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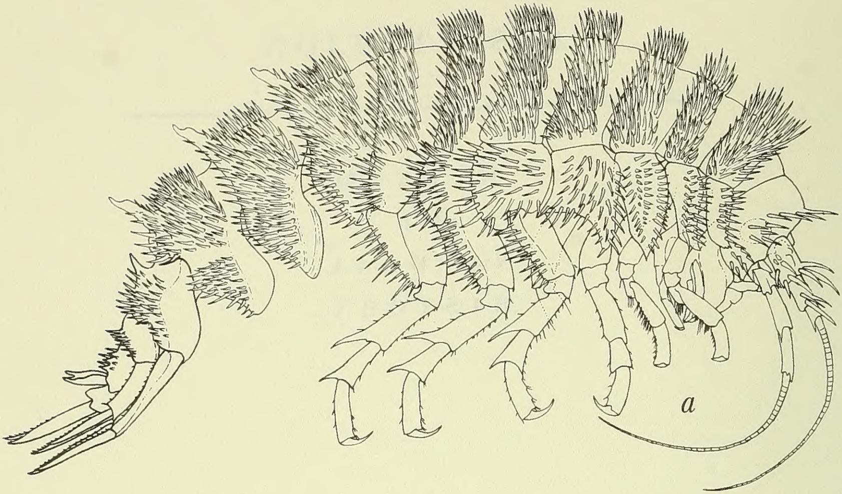
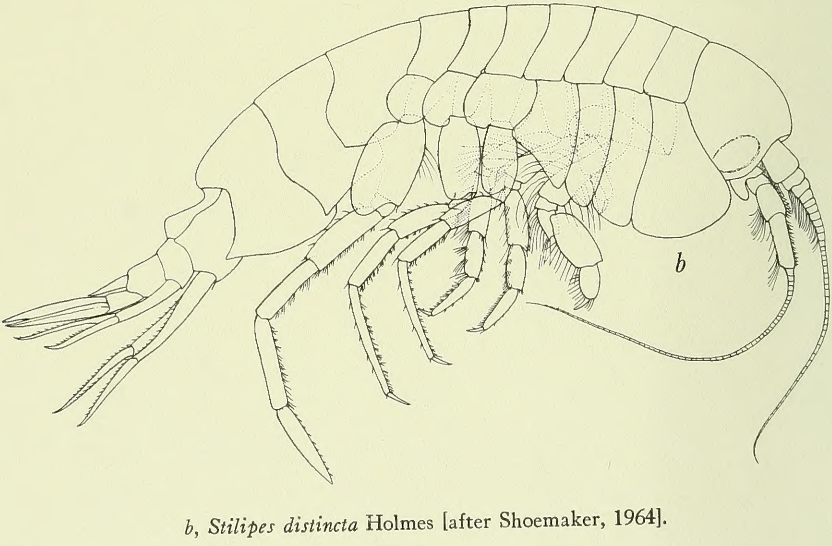


a, Uschakoviella echinophora Gurjanova [after Shoemaker, 1964].



b, Stilipes distincta Holmes [after Shoemaker, 1964].

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The Families and Genera of Marine Gammaridean Amphipoda

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Frank A. Taylor
Director, United States National Museum

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Contents

The Families and Genera of Marine Gammaridean Amphipoda

Introduction

Keys and diagnoses, with illustrations, to the families and genera of marine gammaridean Amphipoda are presented here in the form of a handbook. Since 1906, when Stebbing monographed this suborder, the number of families has been increased by 25 percent, the number of genera by 200 percent and the number of species by nearly 200 percent (J. L. Barnard, 1959d). Stebbing's general arrangement of families and genera remains substantially intact, but the discovery of many additional species has required a considerable emendation of familial and generic limits. The near absence of phyletic monographs and the plethora of faunal compilations widely scattered in the literature have hindered advances in classification of the group. Ready identification of taxa not only by nonspecialists but even by experts has become extremely difficult because of the lack of a modern focal point.

The present work is at best a stopgap. Specialists recognize that much exploration and discovery remain to be accomplished in the Amphipoda (witness the numerous new haustoriid taxa discovered by Bousfield, 1965). No specialist is nearly satisfied with current classification at familial levels. Many genera are extremely confused, not only for the lack of clear description of their type-species but for the obviously erroneous inclusion of many of their congeners. Few studies on population variability have been published and the criteria to be applied at generic and familial .evels have rarely been tested even by dialectical means.

No radical changes in classification are proposed herein, but numerous problems are noted. The purpose of this paper is to assemble the families and genera within the previously arranged general scheme and to provide rapidly usable (and thus simplified) means for their identification. In this way the keys coincide with the published literature and may be of greater help than would be a brief, completely revised system, which might not stand the test of time. Hopefully this paper will encourage recruitment of new taxonomists and relieve some of the burdens of identification now overwhelming the few active specialists. Perhaps it will stimulate monographic studies of families and genera. It may be of greatest use to those students who must make generic determinations of their material without adequate library facilities; it should restrict bibliographic needs to small numbers of publications which can be borrowed more easily than can the entire literature. An index to the species of Gammaridea (J. L. Barnard, 1958a) may be of some help. An expanded and more useful index is now in preparation.

Brief sections on distribution, faunules, and evolution are presented in hopes of stimulating further inquiry into these fascinating but poorly studied topics. Our knowledge of anatomy (especially musculature), functional morphology, behaviour, food habits, indeed general ecology is rudimentary.

The identification system proposed herein requires familiarity with a basic gammaridean plan similar to that exemplified by some members of the Gammaridae. These gammarids may be the most primitive grade of living Amphipoda. A knowledge of their structure is vital to an understanding of the unfolding of the complex network of specializations found in other gammaridean families. The lines of evolution from gammarid-like ancestors, so ill understood, are not only manifold but they confuse identification procedures. At times the specialist is confronted with the feeling that most of the "missing links" in Amphipoda are still alive. Only a few families are so remote morphologically from the Gammaridae that they are instantly recognizable. With a few exceptions the specialization of gammaridean families is a result of the loss of morphological complexity.

The basic gammaridean is illustrated in figures 1 and 2 and described on p. 50. Families other than the Gammaridae are provided with short diagnoses which include only definitive and exclusive differences from the basic gammaridean. Some of these diagnoses are identical among several families. Those taxa are further distinguished by intercomparison of their descriptions and by reference to paragraphs on relationship. Part of each diagnosis is a reference to a related (or superficially similar) family.

Diagnostic characters of the families are illustrated in a group of boxes (figs. 3–53). Instructions for identification procedures using these tools are presented in following pages.

Acknowledgments

This work was compiled during the writer's tenures at the Allan Hancock Foundation, the Beaudette Foundation of California, and the Smithsonian Institution, to which institutions and their administrative heads my gratitude is expressed. Mrs. Dorothy M. Halmos of the Hancock Library and Mr. Jack Marquardt of the Smithsonian Institution have been very helpful in obtaining references. Literature published subsequent to December 1965 has not been incorporated. The figures were redrawn largely from the literature and some of them have been simplified as a means of providing standardization. Four illustrators have assisted with the work over the years, Mr. L. R. Hales, Mrs. D. McLaughlin and, especially, Miss Jacqueline M. Hampton of the Beaudette Foundation; and Miss Naomi D. Manowitz of the Smithsonian Institution. They were partially supported by grants from the National Science Foundation.

Dr. D. E. Hurley of New Zealand Oceanographic Institute has assisted my thinking with regard to the difficult family Lysianassidae by letting me read his various manuscripts concerning the classification of that family. Dr. E. L. Bousfield of the National Museum of Canada kindly loaned the paratype of Oldevig's *Haustorioides munsternjelmi* for this study. Numerous colleagues have helped with friendly advice and encouragement and among those must be mentioned the foregoing plus Dr. Fenner A. Chace, Jr., Dr. Thomas E. Bowman, and Dr. Olga Hartman. Dr. Richard Cowan, Dr. Donald Squires, Dr. I. E. Wallen, and Dr. Raymond B. Manning have created the ideal environment at the Smithsonian Institution for this work to be brought to its conclusion. Portions of the final draft were composed while the writer worked as a Smithsonian fellow to Bishop Museum, Honolulu; and I must thank Dr. Roland W. Force, Director, for providing the facilities and help of that Museum.

This paper is dedicated to Mr. Clarence R. Shoemaker (1876–1958), America's foremost student of Amphipoda. The frontispiece represents two of the beautiful drawings he did.

Status of Gammaridean Systematics

More than 3300 species in about 670 genera are known currently in the Gammaridea.* The rate of description of new species has increased recently and will presumably exceed the average description of 40 per year that occurred between 1906 and 1956. Outside of the littoral north Atlantic, Arctic U.S.S.R., and the northwestern Pacific, knowledge is highly incomplete. The magnificent work of Sars (1895), supported by that of Chevreux and Fage (1925), brought the west European fauna into definition at an early stage. Unfortunately, the excellent taxonomic status of north Atlantic amphipods

*About 130 genera and 850 species occur in nonmarine environments and most are not included in this handbook.

has not been exploited fully in making advances in ecological, physiological, and genetical studies, although most of those special studies so far undertaken have been pursued in the northeastern Atlantic.

Intensive work has been accomplished in antarctic seas but the fauna there needs to be placed on a Sarsian basis with full illustrations and descriptions. The works of Chevreux (1906c, 1912b) are notable for that region, but numerous sticky problems resulting from other studies have not been clarified there.

The remaining faunas are sketchily known. An imbalanced emphasis on the deep-sea is occurring in this decade, but this has helped bring into focus many problems in the higher taxa of amphipods. Since World War II research on the marine species has been meager, because more than 90 percent of the printed pages have been produced by fewer than 10 taxonomists (Zoological Record, years 1953–60).

Morphological Terminology

The taxonomic assessment of gammaridean morphology is almost always stated in subjective terms: in words and phrases which, through experience, taxonomists have come to understand and visualize easily, but which are difficult to convey with mensurative precision. There is no current solution to this difficulty but taxonomists may eventually be able to compile an illustrated handbook in which all possible shapes and relative proportions can be figured, named, and coded. Identifications may then be amenable to mechanical analysis. Meanwhile one must work with terms such as "strong, large, small, feeble, weak, minute, elongate, shortened" and various adjectives with the modifier "sub," such as "subquadrate" and "subacute". I have used these terms everywhere in this handbook, but have attempted to provide illustrations as a demonstration of their extent, for the degree varies in the different families. For instance, gnathopods of the genus *Apherusa* are "feeble" in comparison to those of its familial congener *Calliopius*, but they are scarcely as feeble as the gnathopods of the Acanthonotozomatidae. The term "subacute" apparently has come to mean a shape that has the overall appearance of sharpness but which terminally is softly rounded. The term "subconical" apparently refers to a 2-dimensional, rather than a geometric cone but the adjective is not necessarily synonymous with "subacute," for a subconical process may have a subacute apex. The term "quadrate" has often been applied to a squared-off shape of an otherwise imperfect rectangle or in simpler fashion as reference to one pair of sides occurring at right angles to each other. "Subquadrate" should refer to sides not precisely at right angles to each other but also seems to have reference to a quadrate shape with softly rounded corners.

The terms "vestigial" and "rudimentary" have their uses, for a mathematical definition in each case might be more involved, confusing, and time consuming than is the process of learning these conditions through trial and error.

A decision as to whether a gnathopod is simple or subchelate is occasionally difficult to make and definitions to classify all borderline cases are almost impossible to compose. There are no terms to describe all of the stages between fully subchelate and fully simple and gammaridean students may eventually encounter difficulties arising from dogmatic use of such all-or-none terms. For instance, two subfamilies of Lysianassidae have been described which are partially based on a subchelate or simple gnathopod 1, but there are several borderline cases and several genera in one subfamily which seem to have stronger affinities with genera in the other subfamily than with members of their own group. The contrast between the concepts of cleft telson and entire telson is far too strong to describe all intermediate stages and the two terms tend to condition the human observer to a reliance on the alternatives as highly significant, whereas numerous exceptions to this significance are apparent [e.g., Eusiridae and Calliopiidae].

Names for the gammaridean abdomen and its parts are not standardized. All six segments of the abdomen are frequently called the "pleon", but "pleonites" 4–6 are often called "urosome" and numbered as "urosomites" 1–3. Pleonites 1–3 are rarely called the "metasome."

Shape and proportion in seemingly infinite array are thus more important to the taxonomist than are qualitative and numerical expressions, but one day we may be able to convert shape and proportion to precise formulations.

Morphology of a Gammaridean Amphipod

Amphipods, like tanaids and isopods, lack a carapace covering the thorax, so that seven definitive thoracic segments (pereonites) are visible (as in other Peracarida the first thoracic segment with its appendage [maxilliped] has become fused to the head). Gammaridean and hyperiidean Amphipoda may be recognized by their possession of three pairs of pleopods (swimmerets) and two or three pairs of uropods on the pleon (abdomen). The consistent presence of at least six pairs of thoracic appendages, five-plus pairs of gills and four pairs of brood lamellae in females are definitive characters of Gammaridea and Hyperiidea.

The pereon (thorax) almost invariably bears seven pairs of legs. The first two pairs are called gnathopods (or gamopods) and usually are prehensile, having the seventh article (dactyl) folded back on the sixth article (propodus, hand, or palmar article). Rarely in gnathopod 1 is there sexual dimorphism but the male often has greatly enlarged second gnathopods. Gnathopod 2 is believed to be used primarily for grasping the female during copulatory amplexus. The male mounts the dorsal side of the female, projects the gnathopods around her body and hooks them into her fifth coxae. The pair of animals then swims, darts among algae, or rests until the female molts (possibly as much as three days after amplexus), at which time the male emits spermatophores (sacs of spermatozoa) that pass from the ventral side of his seventh pereon segment into the pouch formed by the female brood lamellae. Ecdysis of the female is taking place during this time period and immediately thereafter she lays eggs through two genital pores on the sternite of thoracic segment 5. The pores normally are so small and heavily chitinized that the eggs cannot be laid until ecdysis occurs and the pore openings become soft and pliable. How the spermatophores pass from male to female is unknown but they may be assisted by gnathopods or pereopods. The ventral side of pereonite 7 in the male bears two minute penial projections, often spinose. Occasionally they are hidden by small gills attached to the coxae of this segment.

Within a genus of gammaridean amphipods, the taxonomic recognition of species often depends on the shape of male gnathopod 2; hence, it is difficult to identify females specifically because taxonomists have not studied minute differences in females and made them basic to identification. The second gnathopods of juveniles and females often are alike; during maturation the male second gnathopods commence an an increase in size and a morphological differentiation, with changes taking place during each instar, even long after the attainment of sexual maturity. This has resulted occasionally in taxonomic confusion because some of these instars have been described as distinct species. A few species are known to have radically distinct phenotypes especially in the terminal male. The ubiquitous *Jassa falcata* has dozens of forms, some of these even bridging the concepts of two or more genera.

All thoracic appendages have seven articles (segments), the proximal member of which is the coxa or sideplate. A few gammarideans (e.g., Bateidae) have reduced numbers of articles on various thoracic appendages. Coxae are of greater taxonomic importance in gammaridean Amphipoda than in other Malacostraca and in many species are structurally more an integral part of the trunk than simply an article of the appendage. They resemble ventral pleuron-like extensions of segments and so contribute to the appearance of lateral compression in the body plan. They are numbered from one to seven, with numbers

1 and 2 belonging with gnathopods 1–2 and numbers 3–7 with pereopods 1–5.

Gills are thoracic and generally are attached to the medial surfaces of coxae 2–7, occasionally only on 2–6, or ?3–6. In females the medial surfaces of coxae 2–5 (?or 2–6) carry brood lamellae. They are simply buds in young females, but as body growth proceeds they become longer and more heavily setose and are interlocked by their setae to form a cradle enclosing the eggs. As the female increases in age and size, the number of eggs laid after each molt becomes larger. Some amphipods lay such large yolky eggs that a young female can carry only one of them; at maturity she may be able to carry three or four. Not all of the extruded eggs hatch; mortality of about 25–50 percent may occur even before hatching; stunted degenerating eggs often may be seen in the broods (as well as commensals such as spherical copepods and reniform ostracods). Some large Amphipoda lay and carry more than 200 eggs at a time.

Commencing with leg 3, the thoracic appendages are termed pereopods (walking legs), so that five pairs of thoracic legs represent pereopods (many specialists commence numbering pereopods with gnathopod 1). There is justification in distinguishing gnathopods by name because of their specialization in analogy to the pereopods of other Crustacea (e.g., posterior maxillipeds of decapods). The first two pairs of pereopods are useful in cleaning the gnathopods and other anterior appendages and as a balance when alighting from a swim. The last three pairs appear rather immobile and less adapted for walking than in isopods. Amphipods are poorly balanced for walking, hence their mobility usually depends on swimming. Their body plan, however, permits a motility through dense masses of hydroids and algae. Perhaps this is one of the reasons why amphipods are one of the most abundant macroscopic crustacean groups in algae and other anastomoses.

Some Amphipoda living on the sea-bottom have immensely elongated pereopods, which are spread out in the fashion of a spider and prevent the amphipod from sinking into the mud. To lower the center of gravity the body of the amphipod hangs upside down in its cradle of legs.

A few families of Gammaridea have the habit of burrowing into benthic sediments and their pereopods are armed densely with strong spines which aid in burrowing. Elongate flexible setae, as well as stiff spine-like setae may occur on pereopods 3–5 of fossorial Amphipoda. Even though a few other nonfossorial Amphipoda, such as Ampeliscidae, have these elongate setae, the term "fossorial pereopods" is usefully applied to the condition. The glossary contains a precise definition of fossorial pereopods.

Six or seven families of amphipods construct dwelling tubes. The cylindrical or flattened tubes are spun from strands of material secreted and probably manipulated by pereopods 1–2. The tubes may be limp (*Ampelisca*) and lay prone on the bottom or they may be stiff and erect and attached to rocks (*Photis*). Mud is occasionally used to reinforce the walls of the erect tubes.

Glands of domiciliary Amphipoda appear to be concentrated mainly, if not exclusively, in pereopods 1–2. They are found most heavily concentrated in article 2, often in article 4 and occasionally in other articles. Glands usually appear to be composed of densely packed, "yolky" tissue, often posterior to the main muscles of article 2, often composed of morula-like bodies, and often of different color than the muscles or other tissues, even in specimens preserved in alcohol; they are frequently yellow, ochre, orange, or purple. Apparently a duct carries the secretion to a meatus located subterminally on the dactyl. The meatus is very difficult to see and not definitive of Gammaridea known to be domiciliary because many other Amphipoda seem to have a dactylar meatus but lack conspicuous glands. The presence of these glands may be a useful clue by assisting in the identification of several genera in Isaeidae, Ischyroceridae, Corophiidae, and Ampithoidae that otherwise resemble nondomiciliary Amphipoda. Complete reliance cannot be made on them as familial characters, for all members of domiciliary familes do not necessarily have glandular pereopods 1–2 and very few species have actually been examined for their presence. Some phoxocephalids, haustoriids, and argissids have conspicuous glands in pereopods 3–5.

Most domiciliary amphipods except for the Ampeliscidae have somewhat depressed bodies, shortened pereopods, and have better crawling ability than do nontube builders. They can be observed emerging from their closely crowded tubes, their antennae apparently being used digitally in a search for particles of food. Ampeliscid amphipods lie upside down in their tubes and project their strongly setose antennae as filtering organs. Only one benthic gammaridean has been reported as a predator but some pelagic amphipods catch prey.

After hatching, young amphipods are like adults (Gammaridea do not have larvae as do most crustaceans) and are carried about for a few hours or days in the brood pouch. In the early stages molting and growth are rapid; a young amphipod may first molt while still in the brood pouch, within a day or two after hatching. As growth proceeds rates of molting and growth decrease, so that adults may molt every 20–30 days and in some striking instances only every six months or so. Few amphipods have been studied for their molting rates; of those examined it has been determined that sexual maturity is reached at about the sixth molt (commencing the seventh instar); the animals are fertile yet the secondary sexual characters are rudimentary; male gnathopods may be poorly developed and brood plates are just beginning to develop in the female. Amphipods are known to live through at least 12 instars, the females laying a brood of eggs during the last five or six or in alternative instars; however, terminal adult females (gerontics) may lose their brood plates, apparently fail to lay eggs and develop aberrencies of an andromorphic nature. Occasionally, these stages have been described as distinct species.

Amphipoda have the unfortunate habit of eating their exoskeletons after ecdysis so that it is difficult to trace their molting sequence in the laboratory. One must watch them continuously in order to obtain ecdysial casts. Because the average instar appears to last about 15 days, the average maximum length of life is expected to exceed 6 months but some species in polar regions are estimated to live 5 or 6 years. Often the structure of the next instar may be seen within an appendage. Such replication within the present organ can be confusing to taxonomists and lead to the description of supernumerary parts.

A few species are known to be hermaphroditic, carrying both male and female gonads, and reflecting both sexes in their secondary sexual characteristics.

Paired pleopods on the first three segments of the pleon are biramous, the rami multisegmented and strongly setose. Minute coupling hooks on the medial edges of the peduncles are used to engage the pairs of pleopods for coordinated paddling. Amphipoda usually are good swimmers. Even burrowing amphipods swim well and phoxcephalid males have the habit of leaving their burrows at night and swimming to the seasurface from depths as great as 100 meters. They will swarm around a light suspended in the water. They may be ascending in search of females even though the latter rarely swim to a night-light. Such swimming behavior may be a dispersal mechanism, especially in groups having a low proportion of males. Some pelagic species apparently undergo great vertical migration; several deep-sea amphipods caught at night near the surface have been found to have alimentary tracts full of benthic sediments.

Variation in pleopods is rarely of sufficient extent to be used in generic or familial definitions except for Phliantidae, Talitroidea and some Corophiidae. Pleopodal morphology, nevertheless, has been neglected and may afford some help in taxonomic distinctions.

There is justification in restricting the term pleon (=metasome) to the first three abdominal segments bearing pleopods and utilizing the term urosome for the last three abdominal segments bearing uropods. "All" Malacostraca have at least one pair of uropods, that pair of appendages on abdominal segment 6. Malacostracans generally have five pairs of pleopods on segments 1–5, but in noncaprellidean amphipods the appendages of segments 4 and 5 resemble the terminal uropod and thus are called uropods 1 and 2. Uropods in many malacostracans are still used for swimming although in different fashion from pleopods, but uropods 1–2 in Amphipoda appear to be used primarily for strengthening the caudal portion of the body to permit jumping or flipping by rapid flexion of the urosome. In many Gammaridea, the third uropods still bear "swimming" setae, and may be used for paddling or as rudders. Males especially have natatory third uropods. But the vast majority of Gammaridea probably do not use the third uropods for active swimming and they are often reduced or occasionally absent in sedentary species. Caprellidea have lost all but a vestige of the abdomen and its appendages.

The telson is a flap attached to the sixth pleonite above the anus. It is of primary taxonomic value, depending on whether it is cleft into two lobes, fused into a single flap, elongate, fleshy, or ornate. Possibly, it is a vestige of paired appendages.

The head bears two pairs of antennae. The first three articles of the first pair are known as the peduncle, the remaining smaller articles the flagellum. In many species an accessory flagellum demonstrates the biramous derivation of the appendage; when present, it sprouts from the end of the third peduncular article and may be elongate or reduced to three, two, or one articles. Although appearing to be of minor importance, the condition of the accessory flagellum is crucial to amphipod systematics and is useful especially at familial and generic levels. The second antennae bear five peduncular articles, followed by a single flagellum. The flagella of both antennal pairs may bear, especially in males, sensory appendages, such as aesthetascs and calceoli. Male antennae often are longer than those of females.

Frequently families and genera have been defined as lacking accessory flagella and then have been shown to have some members bearing extremely small 1-articulate pieces. Allowance should be made by the observer so as to admit to genera and families those species with microscopic remnants of accessory flagella that have heretofore been overlooked.

The mouthparts are composed of the following structures; they are highly variable intergenerically and their morphology is important for classification:

Upper lip: A single lobe or flap anterior to the mouth. In about 10 percent of known species the anterior cephalic surface above the upper lip is produced into a point, keel, or lobe known as the epistome. Its function is unknown. In a few families, especially Lysianassidae, the upper lip has a keel projecting anteriorly and usually separated from the epistomal region by a deep slit or sinus. Occasionally both

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epistome and upper lip are produced together and occasionally they are fully amalgamated.

Lower lip: A bilaterally symmetrical complex forming a partition behind the mouth. It is composed of at least a pair of lateral lobes, having their lateral extremities produced, often acutely and often bearing apicomedially a tiny cusp enclosing the meatus of a salivary duct. About half of the known gammarideans has a pair of medial lobes on the lower lip.

Mandibles: A pair of appendages attached lateral to the mouth; with the upper and lower lips they form a box around the mouth, permitting buccal closure. The mandibles are powerful and difficult to remove because of their large muscles. Mandibles generally have their anterodistal ends (incisors) cut into a series of teeth for biting; just proximal to the distal teeth may be an articulated process, also toothed, the lacinia mobilis (accessory plate) which may occur on only one of the mandibles. A molar with a grinding surface often occurs on the medioventral surface of the mandible. It may be ridged and toothed (triturative), or smooth, or be completely absent, especially in inquilinous amphipods having the mandibles elongated for piercing and sucking. Most Gammaridea have a 3-articulate palp attached to the dorsolateral surface of the mandible, the palp being used to clean the bases of the antennae. Its absence is moderately frequent and often of familial importance, but its reduction to two or one articles is uncommon.

First maxillae: These are situated posterior to the lower lip. This pair of appendages is small, each bearing a medial free lobe, an outer lobe with heavy spines, and attached to the outer lobe a palp composed of one or two segments, occasionally reduced in size or absent.

Second maxillae: These are two pairs of lobes behind the first maxillae, each composed of simple medial and lateral plates, occasionally reduced to one plate or absent, rarely with the outer lobe attached to the inner by a basal geniculation or extension. Basal articles of maxillae and maxillipeds are present but rarely are of taxonomic importance.

Maxillipeds: One pair of appendages posterior to the maxillae, each maxilliped is formed of an inner (proximal) lobe, an outer (distal) lobe and a palp of two to four articles, rarely absent in Gammaridea, but always absent in the pelagic and often inquilinous Hyperiidea and in cyamid Caprellidea. The Ochlesidae, lacking such palps, are assigned to the Gammaridea on the basis of their resemblance to Gammaridea in other morphological features and their supposed benthic habits. In peracaridan phylogeny the maxillipeds were originally the first pair of thoracic legs, but they have become incorporated into the cephalic complex; in some talitrids such as *Orchestoidea,* the lines of fusion of this thoracic segment to the head are still apparent but in most amphipods such external demarcation is obscure.

In comparison to crustacean groups such as the Isopoda, the body plan of the Gammaridea is conservative. Extreme deviations from the laterally compressed body with enlarged coxal plates occur in a few families in which the body has become dorsally depressed (Corophiidae, Cheluridae, Podoceridae). Two or more of the urosomal segments have become fused in the Ampeliscidae, Atylidae, Cheluridae, and Kuriidae. Coxae have become deformed or enlarged in some Lysianassidae, Astyridae, and Hyperiopsidae. The body is shortened and puliciform in some Haustoriidae and immensely globular in some Lysianassidae. In the Podoceridae the first urosomal segment has become elongated and in the Eophliantidae and Colomastigidae the body becomes subcylindrical as in tanaids.

Major ornaments, of taxonomic value generally at the specific level, include the frequent occurrence of a rostrum, the differentiation of lateral cephalic lobes, the presence of processes on the peduncles of the antennae (especially the Acanthonotozomatidae and Lepechinellidae), and the cuspidation of the pleonal epimera. Dorsal ornamentation is most common among cold-water Gammaridea and occurs in the form of teeth and cusps on the pereonites and pleonites. The first urosomite is often ornamented even in genera without other display.

The absence of eyes is rarely of taxonomic concern other than at the specific level; indeed many sublittoral oculate species are known to have eyeless populations in bathyal depths.

The condition of the head in the Gammaridea is highly variable and thus useful to the taxonomist, but its morphology is often left undescribed. The "basic" gammaridean generally has the head about as long as 1.5 pereonites but it varies in different families and their genera from much shorter than the first pereonite to as long as the first three pereonites combined. The elongate head is especially noticeable in the Ampeliscidae, Phoxocephalidae (including the visor-like rostrum), Synopiidae, and Oedicerotidae. In the latter two families the head is considered "massive" because it is not only elongate but very deep. Other families, such as the Stegocephalidae may have deep heads but they are much shorter than the first three pereonites combined. Recognition of Synopiidae is almost fully dependent on the final confirmation of a "massive" head. Most members of that group have a massive head primarily because pereonites 1–3 are so short that the head appears relatively large by comparison.

The presence and/or condition of the cephalic rostrum is only occasionally conservative at the familial level (e.g., Phoxocephalidae, Synopiidae). Its presence is of relatively uniform value at the generic level (example of an exception is *Bathymedon*) and its shape is often of good specific value.

Gill structures have been used occasionally for specific and generic distinctions but their conditions have been ignored in most Gammaridea and require extensive study. Gills are often well known in those genera in which accessory tube-like branchial appendages have been discovered or where the primary gills are extraordinarily plaited or folded. Brood lamellae of the female also have been largely ignored although a great deal of variation occurs in their shape, setosity, and terminal ornamentation of the setae. They and the gills may be of assistance in tracing phylogenetic relationships among families and superfamilies of Gammaridea. Male reproductive appendages generally occur as a small pair of projections on the seventh pereonal sternite; occasionally they are spinose. Other sternal teeth, keels, and flanges appear to be of rare occurrence (e.g., Aoridae, Eophliantidae).

Geographic Distribution of Marine Gammaridea

The distribution of so few species of Gammaridea is well known enough as to offer a precise statement of their geographic distribution, but the distribution of most genera is moderately well outlined because, of course, bits of data afforded by each species are cumulative for genera.

Genera can be sorted out relatively easily by gross geographic zones because faunistic monographers have concentrated primarily within these zones. Only Sars (1895), Chevreux and Fage (1925), and Schellenberg (1926a) have written faunistic monographs broadly overlapping two zones. Other large scale papers, seemingly monographic, are but obvious collectors' assemblages. Warm-temperate analyses have suffered for the lack of discretion between that zone and either tropics or boreal (=cold-temperate) and I have not taken the time to segregate precisely the boundaries between the broad arctic-subarctic regions and cold-temperate in describing the distribution of each species. Arctic Amphipoda of the north polar basin are very poorly known and probably very sparse; most of the northern Siberian, Alaskan, Canadian, Greenlandian, and Norwegian shores are placed in the arctic-subarctic region; Iceland, Kamchatka Peninsula, and Okhotsk Sea are considered as boreal (cold-temperate), and that region extends southward to the Japan Sea, middle California, Cape Hatteras, and the Breton Capes; the warm-temperate includes the southern and Baja Californias, Mediterranean Sea, much of northwest Africa, and the northern Gulf of Mexico; south warm-temperate includes the southwestern and southeastern coasts of Australia, South Africa, and Peru to middle Chile; antiboreal includes Tasmania and all of New Zealand, for convenience, and in South America includes all of Schellenberg's (1931) Magellan and Falkland fauna. South Georgian faunas are thrown into antarctic-subantarctic classification. The tropics of western South America end at approximately 4° S. Warm-temperate of eastern South America is indefinable but of no consequence because of the absence of gammaridean studies along most of that coast except in obvious tropical or cold-temperate regions.

Gammaridean genera have been found to fall relatively easily into these broad classes, the genera either being confined to one class or being of such wide distribution as to be called cosmopolitan. The latter term, however, primarily refers to genera that radiate outwards from tropical regions into boreal regions but not into arctic-antarctic regions, and there has been little point in so splitting the analysis to segregate cosmopolitan genera that extend high into polar regions. Bathyal, abyssal, and hadal faunas are highly discrete, poorly influenced by submergent polar faunas, and, thus, are recognizable as distinct from latitudinal considerations; the few deep-sea genera that have been found only in polar regions have been removed from their endemic position in those regions to the deep-sea classifications.

No precise statistical methods have been used in dealing with problem genera, those with distributions partially overlapping two classes, because a bit of subjectivism has been applied in each case and because the principle of "centralism" has been utilized. Genera are thus considered to be confined primarily to that region in which "most" of the species occur, to wit: a genus with two boreal and one subarctic species is considered to be boreal but a genus with eight boreal, two warm-temperate and one tropical species is thrown into the cosmopolitan class on the probability that more tropical species remain to be described.

The results of this subjective analysis are presented in table 1; on first sight the data seem to reveal mostly a relationship to study effort, with faunas of low latitudes or southern quartospheres suffering by comparison with well studied boreal-arctic regions. On the other hand the data seem reasonable if one considers that antiboreal regions are few in number, small in size, and low in habitat-diversity compared with the extensive boreal regions; except for small oceanic islands the antiboreal region is confined to Tasmania, New Zealand, and two coasts of South America, whereas north boreal regions have four coasts on two continents and a significant disjunct subarctic embayment, the Okhotsk Sea. The rich antarctic shelves are a strong contrast to the polar-arctic impoverishment but perhaps the most striking implication in the data is the low count of tropical endemic

Table 1.—*Geographic classification of gammaridean genera*

Class or Zone	Genera	Species in those Genera
Cosmopolitan	52	898
Antarctic-subantarctic	56	110
Antiboreal	38	75
South warm-temperate	29	48
Tropical	53	111
North warm-temperate	35	61
Boreal	89	551
Arctic-subarctic	25	71
Bipolar [1]	37	488
Biboreal only	5	64
Biwarm-temperate	3	7
Bathyal only	62	163
Abyssal only	38	72
Hadal only	4	4
Total	526	2723
First group amalgamation:		
Arctic-boreal	114	622
Antarctic-antiboreal	94	185
North warm-temperate [2]	38	68
South warm-temperate [2]	32	55
Cosmopolitan (including bipolar, biboreal, bi-WT)	97	1457
Deep-sea	104	239
Tropical	53	111
Second group amalgamation (genera only):		
Antarctic (including bipolar)	93	
Arctic (including bipolar)	62	
North warm-temperate (including cosmopolitan, bi-WT)	90	
South warm-temperate (including cosmopolitan, bi-WT)	84	
Boreal (including cosmopolitan, bipolar, biboreal)	183	
Antiboreal (including cosmopolitan, bipolar, biboreal)	132	
Tropical (including cosmopolitan)	105	

[1] Including arctic-boreal and antarctic-antiboreal. [2] Including biwarm-temperate (bi-WT).

genera. Even though numerous species of tropical amphipods remain to be described, my experience in sorting through quantities of tropical materials suggests that most of these species will be described in known genera. New genera seem to be confined primarily to inquilinous forms probably associated with the vast numbers of sessile tropical invertebrates. Thus Gammaridea are primarily a cool-water group in terms of generic diversity; this is reflected in their strong penetration of the deep-sea. Their body sizes are very strongly associated with thermal conditions in shallow waters, the larger bodies occurring in colder water. This does not apply to deep-sea benthic Amphipoda, however, for there is strong indication (J. L. Barnard, 1962d) that body size becomes smaller or remains relatively static with increase of bottom depth along a latitudinal line.

About 40 percent of the 53 families of Gammaridea can be classified as cosmopolitan in distribution but the other 60 percent are moderately to strongly confined to specific regions or thermal zones (see below). They are primarily cold-water oriented, for only 6 families with 21 genera and 53 species are confined to warm shallow waters of low latitudes. This seems to confirm the orientation of Gammaridea to cool waters.

The geographic distribution of noncosmopolitan gammaridean families, or those almost wholly confined to such classification, are as follows:

Antarctic-antiboreal: Acanthonotozomatidae, Pagetinidae.

S. warm-temperate: Ochlesidae.

Tropical: Anamixidae, Bateidae, Kuriidae, Leucothoidae.

Boreal: Cressidae, Dogielinotidae, Lafystiidae.

Bathyal: Astyridae.

Abyssal: Hyperiopsidae, Lepechinellidae, Vitjazianidae.

Cold water; bipolar submergents: Atylidae, Eusiridae, Haustoriidae, Lysianassidae, Melphidippidae, Oedicerotidae, Pleustidae, Paramphithoidae, Pardaliscidae, Sebidae, Stegocephalidae, Stilipedidae, Synopiidae, Thaumatelsonidae.

Warm water; low latitudes: Phliantidae, Prophliantidae.

In summary, there is scarcely a coastline where an exploratory taxonomist interested in species diversity cannot make some contribution, as Gurjanova (1962) has so ably shown in her study of boreal-subarctic north Pacific; the taxonomist of western Europe, however, must move into beta-taxonomy and the northwestern Atlantic taxonomist must move in that direction in order to detect the relationships of his fauna to that of western Europe. So also, must the northeast Pacific taxonomist orient himself to the groundwork laid for him in Russian Pacific works. The exploratory taxonomist interested in total generic diversity will find the greatest needs for study in all warm-temperate regions, the antiboreal, the tropics, and various islands of low latitudes.

The Composition of a Faunule

A faunule is the aggregate of species of Gammaridea in one geographic province, region, or habitat. Five megafaunules are well known: cold-temperate of northeast Atlantic, cold-temperate of northwest Pacific (including the arctic-like Okhotsk region); circum-subantarctic encompassing the Norwegian basin and the north coasts of Siberia; the warm temperate of northeast Atlantic including the western Mediterranean and the circum-antarctic-subantarctic faunule. Two faunules secondarily well known are those of the South African warm-temperate and the northeastern Pacific warm-temperate. The faunules of individual islands or small geographic areas also have been more intensively studied than of these larger provinces, examples being Plymouth, England; Naples, Italy; South Georgia Island.

A good model faunule is that of southern California because it is midlatitudinal and relatively well explored by quantitative sampling. The littoral-sublittoral (coastal shelf 0–100 m) faunule comprises 186 reported species of which 59 species live in both littoral and shallow sublittoral depths; thus the littoral (intertidal) faunule totals 138 species, including about 5 species of beachhoppers and the sublittoral (coastal shelf) faunule totals 166 species.

TABLE 2.—*Number of species and genera of Gammaridea in known faunules*

Region	Genera	Species
Warm-temperate California		
intertidal (compiled)	66	138
sublittoral	98	166
total, less common to both	112	186
Norway (Sars, 1895), boreal section, mainly sublittoral,		
0–80 fms	115	221
0–50 fms	110	203
Plymouth, England (Plymouth Marine Fauna), intertidal	63	92
Isle of Man (Bruce et al, 1963) intertidal	40	66
Mediterranean France (Chevreux & Fage, 1925), intertidal	41	72
Atlantic France (Chevreux & Fage, 1925), intertidal	69	109
South Georgia Island	88	159
South Georgia Island, intertidal only (Schellenberg, 1931)	45	62
Falkland Islands, intertidal (Schellenberg, 1931)	48	63
Magellan continental, intertidal (Schellenberg, 1931)	57	77
Indo-Pacific tropics (not including Red Sea with an additional 22 species) (J. L. Barnard, 1965)	97	204

TABLE 3.—*Dominant benthic genera of Gammaridea in sublittoral soft-bottom faunule of southern California* (+=yes; 0=no.)

Genus	Number of species	Kind of domination	
		Specific Diversity	Frequency of Individuals
Ampelisca [1]	12	+	+
Byblis [1]	1	0	+
Ericthonius [2]	1	0	+
Eurystheus [2]	1	0	+
Heterophoxus [3]	1	0	+
Listriella [4]	5	+	0
Metaphoxus [3]	2	0	+
Monoculodes [3]	4	0	+
Paraphoxus [3]	18	+	+
Photis [2]	5	+	+
(Phoxocephalus)[3]	1	0	+
Protomedeia [2]	1	0	+
Synchelidium [3]	5	+	+
Westwoodilla [3]	1	0	+

[1] Forming limp tubes on or in substrate. [2] Forming stiff or limp tubes on particles or sessile infaunal structures. [3] Burrowers. [4] Nestler or semicommensal.

Various other faunules are compiled in table 2. No attempt has been made to modernize certain faunules such as Sars' Norwegian boreal in order to maintain congruency among the reports; thus each faunule presumably represents a minimal statement on diversity as a result of extensive, but not exhaustive exploration.

Generic domination within a faunule may occur through specific diversity or through high frequencies of individuals in poorly diverse genera. The Californian faunules of tables 2 and 3 thus comprise some dominant genera having numerous species, only a few of which have high frequencies of individuals and other monospecific genera, with extraordinarily abundant individuals per square meter of habitat. Other faunules have been compiled in table 4 on the basis only of intrageneric diversity, as quantitative information is virtually absent except in the California region. These few examples may give the reader an approximation of what to expect in commencing quantitative explorations of provinces.

The ecological kinds of Gammaridea within a benthic faunule are to a large extent determined by domiciliary position rather than food-type, as most Gammaridea are presumed to be scavengers or inquilines and their feeding behavior is poorly known. A few true herbivores apparently occur but only one raptorial predator has ever

TABLE 4.—*Dominant benthic genera of Gammaridea in littoral epifaunal faunule of southern California (+=yes; 0=no.)*

Genus	Number of species	Kind of domination	
		Specific Diversity	Frequency of Individuals
*Ampithoe	11	+	+
*Aoroides	1	0	+
Elasmopus	5	+	+
*Ericthonius	1	0	+
*Eurystheus	4	+	+
Hyale	3	0	+
*Ischyrocerus	2	0	+
*Jassa	2	0	+
Maera	5	+	0
*Microdeutopus	1	0	+
Parapleustes	4	+	+0
*Photis	6	+	+

*Forming tubes; others are nestlers.

been described. Of course there are numerous kinds of scavenger feeding. An intertidal faunule of low latitudes in lush algae will be comprised of extremely abundant nestlers such as *Hyale*, *Elasmopus*, *Maera;* protected rock surfaces, interstices and root systems of algae or surf-grass will contain the domicolous amphipods building tubes, such as *Ampithoe*, *Ericthonius*, *Gammaropsis*, *Jassa*, *Ischyrocerus*, and *Photis*. Sessile invertebrates like sponges and tunicates will harbor nestlers and domicilary kinds as well as a few inquilines, such as *Leucothoe* and *Polycheria*.

The sublittoral faunule on soft bottoms will be comprised of burrowers such as *Paraphoxus* (and other phoxocephalids), haustoriids, oedicerotids; domiciliary kinds building limp tubes on the sediment surface, primarily the Ampeliscidae; various domicilary kinds building tubes on hard particles of the substrate or on projecting tubes of infaunal organisms, thus the Isaeidae (Photidae); and a few nestlers or semicommensal organisms like *Listriella*.

Intertidal zones of high latitudes will have nestlers like *Pontogeneia*, *Paramoera*.

The dominant genera of Gammaridea on sublittoral soft bottoms by gross region are as follows (*=genera with low specific diversity but high individual frequency):

COSMOPOLITAN: *Ampelisca*, [*Gammaropsis*], *Idunella*, *Listriella*, *Lysianassa*, *Metaphoxus*, *Paraphoxus*, *Podocerus*, *Synchelidium*, *Urothoe*.

BIPOLAR, COLD-WATER: *Aristias*, *Byblis*, *Epimeria*, *Eusirus*, *Liljeborgia*, *Melphidippa*, *Orchomene*, *Podoceropsis*, *Tryphosella* ("*Tryphosa*, *Tmetonyx*").

ANTARCTIC: *Oediceroides, Pseudorchomene*, Tryphosites*, Uristes.*
ANTIBOREAL: *Acontiostoma*, Amaryllis, Heterophoxus.*
TROPICAL: *Idunella, Platyischnopus.*
WARM-TEMPERATE: *Listriella.*
ARCTIC-BOREAL: *Anonyx, Bathyporeia, Dulichia,* flock of haustoriid genera, *Lepidepecreum Monoculodes, Oediceros, Onisimus, Paramphithoe, Pontocrates, Pseudalibrotus, Westwoodilla, Unciola.*

The dominant genera of Gammaridea in epifaunas of intertidal and shallow sublittoral (0–75 m) zones by gross region (*=genera with low specific diversity but high individual frequency; N=nestler; I=inquiline; D=domicolous tube-dweller).

COSMOPOLITAN: *Allorchestes* N, *Ampithoe* D, *Cerapus* D, *Colomastix* I, *Corophium* D, *Ericthonius* D, *Gammaropsis* D, *Hyale* N, *Jassa* D, *Lembos* D, *Leucothoe* I, *Maera* N, *Melita* N, *Photis* D, *Podocerus* D, *Polycheria* I, *Stenothoe* I.
BIPOLAR, COLD-WATER: *Aora* D, *Apherusa* N, *Halirages* N, *Liljeborgia* N, *Paramoera* N, *Pontogeneia* N, *Proboloides* (*Metopoides*) N.
ANTARCTIC-ANTIBOREAL: *Amaryllis, Andaniotes* ?I, *Atyloella* N, *Atylopsis* N, *Bovallia* N*, *Djerboa* N*, *Echiniphimedia, Gnathiphimedia, Haplocheira* D, *Oradarea, Paradexamine, Pariphimediella, Pontogeniella* N, *Seba* I, *Schraderia* N*, *Stebbingia* N*, *Thaumatelson* I.
WARM-TEMPERATE AND TROPICAL: *Amphilochus, Anamixis* I*, *Batea* N, *Ceradocus* N, *Cheiriphotis* D*, *Chevalia* D*, *Cymadusa* D, *Elasmopus* N, *Gitanopsis, Grandidierella* D, *Leucothoides* I*, *Microdeutopus* D, *Microjassa* D, *Paragrubia* D*, *Parelasmopus* N, *Parhyale* N*.
ARCTIC-BOREAL: *Amphilochus, Anisogammarus* N, *Aoroides* D*, *Atylus* N, *Calliopius* N, *Cressa, Gammarus* N, *Gammarellus* N, *Gitanopsis, Ischyrocerus* D, *Leptocheirus* D, *Metopa, Metopella, Microdeutopus* D, *Neopleustes* N, *Parapleustes* N, *Pleustes* N, *Sympleustes* N.

The dominant genera of Gammaridea in the pelagic realms, including some demersal genera, are as follows (*=dominant by frequency of individuals only).

NERITIC: *Megaluropus, Paraphoxus* (males), *Synchelidium* (pelagic phases), *Synopia.*
EPIPELAGIC: *Stenopleura*, Synopia.*
BATHY- AND ABYSSOPELAGIC: *Andaniexis, Astyra, Cleonardo, Cyclocaris*, Cyphocaris, Euandania*, Euonyx, Eusirella, Eusirogenes*, Eusirus, Halice, Hirondellea, Hyperiopsis, Ichnopus, Joubinella, Koroga*, Metacyphocaris*, Orchomene, Paracallisoma*, Paralicella, Parandania*, Parargissa, Phippsiella, Rhachotropis, Scopelocheirus.*

The dominant genera of bathyal-abyssal benthos are as follows (*=dominant by frequency of individuals only. D=demersal?). Conservative numbers of species in depths exceeding 200 meters are given following each genus.

BENTHIC: *Amathillopsis* 6, *Ampelisca* 25, *Anonyx* 5 (Pacific boreal), *Bathyamaryllis* 4, *Byblis* 5, *Bonnierella* 5, *Bathymedon* 4, *Bruzelia* 4, *Dulichia* 6 (Atlantic boreal), *Epimeria* 6, *Haploops* 8, *Harpinia* 4 (Atlantic boreal), *Harpiniopsis* 19, "*Hippomedon*" 12, *Lepidepecreum* 6, *Leucothoe* 4, *Liljeborgia*

6, *Melita* 5, *Metopa* 7, *Monoculodes* 4, *Oediceroides* 11, *Onesimoides* 3, *Orchomene* 14, *Proboloides* 7, *Pseudharpinia* 5, *Schisturella* 5, *Stegocephaloides* 5, *Stenothoe* 4, *Syrrhoe* 5, *Syrrhoites* 8, *Tryphosella* 20, *Unciola* 6 (Atlantic boreal), *Uristes* 11, *Urothoe* 5.

DEMERSAL?: *Aristias* 8, *Astyra* 5, *Cleonardo* 8, *Eurythenes** 2, *Eusirus* 9, *Halice* 8, *Lepechinella* 13, *Pseudotiron* 3, *Rhachotropis* 20, *Valettiopsis* 3.

Morphological Evolution of the Amphipoda

Amphipoda comprise four unusual suborders: (1) the Gammaridea, primarily benthic, with perhaps 20 percent pelagic and demersal species, but having apparently radiated a half dozen or more times into a gradational suborder, (2) the Hyperiidea, marked by fully pelagic (free or inquilinous) habits, the strange but universal loss of maxillipedal palp, and a spectrum of other minor changes presumably correlated with their habits; perhaps from podocerid gammarideans have evolved (3) the Caprellidea, skeleton shrimps or marine praying mantises, characterized by extremely thin tubular bodies, reduction in abdomen, reduction in two pairs of pereopods, increased cephalization and primarily adapted to a sedentary life in epifaunal anastomoses; but through secondary body depression within the caprellidean scheme (like *Temnophlias* in the gammaridean scheme) arose the cetacean ectoparasites Cyamidae, essentially comprising a fifth major group of Amphipoda; and finally (4) the Ingolfiellidea, apparently undergoing development in association with troglobitic conditions but occasionally returning to marine niches yet open to those organisms with vestigial pleopods, often bearing cephalic "ocular" scales and with, perhaps, other special ecological adaptations.

Even though Amphipoda have radiated into nearly 60 families the major diversity can probably be visualized in terms of a score of kinds. These typological centers may be described by the following adjectives: ingolfiellid, cyamid, caprellid, six to eight kinds of hyperiid, gammarid, eusirid, isaeid, lysianassid, colomastigid, eophliantid, phliantid, talitroid, stenothoid, amphilochid-leucothoid, ampeliscid, and acanthonotozomatid. Some outgrowths of these centers form radical morphs but they fail to qualify as typological centers because (1) their relationships are not discontinuous or (2) they have not radiated strongly. The Cheluridae are an example of a radical morph with presumed relationships to the Isaeidea and low internal diversity; they are not considered as a typological center. The Colomastigidae, though of low diversity, have discontinuous relationships with other Amphipoda and are, therefore, considered as a typological center. The eusirids (not necessarily the type-genus) have clear relationships to another center but have radiated so strongly that they must be considered a typological group. My concept of these centers on current knowledge is weak and open to extensive revision as we come to understand the micromorphology, anatomy, and chemistry of the various Amphipoda.

On numerous occasions parallel adaptation, convergent evolution, and independent evolution of morphofunctional conditions have occurred in Amphipoda. These concern cylindricalization of bodies (Eophliantidae, Podoceridae, Colomastigidae), cylindricalization of heads (Cheluridae and Eophliantidae), dorsoventral flattening of body (*Temnophlias*, *Podocerus* and Cyamidae), development of domitubicolous glands (Ampeliscidae and Isaeidea), loss of maxillipedal palps (Hyperiidea, Ochlesidae, Cyamidae, and some Lysianassidae), and in a host of minor ways. But, for example, the diversity does have a measure of constriction in that Amphipoda have never evolved as fully as have the Copepoda into numerous parasitic modes or, to our knowledge, have the Amphipoda developed hosts of rapacious or errant predators in the benthic realm. Predators do occur in the nektonic Hyperiidea and Gammaridea but none of the former and few of the latter have returned to a benthic orientation. Although few Isopoda have any degree of lateral compression, whereas many Gammaridea do have dorsoventral depression, the Isopoda would seem to be the more highly diversified because they have cylindrical representatives (*Astacilla*) and fully evolved parasites (Bopyridae). In contrast, the Amphipoda are far more diverse than certain other orders of Peracarida, such as the Cumacea and the Tanaidacea. Fourteen families of Gammaridea alone are more or less inquilinous.

A microhabitational stress must exist between various Amphipoda and members of the other crustacean orders and phyla, which restricts a fuller display of genetic potential than now in existence. The tendency of some Amphipoda to enter the crawling realm of Isopoda, indicates that were Isopoda extinct, Amphipoda could fill many of those niches, even though rudimentarily or imperfectly.

Various members of the Gammaridae have been considered as the most primitive of living amphipods. They display most of the basic gammaridean morphology but the strong development of the lateral shield (Gurjanova, 1962), composed of coxae or pereopodal wings in many gammarids, suggests that they have strongly differentiated from a precursor lacking such a shield. If pereopodal tube-spinning glands represent a secondary development in Amphipoda, then many of the isaeid genera that might be considered as close to a shieldless precursor, have probably undergone a secondary reversion by a reduction of the lateral shield (e.g., Corophiidae). Other groups with reduced lateral shield (Eophliantidae, Podoceridae, Colomastigidae) apparently do not stand close to the primitive amphipod model because of vastly modified mouthparts or of so-called pygidization, the solidification of the urosome and its appendages by segmental coalescence or loss of uropodal rami and peduncles. Of course, other peracarids without lateral shield may also have tube-spinning glands (tanaidaceans) and the primitive amphipod may have been in the glandular line. There are sufficient intergrades in telsonic morphology between isaeids and gammarids to make this suggestion very attractive. Several isaeids are almost perfect replicas of the basic gammaridean except for their fleshy telsonic nobs. One has to balance at least two alternatives, whether the coalesced telson represents a full segment lost in phylogeny or whether the lobed telson of gammarids represents a pair of appendages long lost. This problem is fundamental to other crustacean orders and my impression is that the uncleft, solid telson is the most common, thus suggesting that it is either more primitive or at least more successful functionally. The telson in Amphipoda is not a conservative feature by any means, and our understanding of it as an evolutionary marker will not be clarified until we understand its function. Several cycles of morphological development, whether by advancement or regression are apparent. If the fleshy isaeid telson becomes "falsely" lobed in advanced species one can almost imagine the small step necessary to convert it into one of the poorly lobed or entire "subfleshy" members of the Gammaridae. Extreme flattening, full clefting, and elongation then occur in other gammarids and various derived families, but coalescence of the lobes and shortening occur again and again. In some haustoriids the telsonic lobes become fully disjunct basally, each lobe appearing as a vestigial appendage.

The fully blown pygidization of Gammaridae, Isaeidae, and most gammarideans, in the sense of having the last three pairs of abdominal appendages formed into relatively inflexible, posteriorly directed uropods, obstructs our detection of an ancestor in any other living order of Peracarida, where only the final pair of appendages is formed into uropods. The reduction or loss of uropods, pleopods, and most of the abdomen in Caprellidea is clearly a secondary development. Several good intergrades occur in this procession from Gammaridea to Caprellidea in such taxa as the Podoceridae, Caprogammaridae and *Cercops*, a caprellidean. Most Caprellidea further have thoracic somite 2 (free segment 1 of other Amphipoda) coalesced with the head, have a reduction in pereopods 1–2, gills and brood plates. If the lateral shield or its functional substitute by means of tubicoly, serve as partial protection for brood and gills in Gammaridea, then Caprellidea, with their complete loss of lateral shield must have some other protection, perhaps reflective of their habitats or behavior. The brood lamellae of caprellids seem to be more strongly cornified than those of gammarideans. The lateral shield has also been suggested to be a frictional-flotational support for those Amphipoda known to swim in peculiar fashion on their sides. Thus the lateral shield, formed of coxae and articular wings on pereopods, may serve as a kort-nozzle* in reverse by channeling water ahead of the pleopods.

Good swimmers obviously occur in the Hyperiidea, for they are all pelagonts; nevertheless, reduction of the lateral shield is a major trend within that group. Hence, natatorial correlation to the lateral shield is far from universal and the functional morphologist will find many fruits to pick once he directs his attention to this problem. The loss of pleopods in Amphipoda is a mark of the sedentary life of Caprellidea, and the terrestrial habits of a few talitroids. Their reduction in ingolfiellids is unexplained but may have some relationship to an interstitial or troglobitic life. A few other inquilinous or sedentary gammarideans have reduced pleopods, but they are otherwise remarkably conservative in most domicolous, fossorial, and inquilinous amphipods, presumably because they are often used for creating water currents.

Function of the last pair of uropods is presumed to be in propulsion and ruddering as in other peracaridans, but uropods 1–2 have seemingly little function except as strengtheners for the urosome during explosive flexation that is a part of jumping behavior. Were this the sole function of uropods 1–2 the maintenance of at least a small degree of articular flexibility of the uropodal peduncles and rami would seem incongruous. Progressive coalescence of uropods 1–2 with the ventral margins of their segments would afford a strong ventral pad to be used as a jumping buffer. Perhaps the small degree of flexibility provides a better shock absorber than would a solid urosome. The increase in ornamentation of uropods on certain fossorial species indicates at least a minimal function in the digging process, but perhaps this ornamentation primarily prevents coarse particles from being lodged in the cracks between uropods and segmental venters. Paddle-like expansion of rami on uropods 1–2 in a few groups (e.g., Synopiidae) points to a swimming function. A few sketchy observations on swimming suggest that the uropods, despite their restricted flexibility, can be laterally splayed and serve in balance or braking during the end of a gliding motion.

Reduction of uropod 3 and reduction or rigidification of the urosome occur in various tube dwellers (e.g., Corophiidae), inquilines (some lysianassids, cressids, thaumatelsonids, possibly kuriids, prophliantids, etc.), tunnel makers (Eophliantidae) and some of those amphipods with semipermanent flexion of the abdomen (Phliantidae). Presumably jumping, swimming, and protection from unwanted particles have been reduced in importance in these species while there

*A tube directing the propeller-wash of ships.

is substituted an adaptation towards more favorable leverage for burrowing into tissues (plant or animal), maintaining special positions in tubes or channels and in streamlining. Rigidification often occurs without decrease in urosomal or uropodal size. The tube-dwelling Ampeliscidae and the inquilinous Dexaminidae have urosomites 2–3 coalesced while the lignivorous Cheluridae have the urosome greatly increased in size and the uropods greatly enlarged or modified. Jumping ability is very strong in the Cheluridae.

The ecological linkages to urosomal evolution in the Gammaridea are manifold; no single solution to functional adaptation has been necessary. The segmented urosome is a remarkably stable feature of the Amphipoda; that and its three pairs of uropods are a revolutionary feature unique to Amphipoda. That it has undergone only one major reversion (Caprellidea), yet has imprinted upon it numerous adaptive features while there is maintained a minimal structural stability, attests to its creation as a major part of the success of amphipods. Like the mandibles, its basic conservativeness has probably been a factor in the successful dispersal of amphipods into many niches. The paradox of the almost complete loss of abdomen in Caprellidea appears to be ameliorated by the recent discovery of the Caprogammaridae (Kudrjaschov and Vassilenko, 1966) in which a podocerid-like metasome and urosome are maintained and by recall of the caprellidean *Cercops* in which the abdomen, though distinctly vestigial, is clearly macroscopic. The Caprogammaridae seem to demonstrate that the loss of urosome was not the trigger for the development of caprellids; rather, the extreme development of a tubular body with elongate segments, reduced coxae, terminal migration of various legs, reduction in numbers of gills and brood plates, all correlated with numerous behavioral changes were more important. The ultimate radiation of caprellids, of course, may have been assisted by the removal of a relatively useless abdomen and the complete amalgamation of head and pereonite 1.

Development of a dorsal shield in a few Gammaridea has been discussed by Gurjanova (1962). This feature is simply an extreme dorsoventral depression of the body and a splaying of the coxae in the Phliantidae. The abdomen is flexed under the thorax possibly as an additional protection to the ventrum owing to removal of the lateral shield. Many isopods, without flexed abdomen do not appear to require this protection, so there may be other reasons for phliantid flexion. Gurjanova points out possible precursors to phliantids in the calliopiid genera *Chosroes* and *Sancho* but those genera must yet be strongly segregated from phliantids because they have fully developed mouthparts and uropods. They probably should be allocated to a new family in order to qualify the development of a dorsal shield as a major, albeit rare, adaptation of Amphipoda. Dorsal shielding is also seen in the calliopiid *Amphithopsis* and it thereby forms a strong link among other Calliopiidae, the two quixotic genera, and is conducted into the Laphystiopsidae. To some extent body depression also occurs in a few Podoceridae and this seems significant in light of their presumed derivation from tubicolous isaeids having lost the tube-spinning glands. This loss may be correlated with such dorsal shielding because both methods of protection would seem unnecessary together.

Temnophlias, a "phliantid," has also been included by Gurjanova as a member of the progression from *Amphithopsis* through *Sancho* into the Phliantidae but another suggestion might be made: that *Temnophlias* is really a cylindrical organism with secondary pleuronization of the pereonites similar to munnid isopods. It may have affinities with the Eophliantidae, the most strongly developed of the cylindrical gammarideans. Cylindricality and dorsal shielding are difficult to separate as various corophiids, chelurids, and aorids have always been considered to be depressed organisms rather than cylindrioid. Both terms partially apply to these groups. But one may consider that those organisms have substituted domiciliary habits in the form of tube building or burrowing for the true lateral shield and that dorsal depression is a consequence of cylindricalization that cannot be carried too far without rendering the organism positionally unstable. Some depression is required for the organism to maintain a crawling equilibrium. Gurjanova appears to regard Phliantidae (dorsal shields) and Eophliantidae as cohesive, but eophliantids are strikingly cylindrical. There is now evidence that eophliantids are phycophilous burrowers and this would correspond with the habitats of other families living in diverse kinds of "tunnels." The spherical heads and cylindrical, rotatable necks of eophliantids are suggestive of limnoriid isopods and are presumably associated with the tunneling habit. They strongly contrast with Phliantidae morphologically but there is one small difficulty in completely segregating the two families in that one phliantid is known to be a lignivore; one must presume that phliantids are not tunneling lignivores on morphological evidence alone.

The cylindrioid Colomastigidae again may be thought of as tunnelers or domiciliaries because they probably inhabit tests or tissues of sessile invertebrates. But inquilinous behavior is scarcely confined to cylindrioid amphipods, for anamixids and dexaminids, both with strong lateral shields, are undoubted inquilines because of their mouthparts (Anamixidae) or their known ascidiophilous behavior (*Polycheria*, Dexaminidae). Piercing and sucking mouthparts are common in many other gammarideans such as Acanthonotozomatidae and various Lysianassidae.

Stenopody is the presumed primordial condition of the arthropod appendage. How far this logic can be carried into the higher Crustacea as a precedent for any ordinal precursor is wholly philosophical as far as Amphipoda are concerned. Our "basic gammaridean" already has specialized anterior appendages, the gnathopods. A precursor to Amphipoda would already have one pair of maxillipeds. The highest Crustacea, the Decapoda, have those two pairs of gnathopodal homologues also attached to the head as maxillipeds. Nonambulatory function of anterior appendages is thus a universally replicated feature of Malacostraca and one might imagine that it was a fundamental corollary of amphipodan development. Amphipoda went one step further than isopods or tanaids in having not just one pair, but two pairs of functional gnathopods. With few presumably secondary exceptions, the second pair became the dominant members. The loss of stenopody signals the development of a nonwalking function as far as the anterior amphipod legs are concerned. In some Amphipoda these changes occur even in legs 3–4 ("pereopods 1–2").

The loss of stenopody was far from immutably fixed in amphipods. In returning to a slender condition, the marks of a grasping function have been left, with few exceptions. Return to stenopody, hence enfeeblement, of gnathopods is a mixed bag among Amphipoda otherwise recognized as either primitive or advanced. This suggests that gnathopodal evolvement, especially of gnathopod 2, was a primary crystallization of the amphipod plan, but that once upon the scene the original enlargement alone was unnecessary for whatever function the gnathopods were put to. Perhaps enlargement even went through a detrimental cycle of overspecialization.

Reduction in size of gnathopods must have come fairly early in gammaridean evolution for several genera of the Gammaridae have the gnathopodal size reduced. Some of the functional value of size may have been replaced by increased setosity. All but two of the eight families standing near the Gammaridae have the gnathopods enfeebled. Liljeborgiidae retained the enlarged gnathopods, and among other reasons, this fact supports the odd thesis that the inquilinous line of Amphilochidae-Leucothoidae-Stenothoidae has some relationship to the Liljeborgiidae. Those three families, despite the presence of other morphological degradations, have not lost the presence or potentiality of large second gnathopods. The maintenance of enlarged gnathopods in many members of the Eusiridae-Calliopiidae-Pleustidae is also further confirmation of their strong relationships to the basic gammaridean. The position of the Oedicerotidae, unusually close to the Gammaridae in the scheme of graph 1, reflects their enlarged gnathopods. But in the 10 families presumed to have evolved out of a eusirid stock, the gnathopods have become enfeebled. Marine talitroideans maintain the enlarged gnathopod 2 but terrestrial members

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often return to the stenopodous condition even though gnathopod 2 has obviously not returned to a walking function because of its peculiar morphology.

The seemingly primitive members of the isaeid stock also maintain the enlarged gnathopod 2 but the advanced members show either an axial reversal, a shift of domination to gnathopod 1, or an enfeeblement. Potentiality for enlarged gnathopod 2 is fully maintained in the Ampithoidae and Ischyroceridae and the ultimate peculiarity is reached in the Cheluridae, one species of which has gnathopod 1! expanded into a fully prehensile appendage like that of *Maera*. Although some of the most diverse and, thus, presumably successful shallow-water (and primarily tropical) genera have the fully enlarged and prehensile gnathopod 2, the trend in gammaridean evolution has been a secondary return to stenopody. Retention of the primitively enlarged gnathopod 2 in the Podoceridae and the Caprellidea, even the Cyamidea, is one more mark of their relationship. Those very successful tropical gammaridean genera with enlarged gnathopod 2 (in males) occur in several distinct evolutionary lines: *Elasmopus*, *Maera*, and *Ceradocus* in the Gammaridae; *Hyale* in the Talitroidea; *Gammaropsis* in the Isaeidae; the axially reversed condition expressed in *Lembos* of the Aoridae; *Podocerus* in the Podoceridae; the inquilinous *Stenothoe* of the Stenothoidae and *Leucothoe* of the Leucothoidae. These genera clearly have their highest diversity in the tropics and subtropics whether they had their origin there or not. The ecologist's attention should be drawn to this curious matter.

Nontropical gammarideans with enlarged gnathopod 2 are particularly conspicuous in the demersal eusirids, the liljeborgiids, various stenothoids and the Gammaridae.

Correlation of mandibular functions with morphology are poorly understood. Biting, chewing, grinding, piercing, and rasping functions are obvious, but mandibular variations are far more numerous than just those five categories. Gammaridean amphipods have been thought of primarily as scavengers, feeding on debris and detritus, carrion and dead plant fragments. The basic mandible seems to be adapted to biting off chunks with the incisors and grinding those chunks with the molarial rasp. The lack of emphasis on herbivorous habits of Gammaridea in the literature is surprising in view of the properly adapted mandibles and the strong infestation of marine plants by amphipods. Macroscopic algae and marine grasses infested with amphipods rarely show gross cropping or evidence of bites having been removed. Stomach contents of a few phycophilous amphipods demonstrate that they probably feed on microscopic epiphytes. Undoubtedly the larger and slower growing algae have evolved mechanisms to limit the success of marine herbivores; poorly adapted macroscopic algae must surely become extinct in view of the almost ubiquitous hordes of marine amphipods that are potential macroherbivores. Microscopic epiphytes presumably survive through rapid growth while the total amphipod population may be restricted by the seasonality of epiphytes; probably a balance is thus maintained in ways similar to the diatom-copepod cycle of the pelagic realm. Amphipods may benefit the macrophytes by cleaning their surfaces of infesting epiphytes.

The microherbivorous amphipod with biting-rasping mandible and enlarged male gnathopod 2 may be the basic member of the amphipodan organization. To suggest that the level bottom scavenging amphipod evolved first and invaded epifloras later would presume that cellulase secretion was not an original part of the amphipod plan. The grossly compressed bodies of the basic amphipod also attest to a preadaptation for nestling and gliding amongst anastomoses. That this ungainly structure later was able to invade a host of other habitats seemingly unsuitable to a flea-like morphology suggests that in the course of their evolution numerous "hidden" adaptations accrued. Some of these may be circumstantial: high prodigality ("success by numerical pressure"), and low genetic plasticity that maintains a broad adaptability to feeding conditions. A more efficient mechanism than the basic mandible may be imagined for cropping micro-epiphytes without radical changes in the general structure. The maintenance of that basic mandible throughout so many families and genera of amphipods, which obviously have put it to numerous functions, suggests that one key to success of amphipods is their potential omnivorous habit. A measure of this manifold feeding potential is seen in one's ability to trap diatom-feeding amphipods by means of a carrion-baited undersea trap.

In the dispersal to level bottoms, amphipodan morphofunction almost invariably changed; the successful Ampeliscidae build tubes; the Phoxocephalidae-Haustoriidae and Oedicerotidae dig burrows and often become much broadened in their bodies; other genera, like *Listriella,* have obtained special associations with infaunal members of the level bottoms.

Almost all of the greater Isaeidea, the tubicolous amphipods, have maintained the basic mandible, palp included. Even the wood "boring" Cheluridae are able to rasp wood with the basic mandible. The greater Talitroidea have maintained the rasping mandible although the palp has been lost. Presumably one function of the palp is the cleansing of the anterior cephalic space between the antennae. Amphipods without palp often have few antennal setae projecting into that space to trap particles.

The trend to a distinct change in mandibular morphology is seen in some Gammaridae and even more strongly in some of the families closely associated with the Gammaridae, such as the Liljeborgiidae, Eusiridae, and Phoxocephalidae-Haustoriidae. Loss of trituration surface and reduction in size of molar are universal in the Liljeborgiidae, but the reasons are not yet apparent as the ecology of the group is poorly known; various burrowers in the Phoxocephalidae, Haustoriidae, and Oedicerotidae have smoothed-off molars and several of those genera have enormously enlarged molars covered with a setular velvet. Such molars are also seen in the Synopiidae. They must have some relationship to the fossorial or semifossorial habit of processing mineral grains. But in those large fossorial families the normal mandible is retained by numerous genera.

The strongest changes in mandibular morphology occur in those families presumed to be inquilines. In one way or another these families have adapted to piercing and sucking or possibly to the scraping of slime but even some inquilinous amphipods maintain the biting and grinding functions. The mandible of *Polycheria* is used chiefly for burrowing into the tests of tunicates for domiciliary purposes rather than for feeding. Indeed, the biting adaptation is rarely lost even in the strongest inquilines; it is maintained in many Acanthonotozomatidae, although others of the family have those incisors developed into stylets. The conformity of the acanthonotozomatid and stegocephalid mouthpart bundle suggests a gross piercing function as if they normally attack some large sessile invertebrate. Presumably some of the "inquilines," like those of the greater Stenothoidea, are grazing predators, biting off coelenterate polyps or consuming sponge and tunicate tissues.

The pardaliscid and stilipedid mandibles are the most paradoxical. They are elytriform like those of some stegocephalids, lack molars but retain palps, yet the mouthpart bundle is rarely coniform and no one has demonstrated an inquilinous behavior. Many of these species are nekters or demersal members of the deep-sea fauna.

Maxillipedal changes mark one of the primary subordinal grades of evolution within the Amphipoda. The loss of palps is a condition of the Hyperiidea. Only two families of Gammaridea and a few genera of two other families have a marked reduction or loss of these palps. Such loss is associated with a nektonic, often inquilinous habit, but numerous pelagic Gammaridea have fully developed palps. Reduction in maxillipedal plates or palps is not perfectly correlated with the inquilinous families or those marked by mandibular changes,but as we should expect, all stages of the perfection of this morphology are apparent and the trend is obvious. Plates and palps often evolve independently as if their functions were distinct; in some cases such as Liljeborgiidae and throughout the greater Stenothoidea, the plates become reduced while the palps are maintained or increased in size.

Interfamilial Gammaridean Relationships

Through recapitulation of the general evolutionary trends within the Gammaridea, one may estimate the pattern of evolution and relative positions of the several families (graph 1). Formulation of this pattern was assisted by organizing data on 3-dimensional stick charts containing plots of characters representing grades of structure, and simple character alternatives; on wheels and triangles so as to demonstrate presence or absence of characters in small familial groups; by determining the fewest logical increments of change necessary to transform one family into another. The final pattern was influenced strongly by ampliative inference in using our knowledge of the extreme members of a family plus the implication that some changes require more genetic input than others even though genetic "revolutions" may occur repeatedly in certain groups and that certain gross characters are very stable.

Only position and change from one condition to another could be incorporated in graph 1; thus each family appears falsely to have equal importance to all others. Estimates of distance might be incorporated as a measure of genetic input; generic and specific diversity of the familial centers could be shown by reducing the graph to an areal projection reflecting the harmony of certain grades of structure (at least in widespread families tested by a wide range of environmental selection) and the low level of diversity in familial "experiments." The pattern has been organized to fit the space although distance from Gammaridae implies specialization or advancement. At best, the pattern is a straw man.

Graph 1 has been partitioned into more than a dozen blocks of one or more families (or genera). Some of those blocks, like the Colomastigidae or Lysianassidae, have uncertain relationships to other Gammaridea. Solid arrows represent estimates of strong and direct relationships; arrows commencing between two families or at long distances from family groups imply relationship only to ancestral pools having grades of structure similar to existing families. Dotted lines imply weak or distant relationships; wavy lines denote families placed close to Gammaridae because of precedential pathways established in adjacent examples. Symbols on the chart are reminders of certain characteristic structures and are cumulative between arrows unless marked otherwise.

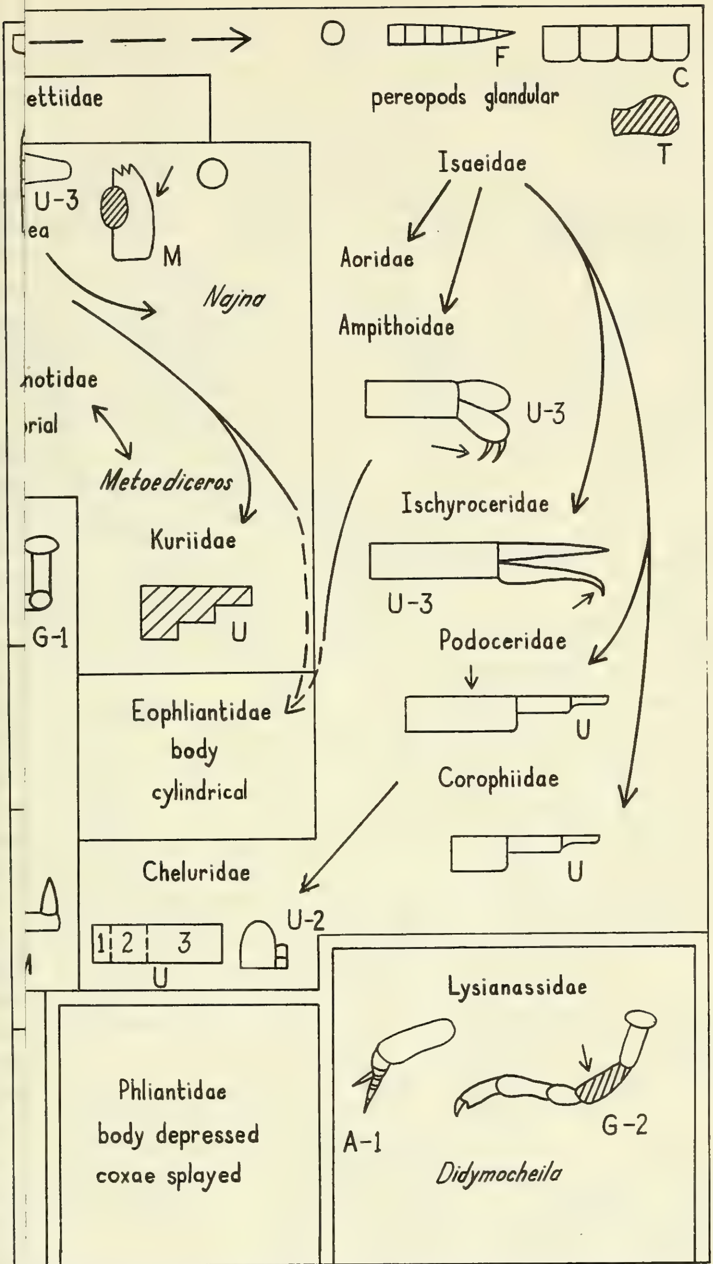
The Gammaridae form the base stock and eight other families are enclosed within the block denoting gammarid-like structure, two families, the Phoxocephalidae and Haustoriidae, being so close to Gammaridae as not to warrant extra space on the diagram. They have extreme fossorial adaptations found rudimentarily in several Gammaridae.

The major line of evolution out of the Gammaridae appears to pass through eusirid organisms in the next block below; this trend is first marked by reduction or loss of accessory flagellum and radiates further by various modifications to be discussed in a later paragraph. The point to be made is that the change from gammarids to eusirids seems to be less revolutionary than the changes from gammarids to various families kept within the gammarid block, and each of those probably should be accorded the rank of a block. The mark of their relationship to gammarids is the retention of the accessory flagellum in multiarticulate condition. A presumption that an accessory flagellum could be redeveloped once lost would have to be invoked in order to bring some of those gammarid-like families down into the eusirid block where grades of other structures show some resemblance. I see little objection and a slight precedent to that possibility in the fact that many Gammaridea add articles to the accessory flagellum with body growth; is there a strong difference in metameric potential between 1 and 2 or zero and 1?. If all the gammarid-block families were placed in the eusirid block only two, Liljeborgiidae and Vitjazianidae, could be further drawn from eusirids by reestablishing the accessory flagellum. There is no logic in funneling all other gammarideans through a eusirid block when many of them can be extended directly from the Gammaridae. Gammaridae are no less diverse than the three major families of the eusirid block. Each of the gammarid-block families shows some tendency in their advanced genera towards reduction in the accessory flagellum, thereby suggesting that the presence of the ramus in those families is primordial.

Melphidippidae have the structure of gammarids in which the coxae have become shortened, and the gnathopods enfeebled like females of the gammarid genus *Cheirocratus*, plus an elongation of uropod 3. Cephalic ocular bulges and a strong trend towards reduction of the accessory flagellum are characteristic.

Vitjazianidae have the general appearance and ecology of some pelagic eusirids but their retention of a 3-articulate accessory flagellum and the conjoint base of the primary flagellum indicate a mode of evolution different from that of eusirids and thus the Vitjazianidae are maintained in the gammarid families even though they may be more advanced than eusirids or gammarids. Gnathopod 1 has become simple and the most specialized vitjazianids have extremely reduced coxae. The mouthparts maintain a basic gammarid structure.

Hyperiopsidae form another pelagic theme. The typical genus resembles hyperiid Amphipoda but retains the maxillipedal palps; the second genus, *Parargissa*, differs so remarkably in its overall appearance that it is debatably an hyperiopsid but mouthparts, antennae, and pereopods seem to confirm the relationships between



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Eophliantidae
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cylindrical
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Lysianassidae
Phliantidae
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A-1
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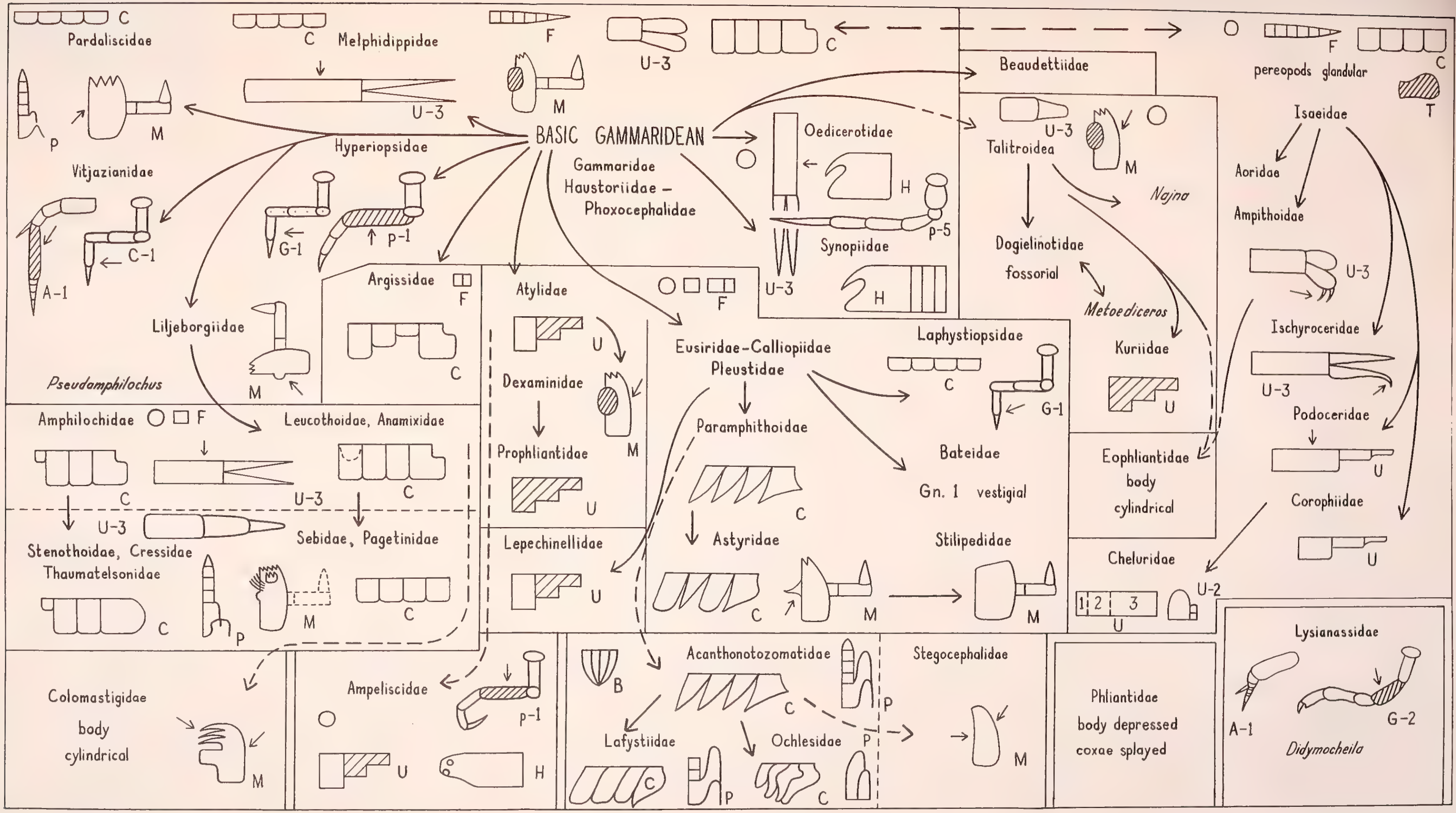
Didymocheila



GRAPH 1.—Pattern of evolution in the Gammaridea (see text for discussion). Symbols: A–1=antenna 1; B=conical mouthpart field; C=coxae 1–3; F=accessory flagellum; G–1 (or Gn. 1), 2=gnathopods 1, 2; H=head; M=mandible, arrows pointing to special features; O=accessory flagellum absent; P=Maxilliped: circles=plates, appendage=palp; p–1, 5=pereopods 1, 5; T=telson, fleshy kind, lateral view; U=urosome; U–2, 3=uropods 2, 3; X=maxilla 1.

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the two genera. Again, some resemblance to the eusirid grade of structure is seen in the elongate enfeebled gnathopods characteristic of some calliopiids, but gnathopod 1 is almost completely simple, the accessory flagellum is 3-articulate and elongate as in some vitjazianids, and, furthermore, the palp on one member of the first maxillae is specially modified, bent and scaly. Article 4 of pereopods 1–2 is enormously elongate, thus giving to the pereopods a strong raptorial function apparently surrendered by the gnathopods.

Argissidae fall as a sidebranch of the gammarid families into the eusirid grade of structure by reduction of the accessory flagellum to 2-articles. Such reduction by itself does not imply any direct relationship to those eusirid families for some marine and nonmarine Gammaridae also have a reduced accessory flagellum; such reduction occurs repeatedly in other completely distinct groups (e.g., isaeids). The peculiar coxal morphology of argissids (fig. 43) is not fully unique, for an analogous condition occurs in a gammarid genus, *Megaluropus*. Enfeeblement of gnathopods is again a feature of argissids but the quadrilocular eyes of oculate members seem significant. Except for those eyes, the diagnostic characters of argissids, though unique together, are drawn from diverse members of the Gammaridae.

Pardaliscidae are a very difficult puzzle. They are perhaps the most aberrant of the gammarid families, although synopiids rival them. Once the principle has been established that the presence of a well-developed accessory flagellum probably marks a gammarid family, or a noneusiridean branch, the Pardaliscidae are to be kept within the gammarid block. But they are characterized by foliation of the mandibles and loss of molars, the frequently occurring conjoint condition at the base of the primary flagellum on antenna 1, feeble gnathopods, progressively reduced coxae, and one or more peculiarities of the maxillipeds: reduction in overall size of the inner plates, often a reduction in the outer plates, and, occasionally, an elongation of the article carrying the outer plates. The lower lip often has the inner lobes coalesced and forming a convex bridge between the outer lobes. A generalized view of the maxillipeds suggests affinities with the Liljeborgiidae in which the maxillipedal palps, like those of the Pardaliscidae, are relatively dominant over the basal plates. The mandibles of Liljeborgiidae show a strong tendency to a complete loss of the molars but liljeborgiid gnathopods are very powerful and the liljeborgiid with the smallest coxae has larger coxae than any pardaliscid. The lower lip of liljeborgiids could be precursive to that of pardaliscids.

The powerful gnathopods of the Liljeborgiidae are reminiscent of those in the Eusiridae (*Rhachotropis*) but most liljeborgiids have a strongly developed accessory flagellum and all have a reduced, nontriturative molar. Some eusirids also have this reduced molar. The

Eusiridae seem to be so broadly polyphyletic that there is cause to investigate the interrelationships of liljeborgiids with some of the eusirids. Several grades of structure are congruent between the Liljeborgiidae and certain members of the Pleustidae. The labia of the two groups are very similar and the mandibular molars of pleustids often resemble those of liljeborgiids. Pleustid gnathopods are often enlarged but the family differs from liljeborgiids in their uncleft telson and vestigial accessory flagellum. The outer rami of uropods 1–3 are shortened in Pleustidae and the outer ramus of uropod 3 is uniarticulate but some liljeborgiids approach these conditions. The pleustid rostrum is a development restricted to a few members only.

Synopiidae are retained in close proximity to the basic gammaridean in view of their elongate accessory flagellum, even though several of their members have the articles reduced to two. Gnathopods are feeble. All but a few synopiids have the head enlarged in relation to the shortened pereonites 1–3. Coxa 3 dominates coxa 4 in most of the genera, and in all but one genus, article 3 of the mandibular palp has become very short, almost vestigial. The mouthparts are otherwise basic except for those genera having the molars extremely enlarged and velvety smooth. This semifossorial condition has also occurred in some haustoriids even closer to the Gammaridae than the Synopiidae. Uropods have undergone the eusirid shortening of the outer rami but uropods 1–2 are far more specialized in the frequent sublamellar condition of the inner rami. In all but *Synopia*, the telson has become elongate. Eyes when present are dorsally coalesced or contiguous.

Oedicerotidae are another group, like the Synopiidae and Pardaliscidae of generally obscure relationships. They have reached the eusirid grade of structure in accessory flagellum, resemble the Synopiidae in head and eyes but the telson is a short, thin, ovate or truncato-ovate, uncleft lamina, unlike that of most Synopiidae. Uropod 3 has become fully elongate, a tendency seen in several synopiids but the pereopods have become strongly fossorial, the first four pairs by virtue of their long setae and the fifth pair by virtue of its immense articular elongation. On the average, gnathopods are of medium size, thus being more powerful than those of synopiids. Oedicerotidae have a strong resemblance to isaeids especially in pleonal epimera and pigmentation but lack pereopodal glands and have a thin, nonfleshy telson.

Three families, each of them highly distinct from one another, seem to have strong relationships to the Eusiridae-Calliopiidae-Pleustidae complex. The least distinct is the Paramphithoidae, a group characterized by acuminate coxae; several intergrading genera suggest that Paramphithoidae might be incorporated within the broader eusirid amalgam. The Laphystiopsidae carry calliopiid tendencies to a loss of molar grinding ridges, miniaturization of coxae, and simplicity of gnathopods to their definitive extremes. Bateidae have the cephalic pleustid aspect but have undergone strong divergence through reduction of gnathopod 1 to a single article or two.

Paramphithoidae have links to more advanced families, either directly or indirectly. Generic intergradations between Paramphithoidae and Astyridae are readily apparent (see those families for elaboration). The Lepechinellidae have the acuminate coxae of paramphithoids, but through coalescence of two urosomal segments resemble a parallel grade, the Atylidae. Their origin is thus plotted in graph 1 as a mixture of characters between Atylidae and Paramphithoidae, an unsatisfactory procedure indicating not phyletic affinities but gradational structure.

The body plan of the Stilipedidae conforms remarkably to that of the Astyridae. If the pardaliscid left mandible, adopted by the Stilipedidae, is a character of major evolutionary significance, then one might consider that stilipedids stand close to the Pardaliscidae. But the astyrid mandible is in a condition precursive to the pardaliscid right mandible. It is partially flattened and grossly toothed while retaining a nontriturative molar. It thus resembles the pardaliscid right mandible whereas the stilipedid mandibles resemble the broadened untoothed left mandible of pardaliscids. Since pardaliscids combine both kinds in a single individual, it does not stretch one's imagination to consider that the astyrid mandible evolved into that of stilipedids. That astyrids did not also produce pardaliscids is attested to by the strong accessory flagellum and weak coxae of pardaliscids.

Atylidae have the same general advancements of the eusirids but the fusion of two urosomites marks a line of evolution which some students suggest has led to the inquilinous Dexaminidae lacking mandibular palps; this condition naturally leads to the palpless Prophliantidae in which all urosomites have become coalesced.

A more radical inquilinous specialization in the acanthonotozomatid line seems to have its gravitational balance near the Paramphithoidae. Here a marked change in the mouthpart field from its basic quadratiform bundle to a conical or triangular field suggests increasing stages towards the functions of piercing and sucking. The individual mouthparts increasingly become better adapted for those habits in the various acanthonotozomatid genera through incisorial styliformity and reduction of molars; but most acanthonotozomatids live in south polar waters, often reach giant body proportions, and, in many cases, the mandibles have become broad, flattened, and very powerful as if their bearers have evolved toward a state of subpredation, perhaps on giant sessile organisms such as sponges. They might be called predatorial grazers if this habit is confirmed.

Direct advancement to the Lafystiidae through reduction in maxillipedal palps is a consequence of acanthonotozomatid specialization and the ultimate is reached in the Ochlesidae, technically hyperiids, because of the complete loss of palps.

Stegocephalidae are the only other major group of Gammaridea with the strong piercing and sucking mouthpart field of acanthonotozomatids and even though their coxae are not as acuminate and their mandibular palps and molars have been lost, there is still merit in considering a direct relationship between the two families. Stegocephalidae have the broad, sublaminar mandibles of several acanthonotozomatids but may have originally evolved as a pelagic group, some members having returned to the benthos in later stages. The breadth of the lateral shield appears to have a relationship to midwater suspension but acumination may still be seen in the anterior coxae. The benthic members may also be predatorial grazers and the only known raptorial predator in the benthic Gammaridea is a member of the Stegocephalidae.

Another line of evolution favoring inquilinous behavior is that commencing with the Amphilochidae and Leucothoidae. Early students of the Gammaridea noticed similarities between Liljeborgiidae and Leucothoidae in maxillipedal structures; other resemblances such as retention of enlarged gnathopods are so clear that one might say that leucothoids are liljeborgiids in which the accessory flagellum has become vestigial and gnathopod 1 has been transformed into its fully carpochelate condition while the outer plates of the maxillipeds became vestigial. The rudiments of the carpochelate gnathopod may be seen in gnathopod 2 of leucothoids, thus resembling the gnathopods of liljeborgiids. Anamixids carry the inquilinous state to the ultimate by the transformation of mandibles and maxillae into a piercing keel.

Amphilochidae may stand almost completely alone. Their mouthparts strongly resemble those of liljeborgiids and their gnathopods are usually miniaturized editions, like those of *Listriella*. But their heads have the appearance of the pleustid-paramphithoid or bateid line. The primary mark of their advancement is the reduction of coxa 1, not as fully reduced as in the Bateidae. This suggests their direct precursorial relationships to the stenothoids. The peculiar *Pseudamphilochus*, through its cleft but ovato-acuminate telson, unreduced coxa 1, large rostrum and nonelongate peduncle of uropod 3, stands among the Amphilochidae, Pleustidae, and Liljeborgiidae. Schellenberg (1931) suggested that it should be assigned to a unique family, the Pseudamphilochidae.

All five families of the stenothoid complex seem to have strong interrelationships by virtue of the mandibular form (see figures) in which at least one mandible has a box-like shape with deeply serrate incisor, a lacinia mobilis formed of a thin lamina resembling the incisor and nearly appressed to it, plus a molar bulge clearly moved distalwards toward the incisor and nearly or partially encroached upon by the spine row. One group of stenothoids has the amphilochid coxa 1, whereas the other has the leucothoid (normal) coxa 1. Sebid gnathopods even vaguely resemble gnathopod 1 of leucothoids and numerous other similarities are apparent. Stenothoidae, Thaumatelsonidae, and Cressidae, those with amphilochid coxa 1, are very closely related among themselves, even though some extremely pygidized species have been used as types of the Thaumatelsonidae and Cressidae. The five stenothoid families are obviously interrelated through the condition of uropod 3. It is uniramous, presumably through loss of the inner ramus, as the remaining ramus is basically biarticulate. Neither the Leucothoidae nor Amphilochidae show a tendency to this condition, except perhaps for the universal genus *Pseudamphilochus*. If the Amphilochidae were the precursors of the Stenothoidae and the Leucothoidae were precursors to the Sebidae, then the evolution of a common uropod 3 had to occur twice.

The superfamily Talitroidea, comprising originally the Talitridae, for nearly a century have been considered as extremely distinct gammarideans, often worthy of even subordinal rank. They are more diverse than they ever have been if one were to add the Dogielinotidae and Kuriidae to their ranks and to suggest that *Najna* and *Metoediceros* represent types of new talitroid families. Bulycheva (1957) split the Talitridae into three families, adding the Hyalidae and the Hyalellidae. The three main families are here treated as a superfamily, mainly for convenience in identification. Talitroids have no universally unique characters; several other families have a uniramous uropod 3 and no mandibular palp but among the genera of talitroids are many unusual morphs. Often the cephalic sclerites are clearly marked. Numerous gnathopodal, pleopodal, and antennal modifications occur in terrestrial genera; the jumping ability is extreme in those genera. The marine members appear more regularized, some even having vestigial inner rami on uropod 3. Perhaps the structure of fringing setae on the female brood lamellae will prove to be characteristic of the group. Although they may be considered as very distant from the basic gammaridean, their singularity is damaged by discovery of the Beaudettiidae. That monotypic family is composed of a species with clear relationship to *Elasmopus*, a member of the Gammaridae. Through loss of mandibular palp, reduction of the inner ramus of uropod 3, and telsonic modification, *Beaudettia* has come close to the talitroidean grade of structure. Morphological distance of talitroids from gammarids, as a reflection of time or extensive genetic change, is thus lessened by our observation of the revolutionary changes that have occurred in *Beaudettia*, possibly in relatively recent times.

The final manifold group in graph 1 is the greater isaeid complex that might be accorded superfamily rank. The primitive isaeid is conceived of as a morphological analogue to the basic member of Gammaridae. Until one examines the fleshy telson and pereopodal glands of primitive isaeids, one is struck by the great similarity of generalized Gammaridae and Isaeidae (=Photidae). Isaeids have become very diverse in many of the same ways as have the gammaridan stock but no highly advanced inquilines have appeared, unless one can link up some of the eophliantids; they instead appear to be lignivores. Even so, the piercing-sucking groups like acanthonotozomatids, the coelenterate loving groups like the stenothoids and amphilochids, the spongicolous and protochordate inhabiting kinds have not evolved within the isaeid complex, perhaps because they have been primarily adapted to form domiciles of their own out of the pereopodal spinning glands. Identification and relationships are clouded by the frequent loss of those glands in the Podoceridae, some Corophiidae, the Cheluridae, and even the nomenclatorial type, *Isaea*. A more basic example of the isaeid line is *Gammaropsis* and its name should ideally be the root of the stock.

The most advanced members of the isaeid group have accumulated two morphological changes, either reversal in gnathopodal domination or development of a partially to fully rigid urosome with loss of uropodal structures. The gnathopodal reversal may be related to a stronger than normal cephalic orientation required of organisms living in tubes open to the anterior end of the animal body. Rigidization of the urosome may assist the organism in maintaining a position within the tube. Some of these tube dwellers have even returned to making burrows (?internally lined) in the substrate.

Perhaps the Podoceridae have come closest to the inquilinous function; their ecology and morphology are poorly known but there has developed the impression that all their members have lost the spinning glands and that many of them are strongly associated with hydroid colonies, as if they were predatorial browsers.

The stability and similarity among the mouthparts of the members of the isaeid complex leads one to the view that podocerids belong with the group. They are frequently mentioned as the root stock of caprellids; indeed, since the time (Dec. 1965) that the contents of this paper were formed, a new family, Caprogammaridae (Kudrjaschov and Vassilenko, 1966) has been described with further strong evidence of podocerid-caprellid relationships.

Distinctions between Isaeidae and Aoridae are not clear except that gnathopod 1 of aorids is either larger than gnathopod 2 or is that member having sexual dimorphism. The Corophiidae seem to be a polyphyletic group of aorids and isaeids with pygidization. They may include some ischyrocerids also. The Ampithoidae are fairly uniform by virtue of their third uropods and the Ischyroceridae, though analogous to ampithoids because of the development of a rudimentarily uncinate condition on the outer rami, are recognizable by the elongation of the peduncle. Ischyroceridae rarely have the reversed gnathopodal domination. One corophiid, *Ericthonius* appears to combine features of Corophiidae, Aoridae, and Ischyroceridae, but it is not the only "isaeid" genus that gives trouble to the systematist.

The lignivorous Cheluridae have numerous resemblances to the isaeid-corophiid line, but the fully pygidized urosome reveals suture marks indicating that urosomite 3 has become extremely enlarged, a feature unique to this family. There is no better demonstration of the extreme genetic potential of numerous Amphipoda in replicating long lost structures than by considering the enormous, *Maera*-like gnathopod 1 of *Chelura insulae* Calman.

Families without clear relationships to others are the Lysianassidae, Phliantidae, Colomastigidae, Ampeliscidae, and potential families are represented by *Didymocheila*, *Ceina*, and *Biancolina*.

The Ampeliscidae are a very advanced group, apparently completely divorced from the isaeid complex, which have developed pereopodal glands and spinning tubes of a different form from those of isaeids. Ampeliscid morphofunction is also discrete, as far as we know. Ampeliscids have a mixture of characters represented by argissids and atylids but those two families otherwise bear no relationships. Thus, the line on graph 1 connecting Ampeliscidae to Argissidae and Atylidae represents only a focus on structural grades.

Despite similarities to the *Sancho-Chosroes* members of the Calliopiidae, the Phliantidae bear relationships to certain dorsoventrally depressed podocerids, like *Podocerus* and I am inclined to the view that the latter suggestion has great merit and should be examined carefully. Phliantids also have about as much in common with Laphystiopsidae (mostly dorsoventral depression) as they do to *Sancho* and *Chosroes*. Apical curls on brood lamellar setae plus many similarities in buccal and urosomal parts suggest phliantid affinities with Talitroidea.

Relationships of the Colomastigidae are difficult to trace. The body form is subcylindrical but the head is not of the spheroid kind found in the Eophliantidae, the rami of uropod 3 are present and elongate, the peduncle is elongate and the mandible apparently lacks a true incisor, that characteristic having been replaced by an enlarged spine row. Affinities with leucothoids are seen in maxillipeds, uropods, and telson.

The Lysianassidae are almost as fully diverse as all of the other Gammaridea put together and comprise about 20 percent of all marine genera and species of the suborder. They are united together by their clearly recognizable gnathopod 2 and furthermore share an almost unique antenna 1, with very short and often telescoped articles 2–3. Otherwise they have radiated into species that exhibit all forms of inquilinous specialization such as piercing and sucking mouthparts, coalesced urosomites, reduced uropod 3 and into numerous highly successful pelagonts. The usual nestling and burrowing members also occur in profusion. Some pelagic members are predatorial and some may have developed narcotizing glands. Even wood boring is a presumed habit of some deep-sea lysianassids eating waterlogged coconuts. But none has developed the tubicoly of isaeids.

The morphologist cannot as yet recognize any clear links between the Lysianassidae and other gammarideans. There are vague resemblances to Stegocephalidae, perhaps of convergence and suggesting that Lysianassidae may have developed, like Stegocephalidae, first as a pelagic group that later reinvaded the benthic realm. The obligatorily pelagic genera among the Lysianassidae are very highly specialized but many unspecialized lysianassids of other large genera (e.g., *Orchomene*) occur prominently in the nekton. Elongation of article 3 on gnathopod 2 is not fully unique to the Lysianassidae, as seen in section B of the written key to families (p. 109). The functional morphology of this lysianassid appendage, with its other unique characters, should be a problem of major concern to gammaridean evolutionists. It is not grossly dimorphic in the two sexes and seems wholly inadequate, like gnathopod 2 in so many other families, of serving as a sexual grasping appendage. Male gnathopod 2 does serve this function in those few Amphipoda that have been observed in amplexus.

Limnetic Evolution of the Gammaridea

That Gammaridae collectively represent the most primitive members of the Gammaridea and of the living Amphipoda, has some support by knowledge of the occurrence of an enormously diverse faunule in Lake Baikal. Nearly 250 species of Amphipoda live in that Siberian lake (see Bazikalova, 1945; Dybowsky, 1874). One might presume from the extent of radiation that has occurred in the Baikalian gammarids that they entered the lake shortly after its formation in the Triassic. All Gammaridea now living in the lake are classified with the family Gammaridae even though there is justification in regarding some of the genera, like *Hyalellopsis*, as members of novel families. Baikalian Gammaridae strikingly reflect many of the morphological conditions now allotted familial importance in marine amphipods. Non-Baikalian epigean and troglobitic amphipods also show some of these conditions. The diversity of Amphipoda in Baikal is an enigma in the sense that the human observer has the tendency to allot a great deal of time for the evolution of such a rich display of

TABLE 5.—*Freshwater or inland saline water Gammaridea*

Family and Locality	Genera	Species
Gammaridae		
Lake Baikal	37	230+
Palearctic–Nearctic	65+	400+
South Africa	2	11
Australia–New Zealand	5 (+3+)	25+
Hyalellidae		
Neotropical	1	28
African	1	1
Australia-New Zealand	2	5
Miscellaneous	1	4
Bogidiellidae		
Tethyan shores	1	9
Hadziidae		
E. Tethyan shores	1	1
Caspiellidae		
Caspian Sea	1	1
Corophiidae		
Tropical–Cold-temperate, mainly river mouths	4	15
Calliopiidae		
Tropics–subtropics	2	5
Haustoriidae		
Cold-temperate	1	1
Eusiridae		
Japan, Australia	2	3+
Metoediceros		
Antiboreal	1	1
Totals	127+	740+

morphs whereas the absence of a solid pre-Miocene fossil record leaves us no confirmation of the group's antiquity. Those Miocene fossils are amber enclosures of species presumably still alive in European freshwaters. One may become enmeshed in circular thinking that the family Gammaridae must be primitive and the suborder Gammaridea very old because not only is Baikal very old but that Gammaridae came to dominate it and, therefore, Gammaridae were on the scene first as well as very early. There are no current facts to counter that argument but one has to maintain a reserve based on logic. Perhaps only Gammaridae are widely preadapted to freshwater conditions. Only the Hadziidae, Caspiellidae, Bogidiellidae, Hyalellidae, and a few members of other families (table 5) also occupy freshwaters (or inland waters). Gammaridae dominate the freshwaters of the world, except for the Neotropical realm where the distantly related Hyalellidae replace the Gammaridae. The other minor families mentioned above probably are closely related to the Gammaridae.

The cold-water orientation of marine Gammaridea and the diversity of brackish water and marine species (the *Anisogammarus* complex) in the north Pacific Basin, with affinities to Baikalian genera, also support the thesis that Gammaridea may have had a fresh-water origin in the vicinity of Baikal and then invaded the sea. The thesis becomes stronger if one confines the theory only to the living members of the family Gammaridae, for that family is generically impoverished not only in tropical shallows but in all deep-seas of the world. Numerous species of *Maera*, *Elasmopus* and *Ceradocus* are prominent in the tropical sublittoral but generic radiation is comparatively low. Isaeids and hyalids also dominate tropical shallows.

The importance of limnetic environments to the development of Amphipoda is also attested to by the species-flock of Hyalellidae in Lake Titicaca, a lake now of alpine character in the tropics but a lake perhaps of warmer climes in earlier times. It seems more than happenstance that most other talitroideans (like the Hyalellidae) are now strongly oriented to the tropics. They include the fully (and only) terrestrial Amphipoda that occur mainly on the islands of the Indo-Pacific region, plus the beachhoppers that also have primarily tropical affinities. Only the aquatic genus *Hyalella* has successfully invaded the Nearctic realm dominated by Gammaridae (which also dominate Palearctic and occur in African (Ethiopian) realms. Talitroideans are more specialized or more advanced morphologically than members of Gammaridae in uropods, mandibles, and antennae and no one has been able to trace any direct relationships between the two groups, even though one may see in the Beaudettiidae a species presumably derived from *Elasmopus* (Gammaridae) that has undergone a revolutionary change in the direction toward *Hyale* (Talitroidea).

One may consider that by the time fresh-water Gammaridae had become dispersed to a cordilleran pathway contiguous to South America that the latter continent had become disjunct or that the circumferential Sonoran belt afforded a major barrier. There may be a strong competitional stress between Gammaridae and Hyalellidae for the northward migration of one hyalellid into the Nearctic realm does suggest the presence of a migratory pathway now in existence, but only one species has managed to make the crossing.

Dispersal of marine Gammaridae to the Neotropical realm also must have come after the successful invasion by hyalellids, because it would appear that even in tropical waters marine gammarids have been able to invade limnetic environments.

All through the ancient Tethyan Sea marine gammarids invaded underground waters, forming the nipharigid and other troglobitic groups. The South African genus *Paramelita* may have its origin in marine melitids and have undergone convergence towards the Baikalian gammarus stock, for Schellenberg (1937a,b) has included that genus with the "gammarus" group. If South African "gammaruses" and the poorly known Australian members of the family have indeed been the results of separate fresh-water invasions then the southern hemisphere was completely blocked from an overland dispersal of Eurasian gammarids.

These stocks of "gammarus" in the southern hemisphere may not be so successful competitively against talitroideans as are Palearctic stocks, for another group of talitroideans, the "chiltonias" have evolved in the African and Australia-New Zealand provinces.

One need not adhere too closely to the thesis that Baikal formed an evolutionary center for the reinvasion of the sea by its products. Baikal and Titicaca may simply be dismissed as habitats open to whatever contiguous marine groups were present. But this also implies, without considering special ecological adaptations of the groups, that if Gammaridae are indeed primitive and represent the survivors of a base stock out of which came talitroideans, that the latter were undergoing their evolution on a tropical frontier while the tropicwards dispersal of various marine Gammaridae was stagnating. Talitroids, therefore, penetrated the tropical barrier in the move southward before marine or fresh-water gammarids. The importance of studying ecological stress in the groups is apparent in the limited "later" success of marine gammarids in partially occupying some of those southern limnetic habitats on the tropical fringe. If there was temporal independence among all these events in Baikal, South America, South Africa, and Australia, and if marine Gammaridae and Talitroidea were already fully developed before any of these limnetic invasions, then one must entertain a strong and independent ecological success of the Palearctic-Nearctic gammarids, for talitroideans have not been able to populate those realms.

Terrestrial nonaquatic talitroids have never become eminently successful. They occupy no major continent except where they have been locally introduced into gardens. They are confined to Indo-Pacific islands in the tropics, in moist, biotically impoverished environments. Beachhoppers on the strand of large continents have never been able to migrate inland as far as we know.

Only two groups of Amphipoda thus have any clear relationship to historical events that we have as yet been able to discover and on which we may devote a great deal of refinement with promise of results other than speculation. The meager evidence seems to indicate that Gammaridae had their major radiation in cold northern climes, either marine or fresh water and that they had not reached either realm of the southern hemisphere before those continents were blocked by some kind of environmental barrier, leaving them open to the Talitroidea.

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The question of interest is whether the Talitroidea existed simultaneous with these events or whether they presumably came much later, and indeed whether they evolved directly through the gammarid funnel; whether modern Gammaridae truly represent a base stock to all other Gammaridea or whether they are simply a blind-alley sidebranch coincidentally representing today the logical primitive gammaridean.

That Gammaridae and all other Amphipoda are heavily oriented to cold water seems more than happenstance. We may determine eventually that the tropics have the most numerous species of Amphipoda of any province but there is little current evidence that we shall also find tropical genera to be the most numerous. Cold waters (but not high polar) undoubtedly have the greater diversity at the higher taxonomic levels. It is occasionally, or at least not always, true that biotic groups have their highest diversity in their centers of origin and I do not wish to imply that diversity and centers of origin are correlated in the Amphipoda. Amphipoda have a bimodal diversity anyway as cold waters obviously occur in two circumferential bands. But the facts that the most primitive morphotype has its center of diversity in cold Siberian Seas, that Gammaridae have strongly radiated generically only in a cold Siberian lake and not in isolated tropical lakes, that Nearctic-Palearctic fresh-water Amphipoda clearly are more diverse generically than in tropical fresh waters, that marine gammarid genera are most numerous in cool waters, that a whole suborder of amphipods, the Hyperiidea is confined primarily to cool pelagic waters, that the largest family of marine amphipods, the Lysianassidae is confined largely to cool waters, all suggest that Amphipoda are preadapted to cool waters and have undergone the major "post-amphipodan" radiation in such climes.

Identification Procedures

The identification of a gammaridean amphipod even at familial levels so often requires a complete dissection and analysis of all appendages and mouthparts that the procedure is considered to be mandatory. This handbook cannot be utilized successfully by a nonspecialist without *dissecting* appendages (Appendix I) and *observing* minute characters (checklist of Appendix II). Once the student has gained some experience, however, portions of these procedures may be skipped, for some families and many genera can often be recognized without extensive analysis.

The procedures for identification described herein are manifold. They include the memorization of a basic gammaridean plan, illustrated in figures 1 and 2 and diagnosed on p. 50. Almost all other families are defined by combinations of characters expressing either minor specializations or minor simplifications of the basic gammaridean plan.

The diagrammatic key to families.—This key (figs. 1–53) is composed of 54 boxes, 51 of which represent a family or superfamily containing one or more illustrated characters in solid lines that distinguish it from the basic gammaridean (figs. 1–2b). For example, if mouthparts are not illustrated they either resemble those of the basic gammaridean or are so highly variable that they have no diagnostic differences from the basic gammaridean and are thus not mutually exclusive. Each of these concordant families is noted in the captions of the illustrated key and character differences in broken lines are figured and explained where necessary. The diagrammatic key is, therefore, not an absolute endpoint, for the taxonomist must also check the illustrated boxes of families resembling the first provisional identification.

The diagrammatic key is arranged in a way to deal first with those families which have highly characteristic and easily observed morphology. Thus, Lysianassidae (fig. 3), with their characteristic gnathopod 2 are presented first, followed by the similar Stegocephalidae (fig. 4), which have characteristic coxae, head, mouthparts and mandibles, followed by Ochlesidae (fig. 5) without maxillipedal palp, Lafystiidae (fig. 6) with 2-articulate maxillipedal palp, and Acanthonotozomatidae (fig. 7) with characteristic coxae. Following those groups is a pair of families with cylindrical bodies, succeeded by seven families with uniramous uropod 3. Succeeding that point (Amphilochidae, fig. 19) all families have a biramous uropod 3, rarely with exceptional genera or species. Other characters are abnormal to the basic gammaridean, however, such as the small coxa 1 of Amphilochidae and some Leucothoidae and the characteristic gnathopod 1 of Leucothoidae and Anamixidae. There follows a group of families with various combinations of coalesced urosomites, and degraded mandibles or acuminate coxae. Commencing with the Oedicerotidae (fig. 27) the identifications become increasingly difficult as the differentiations from the basic gammaridean become less apparent: the Oedicerotidae have elongated pereopod 5 and short, uncleft telson; Paradaliscidae (fig. 28) have characteristic mandibles; Bateidae (fig. 30) have degraded gnathopod 1; Synopiidae (fig. 31) have massive, rostrate heads; the next four families (figs. 32–35) have various combinations of feeble gnathopods, degraded mandibles, special shapes of lower lips and maxillae and various telsonic lengths and clefts; the next three families differ from the basic gammaridean by poorly cleft telsons and degraded accessory flagella; the next group has cleft telesons but degraded accessory flagella; then a group with normal accessory flagella but with various combinations of degraded molars, characteristic rostra, coxae, and pereopods, until finally the Gammaridae are reached.

After the Gammaridae is the group of isaeid-like families, most of which form tubes, have spinning glands in the pereopods, bear short, uncleft fleshy telsons, posteriorly unexcavate coxa 4, and normal mouthparts but which often have increasingly complex or reduced uropods difficult to separate from the network of families anterior to the Gammaridae. The identifier must keep them in mind. Some genera of the isaeid-like families are very difficult to recognize and all of these family keys and diagnoses should be examined when identifying presumed Corophiidae, Aoridae, Isaeidae, Ischyroceridae, Ampithoidae, and Podoceridae. Perhaps it is wise to become familiar with known variations in characters of these families for it is often difficult to recognize spinning glands in pereopods (and some genera of isaeid-like families lack them). Shallow-water isaeids are usually strongly pigmented in browns and purples but this is not a reliable character, because other families occasionally have strongly pigmented species.

Example 1: Perhaps the observer determines from the completed checklist (Appendix II), that the characters of the box Liljeborgiidae (fig. 41) fit the specimen being identified. All characters match those of the basic gammaridean except for the mandibular molar, which is nontriturative; the accessory flagellum is multiarticulate, the mandible has a 3-articulate palp, the maxillae are normal, maxillipeds have well developed lobes and 4-articulate palps, gnathopod 1 is of normal or enlarged size and is subchelate, gnathopod 2 is enlarged and subchelate, all pleonites are free, pereopods are generalized, uropod 3 is large and biramous, and the telson cleft. The caption lists related families or those families with which Liljeborgiidae might be confused and their boxes should be examined for special combinations of characters not shared with the specimen at hand. For instance, the Liljeborgiidae caption lists Gammaridae and Eusiridae as congruent families, but the box of Eusiridae (fig. 39) indicates (1) by the absence of a drawing of the mandible that it is either like the basic gammaridean and therefore has a triturative molar, or is of variable character; and (2) that the accessory flagellum is 0–2 articulate. If the specimen being identified has an accessory flagellum of 3-plus articles then it is not a eusirid; if it has a 2-articulate accessory flagellum and triturative molar then it is not a liljeboriid; if it has a 2-articulate accessory flagellum and a nontriturative molar it may be either a eusirid or liljeborgiid and the reader would turn to the descriptions of those families (p. 213 and p. 291) and compare them with the specimen. He would read the sections on Relationships to discover that a few genera of Eusiridae also have a nontriturative molar and thus resemble Liljeborgiidae; but those genera lack an accessory flagellum entirely; furthermore their gnathopods are unlike those of Liljeborgiidae.

Example 2: Eusiridae (fig. 39) differ from the basic gammaridean only by the reduction of the accessory flagellum to 0–2 articles shown in solid lines and by the elongation of the telson. Also figured in the box is the lower lip in broken lines to show a distinction from the Pleustidae and the Astyridae; uropods 1 and 2 in broken lines show a distinction from the Liljeborgiidae and the illustrated telsons differ from those of the Calliopiidae.

Thus, the vestigial eusirid accessory flagellum is shared with many other families but the special combination of basic gammaridean morphology plus the telson, uropods, and lower lip is distinctive.

Also, an inference is made on the caption that the student refer to the figures of the Vitjazianidae (fig. 34), and the Oedicerotidae (fig. 27) for characters distinguishing those families from the Eusiridae, i.e., the simple first gnathopod and conjoint primary flagella of antenna 1 in the Vitjazianidae and the disproportionately long fifth pereopod in the Oedicerotidae.

Not mentioned are other deviations, such as the occasional reduction of mandibular molars and 1-articulate first maxillary palps. Several other families share these characters and may be partially defined by them, but those families may be distinguished from the Eusiridae by more important characteristics.

Example 3: Calliopiidae (fig. 38) differ from the basic gammaridean only in the reduction of the accessory flagellum to 0–1 article and the coalescence of the telsonic lobes. Also illustrated are the lower lip which differs from that of the Pleustidae, coxa 4 to show a distinction from the Isaeidae (=Photidae) and telsons to show faint distinctions from the Eusiridae. Some calliopiids have isaeid-like coxa 4 but their telsons are not fleshy and their pereopods lack glands.

Example 4: The diagnosis of Amphilochidae (p. 132) includes only: "Accessory flagellum absent; coxa 1 very small, partially hidden by following coxae." Next is stated "See [the family] Pleustidae. . . ." The description of that family implies that coxa 1 is "normal" in size and placement. In sequence, the description of the mentioned Stenothoidae should be examined to see that uropod 3 is uniramous and therefore distinct from uropod 3 of the Amphilochidae.

The Diagrammatic Key to Families is, at best, a method of narrowing the search for a familial identification to a few possibilities, each textual diagnosis and description of which must be examined for goodness of fit. A flexibility has been maintained in the diagrammatic key because of space limitations in presenting a compact visual impression of a group as well as the possibility that the observer will handle undescribed genera and families. The need to cross-check diagnoses and test keys to genera in several families is a part of the identification process.

The textual diagnoses, descriptions and relationships of the 53 families are presented in alphabetical sequence. The Hyalidae, Hyallidae, and Talitridae are combined into the superfamily Talitroidea for ease of identification. Each family has a written key to its genera and each family is accompanied by several sets of figures illustrating: (1) the characters of the generic keys, and (2) the variation in lateral aspects and appendages of the several genera.

Perhaps the key to success in using the diagrammatic keys is the need to memorize the plan of the basic gammaridean and to keep an account of generalized characters, especially the generalization of heads, feeble and strong gnathopods, anterior coxae, and elongation of telsons and pereopods. Thus, Synopiidae are extremely difficult to recognize because the subtle shapes of their heads are primary to their identification. Acanthonotozomatidae, Paramphithoidae, and Stegocephalidae are recognized mainly by their anterior coxae.

Written keys.—If the Diagrammatic Key to Families does not produce results one may utilize the written key to families (pp. 106-116). The written key is not as satisfactory as the Diagrammatic Key because the observer must repeatedly make "yes or no" decisions on individual characters and no accomodation for undescribed genera and families can be made. Simplicity of the keys requires occasional repetition of taxa in order to account for morphological diversity.

Extraordinarily long keys are occasionally divided into sections in order to improve their usefulness. The establishment of subgroups in this manner is believed to be of assistance in retaining conceptual images while the observer is proceeding through the maze of an extremely complicated key.

Diagnoses.—Familial diagnoses are compatible with the Diagrammatic Key to Families and are not mutually exclusive, for the diagnoses only differentiate the families from the basic gammaridean. Interrelated families are listed as a part of the diagnoses and are discussed under "Relationships." These discussions are not necessarily repeated in all possible places and the reader may have to turn from the Synopiidae to the Liljeborgiidae, for example, in order to find a discussion of the interrelationships between the two families.

Genera are diagnosed in as brief and consistent form as possible, in direct relationship to the keys. Where two genera are mutually distinguished by a character of no taxonomic importance to other genera of a family, the alternatives of the character are italicized and the related genus is stated. Such character alternatives are omitted from the diagnoses of other genera. Character alternatives that are known as "combining characters," because of their usage in keys, are occasionally listed in diagnoses and italicized; they reflect the necessity to state a general character that is diagnostic only because it occurs in unique combination with all other characters stated for the genus under question; the character is not necessarily restricted to the taxon in question.

Each diagnosis has as its framework the conditions known for the type-species or type-genus. In some families with few genera, the diagnoses are confined to the keys. No doubt, the range of variation permitted in the diagnoses is too narrow; time has not been allotted to analyze the literature of each species in each genus in order to widen the generic limitations because the literature is occasionally so defective that one would waste time to ponder, analyze, and argue possible truths or to speculate on omissions. Many described species are undoubtedly misclassified.

Brief synonymies of recently established families are given but otherwise such information may be found in Stebbing (1906) or J. L. Barnard (1958a).

Type-species of each genus and their modes of selection are listed below the generic synonymies. A modern reference, if available, is given for the type-species. The number of species is included, along with generalized distributional notes on the genus. "Littoral" includes sublittoral, to 300 m; "bathyal" includes depths from 300 to 2000 m (here); "abyssal" exceeds 2000 m, and "hadal" 6000 m. Some species in depths exceeding 300 m are pelagic but have not been so designated because of uncertain data on collecting methods. Reference to terms such as "arctic, antarctic, boreal," is very imprecise because no exact definitions are followed. If a genus is centered generally in the antarctic as well as the subantarctic the terminology is simplified to "antarctic." The "arctic" includes the Norwegian Basin and its fringes as well as the polar basin. "Biboreal" denotes occurrence in northern and southern hemispheres; "amphiboreal" denotes occurrence in both oceans of the northern hemisphere.

Occasionally depths in meters are given where they have some interest or precision. Distributional information in parentheses indicates rarity in those situations.

Diagnosis of the Basic Marine Gammaridean (Many Marine Gammaridae)

Figures 1, 2

Accessory flagellum well developed, with four or more articles. Primary flagellum of antenna 1 not basally conjoint.

Mouthpart field quadratiform from lateral view. Each mandible with 3-articulate palp, article 3 longer than article 1; molar present, with grinding surface composed of ridges and teeth (=triturative). Lower lip with principal lobes undivided (unnotched) and not widely separate. Each maxilla 1 bearing inner lobe, outer spinose lobe, and strong unflexed palp of two articles. Each maxilla 2 with two well-developed, setose lobes. Each side of maxillipeds with large inner (proximal) lobe and outer (distal) lobe, and 4-articulate palp, article 4 claw-shaped (unguiform).

Gnathopods well developed and subchelate ("powerful"), non-lysianassid. Gnathopod 2 larger than gnathopod 1 in male, gnathopod 1 never larger than 2 in female, article 3 of gnathopod 2 short. Article 4 of pereopods 1–2 not extensively elongate. Pereopods 3–5 of congruent structure and successively slightly longer.

Three pairs of large and subequal uropods present, all biramous, rami subequal in length, lanceolate. Peduncle of uropod 3 not elongate. Telson deeply cleft, of medium length.

Coxae forming elongate, rectangular plates with quadrate or rounded distal edges, coxae 1–4 of uniform shape or slightly increasing in size consecutively, coxa 4 excavate posteriorly.

All body segments free. Metasome only as long as last five pereonites combined. Head subcuboidal, not "massive," rostrum small.

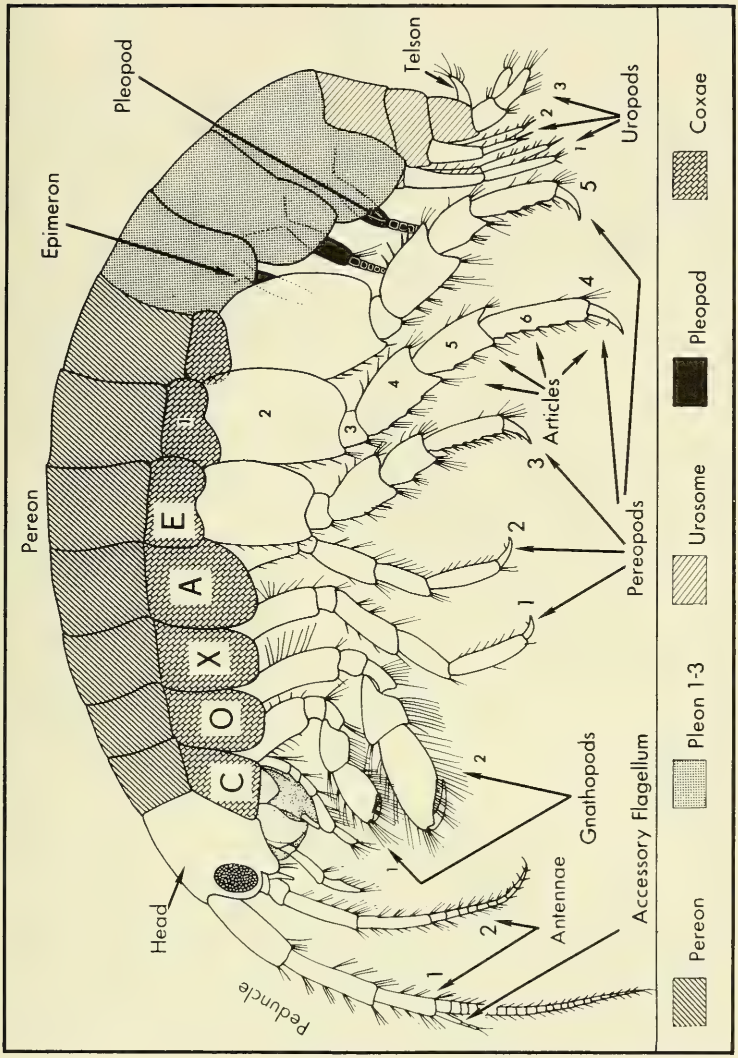

FIGURE 1.—BASIC GAMMARIDEAN, part I, lateral aspect. Note the following characteristics of the basic gammaridean: elongate antennal peduncles; head of medium size, rostrum small or obsolete; eyes when present paired, lateral, composed of ommatidia and lacking cuticular lenses; accessory flagellum multiarticulate; coxae 1–4 subequal to each other in size, subquadrate in outline, coxa 4 posteriorly excavate; gnathopod 2 equal to or larger than gnathopod 1; no articles of pereopods 1–2 differentially elongated; pereopods 3–5 subequal to each other in length; all body segments free; uropods all biramous, no uropod elongated; telson free. See diagnosis.

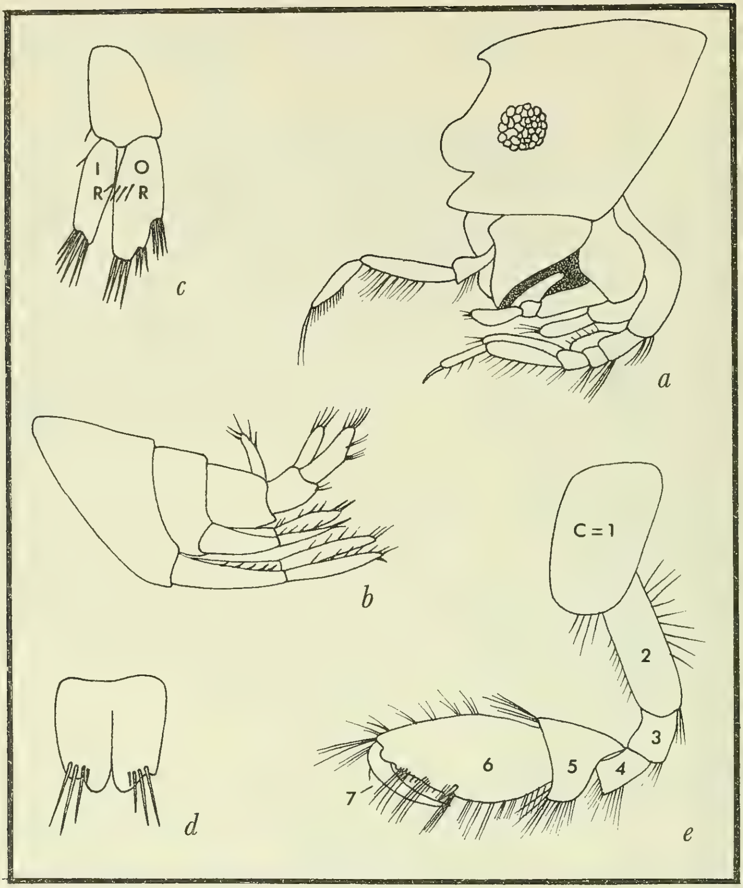

FIGURE 2A.—BASIC GAMMARIDEAN. part II: *a*, head, lateral aspect [mouthparts arranged in quadrate bundle]; *b*, urosome, left lateral aspect, with uropods 1–3 and telson [all segments free, none extremely elongate, no uropods extremely disproportionate, all uropods biramous, telson freely articulate and not thickened dorsoventrally]; *c*, uropod 3 [well developed but of medium length, rami subequal to each other, no parts greatly elongate]; *d*, telson [of medium length, cleft about three fourths of its length]; *e*, gnathopod 2 [subchelate, equal to or larger than gnathopod 1].

Symbols: 1, 2, 3, etc.=articles of appendage; c=coxa; l=lacinia mobilis; i=incisor; ip=inner plate; ir=inner ramus; op=outer plate; or=outer ramus; p=palp.

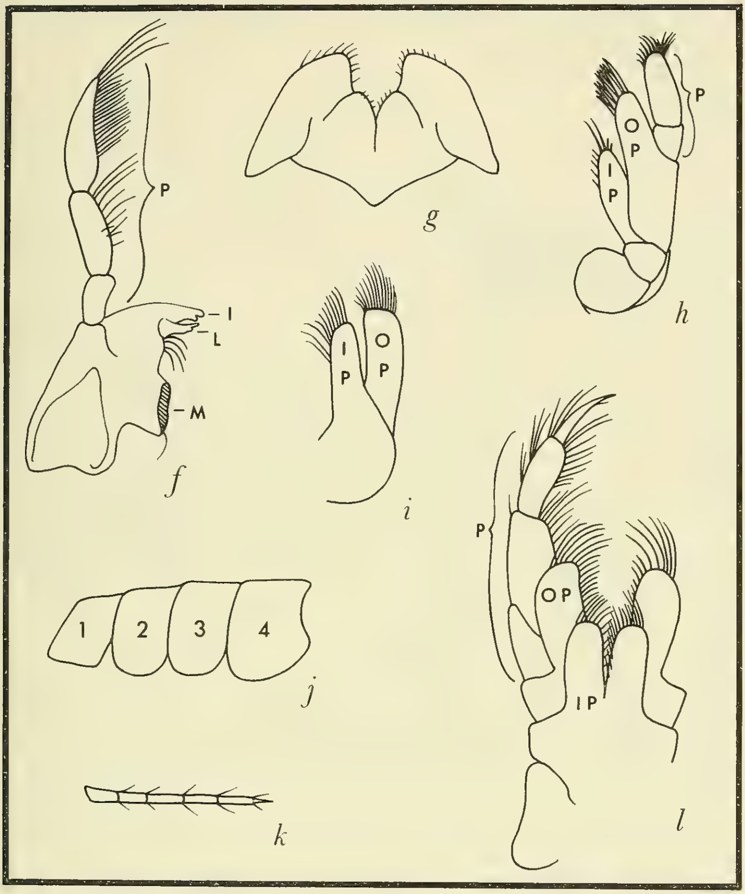

FIGURE 2B.—BASIC GAMMARIDEAN. part II: *f*, mandible [with 3-articulate palp, molar present and strongly triturative]; *g*, lower lip [lateral lobes close together, not perfectly oval, inner lobes if distinct, not amalgamated]; *h*, maxilla 1 [well developed, spinose, palp 2-articulate]; *i*, maxilla 2 [well developed]; *j*, coxae 1–4 [all present, generally subequal in size or consecutively slightly larger, quadrate in outline, coxa 4 excavate posteriorly]; *k*, accessory flagellum [multiarticulate]; *l*, maxilliped [inner and outer plates large, palp 4-articulate]. See fig. 2A for symbols.

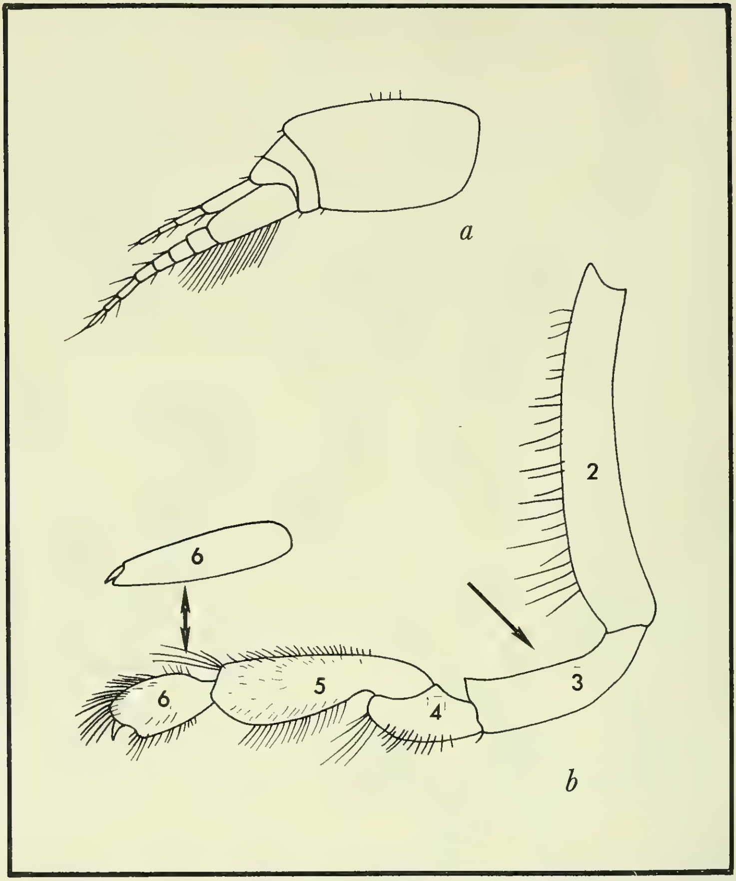

FIGURE 3.—**Lysiannassidae:** *a*, antenna 1, note very short peduncle [see Sebidae]; *b*, gnathopod 2, and an extreme variation of articles 6–7, as offset; note elongation of article 3 [highly characteristic overall shape, but see Sebidae, Stegocephalidae].

Stegocephalidae always lack molars and palps on mandibles, have some foliaceous portions on maxillae, always have a 1–2–articulate accessory flagellum and a characteristic shape of coxae 1–4. The combination of those characters never occurs in Lysianassidae.

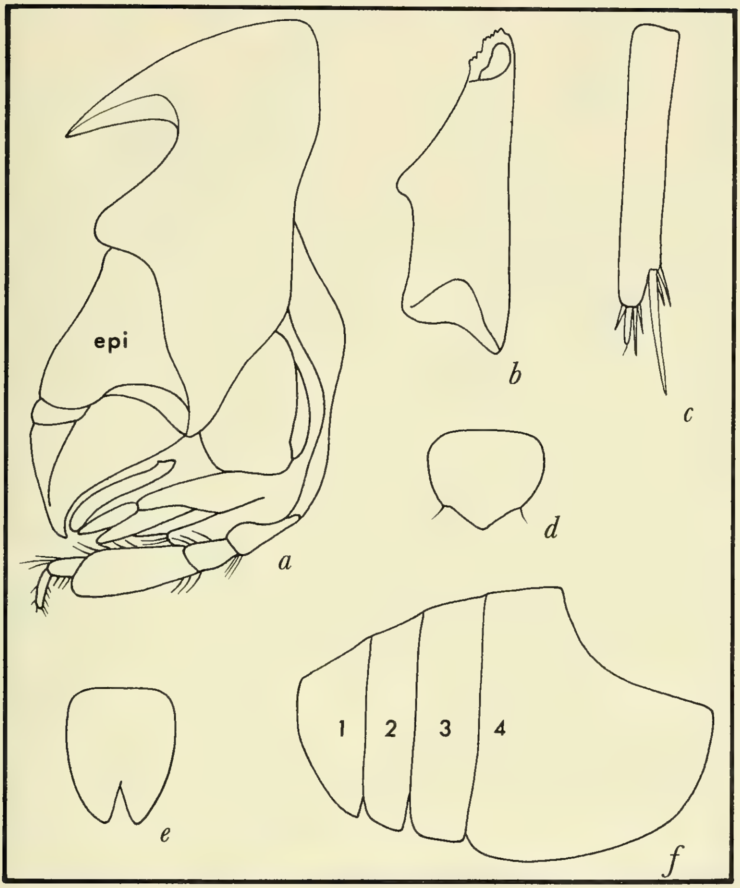

FIGURE 4.—**Stegocephalidae:** *a*, head, left lateral aspect showing subconical grouping of mouthparts, shortening of head, enlargement of epistomal region (epi); *b*, mandible, note absence of palp and molar and weakly developed styliform shape [see Acanthonotozomatidae]; *c*, accessory flagellum [see Acanthonotozomatidae]; *d,e*, variation in telson; *f*, coxae 1–4, left to right, note slight acumination of anterior coxae [overall shape not occurring in Lysianassidae].

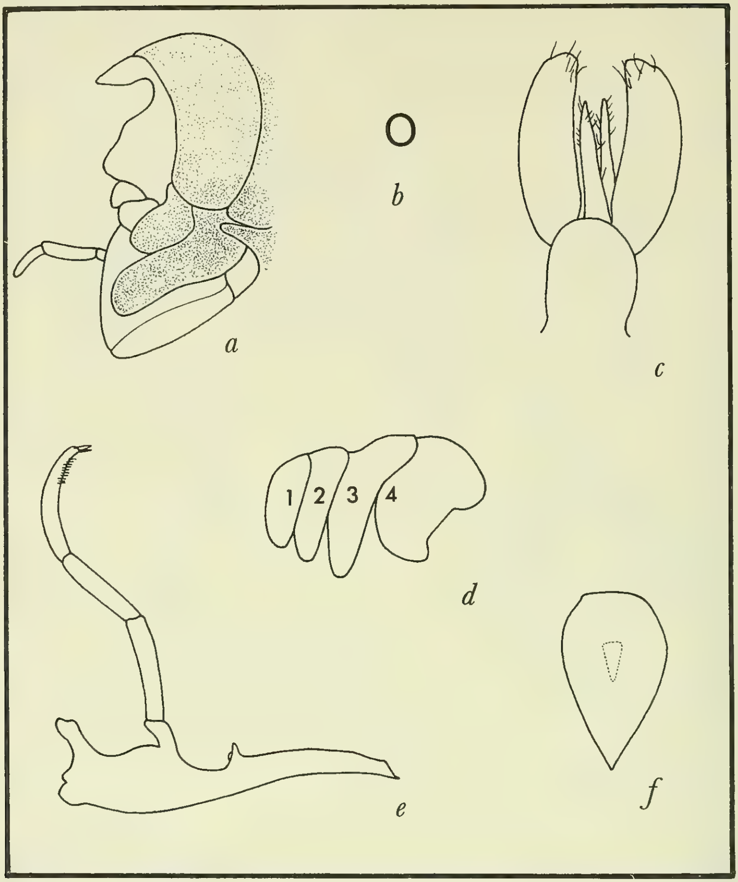

FIGURE 5.—**Ochlesidae:** *a*, head, left lateral aspect showing conical grouping of mouthparts [stippled portions are body and coxae]; *b*, accessory flagellum absent; *c*, maxillipeds, note absence of palps [see Acanthonotozomatidae, Lafystiidae]; *d*, coxae 1–4, left to right, note subacumination; *e*, mandible, note styliform shape; *f*, telson.

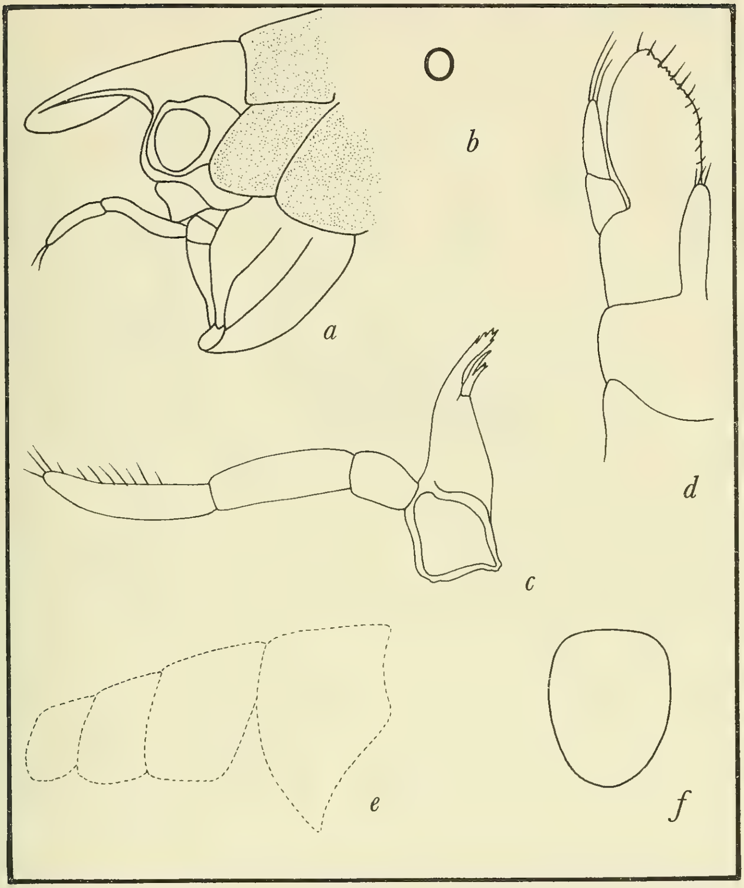

FIGURE 6.—**Lafystiidae:** *a.* head and conical mouthpart bundle [stippled area is body]; *b*, accessory flagellum absent; *c*, mandible, molar absent, note styliform shape; *d*, maxilliped, note only two palp articles [differing from nearly all other Gammaridea]; *e*, coxae 1–4, left to right [see Acanthonotozomatidae]; *f*, telson.

Gnathopod 1 is simple, gnathopod 2 is weakly subchelate. Similar to Acanthonotozomatidae except for reduced maxillipedal palp, lack of pereonal and metasomal sculpture, and shapes of coxae 1–4.

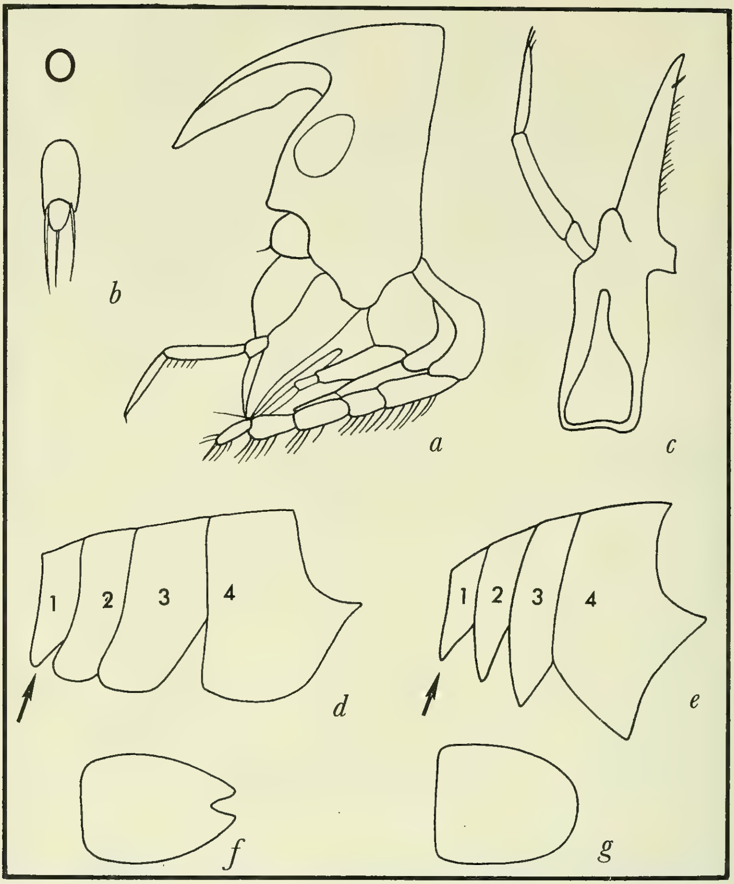

FIGURE 7.—**Acanthonotozomatidae:** *a*, head, note mouthparts arranged into conical bundle [see Paramphithoidae, Stilipedidae]; *b*, accessory flagellum absent or vestigial; *c*, mandible, note styliform shape [see Stegocephalidae]; *d,e*, variation in coxae 1–4, left to right, note acumination of one or more coxae ventrally [see Pardaliscidae, Lafystiidae, Stilipedidae]; *f,g*, variation in telson.

Ochlesidae have no maxillipedal palps whereas Acanthonotozomatidae have 3–4–articulate palps. Lafystiidae have 2-articulate maxillipedal palps.

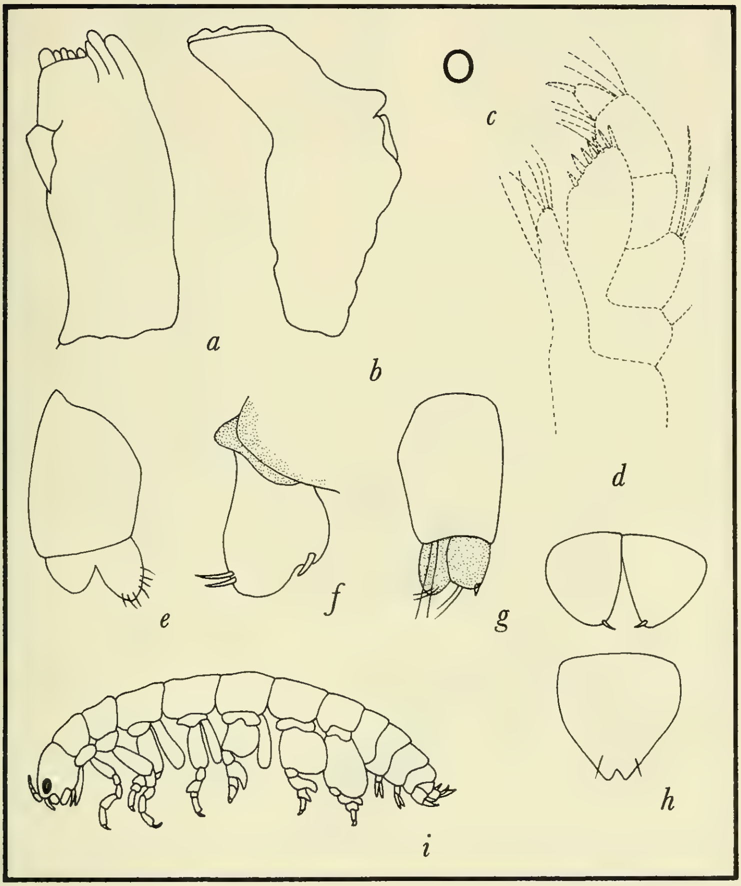

FIGURE 8.—**Eophliantidae:** body cylindrical, coxae short: *a,b,* mandibles, note absence of molars and palps [see Talitroidea (except *Najna*), Kuriidae, Corophiidae, Podoceridae]; *c*, accessory flagellum absent; *d*, maxilliped [see Colomastigidae]; *e,f,g*, variations of uropod 3 [see Prophliantidae]; *h*, telsons, cleft weakly or into two pieces [see Colomastigidae]; *i*, body, cylindrical, coxae very short [see Phliantidae, Talitroidea].

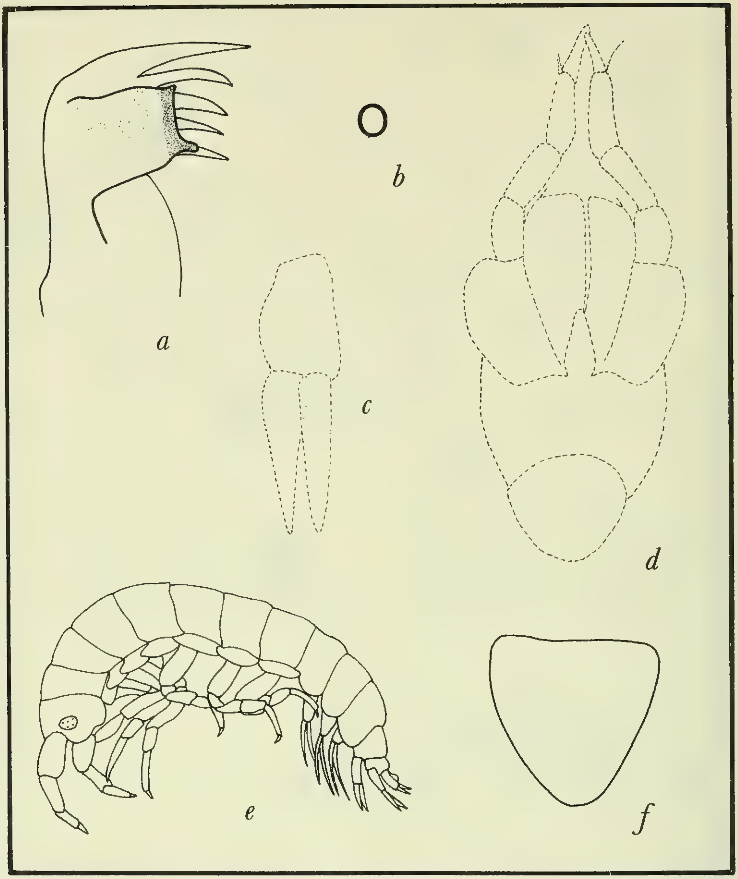

FIGURE 9.—**Colomastigidae:** *a*, mandible, note absence of palp, molar (stippled) and deeply serrate cutting edge [see Eophliantidae, Corophiidae, Podoceridae]; *b*, accessory flagellum absent; *c*, uropod 3 [see Kuriidae, Eophliantidae]; *d*, maxilliped, note coalesced inner lobes [see Eophliantidae]; *e*, body, subcylindrical, coxae short; *f*, telson [see Eophliantidae, Prophliantidae].

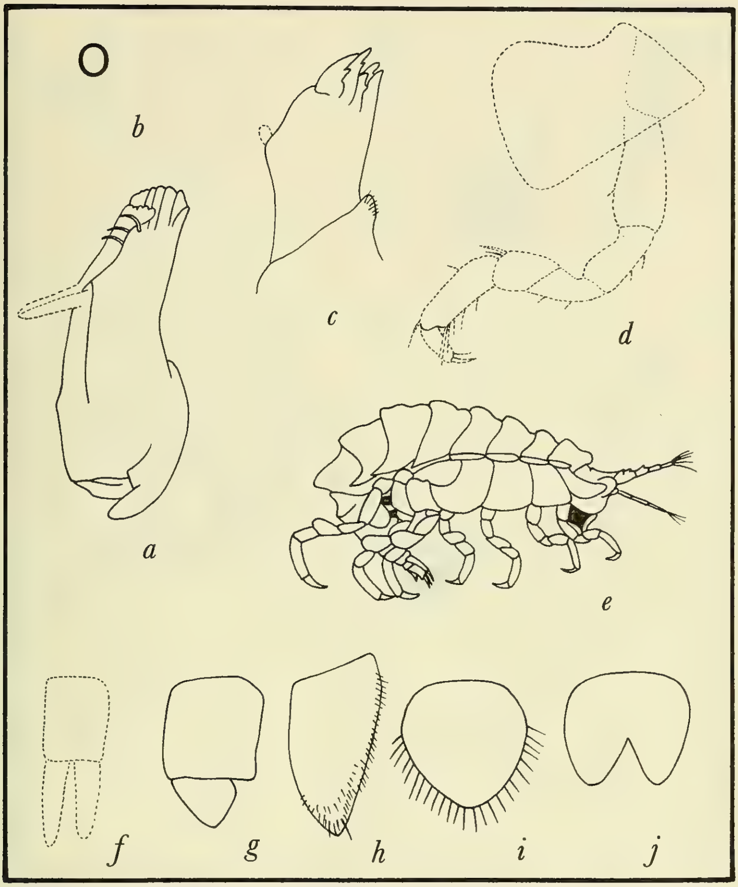

Figure 10.—**Phliantidae:** *a*, mandible, note absence of palp and molar, projection to left is ?tendon [see Podoceridae, Talitroidea, Kuriidae, Dexaminidae, Pagetinidae]; *b*, accessory flagellum absent; *c*, maxilla 1, note degradation of palp [see Dexaminidae]; *d*, gnathopod 1 (and 2), note feeble condition (except *Ceinina*) [see Prophliantidae]; note elongated article 3; *e*, body, depressed, rugose, coxae splayed [see Eophliantidae, Colomastigidae]; *f*, uropod 3 of *Phlias*, probably erroneous; *g,h*, variation in uropod 3 [see Acanthonotozomatidae, Prophliantidae]; *i,j*, variation in telson, condition in figure *j* rarely occurring.

Kuriidae have poorly developed outer plates of the maxillipeds.

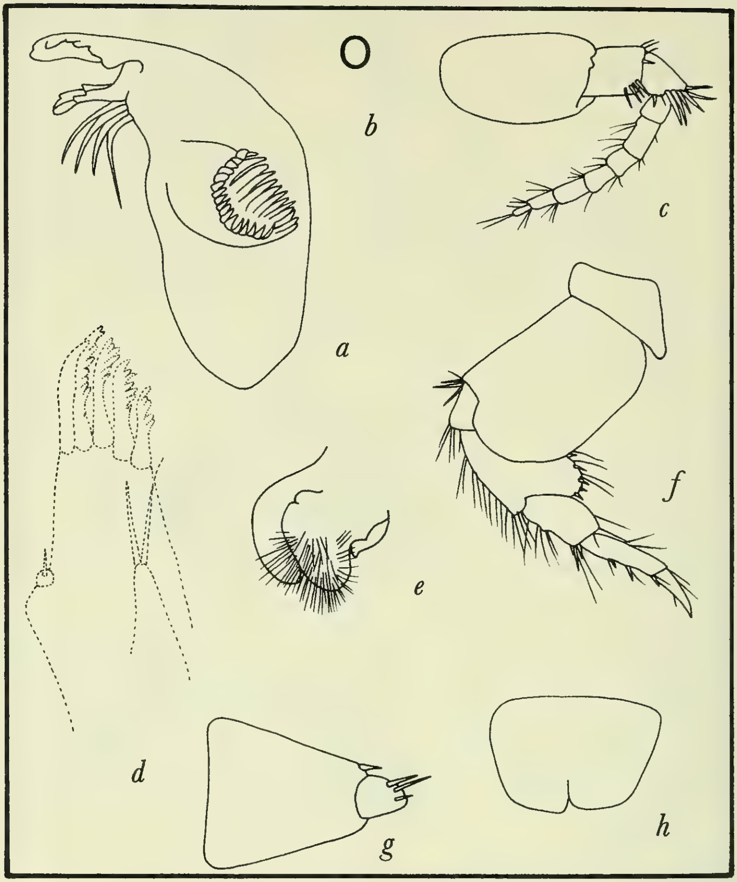

FIGURE 11.—**Dogielinotidae:** *a*, mandible, note absence of palp [see Haustoriidae]; *b*, accessory flagellum absent [see Haustoriidae]; *c*, antenna 1, note spinosity [see Talitroidea]; *d*, maxilla 1, note degradation of palp; *e*, epistome and upper lip, left lateral aspect, note pendant epistome [see Talitoridea]; *f*, any of pereopods 3–5, note heavy spinosity [see Talitroidea]; *g*, uropod 3, uniramous [see Haustoriidae]; *h*, telson.

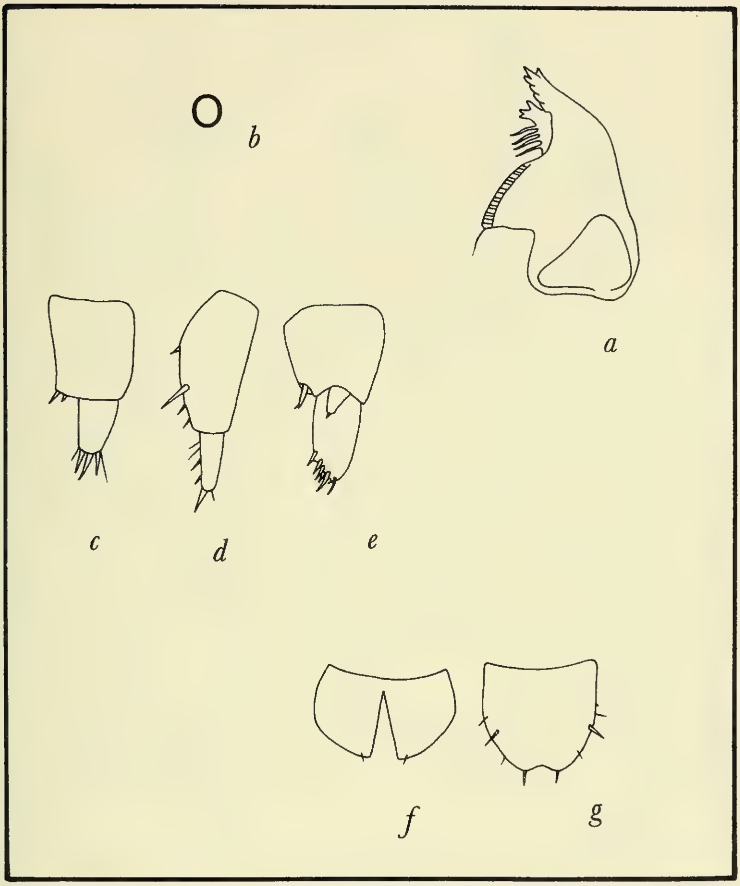

FIGURE 12.—**Talitroidea:** *a*, mandible, note absence of palp; *b*, accessory flagellum absent; *c,d,e*, variations of uropod 3, essentially uniramous, rarely with scale-like inner ramus; *f,g*, extremes of telson.

Dexaminidae, Prophliantidae, and Kuriidae have coalescence of two or three urosomal segments. Dogielinotidae have aspects of extreme fossorial adaptation such as spinose antennae and pereopods, and a nasiform epistomal projection. Eophliantidae have cylindrical bodies, short coxae and degraded mandibular molars. Phliantidae have depressed, rugose bodies and splayed coxae. Note the convergence of Beaudettiidae, figure 42.

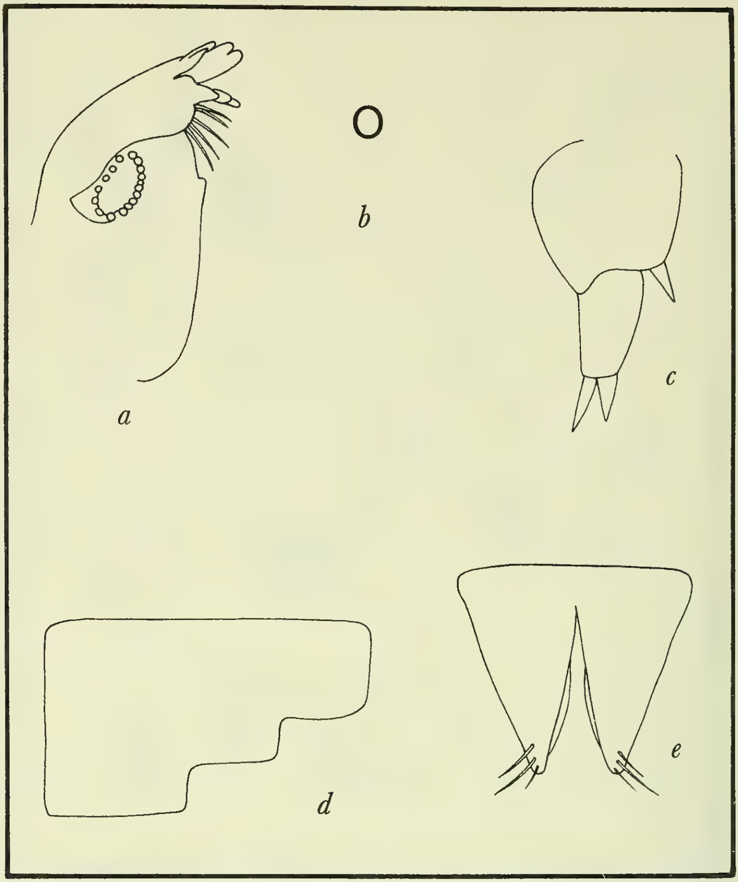

FIGURE 13.—**Kuriidae:** *a*, mandible, note absence of palp and presence of molar [see Prophliantidae]; *b*, accessory flagellum absent; *c*, uropod 3, uniramous [see Prophliantidae, Dexaminidae]; *d*, urosome, left lateral diagrammatic, all segments coalesced [see Talitroidea]; *e*, telson.

Eophliantidae have cylindrical bodies. Phliantidae have depressed, rugose bodies and splayed coxae.

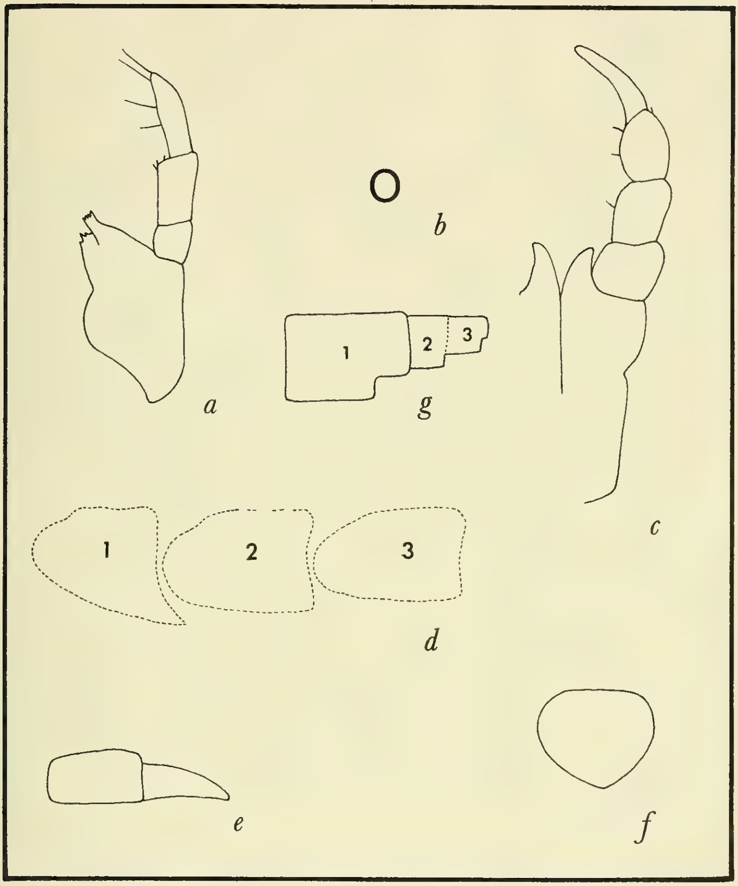

FIGURE 14.—**Pagetinidae:** *a*, mandible, note palp [see Eophliantidae. Phliantidae]; *b*, accessory flagellum absent [see Sebidae]; *c*, maxilliped, note absence of outer plate [see Sebidae]; *d*, coxae 1–3, left to right [see Stenothoidae, Cressidae, Thaumatelsonidae]; *e*, uropod 3, uniramous, ramus 1–2-articulate [see Pardaliscidae]; *f*, telson short [see Stenothoidae, Cressidae, Thaumatelsonidae]; *g*, side of urosome, segments 2–3 apparently coalesced.

Sebidae have chelate gnathopods.

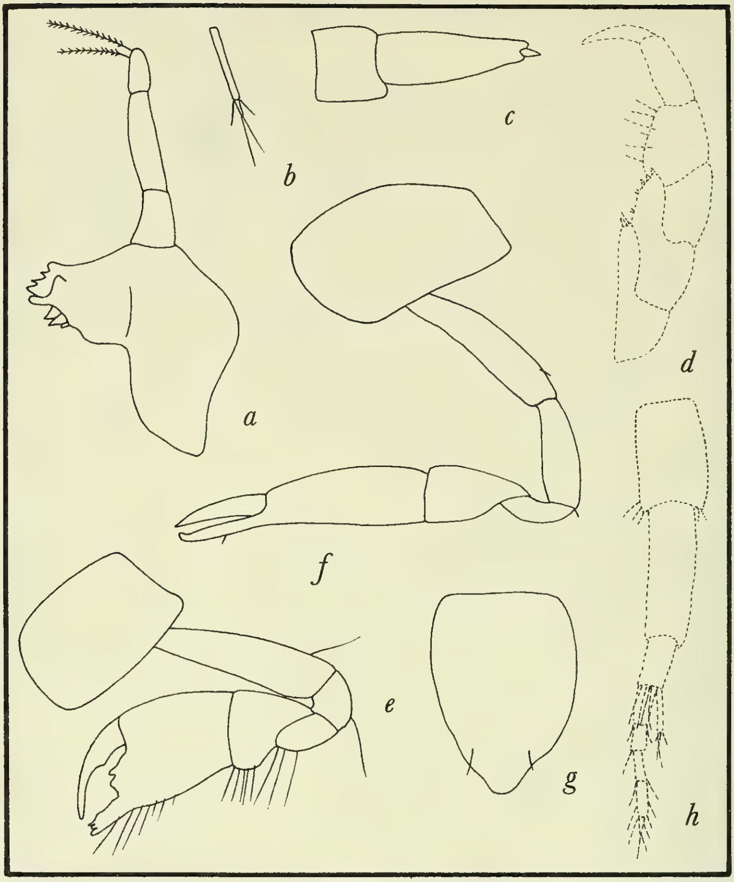

FIGURE 15.—**Sebidae:** *a*, mandible, note absence of molar; *b*, accessory flagellum; *c*, uropod 3, uniramous and elongate [see Lysianassidae, Leucothoidae, Anamixidae, Amphilochidae]; *d*, maxilliped, [see Pagetinidae]; *e*, gnathopod 1, note chelateness [see Leucothoidae]; *f*, gnathopod 2, note chelateness and elongation of article 3 [see Pagetinidae]; *g*, telson; *h*, antenna 1, note elongation of peduncle [see Lysianassidae].

Stenothoidae, Thaumatelsonidae, Cressidae have a reduced coxa 1.

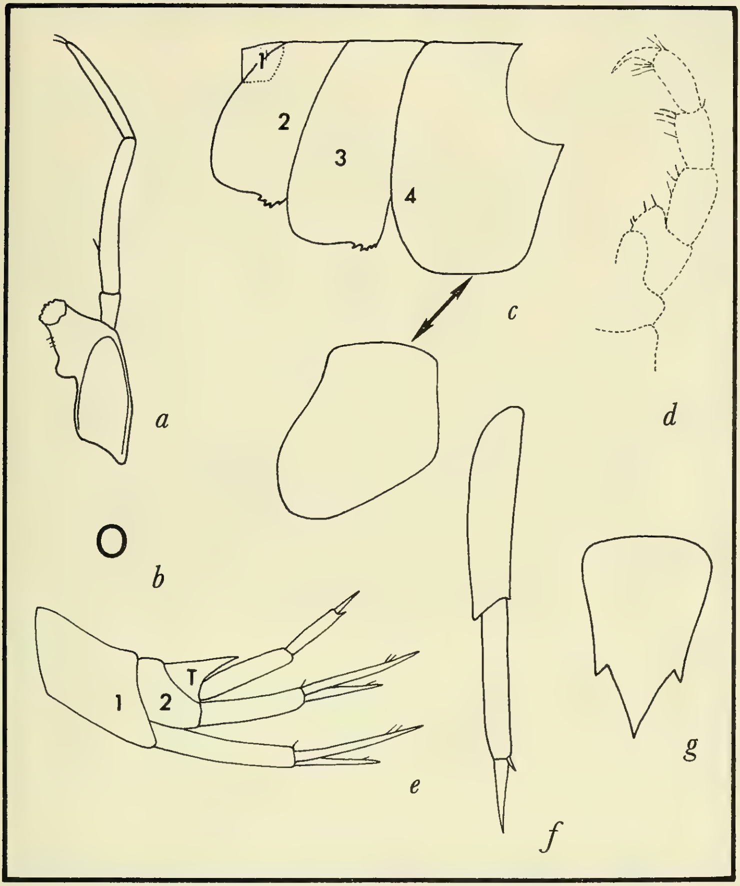

FIGURE 16.—**Cressidae:** *a*, mandible, note obsolescent molar; *b*, accessory flagellum absent; *c*, coxae 1–4, left to right, note coxa 4 often not completely shield-like [see Thaumatelsonidae, Stenothoidae, Pagetinidae]; *d*, maxilliped, note reduced outer plate; *e*, urosome, left, note telson (T) fused with segment 3 [see Stenothoidae, Thaumatelsonidae]; *f*, uropod 3, uniramous [see Amphilochidae]; *g*, telson.

Article 2 of pereopod 3 is always expanded in Cressidae, unlike Stenothoidae.

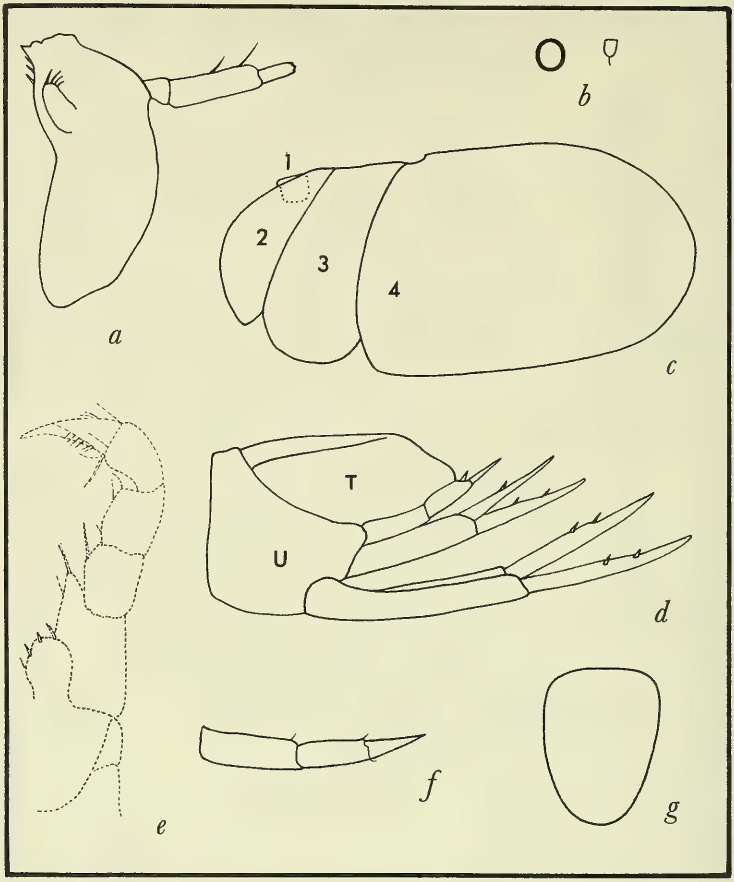

FIGURE 17.—**Thaumatelsonidae:** *a*, mandible, note small, nontriturative molar; *b*, accessory flagellum absent or vestigial; *c*, coxae 1–4, left to right [see Pagetinidae]; *d*, urosome, left side (U=urosome, T=telson), note fusion of segments and thickened telson [see Stenothoidae, Cressidae]; *e*, maxilliped, note smallness of outer plate; *f*, uropod 3, uniramous [see Amphilochidae]; *g*, telson.

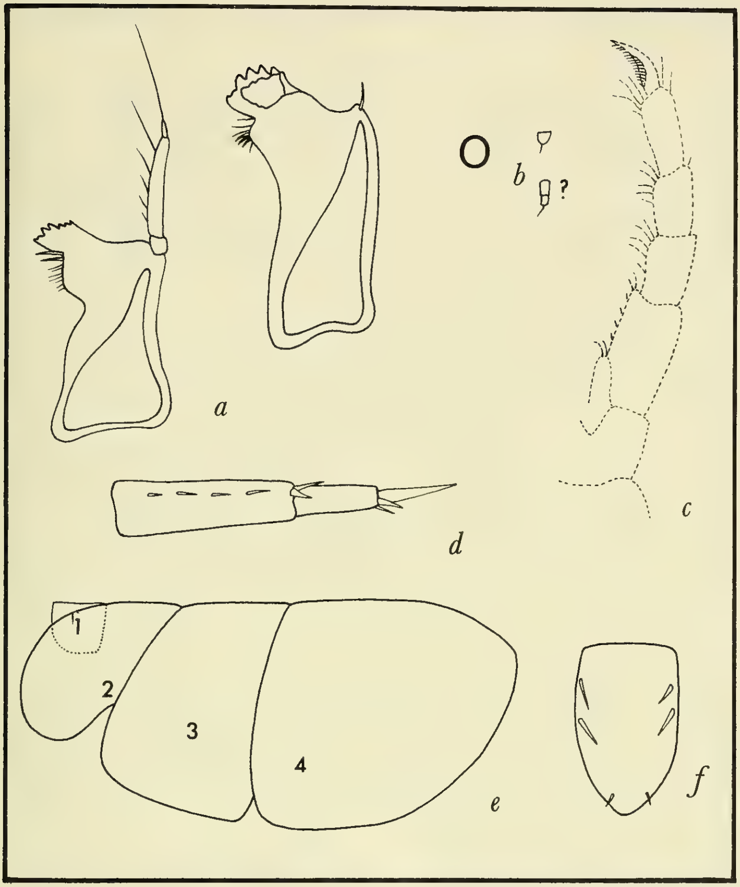

FIGURE 18.—**Stenothoidae:** *a*, mandibles, note variations in palp, absence of triturative molar; *b*, accessory flagellum vestigial or absent; *c*, maxilliped, note obsolescence of outer plate [see Amphilochidae]; *d*, uropod 3, uniramous [see Amphilochidae]; *e*, coxae 1–4, left to right [see Leucothoidae, Anamixidae, Pagetinidae, Phliantidae]; *f*, telson.

Thaumatelsonidae often have some of the urosomal segments coalesced and the telson strongly thickened. Cressidae have the telson fused with pleonite 6, and always have an expanded article 2 of pereopod 3, whereas Stenothoidae always have a slender article 2.

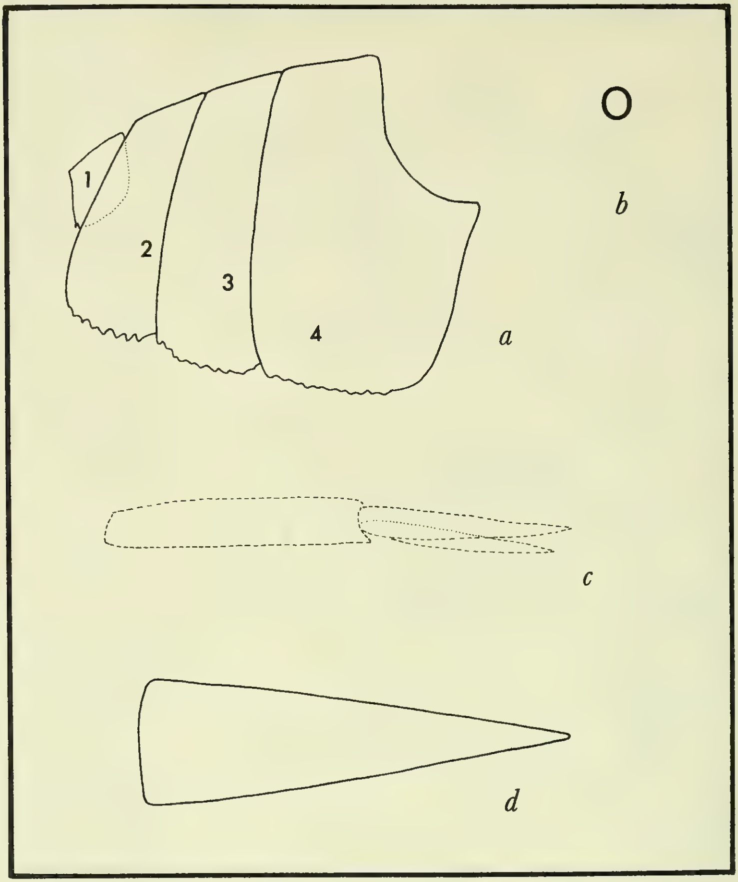

FIGURE 19.—**Amphilochidae:** *a*, coxae 1–4, left to right [see Leucothoidae, Pleustidae, Calliopiidae, Stegocephalidae]; *b*, accessory flagellum absent [see Stegocephalidae]; *c*, uropod 3, note biramous condition [Stenothoidae, Cressidae, Thaumatelsonidae]; *d*, telson, entire [with one exception].

Stegocephalidae have mandibles always without molars and palps, whereas Amphilochidae have mandibles with either one or both occurring together. Anamixidae have a ventral cephalic keel replacing mandibles and maxillae.

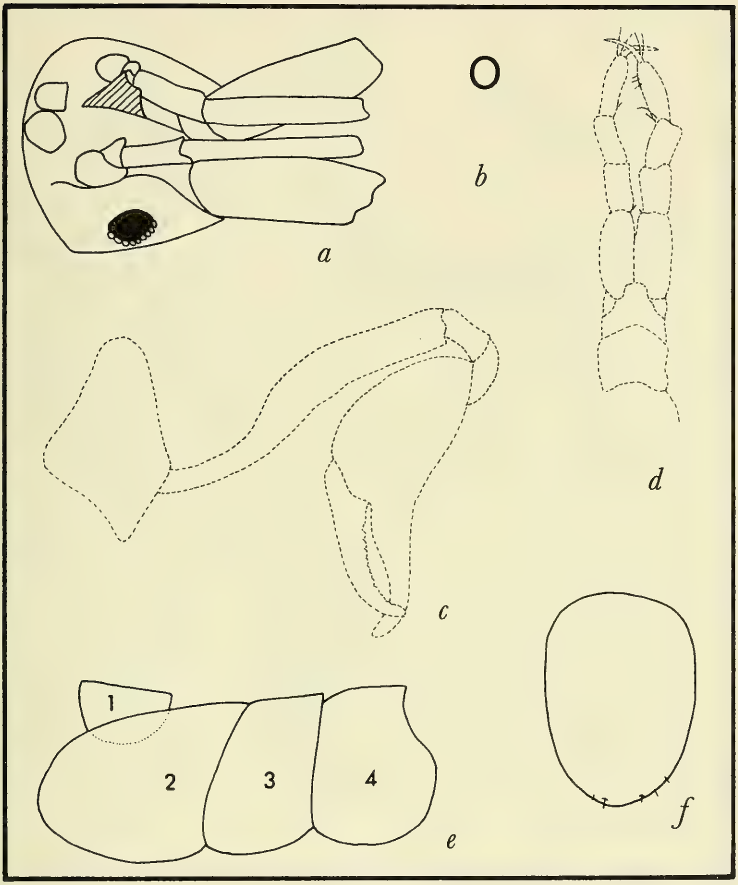

FIGURE 20.—**Anamixidae:** *a*, oblique ventral view of head, showing absence of maxillae and mandibles, presence of ventral keel (cross-lined), maxillipeds removed to show maxillary protuberances [see Leucothoidae, Amphilochidae]; *b*, accessory flagellum absent; *c*, gnathopod 1, note chelate condition [and absence of article 7 in this case] [see Amphilochidae], occasionally this appendage is absent; *d*, maxillipeds, note amalgamated inner lobes and absence of outer lobes; *e*, coxae 1–4, left to right [see most Leucothoidae]; *f*, telson.

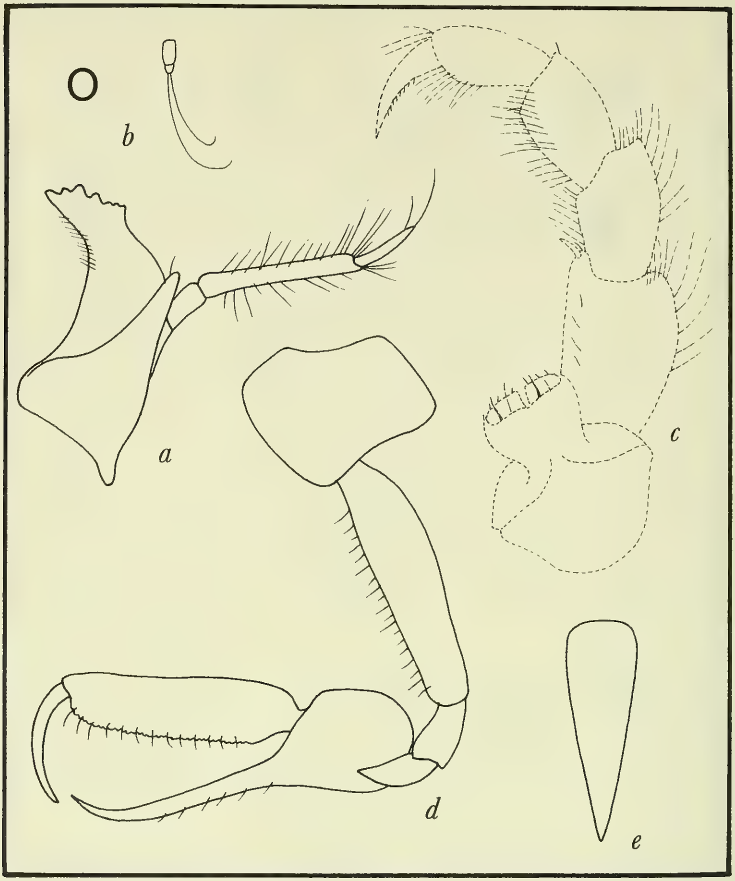

FIGURE 21.—**Leucothoidae:** *a*, mandible, note absence of molar; *b*, extremes of accessory flagellum, always very small; *c*, maxilliped, note obsolescence of outer plate; *d*, gnathopod 1, note complex subchelation [see Cressidae, Thaumatelsonidae, and Stenothoidae, all of which also have uniramous uropod 3]; *e*, telson, entire.

Sebidae have a uniramous uropod 3 and chelate gnathopod 2. Anamixidae, resembling Leucothoidae strongly, lack maxillae and recognizable mandibles, and have a strongly reduced coxa 1.

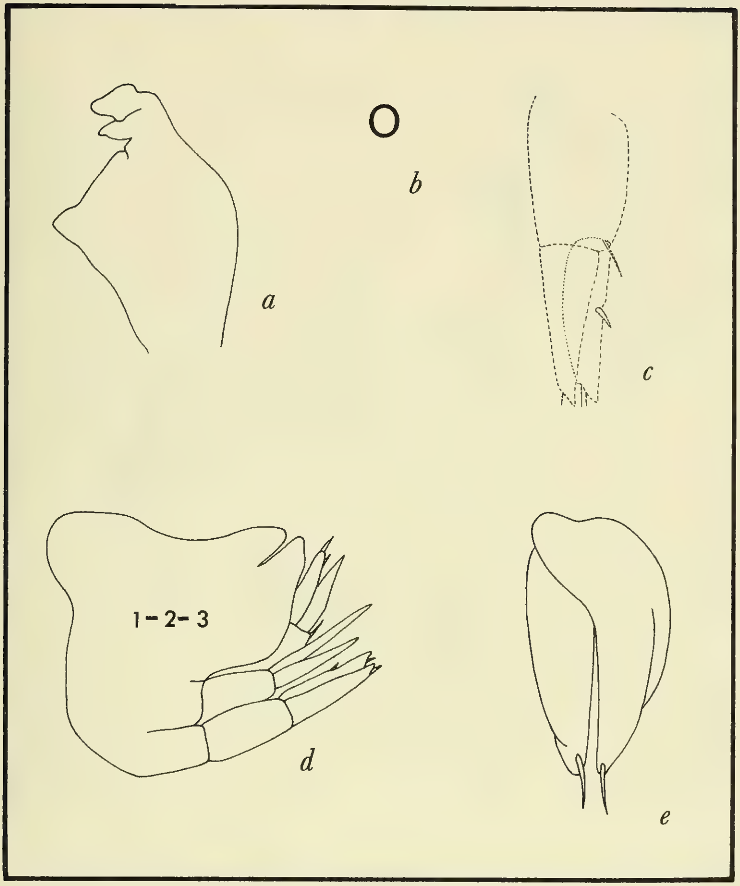

Figure 22.—**Prophliantidae:** *a*, mandible, note absence of palp and recognizable molar [see Atylidae]; *b*, accessory flagellum absent; *c*, uropod 3 [see Kuriidae, Talitroidea, Phliantidae]; *d*, urosome, left lateral aspect, note amalgamation of all segments and telson [see Talitroidea, Dexaminidae]; *e*, telson.

Eophliantidae have cylindrical bodies and reduced coxae.

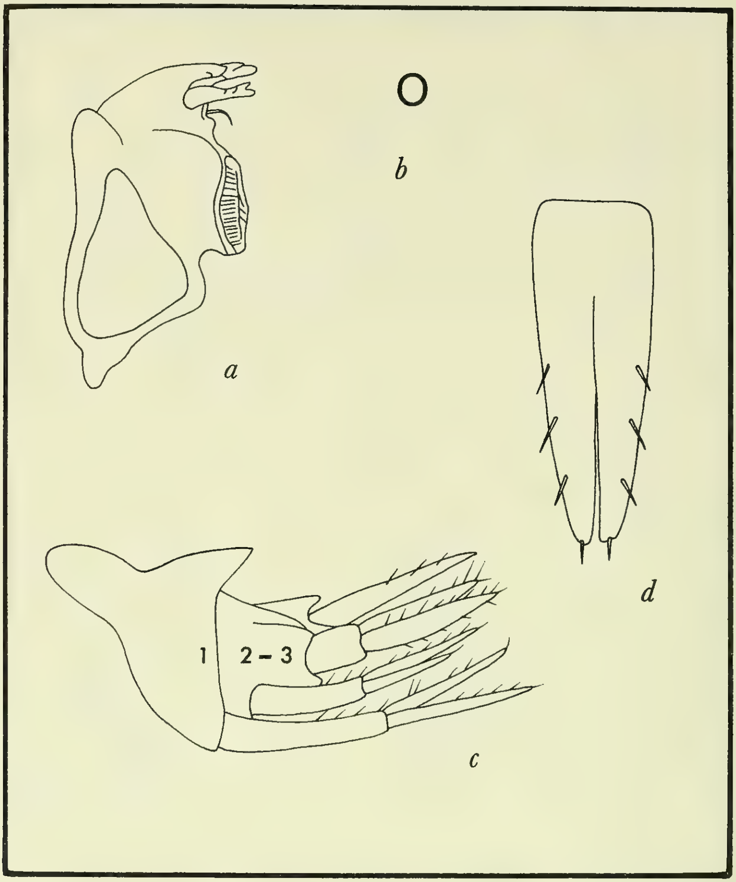

FIGURE 23.—**Dexaminidae:** *a*, mandible, palp absent [molar evanescent in Anatylinae]; *b*, accessory flagellum absent; *c*, urosome, left lateral aspect, note amalgamation of urosomites 2–3 [see Prophliantidae, Talitroidea]; *d*, telson.

Phliantidae have the palp of maxilla 1 degraded, and depressed rugose bodies with splayed coxae.

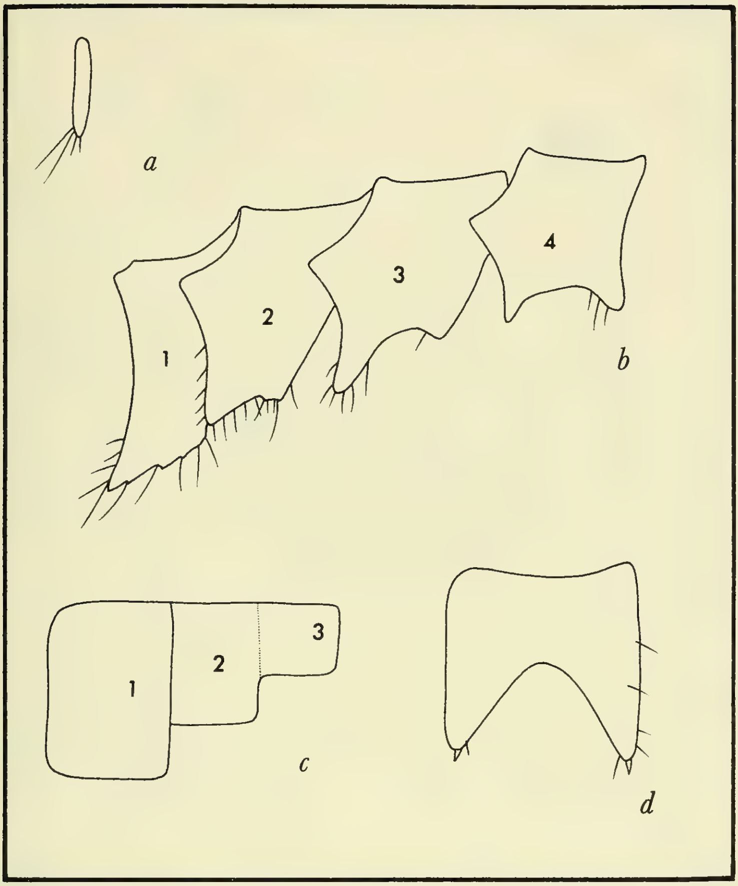

FIGURE 24.—**Lepechinellidae:** *a*, accessory flagellum [see Pleustidae, Ampeliscidae]; *b*, coxae 1–4, left to right, note acumination [see Atylidae, Ampeliscidae]; *c*, urosomites 1–3, left to right, note amalgamation of segments 2–3, presumably occurring in all lepechinellids [see Pleustidae, Paramphithoidae]; *d*, telson.

Presumably all lepechinellids have coalesced inner lobes on the lower lip and thus differ from Paramphithoidae. Kuriidae, Dexaminidae, and Prophliantidae lack mandibular palps,

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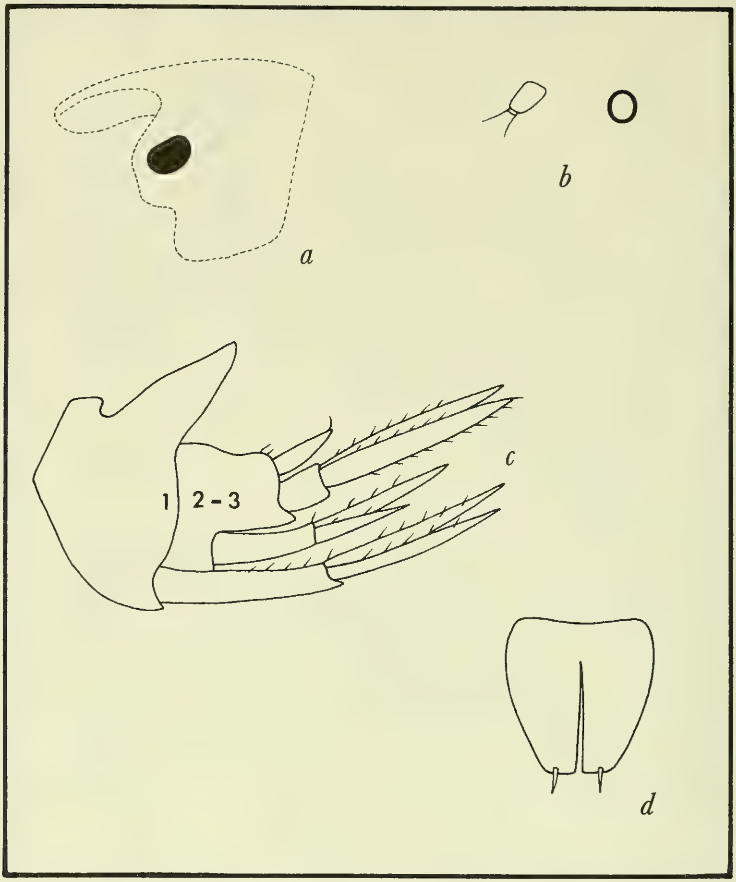

FIGURE 25.—**Atylidae:** *a*, head [see Ampeliscidae]; *b*, extremes of accessory flagellum; *c*, urosome, left lateral view, showing amalgamation of urosomites 2–3; *d*, telson. Lepechinellidae have acuminate coxae 1–4. Shallow-water Ampeliscidae have cuticular cephalic lenses. Dexaminidae, Prophliantidae, and Kuriidae lack a mandibular palp.

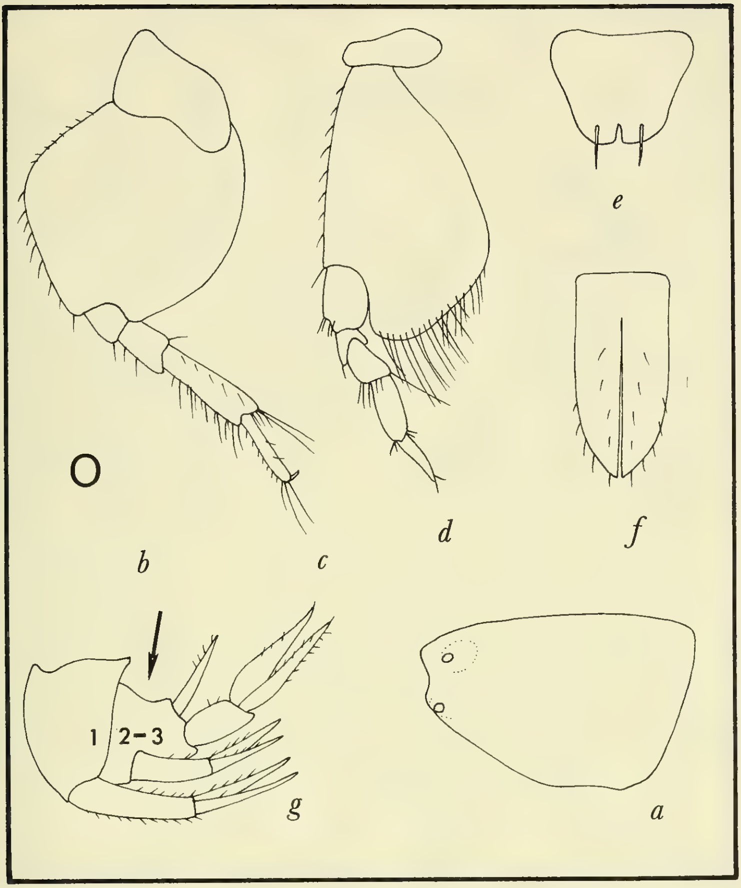

FIGURE 26.—**Ampeliscidae:** pereopods glandular: *a*, head, left lateral aspect, showing cuticular lenses and dotted lines indicating internal pigment (lenses unique in Gammaridea but absent in deep-sea ampeliscids) [see Atylidae]; *b*, accessory flagellum absent; *c*, pereopod 4 [often longer than pereopod 5 and of different shape]; *d*, pereopod 5; *e,f*, variations in telson; *g*, urosome, left lateral aspect, note amalgamation of urosomites 2–3. Atylidae have ommatidial eyes and lack the special combination of pereopods 4 and 5 shown here.

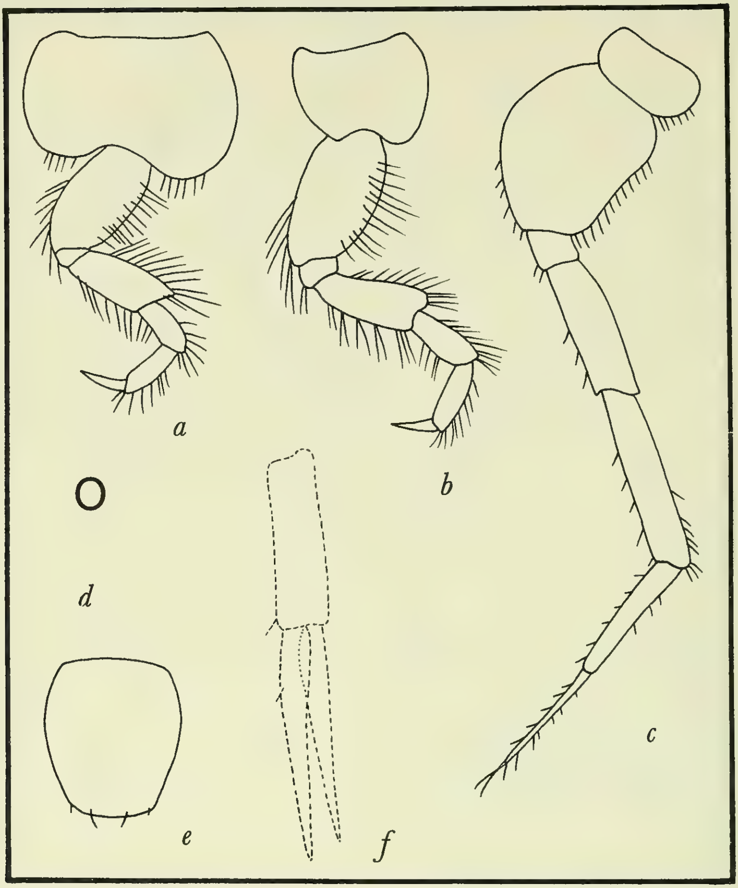

FIGURE 27.—**Oedicerotidae:** *a,b,c,* pereopods 3, 4, 5, note elongation of pereopod 5 [see Calliopiidae, Pleustidae, Synopiidae, Isaeidae and related families, Laphystiopsidae]; *d,* accessory flagellum absent [see Synopiidae, Pardaliscidae]; *e,* telson; *f,* uropod 3, note elongated peduncle [see Calliopiidae, Pleustidae, Laphystiopsidae].

Isaeid-like families have a thick, fleshy telson. Oculate oedicerotids mostly have dorsally contiguous or coalesced eyes.

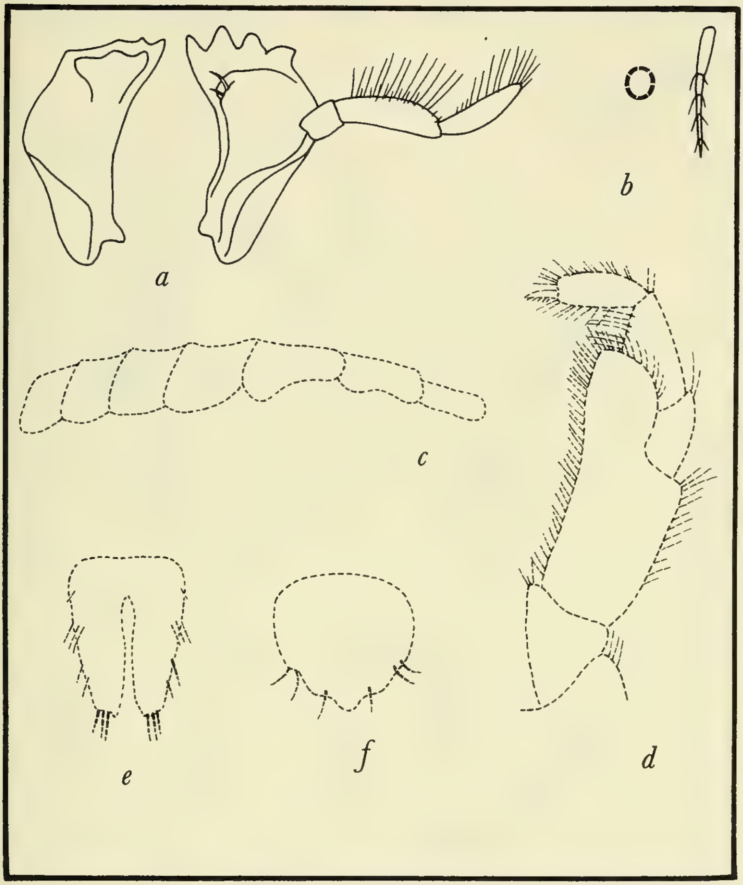

FIGURE 28.—**Pardaliscidae:** *a*, mandibles, left with palp not illustrated, note absence of molars and foliate cutting edges [see Laphystiopsidae]; *b*, accessory flagella, usually multiarticulate, absence extremely rare [see Stilipedidae]; *c*, coxae 1–7, very short [see Stilipedidae, Acanthonotozomatidae]; *d*, maxilliped, note obsolescence of inner plate [see Acanthonotozomatidae, Astyridae, Laphystiopsidae]; *e,f*, extremes of telson.

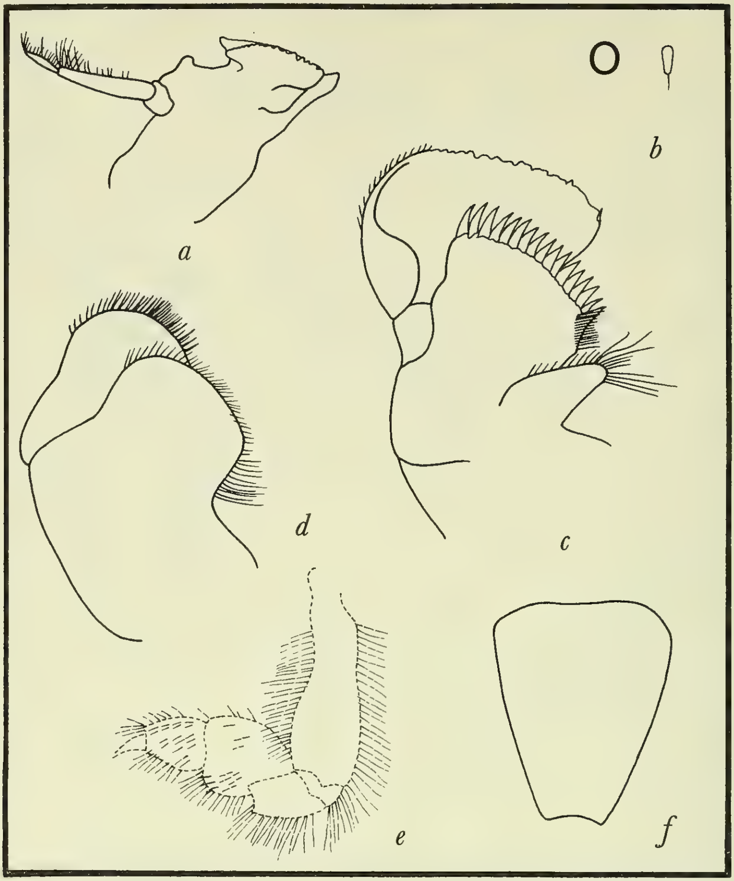

FIGURE 29.—**Stilipedidae:** *a*, mandible [see Synopiidae, Hyperiopsidae, Astyridae, Laphystiopsidae]; *b*, extremes of accessory flagellum, vestigial or absent [see Pardaliscidae which usually have multiarticulate condition]; *c,d*, maxillae 1, 2, foliaceous [see Pardaliscidae, never having foliaceous maxilla 2, Laphystiopsidae]; *e*, gnathopod 1, simple (gnathopod 2 also); *f*, telson.

Acanthonotozomatidae have their mouthparts grouped as a conical bundle and only one acanthonotozomatid genus has foliaceous maxillae.

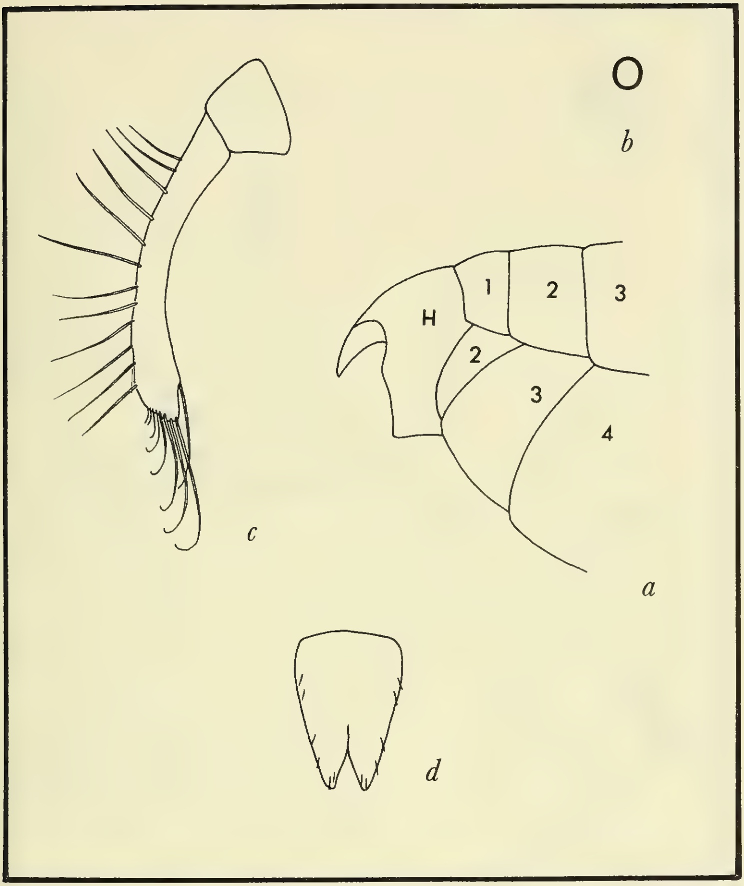

FIGURE 30.—**Bateidae:** *a*, head (H) and pereonites 1–3 with coxae 2–4 [coxa 1 vestigial or absent]: *b*, accessory flagellum absent; *c*, gnathopod 1, composed of coxa and article 2, other articles absent [exclusively characteristic]; *d*, telson.

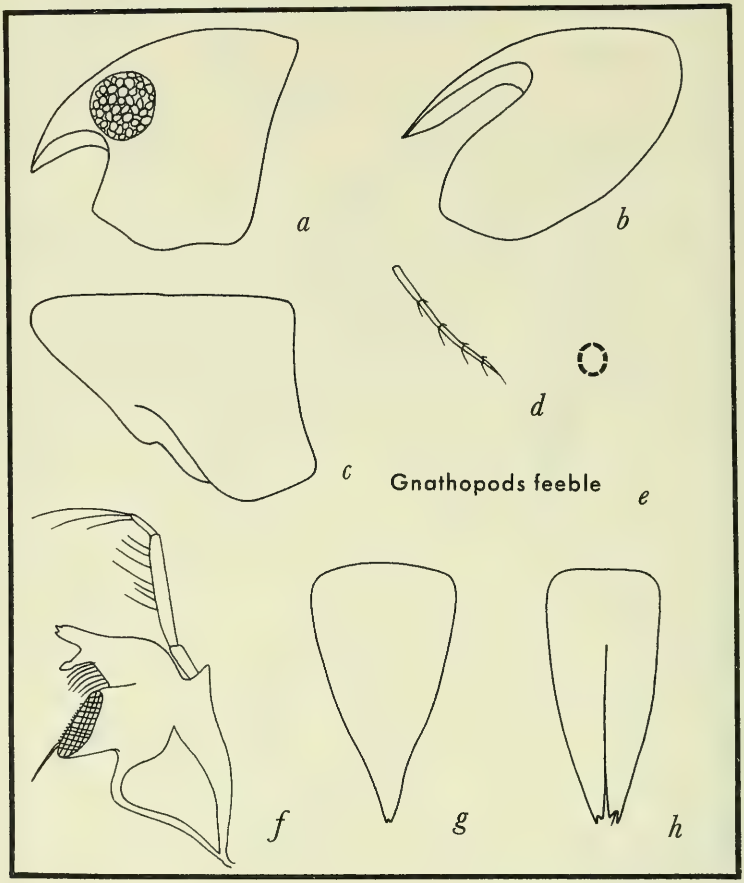

FIGURE 31.—**Synopiidae:** *a,b,c,* variations of head, head very large, usually galeate, with large downturned rostrum, except a few genera with head like fig. *c*; head like fig. *c* also occurring in Astyridae [see Vitjazianidae, Eusiridae]; *d*, accessory flagella, absence probably erroneous, usually more than 3-articulate [see Eusiridae]; *e*, gnathopods feeble; *f*, mandible, note short article 3 of palp (except in *Bruzeliopsis*) [see Astyridae, Pardaliscidae, Eusiridae]; *g,h*, telsons [see Astyridae, Oedicerotidae].

Astyridae have a uniarticulate accessory flagellum, and widely spaced outer lobes of the lower lip. Argissidae have a unique combination of shapes of coxae 1–4. Pardaliscidae have very short coxae. Oedicerotidae have elongated fifth pereopods. Hyperiopsidae have bent maxillary palps and elongated fourth articles of pereopods 1–2. Occasionally Astyridae and Pardaliscidae have heads like figure *b*. Oculate synopiids have dorsally contiguous or coalesced eyes, occasionally with anteroventral accessory ommatidia.

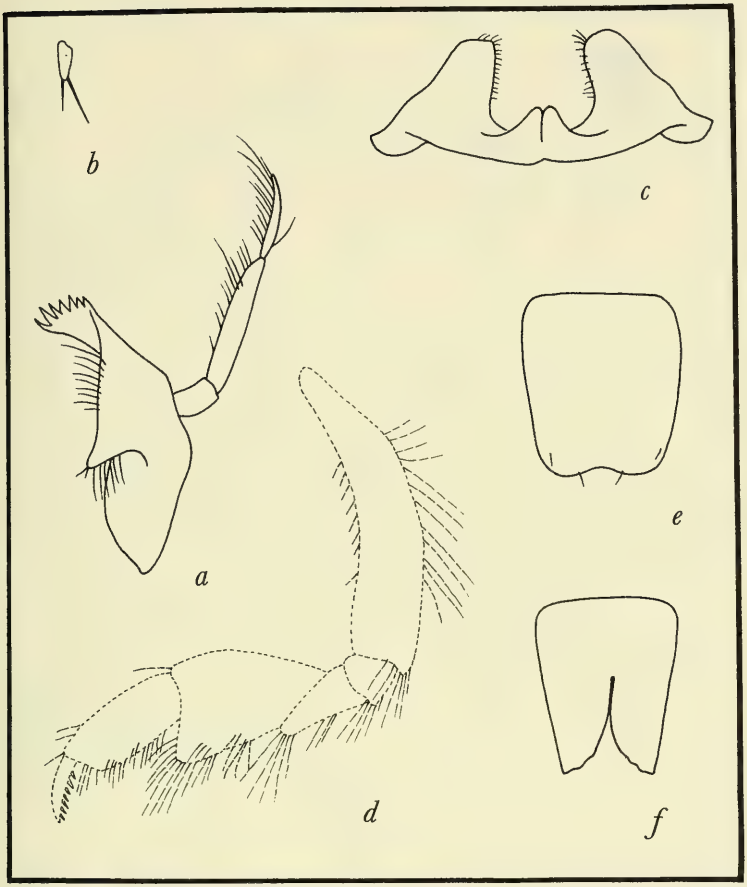

FIGURE 32.—**Astyridae:** *a*, mandible, note setose and conical but nontriturative molar [see Synopiidae, Pardaliscidae, most Eusiridae, Vitjazianidae]; *b*, accessory flagellum [see Synopiidae, Oedicerotidae, Vitjazianidae, Hyperiopsidae]; *c*, lower lip, note widely separated outer lobes [highly characteristic] [see Paramphithoidae]; *d*, gnathopod 1 (2 is similar) [see Liljeborgiidae, most Oedicerotidae, Vitjazianidae]; *e,f*, extremes of telson.

Eusiridae generally have an elongate telson, and often enlarged gnathopods. Hyperiopsidae have bent maxillary palps, and elongated fourth articles of pereopods 1–2. Haustoriidae generally have either a multiarticulate accessory flagellum, or a large or triturative molar. Astyrid cephalons may resemble those of Synopiidae (see fig. 31). Two paramphithoid genera, with nontriturative molars and weakly acuminate coxae, resemble Astyridae closely.

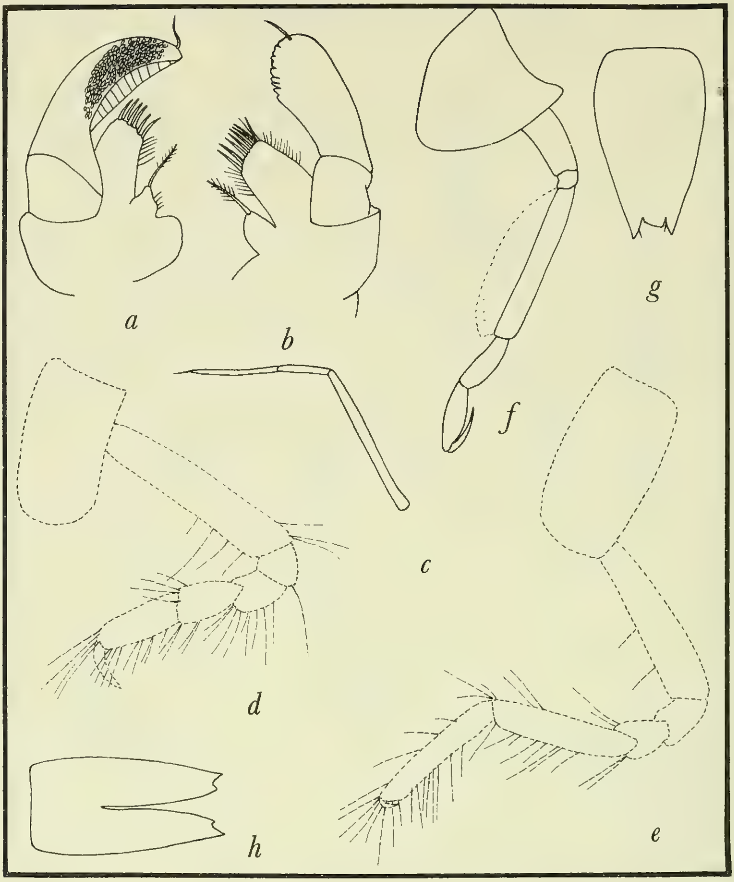

Figure 33.—**Hyperiopsidae:** *a,b,* maxilla 1, note enlarged condition of palps, one of them bent; *c,* accessory flagellum [see Ampeliscidae and Stilipedidae]; *d,e,* gnathopods 1, 2; *f,* pereopod 1 (and 2 similar), note elongation of article 4 and either slender or inflated; *g,h,* extremes of telson.

Combination of elongate article 4 of pereopods 1–2 and bent maxillary palps differentiates Hyperiopsidae from Astyridae, Synopiidae, Pardaliscidae, Vitjazianidae, Calliopiidae, and Eusiridae.

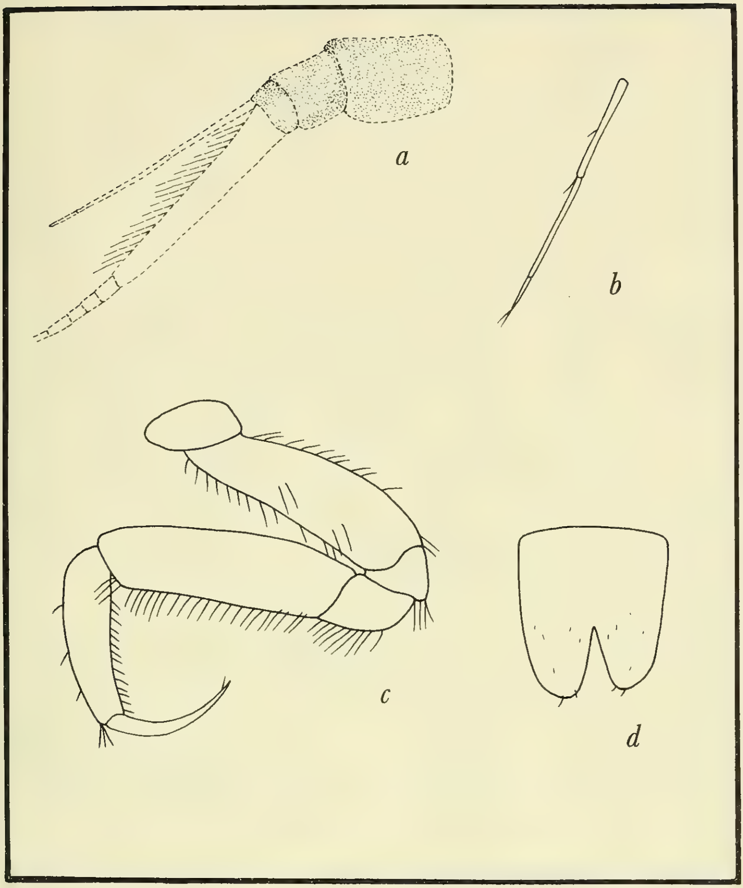

FIGURE 34.—**Vitjazianidae:** *a*, peduncle (stippled) of antenna 1, very short, and base of flagellum conjoint (a long article 1 of antenna 1 flagellum) [see Eusiridae, Gammaridae, Melphidippidae]; *b*, accessory flagellum [see Astyridae, Stilipedidae]; *c*, gnathopod 1 [see Liljeborgiidae]; *d*, telson.

Maxilla 1 normal [see Hyperiopsidae, Stilipedidae]. Article 4 of pereopods 1–2 of normal length [see Hyperiopsidae]. Uropod 3 of normal length [see Melphidippidae]. Mandibular molar large and triturative [see Astyridae, Stilipedidae]. Lower lip normal [see Astyridae]. Head small and poorly rostrate [see Synopiidae].

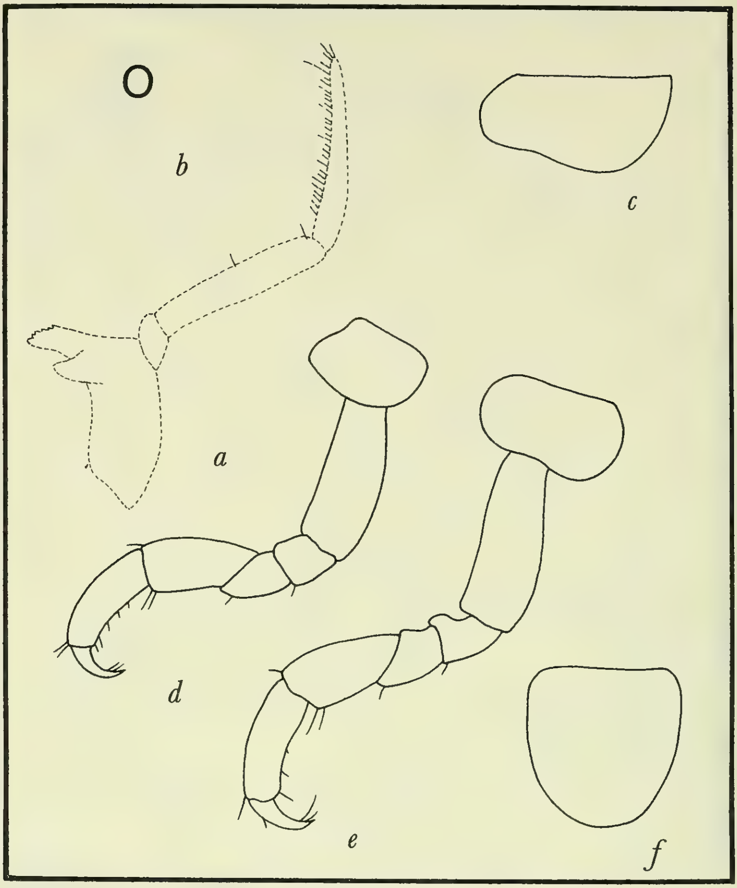

FIGURE 35.—**Laphystiopsidae:** *a*, mandible, note simple molar (general shape differing from that of Stilipedidae) [see Isaeidae and related families]; *b*, accessory flagellum [see Astyridae]; *c*, coxa 4, left aspect, of only type-genus; *d,e*, gnathopods 1, 2 (simple) [see Oedicerotidae, Isaeidae and related families]; *f*, telson.

One genus perhaps erroneously included here, see text. Probably a compound and artificial family. Lower lip resembling Pleustidae but type-genus *Laphystiopsis* distinguished by having reduced coxae and simple gnathopods. *Prolaphystius* has elongated urosomite 1. Family scarcely distinct from Calliopiidae but *Laphystiopsis* bearing large spatulate rostrum. See lower lip of Astyridae. Oedicerotidae usually have subchelate gnathopods, large coxae, and elongated peduncles of uropod 3.

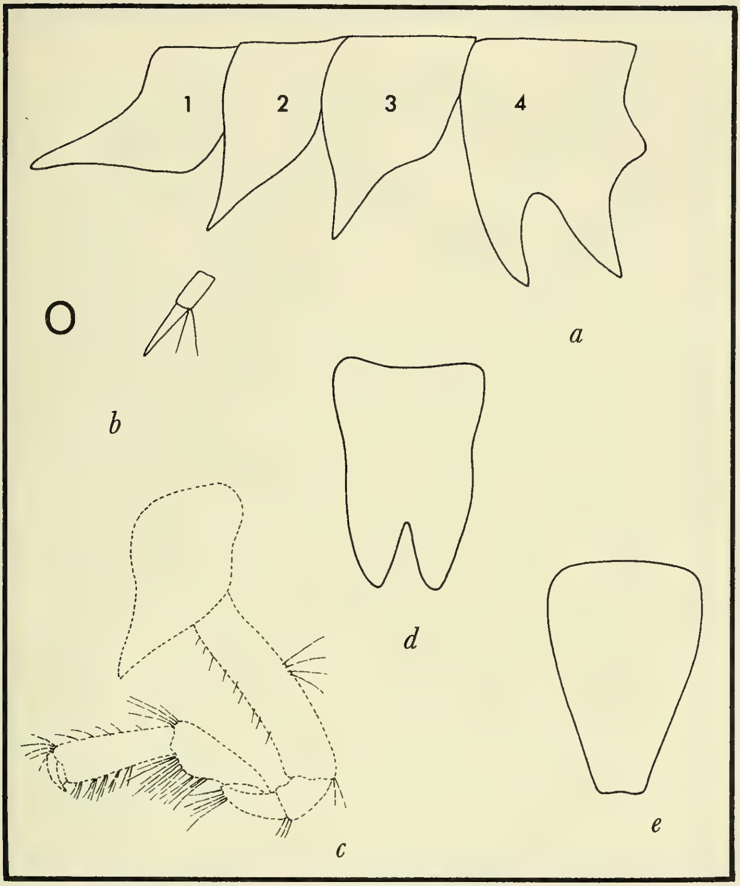

FIGURE 36.—**Paramphithoidae:** (incl. Amathillopsidae): *a*, coxae 1–4, left to right, note acumination [see Pleustidae, Eusiridae, Calliopiidae]; *b*, extremes of accessory flagellum; *c*, gnathopod 2, note feeble condition; *d*,*e*, extremes of telson.

Acanthonotozomatidae lack a distinct mandibular molar and have their mouthparts arranged in a conical bundle. Lepechinellidae have pleonites 5–6 amalgamated, extremely slender second articles of pereopods 3–5 and coalesced inner lobes of the lower lip. Haustoriidae have multiarticulate accessory flagella and strongly spinose pereopods.

Astyridae have nontriturative mandibular molars and widely separate outer lobes of the lower lip. Two genera of Paramphithoidae have nontriturative molars and may be examined in the key to the genera of Astyridae.

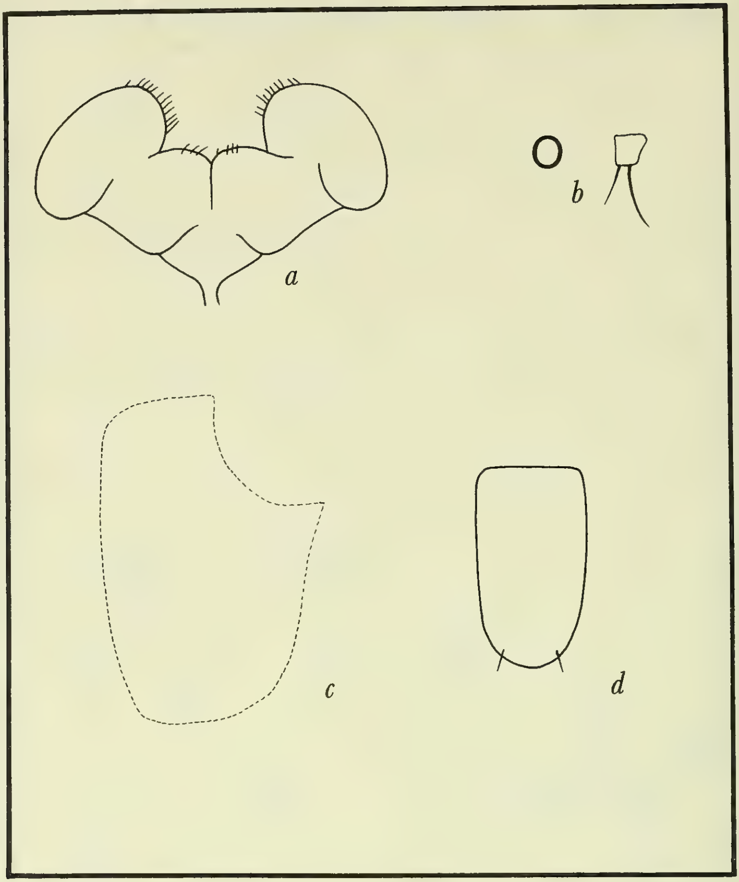

FIGURE 37.—**Pleustidae:** *a*, lower lip [see Calliopiidae]; *b*, accessory flagellum, absent or uniarticulate [see Liljeborgiidae]; *c*, coxa 4, left aspect, posteriorly excavate [see Isaeidae and related families, Laphystiopsidae]; *d*, telson [see Liljeborgiidae, Eusiridae, Lepechinellidae].

Paramphithoidae and Lepechinellidae have one or more of coxae 1–4 cuspidate or pointed [*Mesopleustes* appears to be assignable to either Paramphithoidae or Pleustidae]. Oedicerotidae have a disproportionately elongated pereopod 5 and short telson. Amphilochidae have a very small coxa 1. Laphystiopsidae may be synonymous with Pleustidae.

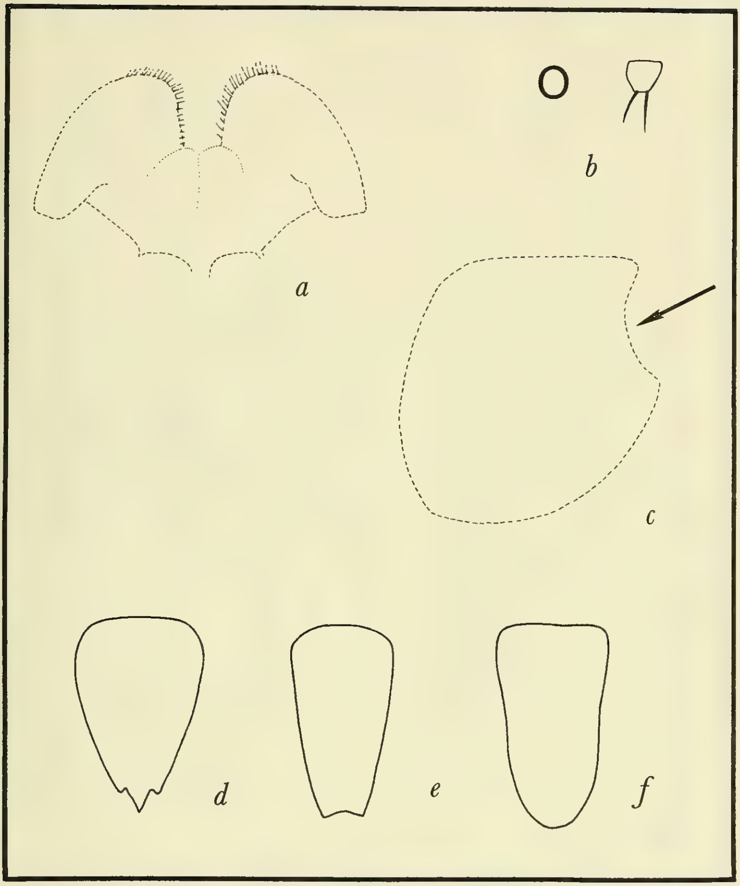

FIGURE 38.—**Calliopiidae:** *a*, lower lip, with or without inner lobes [see shape of lower lip of Pleustidae]; *b*, accessory flagellum either absent or uniarticulate; *c*, coxa 4, left aspect, posterior edge excavate [see Isaeidae and related families]; *d,e,f*, variations in telson [see Eusiridae, Gammaridae].

Oedicerotidae have disproportionately long fifth pereopods (but see *Paracalliope*). Laphystiopsidae have a poorly developed mandibular molar. Paramphithoidae have one or more of coxae 1–4 cuspidate or pointed. Amphilochidae have reduced first coxae. Some calliopiids have nonexcavate coxa 4 but lack pereopodal glands of isaeid-like families and do not have fleshy telsons.

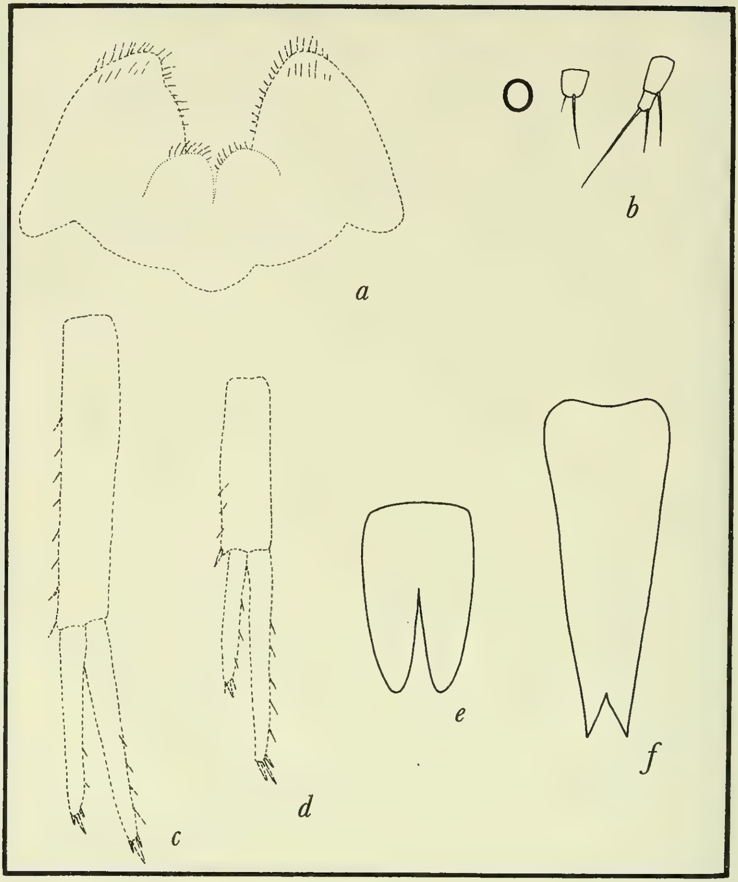

FIGURE 39.—**Eusiridae:** *a*, lower lip, with or without inner lobes [see shape of lower lip of Pleustidae, Astyridae]; *b*, accessory flagellum, absent, uni- or biarticulate [see Gammaridae which have a few species with 2-articulate accessory flagella]; *c,d*, uropods 1, 2, note shortened outer rami [most Gammaridae do not]; *e,f*, extremes of telson [see Calliopiidae, Pleustidae].

Astyridae have nontriturative mandibular molars but all Eusiridae except *Eusirella* have strongly triturative molars. Vitjazianidae have simple first gnathopods and basally conjoint primary flagella of antenna 1. Synopiidae have massive heads with deflexed rostra, usually have multiarticulate accessory flagella and feeble gnathopods whereas most Eusiridae have powerful gnathopods. Oedicerotidae have pereopod 5 disproportionately elongate in comparison with pereopods 3 and 4. Paramphithoidae always have the unique combination of feeble gnathopods and one or more acuminate coxae 1–4. Liljeborgiidae have the unique combination of powerful gnathopods and nontriturative mandibular molar. Gammaridae have pleonites 1–3 together not exceeding length of 5 pereonites together, whereas Eusiridae have these pleonites (metasome) exceeding six pereonites in length; all Eusiridae except one genus have elongate telsons, whereas Gammaridae have short telsons not or scarcely exceeding the length of pleonite 6.

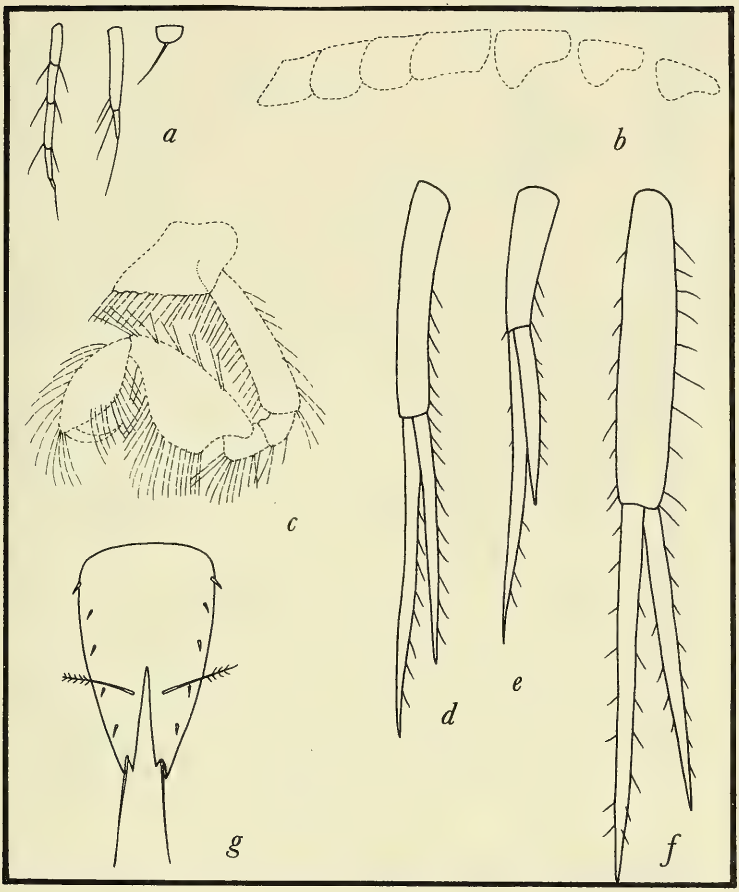

FIGURE 40.—**Melphidippidae:** *a*, extremes of accessory flagellum; *b*, coxae 1–7, left to right, note shortness; *c*, gnathopod 1, feeble (gnathopod 2 also feeble); *d,e,f*, uropods 1, 2, 3, [note extreme elongation of uropod 3, see Gammaridae]; *g*, telson.

Melphidippidae differ from Vitjazianidae by the normally elongated peduncle of antenna 1. See couplet 7, Section A of written key to families (p. 107) for definition of elongate uropod 3.

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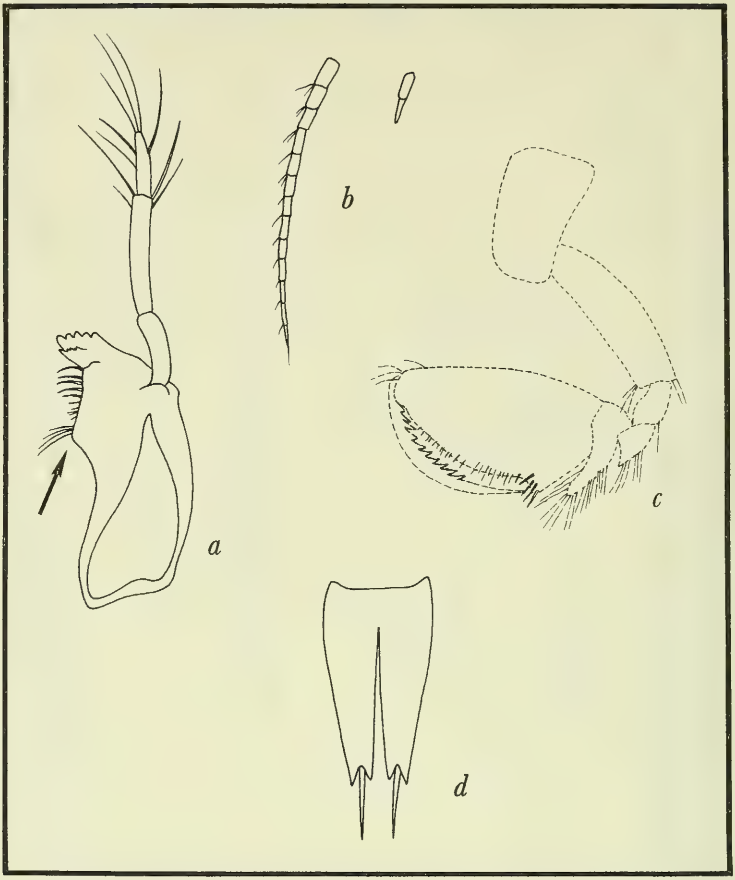

FIGURE 41.—**Liljeborgiidae:** *a*, mandible (molar weak and nontriturative) [see Gammaridae, Haustoriidae and most genera of Eusiridae]; *b*, extremes of accessory flagellum [see Pleustidae]; *c*, gnathopods 1–2 (powerful) [see Haustoriidae, Astyridae, Vitjazianidae]; *d*, telson [see Pleustidae].

Article 1 of mandibular palp in Liljeborgiidae often elongate.

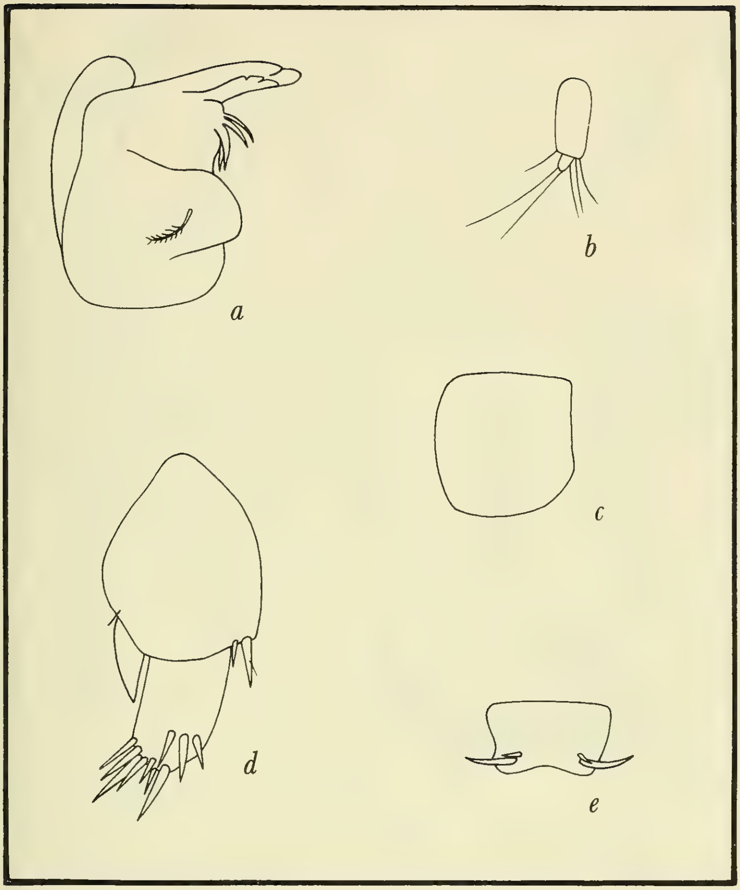

FIGURE 42.—**Beaudettiidae:** *a*, mandible (palp absent) [see Gammaridae]; *b*, accessory flagellum (2-articulate); *c*, coxa 4, left aspect (not posteriorly excavate); *d*, uropod 3 (inner ramus vestigial); *e*, telson, very short, entire [see Gammaridae].

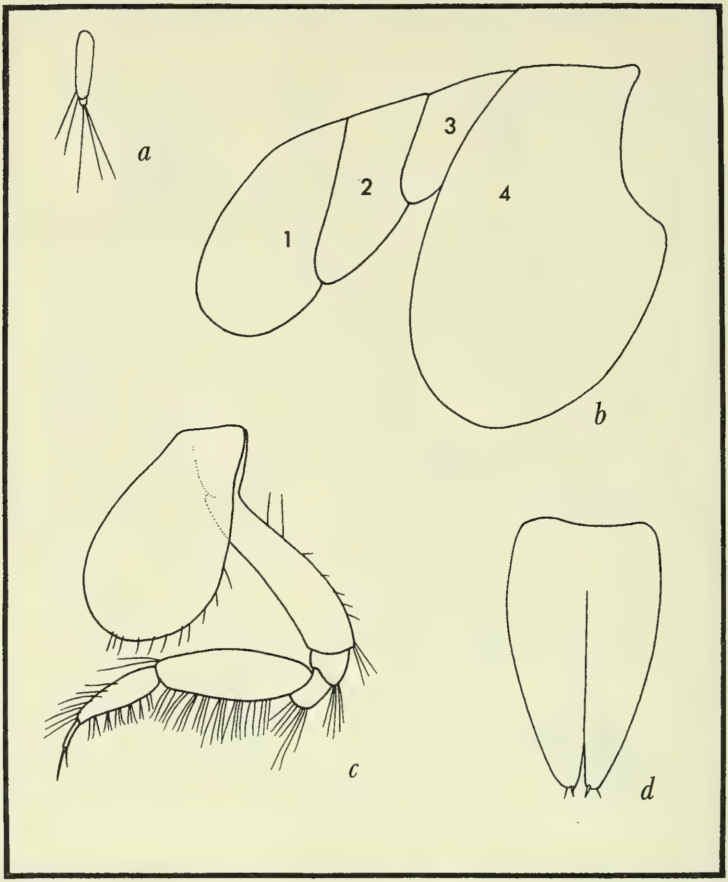

FIGURE 43.—**Argissidae:** *a*, accessory flagellum [see Ampeliscidae]; *b*, coxae 1–4, left to right [see Gammaridae, especially *Megaluropus*; Haustoriidae]; *c*, gnathopod 1 [2 is similar], feeble; *d*, telson.

Shallow-water Ampeliscidae have external cephalic cuticular lenses and amalgamated urosomites 2–3. Shallow-water Argissidae have four internal, bigeminous, lenticular, ocular bodies.

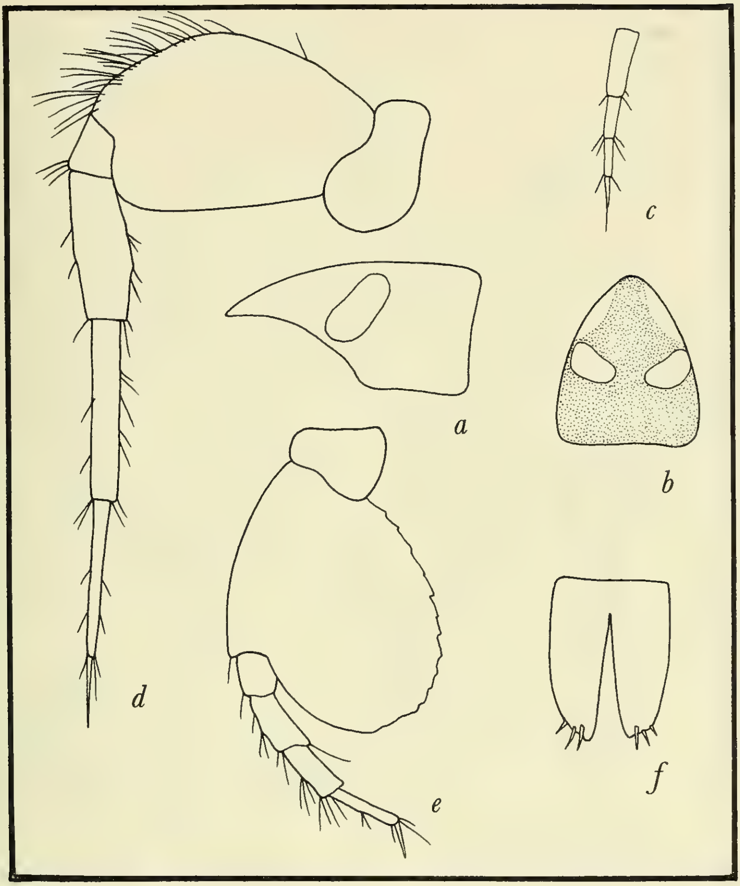

FIGURE 44.—**Phoxocephalidae:** *a,b,* lateral and dorsal views of head, note wide or narrow (stippled) rostrum in fig. *b; c,* accessory flagellum; *d,* pereopod 4 (elongated) [see Gammaridae]; *e,* pereopod 5; *f,* telson.

Combination of head with large rostrum and configurations of pereopods 4 and 5 is characteristic [see Haustoriidae].

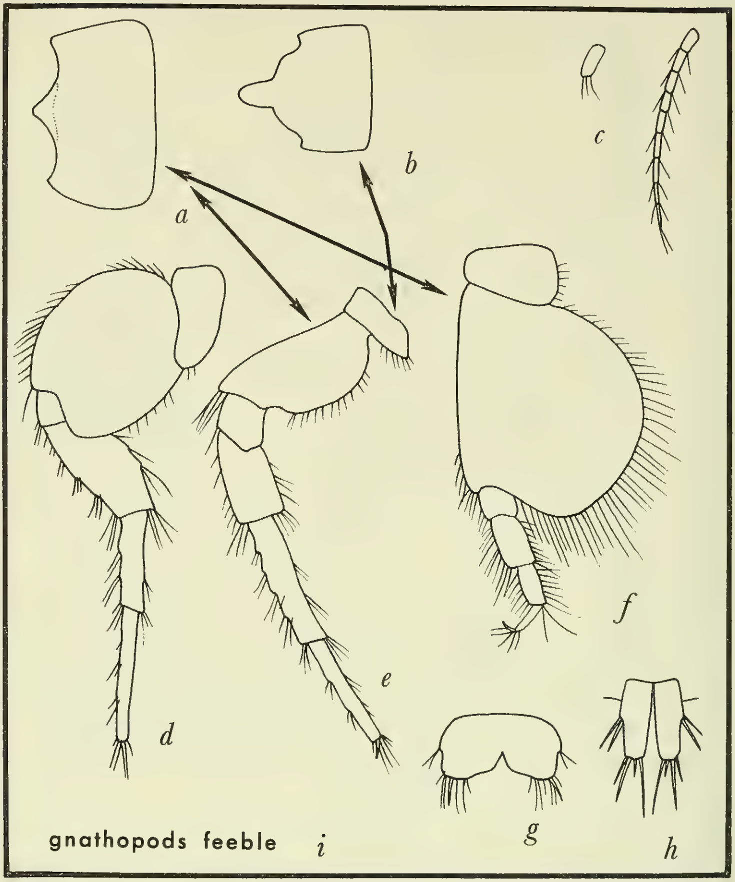

FIGURE 45.—**Haustoriidae:** *a,b*, head, dorsal views showing small and large rostra (occasionally genera occur with no rostra; those with large rostra (fig. *b*) have pereopod 5 like fig. *e*, thus not shorter than pereopod 4; genera with large rostra and pereopod 5 like fig. *f* are assigned to Phoxocephalidae); *c*, variational extremes in accessory flagellum [see Ampeliscidae, Astyridae, Paramphithoidae]; *d*, pereopod 4, note spinosity and occasional absence of article 7; *e,f*, extremes of pereopod 5, note spinosity [see Paramphithoidae]; *g,h*, telsons; *i*, gnathopods highly variable but feeble [see most Gammaridae, Liljeborgiidae]. Ampeliscidae have amalgamated urosomites 2–3. Dogielinotidae lack mandibular palps and have a uniramous uropod 3. Astyridae have a characteristic lower lip. Argissidae have a special configuration of coxae 1–4.

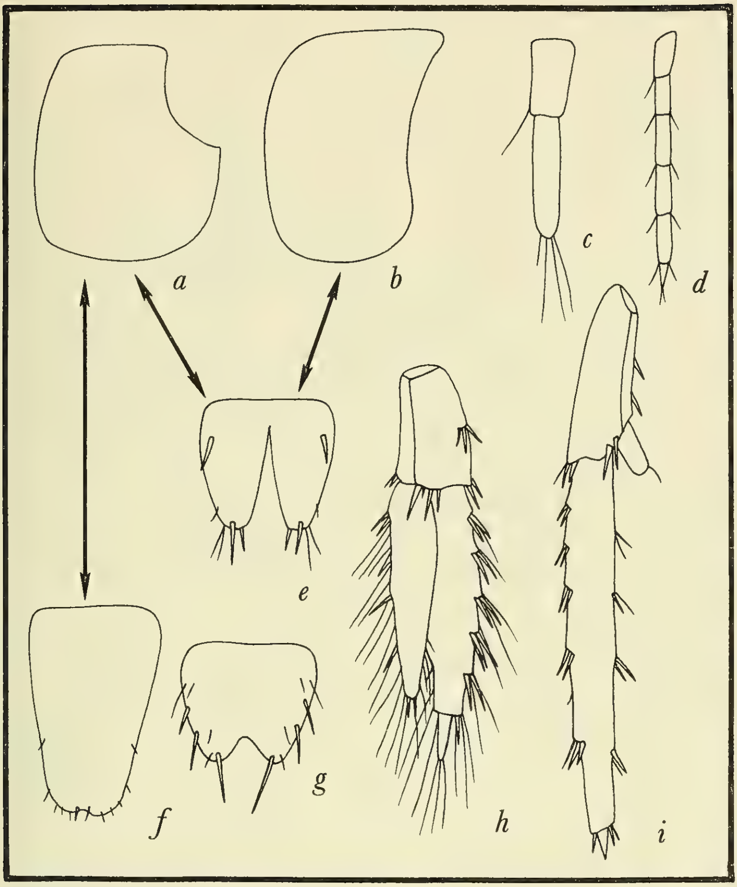

FIGURE 46.—**Gammaridae,** marine: *a,b,* two kinds of coxa 4, left aspect; *c,d,* two extremes of accessory flagellum, 2- or multiarticulate, rarely 1-articulate; *e,f,g,* three kinds of telson (arrows showing possible combinations with kinds of coxae, thus poorly excavate coxa 4 never combined with uncleft telson, except in *Falklandella*); *h,* uropod 3 (common kind); *i,* uropod 3 (rare kind). Figures *a,d,e* and *h* represent a combination similar to the basic gammaridean.

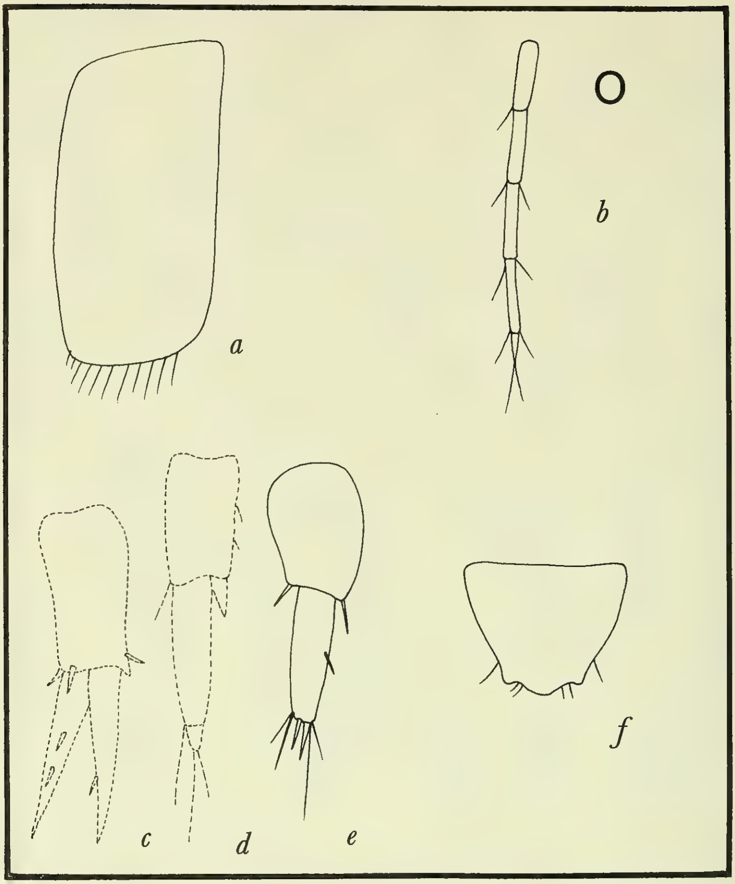

FIGURE 47.—**Isaeidae** (incl. Photidae), pereopods usually glandular: *a*, coxa 4, note lack of posterior excavation (coxa 4 may be long or short) [see some Gammaridae, Pleustidae, Calliopiidae and related families]; *b*, extremes of accessory flagellum; *c,d,e*, variations in uropod 3; *f*, telson, thick, short, and fleshy [see Calliopiidae, Pleustidae, Oedicerotidae]. Five isaeid genera have uniramous uropod 3 and might be confused with numerous other gammaridean families having uncleft telsons. But Cressidae, Stenothoidae, and Thaumatelsonidae have reduced first coxae; Eophliantidae have cylindrical bodies; Phliantidae, Talitroidea, and Dogielinotidae lack mandibular palps. Sebidae have subequally large, chelate gnathopods. Pagetinidae have evanescent mandibular molars and poorly developed outer plates of maxillipeds. See Aoridae, Ischyroceridae, Ampithoidae, Corophiidae, Podoceridae, and Cheluridae to follow for diagnostic differences.

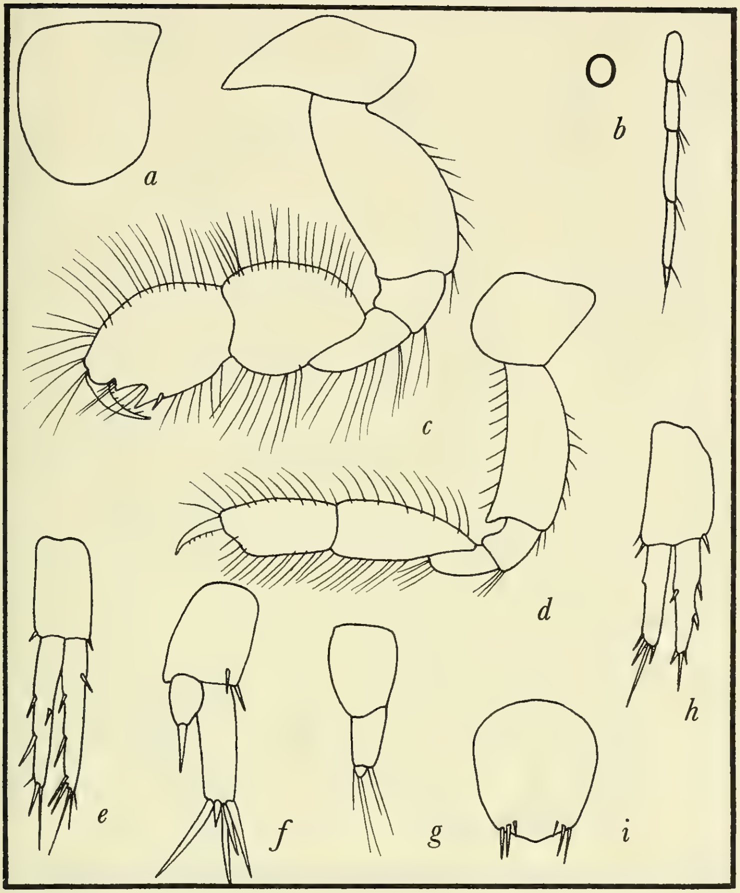

FIGURE 48.—**Aoridae,** pereopods glandular, like Isaeidae but gnathopod 1 larger than gnathopod 2 and bearing male sexual modifications: *a*, coxa 4, note absence of posterior excavation; *b*, extremes of accessory flagellum; *c,d*, gnathopods 1, 2, note 1 larger than 2 [see Isaeidae]; *e,f,g,h*, variation in uropod 3 [see Ischyroceridae, Corophiidae, Cheluridae]; *i*, telson, short, thick, fleshy.

See Isaeidae for characters differentiating genera with uniramous uropod 3 from families with uniramous uropod 3. Podoceridae have elongate urosomite 1. Cheluridae have coalesced urosomites 1–3. Corophiidae have depressed urosomes. Ischyroceridae and Ampithoidae have elongate peduncles of uropod 3. Ampithoidae have characteristic lower lips.

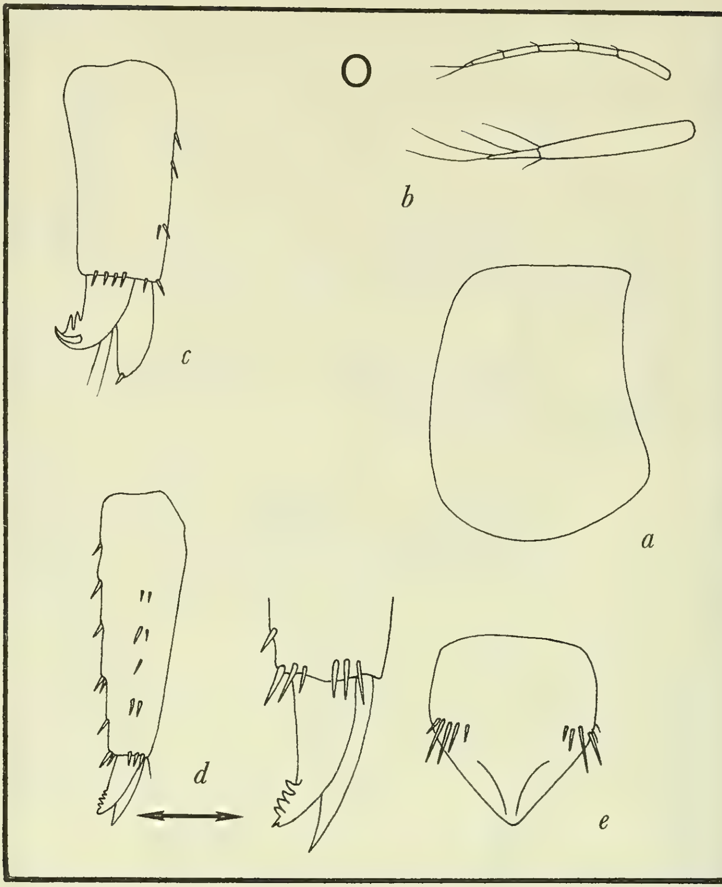

FIGURE 49.—**Ischyroceridae,** pereopods glandular, like Isaeidae and Aoridae but uropod 3 with elongate peduncle and outer ramus with minute distal ornaments: *a*, coxa 4, note lack of posterior excavation; *b*, extremes of accessory flagellum; *c*,*d*, uropod 3 and enlarged rami, note elongate peduncle and minute nonarticulate ornaments on outer ramus [see Isaeidae, Aoridae, Corophiidae, Ampithoidae]; *e*, telson, short, thick, fleshy.

Ampithoidae have characteristic lower lips. Podoceridae have elongate urosomite 1.

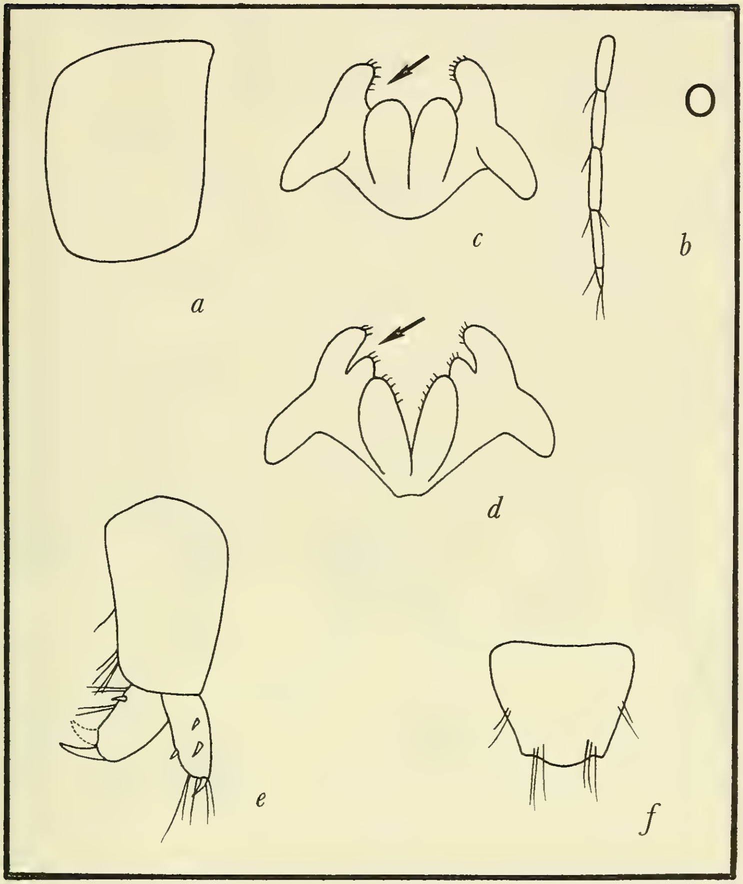

FIGURE 50.—**Ampithoidae,** pereopods glandular, like Isaeidae and Aoridae but peduncle of uropod 3 elongated and lower lips with characteristic shape, usually with notched outer lobes: *a*, coxa 4, note lack of posterior excavation; *b*, extremes of accessory flagellum; *c,d*, lower lips, outer lobes usually notched or excavate medially [see Ischyroceridae, Isaeidae, Aoridae, Corophiidae]; *e*, uropod 3, note elongate peduncle, short rami, presence of one or two large distal spines on outer ramus [see Ischyroceridae, Isaeidae, Aoridae, Corophiidae, Cheluridae]; *f*, telson.

Podoceridae have elongate urosomite 1. See text for *Jassa* (p. 279), the ischyrocerid often confused with ampithoids.

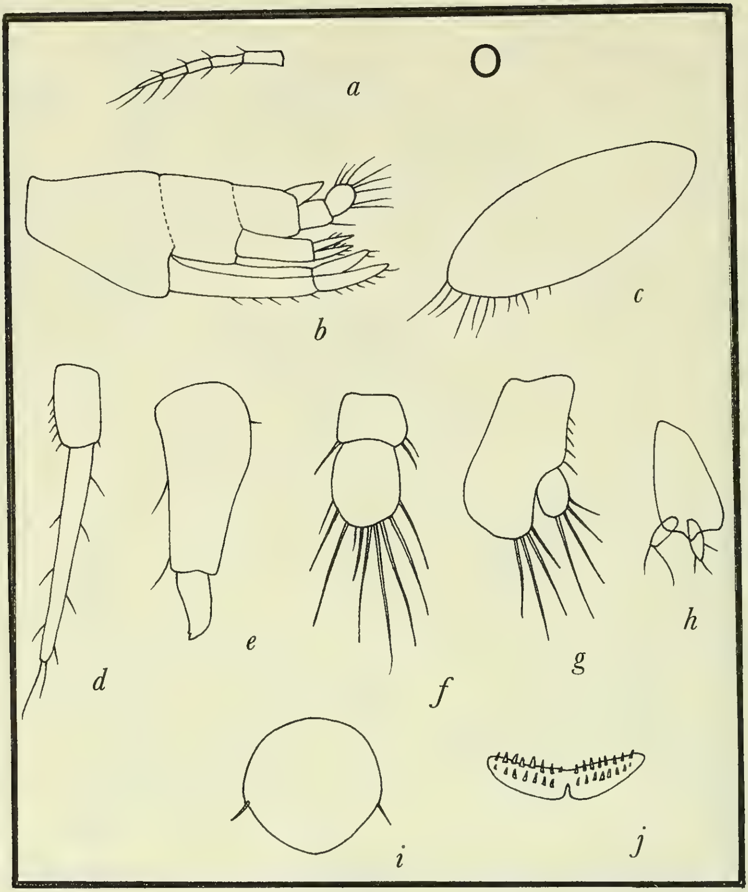

FIGURE 51.—**Corophiidae,** pereopods usually glandular; like Isaeidae, Aoridae, Ischyroceridae, but urosome depressed; uropod 3 almost always uniramous: *a*, extremes in accessory flagellum; *b*, urosome, left lateral aspect to show depression and occasional fusion of segments; *c*, coxa 4, note lack of posterior excavation [shape highly variable]; *d,e,f,g,h*, variations in uropod 3, usually uniramous [see Isaeidae for distinctions from distantly related families]; *i,j*, extremes in telson.

Genera with uropod 3 like figs. *e* and *h* are probably assignable to Ischyroceridae. Genera with enlarged gnathopod 1 are probably assignable to Aoridae, and others, except *Corophium*, are assignable to Isaeidae. Podoceridae have extremely elongated urosomite 1. Colomastigidae and Eophliantidae have degraded mandibles.

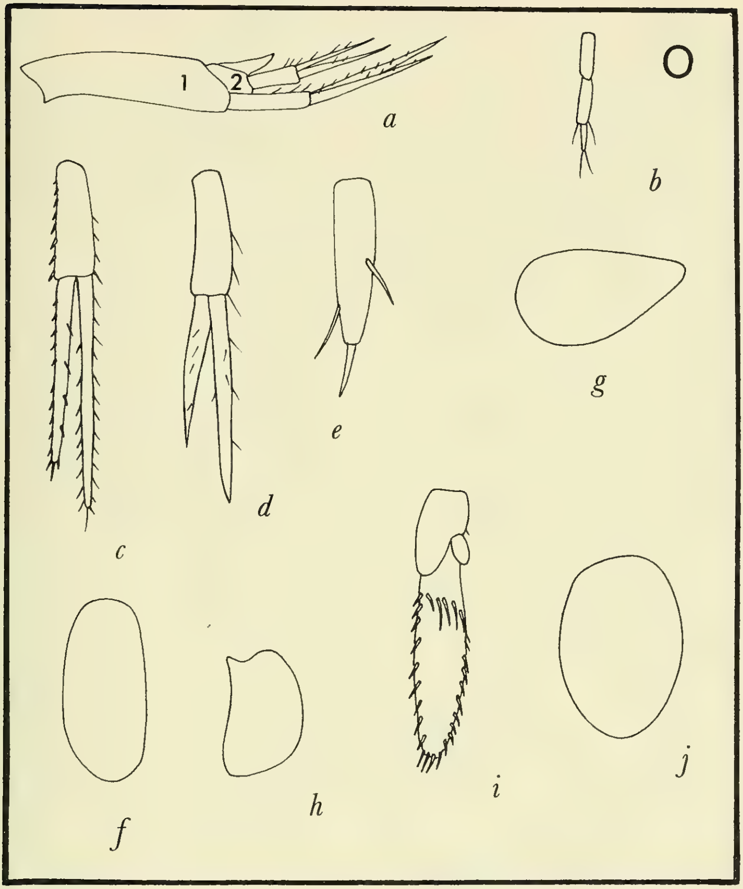

FIGURE 52.—**Podoceridae,** pereopods probably never glandular: *a*, urosome, left lateral aspect, showing elongated urosomite 1, typically depressed condition and frequent amalgamation of urosomites 2 and 3 (=2) [see Isaeidae, Ischyroceridae, Aoridae, Corophiidae, Cheluridae, Ampithoidae]; *b*, extremes of accessory flagellum; *c*, uropod 1; *d,e,f*, variation in uropod 2; *g*, coxa 4, note unexcavate posterior edge; *h,i*, extreme variations of uropod 3; *j*, telson.

Colomastigidae and Eophliantidae have degraded mandibles.

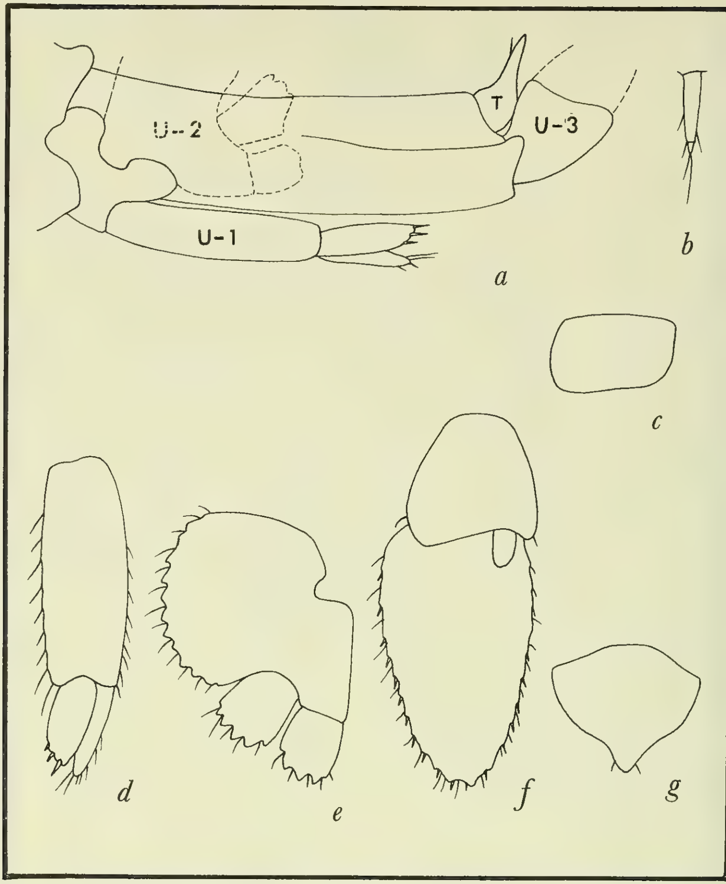

FIGURE 53.—**Cheluridae:** *a*, urosome, left lateral aspect showing amalgamation of all segments and depressed condition, uropods 1–3 (U–1, 2, 3) and telson (T) [see Podoceridae, Corophiidae]; *b*, accessory flagellum; *c*, coxa 4, note absence of posterior excavation; *d,e,f*, uropods 1, 2, 3 [see Corophiidae, Podoceridae]; *g*, telson.

Order Amphipoda

DIAGNOSIS.—Peracarid Malacostraca lacking carapace, thus having all but one or two of the thoracic segments freely visible; one thoracic segment carrying maxillipeds fused to head, occasionally next thoracic segment carrying gnathopods also fused to head (Caprellidea), followed by seven (occasionally six) visibly articulated thoracic segments, each bearing paired appendages, followed by six abdominal segments or their macroscopic remnants (except Caprellidea), first three (pleon) usually bearing paired biramous pleopods, remaining three (urosome) bearing paired biramous uropods; telson freely articulate in primitive and majority of members; head with two pairs of antennae, first occasionally biramous; maxillipeds lacking exopodites; heart mainly thoracic; respiration thoracic with gills attached to coxae (or their remnants) of segments 2–7 (variable); eyes sessile or rarely borne on unstalked cephalic scale; eggs carried in female brood pouch on ventral thorax formed of 2 to 4 (or 5) pairs of lamellae attached to coxae 2–6.

There are no radically degenerate and fully endoparasitic Gammaridae, although a number are inquilines, ectoparasites, and commensals which have sucking mouthparts and prehensile mechanisms on their appendages.

Gammaridea, especially the Gammaridae, lie closest to the logical, primitive stem of the Amphipoda and almost all evolutionary lines from Gammaridae-like ancestors are based on simplification of primitive parts. The Caprellidea have reduced but a vestige of the abdomen (except *Cercops* and *Caprogammarus*) and the Hyperiidea have lost the maxillipedal palps. Reduction of coxae is common in both of those suborders. Ingolfiellidea have lost all pleopods but some have developed a movable scale on which the eyes are borne when present.

One family of Gammaridea, the Ochlesidae, have lost the maxillipedal palps but their resemblance to Gammaridea in coxae and body shape and their presumed benthic habits have caused their assignment to the Gammaridea.

Key to the Suborders of Amphipoda

1. Abdomen normally vestigial, usually lacking large pleopods or uropods, except for microscopic vestiges not exceeding two pairs, gills two or 3 pairs and brood lamellae two pairs each, head and segment bearing gnathopod 1 usually immovably coalesced.
   CAPRELLIDEA (skeletonshrimps, whalelice, 250 species)

   Abdomen well developed, with six segments or their gross vestiges apparent, bearing some gross appendages, gills and brood lamellae exceeding three pairs each, head and thorax free 2

2. Maxillipeds absent . . . . HYPERIIDEA (pelagic, ?500 species)
   Maxillipeds bearing palps (except one rare family) 3
3. Movable compound dactyl of gnathopods 1–2 formed of articles 6–7 together; head occasionally with articulate ocular scale; pleopods when present, all reduced in size, leaf-like.
   INGOLFIELLIDEA (caves and marine, 15+ species)
   Dactyl of gnathopods 1–2 formed only of article 7; head never bearing ocular scale; pleopods biramous, elongate, rarely reduced except in terrestrial species.
   GAMMARIDEA (marine and limnetic scuds; beachhoppers; 3300 species)

Nomenclatural Changes in Gammaridean Families

Amathillopsidae are combined with the Paramphithoidae.
Anatylidae are combined with the Dexaminidae.
Hyalellidae are included with the superfamily Talitroidea.
Hyalidae are included with the superfamily Talitroidea.
Photidae are combined with the Isaeidae.
Pontogeneiidae are combined with the Eusiridae.
Talitridae are included with the superfamily Talitroidea.
Tironidae are combined with the Synopiidae.

Key to the Families of the Suborder Gammaridea [1]

("exceptional" refers to rare occurrence of familial members in this category)

SECTION A

1. Article 3 of gnathopod 2 elongate (fig. 3) . . . . Section B
   Article 3 of gnathopod 2 not elongate 2
2. Urosomites 1–2 coalesced, urosomite 3 free (fig. 105*b*).
   some species of PHLIANTIDAE; **Kamaka** (Corophiidae); and **Chevalia** (Isaeidae)
   Urosomites 2–3 or 1–3 coalesced . . . . Section C
   Urosomites separate 3
3. Coxa 1 small or absent, mostly hidden by a following coxa (some of following coxae longer than wide) (occasionally gnathopod 1 absent or vestigial). Section D
   Coxa 1 small or large but usually subequal to coxa 2 and never hidden by following coxae (occasionally coxa 1 partially hidden but all following coxae wider than long), (gnathopod 1 always fully developed) 4
4. Uropod 3 uniramous, or lacking rami, or absent . . . . Section E
   Uropod 3 biramous, inner ramus often reduced 5
5. Mandibular palp absent (use alternate if Section F unsatisfactory, because of uncertain loss of palp) . . . . Section F
   Mandibular palp present (with very rare exception absent) 6
6. Mandibular molar absent or if present not triturative, lacking numerous ridges and teeth (occasionally with articulate spines), occasionally large or immense and dominating mandible (fig. 166*d*) . . . . . . Section G

[1] Gurjanova (1962) also has a modern key to the families.

Mandibular molar well developed, triturative, bearing ridges and teeth, never extremely large or dominating mandible 7

7. Peduncle of uropod 3 elongate, as long as or longer than rami of uropods 1–2 (fig. 40) and more than twice as long as telson and peduncle of uropod 2, uropod 3 also greatly exceeding apices of either uropods 1 or 2 and rami elongate, subequal and nearly as long as rami of uropods 1–2 (uropod 3 is usually missing on individuals of this category but melphidippids are also recognized by the presence of dorsal teeth and serrations on the pleon, in combination with short, subequal and evenly quadrate anterior coxae, plus strong hemispherical lateral ocular bulges on head) . . . . 8[2]

If peduncle of uropod 3 elongate as above then uropod 3 not strongly exceeding apices of uropods 1–2; if peduncle of uropod 3 twice as long as telson then uropod 3 not exceeding apices of uropods 1–2 or peduncle not as long as rami of uropods 1–2; if uropod 3 greatly exceeding apices of uropods 1–2 then inner ramus short and scale-like or peduncle not elongate and not more than 1.2 times as long as peduncle of uropod 2, or rami much shorter than peduncle; thus uropod 3 not like that of first part of this couplet 9

8. Coxae 2–3 longer than broad, pleon dorsally smooth, pereopod 5 very conspicuously longer than 3 or 4, head without lateral ocular bulges (head often strongly rostrate) . . (exceptional) OEDICEROTIDAE (p. 373)

Coxae 2–3 very short and broader than long, pleon dorsally toothed and serrate, pereopods 3–5 very long but subequal in length to each other, head with strong hemispherical ocular bulges on sides.
MELPHIDIPPIDAE (p. 368)

Coxae 2–3 about as long as broad, pleonite 4 with one dorsal tooth, pereopods 3–5 long but subequal in length, head without lateral ocular bulges.
Casco (Gammaridae) (p. 238)

9. Coxae 1–3 successively and very distinctly shortened (fig. 43), (and see mimic *Megaluropus* in Gammaridae and *Casco* with anteriorly acuminate coxa 1 in Gammaridae) . . . . ARGISSIDAE (p. 157)

Coxae 2 or 3 always as long as or larger than coxa 1 10

10. Telson entire, or emarginate, very short, coxa 4 not excavate posteriorly (pereopods often glandular) . . . . Section H

Telson entire or cleft, short or long, coxa 4 usually excavate posteriorly or acuminate (coxa 4 always excavate posteriorly or acuminate when telson entire, but see *Parapherusa* in Section F and in Gammaridae), (pereopods not glandular) 11

11. Head massive (see definition in glossary), or with strongly downturned rostrum, or "shark-nose" rostral projection (fig. 31*c*), [gnathopods weak (fig. 31)] 12

Head not massive or rostrum if present on massive head not downturned (Hyperiopsidae have massive head, no rostrum; Pleustidae and some Phoxocephalidae have downturned rostrum on small head) 13

12. Pereopod 5 conspicuously longer than pereopods 3–4, at least 1.5 times as long as pereopod 4, accessory flagellum absent, or 1-articulate and short if present, peduncle of uropod 3 always elongate and telson always half or less as long as that peduncle and usually entire or rarely emarginate.
OEDICEROTIDAE (p. 373)

Pereopod 5 subequal to pereopod 4 in length, though both often elongate, accessory flagellum always present and usually multiarticulate; when 1-articulate, accessory flagellum elongate; peduncle of uropod 3 rarely

[2] See also the calliopiid *Metaleptamphopus*.

elongate but telson always (except *Synopia* with large accessory flagellum) longer than and generally twice as long as peduncle of uropod 3, cleft or entire . . . . SYNOPIIDAE (p. 454)

13. Pereopods 3–5 strongly spinose or setose and with elongate setae ("fossorial," see glossary) (figs. 97–99) 14
 Pereopods 3–5 poorly spinose or setose or not fossorial 19

14. Pereopod 5 conspicuously elongate, at least 1.5 times longer than pereopods 3–4 . . . . OEDICEROTIDAE (p. 373)
 Pereopod 5 not conspicuously elongate, subequal to, shorter than or slightly longer than pereopod 4 15

15. Telson elongate, nearly twice as long as peduncle of uropod 3 or urosomite 3 . . . . (exceptional) SYNOPIIDAE (p. 454)
 Telson not elongate, scarcely exceeding length of peduncle on uropod 3 or urosomite 3 16

16. Base of primary flagellum of antenna 1 conjoint, thus article 1 of flagellum longer than peduncle (fig. 34*a*) . (exceptional) VITJAZIANIDAE (p. 476)
 Base of primary flagellum of antenna 1 multiarticulate, article 1 of flagellum less than half as long as peduncle 17

17. Rostrum usually evanescent, pereopod 5 usually similar to pereopod 4 in structure; when pereopod 5 shorter than and of different structure than pereopod 4 then rostrum absent (fig. 45).
 (See *Sancho* in Calliopiidae) 18
 Head with distinct, and depressed or downturned, rostrum, pereopod 5 always shorter and of different structure than pereopod 4 (fig. 44).
 PHOXOCEPHALIDAE (p. 412)

18. Check the individual through the family key of Haustoriidae. Most haustoriids will be detected in the first 15 couplets. If one of the following characters does not apply to the species, proceed to Gammaridae: (1) pereopod 5 much shorter than 4 and article 2 lamellar (*Pontoporeia* and *Urothoides*); (2) mandible immense, triturating surface large and smooth, distal, palp relatively small and thin, and nearly asetose (*Carangolia*); (3) article 2 of maxilla 1 palp shorter than article 1 (*Phoxocephalopsis*); (4) mandibular incisor unproduced and teeth absent or obsolescent and article 6 of pereopods 1–2 with stout spines (*Urothoe* and *Urothoides*).
 HAUSTORIIDAE (p. 248) and GAMMARIDAE (p. 231)

19. Some anterior coxae acuminate midventrally (fig. 36), and accessory flagellum less than 3-articulate.
 PARAMPHITHOIDAE (p. 389) and ACANTHONOTOZOMATIDAE (p. 117) [3]
 Anterior coxae not acuminate midventrally, or if acuminate then accessory flagellum more than 2-articulate 20

20. Article 4 of pereopods 1–2 extremely elongate relative to other articles, palp of one member of first maxillae distinctly geniculate and scaled.
 (fig. 33) HYPERIOPSIDAE (p. 261)
 Article 4 of pereopods 1–2 not elongate, palp of maxilla 1 neither strongly geniculate nor scaled 21

21. Telson entire (often with minute notch or shallow emargination) . . . 22
 Telson cleft 26

[3] See also *Halirages stebbingi* Schellenberg (1931) (=*H. huxleyanus* Stebbing, 1888, not Bate) in family Calliopiidae. Note that almost all acanthonotozomatids have a nontriturative mandibular molar or no molar whereas almost all Paramphithoidae have triturative molars. Acanthonotozomatidae usually have conically grouped mouth parts from lateral view whereas most Paramphithoidae have mouth parts grouped in a quadrate bundle. See text for further discussion.

22. Accessory flagellum 2-articulate 23
Accessory flagellum 1-articulate or absent 24
23. Rami of uropod 3 cylindroconical, much shorter than elongate peduncle.
Bathyphotis (Ischyroceridae) (p. 275)
Rami of uropod 3 lanceolate or flabellate, much longer than peduncle.
(exceptional) GAMMARIDAE (p. 231)
24. Lower lip with unpointed, tilted, oval lobes astride partially coalesced inner lobes (fig. 37) . . . . PLEUSTIDAE (p. 421)
Lower lip with tilted or untilted outer lobes but with distinct mandibular extensions, inner lobes when present not coalesced (fig. 38), (examine also key to Eusiridae if telsonic condition dubious) 25
25. Telson longer than wide . . . . CALLIOPIIDAE (p. 167)
Telson as wide as or wider than long . . . . (exceptional) GAMMARIDAE
26. Article 1 of primary flagellum on antenna 1 as long as peduncle.
VITJAZIANIDAE (p. 476) and (exceptional) male SYNOPIIDAE (p. 454)
Article 1 of primary flagellum on antenna 1 not longer than half of peduncle 27
27. Telson elongate (fig. 39), twice as long as peduncle of uropod 3 28
Telson rarely longer than peduncle of uropod 3, never twice as long as peduncle of uropod 3 30
28. Urosomite 3 twice as long as urosomite 2, head with anterodorsal margin extended as blunt plow (fig. 66*d*) . **Pseudotiron** (Synopiidae) (p. 461)
Urosomite 3 less than 1.5 times as long as urosomite 2, head of normal dimensions as in basic gammaridean 29
29. Accessory flagellum 3+-articulate . . (exceptional) SYNOPIIDAE (p. 454)
Accessory flagellum 0–2-articulate (examine also key to Calliopiidae if telsonic cleft dubious) . . . . EUSIRIDAE (p. 213)
30. Inner ramus of uropod 3 short and scale-like (fig. 96*c*).
(exceptional) GAMMARIDAE (p. 231)
Inner ramus of uropod 3 elongate 31
31. Rami of uropod 3 foliaceous . . . . (exceptional) GAMMARIDAE (p. 231)
Rami of uropod 3 lanceolate 32
32. Mandibular palp article 2 shorter than article 1.
(exceptional) GAMMARIDAE (p. 231)
Mandibular palp article 2 longer than article 1 33
33. Gnathopod 1 simple . . . . (exceptional) GAMMARIDAE (p. 231)
Gnathopod 1 subchelate 34
34. Accessory flagellum 2+-articulate . . . . GAMMARIDAE (p. 231)
Accessory flagellum 1-articulate or absent . . . . . EUSIRIDAE (p. 213)

SECTION B

1. Head and body strongly depressed, rugose, coxae splayed (fig. 10).
PHLIANTIDAE (p. 405)
Head subglobular, body cylindrical (fig. 8*i*), coxae short, not splayed.
(exceptional) EOPHLIANTIDAE (p. 209)
Head compressed or subglobular, body compressed laterally, rarely rugose, coxae never splayed 2
2. Article 2 of antenna 1 shorter than or equal to article 1, uropod 3 usually biramous but when uniramous then article 2 of antenna 1 not elongate or gnathopod 1 not chelate 3
Article 2 of antenna 1 much longer than or equal to article 1 (fig. 15), uropod 3 always uniramous, gnathopods strongly chelate . . . SEBIDAE (p. 435)

3. Article 4 of pereopods 1–2 enormously elongate relative to other articles and often inflated (fig. 33*f*) 4
   Article 4 of pereopods 1–2 of normal length relative to other articles . . . 5
4. Palp of maxilla 1 claviform, slightly geniculate (figs. 33*a*, *b*.). HYPERIOPSIDAE (p. 261)
   Palp of maxilla 1 not geniculate . . . . proceed to couplet 5
5. Gnathopod 2 with form of typical lysianassid mitten (fig. 3) 6
   Gnathopod 2 not typical of lysianassids 7
6. Accessory flagellum absent and pleonites 1–3 with sharp dorsal processes, articles 5 and 6 of gnathopod 2 lacking scales or minute coarse setules. (exceptional) ACANTHONOTOZOMATIDAE (p. 117)
   If accessory flagellum absent then pleonites 1–3 dorsally smooth; accessory flagellum otherwise present, articles 5 and 6 of gnathopod 2 bearing scales or minute coarse setules . . . . (fig. 3) LYSIANASSIDAE (p. 294)
7. Urosomites all coalesced 8
   Urosomites separate 9
8. Uropod 3 biramous . . . . (fig. 22) PROPHLIANTIDAE (p. 432)
   Uropod 3 uniramous . . . . (fig. 13) KURIIDAE (p. 280)
9. Uropod 3 formed only of small, scale-like peduncle. **Didymocheila** (incertae sedis) (p. 478)
   Uropod 3 bearing one or two rami (inner often reduced) 10
10. Uropod 3 with one ramus . . . . **Microprotopus** (Isaeidae) (p. 274)
    Uropod 3 with two rami 11
11. All mouthparts except maxilliped replaced by ventral buccal keel and bulbs. (fig. 20) ANAMIXIDAE (p. 145)
    Mandibles, lower lip and maxillae present 12
12. Accessory flagellum 1–2 articulate or absent, mouthparts from lateral view usually grouped in conical bundle, pereopods not strongly spinose . . 13
    Accessory flagellum always 1+-articulate, mouthparts from lateral view usually quadrately grouped, pereopods strongly spinose and setose ("fossorial") (fig. 45) . . . . (exceptional) HAUSTORIIDAE (p. 248)
13. Mandibular palp present, pleon processiferous (fig. 7). (exceptional) ACANTHONOTOZOMATIDAE (p. 117)
    Mandibular palp absent, pleon never processiferous (fig. 4). STEGOCEPHALIDAE (p. 436)

SECTION C

1. Body plan cylindrical or depressed (tanaid-like, caprellid-like or extremely broad and flat) 2
   Body plan compressed laterally (normal gammaridean plan) 6
2. Mandible lacking palp and molar degraded 3
   Mandible with palp of one to three articles, molar triturative 4
3. Body cylindrical, tanaid-like, smooth (fig. 8), coxae very small. COLOMASTIGIDAE and EOPHLIANTIDAE (pp. 182 and 209)
   Body strongly depressed, very broad and rugose (fig. 10), coxae large and splayed or body, if not rugose, with pereonites laterally discontiguous. PHLIANTIDAE (p. 405)
4. Urosomites 1–3 coalesced 5
   Urosomites 2–3 coalesced and urosomite 1 very elongate (fig. 52). PODOCERIDAE (p. 426)
5. Uropods 1–2 of very diverse structure (fig. 53) . . . CHELURIDAE (p. 180)
   Uropods 1–2 similar to each other and of normal gammaridean structure. (exceptional) COROPHIIDAE (p. 184)

6. Uropod 3 uniramous 7
Uropod 3 biramous 10
7. Coxa 1 visible, not covered by following coxae 8
Coxa 1 small and hidden by large following coxae 9
8. Mandible lacking palp, bearing molar, inner plates of maxillipeds obsolescent, telson cleft . . . . (fig. 13) KURIIDAE (p. 280)
Mandible bearing palp, lacking molar, inner plates of maxillipeds fully developed, telson entire . . . . (fig. 14) PAGETINIDAE (p. 387)
9. Telson and pleonite 6 coalesced even though telson recognizable and unthickened, article 2 of pereopod 3 expanded. (fig. 16) CRESSIDAE (p. 198)
Telson thickened dorsoventrally and distinct from urosome, but urosomites partially coalesced, article 2 of pereopod 3 linear. (fig. 17) THAUMATELSONIDAE (p. 473)
10. Mandibular palp absent 11
Mandibular palp present 12
11. Only urosomites 2–3 coalesced (fig. 23) . . . . . DEXAMINIDAE (p. 200)
Urosomites 1–3 coalesced (fig. 22) . . . . PROPHLIANTIDAE (p. 432)
12. Pereopod 5 of different structure and almost always shorter than pereopod 4 (fig. 26) . . . . AMPELISCIDAE (p. 128)
Pereopod 5 similar and subequal to or longer than pereopod 4 (or these pereopods often broken or missing) 13
13. Telson entire or slightly emarginate 14
Telson cleft or deeply emarginate 16
14. Urosomite 1 elongate (fig. 52) . . . . PODOCERIDAE (p. 426)
Urosomite 1 not elongate, or all urosomites coalesced . . . . 15[1]
15. Uropods 1 and 2 of extremely diverse structure (fig. 53). CHELURIDAE (p. 180)
Uropods 1 and 2 similar to each other and of normal gammaridean structure (fig. 51) . . . . COROPHIIDAE (p. 184)
16. Coxae 1–4 rounded, quadrate or blunt ventrally. (fig. 25) ATYLIDAE (p. 161)
One or more of coxae 1–4 acuminate ventrally and often bifid (fig. 24). LEPECHINELLIDAE (p. 286)

[1] See *Paracalliope* in supplement.

SECTION D

1. Gnathopod 1 reduced to one or two articles or absent (figs. 20, 30) . . . 2
Gnathopod 1 present, comprising six or seven articles 3
2. Mouthparts all present and normal . . . . . (fig. 30) BATEIDAE (p. 163)
Mandibles and maxillae absent or coalesced into sharp keel (fig. 20) ANAMIXIDAE (p.145)
3. Pereopods 3–5 fossorial, article 4 of antenna 2 strongly expanded, antennae with plumose setae longer than any antennal article. (exceptional) HAUSTORIIDAE (p. 248)
Pereopods 3–5 usually not fossorial but if fossorial then article 4 of antenna 2 not expanded, setae of antennae not elongate plumes 4
4. Gnathopod 1 strongly carpochelate, carpus larger than propodus (or appearing as propodochelate because of loss of dactyl) (fig. 20) 5
Gnathopod 1 subchelate or simple, or carpus smaller than propodus (occasionally carpus with long lobe but not distinctly chelate) 6
5. Mouthparts except maxilliped replaced by a ventral keel and bulbs. (fig. 20) ANAMIXIDAE (p. 145)

Mandibles, lower lip and maxillae present.
(exceptional) LEUCOTHOIDAE (p. 289)

6. Uropod 3 biramous 7
Uropod 3 uniramous 10
7. Coxa 4 not excavate posteriorly, pereopods 1–2 glandular 8
Coxa 4 excavate posteriorly, pereopods 1–2 not glandular 9
8. Rami of uropod 3 shorter than peduncle, outer ramus with distal hook or distolateral denticles, lacking setae.
(exceptional) ISCHYROCERIDAE (p. 275)
Rami of uropod 3 longer than peduncle, outer ramus setose or spinose but lacking special hooks or denticles.
(exceptional) ISAEIDAE (=Photidae) (p. 264)
9. Article 4 of pereopods 1–2 exceptionally elongate (fig. 33*f*), base of primary flagellum on antenna 1 conjoint and forming an article longer than peduncle, palp of maxilla 1 geniculate and scaled (figs. 102*a*, *b*).
Parargissa (Hyperiopsidae) (p. 264)
Article 4 of pereopods 1–2 not elongate, base of primary flagellum on antenna 1 not conjoint, palp of maxilla 1 not geniculate or scaled.
AMPHILOCHIDAE (p. 132)
10. Gnathopods simple and slender, with dense setae as long as fifth and sixth articles, all coxae at least as broad as long.
(exceptional) ISAEIDAE (=Photidae) (p. 264)
Gnathopods usually subchelate and one pair usually stout, if not then their setae very short and sparse, some coxae very much longer than broad . 11
11. Article 2 of pereopod 3 slender and linear (like fig. 162 *v*) 12
Article 2 of pereopod 3 expanded like pereopods 4–5 (like fig. 162*s*).
CRESSIDAE (p. 198)
12. Urosomal segments coalesced fully or partially, telson thickened dorsoventrally (fig. 17), or gnathopod 2 carpochelate.
(exceptional) THAUMATELSONIDAE (p. 473)
Urosomal segments separate, telson depressed (fig. 18), gnathopod 2 never carpochelate . . . . STENOTHOIDAE (p. 444)

SECTION E

Uropod 3 essentially uniramous, lacking rami or occasionally absent; when present inner ramus scalelike and outer ramus cylindrical; Cheluridae partially included herein although outer ramus flat; observer urged to verify that one ramus of uropod 3 not accidentally broken off.

1. Mandibular molar bearing grinding ridges (triturative) or if not triturative then molar cupshaped 2
Mandibular molar smooth or bearing a few articulate spines, or molar absent or not cupshaped 10
2. Mandibular palp present 3
Mandibular palp absent 6
3. Urosomite 1 elongate, longer than metasomite 3 and more than twice as long as urosomite 2 (fig. 52) . . . . PODOCERIDAE (p. 426)
Urosomite 1 not elongate as above 4
4. All urosomites coalesced 5
Urosomites separate 8
5. Uropods 1–2 of strongly diverse structure (fig. 53) . CHELURIDAE (p. 180)
Uropods 1–2 normally styliform, although occasionally with rami or peduncles reduced in size . . . . (fig. 51) COROPHIIDAE (p. 184)

6. All urosomites coalesced (fig. 13) . . . . KURIIDAE (p. 280)
Urosomites separate 7
7. Antennae and pereopods strongly spinose or setose, spines and setae long, epistome nasiform (fig. 11) . . . . DOGIELINOTIDAE [1] (p. 207)
Antennae and pereopods poorly spinose or setose (spines if numerous very small), epistome rounded or truncate in front. (fig. 12) TALITROIDEA (p. 463)
8. Lower lip lacking inner lobes, outer lobes obsolescent (fig. 173*g*), gnathopods small, chelate, slender, equal, sixth article elongate (figs. 173*d*, *e*). **Didymocheila** (incertae sedis) (p. 478)
Lower lip with inner lobes and strong mandibular lobes, gnathopods not taking special form of figs. 173*d*, *e* 9
9. Urosome depressed . . . . COROPHIIDAE (p. 184)
Urosome not depressed . . . (exceptional) AORIDAE (p. 147) and ISAEIDAE (p. 264)
10. Mandibular palp present 11
Mandibular palp absent 12
11. Gnathopods subchelate, outer plates of maxilliped very small, inner obsolete. (fig. 14) PAGETINIDAE [2] (p. 387)
Gnathopods chelate (fig. 15*e*) inner and outer plates of maxilliped well formed. (exceptional) SEBIDAE (p. 435)
12. Body cylindrical (fig. 87*a*), coxae small . . (fig. 8) EOPHLIANTIDAE (p. 209)
Body compressed (normal), coxae large, not splayed. **Najna** (Talitroidea) (p. 470)
Body depressed, rugose, coxae splayed laterally, or if body not rugose pereonites laterally discontiguous . . . . (fig. 10) PHLIANTIDAE (p. 405)

[1] *Metoediceros* Schellenberg (1931) resembles this family but its epistome is unknown and its telson is nearly a perfect, uncleft circle, whereas Dogielinotidae have a rectangular, cleft telson. *Metoediceros* is presently classified with the Oedicerotidae but it probably should form the type of a new family and is therefore removed to "incertae sedis."
[2] Urosomites 2–3 are presumed to be coalesced.

SECTION F

1. Body plan cylindrical (fig. 87*a*) 2
Body plan compressed or depressed 3
2. Palp of maxilla 1 larger than outer plate, inner lobes of maxilliped degraded. (fig. 9) COLOMASTIGIDAE (p. 182)
Palp of maxilla 1 degraded, inner plates of maxilliped well developed, separate . . . . (fig. 8) EOPHLIANTIDAE (p. 209)
3. Mandibular molar of medium size, triturative (fig. 2*f*) 4
Mandibular molar enormous, smooth (fig. 166*d*). **Jeddo** (Synopiidae) (p. 461)
Mandibular molar evanescent or absent, lacking grinding ridges 6
4. Uropod 3 with subequal rami (fig. 50). **Sunamphitoe** (Ampithoidae) (p. 145)
Uropod 3 with inner ramus reduced or absent 5
5. Accessory flagellum absent . . . . . . (fig. 12) TALITROIDEA (p. 463)
Accessory flagellum present . . . . (fig. 42) BEAUDETTIIDAE (p. 166)
6. Mouthparts from lateral view conically grouped below head, uropod 3 biramous and well developed, coxae 1–4 compressed, elongate, forming lateral shield, body compressed, smooth . . (fig. 4) STEGOCEPHALIDAE (p. 436)

Mouthparts from lateral view not conically grouped below head, uropod 3 degraded, coxae 1–4 not forming lateral shield, splayed laterally, body depressed, rugose . . . . (fig. 10) PHLIANTIDAE (p. 405)

Mouthparts from lateral view not conically grouped below head, uropod 3 biramous and well developed, coxae 1–4 compressed, very short, not forming lateral shield, body compressed, smooth. **Parahalice** (Pardaliscidae) (p. 403)

SECTION G

1. Maxillipedal palp with fewer than four articles 2
   Maxillipedal palp with four articles 3
2. Maxillipedal palp 3-articulate. (fig. 7) (exceptional) ACANTHONOTOZOMATIDAE (p. 117)
   Maxillipedal palp 2-articulate (fig. 6) . . . . LAFYSTIIDAE (p. 281)
   Maxilliped lacking palp (fig. 5) . . . . OCHLESIDAE (p. 371)
3. Mouthparts from lateral view conically grouped below head 4
   Mouthparts from lateral view not conically grouped below head 5
4. Anterior coxae long, some acuminate ventrally (fig. 7). ACANTHONOTOZOMATIDAE (p. 117)
   Coxae short, not acuminate ventrally (fig. 28). **Halicella** (Pardaliscidae) (p. 402)
5. Gnathopod 1 carpochelate (fig. 21) . . . . LEUCOTHOIDAE (p. 289)
   Gnathopod 1 propodochelate, subchelate, or simple 6
6. Mandibular molar present (though occasionally very minute) 7
   Mandibular molar absent 22
7. Pereopod 5 shorter and of different structure than pereopod 4, head with strongly depressed large rostrum. (fig. 44) (exceptional) PHOXOCEPHALIDAE (p. 412)
   Pereopod 5 of structure similar to pereopod 4, rarely shorter than 4, rostrum if present not depressed (not dorsoventrally flattened) 8
8. Telson elongate, more than twice as long as urosomite 3 9
   Telson short, subequal to or shorter than urosomite 3 (seen laterally) . . 10
9. Accessory flagellum 1-articulate; antennae with large calceoli; gnathopods large and strongly subchelate (fig. 92*h*). **Eusirella** (p. 225) and **Eusiropsis** (Eusiridae) (p. 225)
   Accessory flagellum multiarticulate; antennae lacking calceoli; gnathopods feeble (fig. 167) . . . . SYNOPIIDAE (p. 454)
10. Pereopods 3–5 fossorial (some setae of those pereopods at least half as long as longest article of any pereopod, fig. 45) 11
    Pereopods 3–5 not fossorial (setae and spines very short, scarcely exceeding article 3 of those pereopods) 12
11. Accessory flagellum 1-articulate and extremely small, or absent; pereopod 5 very elongate, at least 1.5 times as long as pereopods 3–4 (uropod 3 always elongate, rami very slender and lanceolate, subequal to peduncle, but uropod 3 often broken, telson always short, linguiform and entire or emarginate) . . . . (exceptional) OEDICEROTIDAE (p. 373)
    Accessory flagellum rarely vestigial (if so, uropod 3 very short, flabellate, rami highly unequal), pereopod 5 shorter than or usually scarcely longer than pereopod 4 (uropod 3 usually with short peduncle, unequal rami one of which longer than peduncle, if not then accessory flagellum multiarticulate, telson cleft even minutely, usually elongate). (exceptional) HAUSTORIIDAE (p. 248)

12. Telson cleft 13
Telson entire 17
13. Gnathopods powerfully subchelate (fig. 41*c* and like fig. 60*q*) 14
Gnathopods feeble (fig. 32*d*) 15
14. Accessory flagellum 2+-articulate, rostrum obsolescent, telson cleft 75 percent of its length . . . . (fig. 41) LILJEBORGIIDAE (p. 291)
Accessory flagellum absent, rostrum nearly as long as article 1 of antenna 1, telson cleft 40 percent of its length.
Pseudamphilochus (Amphilochidae) (p. 139)
Accessory flagellum 0–1 articulate, rostrum obsolescent, telson cleft 25 percent of its length . . . . . . **Austropleustes** (Pleustidae) (p. 422)
15. Mandibular molar a conical or trapezoidal, setose lamina 16
Mandibular molar a large setulose tuberosity.
Synopia (Synopiidae) (p. 462)
16. Accessory flagellum present . . . . (fig. 32) ASTYRIDAE (p. 157)
Accessory flagellum absent.
Eclysis and **Epimeriella** (Paramphithoidae and Astyridae) (pp. 161, 389)
17. Coxa 3 with about 3 times surface area of coxa 4, maxillipeds foliaceous, article 3 of mandibular palp vestigial, subequal to article 1 (fig. 165*e*).
Synopia (Synopiidae) (p. 462)
Coxa 4 usually slightly larger than, subequal to, or scarcely smaller than coxa 3, maxillipeds not foliaceous, article 3 of mandibular palp much longer than article 1 18
18. Coxae 1–4 wider (anterior-posterior) than long (dorsal-ventral) (fig. 111*a*) 19
Coxae 1–4 longer than wide (fig. 37) 20
19. Coxae contiguous or slightly overlapping.
(exceptional) CALLIOPIIDAE (p. 167)
Coxae not touching serially (fig. 111*a*).
Laphystiopsis (p. 285) and **Prolaphystiopsis** (Laphystiopsidae) (p. 285)
20. Mandibular molar bulbous, ovate or cylindrical 21
Mandibular molar a setose conical lamella . . (fig. 32) ASTYRIDAE (p. 157)
21. Article 4 of pereopods 1–2 enormously elongate (fig. 33*f*), accessory flagellum long and at least 3-articulate . . . . HYPERIOPSIDAE (p. 261)
Article 4 of pereopods 1–2 of normal dimensions, accessory flagellum short or absent and less than 3-articulate.
PLEUSTIDAE (p. 421) and CALLIOPIIDAE (p. 167)
22. Accessory flagellum usually (probably always) present and 3+-articulate, maxillae not foliaceous (occasionally palp of maxilla 1 slightly foliaceous).
(fig. 28) PARDALISCIDAE (p. 397)
Accessory flagellum absent, vestigial or 2-articulate, extremely small, maxillae foliaceous . . . . (fig. 29) STILIPEDIDAE (p. 451)

SECTION H

1. Pereopod 5 exceeding 1.5 times length of pereopods 3–4 [1] (fig. 27).
OEDICEROTIDAE (p. 373)
Pereopod 5 scarcely longer than or shorter than pereopod 4 2
2. Outer lobes of lower lip notched apically or medially excavate, outer ramus of uropod 3 bearing one or two giant, hooked, articulate spines, rami flattened.
(fig. 50) AMPITHOIDAE (p. 141)

[1] Consult Aoridae if telson fleshy and pereopods 1–2 glandular.

Outer lobes of lower lip not notched nor medially excavate, outer ramus of uropod 3 not bearing giant hooked spines (except *Jassa*), occasionally bearing small distal hook, or bent and serrate spine, rami lanceolate or styliform 3

3. Peduncle of uropod 3 often nearly as long as or longer than peduncle of uropod 2, rami of uropod 3 much shorter than peduncle, outer ramus of uropod 3 distally hooked (hook a giant spine in *Jassa*), or with minute distolateral denticles, pectinae or serrations (and see *Parapherusa* in Gammaridae). (fig. 49) ISCHYROCERIDAE (p. 275)

   Peduncle of uropod 3 usually much shorter than peduncle of uropod 2, or rami of uropod 3 subequal to or longer than peduncle, or outer ramus of uropod 3 not distally hooked and lacking distolateral ornamentation . 4

4. Urosome depressed 5

   Urosome not depressed 7

5. All urosomites coalesced, uropods 1–3 of highly diverse structure (fig. 53). CHELURIDAE (p. 180)

   Urosomites rarely all coalesced, uropods 1–2 (but rarely 3) similar to each other and of normal gammaridean form 6

6. Urosomite 1 elongate (fig. 52) . . . . PODOCERIDAE (p. 426)

   Urosomite 1 not elongate (fig. 51) . . . . COROPHIIDAE (p. 184)

7. Gnathopods 1–2 feeble, subequal to each other, simple or nearly so, article 3 of mandibular palp vestigial (fig. 165*e*), article 1 of primary flagellum of antenna 1 elongate, plates of maxilliped foliaceous. **Synopia** (Synopiidae) (p. 462)

   Gnathopods 1–2 strong, usually dimorphic and subchelate, article 3 of mandibular palp strong, article 1 of primary flagellum of antenna 1 not elongate, plates of maxilliped not foliaceous . . . . , 8

8. Gnathopod 1 larger than 2 (fig. 48) 9

   Gnathopod 2 larger than 1 or gnathopods equal in size 10

9. Telson thick and fleshy, perepods glandular . . . . AORIDAE (p. 147)

   Telson thin dorsoventrally, pereopods not glandular. **Falklandella** [2] (Gammaridae) (p. 241)

10. Telson thick and fleshy, pereopods usually glandular. (fig. 47) ISAEIDAE (p. 264)

    Telson thin dorsoventrally, pereopods not glandular 11

11. Accessory flagellum exceeding three articles. (exceptional) GAMMARIDAE (p. 231)

    Accessory flagellum 2-articulate or less, often absent 12

12. Coxae 1–4 strongly or weakly acuminate midventrally or coxae midventrally excavate to form weak or strong anterior and posterior acuminations. (exceptional) PARAMPHITHOIDAE (p. 389)

    Coxae 1–4 rounded or quadrate ventrally. (exceptional) CALLIOPIIDAE (p. 167)

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[2] Schellenberg (1931) writes that coxa 4 is distinctly excavate posteriorly but no figure is given and such excavation must be deep and distinct to avoid placing a genus in section H.

Acanthonotozomatidae

Figures 54–56

Diagnosis.—Mouthparts grouped into cone-shaped bundle projecting from ventral surface of head; accessory flagellum absent or vestigial. See Paramphithoidae, Ochlesidae, Pardaliscidae, Lafystiidae.

Description.—Accessory flagellum absent, 1- or 2-articulate when present, very small and short; body usually with dorsal processes; rostrum well-developed; mouthparts rather linear in shape (to fit conical bundle and probably adapted for piercing and sucking); mandible especially linear, usually lacking molar or having only small molar protuberance, although triturative molar present in some genera; palp of mandible always present; lower lip variable, with or without inner lobes, apices of outer lobes occasionally incised; maxilliped with well-developed plates but palp with three or four articles and long or short; coxae 1–4 usually acuminate or subacuminate; gnathopod 1 and usually gnathopod 2 very feeble, often minutely chelate, article 3 of gnathopod 2 occasionally elongate; rami of uropod 3 longer than peduncle, rami flattened-lanceolate; telson entire or slightly cleft; article 2 of pereopods 3–5 usually with posterior teeth.

Relationship.—The mandibular molar of Astyridae is larger than but not morphologically distinct from the protuberances occurring in some acanthonotozomatids; the accessory flagellum of astyrids is 1-articulate but long, and the mouthparts are not arranged in a conical bundle.

The Lafystiidae have a 2-articulate maxillipedal palp, but otherwise the family is so similar to the Acanthonotozomatidae that the two families might be joined together.

The Stilipedidae resemble Acanthonotozomatidae but apparently the mouthparts are not grouped in a conical bundle; the maxillae are strongly foliaceous but this is true also of *Maxilliphimedia*.

With one exception the mouthparts of Pardaliscidae are not grouped in a conical bundle; usually pardaliscids have a multiarticulate accessory flagellum and the inner plates of the maxillipeds are obsolescent. One of the mandibles is especially flattened and heavily toothed.

The Stegocephalidae lack a mandibular palp.

Mouthparts of the Paramphithoidae are not arranged in a conical bundle but this distinction is confused by the acanthonotozomatid *Bathypanoploea australis* (Chilton, 1912) (see Schellenberg, 1931). The mouthparts of *B. australis* not only are grouped in a quadrate bundle but the molar is absent and the gnathopods are styliform as in most acanthonotozomatids. The type genera of the two families differ in the following ways:

FIGURE 54.—Acanthonotozomatidae: *a*, *Echiniphimedia hodgsoni* (Walker), original drawing; *b*, *Acanthonotozoma cristatum* (Ross) (Sars, 1895, pl. 131).

	Paramphithoe	*Acanthonotozoma*
Mouthparts	bluntly bundled	conically bundled
Mandible	stout	substyliform
Mandibular molar	large, ridged	obsolescent, conical
Maxillae	stout	substyliform
Gnathopods	small, subchelate	styliform

Intergradations of these conditions occur in the genera of both families. If the sea yields more genera similar to *Bathypanoploea,* the fusion of the Paramphithoidae and Acanthonotozomatidae may be required.

Acanthonotozomella oatesi K. H. Barnard (1930) is transferred to *Acanthonotozomoides.*

Key to the Genera of Acanthonotozomatidae

1. Palp of maxilla 1 uniarticulate (fig. 56*d*) 2
   Palp of maxilla 1 biarticulate (fig. 56*c*) 4
2. Gnathopod 2 slender and chelate (fig. 56*o*). 3
   Gnathopod 2 stout and subchelate (fig. 56*p*) . . . . **Odius**
3. Palp article 2 of maxilliped strongly produced medially along article 3 (fig. 56*i*) . . . . **Pariphimedia**
   Palp article 2 of maxilliped not produced (fig. 56*h*) . . **Paranchiphimedia**
4. Palp of maxilla 1 very short, not reaching end of outer plate (fig. 56*d*) . . 5
   Palp of maxilla 1 reaching end of outer plate (fig. 56*c*) 7
5. Gnathopods 1 and 2 simple (figs. 56*k,n*) . . . . **Panoploeopsis**
   Gnathopod 1 minutely chelate (figs. 56*l, m*), gnathopod 2 not simple . . 6
6. Palp article 2 of maxilliped produced along inside of third (fig. 56*i*), lower lip usually incised (fig. 56*a*) . . . . **Panoploea**
   Palp artile 2 of maxilliped not produced along inside of third (fig. 56*g*), lower lip not incised (fig. 56*b*) . . . . **Anchiphimedia**
7. Mandible tapering to a smooth, symmetrical, scoop-shaped apex (fig. 55*g*) . 8
   Mandible not as above (e.g., fig. 55*k*) 9
8. Upper lip rounded, not incised (fig. 55*c*); lower lip not incised (fig. 56*b*). **Labriphimedia**
   Upper lip quadrangular, incised (fig. 55*d*); lower lip incised (fig. 56*a*). **Maoriphimedia**
9. Gnathopod 1 simple (fig. 56*k*) 10
   Gnathopod 1 chelate (fig. 56*l*) 13
10. Telson entire, rounded (fig. 56*q*) . . . . **Acanthonotozomoides**
    Telson distally notched or emarginate (figs. 56*r,s*) 11
11. Gnathopod 1 feeble, very slender, gnathopod 2 stouter than 1. **Acanthonotozoma**
    Gnathopods 1 and 2 similar to each other, well developed 12
12. Palp of maxilliped shorter than outer plate; mandible pointed (fig. 55*l*). **Bathypanoploea**
    Palp of maxilliped longer than outer plate; mandible distally broad (fig. 55*k*). **Acanthonotozomella**
13. Cutting edge of mandible drawn out in a long, needle-like apex (fig. 55*j*). **Parapanoploea**

Mandible not drawn out in a long, needle-like apex 14

14. Palp of maxilla 1 enormously expanded into an ovate lamina, upper lip asymmetrically incised (fig. 55*e*), lower lip not incised (fig. 56*b*). **Maxilliphimedia**

These characters not combined 15

15. Palp article 2 of maxilliped distinctly produced along medial edge of article 3 (fig. 56*i*), outer lobes of lower lip apically and strongly notched (fig. 56*a*) 16

Palp article 2 of maxilliped indistinctly or not produced along medial edge of article 3 (figs. 56*g,h*), outer lobes of lower lip unnotched or very weakly notched 17

16. Pereonite 1 as long as next three segments combined (fig. 55*m*), mandibular incisor apparently absent . . . . **Cypsiphimedia**

Pereonite 1 not longer than each of next three segments (fig. 55*a*), mandibular incisor strong . . . . **Iphimedia**[1]

17. Upper lip deeply incised (fig. 55*d*), first two articles of maxillipedal palp extraordinarily broadened (fig. 56*f*) . . . . **Pseudiphimediella**

Upper lip entire or emarginate, first two articles of maxillipedal palp not broadened (fig. 56*g*) 18

18. Some or all coxae with submarginal teeth . . . . . . **Echiniphimedia**

Coxae lacking submarginal teeth 19

19. Primary cutting edge of mandible multidentate (figs. 55*h,j*). **Pariphimediella**

Primary cutting edge of mandible 2- or less dentate (fig. 55*l*) 20

20. Mandible short, stout, primary cutting edge very broad, smooth, molar conical (fig. 55*i*) . . . . **Gnathiphimedia**

Mandible slender, long, primary cutting edge tapering, subacute, molar if present, not conical (fig. 55*l*) . . . . **Iphimediella**

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[1] See also *Panoploea spinosa* Thomson (Hurley, 1954c) which keys here because of its scarcely shortened palp of maxilla 1.

Genera of Acanthonotozomatidae

Acanthonotozoma Boeck

Acanthonotus Ross, 1835 (homonym, Pisces).
Acanthonotozoma Boeck, 1876 (new name for *Acanthonotus*).—Stebbing, 1906.

Type-species: *Acanthonotus cristatus* Ross, 1835 (original designation). See Sars, 1895.

Upper lip incised; mandible with narrow, rounded apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching or exceeding end of outer plate; maxillipedal palp exceeding outer plate, 4-articulate, article 2 not produced; gnathopods simple, gnathopod 1 very slender, feeble, gnathopod 2 stouter than 1; telson apically incised. Species: 4, arctic-boreal, littoral (rarely to 700 m).

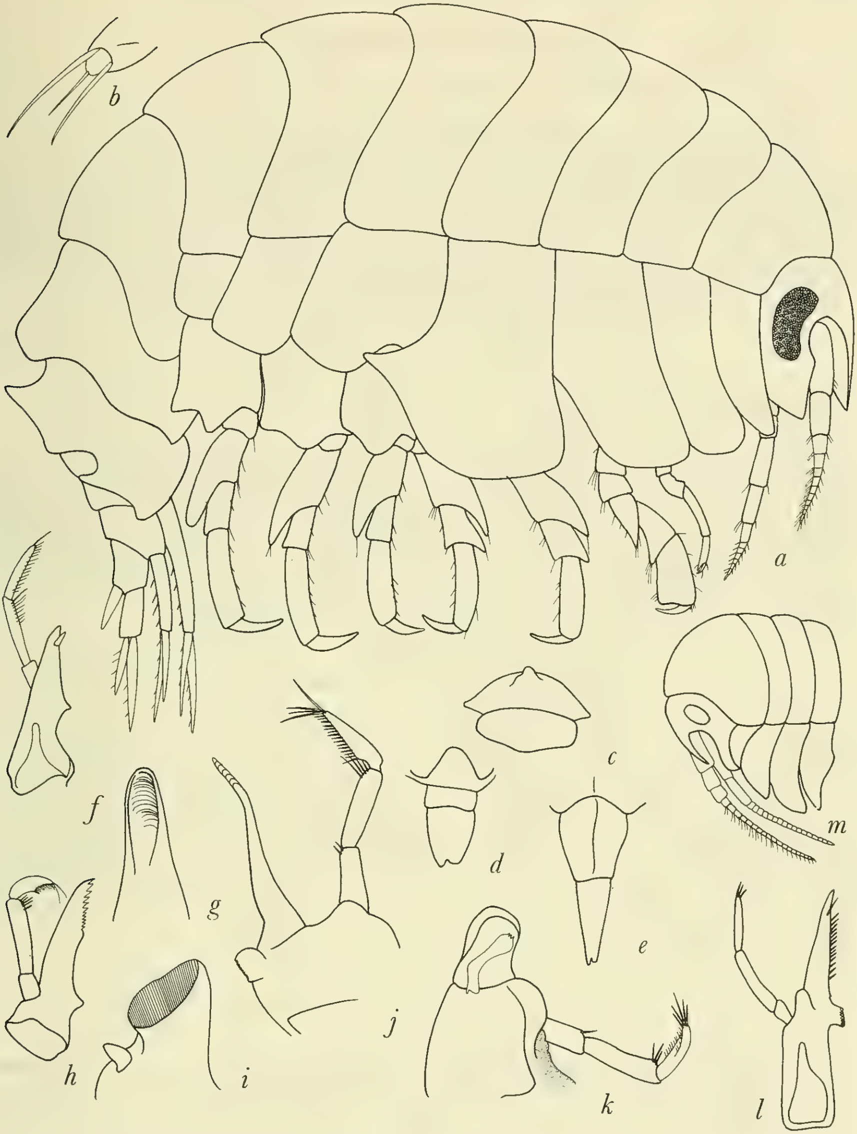

FIGURE 55.—Acanthonotozomatidae: *a*, *Odius carinatus* (Bate) (Sars, 1895, pl. 133). Accessory flagellum: *b*, *Iphimedia haurakiensis* Hurley (1954c). Upper lip: *c*, *Labriphimedia vespuccii* K. H. Barnard (1932); *d*, *Acanthonotozoma serratum* (Fabricius) (Sars, 1895, pl. 131); *e*, *Odius*. Mandible: *f*, *Acanthonotozoma;* *g*, *Labriphimedia*, apex; *h*, *Pariphimedia integricauda* Chevreux (1906c); *i*, *Gnathiphimedia mandibularis* K. H. Barnard (1930); *j*, *Parapanoploea oxygnathia* Nicholls (1938); *k*, *Maoriphimedia hinemoa* Hurley (1954c); *l*, *Odius*. Front of body: *m*, *Cypsiphimedia gibba* K. H. Barnard (1955).

Acanthonotozomella Schellenberg

Acanthonotozomella Schellenberg, 1926a.

Type-species: *A. alata* Schellenberg, 1926a (monotypy).

Upper lip ?incised ["eingekerbt"]; mandible with narrow, rounded apex, minutely serrate; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 4-articulate, article 2 not produced; gnathopods simple, alike; telson apically incised. Species: 1, antarctic, littoral.

Acanthonotozomoides Schellenberg

Acanthonotozomoides Schellenberg, 1931.

Type-species: *A. sublitoralis* Schellenberg, 1931 (monotypy).

Upper lip incised; mandible with narrow, slightly toothed apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 4-articulate, article 2 slightly produced medially; gnathopods simple, alike; telson apically rounded, entire. Species: 2, antiboreal, littoral.

Anchiphimedia K. H. Barnard

Anchiphimedia K. H. Barnard, 1930.

Type-species: *A. dorsalis* K. H. Barnard, 1930, 1932 (monotypy).

Upper lip incised; mandible with narrow, acute apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, very short; maxillipedal palp exceeding outer plate, 3-articulate, article 2 not produced; gnathopod 1 minutely chelate, gnathopod 2 not simple; telson slightly incised. Species: 1, antarctic, bathyal (to 550 m).

Bathypanoploea Schellenberg

Epimeriopsis K. H. Barnard, 1931 (void *ab initio*).
Iphimediopsis Schellenberg, 1931 (homonym, not Della Valle, 1893).
Bathypanoploea Schellenberg, 1939 (footnote p. 137; new name for *Iphimediopsis* Schellenberg).
Pseudiphimediopsis Ruffo, 1949.

Type-species: *Acanthonotozoma australis* Chilton, 1912 (monotypy). K. H. Barnard (1932, p. 182) noted that *Epimeriopsis* is void *ab initio* because of its basis on a misidentified specimen of the designated type-species, *A. australis* Chilton.

Upper lip incised; mandible with broad, toothed apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp shorter than outer plate, 4-articulate, article 2 not produced; gnathopods simple, alike; telson emarginate. Species: 1, subantarctic, abyssal.

Cypsiphimedia K. H. Barnard

Cypsiphimedia K. H. Barnard, 1955.

Type-species: *C. gibba* K. H. Barnard, 1955 (original designation). Upper lip incised; mandibular incisor feeble or ?absent; lobes of lower lip notched; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate, article 2 medially produced along article 3; gnathopod 1 chelate, gnathopod 2 subchelate; *pereonite 1 as long as next three segments combined;* telson slightly emarginate. Species: 1, South Africa, littoral.

FIGURE 56.—Acanthonotozomatidae: Lower lip: *a*, *Iphimedia obesa* Rathke (Sars, 1895, pl. 132); *b*, *Acanthonotozoma serratum* (Fabricius) (Sars, 1895, pl. 131). Maxilla 1: *c*, *Acanthonotozoma; d, Odius carinatus* (Bate) (Sars, 1895, pl. 133). Maxilla 2: *e*, *Acanthonotozoma.* Maxilliped: *f*, *Pseudiphimediella nodosa* (Dana) (Schellenberg, 1931); *g*, *Labriphimedia vespuccii* K. H. Barnard (1932); *h*, *Acanthonotozoma; i*, *Iphimedia; j*, *Pariphimedia integricauda* Chevreux (1906c). Gnathopod 1: *k*, *Acanthonotozoma; l*, *Iphimedia; m*, *Odius.* Gnathopod 2: *n*, *Acanthonotozoma; o*, *Iphimedia; p*, *Odius.* Telson: *q*, *Pariphimedia; r*, *Iphimedia; s*, *Acanthonotozoma; t*, *Odius.* Uropod 3: *u*, *Acanthonotozoma.*

Echiniphimedia K. H. Barnard

Echiniphimedia K. H. Barnard, 1930.

Type-species: *Iphimedia hodgsoni* Walker (see 1907) (present selection).

Upper lip entire or slightly emarginate; mandible with narrow, rounded apex; lobes of lower lip not incised or minutely so; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 4-articulate, article 4 extremely minute, article 2 scarcely or not produced; gnathopods 1 and 2 chelate; telson with shallow, broad emargination; *some or all coxae with submarginal teeth.* Species: 3, antarctic, bathyal to littoral (to 824 m).

Gnathiphimedia K. H. Barnard

Gnathiphimedia K. H. Barnard, 1930.

Type-species: *G. mandibularis* K. H. Barnard, 1930 (present selection).

Upper lip entire; mandible short, broad, apex smooth, molar conical; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate, article 2 indistinctly or not produced; gnathopod 1 chelate; telson ?emarginate. Species: 3, antarctic, bathyal (littoral) (to 824 m).

Iphimedia Rathke

Iphimedia Rathke, 1843.—Stebbing, 1906.
Microcheles Krøyer, 1846.

Type-species: *I. obesa* Rathke, 1843 (monotypy). See Sars, 1895.

Upper lip slightly emarginate or truncate; mandible with medium-broad, slightly toothed apex; lobes of lower lip notched; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate, article 2 produced along article 3; gnathopods both chelate or gnathopod 2 subchelate; telson incised or emarginate. Species: 8, tropical Pacific to antarctic, littoral (one bathyal).

Iphimediella Chevreux

Iphimediella Chevreux, 1911c, 1912a, 1912b.

Type-species: *I. margueritei* Chevreux 1912a (designated by Chevreux); 1912b.

Upper lip entire or weakly incised; mandible medium-broad, apex scarcely toothed; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate, article 2 scarcely or not produced; gnathopods both chelate; telson cleft one third. Species: 4, antarctic, bathyal (110–457 m).

Labriphimedia K. H. Barnard

Labriphimedia K. H. Barnard, 1931.

Type-species: *L. vespuccii* K. H. Barnard, 1931 (original designation).

Upper lip entire; mandible with smooth, scoop-shaped, tapering apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, composed of three articles tipped with a very minute fourth, article 2 not produced; gnathopods both ?chelate (type-species not described); telson notched. Species: 2, antarctic, littoral.

Maoriphimedia Hurley

Maoriphimedia Hurley, 1954c.

Type-species: *M. hinemoa* Hurley, 1954c (original designation).

Upper lip slightly incised; mandibular apex broad, untoothed, scoop-shaped; lobes of lower lip slightly incised apically; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate, article 2 not produced; gnathopods both chelate; telson apically notched. Species: 1, New Zealand, littoral.

Maxilliphimedia K. H. Barnard

Maxilliphimedia K. H. Barnard, 1930.

Type-species: *Iphimedia longipes* Walker (see 1907) (monotypy).

Upper lip broad, incised; mandible with broad, toothed apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, article 2 enormously expanded; maxillipedal palp exceeding outer plate, 3-articulate, article 2 not produced; gnathopod 1 chelate, (gnathopod 2 not described); telson deeply notched. Species: 1, antarctic, bathyal, (183–379 m).

Odius Liljeborg

Otus Bate, 1862 (homonym, Lepidoptera).
Odius Liljeborg, 1865.—Stebbing, 1906.

Type-species: *Otus carinatus* Bate, 1862 (monotypy).

Upper lip narrow, incised; mandible with narrow, dentate apex; lobes of lower lip not incised; palp of maxilla 1 uniarticulate, tiny, not reaching end of outer plate; maxillipedal palp exceeding outer plate, 4-articulate, article 2 not produced; gnathopod 1 slender, chelate, gnathopod 2 stout, subchelate; telson notched. Species: 2, arctic-boreal, N. Atlantic, littoral.

Panoploea Thomson

Panoploea Thomson, 1880.—Stebbing, 1906.
Iphimediopsis Della Valle, 1893.

Type-species: *P. spinosa* Thomson, 1880 (present selection); Chevreux and Fage (1925) erroneously cite as type-species, *Iphimedia eblanae* Bate (1857d), a species not included originally in the genus by Thomson.

Upper lip narrow, ?incised or not; mandible with very narrow, scarcely dentate apex; lobes of lower lip incised or not; palp of maxilla 1 biarticulate, not reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate, article 2 produced medially; gnathopod 1 chelate, gnathopod 2 slightly chelate or subchelate; telson broadly or minutely incised or cleft. Species: 8, amphiboreal, littoral (one in bathyal antarctic to 550 m).

Panoploeopsis Kunkel

Panoploeopsis Kunkel, 1910.

Type-species: *P. porta* Kunkel, 1910 (monotypy).

Upper lip narrow, possibly not incised; mandible with narrow, dentate apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, not reaching end of outer plate; maxillipedal palp barely exceeding outer plate, 3-articulate, article 2 slightly produced medially; gnathopods simple; telson bilobate. Species: 1, Bermuda, littoral.

Paranchiphimedia Ruffo

Paranchiphimedia Ruffo, 1949.

Type-species: *P. monodi* Ruffo, 1949 (original designation).

Upper lip deeply emarginate; mandible subpyramidal, incisor untoothed; [lobes of lower lip unknown]; palp of maxilla 1 uniarticulate, short; maxillipedal palp exceeding outer plate, 3-articulate, article 2 not produced; gnathopods chelate; telson emarginate. Species: 1, antarctic, ?littoral.

Parapanoploea Nicholls

Parapanoploea Nicholls, 1938.

Type-species: *P. oxygnathia* Nicholls, 1938 (original designation).

Upper lip broad, faintly emarginate; mandible with needle-like apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 4-articulate, article 2 slightly produced medially; gnathopods chelate; telson notched. Species: 1, antarctic (220 m).

Pariphimedia Chevreux

Pariphimedia Chevreux, 1906a.

Type-species: *P. integricauda* Chevreux, 1906a (original designation).

Upper lip broad, faintly emarginate; mandible with narrow, dentate apex; lobes of lower lip not incised; palp of maxilla 1 uniarticulate, not reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate or with minute article 4, article 2 strongly produced medially; gnathopods chelate; telson entire. Species: 2, antarctic, littoral.

Pariphimediella Schellenberg

Pariphimediella Schellenberg, 1931.

Type-species: *Iphimedia serrata* Schellenberg, 1926a (original designation).

Upper lip broad, faintly emarginate; mandible with narrow, toothed apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate, article 2 faintly produced; gnathopods chelate; telson broadly emarginate or cleft. Species: 5, antarctic, littoral to bathyal.

Pseudiphimediella Schellenberg

Pseudiphimediella Schellenberg, 1931.

Type-species: *Amphitoë nodosa* Dana, 1853 (original designation).

Upper lip broad, incised; mandible with broad, toothed apex; lobes of lower lip not incised; palp of maxilla 1 biarticulate, reaching end of outer plate; maxillipedal palp exceeding outer plate, 3-articulate, article 2 not produced, articles 1–2 broadened; gnathopod 1 chelate, gnathopod 2 slightly chelate; telson entire or faintly emarginate. Species: 1, subantarctic, littoral.

Ampeliscidae

Figures 57, 58

Diagnosis.—Accessory flagellum absent; pereopod 5 shorter than and of different structure from 4; article 4 of pereopods 1–2 elongate; head elongate; eyes when present bearing maximum of two pairs of anterolateral cuticular lenses; urosomites 2–3 coalesced; pereopods 1–2 glandular. See Atylidae, Haustoriidae, Argissidae.

Description.—Accessory flagellum absent; head elongate, tall, compressed; body lacking dorsal processes, except on pleonite 4 and occasionally low carinae on pleonites 1–3; antennae and their peduncles elongate, often with long setae, male primary flagellum conjoint basally; anterior coxae long, coxa 1 often broader than 2, 2 occasionally tapering; mouthparts basic but mandibular palp article 3 of many species much shorter than article 2 and mandibular lobes of lower lip obsolescent; gnathopods feeble, subchelate or nearly simple; article 4 of pereopods 1–2 elongate; pereopod 5 always shorter and of different morphology from pereopod 4; pereopods with a few elongate setae, especially on article 2 of pereopod 5 and article 4 of pereopods 1–2, pereopods 3–4 often with strong submarginal spines on articles 4–5; rami of uropod 3 lanceolate, usually elongate, occasionally foliaceous or shortened; telson either elongate or very short, usually cleft, cleft often short.

Relationship.—The shiny cuticular lenses of oculate ampeliscids are unique to this family, except for their rare occurrence in a few lysianassids. Oculate ampeliscids also have bright red, brown, or black pigmentary masses in the head towards which, perhaps, the cuticular lenses direct light.

Pereopods of this family are definitively fossorial but presumably they are used not in digging but in clinging to or rearranging the insides of their tubes spun by pereopods 1–2 or in creating water currents and feeding.

The Phoxocephalidae always bear a rostrum and a multiarticulate accessory flagellum. The Haustoriidae bear a multiarticulate accessory flagellum. Both of those families form burrows in sediments whereas Ampeliscidae are provided with glands in the pereopods for the construction of tubes lying on the substrate surface.

The Atylidae have ommatidial eyes and pereopod 5 is usually longer than pereopod 4 and of similar structure; the pereopods are not glandular.

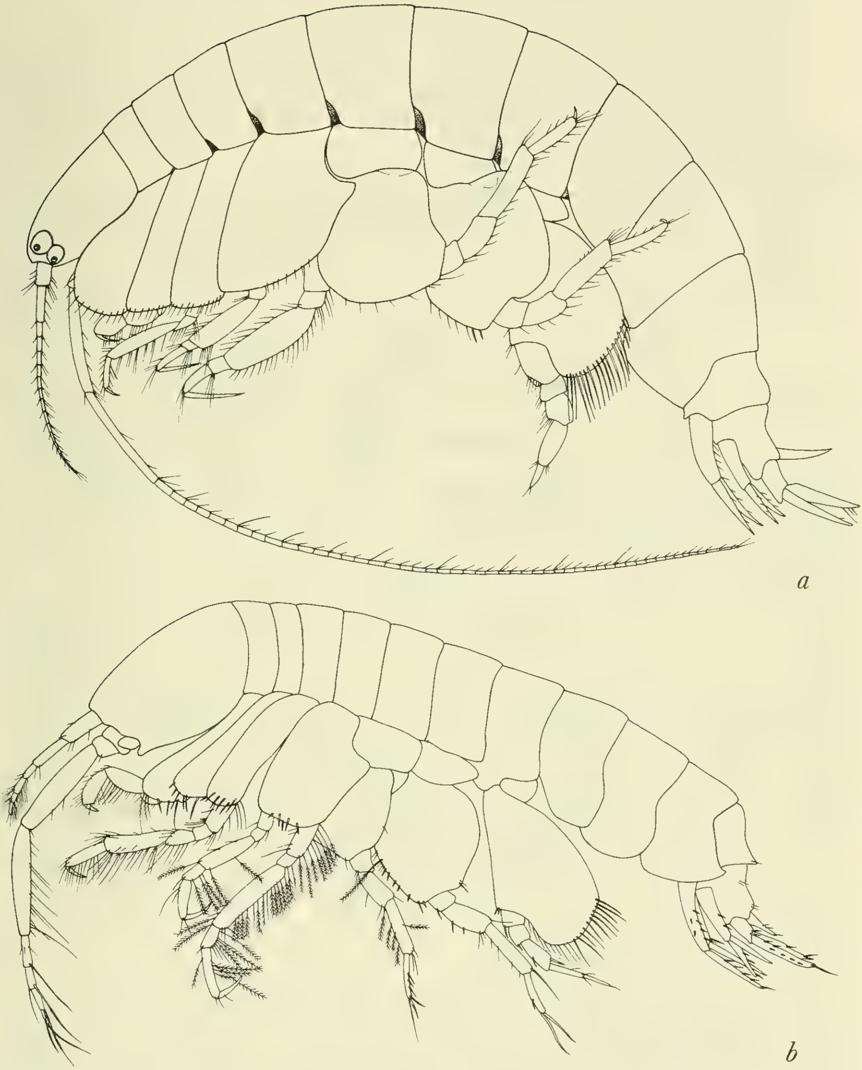

FIGURE 57.—Ampeliscidae: *a*, *Ampelisca tenuicornis* Liljeborg (Sars, 1895, pl. 58); *b*, *Byblisoides arcillis* J. L. Barnard (1961).

Key to the Genera of Ampeliscidae

1. Pereopod 5: anterior edge of posterior lobe on article 2 lacking setae near its junction with article 3 (fig. 58*l*) 2
   Pereopod 5: anterior edge of posterior lobe on article 2 bearing setae up to its junction with article 3 (figs. 58*m,n,o*) 4
2. Flagella of antennae poorly developed, with 2 to 4 articles (fig. 57*b*) [anteroventral corner of head produced (fig. 57*b*)] . . . . **Byblisoides**
   Flagella of antennae long, usually with more than 10 articles [anteroventral corner of head rarely produced] 3
3. Anteroventral corner of head produced . . . . **Triodos**
   Anteroventral corner of head sloping, unproduced . . . . **Ampelisca**
4. Posterior lobe of article 2 on pereopod 5 strongly expanded distally, posterior edge oblique (fig. 58*m*) . . . . **Byblis**
   Posterior lobe of article 2 on pereopod 5 not expanded distally, posterior edge vertical (figs. 58*n,o*) . . . . **Haploops**

Genera of Ampeliscidae

Ampelisca Krøyer

Ampelisca Krøyer, 1842.—Stebbing, 1906.
Pseudophthalmus Stimpson, 1853.
Araneops Costa, 1853c, 1857.
Tetromatus Bate, 1856, 1857a, 1857c.

Type-species: *A. eschrichtii* Krøyer, 1842 (monotypy). See Sars, 1895.

Pereopod 5 with posterior lobe of article 2 greatly expanded distally, posterior edge oblique, anterior edge of posterior lobe lacking setae near its junction with article 3; palp article 3 of mandible variable in length; antenna 2 with more than five flagellar articles; anteroventral corner of head unproduced. Species: 94, primarily littoral cosmopolitan, about 20 bathyal and one abyssal species.

Byblis Boeck

Byblis Boeck, 1871.—Stebbing, 1906.

Type-species: *Ampelisia* (lapsus) *gaimardii* Krøyer, 1846 (monotypy). See Sars, 1895.

Pereopod 5 with posterior lobe of article 2 greatly expanded distally, posterior edge oblique, anterior edge of posterior lobe bearing setae near its junction with article 3; palp article 3 of mandible shorter than article 2; antenna 2 with more than five flagellar articles; anteroventral corner of head unproduced. Species: 21, cosmopolitan, littoral to abyssal.

FIGURE 58.—Ampeliscidae: Upper lip: *a*, *Ampelisca typica* (Bate) (Sars, 1895, pl. 57). Mandible: *b*, *Ampelisca; c*, *Byblis gaimardi* (Krøyer) (Sars, 1895, pl. 64). Lower lip: *d*, *Ampelisca; e*, *Byblis*. Maxillae 1–2: *f,g*, *Ampelisca*. Maxilliped: *h*, *Ampelisca*. Gnathopods 1–2, Pereopods 1,5: *i,j,k,l*, *Ampelisca*. Pereopod 5: *m*, *Byblis; n*, *Haploops setosa* Boeck (Sars, 1895, pl. 68); *o*, *Haploops tubicola* Liljeborg (Sars, 1895, pl. 67). Uropod 3: *p*, *Ampelisca*. Telson: *q*, *Ampelisca; r*, *Byblis*.

Byblisoides K. H. Barnard

Byblisoides K. H. Barnard, 1931, 1932.

Type-species: *B. juxticornis* K. H. Barnard, 1931 (original designation).

Pereopod 5 with posterior lobe of article 2 greatly expanded distally, posterior edge oblique, anterior edge of posterior lobe lacking setae near its junction with article 3; palp article 3 of mandible shorter than article 2; antenna 2 with less than five flagellar articles; anteroventral corner of head produced. Species: 4, tropics to antarctic, bathyal.

Haploops Liljeborg

Haploops Liljeborg, 1856.—Stebbing, 1906.

Type-species: *H. tubicola* Liljeborg, 1856 (original designation). See Sars, 1895.

Pereopod 5 with posterior lobe of article 2 not expanded distally, usually narrow, posterior edge vertical, anterior edge of posterior lobe bearing setae near its junction with article 3; palp article 3 of mandible as long as article 2; antenna 2 with more than five flagellar articles; anteroventral corner of head unproduced. Species: 13, cosmopolitan, cold-water, littoral to abyssal, primarily bathyal.

Triodos K. H. Barnard

Triodos K. H. Barnard, 1916.

Type-species: *T. insignis* K. H. Barnard, 1916 (monotypy).

Pereopod 5 with posterior lobe of article 2 greatly expanded distally, posterior edge oblique, anterior edge of posterior lobe lacking setae near its junction with article 3; palp article 3 of mandible as long as article 2; antenna 2 with more than five flagellar articles; anteroventral corner of head produced. Species: 1, S. Africa, littoral.

Amphilochidae

Figures 59, 60

Diagnosis.—Accessory flagellum absent; coxa 1 very small, partially hidden by following coxae. See Pleustidae, Calliopiidae, Leucothoidae, Anamixidae, Stenothoidae, Thaumatelsonidae, Cressidae, Stegocephalidae.

Description.—Accessory flagellum absent; rostrum conspicuous; coxa 1 very small in all but one genus and partially hidden by fol-

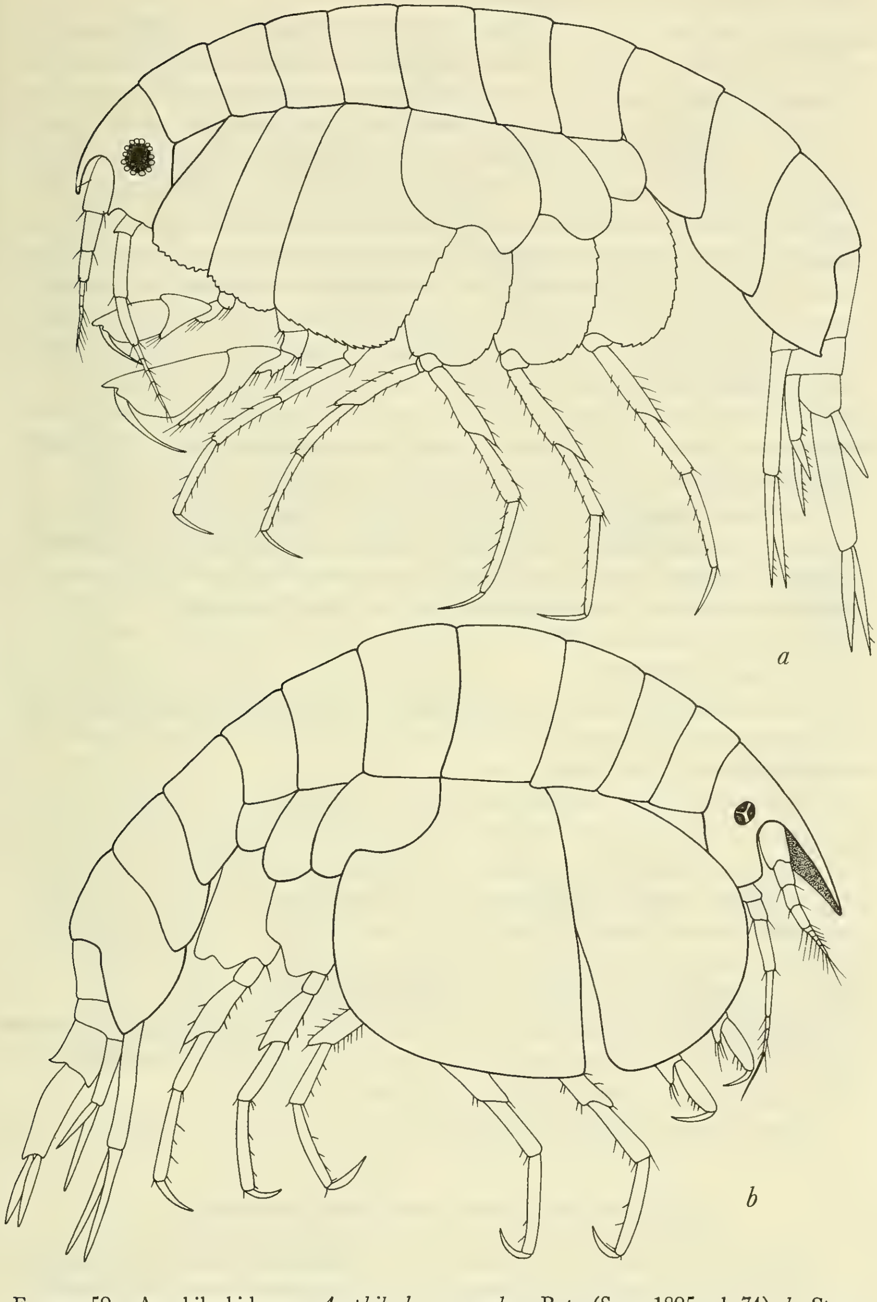

FIGURE 59.—Amphilochidae: *a*, *Amphilochus manudens* Bate (Sars, 1895, pl. 74); *b*, *Stegoplax longirostris* Sars (1895, pl. 79).

lowing coxae, coxa 2 occasionally as small as coxa 1 but often as large as coxa 3 and not hidden; coxae 3–4 enlarged, either overlapping or, when immensely enlarged, with contiguous margins abutting; upper lip usually deeply incised, rarely slightly excavate; mandible usually with 3-articulate palp, rarely absent, molar well developed and triturative or formed of a smooth protuberance or evanescent; lower lips of two kinds (see figures); maxilla 1 with 1- or 2-articulate palp; maxilla 2 rarely reduced in size, in one genus formed of a single plate; maxillipeds normal; gnathopods of medium size or small, subchelate or nearly simple, often incompletely carpochelate; uropod 2 shortened; uropod 3 biramous, peduncle elongate (except *Pseudamphilochus*); telson entire in all but one genus, often elongate and triangular, also short and linguiform.

Relationship.—The Pleustidae and Calliopiidae have large first coxae, not hidden by following coxae. Leucothoidae have completely carpochelate first gnathopods because article 6 is narrow.

The Stegocephalidae always lack a mandibular molar and palp; no amphilochid lacks both at the same time; the mouthparts of stegocephalids project in a conical bundle, an accessory flagellum is present and the first coxa is never hidden by the following coxae.

The Stenothoidae, Thaumatelsonidae, and Cressidae have uniramous third uropods.

The Anamixidae have a completely carpochelate first gnathopod or the appendage is absent, and a ventral cephalic keel replaces the mandibles and maxillae.

Pseudamphilochus Schellenberg is an aberrant amphilochid in its normal coxa 1 and cleft telson. It tends to fall into the Eusiridae in the various keys but a special place has been made for it also in Gammaridea Family Key, Section G. It also appears to be a pleustid with cleft telson even though its lower lip is not fully typical of pleustids. It can also be confused with liljeborgiids even though the accessory flagellum is absent in *Pseudamphilochus*.

Incomplete carpochelation of gnathopods is ignored in the keys and diagnoses to follow and the terms "simple" and "subchelate" refer only to the condition of the propodus (article 6).

Neocyproidea peninsulae Hurley (1955) is removed to *Peltopes*.

Key to the Genera of Amphilochidae

1. Coxae 3–4 not immensely broadened, with contiguous margins overlapping, not concealing coxa 2 (fig. 59*a*) . . . (Amphilochinae, new subfamily) 2
   Coxae 3–4 immensely broadened, contiguous margins abutting, concealing the vestigial first two coxae (fig. 59*b*) . (Cyproideinae, new subfamily) 10
2. Mandibular molar large, with ridged and toothed triturating surface (fig. 60*c*) 3

Mandibular molar small, or absent, unarmed or bearing one to three spines (fig. 60*d*) 6
3. Palp of maxilla 1 with two articles (fig. 60*j*) . . . . **Gitanopsis**
Palp of maxilla 1 with one article (fig. 60*k*) 4
4. Outer plate of maxilliped strongly excavate medially, article 1 of palp much longer than other palp articles (fig. 60*p*) . . . . **Gitanogeiton**
Outer plate of maxilliped straight or slightly excavate medially, article 1 of palp subequal to article 2 (fig. 60*o*) 5
5. Gnathopod 2 large, subchelate (fig. 60*v*) . . . . **Amphilochopsis**
Gnathopod 2 small, nearly simple (fig. 60*u*) . . . . **Gitana**
6. Maxilla 2 composed of only one elongate plate (fig. 60*m*) . . **Amphilochella**
Maxilla 2 composed of two plates (fig. 60*l*) 7
7. Maxilla 2 degraded, plates tiny, subequal in width (fig. 60*n*) 8
Maxilla 2 normal, inner plate much broader than outer (fig. 60*l*) 9
8. Posterolateral angles of pleonite 6 not produced . . . . . **Amphilochoides**
Posterolateral angles of pleonite 6 produced, reaching apex of telson. **Cyclotelson**
9. Telson entire (fig. 60*x*) . . . . **Amphilochus**
Telson cleft (fig. 60*y*) . . . . **Pseudamphilochus**
10. Article 2 of pereopods 4–5 linear, slender 11
Article 2 of pereopod 5 and usually pereopod 4 expanded 12
11. Palm of gnathopod 2 transverse, urosomite 3 vaulting over telson, telson small . . . . **Cyproidea**
Palm of gnathopod 2 oblique, urosomite 3 not vaulting over telson, telson huge . . . . **Paracyproidea**
12. Urosomite 1 unkeeled, long or short 13
Urosomite 1 dorsally keeled, elongate 14
13. Gnathopod 2 simple; uropod 2 shortened, not reaching end of uropod 3 (figs. 59*a,b*) . . . . **Stegoplax**
Gnathopod 2 subchelate, with transverse palm; uropod 2 reaching end of uropod 3 (figs. 60*bb,cc*) . . . . **Peltocoxa**
14. Article 2 of pereopod 3 slender, linear 15
Article 2 of pereopod 3 expanded 16
15. Palp of maxilla 1 biarticulate, outer plate of maxilliped reaching to end of palp article 2, article 7 of gnathopod 1 apparently fitting oblique palm. **Hoplopleon**
Palp of maxilla 1 uniarticulate, outer plate of maxilliped reaching to end of palp article 1, article 7 of gnathopod 1 greatly overlapping short, transverse palm . . . . **Hoplopheonoides**
16. Mandibular palp present . . . . **Peltopes**
Mandibular palp absent . . . . **Neocyproidea**

Genera of Amphilochidae

Subfamily Amphilochinae, new subfamily

Type-genus: *Amphilochus* Bate.

Coxae 2–4 not immensely broadened, with contiguous margins overlapping.

Amphilochella Schellenberg

Amphilochella Schellenberg, 1926a.

Type-species: *A. simplicarpus* Schellenberg, 1926a (monotypy).

Mandibular molar absent; palp of maxilla 1 biarticulate; maxilla 2 composed of one elongate plate; outer plates of maxillipeds not excavate; palp article 1 shorter than article 2; gnathopod 2 small, slender, scarcely subchelate; telson apparently entire. Species: 1, antarctic, littoral.

Amphilochoides Sars

Amphilochoides Sars, 1895.—Stebbing, 1906.

Type-species: *Amphilochus odontonyx* Boeck, 1871 (original designation). This species is figured by Sars erroneously under his *Amphilochoides pusillus* which becomes a synonym of *A. odontonyx;* Sars' description and figures of *A. odontonyx* are proposed by him on p. 690 to have the name *A. boeckii* which Stebbing (1906) finds is a junior synonym of *Probolium serratipes* Norman (1869a).

Mandibular molar obsolete; palp of maxilla 1 biarticulate; lower lip atypical for family, with tilted oval outer lobes astride distinct inner lobes; maxilla 2 degraded but with two distinct subequal lobes; outer plates of maxillipeds not excavate, palp article 1 subequal to article 2; gnathopod 2 large, subchelate; telson entire. Species: 4, N.E. Atlantic, littoral.

Amphilochopsis Stephensen

Amphilochopsis Stephensen, 1925a.

Type-species: *A. hamatus* Stephensen, 1925a (monotypy).

Mandibular molar large, triturative; palp of maxilla 1 uniarticulate; maxilla 2 normal, outer plate narrower than inner; outer plates of maxillipeds not excavate, palp article 1 subequal to article 2; gnathopod 2 large, subchelate; telson entire. Species: 1, subarctic, bathyal to abyssal (325–2702 m).

Amphilochus Bate

Amphilochus Bate, 1862.—Stebbing, 1906.
Callimerus Stebbing, 1876.

Type-species: *A. manudens* Bate, 1862 (monotypy). See Sars, 1895.

Mandibular molar small, not triturative; palp of maxilla 1 biarticulate; maxilla 2 normal, outer plate narrower than inner; outer plates of maxillipeds not excavate, palp article 1 subequal to article 2; gnathopod 2 large, subchelate; telson entire. Species: 11, cosmopolitan, littoral (one species to 913 m).

FIGURE 60.—Amphilochidae: Upper lip: *a*, *Amphilochus manudens* Bate (Sars, 1895, pl. 74); *b*, *Pseudamphilochus shoemakeri* Schellenberg (1931). Mandible: *c*, *Gitanopsis bispinosa* (Boeck) (Sars, 1895, pl. 76); *d*, *Amphilochus*; *e*, *Neocyproidea otakensis* Hurley (1955); *f*, *Pseudamphilochus*. Lower lip: *g*, *Gitanopsis; h*, *Amphilochoides odontonyx* (Boeck) (Sars, 1895, pl. 76); *i*, *Amphilochus*. Maxilla 1: *j*, *Amphilochus; k*, *Gitana sarsi* Boeck (Sars, 1895, pl. 78). Maxilla 2: *l*, *Amphilochus; m*, *Amphilochella simplicarpus* Schellenberg (1926a); *n*, *Amphilochoides*. Maxilliped: *o*, *Amphilochus; p*, *Gitanogeiton sarsi* Stebbing (1910). Gnathopod 1: *q*, *Amphilochus; r*, *Gitana; s*, *Hoplopheonoides obesa* Shoemaker (1956a); *t*, *Peltopes productus* K. H. Barnard (1930). Gnathopod 2: *u*, *Gitana; v*, *Amphilochus; w*, *Hoplophenonoides*. Telson: *x*, *Amphilochus; y*, *Pseudamphilochus; z*, *Cyclotelson purpureum* Potts (1915). Uropod 3: *aa*, *Amphilochus*. Pleon and Telson, lateral: *bb*, *Hoplopheonoides; cc*, *Peltocoxa marioni* Catta (Chevreux and Fage, 1925).

Cyclotelson Potts

Cyclotelson Potts, 1915.

Type-species: *C. purpureum* Potts, 1915 (monotypy).

Mandibular molar absent; palp of maxilla 1 biarticulate; maxilla 2 degraded but with two distinct subequal lobes; outer plates of maxillipeds not excavate, palp article 1 subequal to article 2; gnathopod 2 small, subchelate; telson entire; *lateral angles of urosomite 3 strongly produced* (*combining character*). Species: 1, Gulf of Mexico, littoral.

Gitana Boeck

Gitana Boeck, 1871.—Stebbing, 1906.

Type-species: *G. sarsi* Boeck, 1871 (designated by Sars, 1895, p. 229, "Remarks").

Mandibular molar large, triturative; palp of maxilla 1 uniarticulate; maxilla 2 normal, outer plate narrower than inner; outer plates of maxillipeds slightly excavate, palp article 1 subequal to article 2; gnathopod 2 small, nearly simple; telson entire. Species: 4, boreal, littoral to bathyal (475 m).

Gitanogeiton Stebbing

Gitanogeiton Stebbing, 1910.

Type-species: *G. sarsi* Stebbing, 1910 (monotypy).

Mandibular molar large, triturative; palp of maxilla 1 uniarticulate; maxilla 2 normal, outer plate narrower than inner; outer plates of maxillipeds strongly excavate, palp article 1 much longer than other articles; gnathopod 2 small, subchelate [telson damaged]. Species: 1, off Manning R., Australia, littoral.

Gitanopsis Sars

Gitanopsis Sars, 1895.—Stebbing, 1906.

Type-species: *Amphilochus bispinosus* Boeck, 1871 (original designation).

Mandibular molar large, triturative; palp of maxilla 1 biarticulate; maxilla 2 normal, outer plate narrower than inner; outer plates of maxilliped rarely excavate, palp article 1 subequal to article 2; gnathopod 2 small, subchelate; telson entire. Species: 12, cosmopolitan, littoral (2 species in bathyal to 1096 m).

Pseudamphilochus Schellenberg

Pseudamphilochus Schellenberg, 1931.

Type-species: *P. shoemakeri* Schellenberg, 1931 (monotypy).

Mandibular molar obsolete; palp of maxilla 1 biarticulate; maxilla 2 normal, outer plate narrower than inner; outer plates of maxilliped not excavate, palp article 1 subequal to article 2; *coxa 1 not reduced;* gnathopod 2 small, subchelate; telson deeply cleft. Species: 1, S. Georgia Is., littoral.

Subfamily Cyproideinae, new subfamily

Type-genus: *Cyproidea* Haswell.

Coxae 3–4 immensely broadened, with contiguous margins abutting, hiding coxae 1 and 2.

Cyproidea Haswell

Cyproidea Haswell, 1880a.—Stebbing, 1906.
Cyproidia [sic] Haswell, 1880c.
Gallea Walker, 1904.

Type-species: *Cyproidia* [sic] *ornata* Haswell, 1880c (present selection). See Walker, 1904 (as *Gallea tecticauda*).

Article 2 of pereopods 3–5 linear, slender; gnathopod 2 subchelate, palm transverse; uropod 2 long; urosomite 1 not elongate, not keeled; urosomite 3 vaulting over telson; telson normal; mandibular molar absent or present, palp 3-articulate. Species: 2, tropics to antiboreal, E. Hemisphere, littoral.

Hoplopheonoides Shoemaker

Hoplopheonoides Shoemaker, 1956a.

Type-species: *H. obesa* Shoemaker, 1956a (monotypy).

Article 2 only of pereopod 5 expanded, of pereopods 3–4 slender and linear (*Hoplopleon*); gnathopod 2 subchelate, tending to be chelate; uropod 2 long; urosomite 1 elongate, dorsally keeled; urosomite 3 not vaulting over telson; telson normal; mandibular molar well developed, triturative, palp absent; *palp of maxilla 1 uniarticulate* (*Hoplopleon*). Species: 1, Florida, littoral. *Hoplopleon similis* Schellenberg is intermediate between this and the next genus.

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Hoplopleon K. H. Barnard

Hoplopleon K. H. Barnard, 1932.

Type-species: *Peltocoxa australis* K. H. Barnard, 1916 (original designation).

Article 2 of pereopods 4–5 expanded, of pereopod 3 slender (*Hoplopheonoides);* gnathopod 2 subchelate, palm oblique or transverse; [uropod 2 unknown]; urosomite 1 elongate, keeled; urosomite 3 not vaulting over telson; telson normal; mandibular molar triturative, palp absent; *palp of maxilla 1 biarticulate* (*Hoplopheonoides*). Species: 3, antarctic to S. W. Africa, littoral.

Neocyproidea Hurley

Neocyproidea Hurley, 1955.

Type-species: *Cyproidea otakensis* Chilton, 1900 (original designation).

Article 2 of pereopods 3–5 somewhat expanded; gnathopod 2 nearly simple; uropod 2 long; urosomite 1 elongate, dorsally keeled, slightly vaulting to base of telson or less; urosomite 3 not vaulting over telson; telson normal; mandibular molar strong, palp absent. Species: 2, New Zealand, littoral.

Paracyproidea Stebbing

Paracyproidea Stebbing, 1899d, 1906.

Type-species: *Cyproidia* [sic] *lineata* Haswell, 1880c (original designation).

Article 2 of pereopods 3–5 slender, linear; gnathopod 2 subchelate, palm oblique; uropod 2 long; urosomite 1 not elongate, not keeled; urosomite 3 not vaulting over telson; telson huge; mandibular molar triturative, palp 3-articulate. Species: 1, E. Australia, littoral.

Peltocoxa Catta

Peltocoxa Catta, 1875.—Stebbing, 1906.

Type-species: *P. marioni* Catta, 1875 (original designation). See Chevreux and Fage, 1925.

Article 2 of pereopods 4–5 expanded, of pereopod 3 slender and linear; gnathopod 2 subchelate, palm transverse; uropod 2 long; urosomite 1 short, unkeeled; urosomite 3 not vaulting over telson; telson huge; mandibular molar triturative, palp 3-articulate. Species: 2, E. Atlantic, littoral.

Peltopes K. H. Barnard

Peltopes K. H. Barnard, 1930.

Type-species: *P. productus* K. H. Barnard, 1930 (monotypy).

Article 2 of pereopods 3–5 expanded; gnathopod 2 simple; uropod 2 long; urosomite 1 elongate, dorsally keeled, process vaulting over following segments; urosomite 3 not vaulting over telson; telson normal; mandibular molar [unknown in type] strong, palp 3-articulate. Species: 2, New Zealand, littoral.

Stegoplax Sars

Stegoplax Sars, 1882.—Stebbing, 1906.

Type-species: *S. longirostris* Sars, 1882 (original designation). See Sars, 1895.

Article 2 of pereopods 3–5 expanded; gnathopod 2 simple; uropod 2 shortened; urosomite 1 short, unkeeled; urosomite 3 slightly vaulting over telson; telson normal; mandibular molar triturative, palp 3-articulate. Species: 1, N. Atlantic, bathyal.

Ampithoidae

FIGURE 61

DIAGNOSIS.—Accessory flagellum present or absent; telson entire, short, fleshy; lower lip with anterior lobes notched or medially excavate (figs. 61*e,f*); coxa 4 not excavate posteriorly; pereopods glandular; uropod 3 with very small, short rami, shorter than peduncle, rami quadrate, blunt, outer armed with one or two hooks. See Isaeidae, Ischyroceridae, Oedicerotidae, Calliopiidae, Pleustidae.

DESCRIPTION.—Accessory flagellum varying from absent to long and multiarticulate; body smooth; rostrum absent; coxae medium in size, quadrate or rounded, coxa 4 not excavate posteriorly; mouthparts basic except for one genus lacking mandibular palp and another with reduced molar; lower lip with lateral (outer) lobes projecting, notched (bilobed) or medially excavate; gnathopods usually powerful, subchelate, in one genus feeble and chelate, gnathopod 1 usually smaller than 2, occasionally larger than 2; uropod 3 with very short quadrate rami, shorter than peduncle, outer ramus armed with one or two hooks; telson short, entire, nearly circular, square or triangular, fleshy.

RELATIONSHIP.—The notched outer lobes of the lower lip distinguish this family from its relatives, the Isaeidae, Aoridae, Ischyroceridae, and Corophiidae. The very short quadrate rami with a hook or hooks on the outer are distinctive (but see *Jassa* in Ischyroceridae).

The Ischyroceridae also have short rami but the peduncle is more elongate, the rami are superficially lanceolate and poorly setose, and the outer is armed with denticles, not large hooks (except *Jassa*).

The genus *Amphitholina* Ruffo was transferred to Eophliantidae by Gurjanova (1938); it bridges these two families in its intersimilar third

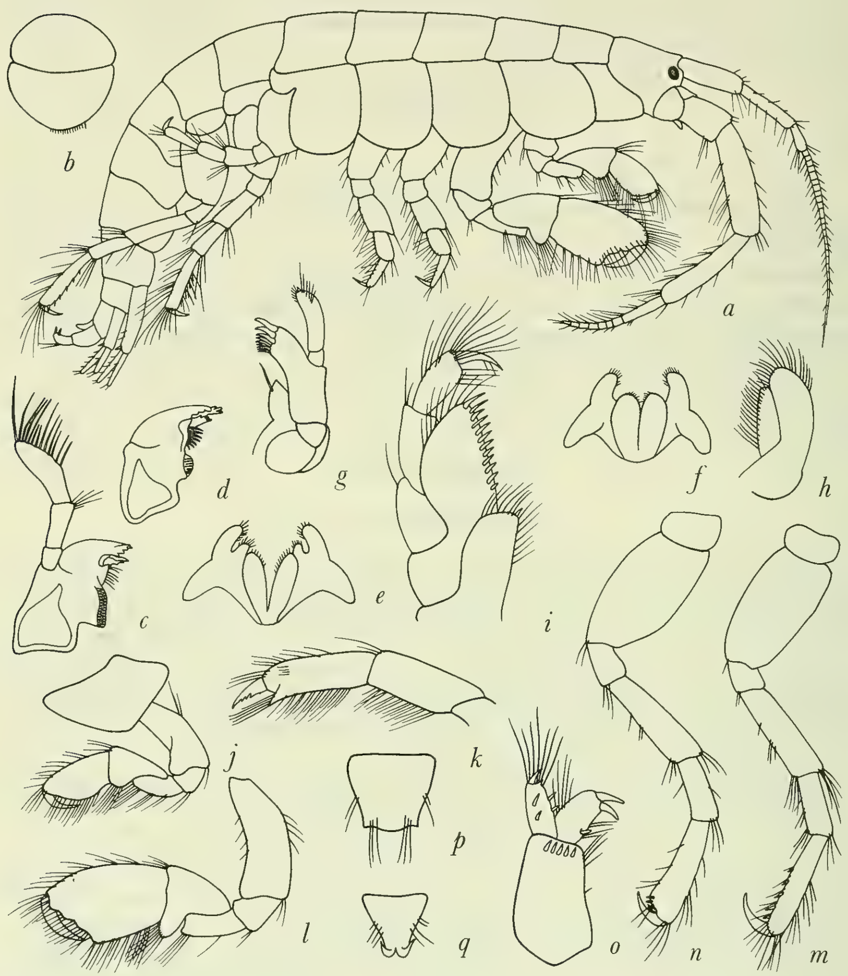

FIGURE 61.—Ampithoidae: *a*, *Ampithoe rubricata* (Montagu) (Sars, 1895, pl. 206). Upper lip: *b*, *Ampithoe*. Mandible: *c*, *Ampithoe*; *d*, *Sunamphitoe pelagica* (Milne Edwards) (Sars, 1895, pl. 208, as *S. conformata*). Lower lip: *e*, *Ampithoe*; *f*, *Pleonexes gammaroides* (Bate) (Sars, 1895, pl. 207). Maxillae 1–2, Maxilliped: *g,h,i*, *Ampithoe*. Gnathopod 1: *j*, *Ampithoe*; *k*, *Macropisthopus stebbingi* K. H. Barnard (1916). Gnathopod 2: *l*, *Ampithoe*. Pereopod 5: *m*, *Ampithoe*; *n*, *Pleonexes*. Uropod 3: *o*, *Ampithoe*. Telson: *p*, *Ampithoe*; *q*, *Pleonexes*.

uropods, but the degeneration of mouthparts and coxae and the subcylindrical body mark it as an eophliantid.

The shape of uropod 3 distinguishes the Ampithoidae from the Calliopiidae, Pleustidae, and Oedicerotidae.

Nomenclatural Changes in Ampithoidae

Amphitholina Ruffo (1953) is removed to Eophliantidae.
Amphithoides patrizii Maccagno (1936) is removed to *Cymadusa*.

Key to the Genera of Ampithoidae

1. Mandible lacking palp (fig. 61*d*) . . . . **Sunamphitoe**
   Mandible bearing palp (fig. 61*c*) 2
2. Antenna 1 lacking accessory flagellum 3
   Antenna 1 bearing accessory flagellum 6
3. Gnathopod 1 larger and stouter than gnathopod 2 . . . . **Exampithoe**
   Gnathopod 1 smaller and more slender than gnathopod 2 4
4. Gnathopods feeble, chelate (fig. 61*k*) . . . . **Macropisthopus**
   Gnathopods large, subchelate (figs. 61*j*,*l*) 5
5. Article 6 of pereopods 3–5 widened apically, subprehensile (fig. 61*n*), often bearing large striated spines, telson with apical pair of reverted, elongate, cornified processes (fig. 61*q*) . . . . **Pleonexes**
   Article 6 of pereopods 3–5 widened or not widened, rarely subprehensile (fig. 61*m*), apical cornified processes of telson if present, obsolescent (fig. 61*p*) . . . . **Ampithoe**
6. Outer ramus of uropod 3 bearing one hook . . . . **Amphithoides**
   Outer ramus of uropod 3 bearing two hooks (fig. 61*o*) 7
7. Gnathopod 1 larger than gnathopod 2 . . . . **Paragrubia**
   Gnathopod 1 smaller than gnathopod . . . . **Cymadusa**

Genera of Ampithoidae

Amphithoides Kossmann

Amphithoides Kossmann, 1880.—Stebbing, 1906.

Type-species: *A. longicornis* Kossmann, 1880 (monotypy).

Antenna 1 with accessory flagellum; mandible with palp; gnathopods large, subchelate, gnathopod 2 equal to or larger than 1; article 6 of pereopods 3–5 not apically widened; outer ramus of uropod 3 with one hook. Species: 1, Red Sea, littoral.

Ampithoe Leach

Ampithoe Leach, 1814a.—Stebbing, 1906.

Type-species: *Cancer* (*Gammarus*) *rubricatus* Montagu, 1808 (monotypy). See Sars, 1895.

Antenna 1 lacking accessory flagellum; mandible with palp; gnathopods large, subchelate, gnathopod 2 equal to or larger than 1; article 6 of pereopods 3–5 scarcely widened apically, rarely prehensile (*Pleonexes*); outer ramus of uropod 3 with two hooks; *apical cornified processes of telson, if present, obsolescent* (*Pleonexes*). Species: 35, cosmopolitan, littoral.

Cymadusa Savigny

Cymadusa Savigny, 1816.
Grubia Czerniavski, 1868.
Acanthogrubia Stout, 1912.

Type-species: *C. filosa* Savigny, 1816 (monotypy). See Chevreux and Fage, 1925 (as *Grubia hirsuta*), Shoemaker, 1935 (as *Grubia filosa*).

Antenna 1 with 1- or 2-articulate accessory flagellum; mandible with palp; gnathopods large, subchelate, gnathopod 2 equal to or larger than 1; article 6 of pereopods 3–5 not apically widened; outer ramus of uropod 3 with two hooks. Species: ca. 10, generally tropical-amphiboreal, littoral.

Exampithoe K. H. Barnard

Exampithoe K. H. Barnard, 1925.

Type-species: *E. natalensis* K. H. Barnard, 1925 (monotypy).

Antenna 1 lacking accessory flagellum; mandible with palp, *molar reduced;* gnathopods large, subchelate, gnathopod 1 stouter than 2; article 6 of pereopods 3–5 apically widened; outer ramus of uropod 3 with two hooks. Species: 1, S. Africa, littoral.

Macropisthopus K. H. Barnard

Macropisthopus K. H. Barnard, 1916.

Type-species: *M. stebbingi* K. H. Barnard, 1916 (monotypy).

Antenna 1 lacking accessory flagellum; mandible with palp; gnathopods feeble, chelate; article 6 of pereopods 3–5 scarcely widened distally; outer ramus of uropod 3 with two hooks. Species: 1, S. Africa, littoral.

Paragrubia Chevreux

Paragrubia Chevreux, 1901a.

Type-species: *P. vorax* Chevreux, 1901a (monotypy).

Antenna 1 with accessory flagellum; mandible with palp; gnathopods large, subchelate, gnathopod 1 larger than 2; article 6 of pereopods 3–5 not apically widened; outer ramus of uropod 3 with two hooks. Species: 1, tropical Pacific, littoral.

Pleonexes Bate

Anisopus Templeton, 1836 (homonym, Diptera).
Pleonexes Bate, 1857a.

Type-species: *P. gammaroides* Bate, 1857a (monotypy). See Sars, 1895.

Antenna 1 lacking accessory flagellum; mandible with palp; gnathopods large, subchelate, gnathoped 2 equal to or larger than 1; *article 6 of pereopods 3–5 apically widened and subprehensile* (*Ampithoe*); outer ramus of uropod 3 with two hooks; *telson with apical pair of reverted, elongate, cornified processes* (*Ampithoe*). Species: 3, N.E. Atlantic, New Zealand, littoral.

Sunamphitoe Bate

Sunamphitoe Bate, 1857a.

Type-species: *Amphithoe pelagica* Milne Edwards, 1830 (designated by Chevreux and Fage, 1925). See Sars, 1895 (as *S. conformata*).

Antenna 1 lacking accessory flagellum; mandible lacking palp; gnathopods large, subchelate, gnathopod 2 equal to or larger than 1; article 6 of pereopods 3–5 not apically widened; outer ramus of uropod 3 with two hooks. Species: 2, N.E. Atlantic, epipelagic.

Anamixidae

Figure 62

Diagnosis.—Mandible, lower lip, and maxillae absent; buccal regions with ventrally projecting keel; outer plates of maxillipeds absent, inner plates small, fused together; coxa 1, when present, hidden by the shield-like coxae 2–4; telson entire. See Leucothoidae, Amphilochidae, Cressidae, Sebidae, Thaumatelsonidae.

Description.—Body smooth, lacking dorsal processes; mouthparts aberrant as in diagnosis; accessory flagellum absent; gnathopod 1, when present, small and complexly chelate, having a chelate process on article 5, articles 6 and 7 (when present) together forming dactyl; gnathopod 2 immense, article 5 forming a false chela but articles 6 and 7 large, and article 7 alone forming the true dactyl; uropod 3 with styliform rami as long as the elongate peduncle; telson entire.

Relationship.—The Leucothoidae bear mandibles and maxillae.

Key to the Genera of Anamixidae

1. Gnathopod 1 present . . . . **Anamixis**
   Gnathopod 1 absent . . . . **Paranamixis**

Genera of Anamixidae

Anamixis Stebbing

Anamixis Stebbing, 1897; 1906.

Type-species: *A. hanseni* Stebbing, 1897 (monotypy).
Species: 4, Indo-Pacific tropics and subtropics, littoral (sponges).

Paranamixis Schellenberg

Paranamixis Schellenberg, 1938.

Type-species: *P. bocki* Schellenberg, 1938 (monotypy).
Species: 1, Gilbert Islands, littoral.

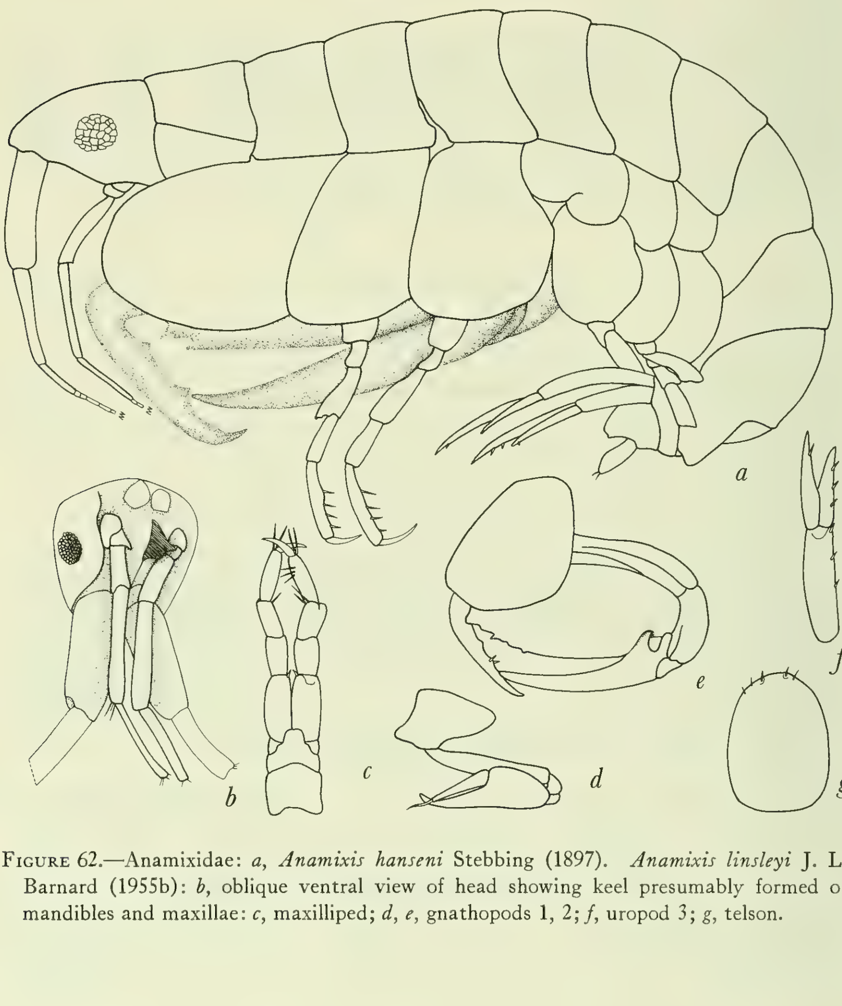

FIGURE 62.—Anamixidae: *a*, *Anamixis hanseni* Stebbing (1897). *Anamixis linsleyi* J. L. Barnard (1955b): *b*, oblique ventral view of head showing keel presumably formed of mandibles and maxillae: *c*, maxilliped; *d*, *e*, gnathopods 1, 2; *f*, uropod 3; *g*, telson.

Aoridae

FIGURES 63, 64

DIAGNOSIS.—Accessory flagellum variable, multiarticulate, or absent; telson entire, short, fleshy; coxa 4 not excavate posteriorly; pereopods glandular; *uropod 3 rarely projecting beyond uropods 1 and 2, at least one of rami as long as or longer than peduncle;* gnathopod 1 larger than gnathopod 2, in rare cases only as large as gnathopod 2 but with male secondary sexual modifications. See Isaeidae, Corophiidae, Ischyroceridae.

DESCRIPTION.—Accessory flagellum varying from absent to long and multiarticulate; body smooth; rostrum vestigial; coxae rounded or quadrate below, varying from long to short, fourth not excavate posteriorly; mouthparts basic; gnathopods powerful, subchelate or complexly subchelate, occasionally nearly simple, but then often extremely setose, first always larger or more complex than second in both sexes and bearing most of male secondary sexual modifications; pereopod 5 usually conspicuously elongate; uropod 3 short, rami usually as long as or longer than peduncle, occasionally inner ramus reduced in size or both rami reduced; telson short, nearly circular or square, entire, occasionally falsely (?secondarily) cleft.

RELATIONSHIP.—Like the Isaeidae but having an enlarged first gnathopod; otherwise Aoridae are related to other families in the same way as are the Isaeidae. Keys of both families and the Corophiidae should be checked when examining any genera with abnormally enlarged or complexly subchelate gnathopods. One may understand the difficulties of segregating Aoridae and Corophiidae when examining the small differences between *Grandidierella* (Corophiidae) and *Neomicrodeutopus* (Aoridae).

Nomenclatural Changes in Aoridae

The female of *Dryopoides* was first assigned to the Aoridae by Stebbing (1888). Its first gnathopod is larger than the second. In 1910, Stebbing discovered the male, with gnathopod 2 larger than 1, but the species was transferred to the Corophiidae. Because the genus may yet prove to be an aorid, the female is retained in the key to Aoridae as if it were a male.

Paradryope and *Dryopoides* might be placed in the family Ischyroceridae, especially *Paradryope* because of the short rami of its uropod 3 and the slightly elongate peduncle. The uropodal peduncle of *Dryopoides* is not greatly elongate. Ischyroceridae would thus receive genera with gnathopod 1 larger than 2, of which *Bonnierella* is an

FIGURE 63.—Aoridae: *a*, *Aora typica* Krøyer (Sars, 1895, pl. 193, as *A. gracilis*). *Aora*: *b*, upper lip; *c*, mandible; *d*, lower lip; *e*, *f*, maxillae 1–2; *g*, maxilliped. Gnathopod 1: *h*, female *Aora*; *i*, male *Aora*; *j*, *Xenocheira fasciata* Haswell (Pirlot, 1938); *k*, *Lembos websteri* Bate (Sars, 1895, pl. 194); *l*, *Rudilemboides stenopropodus* J. L. Barnard (1959a); *m*, *Lembopsis spinicarpus* Pearse (1912). Uropod 3: *n*, *Aora*; *o*, *Dryopoides westwoodi* Stebbing (1888); *p*, *Paraoroides unistilus* Stebbing (1910); *q*, *Acuminodeutopus heteruropus* J. L. Barnard (1959a). Telson: *r*, *Aora*.

intermediate genus. This procedure would also justify combining the remaining Aoridae with the Isaeidae (Photidae) and might eventually result in the Ischyroceridae also being joined to the Isaeidae, perhaps as a subfamily.

Key to Genera of Aoridae

[MALES AND MALE-LIKE FEMALES]

1. Article 4 of gnathopod 1 produced into a long tooth (merochelate) (fig. 63*i*)[1]. 2
   Article 4 of gnathopod 1 not produced into a long tooth (occasionally with a short tooth)[1] 3
2. Accessory flagellum long, composed of three or more articles . . . . **Aora**
   Accessory flagellum absent . . . . **Aoroides**
3. Article 5 of gnathopod 1 with one or more strong distal or subposterior teeth (carpochelate) (fig. 64*j*) 4
   Article 5 of gnathopod 1 lacking a strong distal tooth (fig. 63*l*) 11
4. Uropod 3 uniramous (fig. 63*p*) . . . . **Neomicrodeutopus**
   Uropod 3 biramous (figs. 63*n*,*q*) 5
5. Gnathopod 1 of both sexes alike . . . . **Hansenella**
   Gnathopod 1 differing in each sex 6
6. Gnathopod 2 heavily setose on full anterior edge of article 5 (fig. 64*g*) . 7
   Gnathopod 2 sparsely setose on anterior edge of article 5 or setae compacted into a distal bundle only 10
7. Article 6 of gnathopod 1 as long and as broad as article 5 (fig. 63*m*). **Lembopsis**
   Article 6 of gnathopod 1 shorter and/or narrower than article 5 (fig. 63*l*) . 8
8. Article 5 of gnathopod 2 longest (fig. 64*g*), female gnathopod 1 simple (like fig. 64*f*) . . . . **Neomegamphopus**
   Article 6 of gnathopod 2 longest, female gnathopod 1 subchelate (fig. 63*h*) . 9
9. Head elongate, antenna 2 attached halfway back on ventral cephalic margin, gnathopod 2 of male as stout as 1, of female weakly setose anteriorly. **Amphideutopus**
   Head not elongate, antenna 2 attached to anteroventral corner of head in front of eye, gnathopod 2 of male much more slender than 1, of female densely setose anteriorly . . . . **Coremapus**
10. Inner ramus of uropod 3 less than half as long as outer ramus (fig. 63*q*). **Acuminodeutopus**
    Rami of uropod 3 subequal (fig. 63*n*) . . . . **Microdeutopus**
11. Uropod 3 lacking rami . . . . **Uncinotarsus**
    Uropod 3 with at least one ramus 12
12. Rami of uropod 3 minute, less than half as long as peduncle (fig. 63*o*) . 13 [2]
    Rami of uropod 3 not minute, as long as or longer than peduncle . . 14
13. Pleonite 6 evanescent dorsally, article 3 of antenna 1 shorter than article 1, accessory flagellum vestigial . . . . **Dryopoides**, female

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[1] Note that juvenile males of *Aora* and *Aoroides* have a very short tooth and thus may key to *Lembos* but gnathopod 1 of *Lembos* is always strongly subchelate, whereas gnathopod 1 of *Aora* and *Aoroides* is essentially simple.

[2] These genera may belong with the Ischyroceridae.

Pleonite 6 visible dorsally, article 3 of antenna 1 longer than article 1, accessory flagellum well developed . . . . **Paradryope**

14. Gnathopod 1 with article 6 equal to or greater in length and breadth than article 5 (fig. 63*j*) 15

Gnathopod 1 with article 6 shorter and/or narrower than article 5 (fig. 63*l*) 19

15. Uropod 3 uniramous, accessory flagellum absent . . . . . . **Paraoroides**

Uropod 3 biramous, accessory flagellum present 16

16. Article 3 of antenna 1 subequal to article 1, gnathopods 1–2 equal in size and morphology, subchelate . . . . **Aorcho**

Article 3 of antenna 1 shorter than article 1, gnathopod 1 larger than gnathopod 2 or gnathopod 2 extremely setose, occasionally gnathopod 2 simple. 17

17. Gnathopod 2 subchelate . . . . **Lembos**

Gnathopod 2 simple (fig. 106*l*) 18

18. Coxae 1 and 2 short, wider than long, subequal in size, subquadrate, coxa 2 not concealing coxa 1, article 5 of gnathopod 2 very bulbous (fig. 64*d*). **Xenocheira**

Coxa 1 smaller than and partially to fully hidden by coxa 2, latter longer than wide, article 5 of gnathopod 2 not bulbous . . . . **Leptocheirus**

19. Gnathopods fully subchelate . . . . **Lemboides**

Gnathopods scarcely subchelate (figs. 63*l*, 64*f*) . . . . . **Rudilemboides**

Genera of Aoridae

Acuminodeutopus J. L. Barnard

Acuminodeutopus J. L. Barnard, 1959a.

Type-species: *A. heteruropus* J. L. Barnard, 1959a (original designation).

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 with large distal tooth on article 5, article 6 shorter and narrower than article 5, simple, female gnathopod 1 subchelate; male gnathopod 2 nearly simple, poorly setose, article 5 longest; outer ramus of uropod 3 longer than peduncle, inner ramus less than half as long as outer. Species: 1, California, littoral.

Amphideutopus J. L. Barnard

Amphideutopus J. L. Barnard, 1959a.

Type-species: *A. oculatus* J. L. Barnard, 1959a (original designation).

[Antenna 1 unknown]; male gnathopod 1 with distal tooth on article 5, article 6 shorter and narrower than 5, simple, female gnathopod 1 subchelate; male gnathopod 2 with moderately setose anterior edge on article 5, article 6 slightly the longest, subchelate; *male gnathopod 2 as stout as gnathopod 1; head elongate, antenna 2 attached halfway back on ventral cephalic margin; female gnathopod 2 weakly setose anteriorly* (*Coremapus*); rami of uropod 3 equal, longer than peduncle. Species: 1, California, littoral.

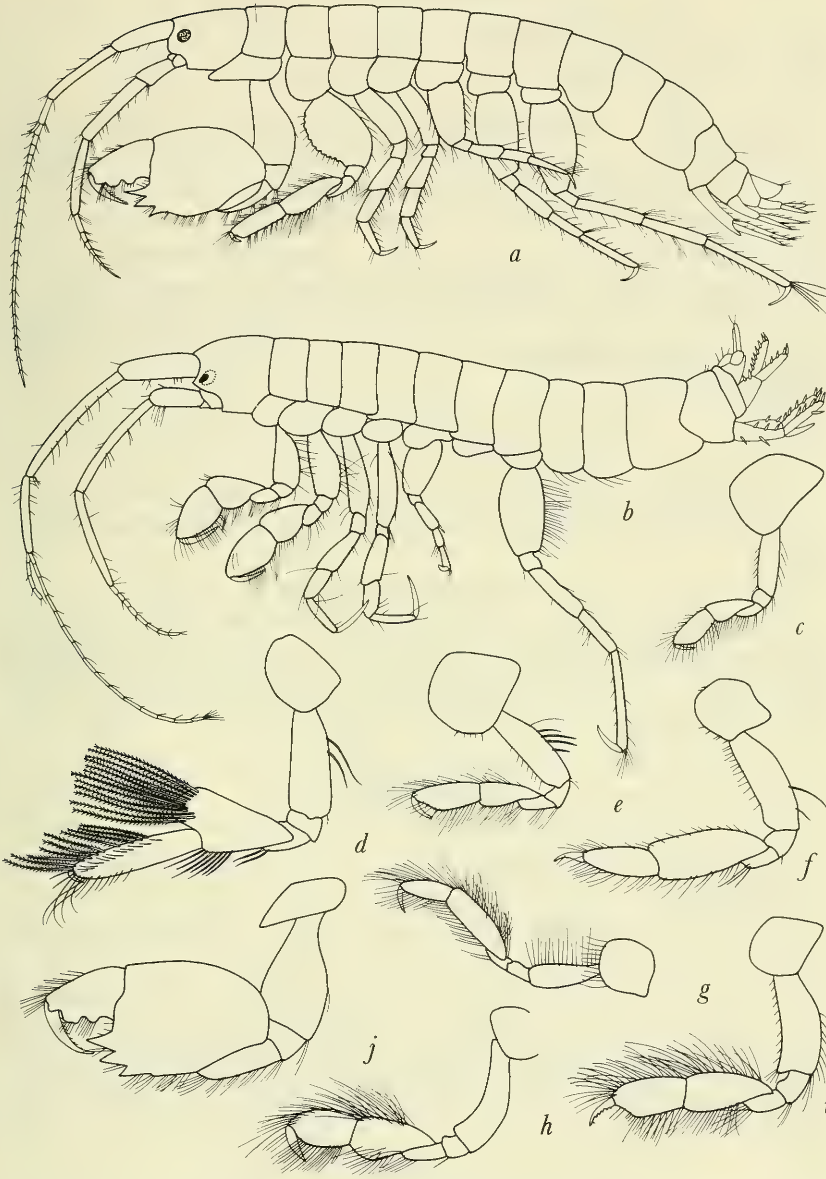

FIGURE 64.—Aoridae: *a*, *Microdeutopus gryllotalpa* Costa (Sars, 1895, pl. 192); *b*, *Aorcho delgadus* J. L. Barnard (1961). Gnathopod 2: *c*, *Aora typica* Krøyer female (Sars, 1895, pl. 193, as *A. gracilis*); *d*, *Xenocheira fasciata* Haswell (Pirlot, 1938); *e*, *Aora* male; *f*, *Rudilemboides stenopropodus* J. L. Barnard (1959a); *g*, *Neomegamphopus roosevelti* Shoemaker (1942); *h*, *Lembopsis spinicarpus* Pearse (1912); *i*, *Lembos websteri* Bate (Sars, 1895, pl. 194). Gnathopod 1: *j*, *Microdeutopus*.

Aora Krøyer

Aora Krøyer, 1845.—Stebbing, 1906.
Lalaria Nicolet, 1849.
Lonchomerus Bate, 1857a.

Type-species: *A. typica* Krøyer, 1845 (monotypy). See Sars, 1895.

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 complexly subchelate, with long tooth on article 4, articles 5-6 lacking teeth, article 6 slightly shorter and sometimes narrower than article 5, simple, female gnathopod 1 scarely subchelate; male gnathopod 2 subchelate, not heavily setose on anterior edge of article 5, articles 5 and 6 subequal; rami of uropod 3 subequal, longer than peduncle. Species: 2, Atlantic, amphiboreal, littoral, bathyal.

Aorcho J. L. Barnard

Aorcho J. L. Barnard, 1961.

Type-species: *A. delgadus* J. L. Barnard, 1961 (original designation).

Article 3 of antenna 1 as long as article 1, accessory flagellum present; male gnathopod 1 lacking teeth, scarcely larger than and similar to gnathopod 2, [female unknown]; gnathopod 2 subchelate, poorly setose, articles 5–6 subequal; rami of uropod 3 subequal, longer than peduncle. Species: 1, Tasman Sea (610 m).

Aoroides Walker

Aoroides Walker, 1898.—Stebbing, 1906.

Type-species: *A. columbiae* Walker, 1898 (monotypy). See J. L. Barnard, 1954.

Article 3 of antenna 1 shorter than article 1, accessory flagellum absent; male gnathopod 1 complexly subchelate, with long tooth on article 4, articles 5–6 lacking teeth, article 6 shorter and narrower than 5, simple, female gnathopod 1 scarcely subchelate; male gnathopod 2 not heavily setose, articles 5–6 subequal, subchelate; rami of uropod 3 subequal, as long as peduncle. Species: 2, Pacific boreal, littoral.

Coremapus Norman

Coremapus Norman, 1905.

Type-species: *Lembos versiculatus* Bate, 1857a (original designation). See Chevreux and Fage, 1925.

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 with distal tooth on article 5, article 6 shorter and narrower than 5, simple, female gnathopod 1 subchelate; male and female gnathopod 2 with heavily setose anterior edge of article 5, article 6 longest, subchelate; *male gnathopod 2 much more slender than gnathopod 1; head not elongate, antenna 2 attached at anteroventral cephalic corner in front of eye* (*Amphideutopus*); rami of uropod 3 equal, longer than peduncle. Species: 1, N. Atlantic boreal, littoral.

Dryopoides Stebbing

Dryopoides Stebbing, 1888; 1906.

Type-species: *D. westwoodi* Stebbing, 1888 (monotypy). See Stebbing, 1910.

Article 3 of antenna 1 shorter than 1, accessory flagellum minute; male gnathopod 1 subchelate, articles 4–6 lacking teeth; female gnathopod 1 subchelate; male gnathopod 2 subchelate, not heavily setose, article 6 longest; rami of uropod 3 minute, equal, much shorter than peduncle; *pleonal segment 6 evanescent dorsally* (*Paradryope*). Species: 1, Australia, littoral. Also assigned to Corophiidae.

Hansenella Chevreux

Hansenella Chevreux, 1909.

Type-species: *H. longicornis* Chevreux, 1909 (original designation).

[Male unknown, but probably like female]; article 3 of antenna 1 shorter than article 1, accessory flagellum present; gnathopod 1 like that of male aorid, with distal tooth on article 5, article 6 shorter and narrower than 5, poorly subchelate; gnathopod 2 subchelate, article 6 longest, article 5 poorly setose anteriorly; rami of uropod 3 equal, slightly longer than peduncle. Possibly synonymous with *Microdeutopus* and representing aberrant female. Species: 1, N. Atlantic (1,360 m).

Lemboides Stebbing

Lemboides Stebbing, 1895; 1906.

Type-species: *L. afer* Stebbing, 1895 (original designation).

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 subchelate, articles 4–5 lacking teeth, 6 occasionally with chela, article 5 longer and broader than 6, female gnathopod 1 subchelate, male gnathopod 2 subchelate, article 5 longest, poorly setose; rami of uropod 3 equal, longer than peduncle. Species: 4, antiboreal, littoral.

Lembopsis Pearse

Lembopsis Pearse, 1912.

Type-species: *L. spinicarpus* Pearse, 1912 (original designation).

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 with long posterior tooth on article 5, article 6 longer and as broad as 5, subchelate; male gnathopod 2 heavily setose on anterior edge of article 5, articles 5–6 subequal; rami of uropod 3 equal, longer than peduncle. Species: 1, Gulf of Mexico, littoral.

Lembos Bate

Lembos Bate, 1857a.—Stebbing, 1906.
Autonoe Bruzelius, 1859.
Bemlos Shoemaker, 1925.

Type-species: *L. websteri* Bate, 1857a (designated by Chevreux and Fage, 1925). See Sars, 1895.

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 subchelate, with articles 4–5 lacking teeth, article 6 not narrower but usually longer than 5, female gnathopod 1 subchelate; male gnathopod 2 subchelate, with article 5 longest, poorly setose on anterior edge; rami of uropod 3 equal, longer than peduncle. Species: 31, cosmopolitan, primarily tropical, littoral (2 bathyal, 1 abyssal).

Leptocheirus Zaddach

Leptocheirus Zaddach, 1844.—Stebbing, 1906.
Ptilocheirus Stimpson, 1853.
Boeckia Malm, 1871.

Type-species: *L. pilosus* Zaddach, 1844 (original designation). See Sexton, 1911; Chevreux and Fage, 1925.

Article 3 of antenna 1 shorter than article 1, accessory flagellum 3+-articulate; male gnathopod 1 subchelate, articles 4–5 lacking teeth; female gnathopod 1 subchelate and extremely setose; gnathopod 2 simple in both sexes and extremely setose on articles 2 and 5 but article 5 not especially bulbous; rami of uropod 3 equal or unequal, one or both rami longer than peduncle; *coxa 1 often very small and occasionally large but always slightly smaller than coxa 2 and often triangular, hidden fully or partially by enlarged coxa 2, latter longer than wide* (*Xenocheira*). Species: 10, boreal N. Atlantic, littoral.

Microdeutopus Costa

Microdeutopus Costa, 1853c.—Stebbing, 1906.
Stimpsonia Bate and Westwood, 1863 (homonym, Nemertea).
Stimpsonella Della Valle, 1893.

Type-species: *M. gryllotalpa* Costa, 1853c (monotypy). See Sars, 1895.

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 with long distal tooth on article 5, article

6 shorter and narrower than article 5, simple, female gnathopod 1 subchelate; male gnathopod 2 subchelate, articles 5–6 variable in length, article 5 not heavily setose anteriorly; rami of uropod 3 subequal, as long as or longer than peduncle. Species: 10, cosmopolitan, littoral.

Neomegamphopus Shoemaker

Neomegamphopus Shoemaker, 1942.

Type-species: *N. roosevelti* Shoemaker, 1942 (original designation).

Article 3 of antenna 1 as long as article 1, accessory flagellum small; male gnathopod 1 with long distal tooth on article 5, article 6 simple, as long but narrower than article 5, female gnathopod 1 simple; male gnathopod 2 with article 5 longer than 6 and heavily setose on anterior edge; rami of uropod 3 subequal, slightly longer than peduncle. Species: 1, E. Pacific tropical, littoral.

Neomicrodeutopus Schellenberg

Neomicrodeutopus Schellenberg, 1925b.

Type-species: *N. cabindae* Schellenberg, 1925b (monotypy).

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 with long distal tooth on article 5, article 6 shorter and narrower than article 5, simple, [female unknown]; male gnathopod 2 subchelate, stout, article 5 longer than 6, article 5 poorly setose anteriorly; uropod 3 with a single ramus twice as long as peduncle, latter with a broad distomedial lobe. Species: 2, W. Africa, littoral. Differs from *Grandidierella* in Corophiidae by normally short article 1 of mandibular palp.

Paradryope Stebbing

Paradryope Stebbing, 1888; 1906.

Type-species: *P. orguion* Stebbing, 1888 (monotypy).

Article 3 of antenna 1 longer than article 1, accessory flagellum present; male gnathopod 1 subchelate, articles 4–5 lacking teeth, article 6 longer and broader than 5; male gnathopod 2 subchelate, not heavily setose, articles 5–6 equal; rami of uropod 3 minute, equal, much shorter than peduncle. Species: 1, N. Pacific, abyssal (4,200 m).

Paraoroides Stebbing

Paraoroides Stebbing, 1910.

Type-species: *P. unistilus* Stebbing, 1910 (monotypy).

Article 3 of antenna 1 shorter than article 1, accessory flagellum

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minute, vestigial; male gnathopod 1 subchelate, articles 4–5 lacking teeth, articles 5–6 subequal, female gnathopod 1 scarcely subchelate; male gnathopod 2 subchelate, poorly setose, article 5 slightly longer than 6; uropod 3 uniramous, ramus equal to peduncle. Species: 1, S.E. Australia, littoral.

Rudilemboides J. L. Barnard

Rudilemboides J. L. Barnard, 1959a.

Type-species: *R. stenopropodus* J. L. Barnard, 1959a (original designation).

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 simple, lacking teeth, article 5 much broader and longer than article 6, female gnathopod 1 subchelate; male gnathopod 2 nearly simple, poorly setose, article 5 longest; rami of uropod 3 equal, longer than peduncle. Species: 1, California, littoral.

Uncinotarsus L'Hardy and Truchot

Uncinotarsus L'Hardy and Truchot, 1964.

Type-species: *U. pellucidus* L'Hardy and Truchot, 1964 (original designation).

Article 3 of antenna 1 shorter than article 1, accessory flagellum 2-articulate; male gnathopod 1 subchelate, articles 4–5 lacking teeth, article 6 broader and longer than article 5, female gnathopod 1 subchelate; male gnathopod 2 subchelate, not heavily setose, article 6 longer than 5; uropod 2 with one ramus; rami of uropod 3 absent. Species: 1, Atlantic France, littoral. Differs from *Concholestes* in Corophiidae by slender antenna 2 being shorter than antenna 1, by gnathopod 1 being larger than 2, by the short article 3 of antenna 1, acuminate coxae 5–7, slender pereopods 1–2, and elongate pereopods 3–5.

Xenocheira Haswell

Xenocheira Haswell, 1880b.—Stebbing, 1906.

Type-species: *X. fasciata* Haswell, 1880b (monotypy). See Pirlot, 1938.

Article 3 of antenna 1 shorter than article 1, accessory flagellum present; male gnathopod 1 subchelate, articles 4–5 lacking teeth; female gnathopod 1 subchelate; male gnathopod 2 simple, female minutely subchelate, article 6 longest, article 5 strongly setose anteriorly *and very bulbous;* gnathopod 2 extremely setose; rami of uropod 3 equal, longer than peduncle; *coxae 1–2 subequal in size, short, wider than long, coxa 1 not concealed by coxa 2* (*Leptocheirus*). Species: 2, tropical Pacific, littoral.

Argissidae

FIGURE 65

DIAGNOSIS.—Accessory flagellum 2-articulate; coxae 1 and 4 long, *coxae 1–3 successively smaller, coxa 4 larger than coxa 1;* gnathopods feeble, simple or poorly subchelate. Monogeneric. See Gammaridae, Haustoriidae, Synopiidae, Ampeliscidae, Vitjazianidae.

DESCRIPTION.—Accessory flagellum 2-articulate; when present, primary flagellum basally conjoint in male; dorsal teeth only on urosome, rostrum obsolescent; coxa 1 large, coxae 2 and 3 successively smaller, coxa 4 larger than 1; mouthparts basic, upper lip slightly incised; mandibular palp with article 3 longer than article 2; gnathopods feeble, simple, except one species having gnathopod 1 poorly subchelate; uropod 3 biramous; telson of medium length, cleft.

RELATIONSHIP.—Argissids are distinguished by the consecutive reduction in size of coxae 1–3. They closely resemble Gammaridae, especially the genus *Megaluropus* in which coxae 1–4 also are irregular but in which coxa 2 is larger than 1 and coxa 3 smaller than 2.

Despite their definitive similarity to Gammaridae, argissids bear external resemblance to Haustoriidae and were at one time included in that family. They call attention to the close relationship of haustoriids to gammarids. Again the unusual coxae distinguish them from haustoriids. The peculiar eyes of *Argissa hamatipes*, four bigeminous lenticular bodies imbedded at the periphery of a common pigmentary mass, seem unique to the family but the other species of *Argissa*, *A. stebbingi*, lacks eyes, so that they are not diagnostic.

Sars (1895) has noted the similarity of the genus *Argissa* to the Ampeliscidae (at that time *Argissa* was placed in the Haustoriidae). Resemblance occurs in the antennae, pereopods 1–2 and 5, the uropods, and the telson. *Argissa* nevertheless has some primitive characters which place it between the Ampeliscidae and the Gammaridae: the accessory flagellum, the intermediately modified pereopods 3 and 4, and a weakly 2-articulate outer ramus of uropod 3. The eyes of *Argissa* may represent a stage in the development of the ampeliscid corneal lens. Of course, *Argissa* cannot stand on the direct line between Ampeliscidae and Gammaridae because of its specializations in coxae but it may well be a close relative of the organisms that occurred directly on the evolutionary pathway. The most important specializations of the Ampeliscidae have been the development of tube-spinning glands in pereopods 1–2, a function apparently not developed in *Argissa*, and the amalgamation of the last two pleonal segments.

Article 2 of pereopods 3–5 in *Argissa* does have conspicuous glands.

Vitjazianids have many characters in common with argissids but *Argissa* may be recognized by the special configuration of coxae.

Nomenclatural Changes in the Argissidae

Parargissa Chevreux (1908c; Pirlot, 1934) is removed to the Hyperiopsidae.

Phylluropus K. H. Barnard (1932) is a synonym of *Megaluropus* (Gammaridae).

Phylluropus capensis K. H. Barnard (1932) is a synonym of *Megaluropus agilis* (fide K. H. Barnard, 1940).

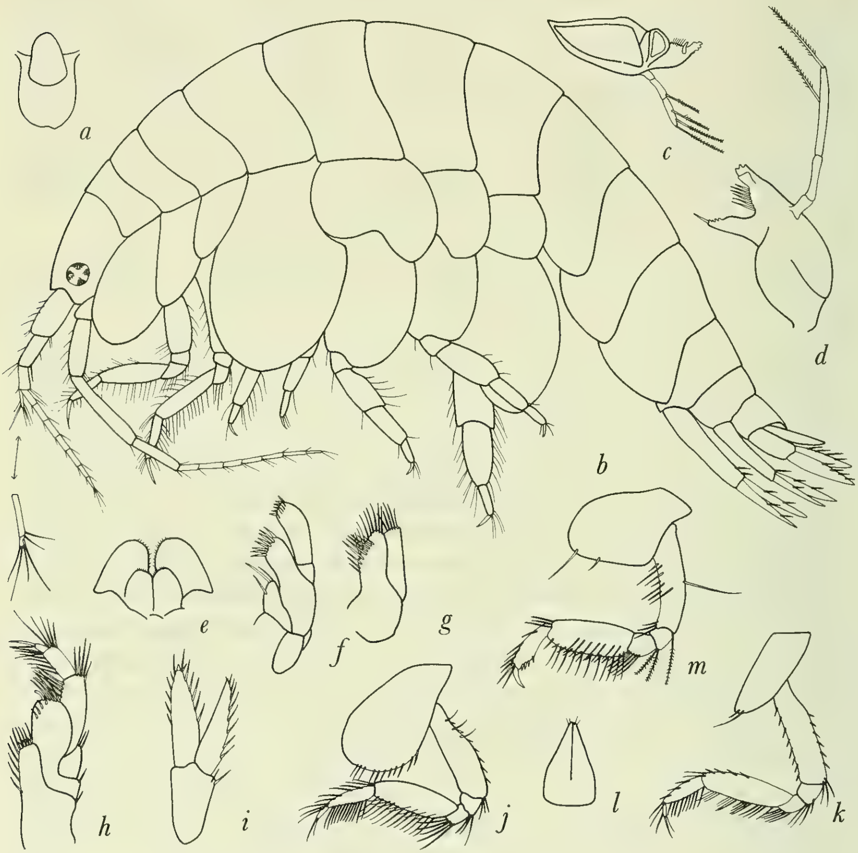

FIGURE 65.—Argissidae: *Argissa hamatipes* (Norman) (Sars, 1895, pl. 48, as *A. typica*): *a*, upper lip; *b*, lateral; *c*, mandible; *e*, lower lip; *f,g*, maxillae 1, 2; *h*, maxilliped; *i*, uropod 3; *j,k*, gnathopods 1, 2; *l*, uropod 3. *Argissa stebbingi* Bonnier (1896): *d*, mandible; *m*, gnathopod 1.

Genera of Argissidae

Argissa Boeck

Argissa Boeck, 1871.—Stebbing, 1906.
Chimaeropsis Meinert, 1890 (homonym, Pisces).

Type-species: *Syrrhoe hamatipes* Norman, 1869a (monotypy and subsequent synonymy). See Sars, 1895.

Species: 2 (possibly synonymous), N. Hemisphere and possibly cosmopolitan, eurybathic (30–1919 m).

Astyridae

FIGURE 66

DIAGNOSIS.—Accessory flagellum 1- or 2-articulate, slender (or absent in dubious genera); mandibular molar nontriturative; lower lip with outer lobes very widely separated; gnathopods feeble. Monogeneric. See Eusiridae, Calliopiidae, Pleustidae, Liljeborgiidae, Haustoriidae, Synopiidae, Vitjazianidae, Hyperiopsidae, Paramphithoidae, Stilipedidae.

DESCRIPTION.—Accessory flagellum a single, medium-sized article or 2-articulate; body smooth; rostrum inconspicuous, head usually normal in appearance but occasionally massive and with "shark nose" appearance (as in some Synopiidae [=Tironidae] and some Pardaliscidae); coxae of medium size or long, rounded or quadrate below but 2 and 4 occasionally subacuminate; mandibular molar a conical, setose, nontriturative lamina; outer lobes of lower lip very widely separated, with or without small erect inner lobes; remainder of mouthparts basic, occasionally maxillae subfoliaceous; gnathopods feeble, barely subchelate; rami of uropod 3 very elongate; telson short, entire or cleft.

RELATIONSHIP.—Usually, the Synopiidae strongly differ from the Astyridae only by their multiarticulate accessory flagella (except the genus *Jeddo*). The combination of very broadly separated lobes of the lower lip, the fact that coxa 4 is usually larger than coxa 3 and the peculiar, sharp, conical, nontriturative molar serve to distinguish Astyridae.

The short coxae and the absence of a mandibular molar distinguish the Pardaliscidae.

Oedicerotidae have strongly setose pereopods, lack an accessory flagellum, have relatively short rami and therefore a relatively long peduncle of uropod 3 and a non-astyrid lower lip.

Most Eusiridae have either a ridged mandibular molar, do not bear the astyrid lower lip or have an elongate telson. Most Calliopiidae have triturative molars and the nontriturative molars of Pleustidae are bulbous, not conical.

In terms of accessory flagellum, mandibular molar, maxillae, maxillipeds, gnathopods, uropods, and telson the Astyridae resemble Paramphithoidae closely, especially to the genera *Eclysis* and *Epimeriella*, which have the same mandibular molar and gnathopods, maxillae and maxillipeds. Astyridae differ from the Paramphithoidae

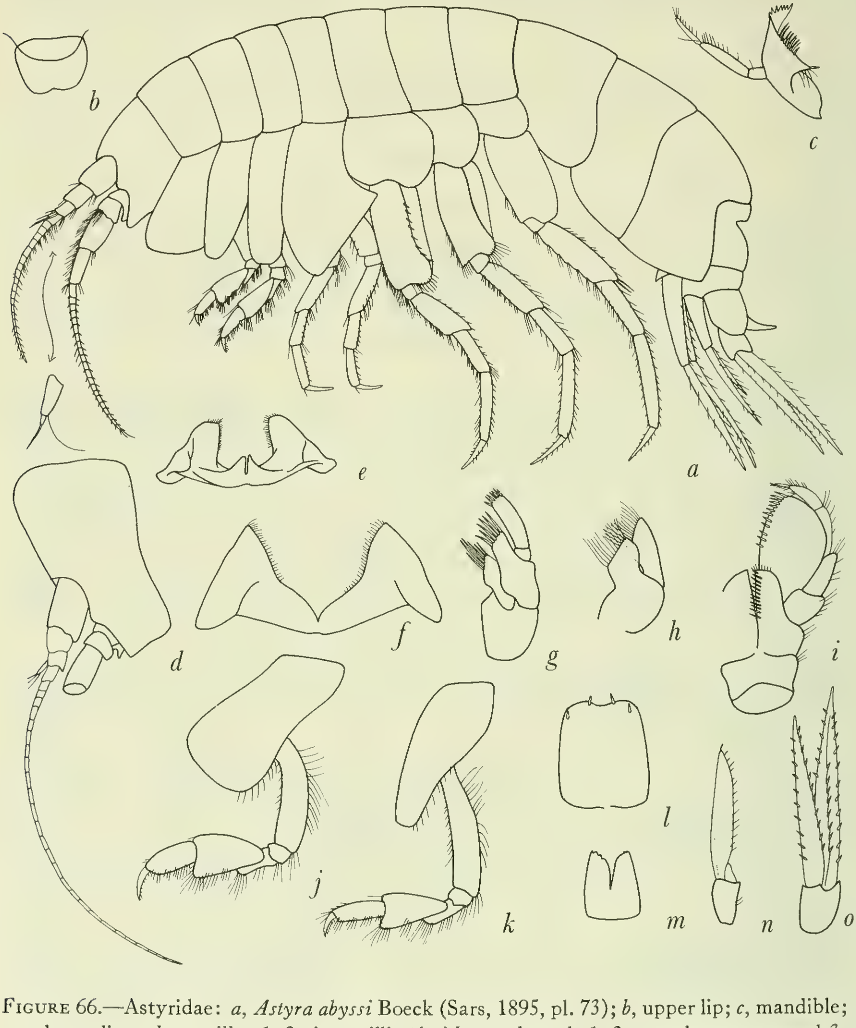

FIGURE 66.—Astyridae: *a, Astyra abyssi* Boeck (Sars, 1895, pl. 73); *b*, upper lip; *c*, mandible; *e*, lower lip; *g,h*, maxillae 1, 2; *i*, maxilliped; *j,k*, gnathopods 1, 2; *m*, telson; *o*, uropod 3; *d*, head of *Astyra gardineri* (Walker) (Pirlot, 1934, as *Parastyra longidactyla*); *f*, lower lip of *A. bogorovi* Birstein and Vinogradov (1955); *l*, telson of *A. zenkevitchi* Birstein and Vinogradov (1955); *n*, uropod 3 of *A. gardineri*.

only by the peculiar lower lip. That this character is sufficient to remove Astyridae from Paramphithoidae is doubtful, especially because of the subacuminate condition of coxae 2 and 4 in astyrids and the distally expanded and rounded-quadrate coxa 1 of *Eclysis*.

The Laphystiopsidae lack an accessory flagellum, have normal lower lips, and entire telsons.

The Haustoriidae do not have the characteristic astyrid lower lip and have fossorial (spiny and setose) pereopods 3–5.

Astyroides Birstein and Vinogradova is synonymized with *Alexandrella* in the Stilipedidae. Stilipedids differ from *Astyra* in the absence of a mandibular molar, the broadening of the mandibular body, the greater foliaceousness of the maxillae, but the two families are strongly related by the condition of coxae 1–2, of which coxa 1 is broader than 2 and 2 tends to taper distally. *Stilipes* stands between *Astyra* and *Alexandrella* in the condition of its upper lip.

Key to the Genera of Astyridae

1.	Coxa 1 subacuminate	**[Epimeriella]**[1]
	Coxa 1 rounded-subquadrate distally	2
2.	Accessory flagellum present	**Astyra**
	Accessory flagellum absent	**[Eclysis]**[1]

[1] See these genera in the Paramphithoidae (pp. 394, 395).

Genera of Astyridae

Astyra Boeck

Astyra Boeck, 1871.—Stebbing, 1906.
Chagosia Walker, 1909.
Parastyra Pirlot, 1934.

Type-species: *A. abyssi* Boeck, 1871 (monotypy). See Sars, 1895.

Species: 5, cosmopolitan, bathypelagic (100–2000 m).

Atylidae

Figures 67, 68

Diagnosis.—Accessory flagellum vestigial or absent; urosomites 2–3 coalesced. Monogeneric. See Ampeliscidae, Dexaminidae, Prophliantidae, Lepechinellidae.

Description.—Accessory flagellum vestigial, 1-articulate or absent; body with dorsal carinae or teeth; rostrum prominent; urosomites

2 and 3 coalesced; mouthparts basic, lower lip lacking distinct inner lobes; gnathopods small, subchelate; uropod 3 biramous; telson of medium length, cleft.

RELATIONSHIP.—The Ampeliscidae have cuticular visual lenses and pereopod 5 is shorter and of different structure than pereopod 4. Other nonisaeid families with coalesced urosomites 2–3 are the Dexa-

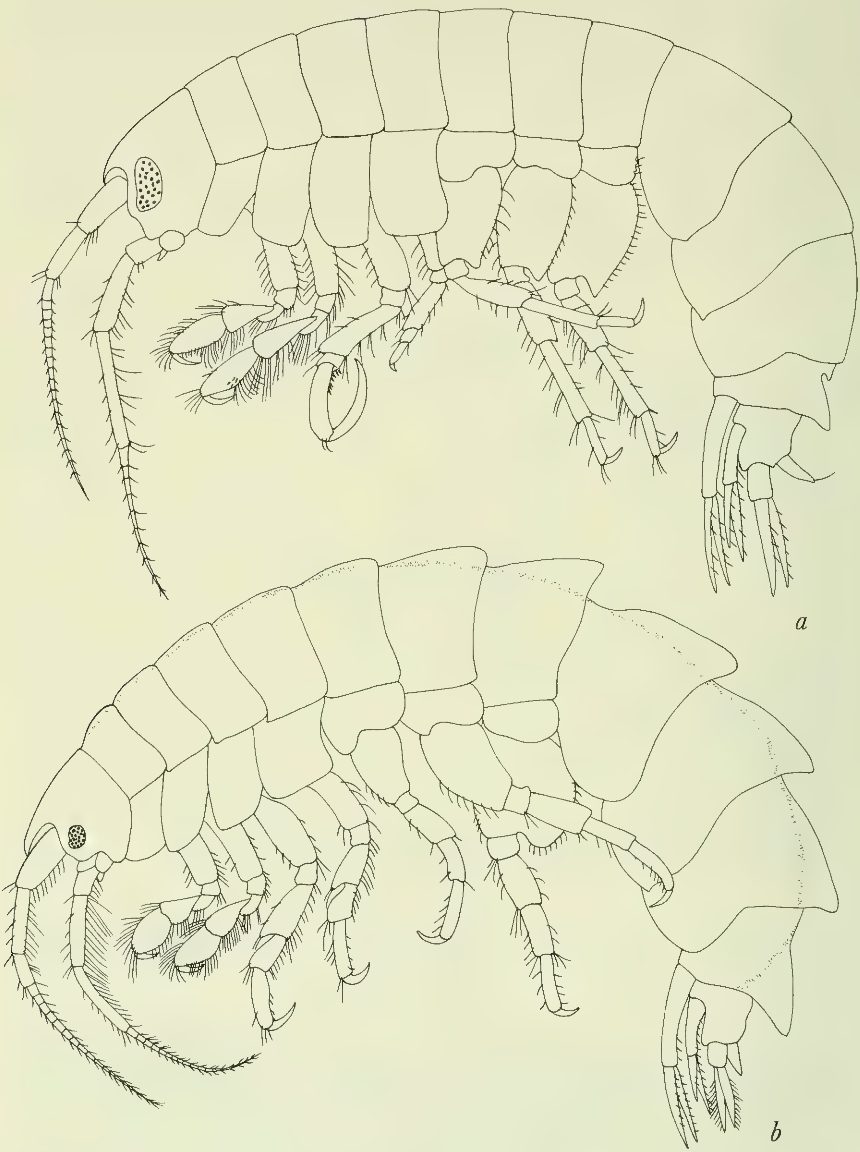

FIGURE 67.—Atylidae: *a*, *Atylus falcatus* Metzger (Sars, 1895, pl. 164); *b*, *Atylus carinatus*, (Fabricius) (Sars, 1895, pl. 166).

minidae, Lepechinellidae, and members of the Eophliantidae, Prophliantidae, and Kuriidae.

The Dexaminidae lack a mandibular palp.

The Lepechinellidae have acuminate or very short coxae and a spine-like accessory flagellum.

The Eophliantidae, Prophliantidae, and Kuriidae all lack mandibular palps and have other mouthparts departing from the basic configuration.

Atylus aberrantis J. L. Barnard (1962d) is removed to *Lepechinella.*

Genera of Atylidae

Atylus Leach

Atylus Leach, 1815.—Stebbing, 1906.—J. L. Barnard, 1956.
Nototropis Costa, 1853c, 1857.
Epidesura Boeck, 1861.
Paratylus Sars, 1895.

Type-species: *Gammarus carinatus* J. C. Fabricius, 1793 (monotypy). See Sars, 1895.

Species: 22, cosmopolitan, littoral (2 boreal bathyal).

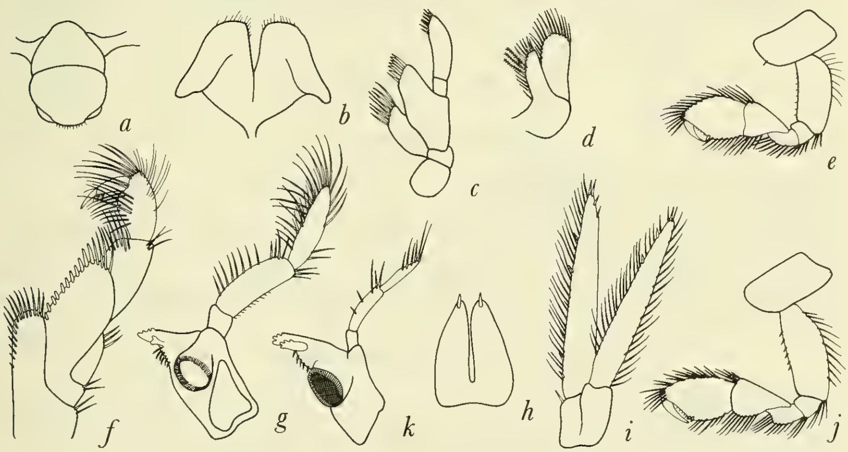

FIGURE 68.—Atylidae: *Atylus carinatus* (Fabricius) (Sars, 1895, pl. 166); *a*, upper lip; *b* lower lip; *c,d*, maxillae 1, 2; *e*, gnathopod 1; *f*, maxilliped; *g*, mandible; *h*, telson; *i*, uropod 3; *j*, gnathopod 2. *Atylus swammerdami* (Milne Edwards) (Sars, 1895, pl. 163): *k*, mandible.

Bateidae

FIGURE 69

DIAGNOSIS.—Coxa 1 vestigial or absent, remainder of gnathopod 1 degraded to a single article; accessory flagellum absent. See Gammaridae, Eusiridae.

DESCRIPTION.—Accessory flagellum absent; rostrum conspicuous; back often with carinae; mouthparts basic, lower lip with or without inner lobes; gnathopod 1 and its coxa degraded; gnathopod 2 feeble, subchelate; others of first 3 coxae rounded ventrally; uropod 3 with elongate, lanceolate rami; telson of medium length, longer than peduncle of uropod 3, cleft.

RELATIONSHIP.—This is the only family with a degraded first gnathopod except the genus *Paranamixis* in the Anamixidae but that family is far removed from the Bateidae. Except for gnathopod 1, bateids resemble the Eusiridae.

Bateidae have a grade of structure similar to the Amphilochidae and the two families casually resemble one another in overall appearance.

Key to the Genera of Bateidae

1. Back with carinae, palp article 1 of maxilla 1 elongate . . . **Carinobatea**
   Back smooth, palp article 1 of maxilla 1 of normal dimensions . . . **Batea**

Genera of Bateidae

Batea Müller

Batea Müller, 1865.—Stebbing, 1906.

Type-species: *B. catharinensis* Müller, 1865 (monotypy). See Shoemaker, 1926.

Species: 4, Caribbean, tropical eastern Pacific, littoral.

Carinobatea Shoemaker

Carinobatea Shoemaker, 1926.

Type-species: *C. cuspidata* Shoemaker, 1926 (original designation).

Species: 2, Caribbean, littoral.

FIGURE 69.—Bateidae (all figures after Shoemaker, 1926): *a*, *Carinobatea cuspidata* Shoemaker. Head: *b*, *Batea catharinensis* Muller. Mandible: *c*, *Batea catharinensis.* Lower lip: *d*, *Carinobatea;* *e*, *Batea.* Mouthparts, *Batea:* *f*, maxilla 1; *g*, maxilla 2; *h*, maxilliped. Gnathopod 1: *i*, *Batea.* Telson: *j*, *Batea transversa;* *k*, *Batea rectangulata;* *l*, *Batea catharinensis.* Uropod 3: *m*, *Batea catharinensis.* Gnathopod 2: *n*, *Batea catharinensis.*

Beaudettiidae

FIGURE 70

DIAGNOSIS.—Accessory flagellum 2-articulate; mandible lacking palp; inner ramus of uropod 3 reduced; coxa 4 not excavate posteriorly; telson very short, entire (but emarginate). Monogeneric. See Gammaridae.

DESCRIPTION.—Body like that of Gammaridae, dorsally unornamented; rostrum obsolete; antennal peduncles elongate, accessory flagellum 2-articulate; mandible with molar but lacking palp; mouthparts otherwise basic; gnathopod 2 larger than 1; coxa 4 unexcavate posteriorly; uropod 3 short, inner ramus half as long and one third as broad as outer ramus; telson very short, entire (but emarginate).

RELATIONSHIP.—This monotypic family apparently is derived from the Gammaridae. It is like the genus *Elasmopus* but has lost the mandibular palp, has a reduced inner ramus of uropod 3, and a short, emarginate telson.

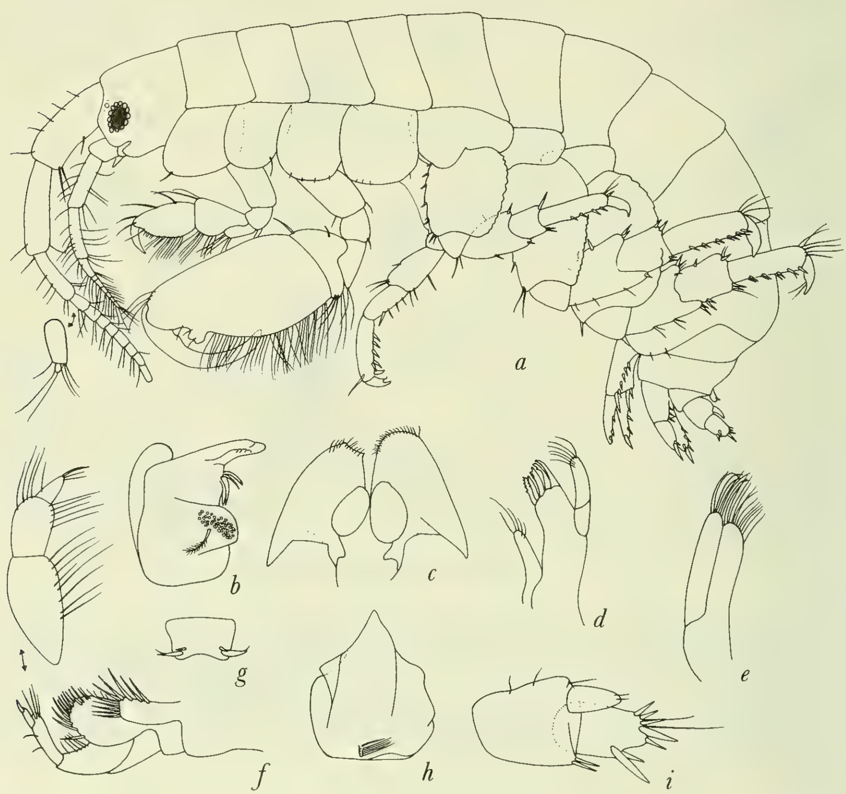

FIGURE 70.—Beaudettiidae: *Beaudettia palmeri* J. L. Barnard (1965): *a*, lateral aspect; *b*, mandible; *c*, lower lip; *d,e*, maxillae 1, 2; *f*, maxilliped; *g*, telson; *h*, upper lip; *i*, uropod 3.

Genera of Beaudettiidae

Beaudettia J. L. Barnard

Beaudettia J. L. Barnard, 1965.

Type-species: *B. palmeri* J. L. Barnard, 1965 (original designation).
Species: 1, Micronesia, littoral.

Calliopiidae

FIGURES 71–73, 146 *i–k*

DIAGNOSIS.—Accessory flagellum absent or composed of a tiny article or scale; telson entire, apically emarginate or apically notched, never deeply split. See Eusiridae, Pleustidae, Isaeidae, Laphystiopsidae, Oedicerotidae, Amphilochidae, Ampithoidae, Paramphithoidae.

DESCRIPTION.—Accessory flagellum vestigial or absent; rostrum usually inconspicuous; upper lip usually poorly incised or not; mouthparts basic, but mandibular molar occasionally nontriturative; lower lip with or without inner lobes, never taking the form of Pleustidae (see p. 421); coxae of medium length or short; occasionally coxa 4 not posteriorly excavate; gnathopods powerful or feeble, usually subchelate, occasionally simple; uropod 3 with elongate lanceolate rami, outer occasionally shorter than inner; telson of medium length, entire, acuminate, emarginate, or notched.

RELATIONSHIP.—Eusiridae are close to this family but have a distinctly cleft telson; when only notched apically the telson is elongate in eusirids. Interfamilial gradation is seen by comparing telsons of *Chosroes*, *Atylopsis*, and *Halirages* in Calliopiidae and *Pontogeneoides* in Eusiridae.

That the Calliopiidae are simply Eusiridae-Pontogeneiidae with fused telsonic lobes is well demonstrated in the fact that some calliopiid genera are paired with some eusirid genera. *Djerboa* (Eusiridae) and *Metaleptamphopus* (Calliopiidae) share pectinate dactyls of pereopods; *Sancho* (Calliopiidae) has eusirid gnathopods; *Harpinioides* (Calliopiidae) and *Harpinioidella* (Eusiridae) have similar gnathopods; *Stenopleura* (Calliopiidae) and *Meteusiroides* (Eusiridae) are very similar in all characters except telsons.

Calliopiids no longer differ from other families by their inconspicuous rostra because several have been discovered lately that have a longer rostrum than do some eusirids and pleustids.

Pleustidae differ from Calliopiidae only by the special configuration of their lower lips. The genera *Mesopleustes* (Pleustidae) and *Harpinioides* (Calliopiidae) have lower lips which are very difficult to classify

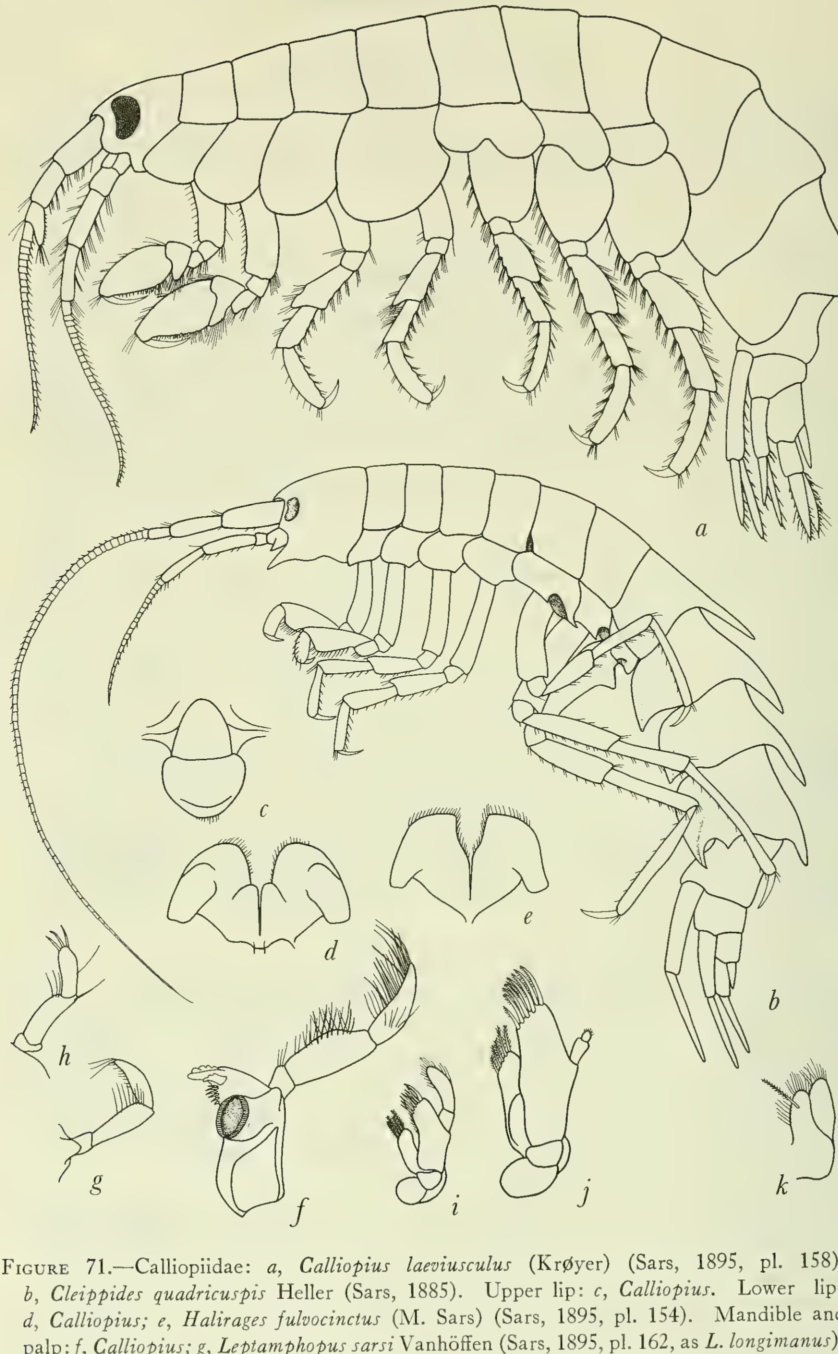

Figure 71.—Calliopiidae: *a, Calliopius laeviusculus* (Krøyer) (Sars, 1895, pl. 158); *b, Cleippides quadricuspis* Heller (Sars, 1885). Upper lip: *c, Calliopius*. Lower lip: *d, Calliopius; e, Halirages fulvocinctus* (M. Sars) (Sars, 1895, pl. 154). Mandible and palp: *f, Calliopius; g, Leptamphopus sarsi* Vanhöffen (Sars, 1895, pl. 162, as *L. longimanus*); *h, Oradarea walkeri* Shoemaker (Walker, 1903). Maxilla 1: *i, Calliopius; j, Laothoes meinerti* Boeck (Sars, 1895, pl. 160). Maxilla 2: *k, Calliopius*.

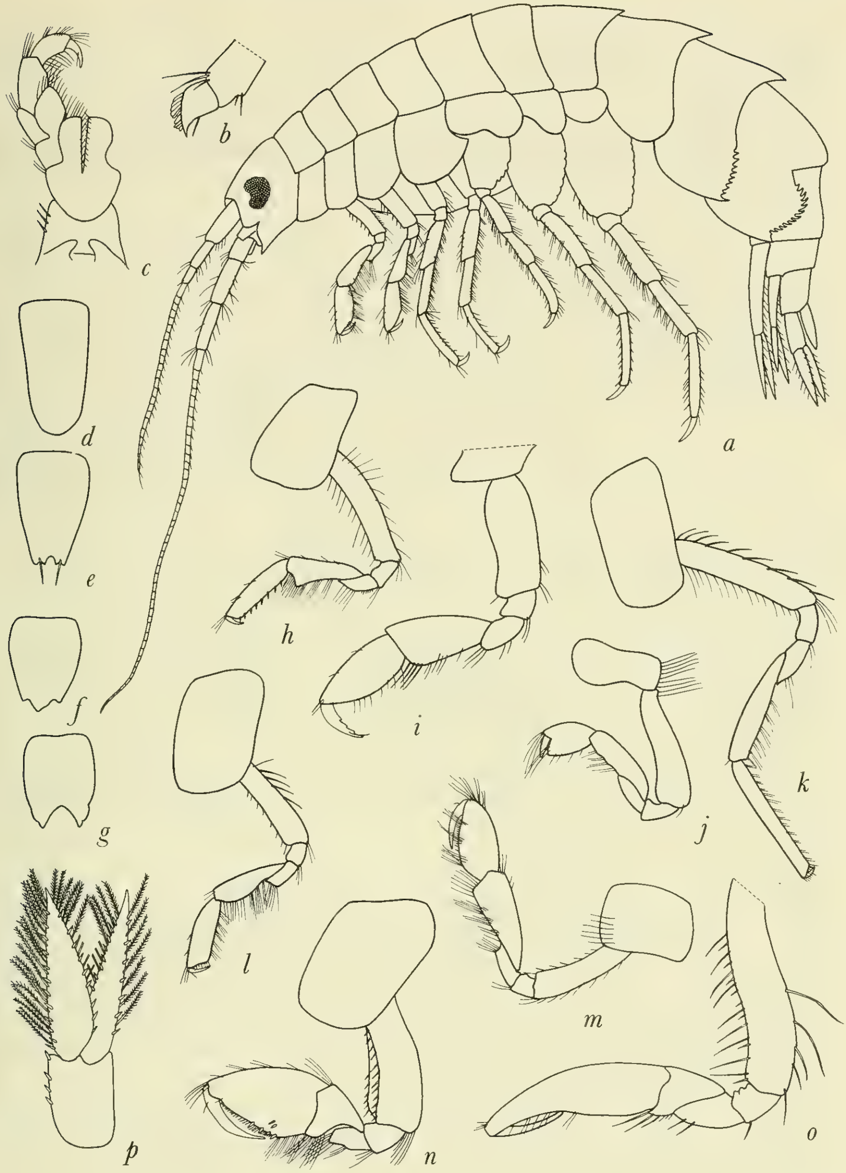

FIGURE 72.—Calliopiidae: *a*, *Apherusa tridentata* (Bruzelius) (Sars, 1895, pl. 156). Pectinate dactyl of pereopod: *b*, *Metaleptamphopus pectinatus* Chevreux (1912b). Maxilliped: *c*, *Calliopius laeviusculus* (Krøyer) (Sars, 1895, pl. 158). Telson: *d*, *Calliopius; e*, *Harpinioides drepanocheir* Stebbing (1888); *f*, *Stenopleura atlantica* Stebbing (1888); *g*, *Atylopsis emarginata* Stebbing (1888). Gnathopod 1: *h*, *Leptamphopus sarsi* Vanhöffen (Sars, 1895, pl. 162, as *L. longimanus*); *i*, *Regalia fascicularis* K. H. Barnard (1930); *j*, *Sancho platynotus* Stebbing (1897). Gnathopod 2: *k*, *Leptamphopus; l*, *Laothoes meinerti* Boeck (Sars, 1895, pl. 160); *m*, *Haliragoides inermis* Sars (1895, pl. 153); *n*, *Calliopius; o*, *Harpinioides*. Uropod 3: *p*, *Calliopius*.

because they are almost perfect intergrades between the lower lips of pleustids and calliopiids.

Calliopiids (and pleustids) may be confused with isaeids, ischyrocerids, and ampithoids unless one notes the absence of pereopodal glands in Calliopiidae. The isaeid-like families have a fleshy telson which is usually much shorter than broad, and generally have unexcavate posterior margins on the fourth coxae.

The Laphystiopsidae, very closely related to the Calliopiidae, differ primarily by the poorly developed mandibular molar. One laphystiopsid genus, *Prolaphystius*, however is included in the key to the Calliopiidae because of its uncertain position in the Laphystiopsidae. It has a moderately well developed molar.

The Vitjazianidae are distinguished by their distinctly simple first gnathopods. Pleustidae have their characteristic lower lips.

The Paramphithoidae are characterized by cuspidate or pointed anterior coxae. Occasionally these acuminations are extremely weak and coxae 1–4 are scarcely excavate ventrally.

One calliopiid, *Halirages regis* (Stebbing, 1914) (=*H. stebbingi* Schellenberg, 1931; =*H. huxleyanus* Stebbing, not Bate, 1862) has subacuminate anterior coxae and thus keys to *Paramphithoe*, type-genus of Paramphithoidae. *Halirages regis* has strongly developed gnathopods with ovate sixth articles and thus differs from most of its congeners and *Paramphithoe*. Superficially, this species forms the perfect intergrade between Calliopiidae and Paramphithoidae and distinctions between the two families are completely confounded; further study of the problem is warranted. Some species of *Cleippides* also have subacuminate coxae.

Some genera of the Gammaridae, such as *Falklandella*, might be placed in the Calliopiidae, except that *Falklandella* has short rami of uropod 3, not characteristic of Calliopiidae. *Gammarellus* and *Weyprechtia* with entire telson, and *Parapherusa* are not assignable to Calliopiidae because of their multiarticulate accessory flagella.

The Oedicerotidae have disproportionately long fifth pereopods and densely setose coxae and pereopods.

Most synopiids have a multiarticulate accessory flagellum but a few have an accessory flagellum similar to that of eusirids. The massive head of synopiids is characteristic, especially because of its strongly deflexed rostrum. Synopiid gnathopods are feeble, whereas those of eusirids are usually powerful.

Gnathopods within a genus are highly variable as to proportions of articles 5 and 6; departures from a "normal theme" are seen in *Oradarea* and *Leptamphopus*, which have exceptionally elongate sixth articles of gnathopod 2. *Cleippides* has a relatively elongate second gnathopod. *Harpinioides* has peculiar, bent sixth articles.

Even the type-genus, *Calliopius*, has enlarged gnathopods, not typical of the remaining members of the family. Extremes of variation are shown in a group of gnathopodal figures presented herein.

Apherusa, *Bouvierella*, *Calliopiella*, *Halirages*, and *Haliragoides* are often very difficult to separate. Their type-species are easily distinguished by conditions of lower lip, anteroventral cephalic corners, coxa 1 and accessory flagella, but those characters are highly variable among other species of the five genera.

Gurjanova (1962) has pointed out the unusual character of *Sancho* and *Chosroes*. They have broadly vaulted, extremely depressed bodies and heads and splayed coxae like those of Phliantidae but they also have subfossorial pereopods and gnathopod 1 like that of fossorial families Phoxocephalidae, Haustoriidae, and Oedicerotidae.

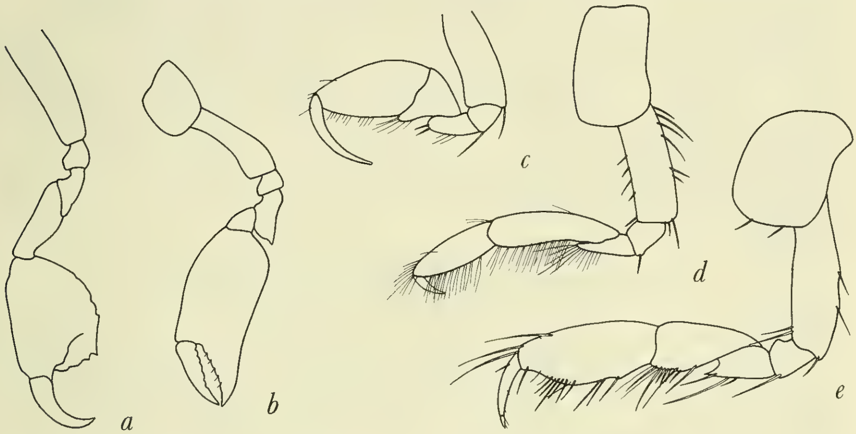

FIGURE 73.—Calliopiidae: Gnathopod 2: *a*, *Sancho platynotus* Stebbing (1897); *b*, *Clarencia chelata* K. H. Barnard (1932); *c*, *Stenopleura atlantica* Stebbing (1888); *d*, *Cleippides bicuspis* Stephensen (Gurjanova, 1951); *e*, *Atylopsis dentatus* Stebbing (1888).

The mouthparts of both genera have a distinct look of the Oedicerotidae. Neither genus has the fully developed pereopod 5 nor elongate peduncle of uropod 3 found in the Oedicerotidae and *Chosroes* has an elongate telson. Gnathopod 2 of *Sancho* distantly resembles that of the phoxocephalid *Joubinella* (and various eusirids); and since Phoxocephalidae and Haustoriidae seem to have strong affinities one might consider *Sancho* to be an aberrant member of the Haustoriidae, were it not for the uncharacteristic short peduncle of antenna 1, the large male gnathopod 2, and the shortened outer rami of the uropods. The conditions of the telson and pereopod 5 exclude the genera from the Phoxocephalidae. But the short outer rami of the uropods of *Sancho* and *Chosroes* like those of the Calliopiidae and Eusiridae are not characteristic of the fossorial families. Probably a new family

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should be created for these two genera which combine in a remarkable way the characteristics of phliantids, oedicerotids, and eusirids. This problem is also discussed under the Phliantidae (p. 405).

Remarks on the key to genera: Differences among genera are minor, for example: couplets 5, 6, 9, 16. Stebbing's (1906) key to the genera utilized such quantitative features as vaulting of the dorsum of the body, the dentition of the segments, and ornaments of the telson, of which the present key resorts only to the latter. Nevertheless, *Halirages* and *Bouvierella* are not clearly separated by qualitative characters and the validity of the genera *Calliopiella*, *Atylopsis*, or *Amphithopsis* is not convincing, the latter being related closely to *Halirages*.

Clarencia is not firmly assignable to the Calliopiidae because the uropods and telson were missing on the unique type-specimen.

Metaleptamphopus appears to be a primitive melphidippid in its elongate uropod 3 and especially resembles *Melphisana* in the uncleft telson, obsolete accessory flagellum, slightly enlarged coxae and well-developed rostrum.

Almost all of the species, except types, need refiguring of mouthparts and accessory flagella.

Nomenclatural Changes in Calliopiidae

Atylopsis latipalpus Walker and Scott (1903) should be removed to a eusirid genus. It appears to resemble some species of *Pontogeneia*.

Pseudopontogeneia Oldevig (1959) is removed to the Eusiridae.

Leptamphopus litoralis Gurjanova (1938) is removed to *Calliopiella*.

Key to the Genera of Calliopiidae

(*Paracalliope* and *Paraleptamphopus* occupy freshwater and are not included in the key.)

1. Gnathopod 2 chelate (fig. 73*b*) . . . . **Clarencia**
   Gnathopod 2 subchelate or simple 2
2. Articles 5–6 of gnathopod 2 together immensely elongate, slender, rectangular, sixth article 75% as long as article 2 (fig. 72*k*) . . . . 3 [1]
   Either article 5 or 6 of gnathopod 2 elongate and slender, article 6 never more than 60% as long as article 2 22
   Neither articles 5 or 6 elongate and slender, not together greatly elongate, usually slightly inflated or oval 5
3. Article 3 of mandibular palp shortened, stout, about two thirds as long as article 2 (fig. 71*h*), accessory flagellum present, lower lip with inner lobes **Oradarea** [1]
   Article 3 of mandibular palp subequal to or about four fifths as long as article 2, relatively slender, falcate or pointed terminally (fig. 71*g*), accessory flagellum absent, lower lip lacking inner lobes 4

[1] See footnote 1 on p. 173.

4. Outer ramus of uropod 3 half or less as long as inner ramus . **Leptamphopus**[1]
Outer ramus of uropod 3 three fourths or more as long as inner ramus. **Bouvierella**[1]
5. Lower lip with inner lobes (fig. 71*d*) 6
Lower lip lacking inner lobes (fig. 71*e*) 14
6. Article 5 of gnathopods with distinct posterior lobe (fig. 72*n*) 7
Article 5 of gnathopods without distinct posterior lobe (fig. 72*i*) . . . 10
7. Article 6 of gnathopods slender, bent distally (fig. 72*o*), essentially simple, mandibular molar nontriturative . . . . **Harpinioides**
Article 6 of gnathopods stout, not bent, mandibular molar triturative . . 8
8. Body dorsally processiferous, pereopod 5 greatly elongate, article 5 as long as articles 2, 3, 4, and 6 together . . . . **Stenopleuroides**
Body dorsally smooth or without sharp processes, pereopod 5 slightly longer than 4, article 5 not disproportionately elongate 9
9. Antenna 1 longer than or equal to antenna 2, telson apically notched or pointed (fig. 72*f*) . . . . **Stenopleura**[2]
Antenna 2 slightly longer than 1, telson apically rounded (fig. 72*d*). **Calliopius**
10. Gnathopods bearing grossly distinct palms (fig. 72*m*) 11
Gnathopods not bearing distinct palms, essentially simple (fig. 72*i*) . . 13
11. Articulate accessory flagellum present. . . . . **Atylopsis**[3]
Accessory flagellum absent, occasionally represented by process 12
12. Coxa 4 slightly longer than coxa 1 (fig. 71*a*) . . **Haliragess and Apherusa**[2]
Coxa 4 not longer than coxa 1 (fig. 71*b*) . . . . **Haliragoides**
13. Article 5 of gnathopods much longer than 6 (fig. 73*d*) . . . . **Cleippides**
Articles 5 and 6 of gnathopods subequal in length (fig. 72*i*) . . . **Regalia**
14. Palp of maxilla 1 reduced, reaching only halfway along outer plate (fig. 71*j*). **Laothoes**
Palp of maxilla 1 of normal length, reaching to or exceeding apex of outer plate (fig. 71*i*) 15
15. Dactyls of pereopods pectinate (fig. 72*b*) . . . . . . **Metaleptamphopus**
Dactyls of pereopods weakly serrate or smooth but not pectinate . . . 16
16. Gnathopod 2 of the *Eusirus* kind, a large suboval sixth article attached to a slender fifth article (fig. 73*a*), (body and head extremely flattened). **Sancho**
Gnathopod 2 not of the *Eusirus* kind 17
17. Accessory flagellum as long as article 1 of primary flagellum (body moderately depressed) . . . . **Amphithopsis**
Accessory flagellum scale-like or absent 18
18. Article 2 of pereopods 1 and 2 smooth anteriorly, body compressed laterally 19
Article 2 of pereopods 1 and 2 with anterior process, body extremely flattened. **Chosroes**

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[1] See also *Atylopsis megalops* Nicholls (1938); and a few species of *Apherusa, Halirages*, and *Laothoes*. Except for *A. megalops*, none of these species has article 6 of the gnathopods more than 60% as long as article 2. *Laothoes* is characterized by the condition of maxilla 1 palp.

[2] *Pontogeneoides* (Eusiridae) resembles *Atylopsis* but has an especially elongate telson; it also keys to *Stenopleura* but has powerfully subchelate gnathopods like *Eusiroides*, large coxae and elongate telson.

[3] A few species of *Rhachotropis* (Eusiridae) may be keyed to this point because of obsolescent telsonic clefts but they may be distinguished by their extremely elongate telsons being more than twice as long as the peduncle of uropod 3.

19. Accessory flagellum absent or represented by a process on article 3 of antenna 1 20
    Accessory flagellum formed of a small articulate scale . . . **Calliopiella**
20. Pereopods 1–5 minutely subcheliform . . . . **Bouvierella**
    Pereopods 1–5 simple 21
21. Male antennae with calceoli . . . . **Halirages**
    Male antennae without calceoli . . . . **Apherusa**
22. Accessory flagellum present 23
    Accessory flagellum absent 24
23. Article 5 of gnathopods elongate, much longer and slightly thicker than article 6 . . . . (exceptional) **Cleippides**
    Articles 5 and 6 together elongate and of similar thickness . . . **Oradarea**
24. Lower lip with small inner lobes . . some species of **Apherusa** and **Halirages**
    Lower lip lacking inner lobes 25
25. Outer ramus of uropod 3 half as long as inner ramus . . . **Leptamphopus**
    Outer ramus of uropod 3 three fourths or more as long as inner ramus . . 26
26. Palp of maxilla 1 reduced, not reaching end of outer plate . . **Laothoes**
    Palp of maxilla 1 normal, reaching or exceeding outer plate 27
27. Gnathopod 2 perfectly simple, inner plate of maxilla 1 without setae, palp of maxilliped not as long as outer plate and its parent article combined. **Prolaphystius** (Laphystiopsidae)
    Gnathopod 2 subchelate, inner plate of maxilla 1 setose, palp of maxilliped nearly twice as long as article and its lobe of outer plate 28
28. Body dorsally smooth . . . . **Bouvierella**
    Body dorsally processiferous . . . . some species of **Halirages**

Genera of Calliopiidae

Amphithopsis Boeck

Amphithopsis Boeck, 1861.—Stebbing, 1906.

Type-species: *A. longicaudata* Boeck, 1861 (selected by Boeck, 1876). See Sars, 1895.

Antennae equal in length; accessory flagellum as long as article 1 of primary flagellum; lower lip without inner lobes; gnathopodal palms distinct, article 5 slightly longer than article 6, articles together not elongate, article 5 of gnathopod 1 with slight posterior lobe; telson rounded apically, *outer ramus of uropod 3 less than half as long as inner, body moderately depressed.* Species: 1, subarctic Atlantic (40–1,505 m).

Apherusa Walker

Gossea Bate and Westwood, 1863 (homonym, Coelenterata).
Apherusa Walker, 1891b.—Stebbing, 1906.
not *Phaedra* Bate, 1858b (possibly type-species a composite of two specimens, head and body).

Type-species: *Amphithoe jurinei* Milne Edwards, 1830 (monotypy and subsequent synonomy). See Sars, 1895.

Antenna 1 shorter than antenna 2; accessory flagellum absent; lower lip with slight inner lobes; gnathopodal palms distinct, article 5 slightly longer than article 6 and occasionally elongate, articles 5–6 together not elongate, article 5 of gnathopod 1 lacking posterior lobe; telson pointed, toothed, emarginate or rounded; *coxa 4 slightly longer than coxa 1* (*Haliragoides*); *calceoli absent on male antennae* (*Halirages*). Species: 16, biboreal, littoral.

Atylopsis Stebbing

Atylopsis Stebbing, 1888; 1906.

Type-species: *A. emarginatus* Stebbing, 1888 (present selection).

Antenna 1 shorter than antenna 2 in type but otherwise variable in length; accessory flagellum shorter than article 1 of primary flagellum; lower lip with inner lobes; gnathopodal palms distinct, articles 5 and 6 together not elongate, article 5 on gnathopod 2 shorter than 6, article 5 of gnathopod 1 as long as 6 or shorter than 6, lacking posterior lobe; gnathopod 2 occasionally slightly elongate; telson with deep notch, broad or narrow. Species: 3, antiboreal, subantarctic, littoral (one species to 567 m).

Bouvierella Chevreux

Bouvierella Chevreux, 1900.

Type-species: *Paramphithoe carcinophilus* Chevreux, 1889 (monotypy).

Antenna 1 slightly longer than antenna 2; accessory flagellum absent; lower lip without inner lobes; gnathopodal palms distinct, article 5 of gnathopod 1 slightly shorter than article 6, with weak posterior lobe, articles 5 and 6 together on gnathopods slightly elongate; telson emarginate; *pereopods 1–5 minutely subcheliform* (*Apherusa*, *Calliopiella*, and *Halirages*). Very close to *Leptamphopus* but gnathopod 2 not fully elongate and outer ramus of uropod 3 nearly as long as inner. Species: 1, Atlantic bathyal (620–1,386 m).

Calliopiella Schellenberg

Calliopiella Schellenberg, 1925b.

Type-species: *Calliopiella michaelseni* Schellenberg, 1925b (monotypy).

Antenna 1 slightly shorter than antenna 2; accessory flagellum scale-like (type) or absent; lower lip without inner lobes; gnathopodal palms distinct, article 5 shorter than article 6, together not elongate, article 5 with slight posterior lobe; telson rounded. Species: 3, W. Africa, N. Pacific temperate, littoral.

Calliopius Liljeborg

Calliope Bate, 1857a (homonym, Aves).
Calliopius Liljeborg, 1865 (new name).—Stebbing, 1906.

Type-species: *Amphithoe laeviuscula* Krøyer, 1838 (monotypy and subsequent synonymy). See Sars, 1895.

Antennae subequal; accessory flagellum absent or article 3 of antenna 1 with a process; lower lip with inner lobes; gnathopods stout, palms distinct, article 5 shorter than article 6, together not elongate, article 5 with distinct posterior lobe; telson rounded. Species: 2, boreal, littoral.

Chosroes Stebbing

Chosroes Stebbing, 1888; 1906.

Type-species: *C. incisus* Stebbing, 1888 (monotypy).

Body and head extraordinarily depressed; antenna 1 slightly shorter than antenna 2; accessory flagellum absent; lower lip lacking inner lobes; gnathopodal palms distinct, articles 5 and 6 subequal, together not elongate, article 5 lacking posterior lobe; telson notched or cleft; *article 2 of pereopods 1 and 2 with large anterior process.* Species: 2, antarctic, littoral (1 to 342 m).

Clarencia K. H. Barnard

Clarencia K. H. Barnard, 1931; 1932.

Type-species: *C. chelata* K. H. Barnard, 1931 (original designation); 1932.

Antenna 1 very short, stout, with few articles; accessory flagellum absent; lower lip with tiny fused inner lobes; gnathopod 1 with distinct palm, articles 5 and 6 subequal; *gnathopod 2 large, chelate, article 5 tiny and masked by articles 4 and 6, article 6 very large, bearing a thumb; pleonite 4 elongate;* [telson unknown]. Species: 1, antarctic (342 m).

Cleippides Boeck

Cleippides Boeck, 1871.—Stebbing, 1906.

Type-species: *Acanthonotus tricuspis* Krøyer, 1846 (monotypy). See Bate, 1862; Gurjanova, 1951.

Antenna 1 much longer than antenna 2; accessory flagellum about half as long as article 1 of primary flagellum; inner lobes of lower lip obsolescent; gnathopodal palms indistinct, article 5 much longer than 6, together slightly elongate, article 5 with weak or no posterior lobe; telson rounded. Close to *Leptamphopus* but inner lobes of lower lip slightly developed and accessory flagellum present. Species: 3, subarctic, littoral to bathyal (1,960 m).

Haliragès Boeck

Haliragès Boeck, 1871.—Stebbing, 1906.

Type-species: *Amphithoe fulvocincta* M. Sars, 1858 (selected by Boeck, 1876). See Sars, 1895.

Antennae subequal or antenna 1 short; accessory flagellum absent or article 3 of antenna 1 with process; lower lip with small or large inner lobes; gnathopodal palms distinct, articles 5 and 6 subequal, together not elongate or article 5 elongate, article 5 lacking distinct posterior lobe; telson emarginate, toothed or pointed; *telson and peduncle of uropod 3 elongate, body usually dorsally processiferous* (*Bouvierella*); *calceoli present on male antennae* (*Apherusa*). Species: 10, bipolar, littoral to abyssal (2,500 m). See note on *H. regis* (Stebbing, 1914) in "Relationship" of Calliopiidae.

Haliragoides Sars

Haliragoides Sars, 1895.—Stebbing, 1906.

Type-species: *Haliragès inermis* Sars, 1882 (monotypy). See Sars, 1895.

Antenna 1 shorter than antenna 2; accessory flagellum absent; lower lip with inner lobes; gnathopodal palms distinct, article 5 longer than article 6, together not elongate, article 5 lacking posterior lobe; telson pointed or toothed; *coxa 4 not longer than coxa 1* (*Apherusa*). Species: 3, bipolar, littoral to abyssal (2,450 m).

Harpinioides Stebbing

Harpinioides Stebbing, 1888; 1906.

Type-species: *H. drepanocheir* Stebbing, 1888 (monotypy).

Antenna 1 longer than antenna 2; accessory flagellum more than half as long as article 1 of primary flagellum; *mandibular molar tumid, ovate, not triturative;* lower lip with slight inner lobes; *sixth articles of gnathopods slender, simple, apically bent, tapering,* article 7 half as long as article 6, article 5 much shorter than article 6, with distinct posterior lobe; telson notched. This genus also assigned to Pleustidae. Species: 1, Indonesia, Kerguelen (108–496 m).

Laothoes Boeck

Laothoes Boeck, 1871.—Stebbing, 1906.
Thoelaos Della Valle, 1893.

Type-species: *L. meinerti* Boeck, 1871 (monotypy). See Sars 1895.

Antenna 1 shorter than antenna 2; accessory flagellum absent; lower lip lacking inner lobes; gnathopodal palms distinct, articles 5 and 6 equal, together not elongate or slightly elongate, article 5 lacking posterior lobe; telson slightly emarginate; *palp of maxilla 1 reduced, reaching halfway along outer plate.* Species: 4, subarctic, littoral to bathyal (1,500 m).

Leptamphopus Sars

Leptamphopus Sars, 1895.—Stebbing, 1906.

Type-species: *L. sarsi* Vanhöffen, 1897 (monotypy; *L. sarsi* is a new name for Sars' misidentification of *Amphithopsis longimana* Boeck). For stability, this arrangement should be preserved.

Antenna 1 slightly longer than antenna 2; accessory flagellum absent; lower lip without inner lobes; gnathopodal palms distinct, articles 5 and 6 together elongate; telson notched; *article 3 of mandibular palp subequal to article 2 or very slightly shorter, relatively slender, falcate or pointed* (*Oradarea*); *outer ramus of uropod 3 half as long as inner* (*Bouvierella*). Species: 2, ?amphiboreal, bipolar, littoral to bathyal (1,505 m).

Metaleptamphopus Chevreux

Metaleptamphopus Chevreux 1911c; 1912a; 1912b.

Type-species: *M. pectinatus* Chevreux, 1912a (designated by Chevreux); 1912b.

Antenna 1 longer than antenna 2; accessory flagellum absent (type) or uniarticulate; lower lip without inner lobes; gnathopodal palms scarcely distinct, articles 5 and 6 equal, together not elongate; article 5 lacking posterior lobe; telson rounded; *dactyls of pereopods strongly pectinate.* Species: 2, littoral subantarctic to S. Atlantic bathyal (537 m).

Oradarea Walker

Oradarea Walker, 1903.—Shoemaker, 1930.

Type-species.—*O. walkeri* Shoemaker, 1930 (monotypy; *O. walkeri* is new name for Walker's *O. longimana* which is a homonym of Boeck's *Amphithopsis longimana* later transferred to *Oradarea*).

Antenna 2 probably longer than antenna 1; accessory flagellum cylindrical but shorter than article 1 of primary flagellum; lower lip with inner lobes; gnathopodal palms distinct, articles 5 and 6 together elongate; telson truncate, rounded but with minute notch or apically pyramidal; *article 3 of mandibular palp short, stout, two thirds as long as article 2* (*Leptamphopus*). Species: 9, primarily antarctic (6), one bathyal Indonesia, one boreal, littoral to bathyal (1,165 m).

Regalia K. H. Barnard

Regalia K. H. Barnard, 1930.

Type-species: *R. fascicularis* K. H. Barnard, 1930 (monotypy).

[Antennae unknown; accessory flagellum unknown]; lower lip with slight inner lobes; gnathopodal palms indistinct, articles 5 and 6 equal, together not elongate, article 5 lacking posterior lobe; telson short, broad, slightly emarginate. Species: 2, one pelagic at New Zealand and one at 304 m in Indonesia.

Sancho Stebbing

Sancho Stebbing, 1897; 1906.

Type-species: *S. platynotus* Stebbing, 1897 (monotypy).

Body and head extremely depressed; antennae subequal, *peduncle of antenna 1 very short;* accessory flagellum as long as article 1 of primary flagellum; lower lip without inner lobes; gnathopods not elongate, *male gnathopod 1 with transverse palm,* article 5 longer than article 6, *gnathopod 2 much larger, Eusirus-like; female gnathopod 2 like male gnathopod 1;* pereopods *spinose as in Haustoriidae;* telson tapering but apically truncate. Species: 1, E. Australia, littoral.

Stenopleura Stebbing

Stenopleura Stebbing, 1888; 1906.

Type-species: *S. atlantica* Stebbing, 1888 (monotypy). See Stephensen, 1915; Birstein and Vinogradov, 1958; J. L. Barnard, 1962d.

Antenna 1 slightly longer than or equal to antenna 2; accessory flagellum absent; lower lip with inner lobes; gnathopods moderately stout, palms indistinct, article 5 much shorter than 6 and with distinct posterior lobe, articles 5 and 6 together not elongate, *article 7 as long as article 6, latter not bent (Harpinioides);* telson apically toothed. Species: 1, probably cosmopolitan epipelagic in tropics. Compare diagnosis of *Stenopleuroides.*

Stenopleuroides Birstein and Vinogradov

Stenopleuroides Birstein and Vinogradov, 1964.

Type-species: *S. macrops* Birstein and Vinogradov, 1964 (monotypy).

Antenna 1 much longer than antenna 2; accessory flagellum absent; [lower lip unknown]; gnathopods moderately stout, palms indistinct, article 5 much shorter than 6 and with distinct posterior lobe, articles 5–6 together not elongate, *article 7 nearly as long as article 6, latter not bent (Harpinioides)*; telson entire, *unornamented; body dorsally cuspidate (pereonite 7 and pleonites 1–4); pereopod 5 very elongate, article 5 as long as articles 2, 3, 4, and 6 together (Stenopleura)*. Species: 1, Indian Ocean, probably epipelagic.

Cheluridae

FIGURE 74

DIAGNOSIS.—Body depressed; segments of urosome immovably fused together, marked ventrally by sutures, segment 3 very large; uropods 1, 2, and 3 radically dissimilar to each other in structure and size; telson foliate, entire; accessory flagellum present; flagellum of antenna 2 clavate, composed largely of one article in the adult. See Corophiidae.

DESCRIPTION.—Accessory flagellum 1-articulate, stout; flagellum of antenna 2 largely composed of one clavate article; head either bulbous and lacking supra-antennal line, or quadrate and bearing such line; mouthparts basic; coxae short, not overlapping; gnathopod 1 either feeble and slightly chelate, or large and subchelate; gnathopod 2 feeble and slightly chelate; uropods dissimilar, uropod 1 composed of normal peduncle and two short rami; uropod 2 composed of foliaceous peduncle, with or without rami; uropod 3 composed of short peduncle, a greatly enlarged outer ramus and a scale-like or no inner ramus; telson entire.

RELATIONSHIP.—Unlike the Cheluridae, uropods 1 and 2 of the Corophiidae are similar to each other, the second antennal flagellum is distinctly multiarticulate, the third urosomal segment, although occasionally fused to the others, is never greatly enlarged, and the third uropods are never immensely enlarged as in the Cheluridae.

Key to the Genera of Cheluridae

1. Uropod 3 bearing a scale-like inner ramus (fig. 74*l*) . . . . **Chelura**
   Uropod 3 lacking an inner ramus. 2
2. Uropod 2 with two rami (fig. 74*k*), gnathopod 1 large, subchelate (fig. 74*n*). **Tropichelura**
   Uropod 2 lacking rami (fig. 74*o*), gnathopod 1 small, slightly chelate (fig. 74*h*). **Nippochelura**

Genera of Cheluridae

Chelura Philippi

Chelura Philippi, 1839.—Stebbing, 1906.

Type-species: *C. terebrans* Philippi, 1839 (monotypy). See Sars, 1895.

Supra-antennal line absent except in defining the lateral ocular lobes; gnathopods small; uropod 2 with two rami; uropod 3 with small inner ramus. Species: 1, circumamphiboreal, littoral, bores wood.

Nippochelura J. L. Barnard

Nippochelura J. L. Barnard, 1959c.

Type-species: *Chelura brevicauda* Shiino, 1948 (original designation), 1957.

Supra-antennal line absent, anterodorsal part of head supporting a large process; gnathopods small; uropod 2 lacking rami; uropod 3 lacking inner ramus. Species: 1, Japan, littoral, bores wood.

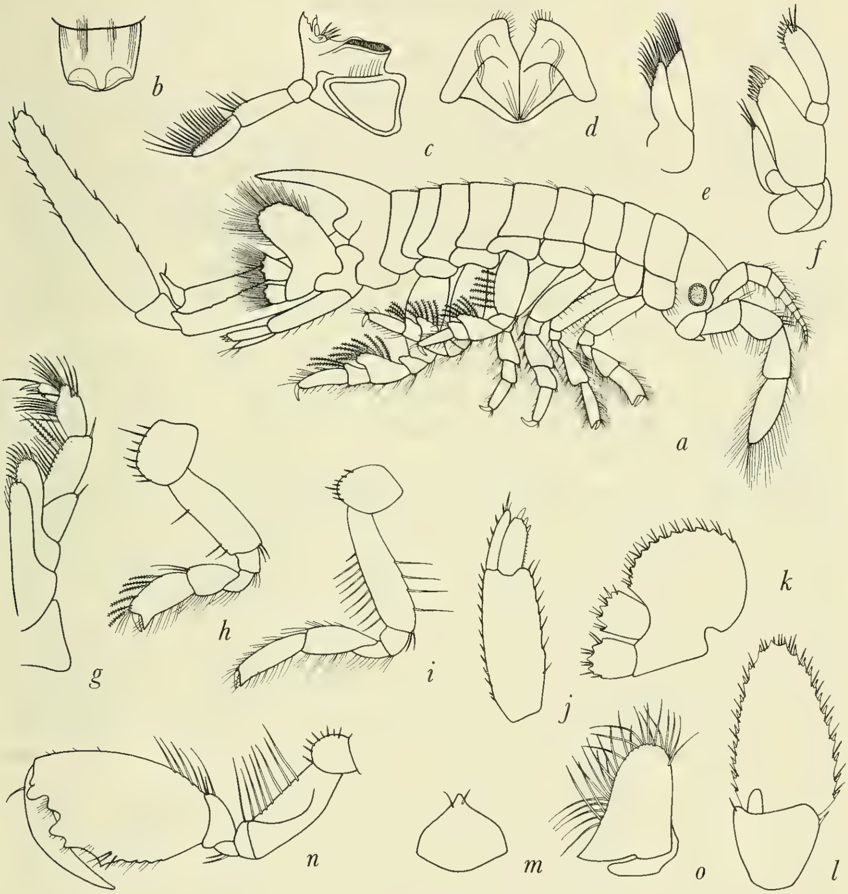

FIGURE 74.—Cheluridae: *Chelura terebrans* Philippi (Sars, 1895, pl. 225): *a*, lateral; *b*, upper lip; *c*, mandible; *d*, lower lip; *e,f*, maxillae 2, 1; *g*, maxilliped; *h,i*, gnathopods 1, 2; *j,k,l*, uropods 1, 2, 3; *m*, telson. *Tropichelura insulae* (Calman) (J. L. Barnard, 1959c): *n*, male gnathopod 1. *Nippochelura brevicauda* (Shiino) (J. L. Barnard, 1959c): *o*, uropod 2.

Tropichelura J. L. Barnard

Tropichelura J. L. Barnard, 1959c.

Type-species: *Chelura insulae* Calman, 1910 (original designation).

Supra-antennal line present; gnathopod 1 large; uropod 2 with two rami; uropod 3 lacking inner ramus. Species: 1, circumtropical, littoral, bores wood.

Colomastigidae

FIGURE 75

DIAGNOSIS.—Accessory flagellum absent; body subcylindrical, urosomites 2 and 3 coalesced; coxae very short but overlapping; mandibular palp absent, primary incisor cut into a series of long spine-like teeth; molar problematical, large but nontriturative in some species, absent or unknown in others; inner plates of maxillipeds very small, fully or partially coalesced, unarmed or acuminate; *uropod 3 biramous;* telson entire. Monogeneric. See Eophliantidae, Phliantidae, Prophliantidae.

DESCRIPTION.—Accessory flagellum absent; body subcylindrical; coxae short but overlapping; epistome projecting acutely in front; upper lip bilobed; mandible lacking palp, its body cut into several long spine-teeth, molar large and unridged, small or "absent"; lower lip poorly known; maxillae stunted, maxilla 1 with 1-articulate palp larger than outer plate; lobes of maxilla 2 partially coalesced; inner plates of maxilliped very small, fused, or split but forming a subconical piece, outer lobes of medium size but appearing large because the articles they are attached to are elongate; gnathopod 1 simple, usually armed apically with spines or setae forming a brush, some males lacking these setae; gnathopod 2 in male enlarged, subchelate, in female small and subchelate; uropod 3 biramous, occasionally outer ramus considerably reduced in size; telson short to medium in length, entire, often apically ornamented.

RELATIONSHIP.—The Eophliantidae also have cylindrical bodies but differ from colomastigids by the well-developed inner lobes of the maxillipeds and the cleft telson; the mandible is not cut into a series of long projecting teeth and the palp of maxilla 1 is degraded.

Phliantidae and Prophliantidae have compressed, or depressed, not cylindrical bodies. The latter have cleft telsons. Probably all phliantids have a reduced inner ramus of uropod 3 and prophliantids have all urosomal segments coalesced.

Possibly the primary cutting edge of the colomastigid mandible is missing and the digitations represent enlarged and basally fused spines of the normal gammaridean spine-row.

Corophiidae and Podoceridae may resemble Colomastigidae because of depressed and subcylindrical bodies but the former two families have mandibular palps and normal maxillipeds.

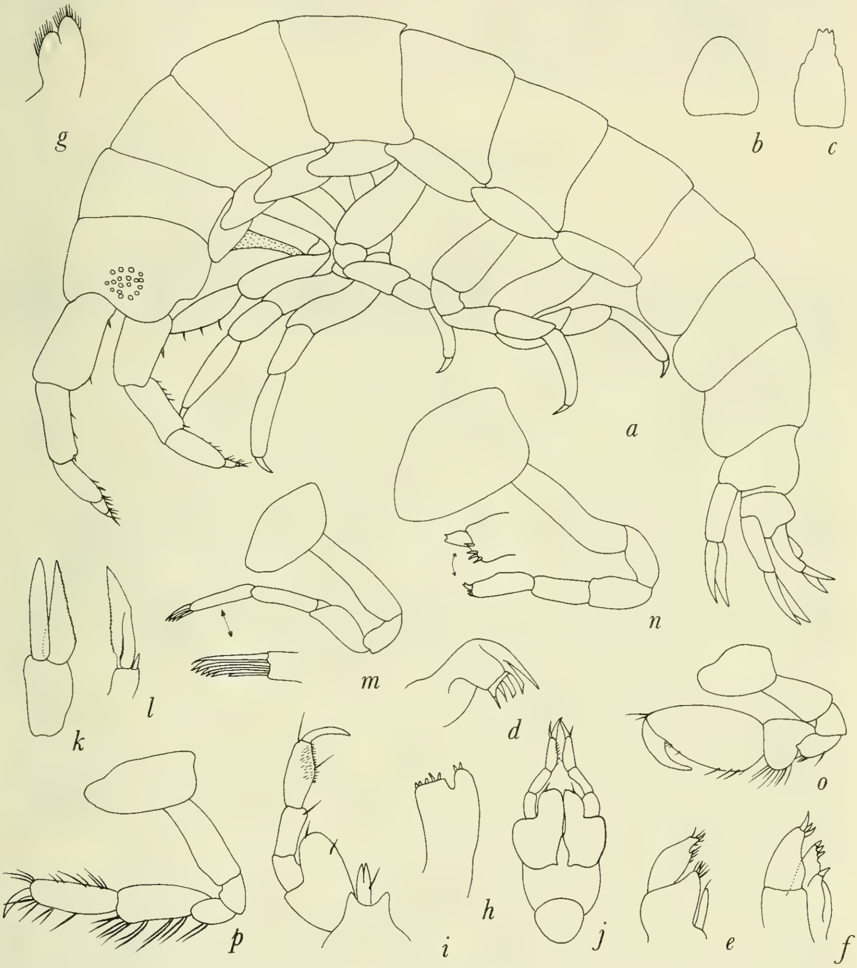

FIGURE 75.—Colomastigidae: *a*, *Colomastix pusilla* Grube (J. L. Barnard, 1955a). Telson: *b*, *C. pusilla; c*, *Colomastix subcastellata* Hurley (1954d). Mandible: *d*, *C. pusilla.* Maxilla 1: *e*, *C. subcastellata; f*, *C. pusilla.* Maxilla 2: *g*, *C. subcastellata; h*, *C. pusilla.* Maxillipeds: *i*, *C. subcastellata; j*, *C. pusilla.* Uropod 3: *k*, *C. pusilla; l*, *C. magnirama* Hurley (1954d). Gnathopod 1, *C. pusilla: m*, female; *n*, male. Gnathopod 2, *C. pusilla: o*, male; *p*, female.

Genera of Colomastigidae

Colomastix Grube

Colomastix Grube, 1861; 1864a.—Stebbing, 1906.
Cratippus Bate, 1862.
Exunguia Norman, 1869b.

Type-species: *Colomastix pusilla* Grube, 1861 (monotypy). See J. L. Barnard, 1955a.

Species: 9, cosmopolitan, littoral.

Corophiidae

Figures 76–80

Diagnosis.—Accessory flagellum variable, often absent; urosome visibly depressed; *urosomal segment 2 subequal to segment 1 in length;* telson entire; pereopods often glandular. See Isaeidae, Aoridae, Podoceridae, Ischyroceridae, Cheluridae.

Description.—Accessory flagellum multiarticulate, 1-articulate or absent; body often subcylindrical, generally depressed, especially urosome, some or all of urosomites often coalesced; body rarely carinate and only on urosome; coxae long, of medium length, or short, often not touching each other, occasionally acuminate; mouthparts basic, except mandibular palp occasionally reduced to one or two articles and upper lip occasionally bilobed; gnathopods variable, either pair the larger, often complexly subchelate; uropods 1 and 2 usually normal, rarely with inner rami reduced, rarely with inner ramus on uropod 2 absent; uropod 3 variable: (1) bearing two rami, the inner reduced in size; (2) bearing one ramus, either longer than peduncle or very short; or (3) rami absent; telson entire, fleshy, circular or symmetrically trapezoidal, or very broad and short, occasionally armed with hooks; pereopod 5 occasionally very elongate and bearing long setae like fossorial families.

Relationship.—The Corophiidae are a mixture of isaeid, aorid, and ischyrocerid kinds having the urosome especially depressed and usually losing the inner ramus of the third uropods, although this condition is found also in some isaeids. It is very difficult to distinguish these three families, as exemplified by the genus *Aorcho*, originally assigned to Corophiidae but now provisionally assigned to Aoridae (see discussion under the Isaeidae). Because of its tall urosome, *Unciolella* is another genus of doubtful assignment to the Corophiidae. *Neomicrodeutopus* (Aoridae) and *Grandidierella* (Corophiidae) are very closely related.

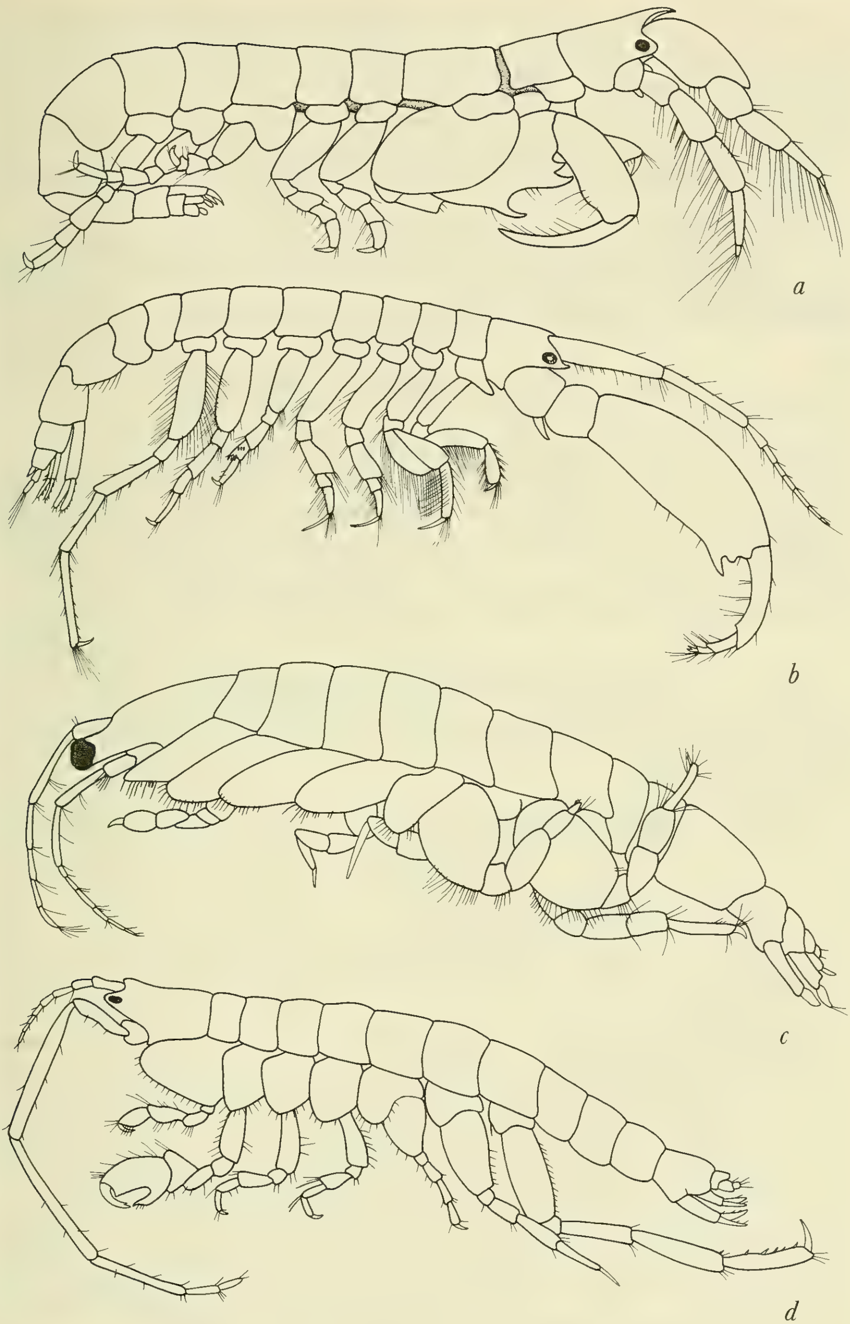

FIGURE 76.—Corophiidae: *a, Cerapus crassicornis* (Bate) (Sars, 1895, pl. 217); *b, Corophium affine* Bruzelius (Sars, 1895, pl. 221); *c, Gaviota podophthalma* J. L. Barnard (1958b); *d, Kamaka kuthae* Derjavin (Gurjanova, 1951).

Because of its peculiar mandibular palp and immensely thickened male antenna 2, *Corophium*, the type-genus, is not typical of most other genera assigned to the family. Dr. E. L. Bousfield (in litt.) has pointed out to me the probability that *Ericthonius*, with its elongate peduncle of uropod 3, belongs with the Ischyroceridae.

The Podoceridae differ from the Corophiidae by their elongate urosomal segment 1.

Corophiidae may resemble Eophliantidae and Colomastigidae because of their depressed, subcylindrical bodies and short, serially gaping coxae but the latter two families have degraded mandibles.

Nomenclatural Changes in Corophiidae

Aorcho J. L. Barnard (1961) is removed to the Aoridae.

Bogenfelsia J. L. Barnard (1962d) is removed to the Ischyroceridae.

Dryopoides Stebbing (1888) was in Aoridae in Stebbing (1906) and transferred to Corophiidae by Stebbing (1910). Female keys out to the Aoridae.

Runanga J. L. Barnard (1961) removed from Podoceridae.

Key to the Genera of Corophiidae

(All species having gnathopod 1 larger than 2 should also be keyed out in the Aoridae.)

1. Uropod 3 lacking rami (fig. 80*n*) . . . . **Concholestes**
   Uropod 3 bearing 1–2 rami (figs. 80*b*–*i*) 2

2. Mandibular palp 3-articulate (fig. 78*g*) 3
   Mandibular palp less than 3-articulate (figs. 78*e*,*f*) 21
3. Inner ramus of uropod 3 distinct (fig. 80*h*) 4
   Inner ramus of uropod 3 absent or indistinct (uropod 3 with one ramus only) (figs. 80*b*–*g*) 7
4. Coxae not touching serially (figs. 76*b*,77*a*) 5
   Coxae touching serially (figs. 76*c*,*d*) 6
5. Gnathopod 1 scarcely larger than and similar to gnathopod 2, palm smooth, inner ramus of uropod 3 distinct but much shorter than outer ramus (fig. 80*h*), third pleonal epimeron smoothly quadrate . . . . . . **Camacho**
   Gnathopod 1 much larger than 2, palm sculptured, inner ramus of uropod 3 usually represented by a large peduncular process (fig. 80*i*), rarely distinct or marked off, when distinct scarcely shorter than outer ramus, third pleonal epimeron bearing posteroventral tooth . . . . **Unciola**
6. Inner ramus of uropod 3 much shorter than outer ramus, gnathopod 2 merochelate . . . . **Paracorophium**
   Rami of uropod 3 equally long, gnathopod 2 not merochelate.
   male of **Dryopoides**

7. Uropod 2 with one ramus (fig. 80*l*) 8
Uropod 2 with two rami (fig. 80*h*) 10
8. Pleopod 3 with one ramus, [article 3 of antenna 1 longer than article 1]. **Runanga**
Pleopod 3 with two rami, [article 3 of antenna 1 rarely longer than article 1] 9
9. Male gnathopod 2, not gnathopod 1, complexly subchelate (fig. 79*l*), head with thorn-like rostrum and eyes . . . . **Cerapus**
Male gnathopod 1, not gnathopod 2, complexly subchelate, head with obsolescent rostrum and no eyes . . . . **Chevreuxius**
10. Inner rami of uropods 1–2 less than half as long as outer rami (fig. 80*j*). **Pseudericthonius**
Inner rami of uropods 1–2 usually subequal to outer rami 11
11. Antenna 1 lacking accessory flagellum 12
Antenna 1 bearing accessory flagellum 15
12. Male gnathopod 2 complexly subchelate (carpochelate) (fig. 79*k*). **Ericthonius**
Male gnathopod 2 not complexly subchelate 13
13. Pleonites 4–5 coalesced . . . . **Kamaka**
Pleonites 4–5 separate 14
14. Male gnathopod 2 chelate (propodochelate) . . . . **Cerapopsis**
Male gnathopod 2 subchelate (fig. 79*j*) . . . . **Gaviota**
15. Accessory flagellum multiarticulate 16
Accessory flagellum 1-articulate 19
16. Coxae angular 17
Coxae with softly rounded corners 18
17. Article 6 of gnathopod 2 an elongate rectangle, parachelate or palm transverse, antennae usually much shorter than body and flagellum of antenna 2 scarcely longer than peduncular article 5, peduncle of uropod 3 often expanded medially very strongly, antenna 2 generally considered stout, often strongly so . . . . **Unciola**
Article 6 of gnathopod 2 ovate or trapezoidal, expanded, palm oblique, antennae usually as long as or longer than body, flagellum of antenna 2 nearly as long as all articles of peduncle, peduncle of uropod 3 rarely expanded medially and usually poorly so, antenna 2 very slender. **Neohela**
18. Inner plate of maxilla 1 with one seta, ramus of uropod 3 about 1.5 times as long as peduncle . . . . **Unciolella**
Inner plate of maxilla 1 with about 10 setae lining medial edge, ramus of uropod 3 about twice as long as peduncle . . . . **Parunciola**
19. Male gnathopod 1 complexly subchelate . . . . **Grandidierella**
Male gnathopod 1 simply subchelate 20
20. Male antenna 2: articles 3–5 stout (fig. 76*b*), [often cuspidate], uropod 3 with asymmetrically prolonged peduncle (fig. 80*i*), or uropod 2 with vestigial inner ramus . . . . **Unciola**
Male antenna 2: articles 3–5 slender (figs. 76*a,d*, 77*a*), uropod 3 with symmetrical peduncle (fig. 80*f*), rami of uropod 2 subequal. **Unciolella** (juvenile)
21. Mandibular palp 1-articulate (fig. 78*e*) . . . . **Siphonoecetes**
Mandibular palp 2-articulate (fig. 78*f*) . . . . **Corophium**

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Genera of Corophiidae

Camacho Stebbing

Camacho Stebbing 1888; 1906.

Type-species: *C. bathyplous* Stebbing, 1888 (monotypy). See J. L. Barnard, 1961.

Accessory flagellum multiarticulate; article 3 of antenna 1 much shorter than article 1, flagellum very long; antenna 2 much shorter than antenna 1, slender, flagellum shorter than article 5 of peduncle; mandibular palp 3-articulate; coxae short, not touching serially; gnathopods normally subchelate; uropod 2 biramous; uropod 3 with outer ramus longer than peduncle, inner ramus one third as long as outer. Species: 1, antiboreal, eurybathic, littoral to abyssal.

Cerapopsis Della Valle

Cerapopsis Della Valle, 1893.—Stebbing, 1906.

Type-species: *C. longipes* Della Valle, 1893 (monotypy).

Accessory flagellum absent; article 3 of antenna 1 equal to article 1; flagellum slightly longer than peduncle; antenna 2 slender, slightly longer than antenna 1, flagellum slightly longer than peduncle; mandibular palp 3-articulate; coxae large, touching serially; gnathopods normally subchelate in female, gnathopod 2 chelate in male, enlarged, with digitate thumb; uropod 2 biramous; uropod 3 with its single ramus as long as peduncle; *head with long lateral, ocular lobes.* Species: 1, Mediterranean, littoral.

Cerapus Say

Cerapus Say, 1817.—Stebbing, 1906.
Cerapodina Milne Edwards, 1840.

Type-species: *C. tubularis* Say, 1817 (monotypy). See J. L. Barnard, 1962a.

Accessory flagellum absent; article 3 of antenna 1 shorter than or 120% as long as article 1, flagellum as long as article 3; antenna 2 slender, equal to antenna 1, flagellum as long as article 5; mandibular palp 3-articulate; coxae short, not touching serially; gnathopod 1 normally subchelate, gnathopod 2 in female simple even though article 6 slightly inflated, in male very large, essentially carpochelate, with teeth on article 5, article 6 simple and more slender than 5, dactyl very large and folding back to middle of article 5; uropod 2 with one ramus; uropod 3 with one vestigial, hooked ramus; *head with thorn-like rostrum.* Species: 5, (possibly less), cosmopolitan, littoral (one bathyal).

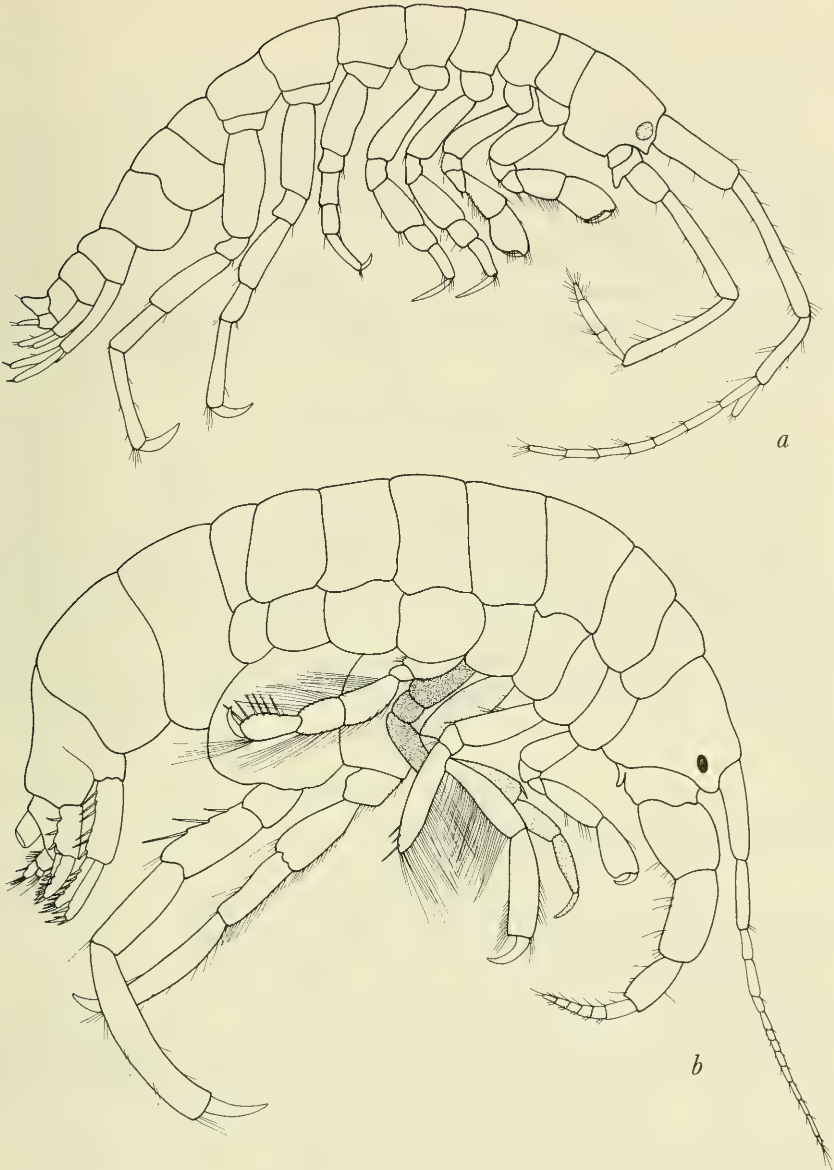

FIGURE 77.—Corophiidae: *a*, *Unciolella lunata* Chevreux (1911a); *b*, *Paracorophium excavatum* (Thomson, 1884).

Chevreuxius Bonnier

Chevreuxius Bonnier, 1896.—Stebbing, 1906.

Type-species: *C. grandimanus* Bonnier, 1896 (monotypy).

Accessory flagellum 2-articulate; article 3 of antenna 1 slightly shorter than article 1, flagellum slightly longer than article 3; antenna 2 slender, equal to antenna 1, flagellum shorter than article 5; mandibular palp 3-articulate; coxae short, not touching serially; male gnathopod 1 much larger than gnathopod 2, carpochelate, article 6 stout and subchelate but narrower than article 5; gnathopod 2 subchelate; uropod 2 with one ramus; uropod 3 with its single ramus as long as peduncle. Species: 1, N. Atlantic, bathyal (950 m).

Concholestes Giles

Concholestes Giles, 1888.—Stebbing, 1906.

Type-species: *C. dentalii* Giles, 1888 (monotypy).

Accessory flagellum absent; article 3 of antenna 1 subequal to article 1, flagellum equal to article 3; antenna 2 of medium stoutness, longer than antenna 1, flagellum much shorter than article 5; [mandible not described]; coxae not touching serially; gnathopod 2 normally subchelate, gnathopod 1 nearly simple; uropod 2 with ?one ramus; uropod 3 lacking rami. Species: 1, Bay of Bengal, littoral, in shell of *Dentalium*. See *Uncinotarsus* in Aoridae.

Corophium Latreille

Corophium Latreille, 1806.—Stebbing, 1906.
Audouinia Costa, 1851b (*nom. nud.*).

Type-species: *Oniscus volutator* Pallas, 1776 (monotypy and subsequent synonymy). See Sars, 1895 (as *C. grossipes*).

Accessory flagellum absent; article 3 of antenna 1 shorter than article 1, flagellum longer than article 3; antenna 2 equal to or longer than antenna 1, stout, especially in male flagellum much shorter than article 5, male article 4 usually with a distal tooth; mandibular palp 2-articulate; coxae short, not touching serially; gnathopods small, gnathopod 1 subchelate, *gnathopod 2 simple, extremely setose, articles 4 and 5 elongate and anteroposteriorly apposed;* uropod 2 biramous; uropod 3 flattened, its single ramus equal to peduncle; *urosomites coalesced or free.* Species: 47, cosmopolitan, open-sea littoral, brackish, fresh-water and Caspian Sea.

Dryopoides Stebbing

Dryopoides Stebbing, 1888.—Stebbing, 1906.

Type-species: *D. westwoodi* Stebbing, 1888 (monotypy). See Stebbing, 1910.

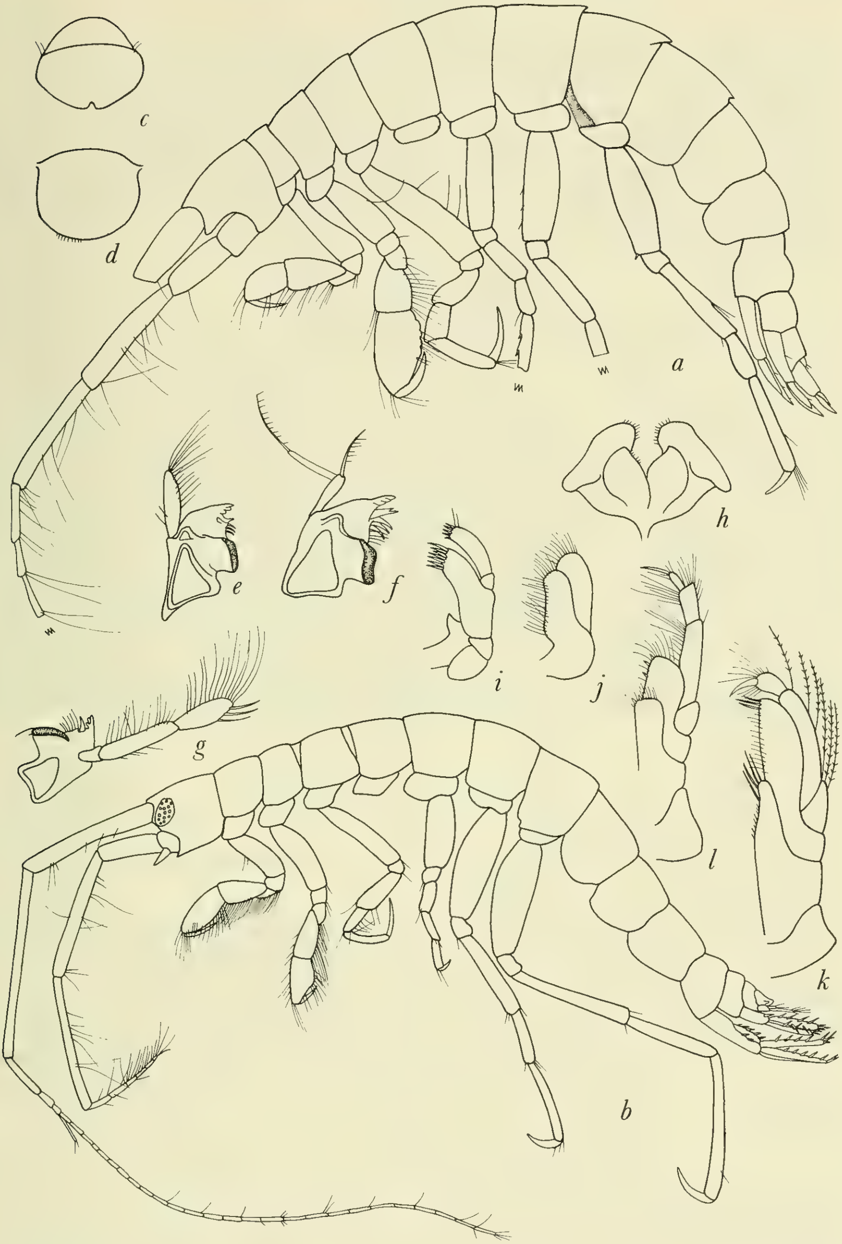

FIGURE 78.—Corophiidae: *a*, *Bogenfelsia incisa* J. L. Barnard (1962d); *b*, *Camacho bathyplous* Stebbing (J. L. Barnard, 1961). Upper lip: *c*, *Neohela monstrosa* (Boeck) (Sars, 1895, pl. 224); *d*, *Corophium volutator* (Pallas) (Sars, 1895, pl. 219 as *C. grossipes*). Mandible: *e*, *Siphonoecetes colletti* Boeck (Sars, 1895, pl. 218); *f*, *Corophium; g*, *Ericthonius brasiliensis* (Dana) (Sars, 1895, pl. 215, as *E. abditus*). Mouthparts, *Corophium: h*, lower lip, *i,j*, maxillae 1, 2, *k*, maxilliped. Maxilliped: *l*, *Ericthonius*.

Accessory flagellum absent; article 3 of antenna 1 much shorter than article 1, flagellum longer than peduncle; antenna 2 slender, slightly shorter than antenna 1, flagellum shorter than article 5; mandibular palp 3-articulate; coxae of medium size, touching serially; gnathopods normally subchelate, gnathopod 2 larger than 1 in male, *smaller than 1 in female;* uropod 2 biramous; uropod 3 biramous, rami shorter than peduncle. Female assigned to Aoridae. Species: 1, E. Australia, littoral.

Ericthonius Milne Edwards

Ericthonius Milne Edwards, 1830.—Stebbing, 1906.
Pyctilus Dana, 1852b.

Type-species: *E. difformis* Milne Edwards, 1830 (selected by Stebbing, 1888, p. 142!). See Sars, 1895.

Accessory flagellum absent; article 3 of antenna 1 longer than article 1, flagellum subequal to peduncle; antenna 2 slender, equal to antenna 1, flagellum as long as peduncle; mandibular palp 3-articulate; coxae short, scarcely touching serially; male gnathopod 2 larger than 1, carpochelate, article 6 simple, female gnathopods normally subchelate; uropod 2 biramous; uropod 3 with its single, medium length, uncinate ramus shorter than peduncle. Species: 8, mainly N. Hemisphere and tropics (one species), littoral (one extends to 1,134 m).

Gaviota J. L. Barnard

Gaviota J. L. Barnard, 1958b.

Type-species: *G. podophthalma* J. L. Barnard, 1958b (original designation).

Accessory flagellum absent; article 3 of antenna 1 equal to article 1, flagellum longer than article 3; antenna 2 slender, equal to antenna 1, flagellum longer than article 5; mandibular palp 3-articulate; coxae long, touching serially; gnathopods normally subchelate; uropod 2 biramous; uropod 3 with its single ramus shorter than peduncle; *head with immense, pedunculate lateral ocular lobes.* Species: 1, California, littoral.

Grandidierella Coutière

Grandidierella Coutière, 1904.

Type-species: *G. mahafalensis* Coutière, 1904 (monotypy). See Ruffo, 1958.

Accessory flagellum 1-articulate, usually elongate; article 3 of antenna 1 shorter than article 1, flagellum nearly as long as peduncle; antenna 2 slender (rarely stout in male), nearly equaling antenna 1, flagellum often shorter than article 5; mandibular palp 3-articulate;

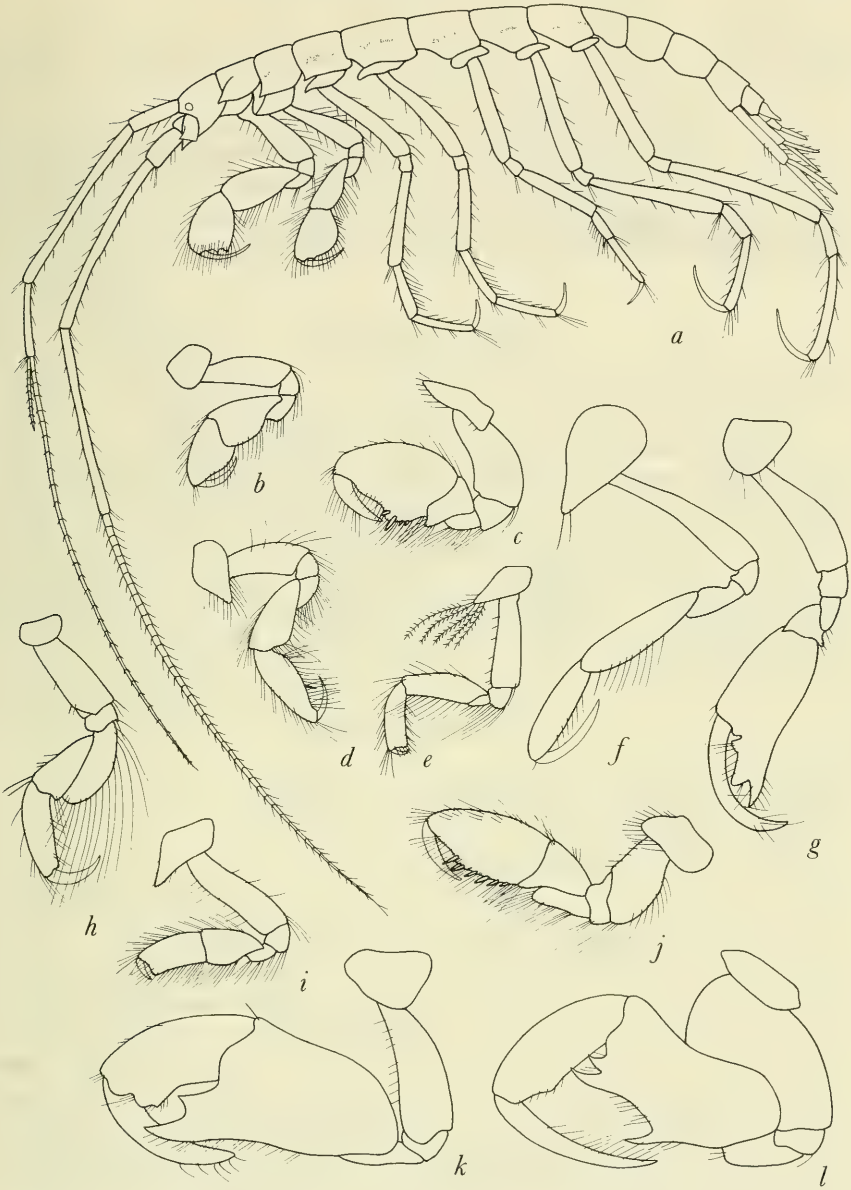

FIGURE 79.—Corophiidae: *a*, *Neohela monstrosa* (Boeck) (Sars, 1895, pl. 224). Gnathopod 1: *b*, *Ericthonius brasiliensis* (Dana) (Sars, 1895, pl. 215, as *E. abditus*); *c*, *Unciola leucopis* (Krøyer) (Sars, 1895, pl. 222); *d*, *Siphonoecetes colletti* Boeck (Sars, 1895, pl. 218); *e*, *Corophium volutator* (Pallas) (Sars, 1895, pl. 219, as *C. grossipes*); *f*, male *Cerapopsis longipes* Della Valle (1893). Gnathopod 2: *g*, *Cerapopsis; h*, *Corophium; i*, *Unciola; j*, *Siphonoecetes; k*, *Ericthonius; l*, *Cerapus crassicornis* (Bate) (Sars, 1895, pl. 217).

coxae short, scarcely touching serially; male gnathopod 1 large, carpochelate, article 5 bearing a tooth (or two), article 6 simple, gnathopod 2 smaller, normally subchelate or slightly chelate, and articles 4–5 sometimes like *Corophium;* uropod 2 biramous; uropod 3 with its single ramus longer than peduncle. Species: 15, circumtropical and warm-temperate, littoral, especially brackish water. Differs from *Neomicrodeutopus* in Aoridae by elongate article 1 of mandibular palp, that article as long as article 2.

Kamaka Derjavin

Kamaka Derjavin, 1923.—Gurjanova, 1951.

Type-species: *K. kuthae* Derjavin, 1923 (monotypy).

Accessory flagellum absent; antenna 1 short, article 3 slightly shorter than article 1, flagellum equal to peduncle; antenna 2 much longer than antenna 1, slender, flagellum equal to or shorter than article 5, often about 2-articulate; mandibular palp 3-articulate; coxae of medium size, touching serially; gnathopods normally subchelate and male gnathopod 2 with large palmar tooth; uropod 2 biramous; uropod 3 with its single ramus slightly shorter than (or subequal to) peduncle; *pleonites 4–5 coalesced.* Species: 3, boreal N. W. Pacific, littoral.

Neohela Smith

Hela Boeck, 1861 (homonym, Decapoda).
Neohela Smith, 1881 (new name).—Stebbing, 1906.
Helella Sars, 1882.

Type-species: *Hela monstrosa* Boeck, 1861 (monotypy). See Sars, 1895.

Accessory flagellum multiarticulate; article 3 of antenna 1 longer than article 1, flagellum longer than peduncle; antenna 2 slender, slightly longer than 1, flagellum longer than peduncle; mandibular palp 3-articulate; coxae short, some sharp, not touching serially; gnathopods normally subchelate, gnathopod 1 slightly larger than gnathopod 2; uropod 2 biramous; uropod 3 with its single ramus equal to or twice as long as peduncle; *telson slightly enlarged and apparently coalesced with urosomite 3; inner plate of maxilla 1 with about five setae mostly terminal* (*Parunciola*). Species: 3, subarctic-boreal, littoral to abyssal (2,288 m).

Paracorophium Stebbing

Paracorophium Stebbing, 1899b, c; 1906.

Type-species: *Corophium excavatum* Thomson, 1884 (monotypy). See Hurley, 1954b.

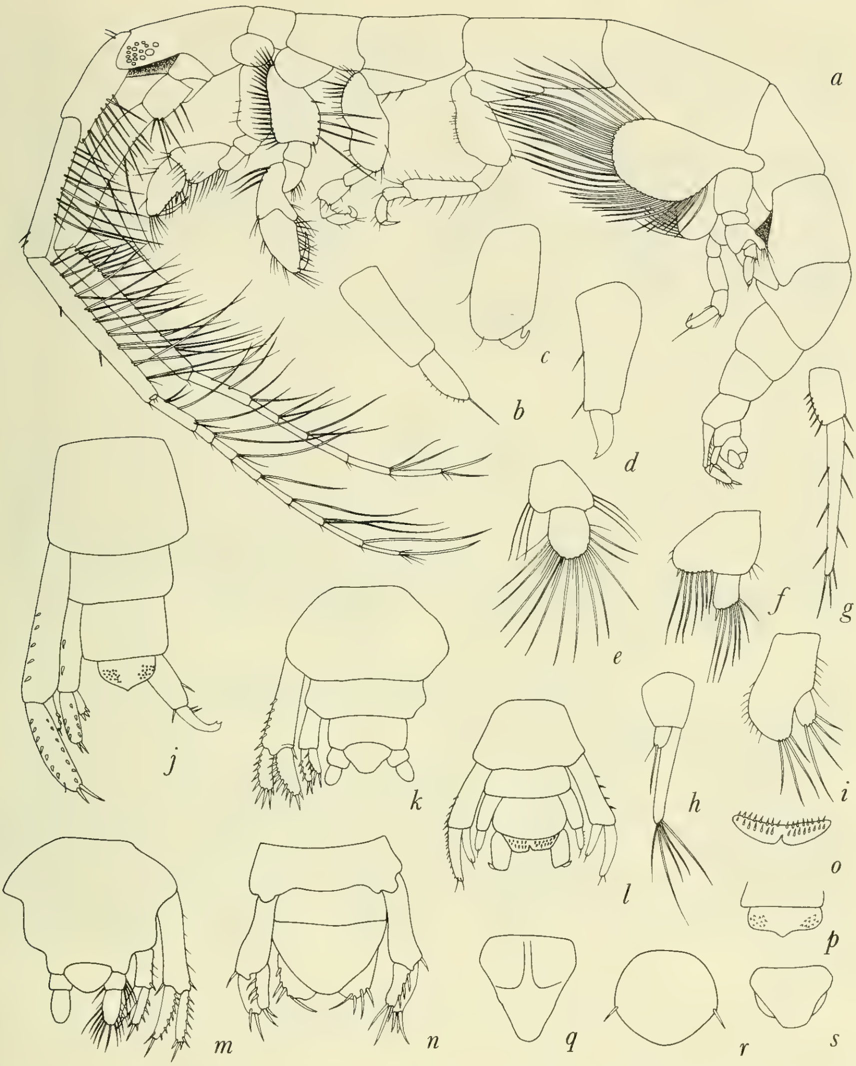

FIGURE 80.—Corophiidae: *a*, *Runanga coxalis* J. L. Barnard (1961). Uropod 2: *b*, *Cerapus crassicornis* (Bate) (Sars, 1895, pl. 217). Uropod 3: *c*, *Cerapus; d*, *Ericthonius brasiliensis* (Dana) (Sars, 1895, pl. 215, as *E. abditus*); *e*, *Corophium crassicorne* Bruzelius (Sars, 1895, pl. 220); *f*, *Siphonoecetes colletti* (Boeck) (Sars, 1895, pl. 218); *g*, *Neohela monstrosa* (Boeck) (Sars, 1895, pl. 224); *h*, *Camacho bathyplous* Stebbing (J. L. Barnard, 1961); *i*, *Unciola leucopis* (Krøyer) (Sars, 1895, pl. 222). Urosome, dorsal: *j*, *Pseudericthonius gaussi* Schellenberg (1926a); *k*, *Corophium volutator* (Pallas) (Sars, 1895, pl. 219, as *C. grossipes*); *l*, *Cerapus; m*, *Corophium crassicorne; n*, *Concholestes dentalii* Giles (1888). Telson: *o*, *Cerapus; p*, *Ericthonius difformis* Milne Edwards (Sars, 1895, pl. 216); *q*, *Neohela; r*, *Unciola; s*, *Corophium.*

Accessory flagellum absent; article 3 of antenna 1 shorter than article 1, flagellum longer than peduncle; antenna 2 stout, shorter than antenna 1, flagellum slightly longer than article 5; mandibular palp 3-articulate; coxae of medium size, touching serially; gnathopod 1 normally subchelate; gnathopod 2 subchelate or chelate, *article 4 greatly prolonged as in Corophium but diverging from article 5 and strongly setose;* uropod 2 biramous; uropod 3 with outer ramus slightly shorter than peduncle, inner ramus half as long as outer. Species: 2, New Zealand, fresh-water.

***Parunciola* Chevreux**

Parunciola Chevreux, 1911a.

Type-species: *P. seurati* Chevreux, 1911a (monotypy).

Accessory flagellum multiarticulate; article 3 of antenna 1 much longer than article 1 [flagellum broken]; antenna 2 slender, equaling antenna 1 [flagellum broken]; mandibular palp 3-articulate; coxae small, with softly rounded corners, but touching serially; gnathopods normally subchelate; uropod 2 biramous; uropod 3 with its single ramus twice as long as peduncle; *inner plate of maxilla 1 with about 10 medial setae* (*Neohela, Unciolella*). Species: 1, Algeria, littoral.

***Pseudericthonius* Schellenberg**

Pseudericthonius Schellenberg, 1926a.

Type-species: *P. gaussi* Schellenberg, 1926a (monotypy).

Antenna 1 not described but apparently as in *Ericthonius;* antenna 2 slender; mandibular palp 3-articulate; coxae short, not touching; gnathopods normally subchelate; *uropods 1 and 2 with inner rami much shorter than outer;* uropod 3 with its single elongate uncinate ramus shorter than peduncle. Species: 1, antarctic, littoral (to 342 m).

***Runanga* J. L. Barnard**

Runanga J. L. Barnard, 1961.

Type-species: *R. coxalis* J. L. Barnard, 1961 (original designation).

Accessory flagellum scale-like; article 3 of antenna 1 much longer than article 1, flagellum longer than article 3; antenna 2 slender, equal to antenna 1, flagellum longer than article 5; mandibular palp 3-articulate; coxae short, not touching serially; gnathopods normally subchelate; uropod 2 with one ramus; uropod 3 with two vestigial rami, outer ramus hooked; *pleopod 3 with one ramus.* Species: 1, Tasman Sea, bathyal (610 m).

Siphonoecetes Krøyer

Siphonoecetes Krøyer, 1845.—Stebbing, 1906.

Type-species: *S. typicus* Krøyer, 1845 (monotypy). See Stephensen, 1944a.

Accessory flagellum absent; article 3 of antenna 1 subequal to article 1, flagellum subequal to or longer than article 3; antenna 2 slender or slightly thickened, longer than antenna 1, flagellum shorter than article 5; mandibular palp 1-articulate; coxae short, not touching serially; gnathopods weakly or normally subchelate; uropod 2 with 1-2 rami; uropod 3 *with medially expanded peduncle,* its single ramus shorter than peduncle. Species: 9, arctic-boreal to ?antisubtropics, littoral to bathyal (565 m).

Unciola Say

Unciola Say, 1818.—Stebbing, 1906.
Glauconeme Krøyer, 1845 (homonym, Bryozoa).
Dryope and *Driope* Bate, 1862 (*Dryope*=homonym, Diptera).

Type-species: *U. irrorata* Say, 1818 (monotypy). See Shoemaker, 1945b.

Accessory flagellum elongate, multiarticulate or 1-articulate; article 3 of antenna 1 equal to article 1, flagellum subequal to peduncle; antenna 2 of medium to strong stoutness, slightly shorter than antenna 1, flagellum subequal to article 5; mandibular palp 3-articulate; coxae short, not touching serially; gnathopod 1 larger than gnathopod 2, both normally subchelate or gnathopod 2 simple or parachelate; uropod 2 biramous; uropod 3 often *with medially expanded peduncle,* its single ramus slightly shorter than peduncle. Species: 15, arctic-boreal, littoral to abyssal.

Unciolella Chevreux

Unciolella Chevreux, 1911a.

Type-species: *U. lunata* Chevreux, 1911a (monotypy).

Accessory flagellum 1-articulate, elongate or multiarticulate; article 3 of antenna 1 equal to or shorter than article 1, flagellum equal to peduncle; antenna 2 slender, shorter than antenna 1, flagellum shorter than article 5; mandibular palp 3-articulate; coxae short, touching or not touching serially, with softly rounded corners; gnathopods normally subchelate, gnathopod 1 slightly the larger; uropod 2 biramous; uropod 3 with its single ramus about 1.5 times longer than peduncle; *inner plate of maxilla 1 with one terminal seta* (*Neohela, Parunciola*). Species: 2, Mediterranean and S. Atlantic, littoral (to 392 m).

Cressidae

FIGURES 81, 82

DIAGNOSIS.—Accessory flagellum absent; mandibular molar evanescent; coxa 1 very small, always partially covered by following coxae; *coxa 4 large, either excavate posteriorly or shield-like and not excavate;* uropod 3 uniramous; outer lobes of maxilliped vestigial; telson entire and fused with pleonite 6, latter often coalesced with pleonite 5; *article 2 of pereopod 3 expanded.* See Stenothoidae, Amphilochidae, Thaumatelsonidae, Pagetinidae, Leucothoidae, Anamixidae, Phliantidae.

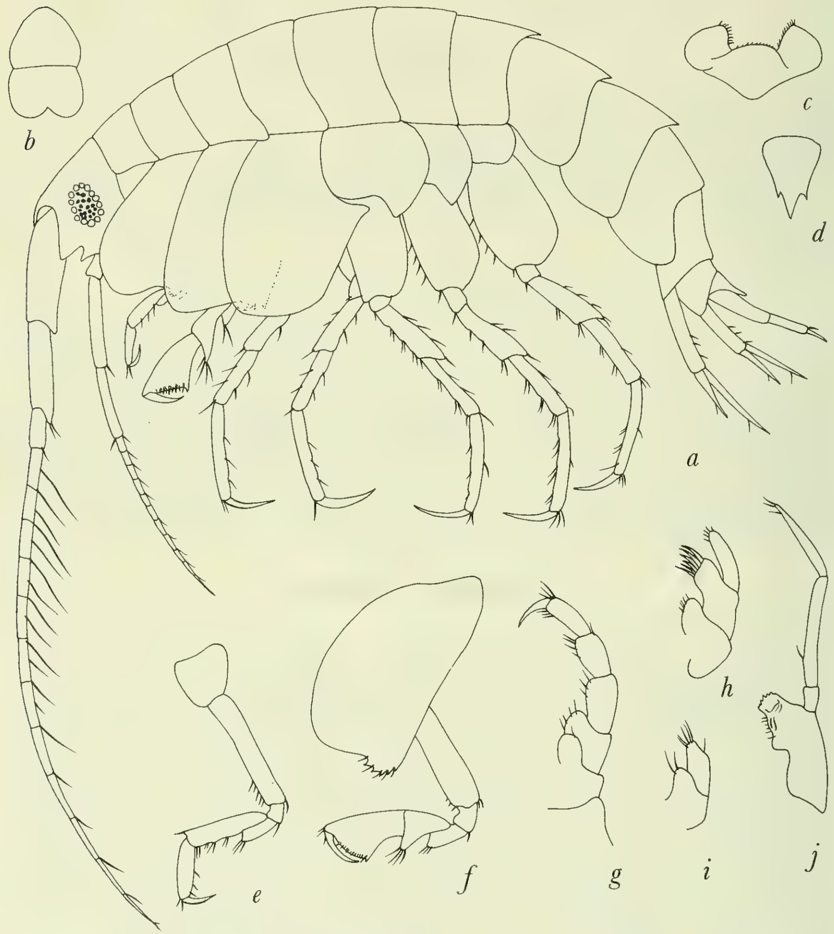

FIGURE 81.—Cressidae: *Cressa dubia* (Bate) (Sars, 1895, pls. 98–99): *a*, lateral; *b*, upper lip; *c*, lower lip; *d*, telson; *e,f*, gnathopods 1, 2; *g*, maxilliped; *h,i*, maxillae 1, 2; *j*, mandible.

Description.—Rostrum inconspicuous; accessory flagellum absent; body smooth or with slight dorsal teeth; coxa 1 small, hidden by following coxae; coxa 4 large, either shield-like or excavate posteriorly; upper lip incised; mandible with weak, sparsely spinose molar, not triturative, palp long, 3-articulate; lower lip with coalesced inner lobes, outer lobes with blunt extremities; palp of maxilla 1 uniarticulate; maxilla 2 small, lobes blunt; maxillipeds slender, outer lobes vestigial; gnathopods small, first simple, second subchelate; uropod 3 uniramous, the single ramus 2-articulate; telson of medium length, entire, fused with pleonite 6; article 2 of pereopod 3 expanded.

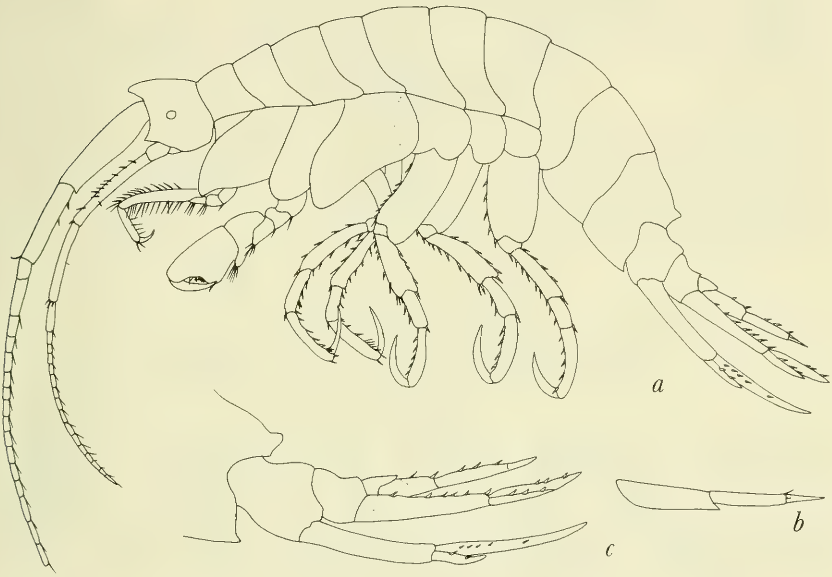

Figure 82.—Cressidae: *a, Cressina monocuspis* Stephensen (1931); *b*, uropod 3 of *Cressa minuta* Boeck (Sars, 1895, pl. 99); *c*, pleonite 3 and urosome, left to right, of *Cressina*, showing absence of urosomite 3.

Relationship.—The Stenothoidae have all segments of the urosome and the telson distinct, coxa 4 is always shield-like, not excavate posteriorly (like *Cressina*, however) and article 2 of pereopod 3 is always linear.

All Thaumatelsonidae have coxa 4 shield-like, not excavate posteriorly. Although the segments of the urosome may be coalesced the telson is not clearly fused with them and is usually thickened dorsoventrally; article 2 of pereopod 3 is always linear.

The Phliantidae have depressed, rugose bodies, and relatively equal coxae.

Key to the Genera of Cressidae

1. Coxa 4 rectangular, excavate posteriorly (fig. 81*a*) . . . . **Cressa**
   Coxa 4 shield-like, not excavate posteriorly (fig. 82*a*) . . . . . . **Cressina**

Genera of Cressidae

Cressa Boeck

Danaia Bate, 1857a (homonym, Anthozoa).
Cressa Boeck, 1871.—Stebbing, 1906.

Type-species: *Danaia dubia* Bate, 1857a (selected by Boeck, 1876, as *Cressa schiodtei* Boeck, 1871). See Sars, 1895.

Species: 6, arctic-boreal, N. Atlantic, littoral to bathyal.

Cressina Stephensen

Cressina Stephensen, 1931.

Type-species: *C. monocuspis* Stephensen, 1931 (monotypy).

Species: 1, subarctic, bathyal (682–1,096 m).

Dexaminidae

[including Anatylidae Bulycheva, 1955]

Figures 83–85

Diagnosis.—Accessory flagellum absent; urosomites 2 and 3 coalesced; mandible lacking palp, molar *well developed* or vestigial; *uropod 3 biramous; telson deeply cleft; body laterally compressed; gnathopods feeble but subchelate.* See Atylidae, Prophliantidae, Phliantidae. See *Sphaerophthalmus* in "Incertae Sedis."

Description.—Accessory flagellum absent; body laterally compressed and often dorsally carinate or toothed; urosomites 2 and 3 coalesced; mandible lacking palp, molar well developed, triturative (Dexamininae) or evanescent (Anatylinae); lower lip with or without mandibular processes, inner lobes well developed or vestigial, occasionally fused; palp of maxilla 1 uni- or biarticulate; maxillipeds with 3- or 4-articulate palp, inner plates occasionally vestigial; gnathopods feeble, subchelate; pereopods occasionally cheliform; uropod 3 biramous; telson long or short, deeply cleft.

Relationship.—The Talitroidea have fully separated urosomal segments.

Phliantidae and Prophliantidae have the mandibular molar evanescent. The Phliantidae, furthermore, have the palp of maxilla 1 degraded or absent. The Prophliantidae have all urosomal segments coalesced.

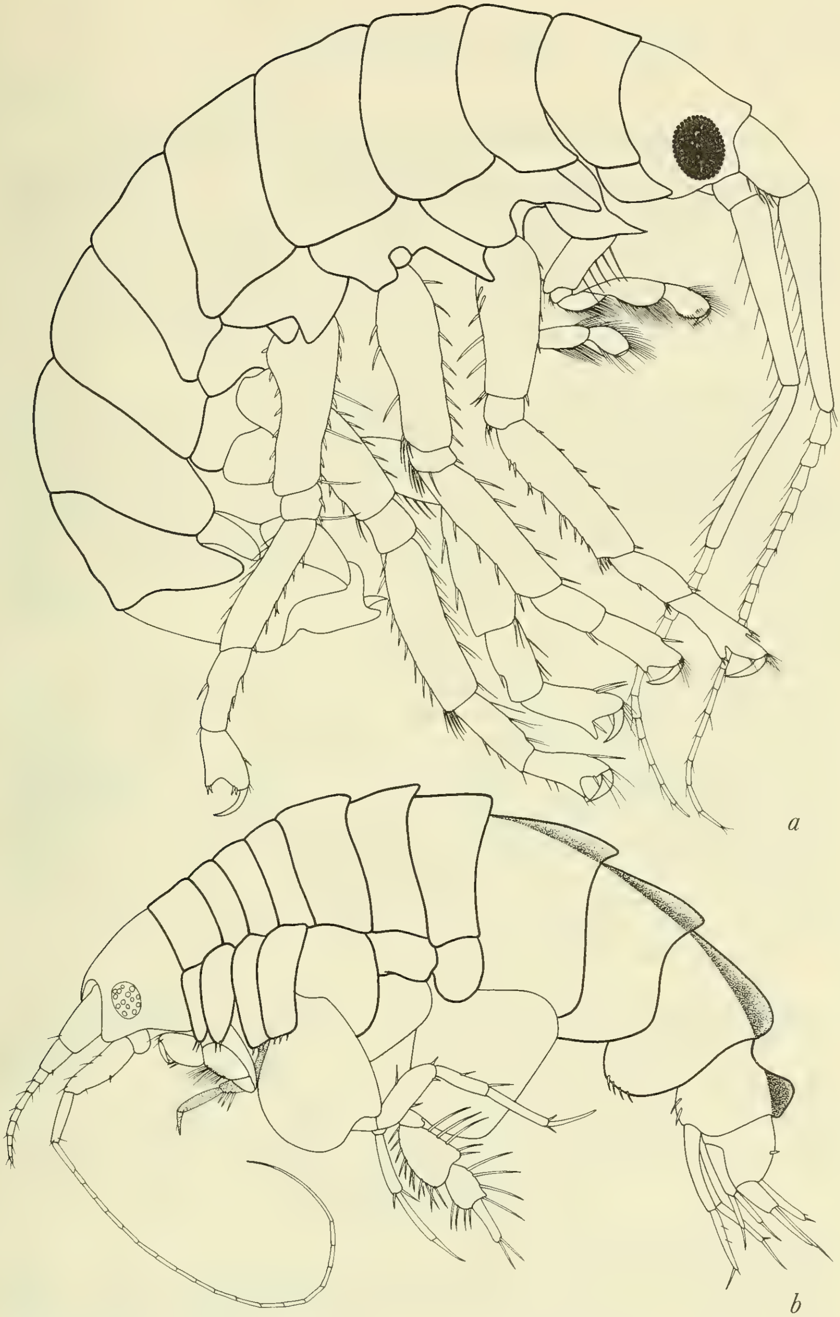

FIGURE 83.—Dexaminidae: *a*, *Polycheria antarctica* (Stebbing, 1888); *b*, *Dexamonica reduncans* J. L. Barnard (1958c).

Probably *Sphaerophthalmus* Spandl is assignable to the Dexaminidae. See its diagnosis under "Incertae Sedis."

Key to Subfamilies of Dexaminidae

1. Mandibular molar large, triturative (fig. 84*j*) . . . . **Dexamininae**
   Mandibular molar evanescent (fig. 85*e*) . . . . **Anatylinae**

Key to the Genera of Dexaminidae

(expanded after Sheard, 1938)

1. Palp of maxilliped with three articles (fig. 84*d*) 2
   Palp of maxilliped with four articles (fig. 84*e*) 4
2. Inner lobes of lower lip well developed (fig. 84*h*) . . . . . . **Dexaminella**
   Inner lobes of lower lip vestigial (fig. 84*i*) 3
3. Pereopods 1–5: article 4 shorter than articles 5–6 combined (fig. 85*n*). **Dexamine**
   Pereopods 1–5: article 4 longer than articles 5–6 combined (fig. 85*o*). **Tritaeta**
4. Pereopods 1–5 cheliform (fig. 85*p*) . . . . **Polycheria**
   Pereopods 1–5 simple 5
5. Palp of maxilla 1 uniarticulate (fig. 84*m*) 6
   Palp of maxilla 1 biarticulate (fig. 84*l*) 9
6. Inner plates of maxillipeds vestigial, short and bud-like (fig. 84*c*) 7
   Inner plates of maxillipeds of medium size (fig. 84*d*) 8
7. Inner lobes and mandibular lobes of lower lip distinct; palp article 4 of maxilliped claw-shaped (fig. 84*e*) . . . . **Dexaminoides**
   Inner lobes of lower lip coalesced, mandibular lobes obsolescent (fig. 84*f*); palp article 4 of maxilliped stout, blunt (fig. 84*c*) . . . . . **Dexamonica**
8. Mandibular processes of lower lip absent (fig. 84*g*) . . . . . **Syndexamine**
   Mandibular processes of lower lip present (fig. 84*i*) . . . . . **Paradexamine**
9. Palp article 2 of maxilla 1 large (fig. 84*l*); inner plates of maxillipeds well developed (fig. 85*i*); coxa 5 small, coxa 4 not posteriorly excavate. **Anatylus**
   Palp article 2 of maxilla 1 small (fig. 84*k*) or large; inner plates of maxillipeds vestigial, short and bud-like (fig. 84*c*); coxa 5 larger than anterior coxae, coxa 4 posteriorly excavate . . . . **Guernea**

Genera of Dexaminidae

Anatylus Bulycheva

Anatylus Bulycheva, 1955.

Type-species: *A. pavlovskii* Bulycheva, 1955 (original designation).

Mandibular molar evanescent; lower lip bearing inner lobes, mandibular processes distinct, palp of maxilla 1 biarticulate, *article 2 long* (*Guernea*); maxillipedal palp 4-articulate, inner plates well developed; *coxa 4 not excavate posteriorly.* Species: 1, boreal N. W. Pacific, littoral.

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Dexamine Leach

Dexamine Leach, 1814b.—Stebbing, 1906.
Amphithonotus Costa, 1851b.

Type-species: *Cancer spinosus* Montagu, 1813 (monotypy). See Sars, 1895.

Lower lip with poorly developed inner lobes, mandibular processes distinct; palp of maxilla 1 uniarticulate; maxillipedal palp 3-articulate, inner plates well developed; *article 4 of pereopods shorter than articles 5–6 combined* (*Tritaeta*). Species: 5, boreal N. E. Atlantic, Mediterranean, Ceylon, littoral.

Dexaminella Schellenberg

Dexaminella Schellenberg, 1928b.

Type-species: *D. aegyptiaca* Schellenberg, 1928b (monotypy).

Lower lip with well-developed inner lobes, mandibular processes distinct; palp of maxilla 1 uniarticulate; maxillipedal palp 3-articulate, inner plates absent. Species: 1, Red Sea, littoral.

Dexaminoides Spandl

Dexaminoides Spandl, 1923.

Type-species: *D. orientalis* Spandl, 1923 (monotypy). See J. L. Barnard, 1965.

Lower lip with well-developed inner lobes, mandibular processes distinct; palp of maxilla 1 uniarticulate; maxillipedal palp 4-articulate, *article 4 claw-like* (*Dexamonica*), inner plates vestigial, bud-like. Species: 1, Indo-Pacific, tropical, littoral.

Dexamonica J. L. Barnard

Dexamonica J. L. Barnard, 1958c.

Type-species: *D. reduncans* J. L. Barnard, 1958c (original designation).

Lower lip with distinct, fused inner lobes, mandibular processes obsolescent; palp of maxilla 1 uniarticulate; maxillipedal palp 4-articulate, *article 4 short, not claw-like* (*Dexaminoides*), inner plates vestigial, bud-like. Species: 1, California, littoral.

Guernea Chevreux

Helleria Norman, 1868 (homonym, Isopoda).
Guernea Chevreux, 1887 (new name).—Stebbing, 1906.
Prinassus Hansen, 1887.

Type-species: *Helleria coalita* Norman, 1868 (monotypy). See Chevreux and Fage, 1925.

FIGURE 84.—Dexaminidae: *a*, *Dexamine spinosa* (Montagu)(Sars, 1895, pl. 167). Upper lip: *b*, *Dexamine*. Maxillipeds: *c*, *Guernea coalita* (Norman) (Chevreux and Fage, 1925); *d*, *Dexamine; e*, *Polycheria antarctica* (Stebbing, 1888). Lower lip: *f*, *Dexamonica reduncans* J. L. Barnard (1958c); *g*, *Syndexamine carinata* Chilton (1914); *h*, *Dexaminella aegyptica* Schellenberg (1928); *i*, *Dexamine*. Mandible: *j*, *Dexamine*. Maxilla 1: *k*, *Guernea; l*, *Polycheria; m*, *Dexamine*. Maxilla 2: *n*, *Dexamine*. Gnathopods 1, 2: *o*, *p*, *Dexamine*.

FIGURE 85.—Dexaminidae: *Anatylus pavlovskii* Bulycheva (1955), parts as follows: *a*, body without appendages; *b,c*, antennae 1, 2; *d*, upper lip; *e*, mandible; *f*, lower lip; *g,h*, maxillae 1, 2; *i*, maxilliped; *j*, uropod 3; *k*, telson; *l,m*, gnathopods 1, 2. Pereopod 4: *n*, *Dexamine spinosa* (Montagu) (Sars, 1895, pl. 167); *o*, *Tritaeta gibbosa* (Bate) (Sars, 1895, pl. 168). Pereopod 3: *p*, *Polycheria antarctica* (Stebbing, 1888). Uropod 3: *q*, *Dexamine*. Telson: *r*, *Guernea coalita* (Norman) (Chevreux and Fage, 1925); *s*, *Dexamine*. Mandible: *t*, *Guernea*.

Lower lip with well-developed inner lobes, mandibular processes absent; palp of maxilla 1 biarticulate, *article 2 short* (*Anatylus*) except in *G. petalocera* Ruffo; maxillipedal palp 4-articulate, inner plates vestigial, bud-like; *coxa 5 larger than anterior coxae* (*Anatylus*). Species: 3, boreal-tropical in N. and E. hemispheres, littoral.

Paradexamine Stebbing

Paradexamine Stebbing, 1899d; 1906.

Type-species: *Dexamine pacifica* Thomson, 1879 (original designation). See Stephensen, 1927.

Lower lip with well-developed inner lobes, mandibular processes distinct; palp of maxilla 1 uniarticulate; maxillipedal palp 4-articulate, inner plates of moderate size. Species: 9, antarctic-antiboreal, littoral.

Polycheria Haswell

Polycheria Haswell, 1880c.—Stebbing, 1906.

Type-species: *Dexamine antarctica* Stebbing, 1875 (present selection, denoted by synonymy of Chilton, 1912). See Stebbing, 1888 (as *Tritaeta antarctica* and *T. kergueleni*).

Lower lip with well-developed inner lobes, mandibular processes absent; palp of maxilla 1 ?biarticulate (uniarticulate=auct. other than Stebbing); maxillipedal palp 4-articulate, inner plates well developed; *pereopods cheliform*. Species: 4, Antarctic to N. Pacific, littoral.

Syndexamine Chilton

Syndexamine Chilton, 1914.

Type-species: *S. carinata* Chilton, 1914 (monotypy).

Lower lip with small but distinct inner lobes, mandibular processes absent; palp of maxilla 1 uniarticulate; maxillipedal palp 4-articulate, inner plates small. Species: 1, New Zealand, littoral.

Tritaeta Boeck

Lampra Boeck, 1871 (homonym, Lepidoptera).
Tritaeta Boeck, 1876 (new name).—Stebbing, 1906.

Type-species: *Atylus gibbosus* Bate and Westwood, 1863 (monotypy). See Sars, 1895.

Lower lip with tiny inner lobes, mandibular processes distinct; palp of maxilla 1 uniarticulate; maxillipedal palp 3-articulate, inner plates well developed; *article 4 of pereopod 5 longer than articles 5–6 combined* (*Dexamine*). Species: 2, E. Atlantic, littoral.

Dogielinotidae

FIGURE 86

DIAGNOSIS.—Accessory flagellum absent; epistome with a pendant lobe; mandible lacking palp; palp of maxilla 1 vestigial; uropod 3 uniramous or lacking a ramus; telson broad, cleft shortly; antennae and pereopods densely spinose and setose (fossorial). See Talitroidea, Haustoriidae, Kuriidae, Phliantidae.

DESCRIPTION.—Accessory flagellum absent; body not carinate or toothed; rostrum small; coxae of medium length; mandible lacking palp, molar large, triturative; palp of maxilla 1 vestigial, 1-articulate; gnathopods of medium size, subchelate; uropod 3 uniramous or ramus absent, ramus small, bearing apical setae; telson short, broad, shortly cleft; antennae and pereopods densely spinose as in phoxocephalids and haustoriids.

RELATIONSHIP.—This remarkable family combines characters of Talitroidea and Phoxocephalidae-Haustoriidae. Its two species have these characters of Talitroidea: no accessory flagellum; uniramous [or aramous] third uropod; the telson of a *Hyale*; no mandibular palp; and a vestigial first maxillary palp. Dogielinotids have these characters of the Phoxocephalidae-Haustoriidae: shape of head and rostrum; short, very spinose antennae; similar gnathopods and pereopods; long peduncular setae of the first and second uropods; and the strong tooth at the posteroventral corner of the third pleonal epimeron.

Metoediceros Schellenberg (1931), now assigned erroneously to Oedicerotidae probably should form the type of a new family with resemblance to Dogielinotidae (see Incertae Sedis). *Metoediceros* differs from dogielinotids in its circular, uncleft telson. Its epistome is unknown.

Dogielinotids are distinguished from Talitroidea by their phoxocephalid characters and vice-versa, and from the Haustoriidae by the uniramous uropod 3 and the absence of a mandibular palp.

The Kuriidae have coalesced urosomal segments.

The Prophliantidae and Phliantidae have evanescent mandibular molars.

Key to the Genera of Dogielinotidae

1. Uropod 3 with one ramus . . . . **Dogielinotus**
   Uropod 3 lacking rami . . . . **Haustorioides**

Genera of Dogielinotidae

Dogielinotus Gurjanova

Dogielinotus Gurjanova, 1953.

Type-species: *Allorchestes moskvitini* Dershavin, 1930 (original designation).

Species: 1, boreal Pacific, littoral.

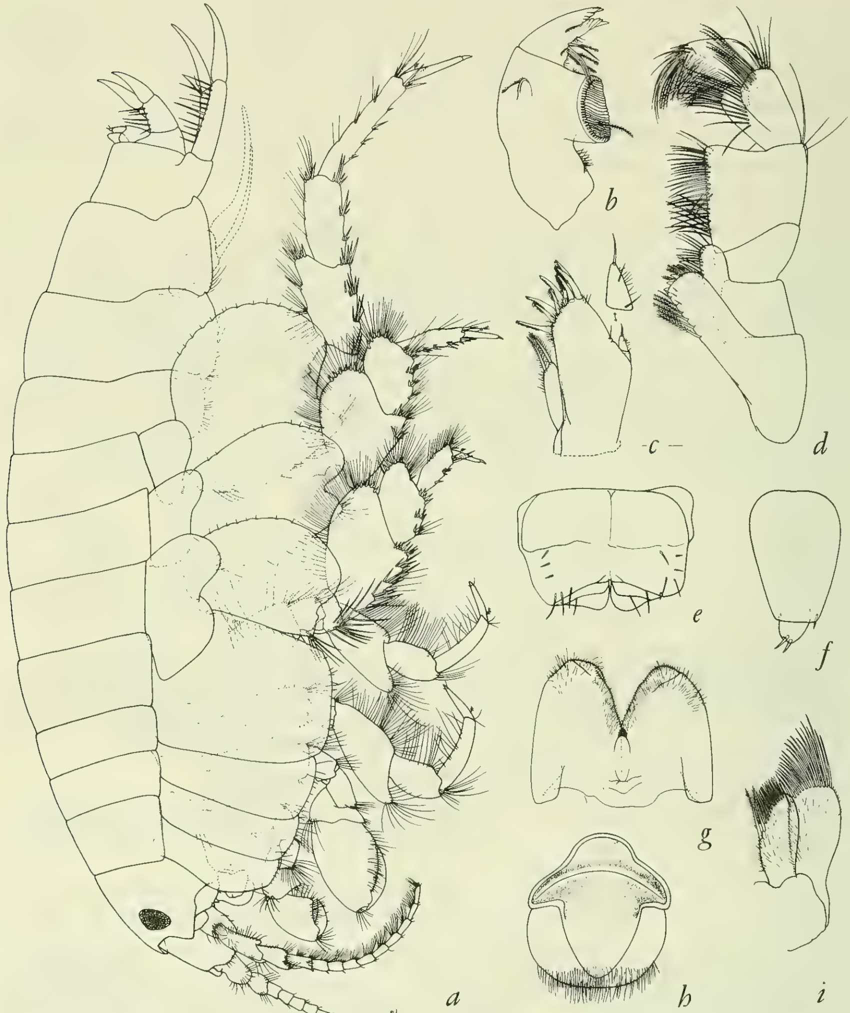

FIGURE 86.—Dogielinotidae: *Dogielinotus* sp., California, original figures: *a*, lateral aspect; *b*, mandible; *c*, maxilla 1; *d*, maxilliped; *e*, telson; *f*, uropod 3; *g*, lower lip; *h*, anterior view of epistome pendant in front of upper lip; *i*, maxilla 2.

Haustorioides Oldevig

Haustorioides Oldevig, 1958.

Type-species: *H. munsterhjelmi* Oldevig, 1958 (monotypy).
Species: 1, boreal Pacific, littoral.

Eophliantidae

[Sheard, 1936a, elevated by Gurjanova, 1958]

FIGURES 87, 88

DIAGNOSIS.—Accessory flagellum absent; body cylindrical; all coxae short, generally not touching; mandible lacking palp, molar vestigial or absent; palp of maxilla 1 degraded or absent; gnathopods usually feeble; uropod 3 becoming degenerate; telson short, weakly to fully cleft. See Prophliantidae, Phliantidae, Talitroidea, Kuriidae, Colomastigidae.

DESCRIPTION.—Body vermiform, head globular, lacking rostrum, urosome tending to be reduced and its segments coalesced, uropod 3 becoming degenerate, with two, one or no rami; accessory flagellum absent; mandible lacking palp and molar obsolescent; palp of maxilla 1 small, 1-articulate or absent; remaining mouthparts basic; gnathopods feeble, simple or weakly subchelate or parachelate, article 3 of gnathopods occasionally elongate; telson short, weakly to fully cleft; pleopods biramous or uniramous, requiring further study in the several genera.

Uropod 3 and its relationship to the urosome need careful study; it is necessary to distinguish clearly pleonite 6, the peduncle of uropod 3, and its ramus. Sometimes pleonite 6 is fused to 5 but a peduncle of uropod 3 may be confused with the segment if one mistakes a ramus for a peduncle.

RELATIONSHIP.—The Phliantidae differ from the Eophliantidae by their depressed or compressed bodies with long coxae.

The Talitroidea differ by their strongly triturative mandibular molars (except *Najna*) and compressed bodies.

The Colomastigidae have cylindrical bodies but the inner plates of the maxillipeds are very small, the telson is cleft, and the mandibular cutting edge is divided into large teeth.

Eophliantidae may resemble Corophiidae and Podoceridae because of their depressed, subcylindrical bodies but the latter two families have mandibular palps and molars.

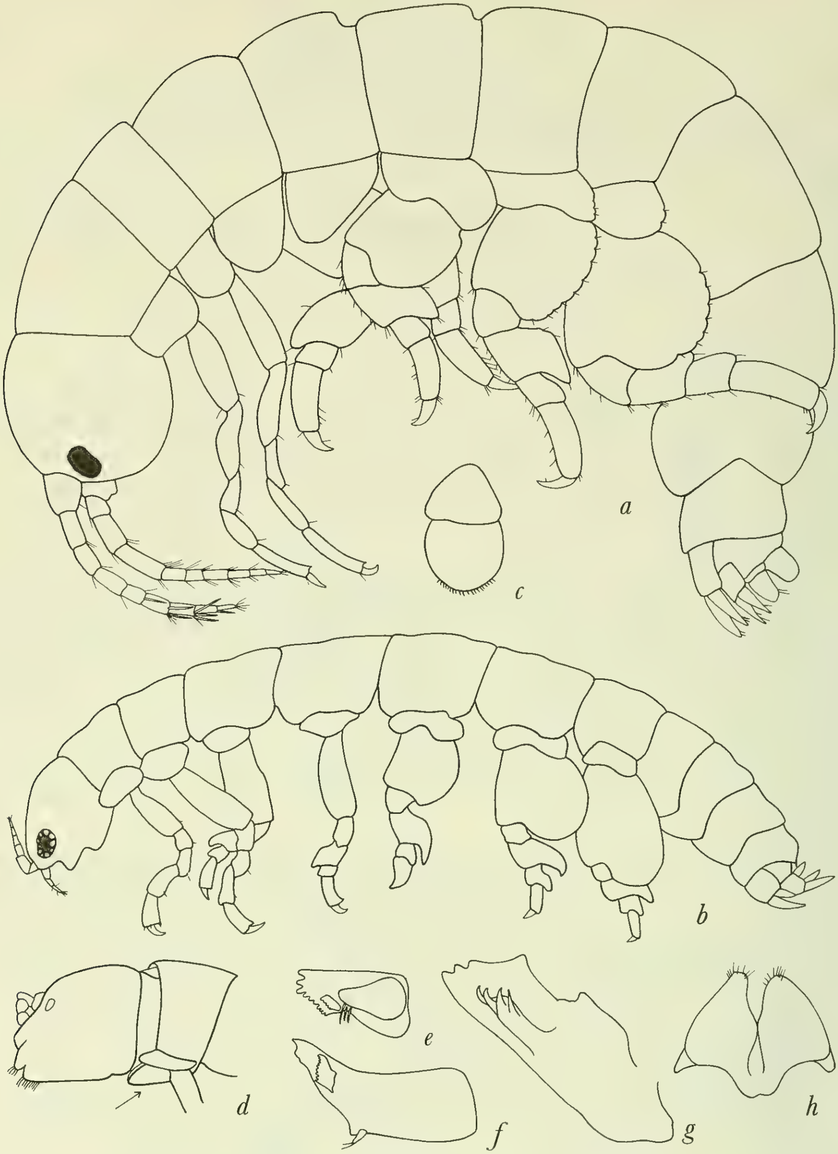

FIGURE 87.—Eophliantidae: *a, Wandelia crassipes* Chevreux (1906c); *b, Ceinina japonica* Stephensen (Gurjanova, 1951). Upper lip: *c, Wandelia.* Head: *d, Bircenna fulva* Chilton (Nicholls, 1939) (arrow marks ventral flange). Mandible: *e, Amphitholina cuniculus* (Stebbing) (Chevreux and Fage, 1925); *f, Wandelia; g, Wandelia japonensis* (Nicholls, 1939). Lower lip: *h, Bircenna ignea* Nicholls (1939).

Key to the Genera of Eophliantidae

1. Uropod 3 biramous (figs. 88*l*,*o*,*q*) 2
   Uropod 3 not biramous (figs. 88*m*,*n*,*p*) 4
2. Maxilla 1 lacking palp (fig. 88*a*) 3
   Maxilla 1 with small palp (fig. 88*c*) . . . . **Eophliantis**[1]
3. Uropod 3 with short, broad rami less than half as long as peduncle (fig. 88*o*), gnathopod 2 powerful (fig. 88*i*) . . . . **Amphitholina**
   Uropod 3 with slender rami as long as peduncle (fig. 88*l*), gnathopod 2 feeble (fig. 88*j*) . . . . **Biancolina**
4. Pleonites 5–6 small but distinct 5
   Pleonites 5–6 coalesced. 6
5. Antennae half as long as head, maxilla 1 lacking palp, mandible lacking molar . . . . (theoretical position) **Ceinina**
   Antennae as long as head, maxilla 1 with minute palp, mandible bearing small molar (one member at least) . . . . **Eophliantis***
6. Pleopods uniramous (fig. 88*k*) . . . . **Cylindryllioides**
   Pleopods biramous. 7
7. Pereonite 1 with a ventral flange (fig. 87*d*) . . . . **Bircenna**
   Pereonite 1 lacking a ventral flange 8
8. Coxae tiny, serially noncontiguous, flagellum of antenna 2 biarticulate, mandibular palp absent . . . . **Ceinina**
   Coxae small, serially contiguous, flagellum of antenna 2 about 6-articulate, mandible with vestigal palp . . . . **Wandelia**

[1] Sheard (1936a) and Nicholls (1939) have different concepts of uropod 3 on *Eophliantis*.

Genera of Eophliantidae

Amphitholina Ruffo

Amphitholina Ruffo, 1953.

Type-species: *Amphithoe cuniculus* Stebbing, 1874 (original designation). See Chevreux and Fage, 1925 (as *Biancolina cuniculus*).

Maxilla 1 lacking palp; pleonites 5–6 apparently separate; uropod 3 with two short broad rami, half as long as peduncle, *gnathopod 2 powerful* (*Biancolina*). Species: 1, Mediterranean, littoral.

Biancolina Della Valle

Biancolina Della Valle, 1893.—Stebbing, 1906 (in part).

Type-species: *B. algicola* Della Valle, 1893 (monotypy).

Maxilla 1 lacking palp; pleonites 5–6 separate; uropod 3 with slender rami as long as peduncle, *gnathopod 2 feeble* (*Amphitholina*). Species: 2, Mediterranean, Australia, littoral.

Bircenna Chilton

Bircenna Chilton, 1884.—Stebbing, 1906.

Type-species: *B. fulvus* Chilton, 1884 (monotypy). See Sheard, 1936a; Nicholls, 1939.

Maxilla 1 lacking palp; pleonites 5–6 coalesced; uropod 3 with a single vestigial ramus or none; *pereonite 1 with a ventral flange.* Species: 4, S. Australia and New Zealand, littoral.

FIGURE 88.—Eophliantidae: Maxilla 1: *a, Wandelia crassipes* Chevreux (1906c); *b, Amphitholina cuniculus* (Stebbing) (Chevreux and Fage, 1925); *c, Eophliantis tindalei* Nicholls (1939). Maxilliped: *d, Wandelia.* Gnathopod 1: *e, Wandelia; f, Amphitholina; g, Biancolina algicola* Della Valle (1893). Gnathopod 2: *h, Wandelia; i, Amphitholina; j, Biancolina algicola.* Pleopod: *k, Cylindryllioides mawsoni* Nicholls (1938). Uropod 3: *l, Biancolina australis* Nicholls (1939); *m, Eophliantis; n, Bircenna nichollsi* Sheard (Nicholls, 1939). Telson, uropod 3 and dorsum of urosome: *o, Amphitholina; p, Wandelia; q, Biancolina algicola.* Urosome, lateral: *r, Eophliantis.*

Ceinina Stephensen

Ceinina Stephensen, 1933.

Type-species: *C. japonica* Stephensen, 1933 (monotypy). See Gurjanova, 1951; Nicholls, 1939 (as *Wandelia japonensis*).

Maxilla 1 lacking palp; pleonites apparently coalesced; uropod 3 with one ramus; *antennae half as long as head, mandible lacking molar* (*Eophliantis*); *coxae tiny, serially noncontiguous* (*Wandelia*). Species: 1, Japan, littoral.

Cylindryllioides Nicholls

Cylindryllioides Nicholls, 1938.

Type-species: *C. mawsoni* Nicholls, 1938 (original designation).

Maxilla 1 lacking palp; pleonites 5–6 coalesced; uropod 3 lacking rami; *pleopods uniramous* (*combining character*). Species: 1, antarctic, littoral.

Eophliantis Sheard

Eophliantis Sheard, 1936a.

Type-species: *E. tindalei* Sheard, 1936a (original designation).

Maxilla 1 with small palp; pleonites 5–6 separate; uropod 3 with two blunt rami (Sheard), no rami (Nicholls, 1939); *antennae as long as head, mandible bearing small molar* (*Ceinina*). Species: 1, Tasmania, littoral.

Wandelia Chevreux

Wandelia Chevreux, 1906a; 1906b.

Type-species: *W. crassipes* Chevreux, 1906a (original designation); 1906b.

Maxilla 1 lacking palp; pleonites 5–6 coalesced; uropod 3 lacking rami; coxae small, *serially contiguous* (*Ceinina*). Species: ?2, antarctic to N. Pacific, littoral.

Eusiridae

[including Pontogeneiidae]

Figures 89–93

Diagnosis.—Accessory flagellum either a single styliform article or two short articles, a scale or absent; *telson cleft*. See Calliopiidae, Pleustidae, Liljeborgiidae, Gammaridae, Vitjazianidae, Astyridae, Lepechinellidae, Paramphithoidae.

Description.—Accessory flagellum absent, or composed of a scale or one long article or two short articles; rostrum present or obsolete; upper lip not incised (bilobed in one genus); mandibles bearing 3-

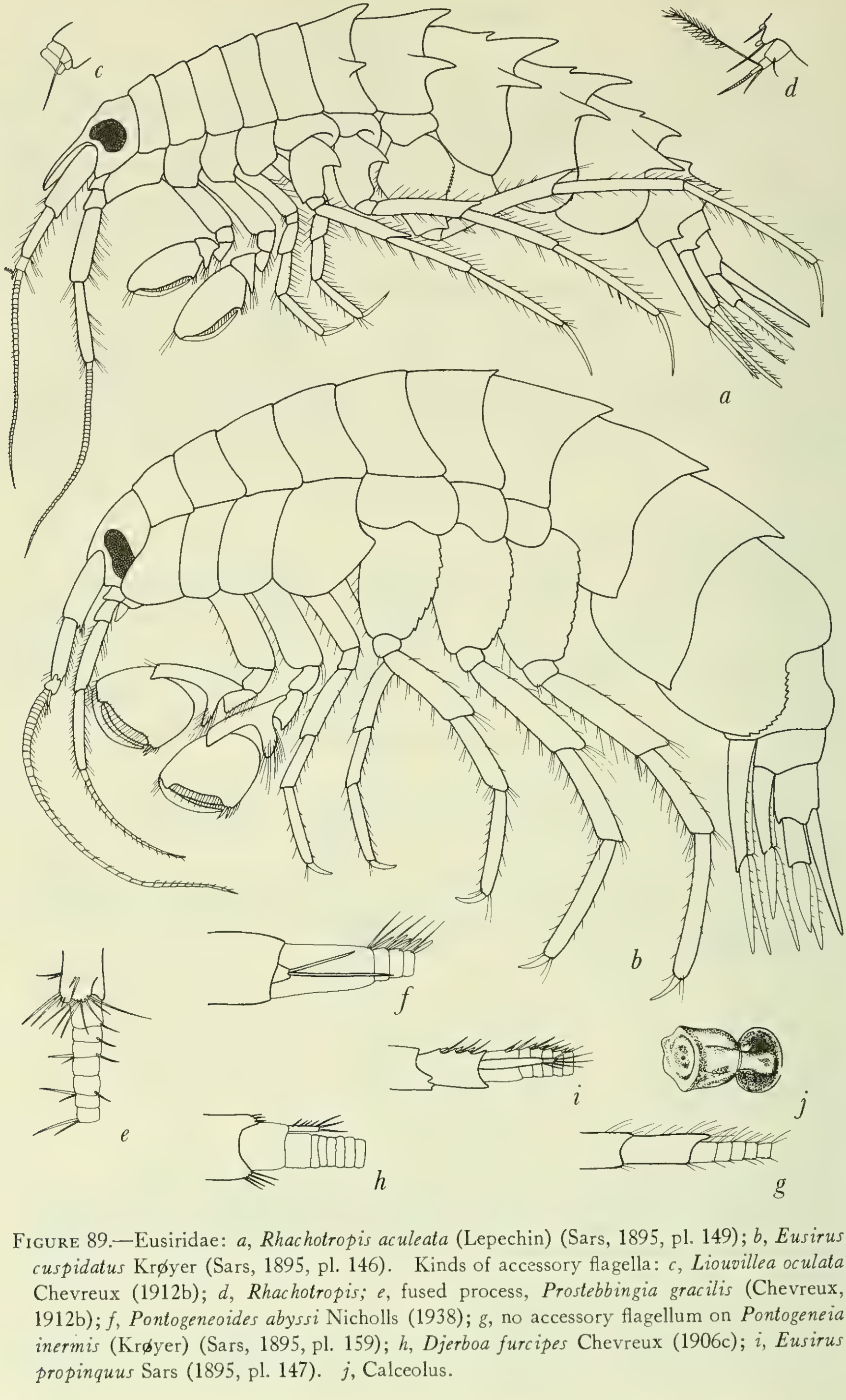

FIGURE 89.—Eusiridae: *a*, *Rhachotropis aculeata* (Lepechin) (Sars, 1895, pl. 149); *b*, *Eusirus cuspidatus* Krøyer (Sars, 1895, pl. 146). Kinds of accessory flagella: *c*, *Liouvillea oculata* Chevreux (1912b); *d*, *Rhachotropis;* *e*, fused process, *Prostebbingia gracilis* (Chevreux, 1912b); *f*, *Pontogeneoides abyssi* Nicholls (1938); *g*, no accessory flagellum on *Pontogeneia inermis* (Krøyer) (Sars, 1895, pl. 159); *h*, *Djerboa furcipes* Chevreux (1906c); *i*, *Eusirus propinquus* Sars (1895, pl. 147). *j*, Calceolus.

articulate palp, molar triturative (except in a few genera); lower lip with or without inner lobes; other mouthparts basic, except one genus with shortened palp of maxilla 1; gnathopods either powerful and subchelate, occasionally small, or feeble, occasionally nearly simple (*Harpinioidella*); coxae of medium length or short; uropod 3 with elongate, lanceolate rami; telson often elongate, much longer than peduncle of uropod 3, or increasingly shortened, cleft deeply or slightly cleft only apically, occasionally appearing to be emarginate; in *Eusirogenes* telson shorter than peduncle of uropod 3.

Relationship.—The Astyridae differ from the Eusiridae by the nontriturative mandibular molar and the characteristic shape of the lower lip. Some astyrids have a massive head and all have a very short telson.

The Vitjazianidae are distinguished by their distinctly simple first gnathopods and the elongate article 1 of the flagellum on antenna 1 which equals the peduncle in length. Pleustidae have their characteristic lower lips.

Since Calliopiidae appear to be Eusiridae-Pontogeneiidae with fused telsonic lobes and some Eusiridae have nearly entire telsons, it must be pointed out that *Sancho* in the Calliopiidae, with entire telson and with 1-articulate accessory flagellum as long as article 1 of the primary flagellum has gnathopod 2 similar to the "Eusirus" gnathopods and might be placed more logically in Eusiridae than in Calliopiidae. See the latter family for further discussion.

Most synopiids have a multiarticulate accessory flagellum but a few have an accessory flagellum similar to that of eusirids. The massive, galeate head of most synopiids is characteristic, especially because of its strongly deflexed rostrum. Synopiid gnathopods are feeble whereas those of eusirids are usually powerful.

Rhachotropis aculeata bears resemblance to Paramphithoidae in its slightly acute first four coxae but differs by its powerful gnathopods. Gnathopods of Paramphithoidae are feeble and one or more of the first four coxae are acuminate.

All Liljeborgiidae have a nontriturative mandibluar molar, but eusirid resemblance to this family is close because some liljeborgiids have a 2-articulate accessory flagellum and a few eusirid genera have a poorly triturative mandibular molar.

Most Gammaridae differ from Eusiridae by their multiarticulate accessory flagella but a number of genera have 1-2-articulate accessory flagella (see couplets 6–17 in Gammaridae key). Eusiridae differ from those genera of Gammaridae by their elongate telsons and the slight elongation of the metasome. Nearly half of those gammarid genera have short inner rami on uropod 3, and most of the remainder have either foliaceous rami on uropod 3, and elongate article 2 of the

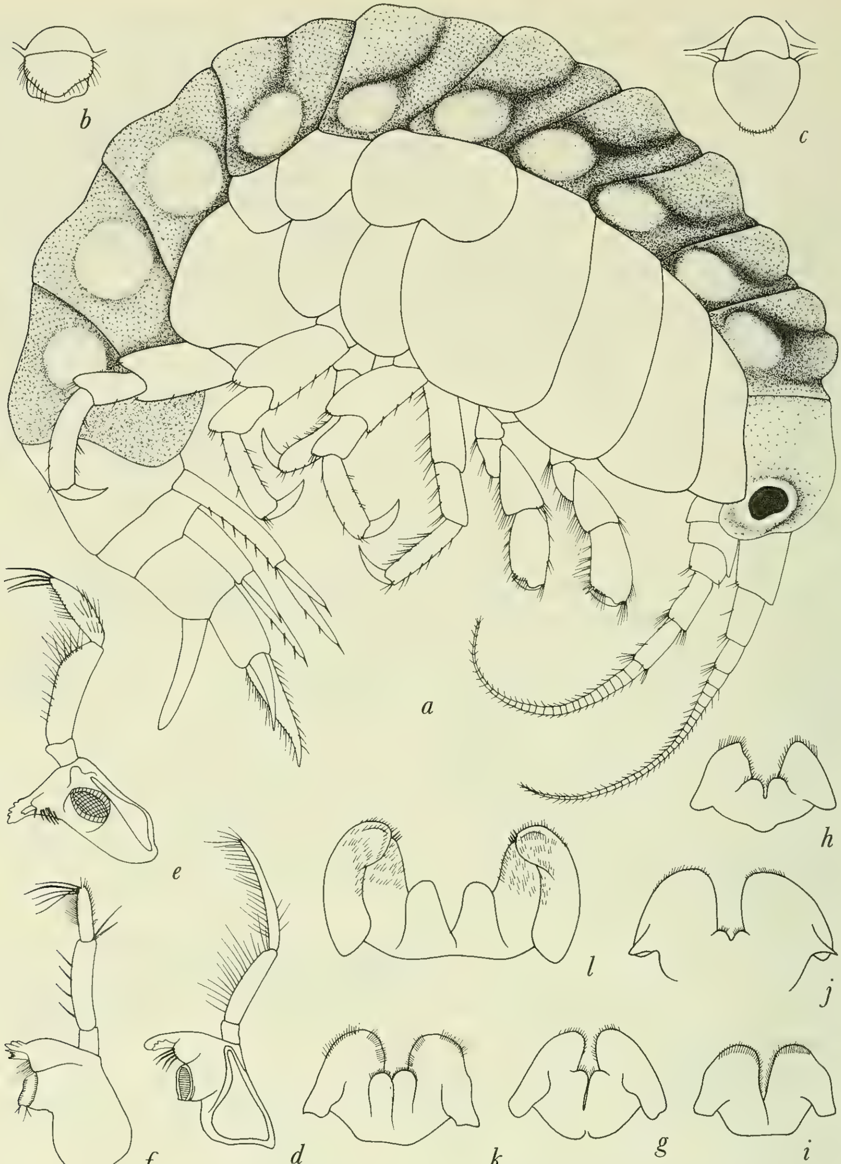

FIGURE 90.—Eusiridae: *a*, *Eurymera monticulosa* Pfeffer (Chevreux, 1906c). Upper lips: *b*, *Eusirus propinquus* Sars (1895, pl. 147); *c*, *Pontogeneia inermis* (Krøyer) (Sars, 1895, pl. 159). Mandible: *d*, *Eusirus; e*, *Pontogeneia; f*, *Liouvillea oculata* Chevreux (1912b). Lower lip: *g*, *Pontogeneia; h*, *Eusirus; i*, *Bovallia gigantea* Pfeffer (Chevreux, 1906c); *j*, *Pontogeneoides abyssi* Nicholls (1938); *k*, *Eurymera; l*, *Meteusiroides keyensis* Pirlot (1934).

mandibular palp or a simple gnathopod 1. Only *Elasmopus*, *Liagoceradocus*, and *Anelasmopus* do not fit these statements.

Though originally assigned to Amphilochidae, *Pseudamphilochus* Schellenberg falls to the Eusiridae, especially through the illustrated family key. That genus has the head of an amphilochid or pleustid, gnathopods of an amphilochid, a lower lip faintly resembling that of Pleustidae, but coxa 1 is not reduced as it is in Amphilochidae and the cleft telson is unlike either pleustids or amphilochids. *Pseudamphilochus* has been given a special place in Gammaridea Family Key G (p. 114) and is mentioned also under the Amphilochidae.

Lepechinellids have acuminate coxae and apparently always have pleonites 5–6 coalesced.

Key to the Genera of Eusiridae [1]

1. Article 6 of gnathopods attached to the strongly produced or extended apex of article 5 ("Eusirus gnathopods"), article 6 as broad as long (figs. 92*b*,*e*,*h*,*j*) 2
   Article 6 of gnathopods with normal attachment, article 6 longer than broad (figs. 92*a*,*c*,*d*,*i*,*m*) 5
2. Articles 4 and 6 of gnathopods touching (fig. 92*h*), antennae with calceoli (fig. 89*i*) . . . . **Eusiropsis**
   Articles 4 and 6 of gnathopods not touching, separated by a lobe of article 5 (figs. 92*b*,*j*), antennae lacking calceoli 3
3. Article 6 of gnathopod 1 larger than article 6 of gnathopod 2, palp article 3 of mandible shorter or scarcely shorter than article 2 (fig. 90*f*) . **Eusirogenes**
   Article 6 of gnathopod 1 equal to or smaller than article 6 of gnathopod 2, palp article 3 of mandible equal to or longer than article 2 (fig. 90*d*) . . 4
4. Posterior border of article 5 of gnathopods forming a very narrow projecting lobe, much narrower than length of tapered distal end of article 5 (fig. 92*b*) . . . . **Eusirus**
   Posterior border of article 5 of gnathopods formed of a broad, shallow setose lobe, its length greater than the tapered distal end of article 5 (fig. 92*e*). **Pareusirogenes**
5. Palp of maxilla 1 short, article 1 longer than 2 (fig. 91*f*) . . . . . **Eusirella**
   Palp of maxilla 1 long, article 2 longer than 1 (fig. 91*g*) 6
6. Articles 4, 5, 6 of pereopods 3–5 each 1.5 times as long as article 2 (if legs broken proceed to couplet 9) (fig. 89*a*) 7
   Articles 4, 5, 6 of pereopods 3–5 each as long as their second articles (fig. 89*b*) 9
7. Gnathopods not subchelate . . . . **Harcledo**
   Gnathopods subchelate 8
8. Body carinate (often weakly), coxa 1 produced forward (fig. 89*a*). **Rhachotropis**
   Body not carinate, coxa 1 not produced forward . . . . **Cleonardo**
9. Epistome with large anterior process (seen from lateral view) . . . . . **10** [2]

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[1] *Pseudopontogeneia* Oldevig (1959) and *Pontogeneoides* Nicholls (1938) are not sufficiently described for inclusion in the following key.

[2] See also small process of *Meteusiroides* and broadly flabelliform (dorsal-ventral) but shallow process of *Chosroes* and footnote 3 to couplet 31.

Epistome lacking large anterior process 11
10. Postantennal cephalic angle acutely produced . . . . **Atyloella**
Postantennal cephalic angle presumably rounded . . . . **Liouvillea**
11. Both articles 5 and 6 of gnathopod 2 long and sublinear (fig. 92*k*) 12
Either article 5 or 6 of gnathopod 2 not long and sublinear 14
12. Convex side of dactyli on pereopods 3–5 with accessory spine or spines (fig. 93*e*) 13
Dactyli of pereopods 3–5 lacking posterior accessory spine . . **Schraderia**
13. Pereopods 1 and 2 with dactylar spine, article 2 of first antennal peduncle shorter than article 1 . . . . **Djerboa**
Pereopods 1 and 2 lacking dactylar spine, article 2 of first antennal peduncle longer than article 1 . . . . **Bathyschraderia**
14. Gnathopods not subchelate (like *Harpinioides* in Calliopiidae) (figs. 92*d,p*). 15
Gnathopods distinctly subchelate 16
15. Probably each of articles 4–6 of pereopods 3–5 not longer than article 2. **Harpinioidella**
Each of articles 4–6 of pereopods 3–5 longer than article 2 . . . **Harcledo**
16. Accessory flagellum distinctly articulate, usually cylindrical, often as long as article 1 of primary flagellum (figs. 89*h,i*) 17
Accessory flagellum usually absent, when present formed of a fused scale or process, not articulate (figs. 89*e,f,g*) 26
17. Inner plate of maxilla 1 with more than four setae, setae generally lining medial edge and apex (figs. 91*d,e*). **Paramoera** (and *Atylopsis* in Calliopiidae)
Inner plate of maxilla 1 with four or fewer terminal setae (figs. 91*c,g*) . . 18
18. Article 6 of gnathopod 2 twice as long as article 5 19
Article 6 of gnathopod 2 subequal to article 5 in length 24
19. Article 6 of pereopods 3–5 subequal to or shorter than article 2 20
Article 6 of pereopods 3–5 longer than article 2 23
20. Accessory flagellum as broad as long (fig. 89*f*) 21
Accessory flagellum long, rectangular (fig. 89*h*) 22
21. Telson deeply cleft (fig. 91*l*) . . . . **Accedomoera**
Telson apically notched (fig. 91*m*). **Paramoera** (and *Atylopsis* in Calliopiidae)
22. Upper lip bilobed . . . . **Ronco**
Upper lip rounded ventrally . . . . **Eusiroides**
23. Body carinate, accessory flagellum 2-articulate . . . . . . **Rhachotropis**
Body smooth, accessory flagellum 1-articulate . . . . **Cleonardo**
24. Body carinate . . . . **Cleonardopsis**
Body smooth 25
25. Article 6 of gnathopods narrower than fifth . . . . **Pseudomoera**
Article 6 of gnathopods as broad as fifth . . . . . **Accedomoera** (in part)
26. Anteroventral cephalic angle with large tooth, coxa 1 produced forward to anterior edge of eye (fig. 93*b*) . . . . **Rozinante**
Anteroventral cephalic angle with small tooth or none, coxa 1 not produced 27
27. Inner plate of maxilla 1 with four or fewer terminal setae 28
Inner plate of maxilla 1 with more than four setae and some setae lining medial edge (fig. 91*e*) 32
28. Articles 4, 5, and 6 of pereopods 3–5 each 1.5 times as long as article 2. **Harcledo**
Articles 4, 5, and 6 of pereopods 3–5 not longer than article 2 29

29. Gnathopods simple (like *Harpinioides* in Calliopiidae) (figs. 92*d,p*). **Harpinioidella**
Gnathopods subchelate 30
30. Outer lobes of lower lip broadly separated, inner lobes large (fig. 90*l*), telson extending three fourths along rami of uropod 3 . . . . . **Meteusiroides**
Outer lobes of lower lip with small medial gap, inner lobes obsolescent or absent (fig. 90*g*), telson extending one third or less along rami of uropod 3 31
31. Inner lobes of lower lip small but distinct, inner plate of maxilla 2 with setae lining medial edge, upper lip rounded or truncate below, gnathopod 2 small . . . . **Pontogeneia** [3]
Inner lobes of lower lip absent, inner plate of maxilla 2 with one medioterminal seta, upper lip with small incision on ventral margin, gnathopod 2 very large (like *Rhachotropis*) . . . . **Dautzenbergia**
32. Dactyls of pereopods 3 and 4 as long as article 6, pereopods very setose and oedicerotid-like (fig. 93*g*) . . . . **Zaramilla**
Dactyls of pereopods 3 and 4 very short, pereopods poorly setose, slender . 33
33. Lower lip with inner lobes 34
Lower lip lacking inner lobes 37
34. Coxa 4 not excavate posteriorly . . . . **Prostebbingia**
Coxa 4 excavate posteriorly 35
35. Body umbonate (fig. 90*a*) . . . . **Eurymera**
Body not umbonate 36
36. Inner lobes of lower lip very small, inner plate of maxilla 1 with setae mostly terminal . . . . **Pontogeneia**
Inner lobes of lower lip large, inner plate of maxilla 1 with setae lining full medial edge . . . . **Pontogeneiella**
37. Coxa 4 deeply excavate posteriorly, upper lip rounded below, telson cleft halfway, maxillipedal palp article 4 shorter than article 3 . . . . **Bovallia**
Coxa 4 scarcely excavate posteriorly, upper lip slightly incised, telson cleft one fifth, maxillipedal palp article 4 longer than article 3. (theoretical possibility) **Dautzenbergia**

[3] Also see *Chosroes decoratus* K. H. Barnard (1932), which is related to the type, *C. incisus* (Calliopiidae), but which has a cleft telson and so inadvertently keys to *Pontogeneia*.

Genera of Eusiridae

NOTE: "EUSIRID" gnathopods have article 6 as broad as long and attached to the produced apex of article 5.

Accedomoera J. L. Barnard

Accedomoera J. L. Barnard, 1964c.

Type-species: *Pontogeneia tricuspidata* Gurjanova, 1938 (original designation).

Accessory flagellum articulate, short; lower lip with small inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 not lobate, shorter than 6, *6 as broad as 5* (*Pseudomoera*); pereopods 3–5 with each of articles 4–6 not distinctly longer than article 2. Species: 3, subantarctic, boreal, N.W. Pacific, littoral.

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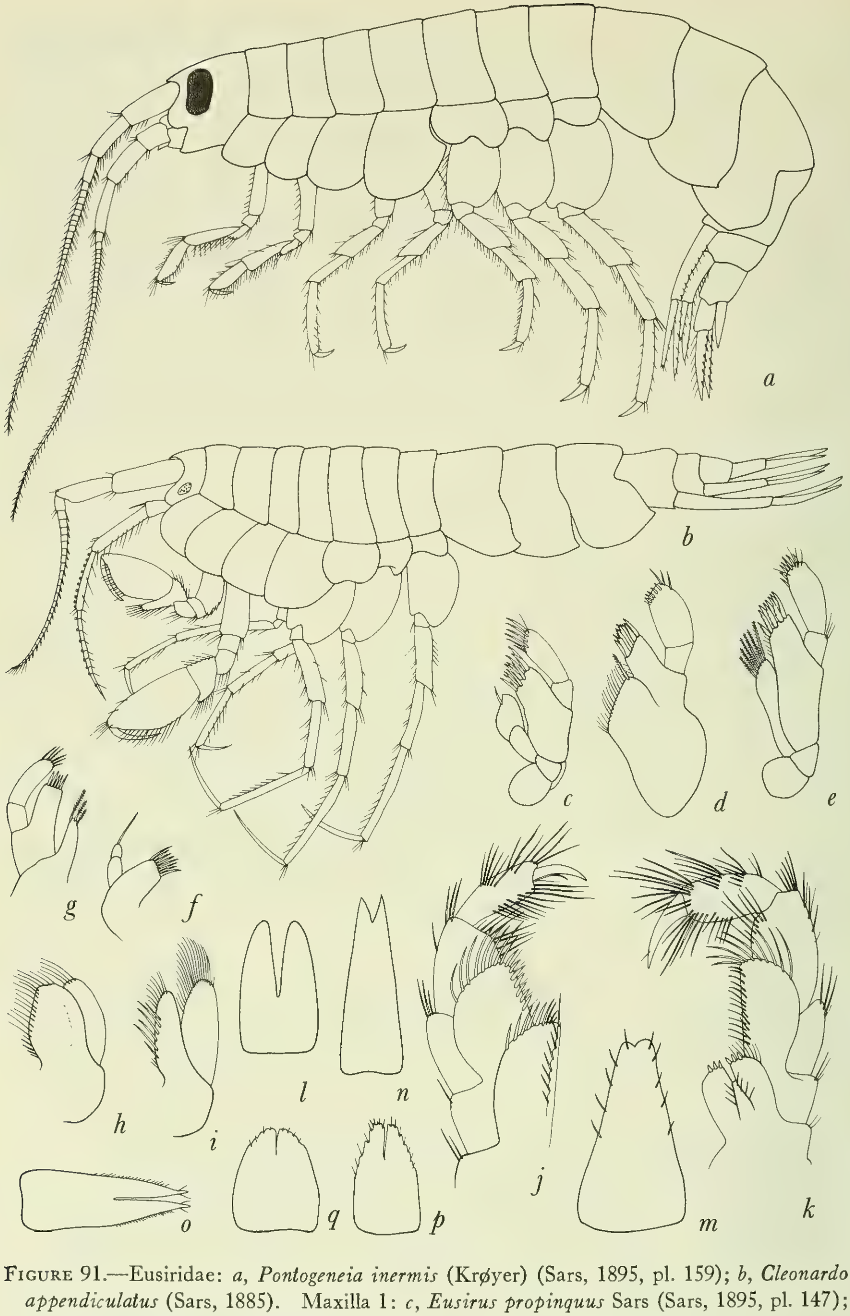

FIGURE 91.—Eusiridae: *a*, *Pontogeneia inermis* (Krøyer) (Sars, 1895, pl. 159); *b*, *Cleonardo appendiculatus* (Sars, 1885). Maxilla 1: *c*, *Eusirus propinquus* Sars (Sars, 1895, pl. 147); *d*, *Eurymera monticulosa* Pfeffer (Chevreux, 1906c); *e*, *Pontogeneia; f*, *Eusirella elegans* Chevreux (1908b); *g*, *Pseudomoera gabrieli* (Sayce, 1901). Maxilla 2: *h*, *Eusirus; i*, *Pontogeneia*. Maxillipeds: *j*, *Pontogeneia; k*, *Eusirus*. Telson: l, *Pontogeneia; m*, *Pontogeneoides abyssi* Nicholls (1938); *n*, *Eusirus minutus* Sars (1895, pl. 147); *o*, *Eusirus propinquus; p*, *Rozinante fragilis* Goës (Gurjanova, 1951); *q*, *Liouvillea oculata* Chevreux (1912b).

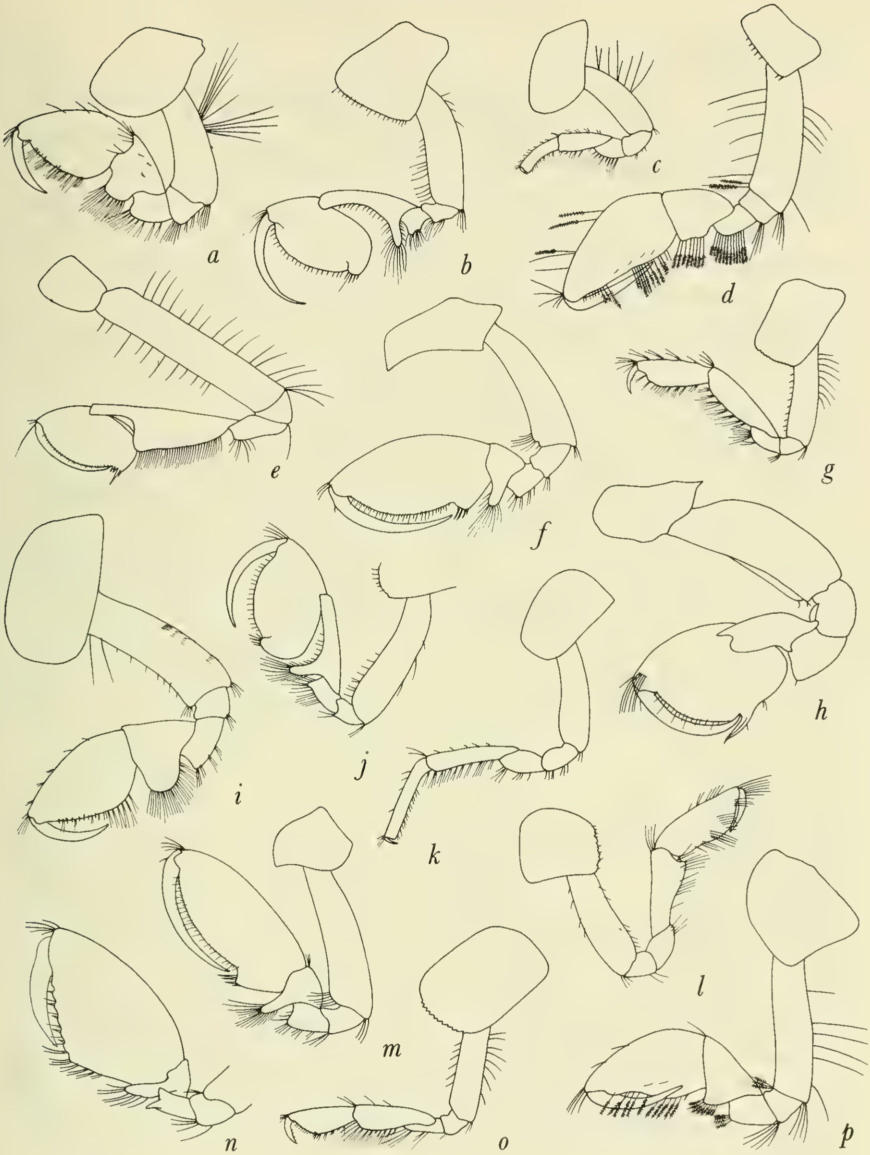

FIGURE 92.—Eusiridae: Gnathopod 1: *a*, *Bovallia gigantea* Pfeffer (Chevreux 1906c); *b*, *Eusirus propinquus* Sars (1895, pl. 147); *c*, *Djerboa furcipes* Chevreux (1906c); *d*, *Harcledo plumipes* (Birstein and Vinogradov, 1955); *e*, *Pareusirogenes carinatus* Birstein and Vinogradov (1955); *f*, *Rhachotropis aculeata* (Lepechin) (Sars, 1895, pl. 149); *g*, *Pontogeneia inermis* (Krøyer) (Sars, 1895, pl. 159); *h*, *Eusiropsis riisei* Stebbing (1897). Gnathopod 2: *i*, *Bovallia;* *j*, *Eusirus;* *k*, *Djerboa*; *l*, *Rozinante fragilis* (Goës) (Gurjanova, 1951); *m*, *Rhachotropis;* *n*, *Pontogeneoides abyssi* Nicholls (1938); *o*, *Pontogeneia;* *p*, *Harcledo.*

Atyloella Schellenberg

Atyloella Schellenberg, 1929a.

Type-species: *Atylopsis magellanicus* Stebbing, 1888 (monotypy).

Accessory flagellum articulate, short; lower lip with inner lobes; inner plate of maxilla 1 with four or five terminal and medial setae; gnathopods not eusirid, subchelate, article 5 not lobate, shorter than 6; pereopods 3–5 with each of articles 4–6 not longer than article 2; *postantennal cephalic angle acutely produced* (*Liouvillea*)*; epistome with anterior process.** Species: 3, antarctic, littoral (to 441 m).

*See footnote with *Meteusiroides* (p. 227).

Bathyschraderia Dahl

Bathyschraderia Dahl, 1959.

Type-species: *B. magnifica* Dahl, 1959 (monotypy).

Accessory flagellum very short but articulate; lower lip lacking inner lobes; inner plate of maxilla 1 densely furnished with terminal and medial setae; gnathopods not eusirid, scarcely subchelate, both articles 5 and 6 of both gnathopods elongate; [pereopods 3–5 not described for lengths of articles]; *pereopods 3–5 with a row of spines on convex side of dactyli, not present on pereopods 1–2* (*combining character and Djerboa*). Species: 1, Kermadec Trench, hadal.

Bovallia Pfeffer

Bovallia Pfeffer, 1888.—Stebbing, 1906.

Type-species: *B. gigantea* Pfeffer, 1888 (monotypy). See Chevreux, 1906b.

Accessory flagellum absent; lower lip lacking inner lobes; inner plate of maxilla 1 with numerous terminal setae and setae partially lining medial edge; gnathopods not eusirid, subchelate, article 5 strongly lobate, shorter than article 6; pereopods 3–5 with articles 4–6 each not longer than article 2; *coxa 4 deeply excavate posteriorly, upper lip rounded ventrally; telson cleft halfway; maxillipedal palp article 4 shorter than article 3* (*Dautzenbergia*). Species: 1, antarctic, littoral.

Cleonardo Stebbing

Cleonardo Stebbing, 1888; 1906.

Type-species: *C. longipes* Stebbing, 1888 (monotypy).

Accessory flagellum articulate, short; lower lip with inner lobes; inner plate of maxilla 1 with less than four terminal setae; gnathopods not eusirid, scarcely subchelate, article 5 strongly lobate, shorter than article 6; pereopods 3–5 with articles 4–6 each much longer than article 2; *body dorsally smooth* (*Rhachotropis*). Species: 7, N. Hemisphere largely, bathyal-abyssal, pelagic or ?demersal.

Cleonardopsis K. H. Barnard

Cleonardopsis K. H. Barnard, 1916.
Amathillopleustes Pirlot, 1934.

Type-species: *C. carinata* K. H. Barnard, 1916 (monotypy). Accessory flagellum articulate and long; lower lip with broad semifused inner lobes; maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 lobate, as long as article 6; pereopods 3–5 with articles 4–6 each not longer than article 2; *body carinate* (*Pseudomoera*). Possibly belongs in the Pleustidae because of the *lower lip*. Species: 1, probably cosmopolitan, bathypelagic.

Dautzenbergia Chevreux

Dautzenbergia Chevreux, 1900.

Type-species: *Amphithopsis grandimana* Chevreux, 1887 (monotypy).

Accessory flagellum absent; lower lip lacking inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 of gnathopod 2 with slender posterior lobe, article 6 in male very large, about 5 times as long as article 5; pereopods 3–5 with articles 4–6 each not longer than article 2; *coxa 4 scarcely excavate posteriorly, upper lip slightly incised, telson cleft one fifth, maxillipedal palp article 4 longer than article 3* (*Bovallia*). Species: 3, subarctic, N. Atlantic to ?Indian Ocean, bathyal to abyssal.

Djerboa Chevreux

Djerboa Chevreux, 1906b.

Type-species: *D. furcipes* Chevreux, 1906b (monotypy).

Accessory flagellum articulate, long; lower lip lacking inner lobes; inner plate of maxilla 1 densely lined with setae on medial edge; gnathopods not eusirid, subchelate, article 5 not lobate, on gnathopod 2 especially, both articles 5 and 6 greatly elongated and sublinear; pereopods 3–5 with articles 4–6 each not longer than article 2; *pereopods 1–5 with accessory spine on convex side of dactyli* (*combining character and Bathyschraderia*). Species: 1, antarctic, littoral.

Eurymera Pfeffer

Eurymera Pfeffer, 1888.—Stebbing, 1906.

Type-species: *E. monticulosa* Pfeffer, 1888 (monotypy). See Chevreux, 1906b.

Accessory flagellum absent; lower lip with inner lobes; inner plate of maxilla 1 densely lined with setae on medial edge; gnathopods not eusirid, subchelate, article 4 not lobate, slightly shorter than 6; pereopods 3–5 with articles 4–6 each not longer than article 2; *body umbonate.* Species: 1, antarctic, littoral.

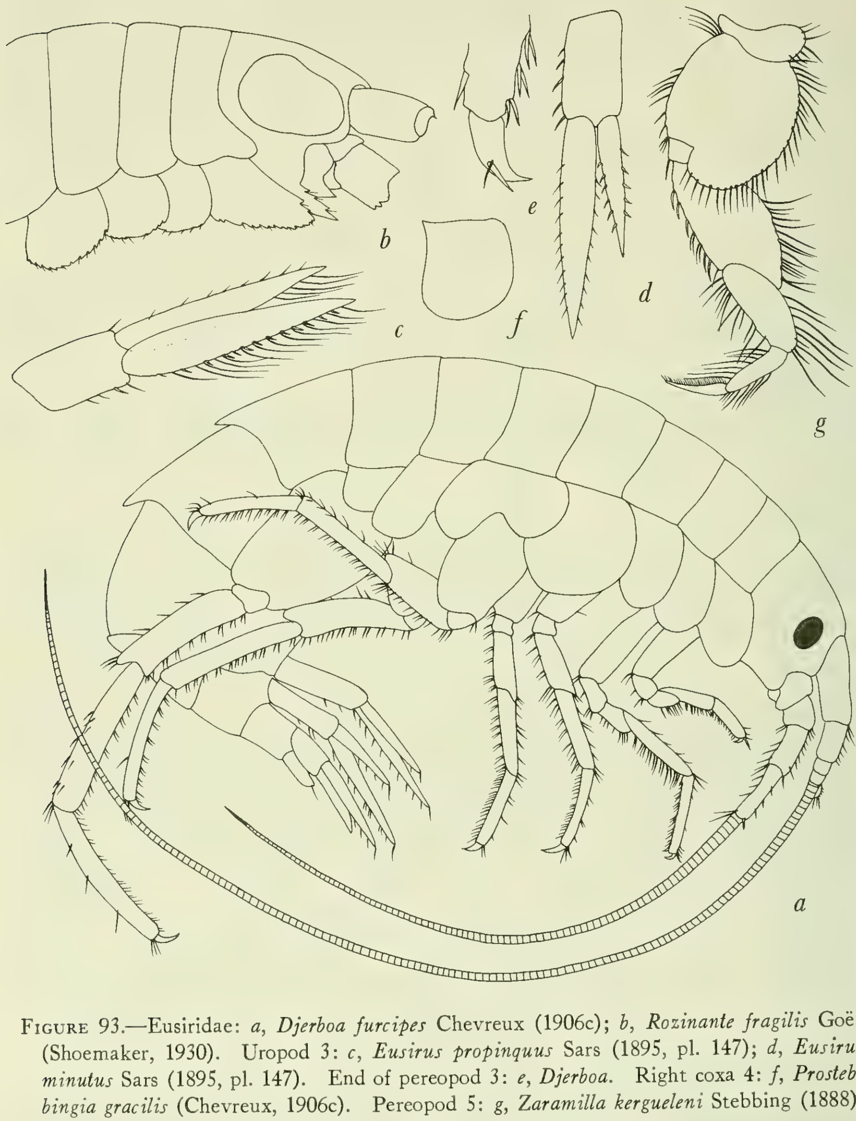

FIGURE 93.—Eusiridae: *a, Djerboa furcipes* Chevreux (1906c); *b, Rozinante fragilis* Goës (Shoemaker, 1930). Uropod 3: *c, Eusirus propinquus* Sars (1895, pl. 147); *d, Eusirus minutus* Sars (1895, pl. 147). End of pereopod 3: *e, Djerboa.* Right coxa 4: *f, Prostebbingia gracilis* (Chevreux, 1906c). Pereopod 5: *g, Zaramilla kergueleni* Stebbing (1888).

Eusirella Chevreux

Eusirella Chevreux, 1908b.

Type-species: *E. elegans* Chevreux, 1908b (original designation).

Accessory flagellum absent; *mandibular molar not triturative;* [lower lip unknown]; *palp of maxilla 1 short, article 1 much longer than article 2;* gnathopods not eusirid, scarcely subchelate but article 6 not fully linear, article 5 not or scarcely lobate, shorter than article 6; *pereopods 1 and 2 with article 6 bearing long plumose posterior setae;* pereopods 3–5 with articles 4–6 each longer than article 2. Species: 4, cosmopolitan, bathypelagic.

Eusirogenes Stebbing

Eusirogenes Stebbing, 1904.

Type-species: *E. dolichocarpus* Stebbing, 1904 (monotypy).

Accessory flagellum articulate, very long; lower lip with inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods eusirid, subchelate, articles 4–6 each not longer than article 2; *palp article 3 of mandible shorter than article 2 (Eusirus, Pareusirogenes); antennae lacking calceoli (Eusiropsis); article 6 of gnathopod 1 larger than that of gnathopod 2.* Species: 5, cosmopolitan (N. Hemisphere), bathypelagic.

Eusiroides Stebbing

Eusiroides Stebbing, 1888; 1906.

Type-species: *Atylus monoculoides* Haswell, 1880c (indicated by Della Valle, 1893, through erroneous synonymy and thus by synonymy of Stebbing, 1906, but firmly selected by Chevreux and Fage, 1925).

Accessory flagellum articulate, of medium size; lower lip with small inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 lobate, shorter than article 6, *palms armed with very stout spines;* pereopods 3–5 with articles 4–6 each not longer than article 2. Species: ca. 6, ?cosmopolitan, littoral to ?bathyal.

Eusiropsis Stebbing

Eusiropsis Stebbing, 1897; 1906.

Type-species: *E. riisei* Stebbing, 1897 (monotypy).

Accessory flagellum articulate, minute; *mandibular molar not triturative;* lower lip with inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods eusirid, articles 4–6 touching; pereopods 3–5 with articles 4–6 each much longer than article 2; *antennae with calceoli (Eusirus, Eusirogenes, Pareusirogenes).* Species: 1, S. Hemisphere (?cosmopolitan), bathypelagic.

Eusirus Krøyer

Eusirus Krøyer, 1845.—Stebbing, 1906.

Type-species: *E. cuspidatus* Krøyer, 1845 (monotypy). See Sars, 1895.

Accessory flagellum articulate, of medium size; lower lip with inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods eusirid, articles 4–6 not touching; pereopods 3–5 with articles 4–6 each not longer than article 2; *antennal calceoli absent* (*Eusiropsis*); *posterior border of gnathopod article 5 forming a projecting lobe much narrower than length of tapered distal end of article 5* (*Pareusirogenes*). Species: 17, bipolar and tropical submergent, primarily bathyal to abyssal.

Harcledo J. L. Barnard

Harcledo J. L. Barnard, 1964c.

Type-species: *Meteusiroides plumipes* Birstein and Vinogradov, 1955 (original designation). Birstein and Vinogradov (1964) synonymized *M. plumipes* with *M. curvidactyla* (Pirlot, 1934).

Accessory flagellum presumably absent; lower lip unknown, but presumably with inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, not distinctly subchelate, article 6 tapering and with article 7 folded back on its setose posterior edge, article 5 slightly lobate and shorter than 6; pereopods 3–5 with articles 4–6 each much longer than article 2. Species: 1, N. W. Pacific, ?3500 m (has eyes), possibly epipelagic.

Harpinioidella Schellenberg

Harpinioidella Schellenberg, 1926a.

Type-species: *H. fissicauda* Schellenberg, 1926a (monotypy).

[Accessory flagellum unknown]; lower lip with inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, simple, article 6 long, bent distally, article 5 much shorter than 6, apparently lobate; [pereopods 3–5 unknown]. Species: 1, antarctic to S. Atlantic, bathyal to ?abyssal (4,893 m), possibly bathypelagic.

Liouvillea Chevreux

Liouvillea Chevreux, 1911c; 1912a; 1912b.

Type-species: *L. oculata* Chevreux, 1912a (designated by Chevreux); 1912b.

Accessory flagellum articulate, short; lower lip with inner lobes; inner plate of maxilla 1 densely lined with setae on medial edge;

gnathopods not eusirid, subchelate, article 5 nearly as long as 6, not lobate; pereopods 3–5 with articles 4–6 each not longer than article 2; *postantennal cephalic angle presumably rounded* (*Atyloella*); *rostrum reaching end of article 1 of antenna 1* (*Paramoera*). Species: 1, antarctic, littoral.

Meteusiroides Pirlot

Meteusiroides Pirlot, 1934.

Type-species: *M. keyensis* Pirlot, 1934 (original designation).

Accessory flagellum absent; lower lip with large inner lobes, *outer lobes very widely spread* (*Pontogeneia*)*; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 lobate, shorter than article 6; pereopods 3–5 with articles 4–6 each not longer than article 2. Species: 2, Indonesia, N. Atlantic, bathyal to abyssal.

*Apparently inner lobes shown by Pirlot (1934), are horizontal basal processes unnaturally flattened and outer lobes therefore excessively spread; small inner lobes present as in *Pontogeneia;* information from antarctic individual of *Meteusiroides* (possible new species in colls. of El Tanin expeds.). *Meteusiroides* has telson extending 3/4 along rami of uropod 3, whereas telson of *Pontogeneia* extends only 1/3 along rami of uropod 3. Also *Meteusiriodes* has small adze-shaped process on epistome and might be confused with *Atyloella.*

Paramoera Miers

Paramoera Miers, 1875.—Stebbing, 1906 (in part, not *Atyloides* Stebbing, 1888).—Schellenberg, 1929a.—K. H. Barnard, 1932.
Stebbingia Pfeffer, 1888.
Aucklandia Walker, 1908.

Type-species: *Amphithoe fissicauda* Dana, 1852a (monotypy and subsequent synonymy). See Schellenberg, 1931; *Atyloides australis* and *A. assimilis* Stebbing, 1888.

Accessory flagellum articulate, of medium length; lower lip with inner lobes indistinct or absent; inner plate of maxilla 1 densely setose along medial edge; gnathopods not eusirid, subchelate, article 5 not lobate, shorter than article 6; pereopods 3–5 with articles 4–6 each not longer than article 2; *rostrum inconspicuous* (*Liouvillea*). Species: 28, bipolar, coldwater, littoral.

Pareusirogenes Birstein and Vinogradov

Pareusirogenes Birstein and Vinogradov, 1955.

Type-species: *P. carinatus* Birstein and Vinogradov, 1955 (original designation).

Accessory flagellum absent; lower lip with inner lobes; inner plate of maxilla 1 with four or fewer terminal setae, hairy along medial edge;

gnathopods eusirid, articles 4–6 not touching; pereopods 3–5 with articles 4–6 each much longer than article 2; *antennal calceoli absent* (*Eusiropsis*); *posterior border of gnathopodal article 5 formed of a broad, setose lobe, its width greater than tapered distal end of article 5* (*Eusirus*). Species: 1, N.W. Pacific, abyssopelagic.

Pontogeneia Boeck

Pontogeneia Boeck, 1871.—Stebbing, 1906.

Type-species: *Amphithoe inermis* Krøyer, 1838 (monotypy). See Sars, 1895.

Accessory flagellum absent; lower lip with small inner lobes; inner plate of maxilla 1 with four or more terminal or subterminal setae; gnathopods not eusirid, article 5 not lobate, slightly longer than article 6; pereopods 3–5 with articles 4–6 each not longer than article 2, *article 4 slender* (*Zaramilla*); *outer lobes of lower lip not broadly separated* (*Meteusiroides*). Species: 25, cosmopolitan, littoral.

Pontogeneiella Schellenberg

Pontogeneiella Schellenberg, 1929a.

Type-species: *Atyloides brevicornis* Chevreux, 1906a, 1906b (present selection).

Accessory flagellum absent; lower lip with inner lobes; inner plate of maxilla 1 densely lined with setae on medial edge; gnathopods not eusirid, subchelate, article 5 not lobate, nearly as long as article 6; pereopods 3–5 with articles 4–6 each not longer than article 2, *article 4 one third as wide as article 2* (*Zaramilla*); *antennae subequal, coxa 4 strongly excavate posteriorly* (*Prostebbingia*). Species: 2, antarctic, littoral.

Pontogeneoides Nicholls

Pontogeneoides Nicholls, 1938.

Type-species: *P. abyssi* Nicholls, 1938 (original designation).

Accessory flagellum articulate, short; lower lip with small inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 lobate on gnathopod 2, shorter than article 6, pereopods unknown; *telson minutely notched*. Species: 2, antarctic, bathyal (480–1,590 m).

Prostebbingia Schellenberg

Prostebbingia Schellenberg, 1926a.

Type-species: *Stebbingia gracilis* Chevreux, 1912a, 1912b (present selection).

Accessory flagellum absent; lower lip with inner lobes; inner plate of maxilla 1 densely lined with setae on medial edge; gnathopods not eusirid, subchelate, article 5 not lobate, slightly shorter than article 6; pereopods 3–5 with articles 4–6 each not longer than article 2; *antenna 1 longer than antenna 2, coxa 4 scarcely excavate posteriorly* (*combining character*). Species: 2, antarctic, littoral (to 400 m).

Pseudomoera Schellenberg

Pseudomoera Schellenberg, 1929a.

Type-species: *Atyloides gabrieli* Sayce, 1901 (monotypy).

Accessory flagellum articulate, of medium length; lower lip with inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 lobate, equal to article 6 in length, *5 slightly broader than 6* (*Accedomoera*); pereopods 3–5 with articles 4–6 each not longer than article 2; *body smooth* (*Cleonardopsis*). Species: 1, Australia, freshwater.

Pseudopontogeneia Oldevig

Pseudopontogeneia Oldevig, 1959.

Type-species: *P. intermedia* Oldevig, 1959 (monotypy).

[Accessory flagellum and lower lip not described]; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods [not distinctly described]; article 6 longer than 5; pereopods 3–5 with articles 4–6 each not longer than article 2. Species: 1, Bering Island, littoral.

Rhachotropis Smith

Tritropis Boeck, 1871 (homonym, Reptilia).
Rhachotropis Smith, 1883 (new name).—Stebbing, 1906.—Shoemaker, 1930.
Gracilipes Holmes, 1908.

Type-species: *Oniscus aculeatus* Lepechin, 1780 (monotypy). See Sars, 1895.

Accessory flagellum *2-articulate*, short; lower lip with small inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 lobate, shorter than article 6; pereopods 3–5 with articles 4–6 each longer than article 2; *body carinate or toothed* (*Cleonardo*). Species: 30, bipolar, tropical submergents, primarily bathyal-abyssal.

Ronco J. L. Barnard

Ronco J. L. Barnard, 1965.

Type-species: *R. sosa* J. L. Barnard, 1965 (original designation).

Accessory flagellum articulate, of medium length; *upper lip bilobate;* lower lip with inner lobes; inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 lobate, shorter than article 6; pereopods 3–5 with articles 4–6 each not longer than article 2. Species: 1, Micronesia, littoral.

Rozinante Stebbing

Rozinante Stebbing, 1894; 1906.

Type-species: *Paramphithoë fragilis* Goës, 1866 (original designation). See Shoemaker, 1930.

Accessory flagellum absent; lower lip with inner lobes obsolete (examined by me); inner plate of maxilla 1 with four or fewer terminal setae; gnathopods not eusirid, subchelate, article 5 not lobate, equal to or slightly longer than article 6; pereopods 3–5 with articles 5–6 (not article 4) each longer than article 2 (examined by me); *anteroventral cephalic corner with large tooth projecting forward to end of small rostrum, coxa 1 produced forward to anterior edge of eye.* Species: 1, arctic-boreal, N. Atlantic, littoral (to 372 m).

Schraderia Pfeffer

Schraderia Pfeffer, 1888.—Stebbing, 1906.—K. H. Barnard, 1932.
Atyloides Stebbing, 1888.

Type-species: *S. gracilis* Pfeffer, 1888 (monotypy).

Accessory flagellum articulate, of medium length; lower lip lacking inner lobes; inner plate of maxilla 1 densely lined with setae along medial edge; gnathopods not eusirid, subchelate, article 5 not lobate, equal to article 6 in length, in gnathopod 2 especially articles 5–6 greatly elongate and sublinear; pereopods 3–5 with articles 4–6 each not longer than article 2. Species: 2, antarctic, littoral.

Zaramilla Stebbing

Zaramilla Stebbing, 1888; 1906.

Type-species: *Z. kergueleni* Stebbing, 1888 (monotypy).

Accessory flagellum absent; lower lip with scarcely discrete inner lobes; inner plate of maxilla 1 densely lined with setae on medial edge; gnathopods not eusirid, subchelate, article 5 not lobate, slightly longer than article 6; pereopods 3–5 with articles 4–6 each not longer than article 2, *article 4 broadly expanded (especially Bovallia and Pontogeneia), article 4 two thirds as wide as article 2 (Pontogeneiella); antennae subequal in length, coxa 4 strongly excavate posteriorly (Prostebbingia); dactyli of pereopods 3–4 as long as article 6, pereopods resembling those of oedicerotids (combining character).* Species: 1, Kerguelen, littoral. Probably referrable to Haustoriidae and included in that family key (p. 252); absence of accessory flagellum in contrast to Haustoriidae.

Marine Gammaridae

FIGURES 94–96

DIAGNOSIS.—Like the basic gammaridean, from which all other diagnoses in this paper are used to distinguish families, but accessory flagellum occasionally reduced to one long article, maxillipedal palp occasionally 3-articulate, gnathopod 1 rarely larger than 2, telson occasionally uncleft, inner ramus of uropod 3 reduced, coxae 1–4 rarely of nonuniform shape, coxa 4 occasionally not posteriorly excavate and pereopod 5 rarely elongate.

DESCRIPTION.—The Gammaridae are variable and many genera form links to other families. Accessory flagellum always present but varying from one long article to more than 20 short articles; peduncle of antenna 1 elongate; rostrum present or absent; upper lip not incised; mandible always bearing strong triturative molar and 3-articulate palp; lower lips variable, never ampithoid or pleustid in structure; maxillae fully developed, not strikingly foliaceous; palp of first maxilla 2-articulate; maxillipeds with well-developed plates, palp 3- or 4-articulate; gnathopods usually powerful and subchelate, occasionally slender and simple, gnathopod 1 rarely larger than 2; coxae of medium length, occasionally shortened; coxa 4 occasionally not excavate posteriorly; uropod 3 highly variable but rami never shorter than peduncle (except *Parapherusa*, *Falklandella*, and *Gammarella*) and usually flattened, not cylindrical, generally lanceolate, foliaceous or subquadrate, inner ramus occasionally very short; telson not elongate (except *Parapherusa*), usually deeply cleft but occasionally broader than long, uncleft or emarginate.

RELATIONSHIPS.—Gammaridae are difficult to define precisely because so many genera have exceptional morphology. Four of the genera have uncleft telsons and thus resemble Calliopiidae but all have well-developed accessory flagella. They may also resemble some of the isaeid-like families but their telsons are not fleshy (not thickened dorsoventrally). The most difficult member of this quartet is *Parapherusa* Stebbing which confounds all possible simplifications made in the keys and diagnoses of families and genera. The unique species of this genus has a third uropod resemblnig that of ischyrocerids or ampithoids (fig. 96d), unexcavate coxa 4, and its telson is entire but elongate, uropod 1 has a ventrodistal peduncular tooth like that of various ischyrocerids and isaeids. The absence of pereopodal glands apparently demonstrates its correct assignment to the Gammaridae, rather than to the glandular families. The other marine gammarid genera with uncleft telson have deep posterior excavations on coxa 4 and thus cannot be confused with isaeid-like genera. One ischyrocerid, *Bathyphotis*, however, has a strongly excavate coxa 4 and has a special

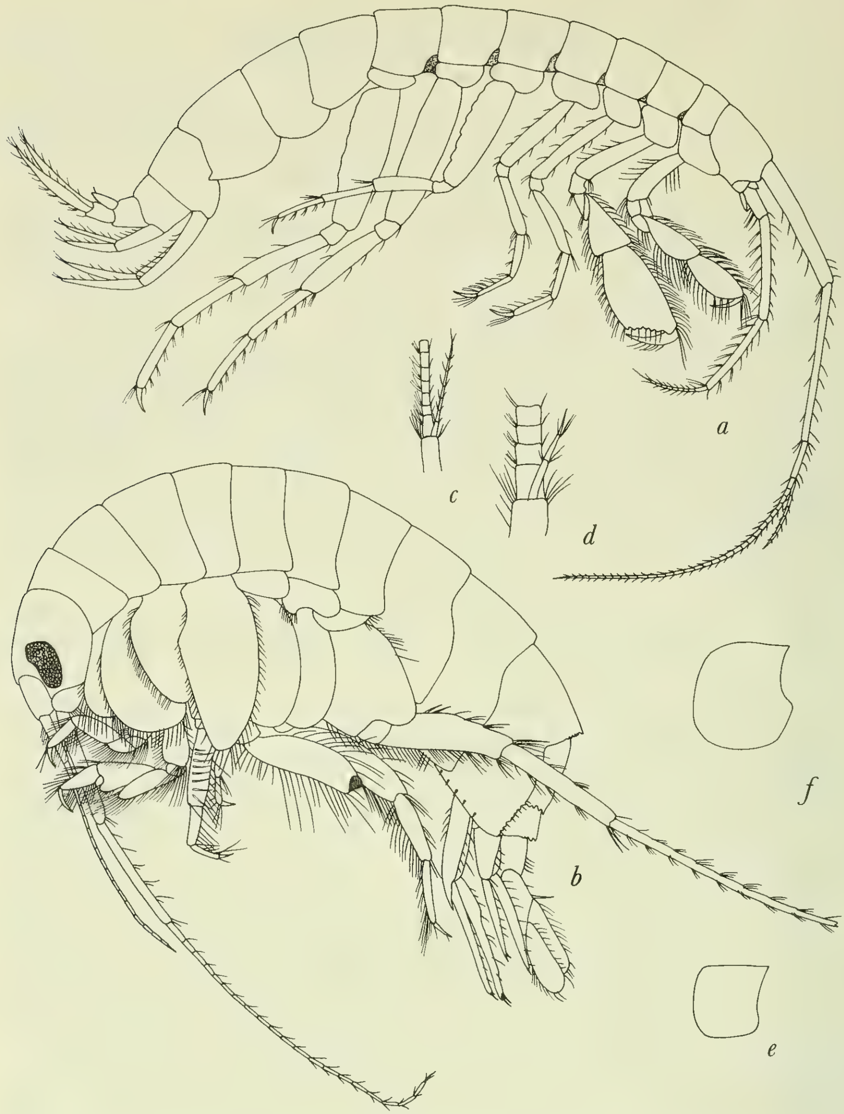

FIGURE 94.—Gammaridae: *a*, *Maera loveni* (Bruzelius) (Sars, 1895, pl. 182); *b*, *Megaluropus ?longimerus* Schellenberg (J. L. Barnard, 1962b). Accessory flagella: *c*, *Marinogammarus marinus* (Leach) (Sars, 1895, pl. 175); *d*, *Elasmopus rapax* Costa (Sars, 1895, pl. 183). Coxa 4: *e*, *Maera othonis* (Milne Edwards) (Sars, 1895, pl. 182); *f*, *Gammarellus homari* (Fabricius) (Sars, 1895, pl. 172).

place in Gammaridea Family Key A (p. 109). Its uropod 3 is even more typically that of an ischyrocerid than is uropod 3 of *Parapherusa*.

Another 13 genera of Gammaridae (in couplets 6–18) have vestigial accessory flagella and cleft telsons and thus resemble Eusiridae. All Eusiridae except *Eusirogenes* Stebbing have elongate telsons and that genus is easily recognizable as a eusirid in its gnathopodal morphology. Eusiridae also have slightly enlarged metasomal segments, the metasome having the length of 6 pereonal segments, whereas gammarids have a metasome the length of only 5 pereonal segments. This is a

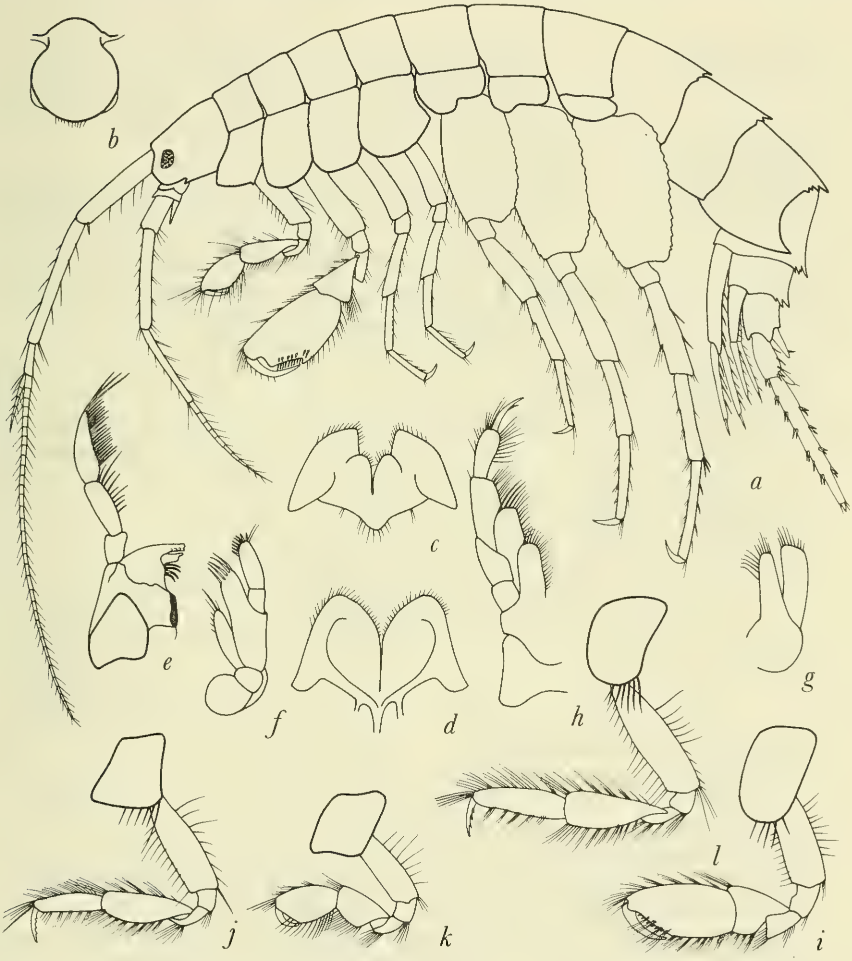

FIGURE 95.—Gammaridae: *a*, *Melita dentata* (Krøyer) (Sars, 1895, pl. 181). Mouthparts of *Elasmopus rapax* Costa (Sars, 1895, pl. 183): *b*, upper lip; *c*, lower lip; *e*, mandible; *f*,*g*, maxillae 1, 2; *h*, maxilliped. Lower lip: *d*, *Gammarellus homari* (Fabricius) (Sars, 1895, pl. 172). Gnathopod 2: *i*, *Elasmopus*; *j*, *Cheirocratus sundevalli* (Rathke) (Sars, 1895, pl. 184). Gnathopod 1: *k*, *Elasmopus*; *l*, *Cheirocratus*.

difficult character analysis to practice however, and one must use simply a process of elimination by checking generic keys and diagnoses in both families for genera which are not obviously gammarid or eusirid. Five of the genera in couplets 6–18 have reduced inner rami of uropod 3 (melita-like uropod 3) and thus are easily eliminated from consideration as eusirids, for in the latter family, the inner ramus of uropod 3 is always as long as or longer than the outer.

Key to the Genera of Marine Gammaridae

Only those genera of Gammaridae with marine representatives are included in this key (except *Falklandella*). Some generic pairs, such as *Maeropsis-Paraceradocus* and *Ceradocus-Ceradocoides* have not been separated by firm distinctions. Other genera are cited twice in the key because of their intergrading or variable structures.

One must pursue both pathways in couplet 6 if the species at hand has three accessory flagellar articles. Since other characters are as variable as accessory flagella and more often poorly known, couplet 6 has been found to be more satisfactory than conceivable substitutes until some of the poorly described genera are clarified.

1. Telson entire (fig. 96*g*) but often emarginate 2
   Telson cleft (fig. 96*h*) 6
2. Urosomal segments with bundles of dorsal spines, metasomites with deep serrations on posterodorsal margins . . . . **Mesogammarus**
   Urosomal segments lacking dorsal bundles of spines, metasome lacking serrations but often with carinae 3
3. Rami of uropod 3 at least 1.5 times as long as peduncle 4
   Rami of uropod 3 equal to or shorter than peduncle 5
4. Body dorsally carinate (even weakly), article 3 of mandibular palp shorter than article 2, lower lip without inner lobes . . . . . . **Gammarellus**[1]
   Body dorsally smooth, article 3 of mandibular palp longer than article 2, lower lip with inner lobes . . . . **Weyprechtia**
5. Accessory flagellum 1-articulate, telson broader than long, emarginate, lower lip without inner lobes, coxa 4 posteriorly excavate . . . **Falklandella**
   Accessory flagellum 8-articulate or more, telson longer than broad, not emarginate, lower lip with strong inner lobes, coxa 4 not excavate posteriorly . . . . **Parapherusa**
6. Accessory flagellum 1- or 2-articulate, occasionally 3 7
   Accessory flagellum 4- or more articulate, occasionally 3 19
7. Inner ramus of uropod 3 scale-like and much smaller than outer (fig. 96*f*) . 8
   Inner ramus of uropod 3 nearly as large as outer 12
8. Apex of uropod 3 not exceeding extent of uropods 1–2 (fig. 96*a*) . **Melitoides**
   Apex of uropod 3 greatly exceeding extent of uropods 1–2 9
9. One or more of coxae 1–4 very distinctly longer (almost twice) than coxae 5–7 . . . . **Melita**
   All coxae subequal in length, very short 10

[1] *Gammaracanthus* has a telson broader than long but so deeply emarginate as to be considered cleft.

10. Maxilla 2, medial edge of inner plate lined with setae (fig. 95*g*), article 2 of outer ramus of uropod 3 subequal to article 1 in length (fig. 96*f*) . **Eriopisa**
Maxilla 2, medial edge of inner plate unarmed, article 2 of outer ramus of uropod 3 much shorter than article 1 or absent 11
11. Outer ramus of uropod 3 biarticulate . . . . **Eriopisella**
Outer ramus of uropod 3 uniarticulate . . . . **Netamelita**
12. Rami of uropod 3 foliaceous, oval, apically rounded (fig. 96*e*), either coxa 2 or 3 much shorter than coxa 1 . . . . **Megaluropus**
Rami of uropod 3 lanceolate, or apices truncate (figs. 96*b*,*d*), *not* foliaceous, coxae 2–3 as long as coxa 1 13
13. Mandibular palp article 2 shorter than article 1 . . . . . **Parelasmopus**
Mandibular palp article 2 equal to or longer than article 1 14
14. Gnathopod 1 subchelate 15
Gnathopod 1 simple (fig. 95*j*) 17
15. Inner plate of maxilla 1 poorly setose (2–5 setae) . . . . . **Elasmopus**
Inner plate of maxilla 1 densely setose (11 setae) 16
16. Uropod 3 strongly exceeding uropod 1, outer ramus 2-articulate. **Liagoceradocus**
Uropod 3 not exceeding uropod 1, outer ramus 1-articulate . **Anelasmopus**[2]
17. Female gnathopod 2 simple (fig. 95*l*) . . . . **Cheirocratus**
Female gnathopod 2 subchelate 18
18. Antenna 1 nearly as long as antenna 2 . . . . **Cheirocratella**
Antenna 1 reaching only to end of peduncle of antenna 2 . . . . . **Casco**
19. All pereonites carinate . . . . **Gammaracanthus**
Pereonites not carinate, or occasionally numbers 6–7 are carinate . . . 20
20. Urosome with two or three segments bearing bundles or rows of articulate spines 21
Urosome occasionally with scattered spines not on all segments and not arranged in bundles, spines usually absent 26
21. Some segments anterior to pleonite 4 bearing dorsal articulate spines. "echinogammarus" members of **Anisogammarus**
No segments anterior to pleonite 4 bearing dorsal articulate spines (occasionally bearing teeth or serrations) 22
22. Metasome with posterodorsal teeth and/or serrations 23
Metasome lacking posterodorsal teeth and serrations 25
23. Telsonic apices quadrate, lobes closely appressed and separated by a slit. **Maerella**
Telsonic apices subacute, lobes gaping 24
24. Metasomites with a single dorsoposterior tooth. **"Marine Carinate Gammarus"**
Metasomites multiserrate dorsoposteriorly . . . . **Mesogammarus**
25. Gnathopod 1 slightly larger than 2, both gnathopodal palms bearing two or more chisel-shaped spines in rows . . . . **Anisogammarus**
Gnathopod 1 smaller than or equal to 2, palms bearing one or no chisel-shaped spines . . . . **Gammarus**
26. Inner ramus of uropod 3 scale-like, very small (fig. 96*f*) 27
Inner ramus of uropod 3 nearly as long as outer 28
27. Uropod 3 strongly exceeding apex of uropod 1 . . . . **Melita**
Uropod 3 not exceeding apex of uropod 1 . . . . **Melitoides**
28. Rami of uropod 3 foliaceous, oval, apices rounded (fig. 96*e*) 29
Rami of uropod 3 lanceolate, square, or apices truncate or pointed . . . 30

[2] Not clearly described. See diagnoses. *Hornellia* Walker resembles *Anelasmopus* but the inner plate of maxilla 1 has not been described.

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29. Eyes four in number; inner plate of maxilla 1 with medial edge fully lined with setae . . . . **Quadrivisio**
    Eyes two in number; inner plate of maxilla 1 with only terminal setae. **Paraceradocus**
30. Maxilla 2, medial edge of inner plate not lined with setae 31
    Maxilla 2, medial edge of inner plate lined with setae 33
31. Palp of maxilliped with three articles . . . . **Maerella**
    Palp of maxilliped with four articles 32
32. Mandibular palp article 3 stout, falcate (fig. 95*e*) . . . . . . **Elasmopus**
    Mandibular palp article 3 slender, not falcate . . . . **Maera**
33. Palm and posterior margin of article 6 on gnathopod 2 not distinct from one another (fig. 95*l*), article 7 of gnathopod 2 nearly as long as article 6, rami of uropod 3 equal to peduncle in length . . . . . . **Gammarella**
    These characters not combined 34
34. Lower lip lacking inner lobes 35
    Lower lip bearing inner lobes (presumptive in *Ceradocoides* and *Maeracunha*) 36
35. Mandibular palp article 3 naked on medial edge, dactyl of maxilliped about 75% as long as article 3, claw-shaped, coxa 4 not excavate posteriorly. **Ceradocopsis**
    Mandibular palp article 3 setose medially, dactyl of maxilliped 25% as long as article 3, setose, coxa 4 excavate posteriorly . . . . **Bathyceradocus**
36. Maxilla 1, medial edge of inner lobe not lined with setae 37
    Maxilla 1, medial edge of inner lobe lined with setae 38
37. Outer ramus of uropod 3 bearing minute article 2 . . . . . **Maeracunha**
    Outer ramus of uropod 3 lacking article 2 . . . . **Maeropsis**
38. Uropod 3 with 2-articulate outer ramus 39
    Uropod 3 with 1-articulate outer ramus 40
39. Mandibular palp article 3 subequal to article 1, bearing only two setae. **Maeracunha**
    Mandibular palp article 3 slightly longer than article 1, multisetose. **Metaceradocoides**
40. Male gnathopod 2 very small and slender . . . . **Metaceradocus**
    Male gnathopod 2 enlarged (fig. 95*a*). 41
41. Mandibular palp article 3 as long as article 2, slightly sickle-shaped, article 1 simple . . . . **Elasmopoides**
    Mandibular palp article 3 less than 75% and generally half or less as long as article 2, article 1 with distomedial process or spines. **Ceradocus** and **Ceradocoides** [3]

[3] Not clearly described.

Genera of Marine Gammaridae

The term "NORMAL GNATHOPODS" indicates that both pairs of gnathopods are subchelate and gnathopod 2 is larger than 1 in the male.

Anelasmopus Oliveira

Anelasmopus Oliveira, 1953.

Type-species: *A. kraui* Oliveira, 1953 (monotypy).

Accessory flagellum 2-articulate; lower lip [unclear], apparently with inner lobes; inner plate of maxilla 1 densely setose (11 setae), inner plate of maxilla 2 setose partially on medial edge; gnathopods normal; uropod 3 short, not exceeding uropod 1, rami short, rectangular, inner slightly shorter than outer, outer 1-articulate; telson deeply cleft; body lacking dorsal carinae, teeth or spines. Species: 1, Brazil, littoral.

Anisogammarus Dershavin

Anisogammarus Dershavin, 1927.—Gurjanova, 1951.
Eogammarus Birstein, 1933 [a valid subgenus].

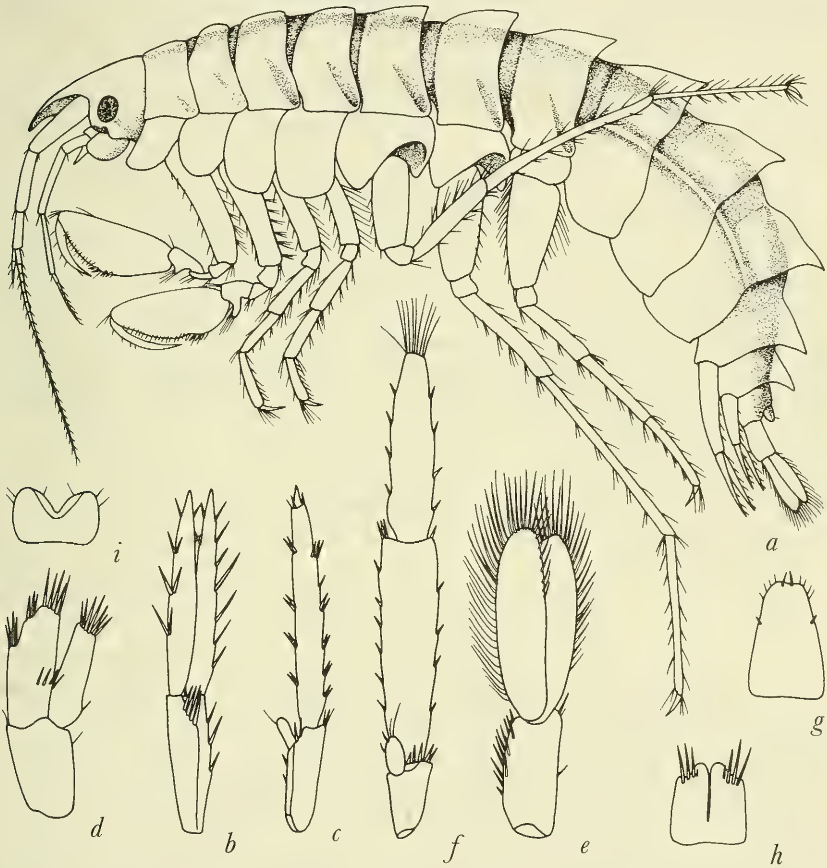

FIGURE 96.—Gammaridae: *a*, *Gammaracanthus loricatus* (Sabine) (Sars, 1895, pl. 174, as *G. relictus*). Uropod 3: *b*, *Cheirocratus sundevalli* (Rathke) (Sars, 1895, pl. 184); *c*, *Melita dentata* (Krøyer) (Sars, 1895, pl. 181); *d*, *Elasmopus rapax* Costa (Sars, 1895, pl. 183); *e*, *Gammaracanthus*; *f*, *Eriopisa elongata* (Bruzelius) (Sars, 1895, pl. 181). Telson: *g*, *Gammarellus homari* (Fabricius) (Sars, 1895, pl. 172); *h*, *Elasmopus*; *i*, *Gammaracanthus*.

Type-species: *Gammarus pugettensis* Dana, 1853 (monotypy and subsequent synonymy). See J. L. Barnard, 1954.

Accessory flagellum more than 3-articulate; lower lip with small or obsolete inner lobes; inner plates of maxillae both densely setose medially; gnathopod 1 slightly larger than 2, *palms bearing many chisel-shaped spines;* uropod 3 exceeding uropod 1, outer ramus long, 2-articulate (? rarely 1-articulate), inner ramus long or very short; telson deeply cleft; urosome and occasionally metasome armed with dorsal bundles of spines, except one species [type of *Anisogammarus*] having a tooth on urosomite 2 instead of spines. Species: 18, boreal Pacific, littoral and freshwater. Includes former marine members of *Echinogammarus*. Possibly this genus divisible into 4 subgenera.

Bathyceradocus Pirlot

Bathyceradocus Pirlot, 1934

Type-species: *B. stephenseni* Pirlot, 1934 (original designation).

Accessory flagellum multiarticulate; lower lip lacking inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods small, subchelate, slender; uropod 3 exceeding uropod 1, rami of medium length, subequal, broadly lanceolate, outer 1-articulate; telson deeply cleft; metasome and urosome toothed and carinate, urosome with scattered dorsal spines; *palp article 4 of maxilliped short, blunt, apically setose* (*Metaceradocoides*). Species: 1, Indo-Pacific, bathyal-abyssal (1,165–4,930 m).

Casco Shoemaker

Casco Shoemaker, 1930.

Type-species: *Cheirocratus bigelowi* Blake, 1929 (original designation).

Accessory flagellum 2-articulate; lower lip with inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopod 1 essentially simple, but dactyl large and folded back on article 6, gnathopod 2 slightly larger than 1 and slightly subchelate; uropod 3 exceeding uropod 1, rami subequal, long, lanceolate, outer 1-articulate; telson deeply cleft; urosome with a tooth and scattered spines; *antenna 1 reaching only to end of peduncle of antenna 2* (*Cheirocratella*)*; antero-ventral corner of head strongly produced.* Species: 1, boreal W. Atlantic, littoral.

Ceradocoides Nicholls

Ceradocoides Nicholls, 1938.

Type-species: *C. chiltoni* Nicholls, 1938 (original designation).

Accessory flagellum more than 4-articulate; [lower lip unknown]; inner plates of maxillae 1–2 densely setose medially; gnathopods apparently normal; uropod 3 not exceeding uropod 1, rami equal, lanceolate [outer ramus articles not described]; telson cleft shortly; body lacking dorsal teeth or spines (distinctions from *Ceradocus* by Nicholls, 1938, unclear). Species: 1, antarctic (420 m).

Ceradocopsis Schellenberg

Ceradocopsis Schellenberg, 1926a.

Type-species: *C. kergueleni* Schellenberg, 1926a (monotypy).

Accessory flagellum more than 4-articulate; lower lip lacking inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods normal; uropod 3 not exceeding uropod 1, rami equal, short, outer 2-articulate; telson deeply cleft; body lacking dorsal teeth or spines. Species: 1, Kerguelen Island, littoral.

Ceradocus Costa

Ceradocus Costa, 1853c, 1857.—Stebbing, 1906.

Type-species: *C. orchestiipes* Costa, 1853c (monotypy). See Chevreux and Fage, 1925.

Accessory flagellum 3- or more articulate; lower lip with inner lobes; inner plate of maxilla 1 densely setose medially, of maxilla 2 moderately to strongly setose medially; gnathopods normal; uropod 3 exceeding uropod 1, rami equal, lanceolate, broad or slender, outer 1-articulate; telson deeply cleft; *palp article 3 of mandible half as long as article 2* (*Metaceradocus*, *Elasmopoides*), *article 1 of palp with medial process or spines or cusp.* Species: 18, cosmopolitan, littoral (and 3 bathyal).

Cheirocratella Stephensen

Cheirocratella Stephensen, 1940.

Type-species: *C. thori* Stephensen, 1940 (original designation).

Accessory flagellum 2-articulate; [lower lip unknown]; inner plates of maxillae 1–2 apparently densely setose medially; gnathopod 1 simple; gnathopod 2 larger and subchelate (only female is known); [uropod 3 unknown]; telson deeply cleft; metasomal and urosomal segments dorsally toothed, urosome with scattered spines; *antennae subequal in length* (*Casco*). Species: 1, Iceland, littoral.

Cheirocratus Norman

Cheirocratus Norman, 1867a.—Stebbing, 1906.

Type-species: *Gammarus assimilis* Liljeborg, 1851 (monotypy and subsequent synonymy). See Sars, 1895.

Accessory flagellum 2-, occasionally 3-articulate; lower lip with inner lobes; inner plates of maxillae 1–2 densely setose medially; female gnathopods simple, slender, male gnathopod 1 simple, male gnathopod 2 powerfully subchelate; uropod 3 exceeding uropod 1, rami equal, lanceolate, outer 1-articulate; telson deeply cleft; urosome with dorsal teeth and setae. Species: 4, boreal N.E. Atlantic, littoral.

Elasmopoides Stebbing

Elasmopoides Stebbing, 1908b.

Type-species: *E. chevreuxi* Stebbing, 1908b (monotypy).

Accessory flagellum exceeding 20 articles; lower lip with inner lobes; inner plate of maxilla 1 densely setose medially, of maxilla 2 moderately to strongly setose medially; gnathopods normal; uropod 3 not exceeding uropod 1, rami equal, broad, outer 1-articulate; telson deeply cleft, lobes separated basally; *palp article 3 of mandible as long as article 2 and slightly sickle-shaped; article 1 simple* (*Ceradocus*). Species: 1, S. Africa, sublittoral.

Elasmopus Costa

Elasmopus Costa, 1853c, 1857.—Stebbing, 1906.
Neogammaropsis Stout, 1913.

Type-species: *E. rapax* Costa, 1853c (monotypy). See Sars, 1895; Chevreux and Fage, 1925; J. L. Barnard, 1962b.

Accessory flagellum 3- or more, occasionally 2-articulate; lower lip with inner lobes; inner plates of maxillae 1–2 with only terminal setae; gnathopods normal; uropod 3 variable in length, rami equal, rectangular, outer 1-articulate; telson deeply cleft; urosome occasionally with dorsal teeth; *palp article 3 of mandible falcate, stout* (*Maera*). Species: 35, tropico-warm-temperate, cosmopolitan, littoral (one bathyal record).

Eriopisa Stebbing

Eriopis Bruzelius, 1859 (homonym, Coleoptera).
Eriopisa Stebbing, 1890 (new name); 1906.

Type-species: *Eriopis elongata* Bruzelius, 1859 (monotypy). See Sars, 1895.

Accessory flagellum 2-articulate; lower lip with slight inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods normal; uropod 3 greatly exceeding uropod 1, immensely elongate, outer ramus with two very long, subequal articles, or article 2 occasionally short, inner ramus very short, scale-like; telson deeply cleft; body lacking dorsal teeth or spines. Species: 6, cosmopolitan, littoral to bathyal (752 m).

Eriopisella Chevreux

Eriopisella Chevreux, 1920.

Type-species: *E. pusilla* Chevreux, 1920 (monotypy).

Accessory flagellum 2- articulate or less; lower lip with scarcely defined inner lobes fused with outer lobes; inner plates of maxillae 1–2 setose only terminally; gnathopods small, subchelate, equal in size; uropod 3 greatly exceeding uropod 1, immensely elongate, outer ramus 2-articulate, article 2 much shorter than article 1, inner ramus very short, scale-like; telson deeply cleft; body lacking dorsal teeth or spines. Species: 3, France, Seychelles, India, littoral.

Falklandella Schellenberg

Falklandella Schellenberg, 1930, 1931.

Type-species: *F. obtusa* Schellenberg, 1930, 1931 (monotypy).

Accessory flagellum 1-articulate; lower lip lacking inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopod 1 larger than gnathopod 2, subchelate; uropod 3 short, not exceeding uropod 1, rami semirectangular, outer 1-articulate, inner half as long as outer; telson short, emarginate; body lacking dorsal teeth or spines. Species: 2, Falkland Islands, freshwater close to sea.

Gammaracanthus Bate

Gammaracanthus Bate, 1862.—Stebbing, 1906.

Type-species: *Gammarus loricatus* Sabine, 1821 (original designation!, Bate, 1862, p. 203). See Gurjanova, 1951.

Accessory flagellum 3- or more articulate; lower lip with inner lobes obsolescent; inner plate of maxilla 1 setose only terminally, of maxilla 2 densely setose medially; gnathopods large, nearly equal in size, nearly eusirid in structure (fig. 96*a*); uropod 3 slightly exceeding uropod 1, rami subequal, foliaceous or subfoliaceous; outer 1-articulate; telson very short, cleft, lobes gaping; body carinate throughout. Species: 1, arctic and Caspian Sea, littoral.

Gammarella Bate, new synonymy

Pherusa Leach, 1814a.—Stebbing, 1906 (homonym, Polychaeta).
Gammarella Bate, 1857a.
Pherusana J. L. Barnard, 1964c (new name for *Pherusa*).

Type-species: *Pherusa fucicola* Leach, 1814a (monotypy and subsequent synonymy). See Walker, 1891a, b; Chevreux and Fage, 1925.

Accessory flagellum 4- or more articulate; lower lip with inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods normal; uropod 3 short, not exceeding uropod 1, rami not longer than peduncle, outer 1-articulate, inner slightly shortened; telson cleft; urosome dorsally carinate; *palm and posterior margin of article 6 on gnathopod 2 not separate, article 7 nearly as long as article 6 (combination of characters)*. Species: 1, subtropical E. Atlantic and Mediterranean, littoral.

Gammarellus Herbst

Gammarellus Herbst, 1793.—Stebbing, 1906.
Amathia Rathke, 1837 (homonym, Hydrozoa).
Grayia Bate, 1862.—Bate and Westwood, 1863.
Amathilla Bate and Westwood, 1863 (new name for *Amathia*).

Type-species: *Astacus homari* J. C. Fabricius, 1779 (type indicated by Stebbing, 1899a, but firmly selected by Chevreux and Fage, 1925). See Sars, 1895.

Accessory flagellum more than 3-articulate; lower lip lacking inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods normal; uropod 3 short, not exceeding uropod 1, rami lanceolate, outer 1-articulate; telson entire or emarginate; body dorsally carinate. Species: 2, arctic and high boreal, littoral.

Gammarus Fabricius

Gammarus Fabricius, 1775.—Stebbing, 1906.
Marinogammarus Schellenberg, 1937a—Sexton and Spooner, 1940 [subgenus, often considered a full genus].
Pectenogammarus Reid, 1940 [valid subgenus].

Type-species: *Cancer locusta* Linné, 1758 (selected by Boeck, 1876). See Sars, 1895.

Accessory flagellum 3- or more articulate; lower lip with inner lobes obsolescent or absent; inner plates of maxillae 1–2 densely setose medially; gnathopods normal or gnathopod 1 slightly larger than 2; uropod 3 exceeding uropod 1, outer ramus 2-articulate, inner variable, long or short; telson deeply cleft; no dorsal teeth or carinae, urosome with dorsal spine-bundles. Marine and brackish species: 13–15, arctic (boreal in Atlantic), littoral. See "Marine Carinate Gammarus" (p. 244).

Hornellia Walker

Hornellia Walker, 1904.

Type-species: *H. incerta* Walker, 1904 (monotypy).

Accessory flagellum 2-articulate; inner lobes of lower lip obsolescent; [inner plate of maxilla 1 undescribed], inner plate of maxilla 2 densely setose on medial edge; gnathopods normal; uropod 3 not exceeding uropod 1, rami equal, broadly lanceolate, outer 1-articulate;

telson long and deeply cleft; metasome and urosome dorsally serrate. Species: 1, Ceylon, littoral.

Liagoceradocus J. L. Barnard

Liagoceradocus J. L. Barnard, 1965.

Type-species: *L. pusillus* J. L. Barnard, 1965 (original designation)

Accessory flagellum 2-articulate; lower lip lacking inner lobes; inner plates of maxillae 1–2 densely setose medially, gnathopods feeble, subchelate, uropod 3 exceeding uropod 1, rami long, equal, broadly lanceolate, outer 2-articulate; telson deeply cleft; body lacking dorsal teeth or spines. Species: 1, Micronesia, littoral.

Maera Leach

Maera Leach, 1814a.—Stebbing, 1906.—Schellenberg, 1938.
Mulleria Leach, 1814a (nomen nudum).
Leptothoe Stimpson, 1853.
Linguimaera Pirlot, 1936.

Type-species: *Cancer grossimanus* Montagu, 1808 (monotypy). See Chevreux and Fage, 1925.

Accessory flagellum 3- or more articulate; lower lip with inner lobes; inner plates of maxillae setose only terminally; gnathopods normal; uropod 3 long or short, rami equal, lanceolate or slightly rectangular, outer 1-articulate; telson deeply cleft; urosome occasionally toothed; *mandibular palp article 3 slender, not falcate* (*Elasmopus*). Species: 35, cosmopolitan, primarily tropical, littoral to bathyal (1,238 m).

Maeracunha Stephensen

Maeracunha Stephensen, 1949.

Type-species: *M. tristanensis* Stephensen, 1949 (monotypy).

Accessory flagellum more than 4-articulate; lower lip with small inner lobes; inner plate of maxilla 1 with seven partially medial setae, inner lobe of maxilla 2 densely setose medially; gnathopods normal; uropod 3 short, rami subequal, sublanceolate, outer 2-articulate; telson deeply cleft; metasome and urosome untoothed; *mandibular palp article 3 subequal to article 1, bearing only two setae* (*combining character*). Species: 1, Tristan da Cunha, littoral.

Maerella Chevreux

Maerella Chevreux, 1911a.

Type-species: *Gammarus tenuimanus* Bate, 1862 (monotypy). See Chevreux and Fage, 1925.

Accessory flagellum 4- or more articulate; lower lip with inner lobes; inner plates of maxillae setose only terminally; gnathopods normal; uropod 3 exceeding uropod 1, rami equal, outer 1-articulate; telson cleft shortly; metasome and urosome dorsally toothed, urosome with scattered spines; *maxillipedal palp with only three articles.* Species: 1, temperate N. E. Atlantic, littoral.

Maeropsis Chevreux

Maeropsis Chevreux 1919; 1927.

Type-species: *M. perrieri* Chevreux, 1919, 1927 (monotypy).

Accessory flagellum more than 4-articulate; lower lip with inner lobes; inner plate of maxilla 1 setose only terminally, of maxilla 2 densely setose medially; gnathopods normal; uropod 3 not exceeding uropod 1, rami equal, rectangular, outer 1-articulate; telson deeply cleft; body lacking dorsal teeth or spines. Species: 1, N. Atlantic, bathyal (698 m).

"Marine Carinate *Gammarus*"

Species: *Gammarus mucronatus* Say, 1818.

Accessory flagellum 3- or more articulate; lower lip with inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods normal, subequal in size; uropod 3 exceeding uropod 1, rami long, outer 2-articulate, inner slightly shorter than outer; telson deeply cleft; each metasomite with one dorsal tooth; urosomites with dorsal bundles of spines. Species: 1, Atlantic and Gulf United States, littoral lagoonal. Formerly included with Baikalian *Carinogammarus* but having affinities with freshwater *Rivulogammarus*. See *Mesogammarus*.

Megaluropus Hoek

Megalonoura Herdman, 1889 (nomen nudum).
Megaluropus Hoek, 1889.—Stebbing, 1906.—K. H. Barnard, 1940.
Phylluropus K. H. Barnard, 1932.

Type-species: *M. agilis* Hoek, 1889 (monotypy). See Chevreux and Fage, 1925.

Accessory flagellum 2-articulate; lower lip with inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods feeble, poorly subchelate; uropod 3 exceeding uropod 1 or not, rami equal, foliaceous, outer 1-articulate; telson deeply cleft; metasome and urosome often dorsally serrate. Species: 3, bi-boreal, littoral (primarily neritic).

Melita Leach, new synonymy

Melita Leach, 1814a.—Stebbing, 1906.—Shoemaker, 1941b.
Boscia Leach, 1814a (nomen nudum).
Megamoera Bate, 1862 (type by present selection, *Gammarus dentatus* Krøyer, 1842).
Caliniphargus Stout, 1913.
Dulichiella Stout, 1913.

Type-species: *Cancer palmatus* Montagu, 1804 (monotypy). See Sars, 1895.

Accessory flagellum 2- or more articulate; lower lip with slight inner lobes; inner plate of maxilla 1 with largely terminal setae, of maxilla 2 densely setose medially; gnathopods normal; uropod 3 greatly exceeding uropod 1, outer ramus very long, 1-articulate, inner short and scale-like; telson deeply cleft; metasome often toothed, urosome often toothed and bearing scattered dorsal spines. Species: 45, cosmopolitan, littoral to abyssal.

Melitoides Gurjanova

Melitoides Gurjanova, 1934.

Type-species: *M. makarovi* Gurjanova, 1934 (monotypy). See Gurjanova, 1951.

Accessory flagellum 4-articulate; lower lip with inner lobes; inner plates of maxillae densely setose medially; gnathopods normal; uropod 3 not exceeding uropod 1, outer ramus long, 1-articulate, inner ramus short, scale-like; telson deeply cleft; urosome dorsally toothed. Species: 1, subarctic, littoral.

Mesogammarus Tzvetkova

Mesogammarus Tzvetkova, 1965.

Type-species: *M. melitoides* Tzvetkova, 1965 (original designation).

Accessory flagellum more than 3-articulate; lower lip with scarce indication of inner lobes; inner plates of maxillae 1–2 lined medially with setae; gnathopod 1 slightly larger than 2; uropod 3 apparently exceeding uropod 1, rami long, lanceolate, subequal in length, outer ramus with short article 2; telson short, broad, cleft halfway, lobes gaping [possibly interpreted as deeply emarginate]; pleonites 1–3 with posterodorsal margins cut into several medium-sized teeth; urosome armed dorsally with rows of spines. Species: 1, Japan Sea, near Vladivostok, littoral.

Metaceradocoides Birstein and Vinogradova

Metaceradocoides Birstein and Vinogradova, 1960.

Type-species: *M. vitjazi* Birstein and Vinogradova, 1960 (original designation).

Accessory flagellum greatly more than 4-articulate; lower lip with inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopod 2 longer and more slender than gnathopod 1, both subchelate; uropod 3 not exceeding uropod 1, rami equal, lanceolate, outer 2-articulate; body lacking dorsal teeth or spines; *palp article 4 of maxilliped long, claw-like* (*Bathyceradocus*). Species: 1, N.W. Pacific, hadal (7,210 m).

Metaceradocus **Chevreux**

Metaceradocus Chevreux, 1925.

Type-species: *M. perdentatus* Chevreux, 1925 (monotypy).

Accessory flagellum 3- or more articulate; lower lip with inner lobes; inner plate of maxilla 1 mostly setose terminally, of maxilla 2 densely setose medially; gnathopods feeble, slender, subchelate; uropod 3 exceeding uropod 1, rami long, equal, lanceolate, outer 1-articulate; telson deeply cleft; pleonites dorsally serrate and with scattered spines; *mandibular palp articles 2 and 3 subequal* (*Ceradocus*). Species: 2, E. Atlantic, E. Pacific, littoral.

Netamelita **J. L. Barnard**

Netamelita J. L. Barnard, 1962b.

Type-species: *N. cortada* J. L. Barnard, 1962b (original designation).

Accessory flagellum 1-articulate; lower lip with inner lobes; inner plates of maxillae 1–2 setose only terminally; gnathopods small, subchelate, equal in size; uropod 3 exceeding uropod 1, outer ramus long, 1-articulate, inner short, scale-like; telson deeply cleft; body lacking dorsal teeth or spines. Like *Eriopisella* but outer ramus of uropod 3 uniarticulate. Species: 1, California, littoral.

Paraceradocus **Stebbing**

Paraceradocus Stebbing, 1899a; 1906.

Type-species: *Megamoera miersii* Pfeffer, 1888 (original designation). See K. H. Barnard, 1932.

Accessory flagellum 4- or more articulate; lower lip with inner lobes; inner plate of maxilla 1 only terminally setose, of maxilla 2 densely setose medially; gnathopods normal; uropod 3 exceeding uropod 1, rami foliaceous, equal, long, outer 1-articulate; telson deeply cleft; some urosomal segments dorsally toothed. Note: *P. micramphopus* Stebbing, 1910, is probably referrable to *Metaceradocus*. Species: 2, subantarctic, Australia, littoral (to 310 m).

Parapherusa Stebbing

Harmomia [lapsus for *Harmonia*] Haswell, 1880c (*Harmonia* =homonym, Coleoptera).
Chloris Haswell, 1880a (homonym, Aves).
Parapherusa Stebbing, 1906 (new name for *Harmomia*).

Type-species: *Harmonia crassipes* Haswell, 1880c (monotypy). See Stephensen, 1949.

Accessory flagellum 4- or more articulate; lower lip with large inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods normal; uropod 3 short, not exceeding uropod 1, rami equal, shorter than peduncle, outer 1-articulate and bearing enlarged serrate spine; telson simple, elongate; body lacking dorsal teeth or spines. Species: 1, antiboreal, Australia-New Zealand, littoral.

Parelasmopus Stebbing

Parelasmopus Stebbing, 1888; 1906.

Type-species: *Gammarus suluensis* Dana, 1852a (monotypy). See Chevreux, 1901b (as *P. setiger*).

Accessory flagellum 2- or 3- articulate; lower lip with inner lobes; inner plate of maxilla 1 setose only terminally, of maxilla 2 generally terminally setose; gnathopods normal; uropod 3 not exceeding uropod 1, rami short, broad, lanceolate, outer 1-articulate; telson deeply cleft; metasome and urosome dorsally carinate, no spines; *mandibular palp article 2 shorter than article 1.* Species: 3, tropical Pacific, littoral (to 522 m).

Quadrivisio Stebbing

Quadrivisio Stebbing, 1907.
Pseudoceradocus Shoemaker, 1933b.

Type-species: *Q. bengalensis* Stebbing, 1907 (monotypy).

Accessory flagellum greatly more than 4-articulate; lower lip with inner lobes; inner plates of maxillae 1–2 densely setose medially; gnathopods normal; uropod 3 exceeding uropod 1, rami equal, foliaceous, outer 1-articulate; telson deeply cleft; body lacking dorsal teeth or spines; *eyes four in number.* Species: 2, circumtropical, littoral.

Weyprechtia Stuxberg

Weyprechtia Stuxberg, 1880.—Stebbing, 1906.

Type-species: *Amathilla heuglini* Buchholz, 1874 (monotypy and subsequent synonymy). See Gurjanova, 1951.

Accessory flagellum 4- or more articulate; inner lobes of lower lip obsolescent (in drawings they appear distinct); inner plates of maxillae

1–2 densely setose medially; gnathopods slender, feeble, poorly subchelate; uropod 3 not exceeding uropod 1, rami equal, lanceolate, outer 1-articulate; telson entire; body lacking dorsal teeth or spines. Species: 2, arctic, littoral.

Haustoriidae

FIGURES 97–100

DIAGNOSIS.—Antenna 1 usually with accessory flagellum; *rostrum usually absent but when present then pereopod 5 longer than 4;* otherwise pereopod 5 shorter and of different structure than pereopod 4; pereopods strongly spinose and setose (fossorial); gnathopods feeble. See Gammaridae, Phoxocephalidae, Liljeborgiidae, Ampeliscidae, Paramphithoidae, Astyridae, Argissidae.

DESCRIPTION.—Accessory flagellum absent (rare) or 1- to multiarticulate; peduncles of antennae elongate or not; antenna 2 peduncle occasionally spinose, often with elongate plumose setae; rostrum usually inconspicuous, occasionally present; upper lip not strongly incised; mandible always with 3-articulate palp and molar rarely absent but often nontriturative; lower lip with inner lobes; maxillae basic; maxilliped with well-developed plates, palp 3–4 articulate, occasionally of peculiar shape; gnathopods feeble, varying from minutely chelate, through simple to lacking article 7; coxae of medium length or long, highly variable, occasionally acuminate; uropod 3 variable but one or both rami longer than or equal to peduncle, lanceolate, rectangular, or subcylindrical, rarely flabellate; telson short or medium in length, deeply cleft or subentire.

RELATIONSHIP.—The family is so neatly linked to the Gammaridae by the genera *Pontoporeia* and *Bathyporeia* that on gross morphological grounds there seems little reason to maintain it; nevertheless taxonomists seem to have been able to recognize its members (excepting *Euxinia* Tucolesco). Of particular significance are the feeble gnathopods of haustoriids and the strong development of spines and setae for these digging animals. Certainly the fossorial habit distinguishes them from most Gammaridae.

Liljeboriids have a weak mandibular molar, poorly spinose appendages and very powerful gnathopods.

Priscillina and *Haustorius* resemble the Paramphithoidae through their subacute first four coxae but the excessive spination and setation of appendages and multiarticulate accessory flagella are distinctive of Haustoriidae.

The Phoxocephalidae are closely related and merge into Haustoriidae through genera such as *Platyischnopus* and *Zobracho.* Most haustoriids lack a distinct rostrum. All phoxocephalids have pereopod 5 shorter than 4 and of different structure, and a large visor-like rostrum. Some haustoriids have a small rostrum and pereopod 5 shorter than 4 and of different structure. With some genera, one must flip a coin to choose the proper family.

FIGURE 97.—Haustoriidae: *a*, *Priscillina armata* (Boeck) (Sars, 1895, pl. 42); *b*, *Urothoe elegans* Bate (Sars, 1895, pl. 47, as *U. norvegica*). Upper lip: *c*, *Haustorius arenarius* (Slabber) (Sars, 1895, pl. 46). Mandible: *d*, *Urothoe*; *e*, *Haustorius*; *f*, *Carangolia mandibularis* J. L. Barnard (1962d). Lower lip: *g*, *Haustorius*; *h*, *Pontoporeia femorata* Krøyer (Sars, 1895, pl. 41).

FIGURE 98.—Haustoriidae: *a*, *Pontoporeia femorata* Krøyer (Sars, 1895, pl. 41); *b*, *Zobracho canguro* J. L. Barnard (1961). Maxilla 1: *c*, *Haustorius arenarius* (Slabber) (Sars, 1895, pl. 46). Maxilla 2: *d*, *Pontoporeia;* *e*, *Haustorius.* Maxilliped: *f*, *Haustorius;* *g*, *Priscillina armata* (Boeck) (Sars, 1895, pl. 42). Urosome: *h*, *Urohaustorius halei* Sheard (1936b).

All Ampeliscidae have pereopod 5 shorter than 4 and of different structure, similar to all Phoxocephalidae and some Haustoriidae. Unlike the burrowing Phoxocephalidae and Haustoriidae, the Ampeliscidae have glands in pereopods 1–2 that secrete a substance used for the formation of tubes. Ampeliscidae never have multiple ommatidia in the eyes as in Phoxocephalidae and Haustoriidae but form cuticular lenses. They have elongate, laterally compressed heads. Unlike phoxocephalids and haustoriids, Ampeliscidae lack any trace of an accessory flagellum. The accessory flagellum of *Carangolia* is vestigial but the animal is otherwise clearly an haustoriid.

Oedicerotidae, with fossorial pereopods and always with vestigial or absent accessory flagella resemble a few haustoriids, but Oedicerotidae always have pereopod 5 very elongate, uropod 3 with elongate peduncle, elongate subequal rami and linguiform, entire (rarely emarginate) telson.

A major division of the key to genera concerns the absence of pereopodal dactyls. The ends of those legs often are highly spinose and if one of the "spines" is not elongate nor obviously distinct from the others then dactyls are considered to be absent.

Nomenclatural Changes for Haustoriidae

See Bousfield (1965) for specific nomenclatural changes.

Haustoriopsis Schellenberg (1938) is removed to the Prophliantidae.

Urothoe simplignathia J. L. Barnard (1962d) is removed to *Pardaliscella,* Pardaliscidae.

Note the comments in the Calliopiidae on the genus *Sancho.*

Haustoriids are perhaps the most interesting group of amphipods and so diversified that by necessity many genera have been illustrated herein.

Key to the Genera of Haustoriidae

1. All of pereopods 1–5 lacking dactyls (fig. 99*b*) [1] 2
   Some of pereopods 1–5 bearing dactyls (fig. 98*a*) [1] 9
2. Pereopod 2 smaller than and morphologically distinct from pereopod 1 (its orientation apparently reversed) . . . . **Eohaustorius**
   Pereopods 1–2 subequal in size and morphologically intersimilar 3
3. Maxillipedal palp with four articles 4
   Maxillipedal palp with three articles 5

[1] See explanation in text (p. 251).

4. Head with large rostrum (fig. 98*b*), telson longer than broad and deeply cleft (fig. 99*f*) . . . . **Zobracho** [2]
Head lacking rostrum, telson broader than long and scarcely cleft (fig. 99*g*). **Carangolia**
5. Inner ramus of uropod 2 absent . . . . **Neohaustorius**
Inner ramus of uropod 2 present 6
6. Maxillipedal palp article 3 weakly geniculate or clavate, outer plate of maxilla 2 scarcely enlarged (fig. 98*d*) 7
Maxillipedal palp article 3 strongly geniculate (fig. 98*f*), outer plate of maxilla 2 greatly enlarged (fig. 98*e*) 8
7. Rami of uropod 1 expanded distally, posterodorsal border of pleonite 3 forming a lobe overhanging urosome . . . . **Pseudohaustorius**
Rami of uropod 1 not expanded distally, posterodorsal border of pleonite 3 not forming lobe overhanging urosome . . . . **Protohaustorius**
8. Pleonal epimeron 3 with large posteroventral tooth . . . **Acanthohaustorius**
Pleonal epimeron 3 rounded posteroventrally. **Haustorius** and **Parahaustorius**
9. Antenna 1 geniculate between articles 1 and 2 (fig. 99*c*) 10
Antenna 1 not geniculate, or occasionally between articles 2 and 3 . . 11
10. Gnathopod 2 lacking dactyl (fig. 100*i*) . . . . **Bathyporeia**
Gnathopod 2 bearing dactyl . . . . **Amphiporeia**
11. Coxa 1 vestigial, less than one fourth as long as coxa 3 12
Coxa 1 not vestigial, at least half as long as coxa 3 13
12. Coxa 2 vestigial, less than one fourth as long as coxa 3 . . **Urohaustorius**
Coxa 2 not vestigial, almost as large as coxa 3 . . . . **Cardenio**
13. Coxa 2 obtusely pointed below (fig. 97*a*) 14
Coxa 2 rounded or quadrate below (fig. 100*a*) 15
14. Telson split nearly its full length . . . . **Zobracho**
Telson split one third its length . . . . **Priscillina**
15. Gnathopods chelate (fig. 100*d*) . . . . **Platyischnopus**
Gnathopods subchelate or simple 16
16. Inner ramus of uropod 3 scale-like, half as long as outer ramus (fig. 100*m*). **Carangolia**
Inner ramus of uropod 3 subequal to outer 17
17. Mandibular palp large, borne on basal process (like fig. 150*g*), article 3 clavate, molar of medium size, ridged . . . . **Phoxocephalopsis**
Mandibular palp small, directly attached to mandibular body, article 3 linear, molar large or medium, smooth 18
18. Outer ramus of uropod 3 uniarticulate 19
Outer ramus of uropod 3 biarticulate 20
19. Accessory flagellum present, usually 2-articulate; pereopod 5 shorter and of different structure than pereopod 4 . . . . **Pontoporeia**
Accessory flagellum absent; pereopod 5 similar to pereopod 4. **Zaramilla** (Eusiridae)
20. Article 4 of pereopod 4 not expanded, article 2 of pereopod 5 not greatly produced downward . . . . **Urothoe**
Article 4 of pereopod 4 expanded, article 2 of pereopod 5 greatly produced downward . . . . **Urothoides**

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[2] *Zobracho* J. L. Barnard (1961). Note that the basal article of the maxillipedal palp was not inked on the original drawing; the palp has four articles.

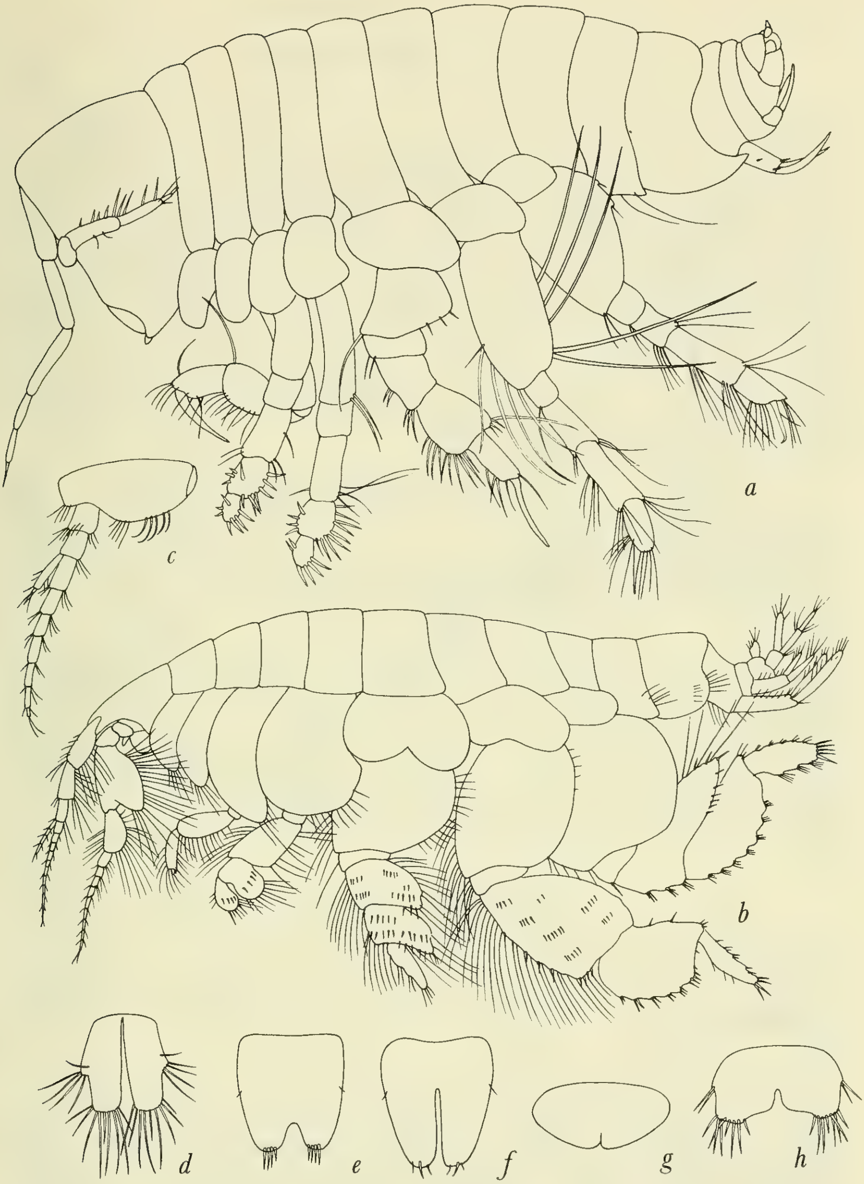

FIGURE 99.—Haustoriidae: *a*, *Carangolia puliciformis* J. L. Barnard (1961); *b*, *Haustorius arenarius* (Slabber) (Sars, 1895, pl. 46). Antenna 1: *c*, *Bathyporeia guilliamsoniana* (Bate) (Sars, 1895, pl. 43, as *B. norvegica*). Telson: *d*, *Bathyporeia: e*, *Priscillina armata* (Boeck) (Sars, 1895, pl. 42); *f*, *Pontoporeia femorata* Krøyer (Sars, 1895, pl. 41); *g*, *Carangolia; h*, *Haustorius.*

Genera of Haustoriidae

Acanthohaustorius Bousfield

Acanthohaustorius Bousfield, 1965.

Type-species: *A. millsi* Bousfield, 1965 (original designation).

Antenna 1 not geniculate; mandibular palp not on basal process, molar ridged; outer plate of maxilla 2 greatly enlarged; maxillipedal palp 3-articulate, article 3 geniculate; coxae 1–2 of normal size, coxae 1–3 obtusely pointed below; gnathopod 1 simple, article 5 longer than 6, gnathopod 2 minutely chelate; pereopods lacking dactyls; uropod 3 slightly elongate, rami subequal; telson short, cleft nearly to base; *pleonal epimeron 3 with spine-like posteroventral process* (*Parahaustorius, Haustorius*); *lower lip lacking mandibular lobes.* Species: 4, N.W. Atlantic, littoral.

Amphiporeia Shoemaker

Amphiporeia Shoemaker, 1929.

Type-species: *A. lawrenciana* Shoemaker, 1929 (original designation).

Antenna 1 geniculate between articles 1 and 2; mandibular palp attached to basal process, molar ridged; outer plates of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxae 1–2 of normal size, rounded-quadrate below; gnathopods subchelate, article 5 of gnathopod 1 slightly longer than article 6; *gnathopod 2 bearing article 7* (*Bathyporeia*); pereopods dactylate; inner ramus of uropod 3 half as long as outer; telson fully cleft. Species: 2, N.W. Atlantic, littoral.

Bathyporeia Lindstrom

Bathyporeia Lindstrom, 1855.—Stebbing, 1906.
Thersites Bate, 1857a, 1857b (homonym, Mollusca).

Type-species: *B. pilosa* Lindstrom, 1855 (monotypy). See Sars, 1895.

Antenna 1 geniculate between articles 1 and 2; mandibular palp attached to basal process, molar ridged; outer plate of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxae 1–2 of normal size, rounded-quadrate below; gnathopods simple, *gnathopod 2 lacking article 7* (*Amphiporeia*), article 5 of gnathopod 1 longer than article 6; at least pereopods 1–2 dactylate; inner ramus of uropod 3 short, scale-like; telson fully cleft. Species: 11, boreal N. Atlantic, littoral.

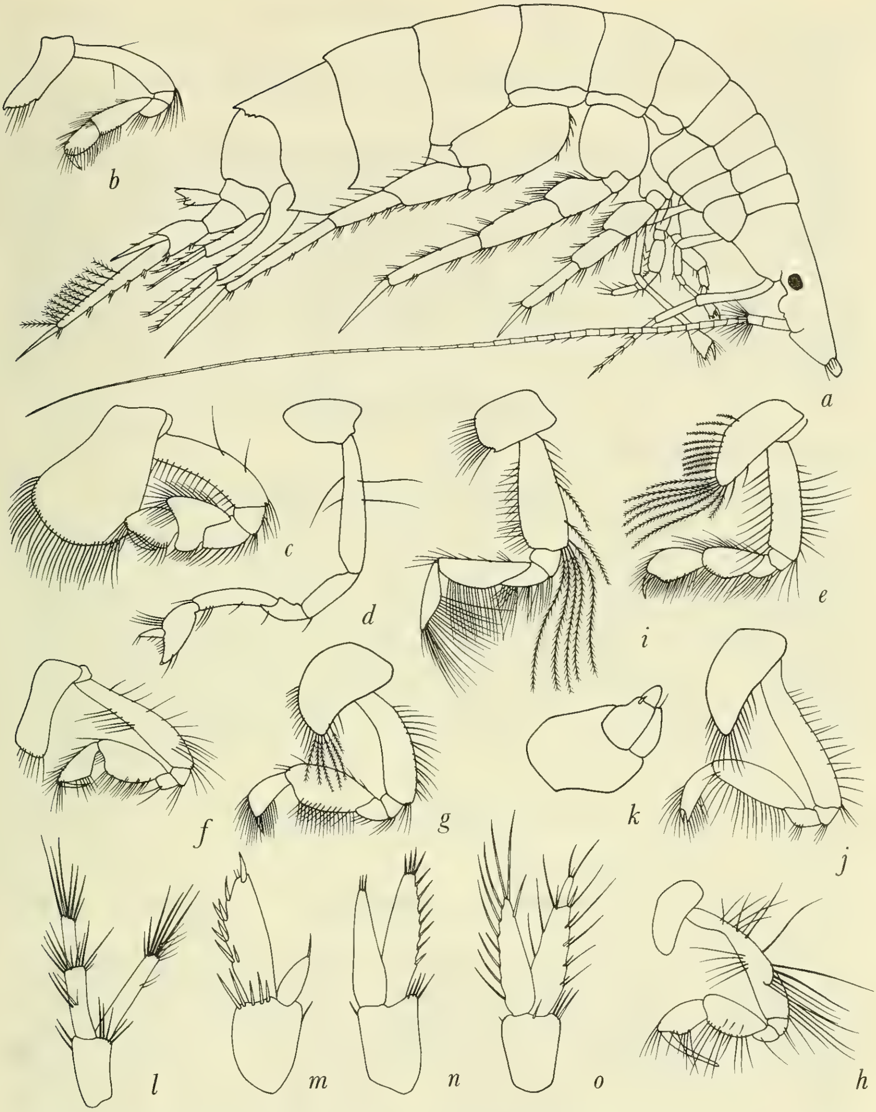

FIGURE 100.—Haustoriidae: *a, Platyischnopus herdmani* Walker (Pillai, 1957). Gnathopod 1: *b, Bathyporeia guilliamsoniana* (Bate) (Sars, 1895, pl. 43, as *B. norvegica*); *c, Pontoporeia femorata* Krøyer (Sars, 1895, pl. 41); *d, Platyischnopus mirabilis* Stebbing (1888); *e, Priscillina armata* (Boeck) (Sars, 1895, pl. 42); *f, Urothoe; g, Haustorius arenarius* (Slabber) (Sars, 1895, pl. 46); *h, Carangolia puliciformis* J. L. Barnard (1961). Gnathopod 2: *i, Bathyporeia; j, Haustorius.* Uropod 3: *k, Carangolia; l, Haustorius; m, Priscillina; n, Pontoporeia; o, Urothoe.*

Carangolia J. L. Barnard

Carangolia J. L. Barnard, 1961.

Type-species: *C. mandibularis* J. L. Barnard, 1961 (original designation).

Antenna 1 not geniculate; mandibular palp not on process, molar large, smooth, terminal in position; outer plate of maxilla 2 not enlarged, maxillipedal palp 4-articulate; gnathopods nearly simple, article 7 immensely elongate, articles 5 and 6 of gnathopod 1 subequal in length; pereopods dactylate (except ?pereopod 1); uropod 3 greatly reduced in size, rami very short, subcircular, inner shorter than outer; telson short, broad, minutely cleft. Species: 2, antiboreal, bathyal (610–1,861 m).

Cardenio Stebbing

Cardenio Stebbing, 1888; 1906.

Type-species: *C. paurodactylus* Stebbing, 1888 (monotypy).

Antenna 1 not geniculate; mandibular palp not on basal process, molar ridged or toothed; outer plates of maxilla 2 not enlarged; maxillipedal palp 3-articulate; coxa 1 very small, coxae rounded-quadrate below; gnathopods simple, article 5 of gnathopod 1 longer than article 6; pereopods 3–5 dactylate, pereopods 1–2 apparently not dactylate; uropod 3 short, rami equal in length; telson long, deeply cleft; *lower lip apparently lacking mandibular processes.* Species: 1, subantarctic, littoral.

Eohaustorius J. L. Barnard

Eohaustorius J. L. Barnard, 1957b.

Type-species: *Haustorius washingtonianus* Thorsteinson, 1941 (original designation).

Antenna 1 not geniculate; mandibular palp not on basal process, molar smooth; outer plates of maxilla 2 not enlarged; maxillipedal palp 3-articulate, article 3 not geniculate; coxae 1 and 2 much smaller than and partially hidden by coxae 3–4; gnathopod 1 simple, article 5 longer than article 6, gnathopod 2 minutely chelate; *pereopod 2 similar to pereopod 3 in orientation,* and smaller than pereopod 1; uropod 3 short, rami equal in length; *telsonic lobes completely detached basally; outer lobes of lower lip lacking mandibular processes.* Species: 4, boreal Pacific, littoral.

Haustorius Müller

Haustorius Müller, 1775.—Stebbing, 1906.
?*Lepidactylis* Say, 1818 (see Bousfield, 1965).
Pterygocerus Latreille, 1825.

Bellia Bate, 1851 (homonym, Decapoda).
Sulcator Bate, 1854.

Type-species: *Oniscus arenarius* Slabber, 1769 (monotypy). See Sars, 1895.

Antenna 1 not geniculate; mandibular palp not on basal process, molar ridged; outer plate of maxilla 2 greatly enlarged; maxillipedal palp 3-articulate, article 3 geniculate; coxae 1–2 of normal size, coxae 1–3 obtusely pointed below; gnathopod 1 simple, article 5 longer than article 6, gnathopod 2 minutely chelate; pereopods lacking dactyls; uropod 3 short, rami equal in length; telson short, partially cleft; *pereopods 4–5 with articles 4–5 three fourths as broad as article 2 of pereopod 5* (*Zobracho* and *Priscillina*); *pleonal epimeron 3 rounded posteroventrally* (*Acanthohaustorius*); *outer lobes of lower lip lacking mandibular processes.* Species: 2, N. Atlantic, littoral.

Neohaustorius Bousfield

Neohaustorius Bousfield, 1965.

Type-species: *N. schmitzi* Bousfield, 1965 (original designation).

Antenna 1 not geniculate; mandibular palp not on basal process, molar triturative; outer plate of maxilla 2 greatly enlarged; maxillipedal palp 3-articulate, article 3 geniculate; coxae 1–2 of normal size, to some extent coxae 1–2 obtusely pointed below; gnathopod 1 simple, article 5 longer than 6, gnathopod 2 minutely chelate; pereopods lacking dactyls; uropod 3 short, rami subequal; telson short, uncleft; *inner ramus of uropod 2 absent; lower lip lacking mandibular lobes.* Species: 2, N.W. Atlantic, littoral.

Parahaustorius Bousfield

Parahaustorius Bousfield, 1965.

Type-species: *P. longimerus* Bousfield, 1965 (original designation).

Antenna 1 not geniculate; mandibular palp not on basal process, molar triturative; outer plate of maxilla 2 greatly enlarged; maxillipedal palp 3-articulate, article 3 geniculate; coxae 1–2 of normal size, coxae 1–2 obtusely pointed below; gnathopod 1 simple, article 5 longer than 6, gnathopod 2 minutely chelate; pereopods lacking dactyls; uropod 3 slightly elongate, rami subequal; telson short, cleft about halfway; *pleonal epimeron 3 rounded posteroventrally* (*Acanthohaustorius*); *lower lip lacking mandibular lobes.* Species: 3, N.W. Atlantic, littoral.

Phoxocephalopsis Schellenberg

Phoxocephalopsis Schellenberg, 1931.
Haustoriella K. H. Barnard, 1931.

Type-species: *P. zimmeri* Schellenberg, 1931 (monotypy).

Antenna 1 not geniculate; mandibular palp on basal process, *large, article 3 clavate* (*Urothoe, Urothoides*), molar ridged; outer plates of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxa 1 nearly obtusely pointed below, others rounded-quadrate; gnathopods subchelate or nearly simple, article 5 of gnathopod 1 longer than article 6; pereopods dactylate; uropod 3 short, rami subfoliaceous, subequal in length; telson short, deeply cleft. Species: 2, subantarctic-antiboreal, littoral.

Platyischnopus Stebbing

Platyischnopus Stebbing, 1888; 1906.

Type-species: *P. mirabilis* Stebbing, 1888 (monotypy).

Antenna 1 not geniculate; mandibular palp not on basal process, molar "ridged," smooth or absent; outer plates of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxae of medium length, rounded-quadrate below; gnathopods chelate, article 5 of gnathopod 1 longer or shorter than article 6; pereopods dactylate; uropod 3 (outer ramus only) immensely elongate, inner ramus short, scale-like; telson partially cleft or emarginate; head with "shark-nose" rostrum. Species: 6, warm N. temperate through tropics to antiboreal, littoral.

Pontoporeia Krøyer

Pontoporeia Krøyer, 1842.—Stebbing, 1906.

Type-species: *P. femorata* Krøyer, 1842 (monotypy). See Sars, 1895.

Antenna 1 not geniculate; mandibular palp not on basal process, molar ridged; outer plate of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxae 1–2 of normal size, rounded-quadrate below; gnathopod 1 subchelate, articles 5–6 subequal in length, gnathopod 2 slightly chelate; at least pereopods 1, 2, 5 dactylate; rami of uropod 3 equal in length; telson cleft halfway or more. Species: 5; 1 Caspian, 4 subarctic-boreal and glacial relicts, littoral.

Priscillina Stebbing

Priscilla Boeck, 1871 (homonym, Coleoptera).
Priscillina Stebbing, 1888 (new name); 1906.

Type-species: *Pontoporeia armata* Boeck, 1861 (monotypy). See Sars, 1895.

Antenna 1 not geniculate; mandibular palp not on basal process, molar ridged; outer plate of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxae 1–2 of normal size, coxae 1–4 obtusely pointed below; gnathopods subchelate, articles 5–6 of gnathopod 1 subequal in length; some pereopods dactylate; uropod 3 short, inner ramus scale-like; telson cleft one third of its length; *articles 4–5 of pereopods 4–5 one third as broad as article 2 of pereopod 5* (*Haustorius*). Species: 1, arctic-subarctic, littoral.

Protohaustorius Bousfield

Protohaustorius Bousfield, 1965.

Type-species: *P. deichmannae* Bousfield, 1965 (original designation).

Antenna 1 semigeniculate; mandibular palp not on basal process, molar triturative; outer plate of maxilla 2 not enlarged; maxillipedal palp 3-articulate, article 3 not geniculate; coxae 1–2 of normal size, not obtusely pointed below; gnathopod 1 simple, article 5 longer than 6, gnathopod 2 minutely chelate; pereopods lacking dactyls; uropod 3 short, rami subequal; telson short, slightly emarginate; *rami of uropod 1 not distally expanded; posterodorsal border of pleonite 3 not forming lobe overhanging urosome* (*Pseudohaustorius*); *lower lip lacking mandibular lobes.* Species: 2, N.W. Atlantic, littoral.

Pseudohaustorius Bousfield

Pseudohaustorius Bousfield, 1965.

Type-species: *P. caroliniensis* Bousfield, 1965 (original designation).

Antenna 1 not geniculate; mandibular palp not on basal process, molar ridged; outer plate of maxilla 2 not enlarged; maxillipedal palp 3-articulate, article 3 clavate; coxae 1–2 of normal size, 1–3 subobtusely pointed below; gnathopod 1 simple, article 5 longer than 6, gnathopod 2 minutely chelate; pereopods lacking dactyls; uropod 3 short, rami subequal; telson short, slightly emarginate; *rami of uropod 1 distally expanded; posterodorsal border of pleonite 3 forming lobe overhanging urosome* (*Protohaustorius*); *lower lip lacking mandibular lobes.* Species: 3, N.W. Atlantic and Gulf of Mexico, littoral.

Urohaustorius Sheard

Urohaustorius Sheard, 1936b.

Type-species: *U. halei* Sheard, 1936b (original designation).

Antenna 1 not geniculate; mandibular palp apparently not on basal process, molar large and projecting but apparently lacking ridges or teeth; outer plates of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxae 1 and 2 vestigial; gnathopod 1 simple, article 5 longer than article 6, gnathopod 2 minutely chelate; pereopods dactylate but some dactyls resembling spines; rami of uropod 3 subequal in length; telson short, entire. Species: 2, S. Australia, littoral.

Urothoe Dana

Urothoe Dana, 1852b.—Stebbing, 1906.
Egidia Costa, 1853c, 1857.

Type-species: *Urothoe irrostratus* Dana, 1853 (indicated by elimination and ipso-facto monotypy of Boeck, 1876, but firmly selected by Stebbing, 1891). Type-species remains dubious and genus herein based provisionally on *U. elegans* Bate, 1857a (Sars, 1895, as *U. norvegica* Boeck, 1861).

Antenna 1 not geniculate; *mandibular palp* not on basal process, *small, article 3 linear* (*Phoxocephalopsis*), molar large, poorly ridged; outer plates of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxae 1–2 of normal size, rounded-quadrate below; gnathopods subchelate or simple, article 5 of gnathopod 1 longer than article 6; pereopods dactylate; rami of uropod 3 equal in length; telson fully cleft; *article 4 of pereopod 4 not strongly expanded, article 2 of pereopod 5 not greatly produced downward* (*Urothoides*). Species: 22, cosmopolitan, littoral to abyssal.

Urothoides Stebbing

Urothoides Stebbing, 1891; 1906.

Type-species: *Urothoe lachneessa* Stebbing, 1888 (monotypy).

Antenna 1 not geniculate; *mandibular palp* not on basal process, *small, article 3 linear* (*Phoxocephalopsis*), molar large, poorly ridged; outer plates of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxae 1–2 of normal size, rounded-quadrate below; gnathopods subchelate, article 5 of gnathopod 1 longer than article 6; pereopods dactylate; uropod 3 of medium length, inner ramus half as long as outer; telson deeply cleft; *article 4 of pereopod 4 expanded, article 2 of pereopod 5 greatly produced downward* (*Urothoe*). See other remarks by K. H. Barnard, 1932. Species: 1+?1, subantarctic, bathyal (236–720 m).

Zobracho J. L. Barnard

Zobracho J. L. Barnard, 1961.

Type-species: *Z. canguro* J. L. Barnard, 1961 (original designation).

Antenna 1 not geniculate; mandibular palp not on basal process, molar small and slightly toothed; outer plates of maxilla 2 not enlarged; maxillipedal palp 4-articulate; coxa 1 strongly reduced in size, coxae 1–2 obtusely pointed below; gnathopods subchelate, article 5 of gnathopod 1 longer than article 6; some pereopods presumably dactylate but dactyls resembling spines; uropod 3 short, inner ramus half as long as outer; telson long, nearly fully cleft; *articles 4–5 of pereopods 4–5 one third as broad as article 2 on pereopod 5* (*Haustorius*); *head with large rostrum.* Species: 1, Australia, bathyal (875 m).

Hyalellidae and Hyalidae

[see Superfamily Talitroidea]

Hyperiopsidae

Figures 101, 102

Diagnosis.—Accessory flagellum well developed; article 4 of pereopods 1–2 greatly elongate; palp of first maxilla claviform, slightly geniculate; gnathopods feeble, simple. See Vitjazianidae, Astyridae, Stilipedidae, Synopiidae.

Description.—Accessory flagellum well developed, its articles very elongate; body variable, smooth or carinate, head globular (resembling hyperiids), subglobular or nearly normal, but rarely bearing distinct lateral lobes; coxae variable, first four small and uniform or coxa 4 enlarged and covering anterior coxae; upper lip with minute incision; mandibular body very short, poorly toothed, molar very small, weakly triturative or not, palp immense; lower lip without inner lobes, outer lobes often alate; palp of maxilla 1 biarticulate, article 2 slightly or greatly bent medially (at least on one side); maxilla 2 and maxilliped normal; gnathopods feeble or nearly simple; uropod 3 biramous; telson cleft or entire, with apical ornamentation.

It is difficult, at first glance, to justify a familial association of the two hyperiopsid genera. *Hyperiopsis* resembles an hyperiid amphipod. It has a globular head, smooth body and short uniform coxae. *Parargissa* has the normal appearance of a gammaridean and although the head is subglobular it is rather small and may have lateral lobes; its fourth coxa is enlarged and covers the smaller coxae 1–3. Nevertheless, *Hyperiopsis* and *Parargissa* share some features that are unusual in the Gammaridea: (1) the peculiar first maxillary palps of which the second articles are claviform and slightly bent on at least one of the maxillae; (2) the very short body of the mandible with a nearly untoothed cutting edge and a very small, poorly developed molar; (3) the great elongation of article 4 on pereopods 1 and 2, a condition rarely occurring in other families (cf. Ampeliscidae); (4) the elongation of article 1 of the first antennal flagellum (not uncommon in some other families, *viz.* Lysianassidae, Synopiidae).

Relationship.—The combination of the elongate article 4 of pereopods 1 and 2 with the bent first maxillary palp separates this family from the following similar families: Astyridae, Synopiidae, Pardaliscidae, and Vitjazianidae.

The Ampeliscidae resemble hyperiopsids because of the elongate fourth articles of pereopods 1–2, but ampeliscids lack accessory flagella and have well-developed mandibular molars.

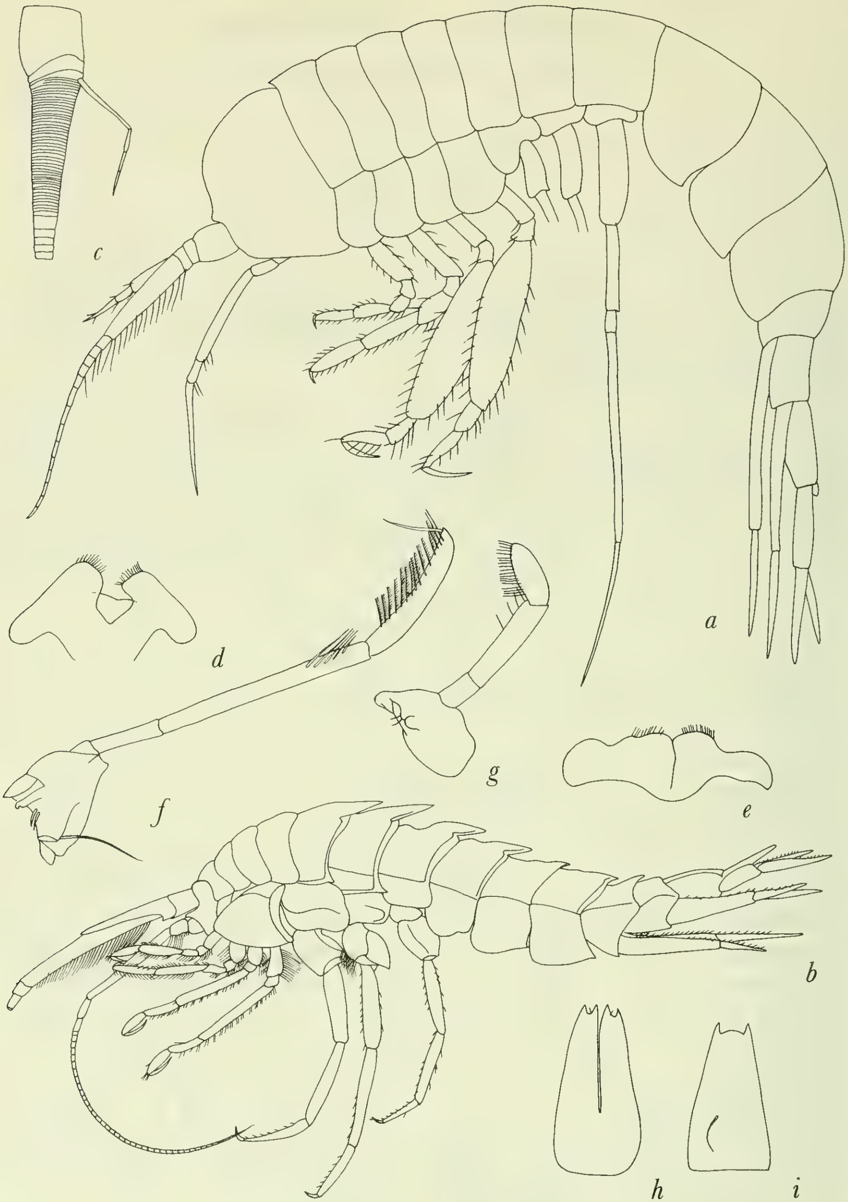

FIGURE 101.—Hyperiopsidae: *a*, *Hyperiopsis voringi* Sars (1885); *b*, *Parargissa galatheae* J. L. Barnard (1961). Accessory flagellum: *c*, *Hyperiopsis laticarpa* Birstein and Vinogradov (1955). Lower lip: *d*, *Parargissa arquata* (Birstein and Vinogradov, 1955); *e*, *Hyperiopsis*. Mandible: *f*, *Hyperiopsis gibbosa* Pirlot (1934); *g*, *Parargissa arquata*. Telson: *h*, *Parargissa arquata; i*, *Hyperiopsis gibbosa*.

Alexandrella, in the Stilipedidae, has a bent first maxillary palp but hyperiopsids have well-developed accessory flagella and mandibular molars.

Key to the Genera of Hyperiopsidae

1. Coxae 1–4 small, similar in size and shape (fig. 101*a*) . . . . **Hyperiopsis**
   Coxa 4 greatly enlarged, concealing the small first three coxae (fig. 101*b*) **Parargissa**

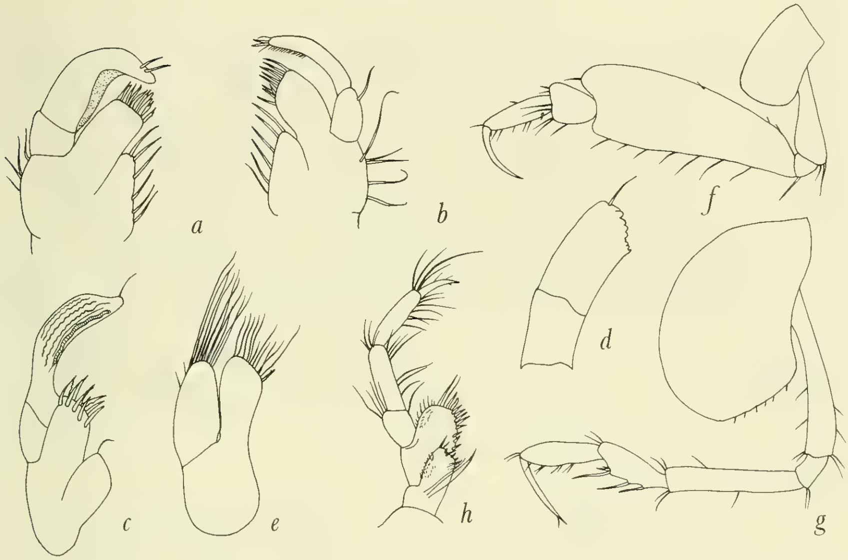

FIGURE 102.—Hyperiopsidae: Maxilla 1: *a,b, Parargissa arquata* (Birstein and Vinogradov, 1955); *c, Hyperiopsis gibbosa* Pirlot (1934); *d*, other palp of *Hyperiopsis*. Maxilla 2: *e, Hyperiopsis*. Pereopods 1 and 2: *f, Hyperiopsis laticarpa* Birstein and Vinogradov (1955); *g, Parargissa arquata*. Maxilliped: *h, Hyperiopsis*.

Genera of Hyperiopsidae

Hyperiopsis Sars

Hyperiopsis Sars, 1885.—Stebbing, 1906.

Type-species: *H. voringii* Sars, 1885 (monotypy). See Stephensen, 1934.

Species: 7, cosmopelagic, abyssal and bathyal.

Parargissa Chevreux

Parargissa Chevreux, 1908c.—Birstein and Vinogradov, 1958.
Protohyperiopsis Birstein and Vinogradov, 1955.

Type-species: *P. nasuta* Chevreux, 1908c (original designation).
Species: 5, cosmopelagic, abyssal.

Isaeidae

[including Photidae]

FIGURES 103–106

DIAGNOSIS.—Accessory flagellum variable in length or absent; telson entire, short, fleshy; coxa 5 not excavate posteriorly; pereopods 1–2 glandular; *uropod 3 rarely projecting beyond uropods 1 and 2, rami* (*at least one*) *as long as or longer than peduncle*, occasionally uropod 3 uniramous. See Aoridae, Corophiidae, Ischyroceridae, Calliopiidae, Laphystiopsidae, Oedicerotidae, Pleustidae.

DESCRIPTION.—Accessory flagellum varying from absent to long and multiarticulate; body smooth, rostrum absent; coxae rounded or quadrate ventrally, long or short, fourth not excavate posteriorly; mouthparts basic; gnathopods usually powerfully subchelate or extremely setose; uropod 3 short, rami as long as or longer than peduncle, not uncinate, occasionally inner ramus reduced or absent; telson entire, short, fleshy, nearly circular or square, occasionally falsely cleft.

RELATIONSHIP.—The Isaeidae do not warrant distinction from the Photidae on the basis of prehensile or partially subchelate pereopods and so they must be joined, Isaeidae (Isaeinae Dana, 1853) taking precedence. This move is unfortunate because of the long use of the name Photidae for a diversity of genera and the relatively infrequent use of the name Isaeidae.

The Laphystiopsidae have a nontriturative mandibular molar and are otherwise like calliopiids and pleustids.

See Calliopiidae for calliopiid-pleustid differences.

The Gammaridae usually have a cleft telson; when entire, the telson is not circular or subcircular and coxa 4 is strongly excavate posteriorly; some Gammaridae have a small, square, unexcavate coxa 4 but in those species the telson is cleft; Gammaridae lack glandular pereopods, do not build tubes, usually have uropod 3 projecting beyond uropods 1 and 2 and the rami are enlarged, either by dorsoventral depression, elongation, or foliaceousness.

The Aoridae have gnathopod 1 larger than gnathopod 2. Linkage is shown to that family by *Aorcho*, in the Aoridae, having gnathopods 1

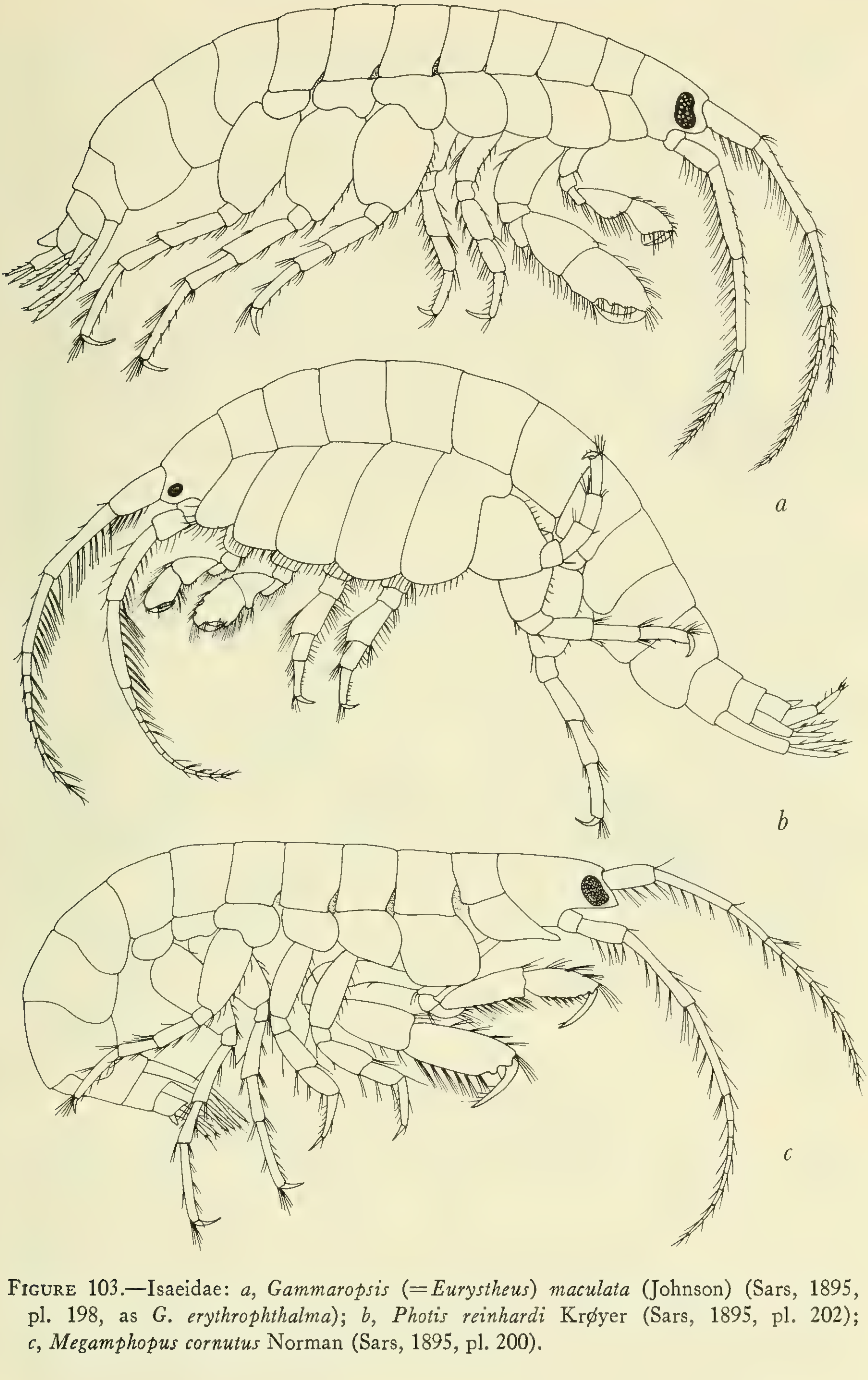

FIGURE 103.—Isaeidae: *a*, *Gammaropsis* (=*Eurystheus*) *maculata* (Johnson) (Sars, 1895, pl. 198, as *G. erythrophthalma*); *b*, *Photis reinhardi* Krøyer (Sars, 1895, pl. 202); *c*, *Megamphopus cornutus* Norman (Sars, 1895, pl. 200).

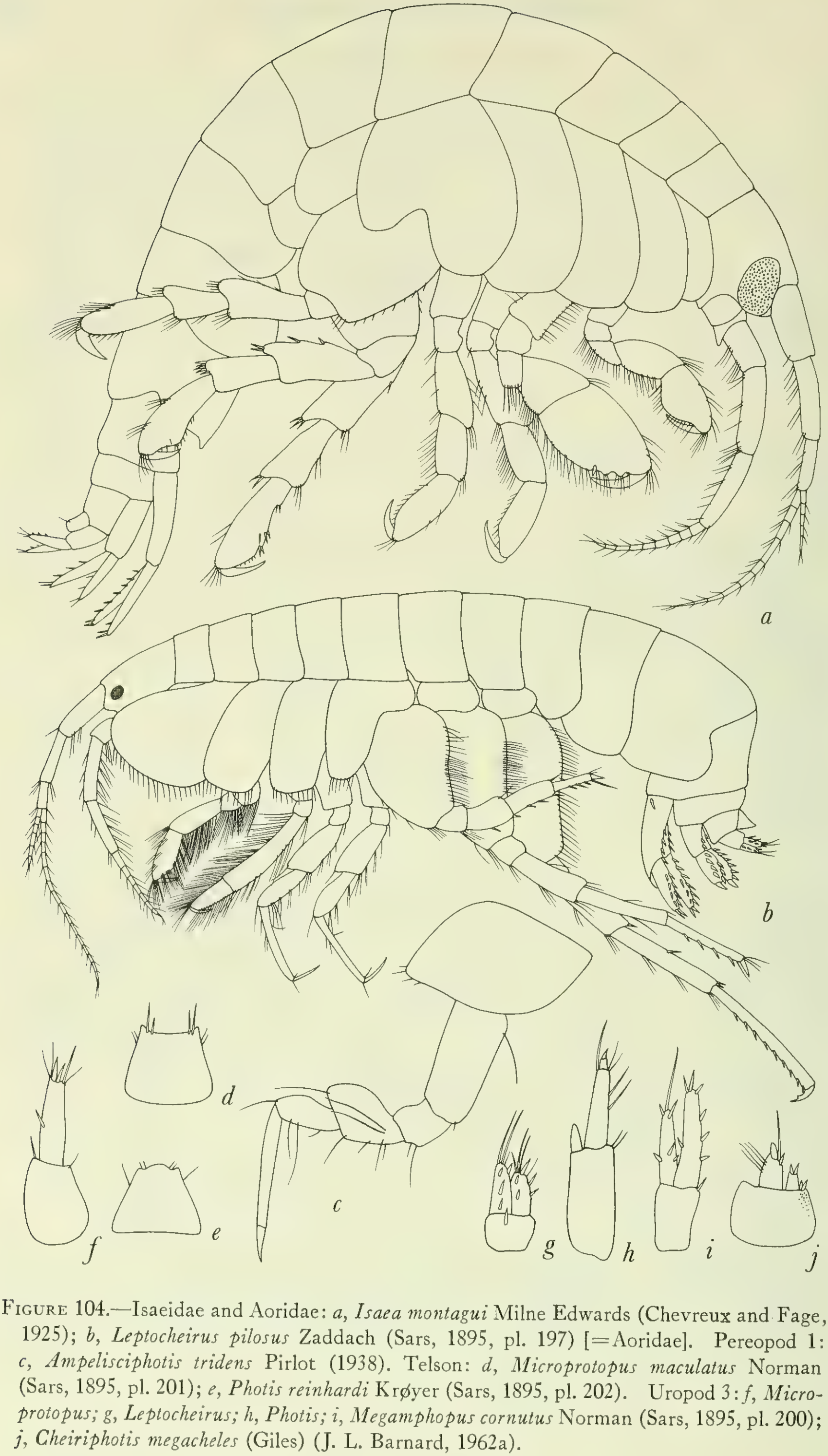

FIGURE 104.—Isaeidae and Aoridae: *a*, *Isaea montagui* Milne Edwards (Chevreux and Fage, 1925); *b*, *Leptocheirus pilosus* Zaddach (Sars, 1895, pl. 197) [=Aoridae]. Pereopod 1: *c*, *Ampelisciphotis tridens* Pirlot (1938). Telson: *d*, *Microprotopus maculatus* Norman (Sars, 1895, pl. 201); *e*, *Photis reinhardi* Krøyer (Sars, 1895, pl. 202). Uropod 3: *f*, *Microprotopus; g*, *Leptocheirus; h*, *Photis; i*, *Megamphopus cornutus* Norman (Sars, 1895, pl. 200); *j*, *Cheiriphotis megacheles* (Giles) (J. L. Barnard, 1962a).

and 2 equal in size. One must also examine *Neomegamphopus*, now assigned to Aoridae, as an intermediary between Isaeidae and Aoridae. All Isaeidae with male gnathopod 1 having secondary sexual modifications have been removed to the Aoridae.

The Ischyroceridae have the rami of uropod 3 shorter than the elongate peduncle and usually have one or more distinct hooks or an uncinate condition on the outer ramus.

The Ampithoidae have an even more stunted third uropod than do isaeids, the outer ramus of which usually bears hooks; the ampithoid lower lip has notched or medially excavate outer lobes.

The Corophiidae have a depressed urosome although this is not clearly distinct in some intergrading genera; all but a few corophiids have aberrant third uropods lacking one ramus, although a few Isaeidae also demonstrate this; some corophiids and isaeids are not clearly distinct and the taxonomist must use both family keys for doubtful genera.

Camacho and *Parunciola* in the Corophiidae and *Aorcho*, now assigned to the Aoridae, show the difficulty in clearly distinguishing among isaeids, aorids, and corophiids. These genera, with their moderately or fully depressed urosomes, equal-sized gnathopods, biramous third uropod [or uniramous third uropod with long ramus], and circular or quadrate telsons, lacking hooks, could be assigned to any of the three families.

The loss of one ramus of uropod 3 in five isaeid genera confounds technical distinction of Isaeidae from several other, distantly related families having uncleft telsons. Cressidae, Stenothoidae, and Thaumatelsonidae are distinguished from isaeids by their small first coxae. Eophliantidae have cylindrical bodies and Phliantidae, Talitroidea, and Dogielinotidae lack mandibular palps. Sebidae have chelate gnathopods and obsolescent mandibular molars and Pagetinidae have evanescent mandibular molars and poorly developed outer plates of the maxillipeds.

Nomenclatural Changes in Isaeidae

Amphideutopus J. L. Barnard (1959a) is removed to the Aoridae.

Audulla Chevreux (1901a) is assigned in the Isaeidae as subgenus to *Gammaropsis*.

Bathyphotis Stephensen (1944b) is removed to the Ischyroceridae.

Bonnierella Chevreux (1900) is removed to the Ischyroceridae but is also assigned in the Isaeidae to *Megamphopus*.

Eurystheus dentatus Holmes (1908) is removed to *Protomedeia* (*Cheirimedeia*).

Leptocheirus Zaddach (1844) is removed to the Aoridae.

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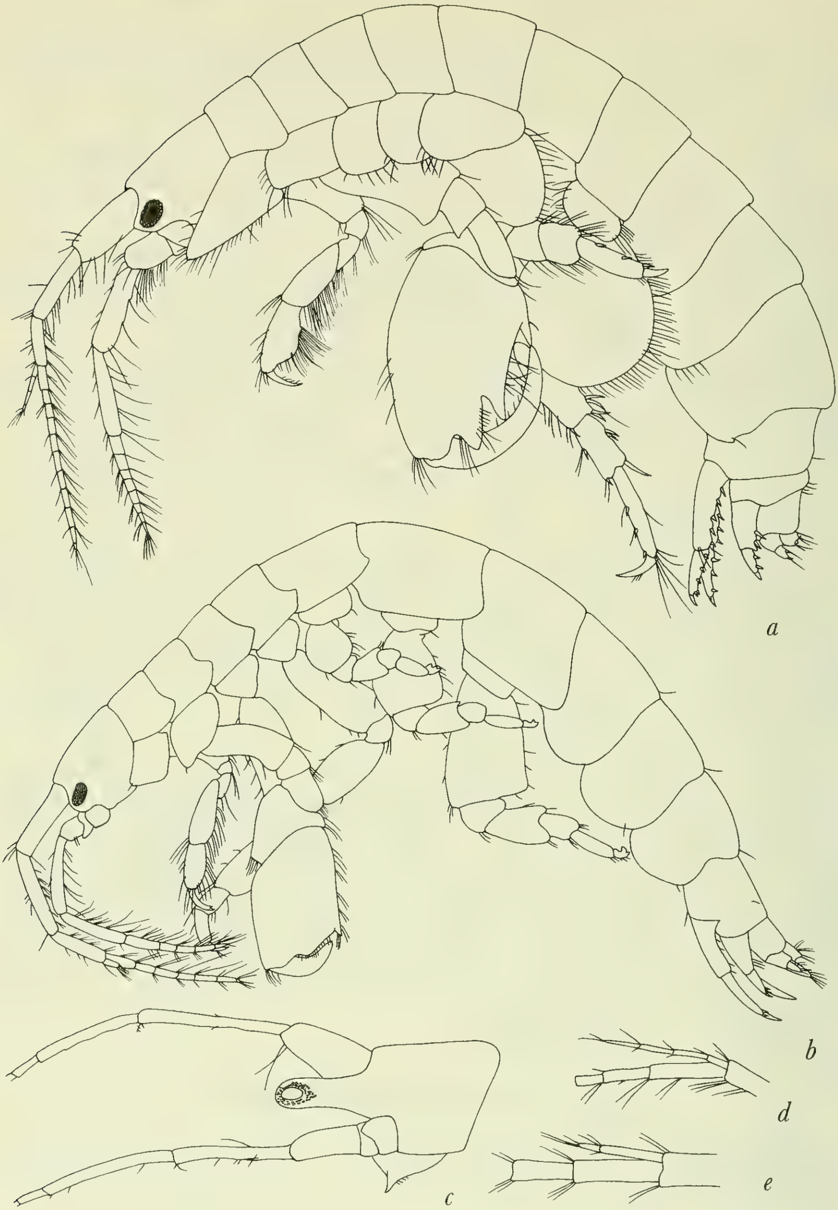

FIGURE 105.—Isaeidae: *a*, *Cheiriphotis megacheles* (Giles) (J. L. Barnard, 1962a); *b*, *Chevalia aviculae* Walker (J. L. Barnard, 1962a). Head: *c*, *Ampelisciphotis tridens* Pirlot (1938). Accessory flagella: *d*, *Gammaropsis* (=*Eurystheus*) *maculata* (Johnston) (Sars, 1895, pl. 199, as *G. melanops*); *e*, *Microprotopus maculatus* Norman (Sars, 1895, pl. 201).

Neomegamphopus Shoemaker (1942) is removed to the Aoridae.

Pseudeurystheus Schellenberg (1931) is assigned in the Isaeidae as subgenus to *Gammaropsis*.

Key to the Genera of Isaeidae

1. Uropod 3 uniramous (fig. 104*f*) 2
   Uropod 3 biramous (figs. 104*g–j*) 6
2. Lateral cephalic lobes pedunculate, article 6 of pereopods 1–2 elongate (figs. 105*c*, 104*c*) . . . . **Ampelisciphotis**
   Lateral cephalic lobes and article 6 of pereopods 1–2 not elongate 3
3. Gnathopod 1 simple (fig. 106*h*) . . . . **Kuphocheira**
   Gnathopod 1 subchelate 4
4. Antenna 1 with accessory flagellum 5
   Antenna 1 lacking accessory flagellum . . . . **Microphotis**
5. Coxae 1–4 similar to each other in size and shape (fig. 103*a*) . **Microprotopus**
   Coxae 1–4 of varying shapes and sizes (fig. 105*a*) . . . . . **Cheiriphotis**
6. Uropod 3 with one distinctly shortened ramus (less than 60% as long as outer) (fig. 104*h*) 7
   Uropod 3 with subequal rami (fig. 104*i*) 10
7. Gnathopods 1–2 simple . . . . **Haplocheira**
   Gnathopod 1 subchelate, gnathopod 2 simple . . **Leptocheirus** (Aoridae)
   Gnathopods 1–2 subchelate 8
8. Antenna 1 lacking accessory flagellum or bearing a vestigial article or scale. **Photis**
   Antenna 1 with multiarticulate accessory flagellum 9
9. Uropod 3 scale-like, peduncle plate-like (fig. 104*j*) . . . . . . **Cheiriphotis**
   Uropod 3 cylindrical (fig. 104*g*) . . . **Protomedeia** (subgenus *Cheirimedeia*)
10. Gnathopod 1 complexly subchelate (fig. 64*a*), gnathopod 2 with well-developed palm . . . . **Amphideutopus** (Aoridae)
    These characters not combined 11
11. Article 3 of antenna 1 as long as article 1 or longer 12
    Article 3 of antenna 1 shorter than article 1 16
12. Accessory flagellum of antenna 1 absent . . . . **Podoceropsis**
    Accessory flagellum of antenna 1 present 13
13. Accessory flagellum composed of a scale . . . . **Kermystheus**
    Accessory flagellum composed of one or more long articles 14
14. Accessory flagellum composed of one or two articles. **Megamphopus** (*Segamphopus* and *Audulla*), **Bonnierella** [1]
    Accessory flagellum composed of three or more articles 15
15. Pereopods 1–5 slightly subchelate (fig. 104*a*) . . . . **Isaea**
    Pereopods 1–5 simple . . . . . **Gammaropsis** (subgenus *Pseudeurystheus*)
16. Accessory flagellum absent . . . . **Dryopoides** [2] and **Goesia**
    Accessory flagellum present 17
17. Gnathopod 2 subchelate, coxae 1 and 2 visible and of normally balanced dimensions 18
    Gnathopod 2 simple (fig. 106*l*), coxa 1 very small and covered by enlarged coxa 2 . . . . **Leptocheirus** (Aoridae)
18. Pleonites 4 and 5 separate . . . . **Protomedeia**
    Pleonites 4 and 5 coalesced (fig. 105*b*) . . . . **Chevalia**

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[1] See this genus in the Ischyroceridae.

[2] See male, Stebbing (1910) and Aoridae (p. 153).

FIGURE 106.—Isaeidae and Aoridae: Mouthparts, *Photis reinhardi* Krøyer (Sars, 1895, pl. 202): *a*, upper lip; *b*, mandible; *c*, lower lip; *d,e*, maxillae 1, 2: *f*, maxilliped. Maxilliped: *g*, *Isaea montagui* Milne Edwards (Chevreux and Fage, 1925). Gnathopod 1: *h*, *Kuphocheira setimanus* K. H. Barnard (1932); *i*, *Photis tenuicornis* (Sars, 1895, pl. 203); *j*, *Leptocheirus pilosus* Zaddach (Sars, 1895, pl. 197) [=Aoridae]; *k*, *Megamphopus cornutus* Norman (Sars, 1895, pl. 200). Gnathopod 2: *l*, *Leptocheirus; m*, *Megamphopus; n*, *Photis tenuicornis*, female; *o*, *Kuphocheira; p*, *Photis tenuicornis*, male.

Genera of Isaeidae

Ampelisciphotis Pirlot

Ampelisciphotis Pirlot, 1938.

Type-species: *A. tridens* Pirlot, 1938 (original designation).

Lateral cephalic lobes and article 6 of pereopods 1–2 elongate (combining character); accessory flagellum absent; article 3 of antenna 1 equal to or slightly longer than article 1; gnathopods subchelate; uropod 3 uniramous, ramus shorter than peduncle. Species: 1, Indonesia, littoral.

Cheiriphotis Walker

Cheiriphotis Walker, 1904.

Type-species: *Melita megacheles* Giles, 1885 (monotypy). See J. L. Barnard, 1962a.

Accessory flagellum 3- or more articulate; article 3 of antenna 1 shorter than article 1; gnathopods subchelate; *uropod 3 scale-like, peduncle plate-like* (*Cheirimedeia*), outer ramus equal to or shorter than peduncle, inner ramus half as long as outer or absent; *coxae 1–4 of varying sizes and shapes* (*Microprotopus*). Species: 2, tropical Indo-Pacific, littoral.

Chevalia Walker

Chevalia Walker, 1904.
Neophotis Stout, 1913.

Type-species: *C. aviculae* Walker, 1904 (monotypy). See J. L. Barnard, 1962a.

Accessory flagellum 2-articulate; article 3 of antenna 1 slightly shorter than article 1; gnathopods subchelate, gnathopod 1 poorly; uropod 3 short, biramous, rami subequal to each other, equal to peduncle in length; *pleonites 4 and 5 coalesced.* Species: 1, tropical Indo-Pacific, littoral.

Gammaropsis Liljeborg, new synonymy

(*Gammaropsis*) Liljeborg, 1855 [subgenus].
Eurystheus Bate, 1857a.—Stebbing, 1906.
Paranaenia Chilton, 1884.
Maeroides Walker, 1898.
Audulla Chevreux, 1901a [a valid subgenus].
Fimbriella Stout, 1913.
Pseudeurystheus Schellenberg, 1931 [a valid subgenus].

Type-species: *Gammarus maculatus* Johnston, 1827 (selected by Boeck, 1876, with subsequent synonymy). See Sars, 1895.

Accessory flagellum 3- or more articulate; article 3 of antenna 1 equal to or longer than article 1; gnathopods subchelate; uropod 3 biramous, rami equal to each other, variable in length, generally equal to or longer than peduncle. Species: 53, cosmopolitan, littoral to bathyal.

Subgenus *Audulla* Chevreux (1901a): Like *Gammaropsis* but flagellum of antenna 2 stout. Species: 1, tropical Indian Ocean, littoral.

Subgenus *Pseudeurystheus* Schellenberg (1931): Like *Gammaropsis* but article 5 of male gnathopod 2 at least 1.6 times as long as article 6. Species: 1, subantarctic, littoral to 310 m.

Goesia Boeck

Goesia Boeck, 1871.—Stebbing, 1906.

Type-species: *Autonoe depressa* Goës, 1866 (monotypy). See Stephensen, 1942, 1944a.

Accessory flagellum absent; article 3 of antenna 1 shorter than article 1; gnathopods subchelate, gnathopod 2 poorly; uropod 3 short, biramous, rami equal to each other, subequal to peduncle. Species: 1, arctic-subarctic, littoral.

Haplocheira Haswell

Haplocheira Haswell, 1880b.—Stebbing, 1906.

Type-species: *Gammarus barbimanus* Thomson, 1879 (monotypy and subsequent synonymy). See Stebbing, 1888.

Accessory flagellum 2- or more articulate; article 3 of antenna 1 shorter than article 1; gnathopods simple; uropod 3 biramous, outer ramus subequal to peduncle, inner ramus very short. Species: 3, subantarctic-antiboreal, littoral to bathyal (457 m).

Isaea Milne Edwards

Isaea Milne Edwards, 1830.—Stebbing, 1906.

Type-species: *I. montagui* Milne Edwards, 1830 (monotypy). See Chevreux and Fage, 1925.

Accessory flagellum 3- or more articulate; article 3 of antenna 1 equal to article 1 in length; gnathopods subchelate; uropod 3 biramous, rami equal to each other, slightly longer than peduncle; *pereopods 1–5 slightly prehensile or subchelate, or article 6 widened distally.* Species: 4, N. Atlantic, littoral, some species inhabit decapods.

Kermystheus J. L. Barnard

Kermystheus J. L. Barnard, 1962a.

Type-species: *Podoceropsis kermadeci* Stebbing, 1888 (original designation).

Accessory flagellum a short, 1-articulate scale; article 3 of antenna 1 equal to or longer than article 1; gnathopods subchelate, gnathopod 1 occasionally poorly so; uropod 3 apparently biramous, rami subequal to each other and to peduncle. Species: 2, Kerguelen Island and California, littoral to bathyal (1,152 m).

Kuphocheira K. H. Barnard

Kuphocheira K. H. Barnard, 1931; 1932.

Type-species: *K. setimanus* K. H. Barnard, 1931 (original designation); 1932.

Accessory flagellum absent; [article 3 of antenna 1 undescribed]; gnathopods simple, *dactyl of gnathopod 2 reduced in size and setose;* uropod 3 uniramous, ramus shorter than peduncle. Species: 1, S. Orkney Islands, littoral.

Megamphopus Norman

Megamphopus Norman, 1869a.—Stebbing, 1906.
(*Segamphopus*) J. L. Barnard, 1962a [subgenus].
[*Bonnierella* Chevreux, 1900], as possible synonym, but also assigned to Ischyroceridae.

Type-species: *M. cornutus* Norman, 1869a (original designation). See Sars, 1895.

Accessory flagellum 1- or 2-articulate, article 1 elongate; article 3 of antenna 1 equal to or longer than article 1; gnathopods subchelate, occasionally poorly; uropod 3 biramous, rami subequal to each other, longer than peduncle. Species: 15, biboreal, littoral to bathyal (385 m).

Subgenus *Bonnierella* Chevreux (1900): Like *Megamphopus* but article 2 of pereopods 3–5 with parallel edges. This subgenus also is assigned as a genus to the Ischyroceridae. Species: 5, bathyal to abyssal.

Subgenus *Segamphopus* J. L. Barnard (1962a): Like *Megamphopus* but article 5 of gnathopod 2 at least 1.6 times as long as article 6. Species: 1, S. Georgia Island, littoral.

Microphotis Ruffo

Microphotis Ruffo, 1952.

Type-species: *M. blachei* Ruffo, 1952 (monotypy).

Accessory flagellum absent; article 3 of antenna 1 equal to article 1; gnathopods subchelate; uropod 3 uniramous, ramus shorter than peduncle. Species: 1, S. China Sea, littoral.

Microprotopus Norman

?*Dercothoe* Dana, 1852b.
Microprotopus Norman, 1867b.—Stebbing, 1906.
Orthopalame Hoek, 1879.

Type-species: *M. maculatus* Norman, 1867b (monotypy). See Sars, 1895.

Accessory flagellum 2-articulate, article 1 elongate; article 3 of antenna 1 shorter than article 1; gnathopods subchelate; uropod 3 uniramous, ramus slightly longer than peduncle. Species: 2, boreal to subtropical E. Atlantic and Mediterranean, littoral.

Photis Krøyer

Photis Krøyer, 1842.—Stebbing, 1906.
Eiscladus Bate and Westwood, 1863. Also *Heiscladus,* lapsus by Norman, 1869a.

Type-species: *P. reinhardi* Krøyer, 1842 (monotypy). See Sars, 1895.

Accessory flagellum absent or formed of a vestigial article or scale; article 3 of antenna 1 equal to or longer than article 1; gnathopods subchelate; uropod 3 biramous, outer ramus equal to or shorter than peduncle, inner ramus much shorter than outer ramus. Species: 41, cosmopolitan, littoral (rare to abyssal).

Podoceropsis Boeck

Podoceropsis Boeck, 1861.—Stebbing, 1906.
Naenia Bate, 1862 (homonym, Lepidoptera).
Xenoclea Boeck, 1871.

Type-species: *P. sophia* Boeck, 1861 (monotypy). See Sars, 1895.

Accessory flagellum absent; article 3 of antenna 1 equal to or longer than article 1; gnathopods subchelate; uropod 3 biramous, rami equal to each other, equal to peduncle in length. Species: 6, Atlantic, littoral to abyssal.

Protomedeia Krøyer

Protomedeia Krøyer, 1842.—Stebbing, 1906.
Cheirimedeia J. L. Barnard, 1962a [valid subgenus].

Type-species: *P. fasciata* Krøyer, 1842 (monotypy). See Sars, 1895.

Accessory flagellum 3- or more articulate; article 3 of antenna 1 shorter than article 1; gnathopods subchelate; uropod 3 biramous, rami subequal to each other, subequal to peduncle. Species: 14, subarctic, boreal Pacific (one Atlantic), littoral (?to bathyal).

Subgenus *Cheirimedeia* J. L. Barnard (1962a): Like *Protomedeia* but inner ramus of uropod 3 half as long as outer ramus. Species: 2, boreal Pacific.

Ischyroceridae

FIGURES 107, 108

DIAGNOSIS.—Accessory flagellum variable; telson short, entire, fleshy; coxa 4 not excavate posteriorly except in one genus; pereopods glandular; *uropod 3 rarely projecting beyond uropods 1 and 2*, peduncle elongate, rami styliform, shorter than peduncle, outer ramus usually uncinate, either with hooked tip, or hooked spine at tip, or denticles. See Isaeidae, Ampithoidae, Calliopiidae, Pleustidae, Corophiidae.

DESCRIPTION.—Accessory flagellum varying from uniarticulate to multiarticulate; body smooth; rostrum absent; coxae rounded or quadrate below, varying from long to short, fourth not excavate posteriorly (with exception in *Bathyphotis*); mouthparts basic, possibly epistome always acutely produced anteriorly; gnathopods usually powerfully subchelate; structure of uropod 3 as in diagnosis but merging with conditions typical of Isaeidae by tendencies to elongation of rami and lack of uncination; telson entire, subcircular or nearly square, thick.

RELATIONSHIP.—The Isaeidae (=Photidae) differ from the Ischyroceridae by the lack of uncination on the outer ramus of uropod 3, the longei rami and shortened peduncles, but some species now assigned to Isaeidae bear third uropods merging with the Ischyroceridae.

Calliopiids and pleustids have a nonfleshy telson and a short peduncle of uropod 3.

Ericthonius in the Corophiidae has an ischyrocerid uropod 3 without an inner ramus. *Dryopoides* and *Paradryope* in the Aoridae have third uropods which technically are ischyrocerid. *Parapherusa* in the Gammaridae lacks pereopodal glands but has uropod 3 similar to that of ischyrocerids.

Key to the Genera of Ischyroceridae

1. Coxae minute, not touching . . . . **Bogenfelsia**
   Coxae small or large, overlapping or barely touching 2
2. Gnathopod 1 distinctly larger than 2.
   Dryopoides (Aoridae) and **Paradryope** (Aoridae)
   Gnathopod 1 smaller than 2 or gnathopods subequal to each other . . . 3
3. Second articles of pereopods 3–5 narrowly linear, palp article 4 of maxilliped claw-like, longer than article 3 . . . . **Bonnierella**
   Second articles of pereopods 3–5 suboval or broadly rectangular, palp article 4 of maxilliped shorter than article 3, blunt,[1] or subconical,[1] (setose) (fig. 107*k*) 4

[1] Not including terminal spine.

4. Article 5 of gnathopod 1 much longer than article 6 5
   Article 5 of gnathopod 1 shorter than or subequal to article 6 6
5. Spines on outer plate of first maxilla nine or more, article 4 of pereopod 3 not wider than on pereopods 4–5 . . . . **Pseudischyrocerus**
   Spines on outer plate of maxilla 1 reduced to four, article 4 of pereopod 3 twice as wide as on pereopods 4–5 . . . . **Bathyphotis**
6. Accessory flagellum a small scale, articulate or not (fig. 107*c*) . . **Parajassa**
   Accessory flagellum elongate (figs. 107*d,e*) 7
7. Coxa 5 subequal to 6 in length, coxa 1 half as long as coxa 2 . . **Microjassa**
   Coxa 5 much longer than 6, coxa 1 three fourths as long as coxa 2 8
8. Pereopods subchelate (fig. 108*d*) . . . . **Isaeopsis**
   Pereopods simple (fig. 107*b*) 9
9. Outer ramus of uropod 3 with basally immersed, hooked terminal spine, distolateral margin of ramus with one to three large, reverted, sharp scales or several denticles (fig. 108*k*); male gnathopod 2 usually with large tooth on proximal portion of palm and with tooth on distal portion of palm. **Jassa** [2]
   Outer ramus of uropod 3 with or without basally immersed terminal spine, never hooked, distolateral margin of ramus with 0–7+ perpendicular, blunt, usually extremely small denticles (fig. 108*j*); male gnathopod 2 lacking proximal palmer tooth but often with distal palmar process . **Ischyrocerus** [2]

[2] These genera extremely difficult to distinguish except in adult males.

Genera of Ischyroceridae

Bathyphotis Stephensen

Bathyphotis Stephensen, 1944b.

Type-species: *B. tridentata* Stephensen, 1944b (monotypy).

Accessory flagellum multiarticulate, elongate; article 5 of gnathopod 1 longer than article 6; coxa 1 more than three fourths as long as coxa 2, coxa 4 subequal to coxa 6 in length, coxa 4 excavate posteriorly; *article 4 of pereopod 3 twice as wide as on pereopods 4–5; outer plate of maxilla 1 with four spines* (*Pseudischyrocerus*). Species: 1, subarctic Atlantic, bathyal (1,096 m).

Bogenfelsia J. L. Barnard

Bogenfelsia J. L. Barnard, 1962d.

Type-species: *B. incisa* J. L. Barnard, 1962d (original designation).

[Accessory flagellum unknown]; article 5 of gnathopod 1 longer than article 6; coxae minute, not touching, equal in length. Species: 1, antiboreal Atlantic, abyssal (4,893 m).

Bonnierella Chevreux

Bonnierella Chevreux, 1900.

Type-species: *Podoceropsis abyssi* Chevreux, 1887 (monotypy).

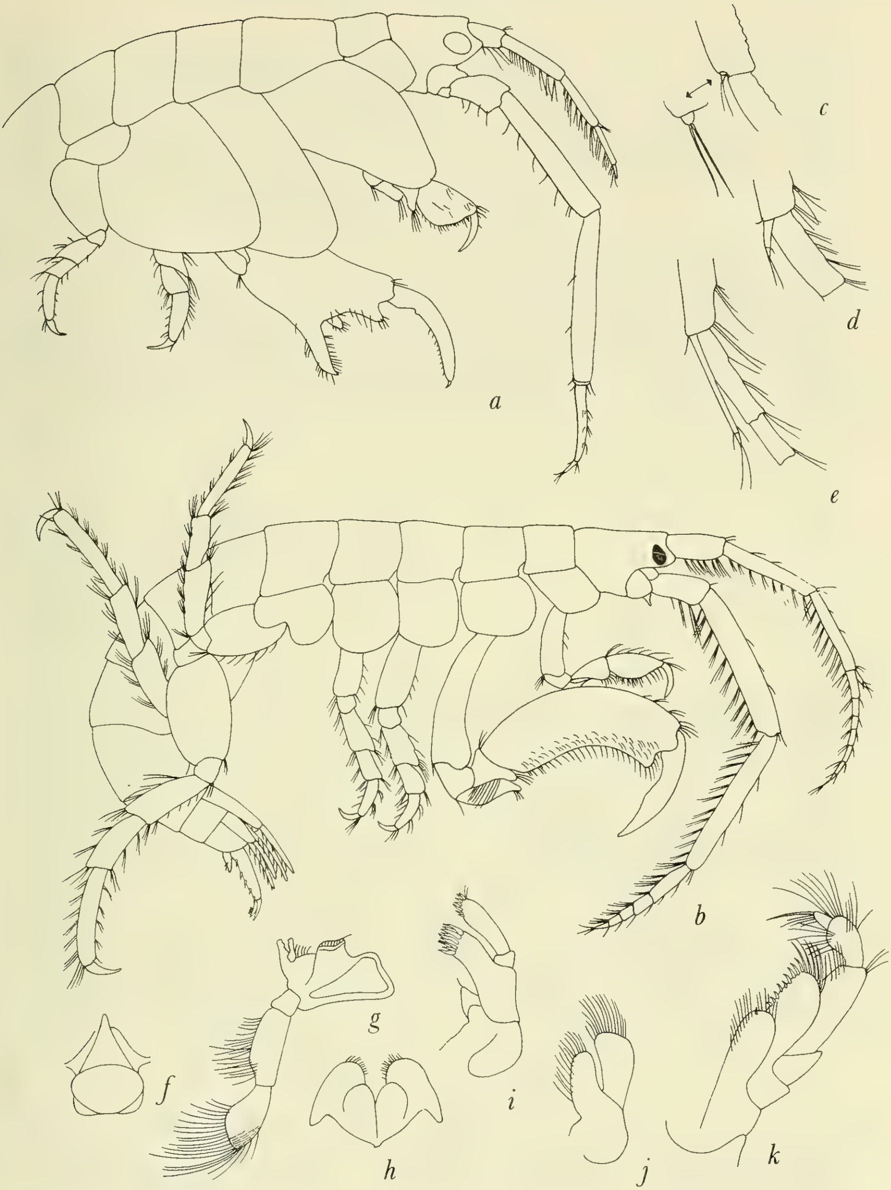

FIGURE 107.—Ischyroceridae: *a*, *Microjassa macrocoxa* Shoemaker (1942); *b*, *Ischyrocerus anguipes* Krøyer (Sars, 1895, pl. 209). Accessory flagella: *c*, *Parajassa pelagica* (Leach) (Sars, 1895, pl. 214, as *Janassa capillata*); *d*, *Jassa falcata* (Montagu) (Sars, 1895, pl. 212); *e*, *Ischyrocerus megacheir* (Boeck) (Sars, 1895, pl. 211). Mouthparts, *Ischyrocerus*: *f*, upper lip; *g*, mandible; *h*, lower lip; *i,j*, maxillae 1, 2; *k*, maxilliped.

Accessory flagellum 2-articulate, elongate; article 6 of gnathopod 1 longer than or equal to article 5; coxa 1 as long as coxa 2, coxa 5 longer than coxa 6; *article 2 of pereopods 3–5 narrow, linear, palp article 4 of maxilliped claw-like, longer than article 3 (combining character).* Species: 5, Atlantic, E. Pacific, bathyal to abyssal.

Isaeopsis K. H. Barnard

Isaeopsis K. H. Barnard, 1916.

Type-species: *I. tenax* K. H. Barnard, 1916 (monotypy).

Accessory flagellum 1-articulate; article 6 of gnathopod 1 longer than article 5; coxa 1 "small," coxa 5 longer than coxa 6; *pereopods prehensile.* Species: 1, S. Africa, littoral.

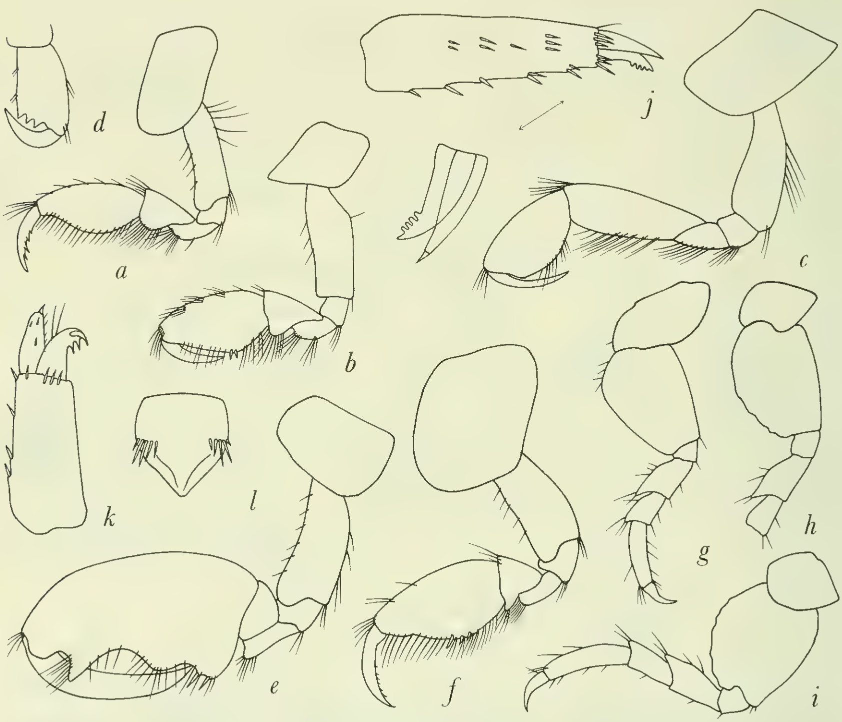

FIGURE 108.—Ischyroceridae: Gnathopod 1: *a*, *Ischyrocerus anguipes* Krøyer (Sars, 1895, pl. 209); *b*, *Jassa falcata* (Montagu) (Sars, 1895, pl. 212); *c*, *Pseudischyrocerus denticauda* Schellenberg (1931). Pereopod 1: *d*, *Isaeopsis tenax* K. H. Barnard (1916). Gnathopod 2: *e*, *Jassa*, note sharp distal palmar tooth and poor development of proximal tooth as an exception to couplet 9 of key; *f*, *Ischyrocerus*. Pereopods 3, 4, 5: *g,h,i*, *Microjassa macrocoxa* Shoemaker (1942). Uropod 3: *j*, *Ischyrocerus*; *k*, *Jassa*. Telson: *l*, *Ischyrocerus*.

Ischyrocerus Krøyer

Ischyrocerus Krøyer, 1838.—Stebbing, 1906.

Type-species: *I. anguipes* Krøyer, 1838 (monotypy). See Sars, 1895.

Accessory flagellum 2-articulate, elongate; article 6 of gnathopod 1 longer than article 5; coxa 1 more than three fourths as long as coxa 2, coxa 5 longer than coxa 6; *article 6 of male gnathopod 2 lacking large posteroproximal tooth; outer ramus of uropod 3 with or without basally immersed, unhooked terminal spine, distolateral margin usually with perpendicular, blunt, mostly very minute denticles* (*Jassa*). Species: 32, possibly cosmopolitan but primarily boreal, littoral to bathyal (2,090 m).

Jassa Leach

Jassa Leach, 1814a.—Stebbing, 1906.
Lusyta Nardo, 1847.
Cratophium Dana, 1852b.
Macleayia Haswell, 1880a.
Wyvillea Haswell, 1880c.
Bruzeliella Norman, 1905.
Hemijassa Walker, 1907.

Type-species: *Cancer falcatus* Montagu, 1808 (selected by Chevreux and Fage, 1925; indicated by subsequent montoypy through elimination by Stebbing, 1899a, and thereafter synonomy of species). See Sars, 1895 (as *Podocerus falcatus*).

Accessory flagellum 2-articulate, elongate; article 6 of gnathopod 1 longer than article 5; coxa 1 more than three fourths as long as coxa 2, coxa 5 longer than coxa 6; *article 6 of male gnathopod 2 usually bearing a large posteroproximal tooth; outer ramus of uropod 3 with distal, basally immersed, hooked spine, distolateral margin with 1–3 large, sharp, reverted scales* (*Ischyrocerus*). Species: 7, cosmopolitan, littoral.

Microjassa Stebbing

Microjassa Stebbing, 1899b; 1906.

Type-species: *Podocerus cumbrensis* Stebbing and Robertson, 1891 (monotypy). See Chevreux and Fage, 1925.

Accessory flagellum 1-articulate, very small; article 6 of gnathopod 1 longer than article 5; coxa 1 less than half as long as coxa 2; coxa 5 not longer than coxa 6. Species: 2, E. Atlantic, E. Pacific, littoral.

Parajassa Stebbing

Janassa Boeck, 1871 (homonym, Pisces).
Parajassa Stebbing 1899a; 1906 (new name for *Janassa*).

Type-species: *Jassa pelagica* Leach, 1814a (monotypy of Boeck and subsequent synonymy). See Sars, 1895 (As *Janassa capillata*).

Accessory flagellum a small tubercle; article 6 of gnathopod 1 longer than article 5; coxae 1 and 2 equal in length, coxa 5 longer than coxa 6. Species: 4, Atlantic, E. Pacific, amphiboreal, littoral.

Pseudischyrocerus Schellenberg

Pseudischyrocerus Schellenberg, 1931.

Type-species: *P. denticauda* Schellenberg, 1931 (present selection).

Accessory flagellum multiarticulate, elongate; article 5 of gnathopod 1 longer than article 6; coxae 1 and 2 equal in length; coxa 5 probably longer than coxa 6; *article 4 of pereopod 3 wider than on pereopods 4–5; outer plate of maxilla 1 with nine spines* (*Bathyphotis*). Species: 1, antiboreal, littoral.

Kuriidae

[J. L. Barnard, 1964c]

Figure 109

Diagnosis.—Accessory flagellum absent; *body laterally compressed*; urosomites all coalesced, mandible lacking palp, *molar well developed, triturative;* gnathopods feeble, subchelate; uropod 3 uniramous; *telson deeply cleft.* Monogeneric. See Phliantidae, Talitroidea, Dogielinotidae, Eophliantidae, Prophliantidae, Pagetinidae.

Description.—Body laterally compressed, all urosomal segments coalesced; mandible lacking palp, molar well developed; [lower lip and maxillae unknown]; maxilliped with outer lobes strongly reduced; gnathopods feeble, slender, subchelate; uropod 3 uniramous; telson short, deeply cleft.

Relationship.—The Talitroidea have discrete urosomal segments and well-developed outer plates on the maxillipeds.

The molar of the mandible is evanescent in the Prophliantidae and Pagetinidae.

Eophliantidae have cylindrical bodies.

The Phliantidae have evanescent mandibular molars and well-developed outer plates of the maxillipeds. Probably the Kuriidae should eventually be assigned as a subfamily to Phliantidae to demonstrate their close relationship. The Kuriidae show a link between Phliantidae and Talitroidea.

The Dexaminidae have only the last two urosomal segments coalesced and possess biramous third uropods but the Kuriidae otherwise demonstrate a link between the Dexaminidae and the Talitroidea.

Genera of Kuriidae

Kuria Walker and Scott

Kuria Walker and Scott, 1903.

Type-species: *K. longimana* Walker and Scott, 1903 (monotypy).
Species: 1, Abd-el-Kuri, littoral.

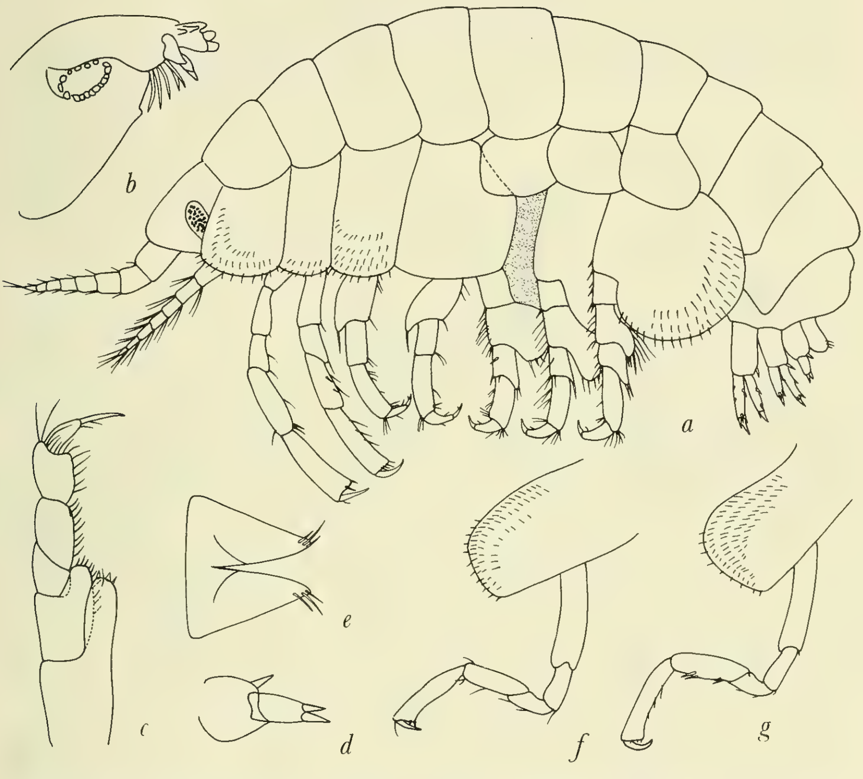

FIGURE 109.—Kuriidae: *Kuria longimanus* Walker and Scott (1903): *a*, lateral aspect, note overlap of pereopods 3–5 probably erroneous; *b*, mandible; *c*, maxilliped; *d*, uropod 3; *e*, telson; *f*,*g*, gnathopods 1, 2.

Lafystiidae

FIGURE 110

DIAGNOSIS.—Accessory flagellum absent; mouthparts arranged into a conical bundle; mandibular molar absent; palp of maxilla 1 reduced to a single tiny article; maxilliped with 2-articulate palp; coxa 4 acuminate, *coxae 1–3 quadrate;* gnathopod 1 simple; telson oval, short, entire. Monogeneric. See Laphystiopsidae, Acanthonotozomatidae.

Description.—Accessory flagellum absent; body broad, not carinate, urosomite 1 elongate; rostrum large, mouthparts arranged into a conical bundle; mandible lacking molar and spine row; lower lip lacking inner lobes; palp of maxilla 1 reduced to a single article; palp of maxilliped reduced to two small articles; coxae 1–3 quadrate, coxa 4 acuminate; gnathopods feeble, 1 simple, 2 weakly subchelate; uropod 3 biramous; telson small, oval, entire.

Relationship.—This family is so closely related to Acanthonotozomatidae that they might be joined together as subfamilies.

The Laphystiopsidae bear a 4-articulate maxillipedal palp, a man-

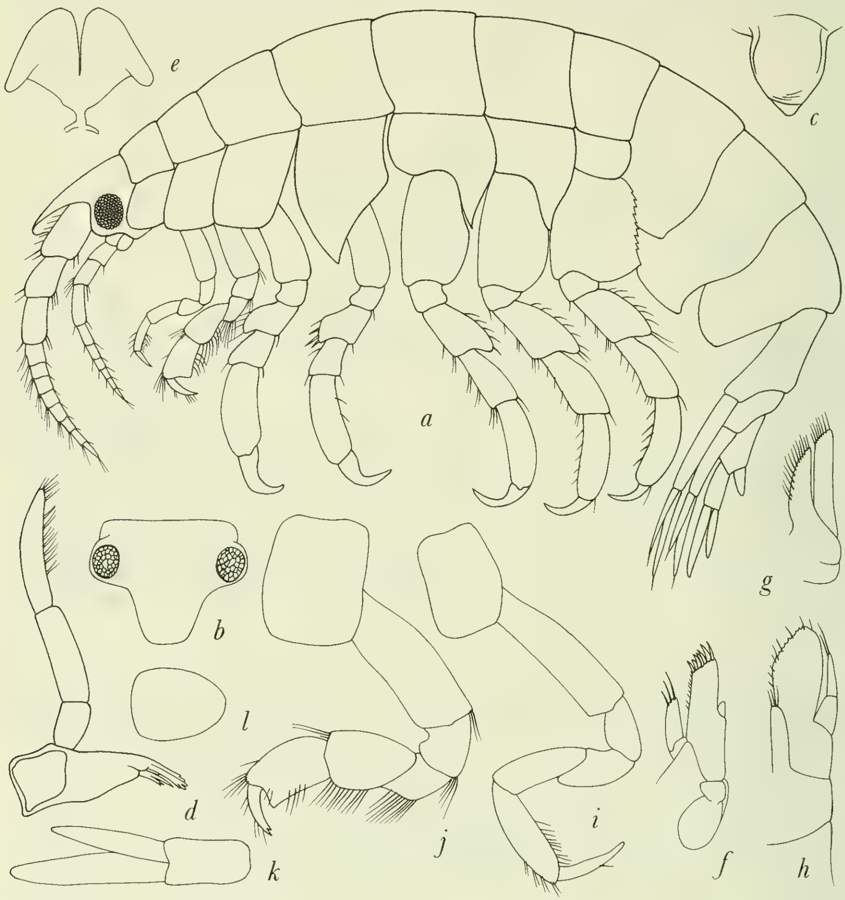

Figure 110.—Lafystiidae: *Lafystius sturionis* Krøyer (Sars, 1895, pl. 134): *a*, lateral; *b*, dorsal view of head; *c*, upper lip; *d*, mandible; *e*, lower lip; *f*,*g*, maxillae 1, 2; *h*, maxilliped; *i*,*j*, gnathopods 1, 2; *k*, uropod 3; *l*, telson.

dibular molar, a large palp on the first maxilla and an incised, broadened upper lip.

Superficially, the Lafystiidae resemble several other families through the Laphystiopsidae [which should be consulted]. As discussed therein the Laphystiopsidae are still considered distinct from Lafystiidae, necessitating the removal of *Prolaphystiopsis* to the Laphystiopsidae.

Genera of Laphystiidae

Lafystius Krøyer

Lafystius Krøyer, 1842.—Stebbing, 1906.
Darwinia Bate, 1857a.
?*Dermophilus* Beneden and Bessels, 1870.
?*Ichthyomyzocus* Hesse, 1873.

Type-species: *L. sturionis* Krøyer, 1842 (monotypy). See Sars, 1895.

Species: 1, boreal N.E. Atlantic, littoral, occurring on fishes.

Laphystiopsidae

FIGURE 111

DIAGNOSIS.—Accessory flagellum absent; mandibular molar nontriturative; gnathopods feeble, simple; telson entire. See Isaeidae, Stilipedidae, Oedicerotidae, Calliopiidae, Pleustidae, Lafystiidae.

DESCRIPTION.—Accessory flagellum absent; body broad, carinate only on a few pleonites; urosomite 1 elongate or not; rostrum large and spatulate or absent; upper lip incised; mandible bearing molar process, simple or slightly triturative; lower lip with or without inner lobes; palp of maxilla 1 large, 1- or 2-articulate; maxilliped with small 4-articulate palp; coxae variable, either very short and rectangular and serially disjunct or of medium length, quadrate or slightly acuminate and overlapping; gnathopods feeble, simple; outer rami of uropods 1–2 slightly shortened; uropod 3 biramous, peduncle short; telson short or of medium length, oval, entire.

RELATIONSHIP.—The Laphystiopsidae are simply Calliopiidae- and Pleustidae-like organisms with feeble, simple gnathopods, feeble, poorly setose maxillipedal palps and poorly developed mandibular molars. Even the lower lip of the type-genus is similar to that of Pleustidae, although *Prolaphystius* lacks inner lobes. Even *Cleippides* and *Regalia* in the Calliopiidae have simple gnathopods.

The Lafystiidae faintly resemble Laphystiopsidae but the latter have lost the mandibular molar and spine row, two articles of the

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maxillipedal palp, and have the first maxillary palp reduced in size. The unique species of lafystiid, however, has retained the subchelate condition of its second gnathopod, although it is feeble.

The uniformity of the Laphystiopsidae is complicated by the loss of the rostrum in *Prolaphystius* and that genus warrants further investigation on its familial assignments. *Prolaphystius* has an elongate urosomite 1 like Podoceridae but otherwise bears no resemblance to that family. It has been included in the key to Calliopiidae where it seems to have strong affinities.

The Astyridae bear a small accessory flagellum and broadly separated outer lobes on the lower lip.

The Oedicerotidae warrant close inspection of their slightly subchelate gnathopods as a feature distinguishing them from laphysti-

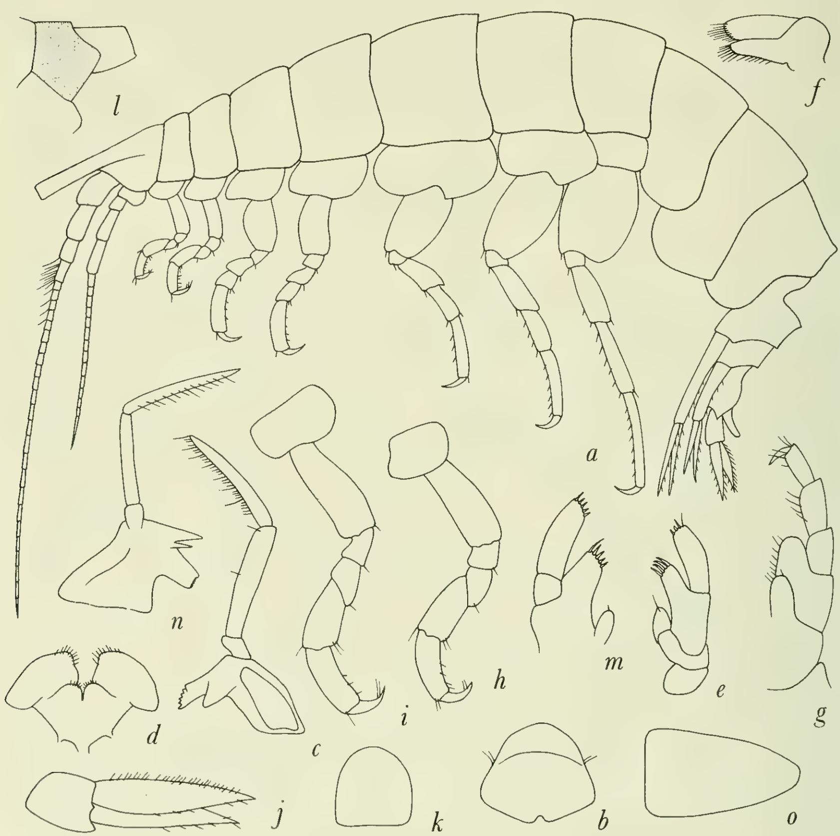

Figure 111.—Laphystiopsidae: *Laphystiopsis planifrons* Sars (1895, pl. 135): *a*, lateral; *b*, upper lip; *c*, mandible; *d*, lower lip; *e,f*, maxillae 1, 2; *g*, maxilliped; *h,i*, gnathopods 1, 2; *j*, uropod 3; *k*, telson. *Prolaphystius isopodops* K. H. Barnard (1930): *l*, head, right side, stippled; *m*, maxilla 1; *n*, mandible; *o*, telson.

opsids. Oedicerotids have an elongate peduncle of uropod 3, equal rami of uropods 1–2, unnotched upper lips, strongly setose appendages and disproportionately long fifth pereopods.

Stilipedidae have a broad, pardaliscid mandibular incisor, no molar and foliaceous maxillae.

Isaeids and their relatives have strongly triturative mandibular molars and usually have subchelate and/or large gnathopods.

Key to the Genera of Laphystiopsidae

1. A large rostrum present (fig. 111*a*) 2
   Rostrum absent (fig. 111*l*) . . . . **Prolaphystius**
2. Palp of maxilla 1 biarticulate (fig. 111*m*) . . . . **Prolaphystiopsis**
   Palp of maxilla 1 uniarticulate (fig. 111*e*) . . . . **Laphystiopsis**

Genera of Laphystiopsidae

Laphystiopsis Sars

Laphystiopsis Sars, 1895.—Stebbing, 1906.

Type-species: *L. planifrons* Sars, 1895 (monotypy).

Rostrum well developed; mandibular molar conical, unridged; palp of maxilla 1 uniarticulate; telson short, oval; pleonite 3 not forming a projecting shelf; coxae not touching serially. Species: 3, boreal to China Sea, littoral to bathyal (900 m).

Prolaphystiopsis Schellenberg

Prolaphystiopsis Schellenberg, 1931.

Type-species: *P. platyceras* Schellenberg, 1931 (monotypy).

Rostrum well developed; mandibular molar truncate, poorly ridged; palp of maxilla 1 biarticulate; telson short, oval; pleonite 3 not forming a projecting shelf; coxae not touching serially. Species: 1, subantarctic, littoral.

Prolaphystius K. H. Barnard

Prolaphystius K. H. Barnard, 1930.

Type-species: *P. isopodops* K. H. Barnard, 1930 (monotypy).

Rostrum absent; mandibular molar truncate, poorly ridged; palp of maxilla 1 biarticulate; telson long, linguiform; pleonite 3 forming a shelf-like projection; coxae of medium size, touching serially. Species: 1, antarctic, bathyal (406 m).

Lepechinellidae

Figure 112

Diagnosis.—One or more and usually all of coxae 1–4 acutely pointed below or anteriorly, occasionally bifid; accessory flagellum composed of one spine-like article; pleonites 5–6 ?coalesced. See Paramphithoidae, Atylidae, Eusiridae, Pleustidae.

Description.—Body processiferous; accessory flagellum 1-articulate, spine-like; rostrum conspicuous; upper lip probably always incised slightly; molar of mandible triturative, palp 3-articulate, slender, short or long; lower lip apparently with coalesced inner lobes, remaining mouthparts basic; gnathopods feeble, slender, subchelate; coxae of medium length or shortened, usually acuminate, often bifid; rami of uropod 3 greatly elongate, very slender, 3–6 times as long as peduncle; telson short, cleft, lobes diverging.

Relationship.—Originally this family was a part of the Paramphithoidae, because the type-genus *Lepechinella* was placed there by Stebbing (1908a); the junior synonym *Dorbanella* Chevreux (1914) was placed in the Tironidae but Schellenberg (1925a) removed that to a family Dorbanellidae, later to take the name of the senior synonym of the type-genus. Lepechinellidae resemble Paramphithoidae but presumably all species have pleonites 5–6 coalesced. The inner lobes of the lower lip of lepechinellids apparently are always fused together in contrast to the Paramphithoidae.

The coxae of Atylidae are elongate and not acuminate distally and their gnathopods are shorter and stouter than those of Lepechinellidae. Coxae 2–4 of *Paralepechinella* are scarcely, if at all acuminate.

No pleustid has coalesced urosomal segments nor a spine-like accessory flagellum. That family has characteristic lower lips.

Dexaminidae, Kuriidae, Prophliantidae all lack mandibular palps.

Key to the Genera of Lepechinellidae

1. Mandibular palp article 3 much shorter than article 2 (fig. 112*c*). **Lepechinella**

   Mandibular palp article 3 immense, much longer than article 2 (fig. 112*h*). **Paralepechinella**

Genera of Lepechinellidae

Lepechinella Stebbing

Lepechinella Stebbing, 1908a.
Dorbanella Chevreux, 1914.

Type-species: *L. chrysotheras* Stebbing, 1908a (monotypy).
Species: 13, cosmopolitan, bathyal and abyssal.

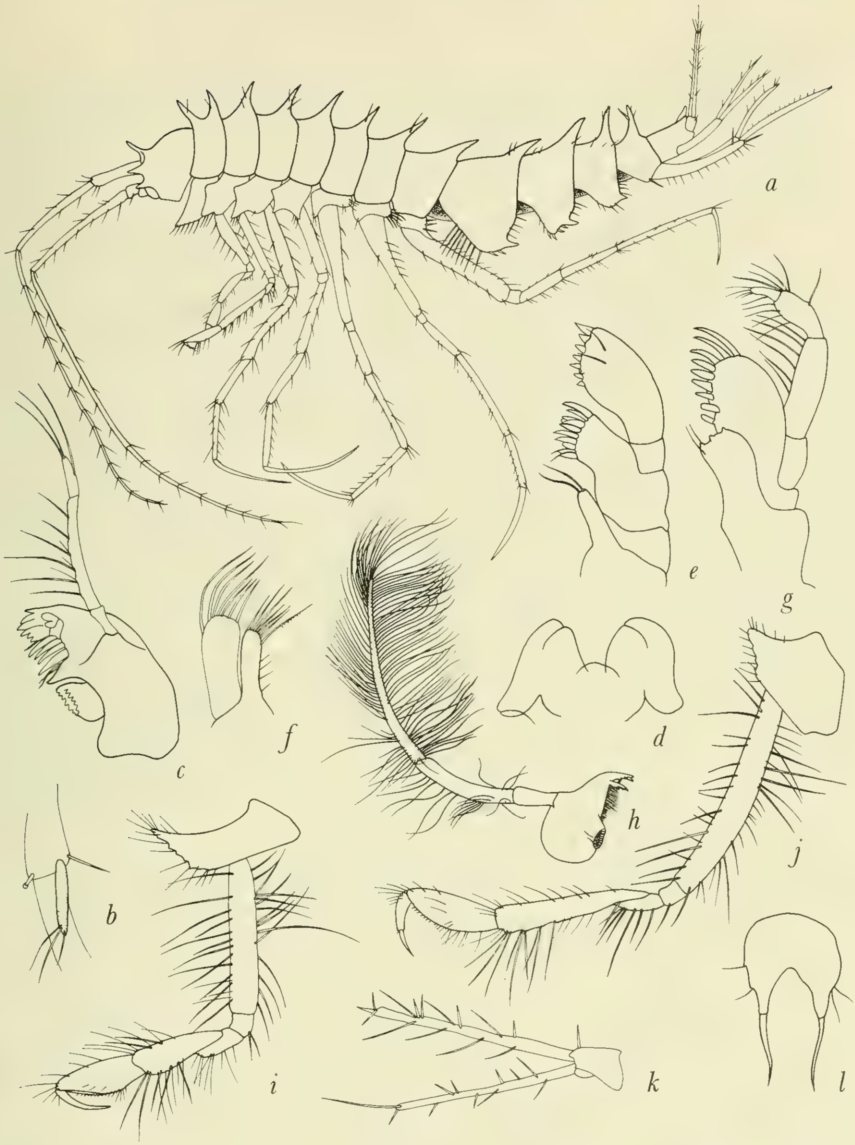

FIGURE 112.—Lepechinellidae: *a*, *Lepechinella bierii* J. L. Barnard (1957c). Accessory flagellum: *b*, *L. bierii*. Mouthparts, *Lepechinella chrysotheras* Stebbing (1908a): *c*, mandible; *d*, lower lip; *e,f*, maxillae 1, 2; *g*, maxilliped. Mandible: *h*, *Paralepechinella longipalpa* Pirlot (1933a). Gnathopods 1–2: *i,j*, *L. bierii*. Uropod 3: *k*, *L. bierii*. Telson: *l*, *L. chrysotheras*.

Paralepechinella Pirlot

Paralepechinella Pirlot, 1933a.

Type-species: *P. longipalpa* Pirlot, 1933a (original designation).
Species: 1, Indonesia, bathyal (1,301 m).

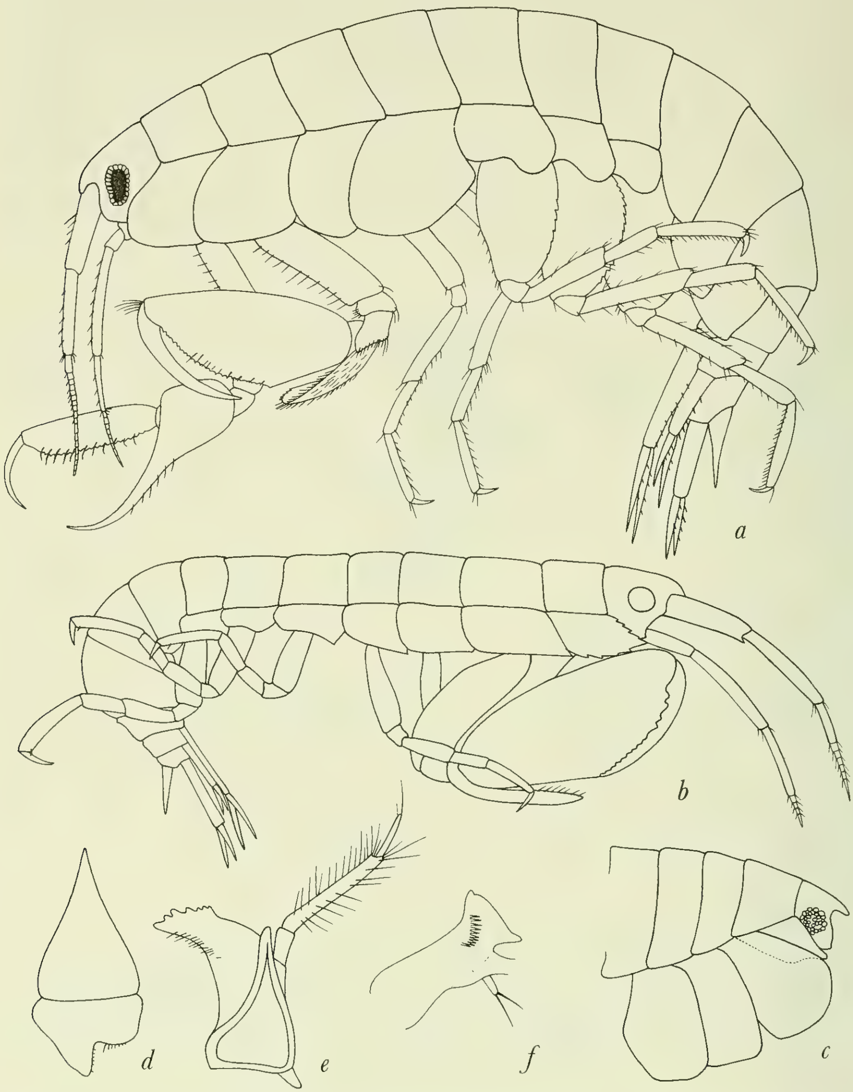

FIGURE 113.—Leucothoidae: *a*, *Leucothoe spinicarpa* (Abildgaard) (Sars, 1895, pl. 100); *b*, *Leucothoella bannwarthi* Schellenberg (1928); *c*, *Leucothoides pottsi* Shoemaker (1933a). Upper lip: *d*, *Leucothoe*. Mandible: *e*, *Leucothoe*; *f*, *Leucothoides*.

Leucothoidae

FIGURES 113, 114

DIAGNOSIS.—Accessory flagellum vestigial, 1- or 2-articulate, very small; mandible lacking molar; outer plates of maxilliped very small, probably never larger than inner plates; telson entire; gnathopod 1 carpochelate. See Anamixidae, Sebidae, Amphilochidae, Cressidae, Thaumatelsonidae.

DESCRIPTION.—Body lacking dorsal processes; accessory flagellum vestigial; epistome probably always produced in front; upper lip probably always asymmetrically incised; mandibles lacking molar, palp 1- or 3-articulate; maxillae basic; maxilliped with very small outer plates, partially fused inner plates and long slender palp; gnathopod 1 carpochelate, immovable finger long and narrow, gnathopod 2 larger than 1, subchelate, article 5 elongate and guarding article 6 posteriorly; coxae variable; uropod 2 shortened; uropod 3 with styliform rami, peduncle elongate, rami not longer than peduncle; telson entire, not longer than peduncle of uropod 3.

RELATIONSHIP.—The Anamixidae lack maxillae and recognizable mandibles.

The Cressidae, Thaumatelsonidae, and Stenothoidae have uniramous third uropods and subchelate first gnathopods.

The Sebidae have uniramous third uropods and chelate second gnathopods.

Key to the Genera of Leucothoidae

1. Coxa 2 covering most of coxa 1 (fig. 113*c*), mandibular palp 1-articulate (fig. 113*f*) . . . . **Leucothoides**
   Coxa 1 not concealed, mandibular palp 3-articulate (fig. 113*e*) 2
2. Coxa 2 very short, broader than long, acute anteriorly (fig. 113*b*). **Leucothoella**
   Coxa 2 at least as long as broad, rounded below and anteriorly (fig. 113*a*) . . 3
3. Outer plate of maxilliped reaching less than halfway along palp article 1 (fig. 114*d*) . . . . **Leucothoe**
   Outer plate of maxilliped reaching almost to end of palp article 1. **Paraleucothoe**

Genera of Leucothoidae

Leucothoe Leach

Leucothoe Leach, 1814a.—Stebbing, 1906.
Cuvieria Leach, 1814a (nomen nudum).
Lycesta Savigny, 1816.

Type-species: *Gammarus spinicarpus* Abildgaard, 1789 (monotypy and subsequent synonymy). See Sars, 1895.

Coxa 2 at least as long as broad, rounded ventrally and anteriorly, coxa 1 not concealed; mandibular palp 3-articulate; outer plate of maxilliped reaching less than halfway along palp article 1. Species: 25, cosmopolitan, littoral to abyssal.

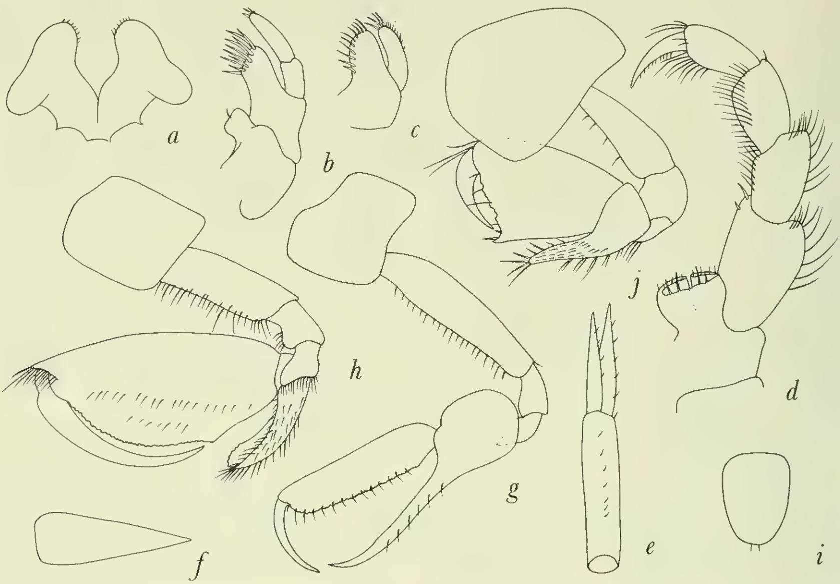

FIGURE 114.—Leucothoidae: *Leucothoe spinicarpa* (Abildgaard) (Sars, 1895, pl. 100): *a*, lower lip; *b,c*, maxillae 1, 2; *d*, maxilliped; *e*, uropod 3; *f*, telson; *g,h*, gnathopods 1, 2. *Leucothoides pottsi* Shoemaker (1933a): *i*, telson; *j*, gnathopod 2.

Leucothoella Schellenberg

Leucothoella Schellenberg, 1928b.

Type-species: *L. bannwarthi* Schellenberg, 1928b (monotypy). Coxa 2 very short, broader than long, acute anteriorly, coxa 1 not concealed; mandibular palp 3-articulate; outer plate of maxilliped reaching less than halfway along palp article 1. Species: 1, tropics, Red Sea to Fiji, littoral.

Leucothoides Shoemaker

Leucothoides Shoemaker, 1933a.

Type-species: *L. pottsi* Shoemaker, 1933a (monotypy).

Coxa 2 at least as long as broad, rounded ventrally and anteriorly, coxa 2 covering most of coxa 1; mandibular palp 1-articulate; outer plate of maxilliped reaching less than halfway along palp article 1. Species: 2, tropical Pacific, Caribbean, littoral.

Paraleucothoe Stebbing

Paraleucothoe Stebbing, 1899d.—Stebbing, 1906.

Type-species: *Leucothoe novaehollandiae* Haswell, 1880c (original designation).

Coxa 2 at least as long as broad, rounded ventrally and anteriorly, coxa 1 not concealed; mandibular palp 3-articulate; outer plate of maxilliped reaching almost to end of palp article 1. Species: 1, Australia, littoral.

Liljeborgiidae

FIGURES 115, 116

DIAGNOSIS.—Molar of mandible poorly developed, not triturative, accessory flagellum 2- or more articulate. See Gammaridae, Eusiridae, Pleustidae, Haustoriidae, Astyridae, Vitjazianidae.

DESCRIPTION.—Accessory flagellum always present, 2- or more articulate; rostrum inconspicuous; coxae long or of medium length; upper lip possibly slightly emarginate, not conspicuously so; mandibles always bearing 3-articulate palp with article 1 often elongate and as long as article 3 (except *Idunella* forming a link to Gammaridae); molar of mandible obsolescent, nontriturative; remaining mouthparts basic; gnathopods powerfully subchelate; uropod 3 with flattened, lanceolate rami; telson deeply cleft, not greatly elongate, apices of lobes bifid.

RELATIONSHIP.—In the Gammaridae only the genus *Parelasmopus* has an elongate mandibular palp article 1 but its mandibular molar has a well-developed grinding surface, unlike that of Liljeborgiidae. Apart from the mandible the Liljeborgiidae are like the Gammaridae.

The Astyridae differ from the Liljeborgiidae by the overall appearance and the presence of inner lobes or a broad medial space on the lower lip (see figures 32 and 41). Astyrids have feeble gnathopods, whereas those of liljeborgiids are powerfully developed. The rami of uropod 3 of Astyridae are much more elongate than those of Liljeborgiidae.

Some genera of Pleustidae have poorly developed mandibular molars as in Liljeborgiidae and the lower lips are similar. Pleustids, however, have vestigial or no accessory flagella and usually have uncleft telsons, but one species of *Austropleustes* confounds the definition. See Gammaridean Family Key G for specific distinctions.

The Eusiridae always have the accessory flagellum 2-articulate or less and this conflicts only with the genus *Listriella* in the Liljeborgiidae. But in contrast to the Eusiridae, *Listriella* usually has a 2-articulate outer ramus of uropod 3 with an elongated article 1 of the mandibular palp. *Eusirella* and *Eusiropsis* are the only eusirids having an obsolescent mandibular molar and they are clearly eusirids for their possession of calceoli. Eusirids have the outer ramus of uropods 1 and 2 shortened; in liljeborgiids this shortening is slightly evident only on uropod 2.

One genus of Amphilochidae, *Pseudamphilochus*, bears resemblance to Liljeborgiidae for its unreduced coxa 1, cleft telson, weak mandibular molar, and moderately powerful gnathopods. *Pseudamphilochus* presumably lacks an accessory flagellum, has a large rostrum, and nonbifid apices of the telson.

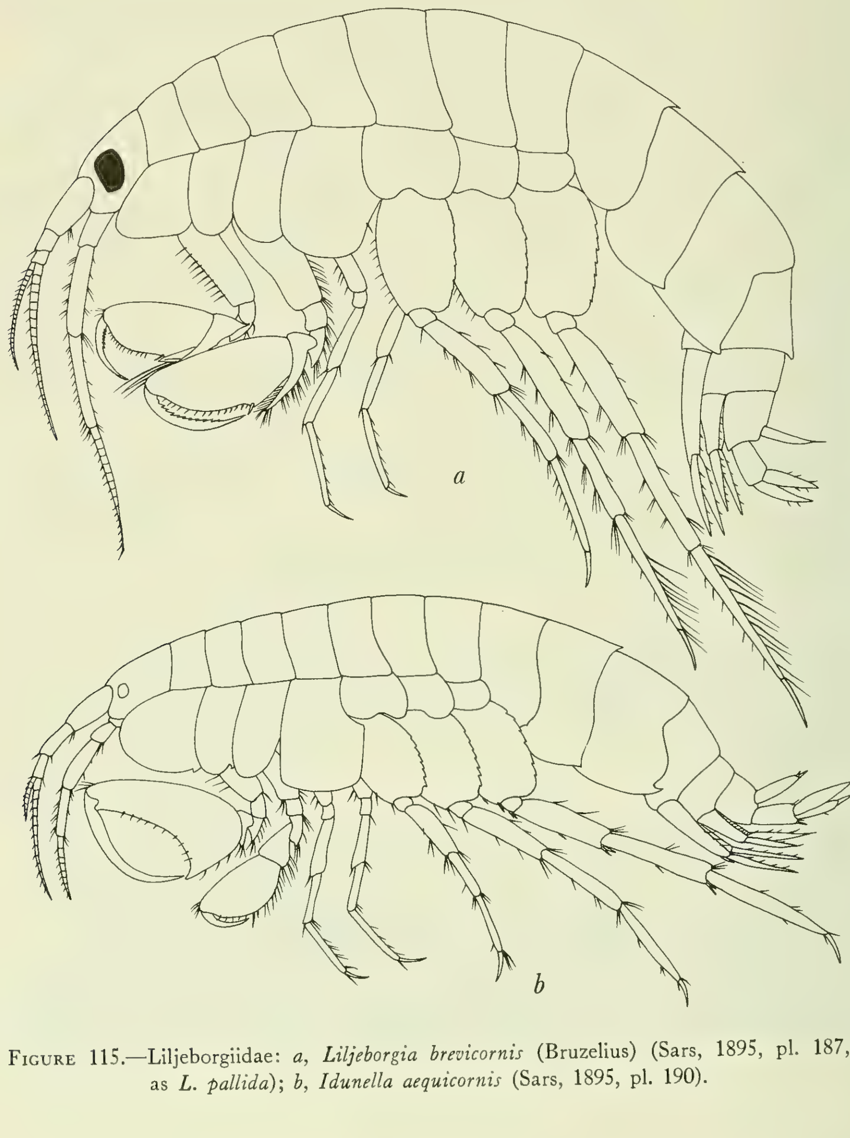

FIGURE 115.—Liljeborgiidae: *a*, *Liljeborgia brevicornis* (Bruzelius) (Sars, 1895, pl. 187, as *L. pallida*); *b*, *Idunella aequicornis* (Sars, 1895, pl. 190).

Key to the Genera of Liljeborgiidae

1. Gnathopod 1 larger than gnathopod 2 (fig. 115*b*) . . . . **Idunella**
   Gnathopod 1 smaller than or equal to gnathopod 2 (fig. 115*a*) 2
2. Article 5 of gnathopods 1–2 strongly produced, slender and elongate (fig. 116*g*); outer ramus of uropod 3 always simple (fig. 116*i*) . . . . **Liljeborgia**
   Article 5 of gnathopods 1–2 weakly produced, thick and blunt (fig. 116*j*); outer ramus of uropod 3 usually composed of two articles (fig. 116*k*) **Listriella**

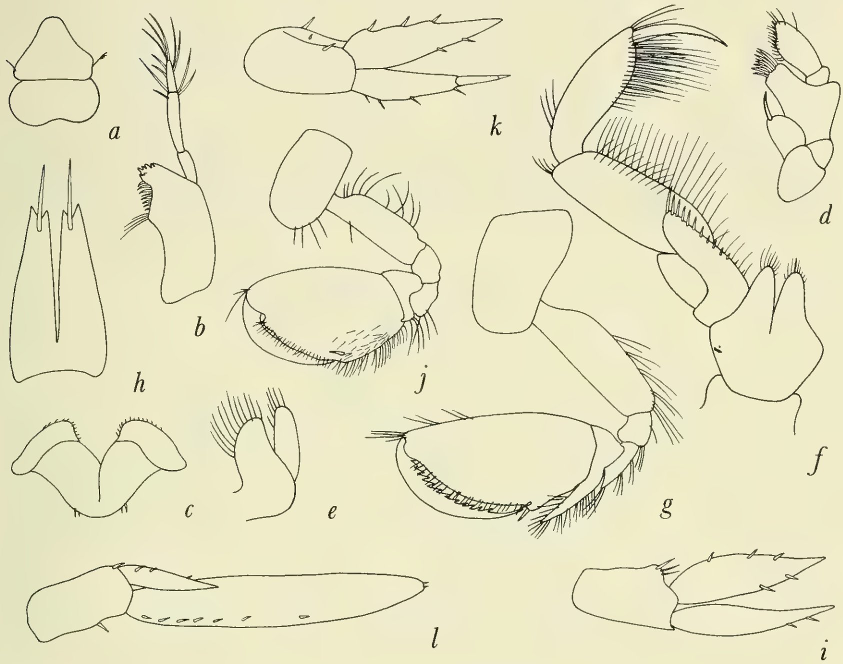

FIGURE 116.—Liljeborgiidae: *Liljeborgia brevicornis* (Bruzelius) (Sars, 1895, pl. 187, as *L. pallida*): *a*, upper lip; *b*, mandible; *c*, lower lip; *d,e*, maxillae 1, 2; *f*, maxilliped; *g*, gnathopod 2; *h*, telson; *i*, uropod 3. Gnathopod 2: *j*, *Listriella goleta* J. L. Barnard (1959b). Uropod 3: *k*, *Listriella diffusa* J. L. Barnard (1959b); *l*, *Listriella eriopisa* J. L. Barnard (1959b).

Genera of Liljeborgiidae

Idunella Sars

Idunella Sars, 1895.—Stebbing, 1906.—J. L. Barnard, 1959b.
Sextonia Chevreux, 1920.

Type-species: *Liljeboria aequicornis* Sars, 1876 (monotypy). See Sars, 1895.

Species: 4, subarctic, warm-temperate of N. Atlantic, tropical Indian Ocean, Japan, littoral to bathyal (763 m).

Liljeborgia Bate

Iduna Boeck, 1861 (homonym, Aves).
Liljeborgia Bate, 1862.—Stebbing, 1906.—K. H. Barnard, 1932.
Microplax Liljeborg, 1865 (homonym, Hemiptera).
Lilljeborgiella Schellenberg, 1931.

Type-species: *Gammarus pallidus* Bate, 1857a (monotypy of Bate, 1862). See Bate and Westwood, 1863.

Species: 28, bipolar and amphiboreal, littoral to abyssal.

Listriella J. L. Barnard

Listriella J. L. Barnard, 1959b.

Type-species: *L. goleta* J. L. Barnard, 1959b (original designation).

Species: 8, tropical and warm-temperate Atlantic and E. Pacific, littoral, often inhabiting tubes of maldanid polychaetes.

Lysianassidae

Figures 117–132

Diagnosis.—Accessory flagellum usually present and multiarticulate; article 3 of gnathopod 2 elongate (fig. 3*a*), gnathopod 2 otherwise of the typical lysianassid kind and with a fuzz of scales or setules on articles 5 and 6 (fig. 129); peduncle of antenna 1 short and stout. See Sebidae, Ochlesidae, Stegocephalidae, *Didymocheila* (incertae sedis).

Description.—Accessory flagellum usually present and more than 3-articulate but occasionally vestigial or few in segments; peduncle of antenna 1 short and stout, articles 2 and 3 usually much shorter than 1 and occasionally scarcely distinguishable because of telescoping; pereon generally lacking processes, often urosomal segment 1 processiferous; body compact, chitin usually very smooth, porcellanous; mouthparts enormously variable, either chewing or piercing, often with reduction in mandibular molars, variable in position of mandibular palps; upper lip and epistome invaluable for identification, either or both often produced in variable configurations; maxilla 1 generally with 2-articulate palp but occasionally reduced or absent; maxilla 2 occasionally poorly developed; maxilliped occasionally with reduced plates and palps; gnathopods usually quite small, 2 mitten-shaped terminally, with article 3 elongate, article 5 generally with a "pineapple cushion", i.e., posterior margin bulbous and with microscopic texture of a pineapple, structure composed of scales or coarse setules, article 6 generally covered with coarse setules or tasseled setules; pereopods generally stout, occasionally prehensile; coxae usually long, first one or two or three occasionally reduced in size or hidden by following coxae; rami of uropod 3 lanceolate, outer often 2-articulate, inner occasionally reduced in size, rarely both absent; telson cleft, emarginate or entire, long or short, rarely absent.

Gnathopod 2 is an unmistakable mark of this family. Nevertheless, Sebidae have a chelate gnathopod 2 with elongate article 3 but they are distinguished from Lysianassidae by the elongate peduncle of antenna 1 and the elongate and uniramous uropod 3. Some talitroideans have a mitten-shaped gnathopod 2 but article 3 is not elongate. Some Stegocephalidae also have long third articles but all of them have a characteristic shape of coxae 1–4, the first acuminate, the second and third narrower than 1, the fourth extremely broad, all four coxae fitting together tightly, forming a ventral semicircle and not overlapping. Stegocephalid mouthparts are highly characteristic although a few Lysianassidae have mouthparts resembling them. Stegocephalid mandibles usually have some foliaceous parts, rarely occurring in Lysianassidae. Stegocephalid mouthparts are always formed into a conical bundle, rarely occurring in Lysianassidae. Gnathopod 2 is always simple, whereas few Lysianassidae have a completely non-subchelate gnathopod 2.

Nomenclatural Changes in Lysianassidae

Alicella scotiae Chilton (1912) is removed to *Paralicella*.

Aruga Holmes (1908) is synonymized with *Lysianassa*.

Arugella Pirlot (1936) is synonymized with *Lysianassa*.

Lakota adversicola K. H. Barnard (1925) is removed to *Schisturella*.

Lakota rotundatus K. H. Barnard (1925) is removed to *Schisturella*.

Lysianassa anomala Nicholls (1938) is removed provisionally to *Parambasia*.

Lysianopsis Holmes (1903) is synonymized with *Lysianassa*.

[*Pronannonyx*] Schellenberg (1953) is also synonymized with *Lysianassa*.

Shoemakerella Pirlot (1936) is synonymized with *Lysianassa*.

Socarnopsis obesa Chevreux (1927) is removed to *Socarnes* in view of Hurley's (1963) classification, because uropod 3 has the outer ramus 2-articulate.

Tryphosites coxalis J. L. Barnard (1962d) is transferred to *Tryphosella* Bonnier, and is reflected in Key I, triplicut 7 (p. 304).

Key to the Genera of Lysianassidae

A basic key partitions the genera into several groups further developed in keys A to Q. This method brings together genera or portions of genera in different places in order to signal their complicated, net-like relationships and obviates the use of a long key with more than 100 couplets. Key N is provided as a separate entity for a special group of genera.

BASIC LYSIANASSID KEY

1. Telson absent (figs. 122*a*, 124*a*) . . . . Key A
   Telson present 2
2. Mandible without distinct incisor (fig. 126*c*) . . . . **Kerguelenia**
   Mandible with distinct incisor (figs. 126*a,b,d*) 3
3. From lateral view, mouthparts group strongly and conically projecting below head, more or less styliform (fig. 123*e*) . . . . Key B
   Mouthparts group usually not strongly or conically projecting below head, parts not styliform [if so, uropod 3 lacking rami (fig. 132*j*)] 4
4. Gnathopod 1 chelate (figs. 129*a,e,h,o*) . . . . Key C
   Gnathopod 1 subchelate or simple, rarely appearing parachelate 5
5. Mandibles: middle of incisor sharply dentate (fig. 126*o*) . . . . . Key D
   Mandibles: middle of incisor not dentate 6
6. Maxilla 1 lacking palp (fig. 127*b*) . . . . Key E
   Maxilla 1 bearing 1- or 2-articulate palp (fig. 126*a*) 7
7. Both coxae 1 and 2 (and occasionally 3) very small or distinctly smaller than following coxae, largely hidden by following coxae (fig. 122*c*). Key F
   Neither coxae 2 nor 3 distinctly reduced, both visible (fig. 122*d*) (occasionally coxa 1 reduced alone) . . . . choose either couplet 8 or 21[1]
8. Telson entire or emarginate, no apical slit (figs. 128*p,w*) . . . . . . Key G
   Telson cleft enough to provide slit or facing edges at angle of less than 45 degrees (figs. 128*n,o,t*) 9
9. Article 2 of pereopod 3 deeply indentured (fig. 131*b*) . . . . . **Glycerina**
   Article 2 of pereopod 3 not deeply indentured . . use either couplet 10 or 11
10. [Branchiae with large plaits (fig. 127*s*) (use Key H for rapid identification of select group of genera only, otherwise continue to couplet 11) . . Key H]
    [Branchiae lacking plaits (if in doubt use this couplet) . . . . 11]
11. Article 7 of gnathopod 1 minute, shrouded among a large and long tuft of setae or cirri attached to either or both propodus and dactyl (figs. 129*n*, 130*m*) . . . . Key K
    Article 7 of gnathopod 1 clearly visible, not shrouded. use either couplets 12 or 19
12. Upper lip produced forward lobately and usually conspicuously in front of epistome (epistome occasionally also projecting forward alongside dorsal edge of labral lobe) (figs. 125*a-d*) . . . . Key I[2]
    Upper lip not conspicuously produced forward lobately, or epistome and upper lip coalesced even if produced . . . . 13[2]
13. Epistome produced forward acutely and separately from upper lip (fig. 125*b*). 14
    Epistome, if produced, not acute or conical or epistome and upper lip coalesced even though produced 16

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[1] Couplet 8 leads to characters of ease in identification whereas couplet 21 leads to a possible natural grouping by use of mandibular structures.

[2] Key I generally contains taxa with produced upper lip (labrum) even if coalesced with epistome as long as labral portion recognizable by its position; couplet 13 generally contains taxa with epistome and upper lip together lobate and separated by a notch even though some of these taxa occur in key I for comparative purposes.

14. Mandibular palp attached level with molar or at its proximal corner . . 15
Mandibular palp attached strongly proximal to molar.
(exceptional) **Orchomene**
15. Coxa 1 tapering slightly and partially covered by coxa 2, inner ramus of uropod 2 simple . . . . **Tryphosella**
Coxa 1 fully expanded distally and freely visible, inner ramus of uropod 2 deeply constricted . . . . **Tryphosites**
16. Telson cleft less than one fourth of its length (figs. 128*n,o,p*) . . . Key J
Telson cleft one third or more of its length (figs. 128*s,t,v*) 17
17. Coxa 2 concealing anteroventral corner of coxa 1; or otherwise shielding coxa 1; or coxa 1 reduced in size or subtriangular (figs. 119*b*, 122*d*, 123*b*). Key L
Coxae 1 and 2 both large and visible and not triangular (figs. 117*a*, 118*a*) . 18
18. Mandible lacking palp . . . . **Stephensenia**
Mandible bearing palp . . . . Key M
19. (from couplet 11.) Coxa 1 slightly or strongly reduced in size or tapering distally (figs. 119*b*, 122*d*, 123*b*), often partially covered by coxa 2 . Key O
Coxa 1 of normal size, anterior and posterior edges parallel or coxa 1 distally expanded 20
20. Mandible lacking palp . . . . **Stephensenia**
Mandible bearing palp . . . . Key M
21. (from couplet 7.) Mandible lacking palp . . . . **Stephensenia**
Mandible bearing palp 22
22. Article 7 of gnathopod 1 minute, shrouded among setae or cirri attached to articles 7 or 6 . . . . Key K
Article 7 small or large, visible, usually claw-like 23
23. Pereopod 1 prehensile and resembling a large gnathopod.
Endevoura and **Ensayara**
Pereopod 1 simple 24
24. Mandibular palp attached distinctly proximal to molar or if molar absent palp distinctly proximal in position . . . . Key P
Mandibular palp attached level with or distal to molar, or if molar absent palp attached distinctly toward distal end of mandible . . . . . . Key Q

KEY A

These are highly aberrant genera, not certainly placed in the Lysianassidae. Shoemaker (1945a) believed *Thoriella* to be in the family Talitridae but the second gnathopod is distinctly that of a lysianassid. *Chevreuxiella* and *Danaella* bear resemblance to cyphocarids (key F) by reason of their coxae.

1. Maxillipedal palp absent (fig. 128*l*); pereonites 3–6 hugely inflated, forming a globular body (fig. 121*a*) . . . . **Danaella**
Maxillipedal palp present even if degraded; pereonites 3–6 not larger than other body segments (fig. 117*b*) 2
2. Urosome composed of two segments (fig. 124*a*) . . . . . . **Chevreuxiella**
Urosome composed of three segments (fig. 122*a*) . . . . **Thoriella**

KEY B[1]

1. Eyes and gnathopod 1 together powerfully developed (fig. 123*a*) 2
Eyes and gnathopod 1 not together powerfully developed 3

2. Coxa 1 half as long as coxa 2 (fig. 123*a*), palp of maxilla 1 very short (fig. 127*c*) . . . . **Trischizostoma**
Coxa 1 nearly as long as coxa 2, palp of maxilla 1 normal . . . . **Normanion**
3. Uropod 3 biramous 4
Uropod 3 not biramous, rami often obsolete 8
4. Maxilla 1: palp well developed, 2-articulate 5
Maxilla 1: palp vestigial (fig. 127*g*) . . . . **Acidostoma**
5. Maxilliped: article 4 of palp well developed 6
Maxilliped: article 4 of palp vestigial (fig. 128*d*) 7
6. Telson deeply cleft, gnathopod 1 stout . . . . **Shackletonia**
Telson entire, gnathopod 1 very slender, flagellate . . . . . **Azotostoma**
7. Gnathopod 1 simple . . . . **Phoxostoma**
Gnathopod 1 strongly subchelate . . . . **Normanion**
8. Gnathopod 1 simple 9
Gnathopod 1 chelate . . . . **Derjugiana**
9. Dactyl of gnathopod 2 present 10
Dactyl of gnathopod 2 absent . . . . **Ocosingo**
10. Coxae 1–2 strongly reduced in size and partially hidden by large coxa 3. **Lepidepecreella**
Coxae 1–2 large and visible . . . . . . **Acontiostoma** and **Stomacontion**

[1] See also *Parawaldeckia kidderi* (Smith) (p. 357).

KEY C

The first gnathopods of *Valettia, Normanion, Cheirimedon* and occasionally of *Orchomene* and *Hirondellea* and females of *Onesimoides* are weakly chelate. These genera are also included in other keys. Gnathopod 1 of *Microlysias* is vaguely chelate but the genus is not included here.

1. Uropod 3 lacking rami . . . . **Derjugiana**
Uropod 3 with rami 2
2. Mandible: cutting edge sharply toothed (though often minutely) (fig. 126*o*) 3
Mandible: cutting edge not toothed (fig. 126*h*) 5
3. Pereopod 3: article 2 deeply indentured (fig. 131*b*) . . . . . . **Podoprion**
Pereopod 3: article 2 not indentured 4
4. Inner ramus of uropod 3 vestigial, telson entire . . . . . . **Onesimoides**
Rami of uropod 3 subequal to each other, telson cleft . . . . . . **Valettia**
5. Maxillipedal palp 3-articulate (fig. 128*g*) 6
Maxillipedal palp 4-articulate 9
6. Telson cleft . . . . **Podoprionides**
Telson entire 7
7. Maxilla 1 lacking palp . . . . **Prachynella**
Maxilla 1 bearing palp 8
8. Pereopods 3–5: article 2 strongly indentured; palp of maxilliped not exceeding end of outer plate . . . . **Podoprionella**
Pereopods 3–5: article 2 not indentured; palp of maxilliped shorter than outer plate (fig. 128*g*) . . . . **Normanion**
9. Coxa 1 reduced in size or tapering distally and partially hidden by coxa 2 . 10
Coxa 1 of normal size and subquadrate shape, and not hidden by coxa 2 . 14

10. Inner plate of maxilla 1 with large sickle-shaped setae (fig. 127*d*). **Hirondellea**
    Inner plate of maxilla 1 with normal setae 11
11. Mandibular molar obsolescent or absent, gnathopod 1 strongly chelate or large 12
    Mandibular molar well developed, ridged or setulose, gnathopod 1 weakly chelate (fig. 129*a*) 13
12. Gnathopod 1 very slender, chela long (fig. 129*o*), epistome acute anteriorly. **Euonyx**
    Gnathopod 1 powerful, article 6 very broad, chela formed by deeply excavate palm (fig. 129*e*), epistome unproduced . . . . **Opisa**
    Gnathopod 1 powerful, article 6 very broad and distally expanding, palm protuberant, not excavate (fig. 129*l*), epistome and labrum each with shallow rounded lobe . . . . **Cheirimedon latimanus** Sars, 1895
13. Epistome with anterior bulb separated from protrusion of upper lip by long, flat margin . . . . **Aristiopsis**
    Epistome rounded and appressed to protrusion of upper lip (exceptional). **Schisturella**
14. Mandibular molar well developed, cuboid or ovate, setulose or ridged . . 15
    Mandibular molar conical and unridged, obsolete or absent 19
15. Telson cleft . . . . **Gainella**
    Telson entire . . . . some species of **Orchomene**
16. Gnathopod 2 tapering to a point (but minutely chelate) (fig. 131*i*). (alternate position) **Gainella**
    Gnathopod 2 distally blunt 17
17. Maxillipedal palp article 4 vestigial (fig. 128*e*) . . . . **Pachynus**
    Maxillipedal palp article 4 normal, claw-shaped 18
18. Outer plate of maxilliped large, exceeding end of palp article 2 19
    Outer plate of maxilliped small, not or scarcely exceeding palp article 1 . 20
19. Eyes very large (losing pigment in alcohol), accessory flagellum 4+-articulate, telson longer than broad . . . . **Koroga**
    Eyes absent, accessory flagellum 1-articulate, telson as broad as long. **Figorella**
20. Spines on outer plate of maxilla 1 reduced to two or three fused members, outer ramus of uropod 3 uniarticulate . . . . **Sophrosyne**
    Spines on outer plate of maxilla 1 of normal number (9) and articulate, outer ramus of uropod 3 biarticulate . . . . **Kyska**

KEY D

Most lysianassids have the primary cutting edge of the mandible bearing at least one notch subtended by a tooth but these notches are always lateral and never in the middle of the cutting edge; the following species have teeth along the middle margin of the primary mandibular plate.

Valettia is also included in Key B, because of its slightly chelate first gnathopod. *Podoprion* and *Onesimoides* in Key C and *Aristiopsis* in Keys C and N also have a toothed incisor. *Clepidecrella* may have an extremely minute incisorial dentition. Nicholls' (1938) figure of *Adeliella* has a slight indication of incisorial teeth.

1. Gnathopod 1 simple . . . . **Alicella**
   Gnathopod 1 subchelate. 2
2. Telson entire, inner ramus of uropod 3 vestigial . . . . **Onesimoides**
   Telson cleft, rami of uropod 3 subequal to each other 3
3. Coxa 2 perfectly rectangular and elongate, partially covering coxa 1, latter shortened, subtriangular; inner plates of maxillae 1–2 fully lined with setae medially . . . . **Valettiopsis**
   Coxa 2 short, broad, subrounded, scarcely concealing any portion of coxa 1, latter not shorter than coxa 2 and of similar shape; inner plates of maxillae 1–2 with mostly terminal setae, medial edges scarcely or not setose. **Valettia**

KEY E

Maxilla 1 lacks a palp, but the mouthparts are arranged in a quadrate bundle, gnathopod 1 is not chelate, and the mandibular cutting edge is not toothed. See Key A, *Acidostoma* in Key B and *Prachynella* in Key C.

1. Gnathopod 1 very large, subchelate (fig. 130*a*), "telson entire" . **Pachychelium**
   Gnathopod 1 small, simple, "telson cleft" 2
2. Antenna 1: article 2 as long as article 1 . . . . **Bathyamaryllis**
   Antenna 1: article 2 about half as long as 1 3
3. Anteroventral corner of coxa 4 acutely produced . . . . **Vijaya**
   Anteroventral corner of coxa 4 rounded . . . . **Amaryllis**

KEY F

These are the cyphocarids, characterized by the distinctly reduced first and second coxae (and occasionally the third), often hidden behind coxa 3 (fig. 122*c*) but not always, depending on the anterior prolongation of the third coxae (or fourth). Coxae 3–4 of *Metacyclocaris* do not fit this key because of their small size but the genus is included for other comparisons. See note of Key A.

1. Urosomites 2 and 3 coalesced (fig. 122*c*) . . . . **Crybelocyphocaris**
   Urosomites 2 and 3 separate 2
2. Mandible lacking palp 3
   Mandible bearing palp 5
3. Pereopods 4–5 prehensile, article 6 of gnathopod 1 shorter than article 5. **Mesocyclocaris**
   Pereopods 4–5 not prehensile, articles 5 and 6 of gnathopod 1 subequal . . 4
4. Telson entire . . . . **Crybelocephalus**
   Telson cleft . . . . **Metacyphocaris**
5. Uropod 3: inner ramus strongly reduced or absent (fig. 132*h*) 6
   Uropod 3: rami subequal to each other, well developed 8
6. Pereopods simple (fig. 117*a*) . . . . **Lepidepecreella**
   Pereopods prehensile (fig. 131*a*) 7
7. Telson cleft . . . . **Mesocyphocaris**
   Telson entire . . . . **Cebocaris**
8. Coxa 2 much larger than 1 and covering it, but coxae 3–4 small, not covering anterior coxae . . . . **Metacyclocaris**
   Some of coxae 1–2 or 1–3 covered either by 3 or 4, coxa 4 large 9

9. Article 2 of pereopod 3 deeply indentured (fig. 131*b*) or with very long, simple posterodistal tooth; coxae 1–3 all small and covered by coxa 4. **Cyphocaris**
   Article 2 of pereopod 3 not deeply indentured, only coxae 1–2 reduced and covered by coxae 3 or 4 10
10. Some pereopods prehensile . . . . **Paracyphocaris**
   Pereopods simple 11
11. Mandible lacking distinct molar or with conicolaminate and unridged molar. **Cyclocaris**
   Mandible bearing triturative molar (fig. 126*g*) . . . . **Procyphocaris**

KEY G

The genus "*Onisimus*" auct. (=*Boeckosimus*, new genus, herein) has always been poorly defined and confusing (see Stebbing, 1906, key p. 9, couplet 14). Some of its species overlap with "*Pseudalibrotus*" auct. (=*Onisimus* as senior synonym) to which I believe they should be transferred. The genus also appears in Keys J and M.

"*Onisimus*" auct. comprises a series ranging from entire telson (as in some species of "*Pseudalibrotus*" auct.) to slightly split (as in Key J) to half split (in *Paronesimus* and *Paratryphosites* (=*Hippomedon*) in Key M). The proportions of articles 5 and 6 of gnathopod 1 vary slightly, enough to cross couplets in Key M.

1. Pereopod 1 formed into a subchelate grasping organ similar to a gnathopod (fig. 130*b*) . . . . **Endevoura** and **Ensayara**
   Pereopod 1 simple 2
2. Upper lip formed into a large keel-like lobe usually strongly projecting in front of epistome (fig. 125*c*) 3
   Upper lip usually small, obscure, and/or scarcely projecting in front of epistome (figs. 125*g,n,o*), or epistome and upper lip coalesced, upper lip if lobate equalled in extent by lobe of epistome 11
3. Uropod 3: inner ramus less than half as long as outer, [article 5 of male antenna 2 dilated (fig. 124*j*)] . . . . **Parawaldeckia**
   Uropod 3: inner ramus subequal to or more than half as long as outer, [article 5 of male antenna 2 not dilated, article 4 rarely dilated] 4
4. Gnathopod 1 with broadly transverse palm (fig. 129*a*) . . . . . **Koroga**
   Gnathopod 1 minutely but distinctly subchelate (fig. 129*b*) 5
   Gnathopod 1 simple (fig. 129*m*) 6
5. Article 4 of antenna 2 tumid . . . . **Lysianella**
   Article 4 of antenna 2 slender . . . . **Paralysianopsis**
6. Article 4 of male antenna 2 dilated . . . . **Lysianella**
   Article 4 of male antenna 2 not dilated 7
7. Uropod 3: peduncle expanded distally into a narrow, plate-like projecting shelf (fig. 132*i*) 8
   Uropod 3: peduncle simple, subcylindrical (fig. 132*g*) . . . . **Lysianassa** [1]
8. Maxilla 1 with two kinds of spines on inner plate 9
   Maxilla 1 with one kind of spine on inner plate 10
9. Inner ramus of uropod 2 constricted (fig. 117*a*) . . . . . . [**Arugella** [1]]
   Inner ramus of uropod 2 unconstricted . . . . [**Pronannonyx** [1]]
10. Maxilla 2: inner plate nearly twice as broad as outer . . [**Shoemakerella** [1]]
   Maxilla 2: inner plate equal to outer in width . [**Lysianopsis** [1]] and [**Aruga** [1]]

[1] I am amalgamating all of these genera in *Lysianassa*, but *Pronannonyx* is questionable and also retained as a genus in alphabetical order.

11. Uropod 3: inner ramus vestigial or absent 12
    Uropod 3: inner ramus more than half as long as outer ramus 13
12. Uropod 3: inner ramus vestigial, article 1 of antenna 1 flagellum 5 times as long as next article . . . . **Onesimoides** [2]
    Uropod 3: inner ramus absent or represented by a spine, article 1 of antenna 1 flagellum not longer than next article. . . . . **Paronesimoides**
    Uropod 3: inner ramus vestigial, article 1 of antenna 1 flagellum not longer than next article . . . . **Clepidecrella** [3]
13. Gnathopod 1 simple 14
    Gnathopod 1 distinctly, though often minutely subchelate 17
14. Mandibular palp attached level with molar (fig. 126*m*), coxa 4 scarcely excavate posteriorly (fig. 117*a*) . . . . . **Paralibrotus** and **Menigrates**
    Mandibular palp attached well proximal of molar (fig. 126*h*), coxa 4 excavate posteriorly (fig. 119*b*) 15
15. Palp article 4 of maxilliped tiny (fig. 128*k*) . . . . **Nannonyx**
    Palp article 4 of maxilliped well developed (fig. 128*c*). 16
16. Epistome and upper lip together strongly produced and separated by a slit . . . . **Aruga** (in part) [=*Lysianassa*] (and possibly [*Pronannonyx*] and see *Adeliella*)
    Epistome and upper lip together not strongly produced, and apparently coalesced . . . . **Parambasia**
17. Maxillipedal palp 3-articulate 18
    Maxillipedal palp 4-articulate 19
18. Maxilliped: inner plates obsolescent (fig. 128*j*) . . . . **Perrierella**
    Maxilliped: inner plates as long as palp (fig. 128*g*) . . . . . . **Normanion**
19. Gnathopod 1: palm excavate (mouthparts unknown) . . . **Pseudambasia**
    Gnathopod 1: palm not excavate 20
20. Mandibular palp attached level with molar (fig. 126*m*) 21
    Mandibular palp attached proximal to molar (fig. 126*h*) or molar absent . 23
21. Maxilla 2 strongly setose (fig. 127*p*), coxa 1 visible. 22
    Maxilla 2 poorly setose (fig. 127*k*), coxa 1 nearly concealed by coxa 2. **Adeliella**
22. Mandibular molar small, conical, attenuated, setulose, gnathopod 1 article 6 enlarged . . . . **Koroga**
    Mandibular molar of medium size, triturative, gnathopod 1 not enlarged. **"Pseudalibrotus"** (=*Onisimus*) and **"Onisimus"** [=*Boeckosimus* (in part)]
23. Rami of uropod 3 reduced in size, inner ramus about half as long as peduncle (fig. 132*k*) . . . . **Nannonyx**
    Rami of uropod 3 as long as or longer than peduncle (fig. 132*g*) 24
24. Article 6 of gnathopod 1 very stout, enlarged (fig. 129*l*) 25
    Article 6 of gnathopod 1 small, rectangular (fig. 129*d*). some species of **Orchomene** and [**Allogaussia**]
25. Mandibular molar of medium size, triturative, article 4 of maxillipedal palp short . . . . **Pseudokoroga**
    Mandibular molar small, conical, attenuated, setulose, article 4 of maxillipedal palp long . . . . **Koroga**

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[2] See also *Adeliella*.

[3] See also *Parawaldeckia kidderi* (Smith) (p. 357), distinguished from *Clepidecrella* by extreme proximal location of mandibular palp.

KEY H

These genera have gills bearing swellings or plaits. Since so many lysianassids have not been investigated for this characteristic and because gills of the following genera are not always clearly plaited the genera have been added to subsequent keys. Hence key H simply represents a quick way for the taxonomist to determine familiar genera with obviously plaited gills. If this key is unsatisfactory one must proceed to couplet 11 of the Basic Key. Many species of *Hippomedon* have indistinctly plaited gills. Gills of *Socarnella* are unknown.

1. Coxa 1 reduced and hidden by coxa 2 (fig. 123*b*) . . . . . . **Schisturella**
   Coxa 1 of normal dimensions and not hidden by coxa 2 2
2. Gnathopod 1 subchelate 3
   Gnathopod 1 simple 7
3. Mandibular palp attached proximal to molar (fig. 126*i*) 4
   Mandibular palp attached level with molar (fig. 126*e*) 5
4. Article 5 of male antenna 2 extremely tumid (like article 4 of fig. 124*k*). **Microlysias**
   Article 5 of male antenna 2 slender or not relatively stouter than article 4. **Orchomene**
5. Mandibular molar imperfectly conical or attenuate, setulose, not ridged (fig. 126*j*) . . . . **Anonyx**
   Mandibular molar cylindrical or cuboidal, ridged (fig. 126*g*) 6
6. Dactyl of gnathopod 1 very small, similar to dactyl of gnathopod 2, palp article 4 of maxilliped stout, short . . . . **Pseudoanonyx**
   Dactyl of gnathopod 1 and palp article 4 of maxilliped long and claw-like. **Hippomedon**
7. Dactyl of gnathopod 1 setose or spinose on posterior edge (fig. 130*i*), upper lip poorly delineated (fig. 125*g*), mandibular palp attached level with molar. **Ichnopus**
   Dactyl of gnathopod 1 not setose or spinose on posterior edge, upper lip strongly delineated (figs. 125*a,c*), mandibular palp attached distinctly proximal to molar 8
8. Outer ramus of uropod 3 biarticulate or composed of one article and large terminal spine . . . . **Socarnes**
   Outer ramus of uropod 3 uniarticulate. 9
9. Telson emarginate; mandible long and narrow, palp article 2 about 5 times as long as article 1 and more than 2 times as long as article 3 . . . **Socarnella**
   Telson cleft more than halfway; mandible short and stubby, palp article 2 only 3 times as long as article 1 and about 1.5 times as long as article 3. **Socarnopsis**

KEY I

Genera of Key H are included here owing to possible confusion in Key G concerning gills. *Koroga* is repeated in case its telson is considered as slightly cleft.

1. Coxa 2 concealing anteroventral corner and most of coxa 1 (fig. 119*b*), coxa 1 slightly or strongly reduced in size or not quadrate 2

Coxa 2 not concealing anteroventral corner of coxa 1 (fig. 117*a*), coxa 1 normal and quadrate or distally expanded 8

2. Coxa 1 half as long as its article 2 (fig. 130*k*) 3
Coxa 1 as long as or longer than its article 2 (fig. 130*g*) 6

3. Gnathopod 1 subchelate (often poorly) 4
Gnathopod 1 simple 5

4. Lobes of maxilla 2 equally broad or inner lobe narrower than outer, mandibular molar short, blunt, or weakly laminate (fig. 126*e*), inner plate of maxilla 1 with two setae . . . . **Metambasia** and **Schisturella**
Inner lobe of maxilla 2 much broader than outer, mandibular molar conicolaminate (fig. 126*f*), inner plate of maxilla 1 densely setose (4 or more setae) . . . . **Aristias**

5. Lobes of maxilla 2 not or scarcely gaping, inner not broader than outer. **Metambasia**
Lobes of maxilla 2 gaping (fig. 127*j*), inner much broader than outer. **Aristias**

6. Maxilliped: outer plate lacking spines . . . . **Ambasiopsis**
Maxilliped: outer plate spinose 7

7. Telson deeply cleft (three fourths or more), outer lobe of maxilla 1 poorly spinose (fig. 127*c*), inner ramus of uropod 2 simple . . . . . **Neoambasia**
Telson deeply cleft, outer lobe of maxilla 1 normally spinose, inner ramus of uropod 2 simple . . . . **Tryphosella**
Telson cleft one third, outer lobe of maxilla 1 normally spinose, inner ramus of uropod 2 constricted . . . . **Schisturella** (=*Pseudonesimus*)

8. Gnathopod 1 simple 9
Gnathopod 1 subchelate 11

9. Pereopod 5 much longer than pereopod 4 . . . . **Ichnopus**
Pereopod 5 not longer than pereopod 4 10

10. Inner ramus of uropod 2 incised . . . . **Socarnoides**[1]
Inner ramus of uropod 2 simple.
Waldeckia, Socarnes, and **Socarnella** (see Key P, couplet 20)

11. Head lacking distinct lateral lobes, anterolateral cephalic margins straight (fig. 121*b*); coxa 5 as long as coxa 4 . . . . **Lepidepecreoides**
Head bearing lateral lobes, anterolateral cephalic margins bulbous or convex; coxa 5 shorter than coxa 4 12

12. Article 4 of antenna 2 very tumid (fig. 124*k*) . . . . **Lysianella**
Article 4 of antenna 2 of normal dimensions 13

13. Mandibular molar large but not strictly cuboidal, often subconical or attenuated or basally bulbous and covered densely with setules (fig. 126*j*) 14
Mandibular molar large or of medium size, cuboidal, ridged, setules if rarely present very sparse (fig. 126*g*) 15

14. Article 6 of gnathopod 1 enlarged (fig. 129*l*), telson apically notched . **Koroga**
Article 6 of gnathopod 1 not enlarged, telson deeply cleft . . . . . . **Anonyx**

15. Uropod 2 with inner ramus strongly incised, epistome with extremely large, acute anterior process . . . . **Tryphosites**
Uropod 2 with simple inner ramus, epistome unproduced.
"Tmetonyx" nobilis (Stimpson) (see Shoemaker, 1930) and **Hippomedon**
Uropod 2 with inner ramus strongly incised, epistome and upper lip coalesced (not separated by notch from lateral view), apparent upper lip portion strongly produced and acute.
"Tryphosa" carinata Schellenberg, 1926a

[1] And see "*Tryphosa*" *carinata* Schellenberg, 1926a (couplet 15) and *Orchomene* (p. 353).

KEY J

Both *Koroga* and *Orchomene* (=?*Allogaussia*) are repeated here, in the event their quantitatively expressed characters were overlooked in previous keys.

1. Coxa 1 nearly concealed by coxa 2 . . . . **Adeliella**
   Coxa 1 fully visible 2
2. Mandibular palp attached level with molar (fig. 126*m*) 3
   Mandibular palp attached proximal to molar (fig. 126*i*) 5
3. Gnathopod 1 subchelate, inner ramus of uropod 3 as long as article 1 of outer. 4
   Gnathopod 1 simple, inner ramus of uropod 3 vestigial . . . . **Clepidecrella**
4. Mandibular molar triturative . . . . **"Onisimus"** [=*Boeckosimus*]
   Mandibular molar simple . . . . **Menigrates**
5. Gnathopod 1: article 6 not wider than article 3 6
   Gnathopod 1: article 6 distally twice as wide as article 3 (fig. 129*l*). **Koroga** and **Pseudokoroga** (see Key G for distinction)
6. Gnathopod 1 subchelate . . . . **Orchomene** [=?*Allogaussia*]
   Gnathopod 1 simple . . . . **Socarnella** and **Menigrates**

KEY K

Gnathopod 1 is slender, the dactyl hidden in a tuft of setae or cirri (fig. 130*m*). *Ichnopus* bears resemblance to this group as a genus with a posterior or distal brush of setae on the dactyl. *Pseudoanonyx* is only marginally assignable to this group.

1. Gnathopod 1 stout and minutely and transversely subchelate or chelate, palp article 4 of maxilliped stout and subclavate . . . . **Pseudoanonyx**
   Gnathopod 1 slender and simple, or palm very oblique, palp article 4 of maxilliped slender and claw-like 2
2. Mandible lacking molar, article 6 of pereopods 1–2 slightly longer than articles 4 and 5 combined (fig. 131*c*) and slightly prehensile. **Scopelocheiropsis**
   Mandible bearing molar, article 6 of pereopods 1–2 shorter than or equal to articles 4 and 5 combined (fig. 117*a*) 3
3. Lower lip with major lobes fully excavate medially, forming a medial gap (fig. 125*s*) . . . . **Bathycallisoma**
   Lower lip with medial edges of major lobes closely appressed (fig. 125*r*) . . 4
4. Gnathopod 2 minutely chelate (fig. 131*f*) 5
   Gnathopod 2 subchelate (fig. 131*j*) 6
5. Epistome flat in front (fig. 125*o*) . . . . **Aroui**
   Epistome grossly lobate in front (fig. 125*m*) . . . . **Scopelocheirus**
6. Inner plate of maxilla 1 setose only terminally and subterminally, dactyl of gnathopod 1 not distinct from cirri (fig. 129*m*) . . . . **Paracallisomopsis**
   Inner plate of maxilla 1 setose medially, dactyl of gnathopod 1 distinct from cirri (fig. 130*m*) (see other characters under *Paracallisomopsis* diagnosis) . 7
7. Article 2 of gnathopod 1 linear, not glandular (fig. 130*m*), coxa 5 much larger than and partially covering coxa 6 . . . . **Paracallisoma**
   Article 2 of gnathopod 1 swollen, glandular (fig. 129*g*), coxa 5 not much larger than and not covering coxa 6 . . . . **Eucallisoma**

KEY L

1. Pereopods 1–5 with long dactyl folded back on an inflated article 6, thus prehensile (fig. 130*d*) . . . . **Metacyclocaris**
   Pereopods 1–5 normal, dactyls short and sixth articles unexpanded . . . 2
2. Maxilla 2: lobes gaping and/or inner much broader than outer (fig. 127*j*); mandible with molar, combined with nearly simple gnathopod 1 . **Aristias**
   Maxilla 2: lobes appressed and of similar shape, other characters not in combination 3
3. Mandible lacking molar, gnathopod 1 simple 4
   Mandible bearing molar, gnathopod 1 subchelate (except in *Metambasia*) . 5
4. Article 2 of maxillipedal palp as broad as or broader than outer plate. **Ambasiella**
   Article 2 of maxillipedal palp less than half as broad as outer plate . **Ambasia**
5. Inner plate of maxilla 1 with one or two immense, falcate setae (fig. 127*d*). **Hirondellea** [1]
   Inner plate of maxilla 1 with small, slender setae 6
6. Maxilla 1: inner plate with five or more setae 7
   Maxilla 1: inner plate with three or fewer setae. 8
7. Mandibular molar immense (fig. 126*d*), inner plate of maxilla 1 setose only terminally, article 3 of gnathopod 1 not elongate . . . . . **Eurythenes**
   Mandibular molar slender but strongly projecting, inner plate of maxilla 1 setose medially and terminally, article 3 of gnathopod 1 elongate [see 2 species of *Cheirimedon*] . . . . **Paralicella**
8. Inner ramus of uropod 2 constricted 9
   Inner ramus of uropod 2 simple 11
9. Gnathopod 1 slightly chelate, epistomal margin dorsoventrally elongate. **Aristiopsis**
   Gnathopod 1 subchelate or simple (*Metambasia*), epistomal margin dorsoventrally compressed even though lobate (normal) 10
10. Mandibular molar poorly developed, weakly triturative or fuzzy, palp attached proximal to molar, gnathopod 1 subchelate. **"Orchomenella" groenlandica** (Hansen)
    Mandibular molar strongly triturative, palp attached level with molar, gnathopod 1 subchelate . . . . **Schisturella**
    Mandibular molar weakly triturative or fuzzy but very large, palp attached level with molar, gnathopod 1 simple . . . . **Metambasia**
11. Outer ramus of uropod 3 uniarticulate . . . . **Tryphosoides**
    Outer ramus of uropod 3 biarticulate 12
12. Mandibular molar lacking setules . . . . **Lepidepecreopsis**
    Mandibular molar bearing setules 13
13. Gnathopod 1 with article 6 enlarged and distally expanding, nearly twice as broad as article 2, palm protuberant, long, and slightly chelate. **Cheirimedon latimanus** Sars, 1895
    Gnathopod 1 with article 6 unexpanded, palm not chelate 14
14. Head very small,[2] epistome and upper lip weakly developed and inconspicuous . . . . **Uristes** [=*Uristoides*]
    Head of normal size, epistome and upper lip strongly developed, epistome generally slightly lobate 15

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[1] See note, Key N, couplet 23 (p. 310).

[2] Occasionally head ventrally extended and covering base of antenna 2 as in "*Uristes*" *lepidus* J. L. Barnard (1964a).

15. Article 7 of gnathopod 1 with accessory tooth.
some species of **Tryphosella** [="*Tmetonyx*" auct.]
Article 7 of gnathopod 1 simple . . . . **Tryphosella** [="*Tryphosa*" auct.]

KEY M

1. Palp of mandible attached proximal to molar (fig. 126*i*) 2
Palp of mandible attached level with molar or molar absent (figs. 126*j,k*) . 11
2. Article 1 of antenna 1 strongly produced distally and dorsally crested (fig. 124*d*) . . . . **Lepidepecreum**
Article 1 of antenna 1 weakly or not produced distally, not dorsally crested (fig. 124*h*) 3
3. Gnathopod 1 simple and small 4
Gnathopod 1 subchelate (or very large and seemingly simple) 7
4. Outer ramus of uropod 3 uniarticulate . . . . **Socarnopsis**
Outer ramus of uropod 3 biarticulate 5
5. Inner ramus of uropod 2 constricted . . . . **Socarnoides**
Inner ramus of uropod 2 simple 6
6. Telson cleft one third of its length, prebuccal parts not prominent (fig. 125*d*), articles 2–3 of antenna 1 peduncle half as long as article 1 of primary flagellum . . . . **Menigrates**
Telson cleft halfway or more, prebuccal parts prominent (fig. 125*c*), articles 2–3 of antenna 1 as long as article 1 of primary flagellum.
Waldeckia and **Socarnes** (see Key P, couplet 21)
7. Article 3 of gnathopod 1 elongate and slender as in typical lysianassid gnathopod 2, articles 5–6 also elongate and slender (fig. 129*i*).
Pseudorchomene
Articles 3,5,6 of gnathopod 1 stout, not relatively elongate (fig. 129*d*) . . 8
8. Article 4 of antenna 2 very tumid, article 5 slender . . . . . . **Lysianella**
Article 5 of [male] antenna 2 very tumid, stouter and longer than article 4.
Microlysias [1]
Neither of articles 4–5 of antenna 2 expanded 9
9. Articles 5 and 6 of gnathopod 1 not immensely enlarged (fig.129*d*) (also check *Lepidepecreum*).
Orchomene [=*Orchomenella*] and juveniles of **Pseudokoroga**
Articles 5 and 6 of gnathopod 1 immensely enlarged (fig. 129*l*) 10
10. Maxillae slender (fig. 127*l*), maxillipedal palp article 4 short, mandibular molar triturative . . . . **Pseudokoroga**
Maxillae stout (fig. 127*o*), maxillipedal palp article 4 elongate, mandibular molar nontriturative . . . . **Koroga**
11. Mandibular molar laminate, conical, not cuboidal, surface simple, lacking ridges, often weakly setulose, or molar absent 12
Mandibular molar cuboidal or columnar, surface usually bearing conspicuous ridges and spines, or distinct punctations, or densely setulose if not fully cuboidal and slightly attenuate (figs. 126*e,g,j,m*) 20
12. Gnathopod 1: article 6 very large and expanded, more than 3 times as long as article 5 (fig. 129*l*) . . . . **Koroga** and **Cheirimedon**
Gnathopod 1: article 6 small, never more than 1.5 times as long as article 5. 13
13. Inner lobe of maxilla 1 bearing five or more setae 14
Inner lobe of maxilla 1 bearing two or fewer setae 15

[1] Possibly article 5 of *Microlysias* has been misidentified.

14. Gnathopods simple . . . . **Alicella**
Gnathopods subchelate . . . . **Paralicella**
15. Gnathopod 1 simple. 16
Gnathopod 1 subchelate 17
16. Rami of uropod 3 subequal to each other in length . . . . . . **Ichnopus** [2]
Inner ramus of uropod 3 vestigial, scale-like . . . . **Clepidecrella**
17. Head globular, maxilla 1 with sickle-shaped setae on inner lobe (fig. 127*d*). **Hirondellea**
Head other than globular, maxilla 1 with normal setae on inner lobe . . 18
18. Maxillipedal palp article 4 reduced in size (fig. 128*a*) . . . . **Centromedon**
Maxillipedal palp article 4 of normal size 19
19. Coxa 1 normally quadrate, untapering, cephalon lacking lateral lobes or strongly truncate anteriorly (fig. 121*b*), coxa 5 as long as coxa 4. **Lepidepecreoides**
Coxa 1 normally quadrate, untapering, cephalon with lateral lobes, coxa 5 much shorter than coxa 4 . . . . proceed to 24
Coxa 1 tapering distally, slightly shortened, cephalon with lateral lobes, coxa 5 much shorter than coxa 4 . . **Lepidepecreopsis** and **Tryphosella**
20. Coxa 1 very slightly triangular, tapering distally (figs. 129*c,k*) 21
Coxa 1 quadrate, or rounded, expanded or unexpanded distally (figs. 129 *a,b,h*) 24
21. Outer ramus of uropod 3 uniarticulate . . . . **Tryphosoides**
Outer ramus of uropod 3 biarticulate 22
22. Head small, epistome and upper lip inconspicuous. **Uristes** [3] [=*Uristoides*] ?some species of **Cheirimedon**
Head large, epistome and upper lip prominent from lateral view . . . 23
23. Dactyl of gnathopod 1 with inner accessory tooth. some species of **"Tmetonyx"** auct. [=*Tryphosella*]
Dactyl of gnathopod 1 lacking accessory tooth. **Tryphosella** [3] [="*Tryphosa*" auct.]
24. Telson not longer than broad, always cleft less than halfway. **Rifcus** and **Boeckosimus** [="*Onisimus*" auct.]
Telson longer than broad (or if short, then cleft halfway or more) . . . 25
25. Gnathopod 1 "simple" 26
Gnathopod 1 subchelate 28
26. Gnathopod 1 perfectly simple, maxillipedal dactyl stunted . **Menigratopsis**
Gnathopod 1 very slightly subchelate, palm small, maxillipedal dactyl elongate 27
27. Uropod 2 with simple inner ramus . . . . **Paronesimus** (in part)
Uropod 2 with incised inner ramus . . **"Anonyx" cicadoides** Stebbing, 1888
28. Mandibular molar densely covered with setules 29
Mandibular molar ridged or weakly punctate, setules generally absent or inconspicuous 30
29. Coxa 1 expanded distally, unguiform dactyl of gnathopod 1 usually lacking accessory tooth, upper lip slightly or strongly protruding in front of epistome, inner ramus of uropod 2 often incised, palp article 4 of maxilliped unguiform . . . . **Anonyx**

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[2] *Menigrates angustipes* Gurjanova (1962) may key to this position inadvertently but note diagnosis of *Ichnopus* does not otherwise fit *Menigrates*.

[3] See also "*Orchomene*" *takoradia* J. L. Barnard (1961); "*Uristes*" *velia* J. L. Barnard (1961).

Coxa 1 unexpanded distally, unguiform dactyl of gnathopod 1 bearing inner accessory tooth, epistome slightly protruding in front of upper lip, inner ramus of uropod 2 simple, palp article 4 of maxilliped unguiform. type-species of **Tmetonyx**

Coxa 1 slightly expanded distally, dactyl of gnathopod 1 with accessory tooth but reduced to size of dactyl on gnathopod 2, prebuccal parts apparently like *Anonyx* of triplicut 29, inner ramus of uropod 2 simple, palp article 4 of maxilliped tumid, subclavate . . . . . . **Pseudoanonyx**

30. Dactyl of gnathopod 1 very small and similar in size and morphology to dactyl of gnathopod 2 . . . . **Pseudoanonyx**

Dactyl of gnathopod 1 long, claw-like, thus normal 31

31. Article 5 of gnathopod 1 longer than article 6 32

Article 6 of gnathopod 1 longer than or subequal to article 5 33

32. Head without distinct lateral lobes, anterolateral margin convexly truncate, coxa 5 as long as coxa 4 . . . . **Lepidepecreoides**

Head with small but distinct lateral lobes, coxa 5 shorter than coxa 4. **Hippomedon** [=*Paratryphosites*, ?*Paracentromedon*, ?*Elimedon*]

33. Outer ramus of uropod 3 uniarticulate . . . . **Tryphosoides**

Outer ramus of uropod 3 biarticulate 34

34. Articles 5 and 6 of gnathopod 1 subequal in length, article 6 not expanded, palm obsolescent . . . . [**Paracentromedon**] and **Paronesimus**

Article 6 of gnathopod 1 large, distally expanding, more than 3 times as long as article 5 (fig. 129*l*), palm strong . . . . **Cheirimedon** (type)

KEY N

All lysianassid genera with coxa 1 distinctly reduced in size and/- or often largely hidden by coxa 2 are assembled here for ease of comparison. Those species of Key F, in which both coxae 1 and 2 are small and hidden by following coxae, are not included. See also notes on *Stomacontion*.

1. Pereopods 1–5 with long dactyls folded back on inflated article 6, thus prehensile (fig. 130*d*) . . . . **Metacyclocaris**

Pereopods 1–5 normal, dactyls short and sixth articles unexpanded . . . 2

2. Upper lip strongly lobate and projecting in front of epistome (figs. 125*c,d*) . 3

Upper lip scarcely or not projecting in front of epistome, latter often large and dominating upper lip (figs. 125*h,i,k*) or epistome and upper lip not distinct from one another 6

3. Coxa 1 half as long as its second article (fig. 130*k*) 4

Coxa 1 as long as or longer than its second article (fig. 130*g*) 5

4. Gnathopod 1 subchelate even though weakly . . . . **Schisturella**

Gnathopod 1 simple . . . . **Metambasia**

5. Outer plates of maxilliped lacking spines, maxilla 1 with seven spines on outer lobe . . . . **Ambasiopsis**

Outer plates of maxilliped spinose, maxilla 1 normal, with 9+ spines on outer lobe . . . . **Schisturella**

Outer plates of maxilliped spinose, maxilla 1 with spines on outer lobe reduced to five . . . . **Neoambasia**

6. Mandibular incisor multidentate (fig. 126*q*) 7

Mandibular incisor not dentate 8

7. Mandible lacking molar, gnathopod 1 chelate, article 2 of pereopod 3 deeply indentured (fig. 131*b*) . . . . **Podoprion**

Mandible with triturative molar, gnathopod 1 subchelate, article 2 of pereopod 3 not deeply indentured . . . . **Valettiopsis**

8. Lobes of maxilla 2 broadly separated, inner lobe pointing medially and of different shape or much broader than outer lobe (fig. 127*j*) 9
   Lobes of maxilla 2 appressed and similar in shape (fig. 127*l*) 10
9. Telson cleft . . . . . . **Ambasiella** and **Aristias** (see Key O, couplet 2)
   Telson entire . . . . **Perrierella**
10. Eyes and gnathopod 1 powerfully developed (fig. 123*a*) 11
    Eyes and gnathopod 1 not together powerfully developed 13
11. Gnathopod 1 with complete torsion distal from article 4 (fig. 130*h*), dactyl and palm thus posterior, mandibular molar needle-like (fig. 126*b*), telson scarcely longer than broad (fig. 128*w*) . . . . . **Trischizostoma**
    Gnathopod 1 untwisted, normal, mandibular incisor broad, flat, telson elongate, much longer than broad 12
12. Gnathopod 1 chelate, palm thus deeply excavate (fig. 129*e*) . . . **Opisa**
    Gnathopod 1 cheliform only, palm convex and protuberant (fig. 129*l*). some species of **Cheirimedon**
13. Palp article 4 of maxilliped vestigial (figs. 128*d, e, i*) 14
    Palp article 4 of maxilliped well developed, claw-like 17
14. Lobes of maxilla 2 strongly setose, telson deeply cleft 15
    Lobes of maxilla 2 with one and four setae, respectively (fig. 127*k*), telson scarcely cleft . . . . **Adeliella**
15. Maxilla 1 with palp 16
    Maxilla 1 lacking palp . . . . continue to couplet 21
16. Epistome and labrum coalesced, labral portion not projecting (epistome often projecting), mandible without molar . **Ambasia** and **Ambasiella**
    Epistome and labrum separated by notch, labral portion slightly projecting, mandible with molar . . . . **Centromedon**
17. Mandibular molar distinctly toothed and ridged (fig. 126*g*) 18
    Mandibular molar untoothed and unridged (fig. 126*i*), or ridges forming marginal girdle only (fig. 126*d*), often fuzzy, or molar absent 19
18. Inner ramus of uropod 2 incised, outer ramus of uropod 3 biarticulate. **Aristiopsis** and **Schisturella** [1]
    Inner ramus of uropod 2 simple, outer ramus of uropod 3 uniarticulate. **Tryphosoides**
19. Gnathopod 1 chelate (chela and gnathopod slender) . **Podoprion** and **Euonyx**
    Gnathopod 1 subchelate or simple 20
20. Gnathopod 1 simple 21
    Gnathopod 1 subchelate (often minutely so) or chelate 23
21. Anteroventral corner of coxa 4 acutely produced . . . . **Vijaya**
    Anteroventral corner of coxa 4 rounded or quadrate 22
22. Article 2 of antenna 1 half as long as article 1 . . . . **Amaryllis**
    Article 2 of antenna 1 fully as long as article 1 . . . . . **Bathyamaryllis**
23. Inner plate of maxilla 1 with one or two immense falcate setae (fig. 127*d*). (cf. *Cheirimedon pectinipalma* K. H. Barnard, 1925) **Hirondellea**
    Inner plate of maxilla 1 with normal setae 24
24. Inner plate of maxilla 1 with five or more setae (adults) 25
    Inner plate of maxilla 1 with three or fewer setae 27

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[1] And see Key L, couplet 10, for "*Orchomenella*" *groenlandica* (Hansen).

25. Setae of inner plate on maxilla 1 mostly terminal, mandibular molar extremely broad even though laminate and subconical, with girdle of ridges or setules (pleonite 3 with dorsal notch), mandible when flattened, with deep S-shaped insinuation between palp and incisor (fig. 126*d*). **Eurythenes**

Setae of inner plate on maxilla 1 medial only or medial and terminal, mandibular molar "absent" or long, narrow, conical and lacking distinct girdle (apparently pleonite 3 dorsally smooth), mandible when flattened with shallow concavity between palp and incisor. 26

26. Coxa 1 longer than broad, ovatorectangular, as long as its article 2, lobes of maxilla 2 equally broad . . . . **Paralicella**

Coxa 1 as broad as long and subquadrate, and only two thirds as long as its article 2, inner lobe of maxilla 2 much broader than outer (lobes often gaping) . . . . **Aristias**

27. Mandibular molar lacking setules. . . . . **Lepidepecreopsis**

Mandibular molar strongly setulose 28

28. Head small, epistome and upper lip small and inconspicuous . . . **Uristes**

Head of normal size, epistome and upper lip large and conspicuous, epistome usually slightly lobate 29

29. Article 7 of gnathopod 1 with accessory tooth. some species of **"Tmetonyx"** auct. [= *Tryphosella*]

Article 7 of gnathopod 1 simple . . . . **Tryphosella** [= "*Tryphosa*" auct.]

KEY O

1. Pereopods 1–5 prehensile (fig. 130*d*). . . . . **Metacyclocaris**

Pereopods 1–5 not prehensile 2

2. Lobes of maxilla 2 gaping, and/or inner lobe much broader than outer (fig. 127*j*), mandible with molar and gnathopod 1 nearly simple . **Aristias**

Lobes of maxilla 2 appressed and of intersimilar shape, characters not in similar combination. 3

3. Gnathopod 1 simple 4

Gnathopod 1 subchelate, even though weakly 7

4. Mandible lacking molar (or if rudiment present, palp attached proximal to molar) 5

Mandible bearing molar 6

5. Article 2 of maxillipedal palp less than half as broad as outer plate. **Centromedon** and **Ambasia**

Article 2 of maxillipedal palp much broader than outer plate . **Ambasiella**

6. Outer plates of maxilliped with spines . . . . **Metambasia**[1]

Outer plates of maxilliped lacking spines . . . . **Ambasiopsis**

7. Inner plate of maxilla 1 with one or two immense falcate setae (fig. 127*d*). **Hirondellea**[2]

Inner plate of maxilla 1 with small, slender setae 8

8. Inner ramus of uropod 2 dorsally notched or constricted 9

Inner ramus of uropod 2 simple 11

9. Gnathopod 1 subchelate 10

Gnathopod 1 weakly chelate (fig. 129*a*) . . . . **Aristiopsis**

10. Coxa 1 tryphosid in outline (fig. 129*k*). **"Orchomenella" groenlandica** (Hansen)

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[1] See *Schisturella* diagnosis (p. 361).

[2] See note, Key N, couplet 23.

Coxa 1 hemioval or subtriangular (fig. 129*c*).
Schisturella [=*Pseudonesimus*]

11. Outer lobe of maxilla 1 degenerate and compressed distally, bearing only five or six spines 12
Outer lobe of maxilla 1 normal, distally bearing seven or more spines . . . 13

12. Apices of maxilla 2 lobes densely setose, with nine or more setae each.
Neoambasia
Apices of maxilla 2 lobes sparsely setose, inner with one seta, outer with about four setae (fig. 127*k*) . . . . **Adeliella**

13. Medial edge of inner lobe of maxilla 1 fully setose, article 3 of gnathopod 1 elongate, as long as article 6 . . . . **Paralicella**
Only distal end of inner lobe of maxilla 1 setose, article 3 of gnathopod 1 not elongate 14

14. Mandibular molar an immense, broad, poorly setulose, girdled lamina (fig. 126*d*), article 1 of antenna 2 enlarged and circular in adults (fig. 124*i*), inner plate of maxilla 1 with five or more setae . . . . . . **Eurythenes**
Mandibular molar of medium or small size, cuboid, subspheroid, or conically laminate, article 1 of antenna 2 not subcircular or enlarged, inner plate of maxilla 1 with three or fewer setae 15

15. Article 4 of maxillipedal palp vestigial (fig. 128*a*) . . . . . **Centromedon**
Article 4 of maxillipedal palp not vestigial 16

16. Mandibular molar very small, sublaminate, conical or sharp, article 6 of gnathopod 1 enlarged (fig. 129*l*).
some species now assigned to **Cheirimedon**
Mandibular molar of normal size and cuboidal dimensions, article 6 of gnathopod 1 small 17

17. Outer ramus of uropod 3 uniarticulate, mandibular molar ridged.
Tryphosoides
Outer ramus of uropod 3 biarticulate, mandibular molar unridged but setulose 18

18. Epistome from lateral view extending much farther than and projecting convexly in front of upper lip (fig. 125*l*).
Tryphosella (*"Tryphosa"* auct. and some species of *"Tmetonyx"* auct.)
Epistome small, short, unprojecting, occasionally dominated by upper lip (figs. 125*g,n,o*) 19

19. Upper lip and epistome small, inconspicuous (figs. 125*o,j*).
some species of **Uristes**
Upper lip dominating epistome (fig. 125*n*) (head ?large, coxa 1 an elongate triangle in type-species, variable in others) . . . . **Ambasiopsis**

KEY P

1. Gnathopod 1 subchelate, even minutely 2
Gnathopod 1 simple 11

2. Either article 4 or 5 of antenna 2 very tumid (fig. 124*k*) 3
Neither article 4 or 5 of antenna 2 tumid 4

3. Broad epistomal lobe dominating labrum . . . . **Microlysias**
Labrum strongly projecting in front of epistome . . . . **Lysianella**

4. Epistome and upper lip amalgamated even though their parts produced, parts not separated by notch (fig. 125*k*) 5
Epistome and upper lip separated by deep notch (figs. 125*c,f*) 7

5. Maxillipedal palp 3-articulate, peduncle of uropod 3 elongate, nearly as long as pleonite 4 and peduncles of uropods 1–2 and longer than rami of uropod 3 . . . . **Normanion**

Maxillipedal palp 4-articulate, peduncle of uropod 3 short, subequal to pleonite 6 and much shorter than peduncles of uropods 1–2 6

6. Epistomal portion of prebuccal complex slightly produced, or flush, inner ramus of uropod 2 simple, inner ramus of uropod 3 half or less as long as outer ramus . . . . **Nannonyx**

Labral portion of prebuccal complex acutely produced, inner ramus of uropod 2 constricted, inner ramus of uropod 3 exceeding three fourths length of outer ramus. . . . . **Paralysianopsis**

7. Inner ramus of uropod 2 constricted (fig. 131*d*) 8

Inner ramus of uropod 2 simple 9

8. Coxa 1 normally quadrate . . . . **Pseudokoroga**

Coxa 1 tapering distally and partially hidden by coxa 2. **"Orchomenella" groenlandica** (Hansen)

9. Article 1 of antenna 1 dorsodistally crested or toothed (fig. 124*d*), body often crested dorsally . . . . **Lepidepecreum**

Article 1 of antenna 1 simple, body smooth or crested only on pleonite 4 . 10

10. Article 3 of gnathopod 1 normally short and stout, articles 5 and 6 normally stout (fig. 129*d*) . . . . **Orchomene**

Article 3 of gnathopod 1 elongate and slender like article 3 of gnathopod 2, articles 5–6 elongate and slender (fig. 129*i*) . . . . . **Pseudorchomene**

11. Telson entire or emarginate 12

Telson cleft one third or more 15

12. Inner ramus of uropod 3 half or less length of outer . . . **Parawaldeckia**

Inner ramus of uropod 3 three fourths or more length of outer 13

13. Upper lip prominently lobate, occasionally epistome also lobate (fig. 125*c*). **Lysianassa, ?Socarnella, [Pronannonyx]**

Upper lip not prominently lobate 14

14. Telson distinctly longer than wide, inner ramus of uropod 2 constricted.[1] **Parambasia**

Telson not longer than wide, inner ramus of uropod 2 simple. **Menigratopsis**

15. Article 2 of pereopod 3 deeply indentured (fig. 131*b*), article 3 of gnathopod 1 elongate and slender like article 3 of gnathopod 2 . . . . . **Glycerina**

Article 2 of pereopod 3 with small teeth or none, article 3 of gnathopod 1 not elongate 16

16. Coxa 1 tapering distally or shortened and partially hidden by coxa 2 (fig. 119*b*) 17

Coxa 1 large, subquadrate or scarcely tapering, mostly visible 18

17. Palp article 2 of maxilliped half or less as broad as outer plate . . **Ambasia**

Palp article 2 of maxilliped as broad as or broader than outer plate. **Ambasiella**

18. Inner ramus of uropod 2 constricted . . . . **Socarnoides**

Inner ramus of uropod 2 simple 19

19. Outer ramus of uropod 3 uniarticulate 20

Outer ramus of uropod 3 biarticulate 21

20. Palp article 2 of mandible about 3 times as long as article 1, article 3 two thirds length of article 2 . . . . **Socarnopsis**

Palp article 2 of mandible about 5 times as long as article 1, article 3 about half as long as article 2 . . . . **Socarnella**

21. Gills strongly plaited (fig. 127*s*) . . . . **Socarnes**

Gills minutely ridged or smooth 22

22. Telson about as long as wide, cleft less than halfway, gills simple. **Menigrates**

Telson about twice as long as wide, cleft more than halfway, some gills with basal accessory lobes . . . . **Waldeckia**

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[1] Assumed in type-species.

KEY Q

1. Mandibular molar distinctly triturative and usually columnar, cylindrical or cuboidal, bearing ridges or cusps for grinding (figs. 126*d,g,m*) 2
   Mandibular molar not triturative or absent, often setulose or bearing a few articulate spines (figs. 126*e,h,i,j*) 17
2. Coxa 1 noticeably reduced and partially hidden by coxa 2 or coxa 1 tapering or triangular 3
   Coxa 1 large, visible, rectangular or distally expanded 7
3. Mandibular molar with triturative girdle, molar immense and not columnar (fig. 126*d*) . . . . **Eurythenes**
   Mandibular molar normally columnar or adze-shaped and medium in size . 4
4. Telson emarginate or cleft one sixth or less, maxilla 2 with setae reduced to one to four per lobe (fig. 127*k*) . . . . **Adeliella**
   Telson cleft one third or more, maxilla 2 with lobes strongly setose (fig. 127*l*) 5
5. Inner ramus of uropod 2 simple.
   Tryphosella, Tryphosoides, and **"Pseudotryphosa"** (?=*Uristes*)
   Inner ramus of uropod 2 constricted 6
6. Epistomal region not dorsoventrally elongate. . . . . **Schisturella**
   Epistomal region dorsoventrally elongate . . . . **Aristiopsis**
7. Gnathopod 1 simple 8
   Gnathopod 1 subchelate 9
8. Telson as broad as long, emarginate . . . . **Onisimus**[=*Pseudalibrotus*]
   Telson longer than broad, deeply cleft . . . . **Menigratopsis**
   Telson as broad as long, cleft halfway.
   Rifcus and **Paronesimus** (see diagnoses)
9. Inner ramus of uropod 3 vestigial or absent (fig. 132*k*), always less than half length of outer ramus 10
   Inner ramus of uropod 3 subequal to outer ramus 11
10. Inner ramus of uropod 3 present, article 1 of both flagella of antenna 1 elongate and that of accessory flagellum expanded . . . . **Onesimoides**
    Inner ramus of uropod 3 absent, article 1 of both flagella of antenna 1 of normal size . . . . **Paronesimoides**
11. Accessory flagellum 2-articulate 12
    Accessory flagellum 3+-articulate 14
12. Spines on outer plate of maxilla 1 reduced to five or six . . . . . **Rifcus**
    Outer plate of maxilla 1 with nine or more spines 13
13. Hand of gnathopod 1 enlarged and expanding distally . . **Cheirimedon** (type)
    Hand of gnathopod 1 of normal unexpanded dimensions . . . **Tryphosoides**
14. Telsonic apices with seven or more spines each (fig. 128*s*).
    Hippomedon [=*Paratryphosites*]
    Telsonic apices with three or fewer spines or telson entire 15
15. Telson cleft halfway or more 16
    Telson cleft one third or less.
    Boeckosimus and **Onisimus** [="*Onisimus*" and "*Pseudalibrotus*"]
16. Inner ramus of uropod 2 simple, epistome unproduced and slightly dominated by labrum (from lateral view) (fig. 125*n*).
    Hippomedon [1] and [**Paracentromedon**] [1]
    Inner ramus of uropod 2 deeply constricted, epistome acutely produced (fig. 125*b*) . . . . **Tryphosites**

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[1] And see *Cheirimedon femoratus* (Pfeffer) and *C. fougneri* Walker distinguished from these genera by the transverse palm of gnathopod 1 (see pp. 334–335).

17. Gnathopod 1 simple [2] 18
Gnathopod 1 distinctly subchelate [2] 31
18. Coxa 1 reduced or distinctly tapering from base and often strongly hidden by coxa 2 19
Coxa 1 large, rectangular and not hidden, taper if present occurring in only distal third of coxa 26
19. Pereopods prehensile . . . . **Metacyclocaris**
Pereopods simple 20
20. Maxillipedal palp with three articles, telson entire . . . . . . **Perrierella**
Maxillipedal palp with four articles, telson cleft 21
21. Maxillipedal palp article 4 vestigial (fig. 128*a*) 22
Maxillipedal palp article 4 well developed and claw-like 23
22. Mandibular molar present, upper lip and epistome coalesced, epistomal region strongly produced . . . . **Centromedon**
Mandibular molar absent, upper lip and epistome separated by notch, upper lip slightly protruding . . . . **Ambasia**
23. Inner plate of maxilla 2 much broader than outer plate and usually gaping mediad . . . . **Aristias**
Plates of maxilla 2 subequal in width and not strongly gaping 24
24. Upper lip and epistome not differentially produced, small and inconspicuous. **Uristes**
Upper lip projecting as lobe in front of epistome (from lateral view) . . 25
25. Outer plates of maxilliped lacking spines, gnathopod 1 weakly subchelate, coxa 1 nearly as long as article 2 of gnathopod 1 . . . . . **Ambasiopsis**
Outer plates of maxilliped spinose, gnathopod 1 perfectly simple, coxa 1 about half as long as article 2 of gnathopod 1 . . . . . . **Metambasia**
26. Inner plate of maxilla 1 fully lined medially with eight or more setae. **Alicella**
Inner plate of maxilla 1 with three or fewer terminal setae 27
27. Inner ramus of uropod 3 vestigial, less than one third length of outer. **Clepidecrella**
Inner ramus of uropod 3 subequal to outer 28
28. Telson cleft one third or more 29
Telson entire or emarginate 30
29. Gnathopod 1 perfectly simple, slender, substyliform, dactyl strong and bearing posterior setal brush near base (fig. 130*i*) . . . . . . **Ichnopus**
Gnathopod 1 perfectly simple, slender, dactyl strong and lacking posterior setal brush . . . . **Menigratopsis**
Gnathopod 1 weakly subchelate, of medium stoutness, dactyl strong but lacking posterior setal brush although bearing small accessory tooth. **Paronesimus**
30. Labral region of prebuccal complex with strongly acute anterior lobe [telson longer than broad] . . . . **Paralysianopsis**
Labral region of prebuccal complex with anteriorly rounded keel or unproduced [telson as broad as long in *Paralibrotus* only]. **Menigrates** (in part), **Paralibrotus**
31. Coxa 1 reduced or distally tapering from base and often strongly hidden by coxa 2 32
Coxa 1 large, rectangular and not hidden by coxa 2, taper if present occurring only in distal third of coxa 42
32. Inner plate of maxilla 1 with three or more setae 33
Inner plate of maxilla 1 with two or fewer setae (or inner plate absent) . 35

[2] Some latitude is expressed in this division as certain genera are found in both pathways.

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33. Maxillipedal palp with three articles (fig. 128*j*) . . . . **Perrierella**
Maxillipedal palp with four articles 34
34. Plates of maxilla 2 subequally broad and not gaping, article 1 of antenna 2 very enlarged and subspherical (adults), telson elongate . . **Eurythenes**
Inner plate of maxilla 2 much broader than outer, inner plate often strongly gaping mediad (fig. 127*j*), article 1 of antenna 2 normally small, telson not elongate . . . . **Aristias**
35. Palp article 4 of maxilliped vestigial (fig. 128*k*) . . . . . **Centromedon** [3]
Palp article 4 of maxilliped well developed and claw-like 36
36. Inner plate of maxilla 1 with at least one large falcate seta (fig. 127*d*). **Hirondellea** [4]
Inner plate of maxilla 1 with normal setae 37
37. Setae of maxilla 2 reduced to one-two and four per inner and outer lobes (fig. 127*k*) . . . . **Adeliella**
Setae of maxilla 2 numerous (7+ per lobe) 38
38. Outer plate of maxilla 1 with spines reduced to five or fewer . . **Neoambasia**
Outer plate of maxilla 1 with seven or more spines 39
39. Gnathopod 1 enlarged, article 5 very short and with small, narrow posterior lobe, article 6 expanding distally, very broad, palm transverse or nearly chelate (fig. 129*l*) . . . . **Cheirimedon latimanus** Sars, 1895
Gnathopod 1 of normal size, article 5 rarely lobate, article 6 not expanding distally even though palm rarely transverse 40
40. Labrum with distinct lobe projecting in front of epistome (from lateral view). **Ambasiopsis**
Labrum not dominating epistome 41
41. "Head small" (fig. 123*b*), epistome and upper lip small, inconspicuous, neither dominant . . . . **Uristes**
"Head large" (fig. 122*d*), prebuccal complex conspicuous, epistome usually dominating upper lip . . . . **Tryphosella**
42. Inner plate of maxilla 1 with eight or more setae lining medial edge. **Paralicella**
Inner plate of maxilla 1 with three or fewer setae 43
43. Coxa 5 as long as 4 (fig. 121*b*) . . . . **Lepidepecreoides**
Coxa 5 much shorter than 4 44
44. Telson entire or cleft less than one eighth its length 45
Telson cleft one eighth or more its length 47
45. Outer ramus of uropod 3 uniarticulate . . . . **Pseudambasia**
Outer ramus of uropod 3 biarticulate 46
46. Labrum rounded anteriorly and scarcely produced beyond epistome, inner ramus of uropod 2 simple, article 6 of gnathopod 1 enlarged and stout, palm transverse (fig. 129*a*) . . . . **Koroga**
Labral area of prebuccal complex acutely produced in front of epistomal area, inner ramus of uropod 2 constricted, article 6 of gnathopod 1 slender, palm obsolescent, oblique . . . . **Paralysianopsis**
47. Palp article 4 of maxilliped very stout and subclavate, dactyl of gnathopod 1 as short and stout as dactyl of gnathopod 2 . . . . **Pseudoanonyx**
Maxillipedal palp article 4 typically unguiform (fig. 128*c*) 48
48. Epistome with acute anterior process dominating upper lip . . **Tryphosites**
Epistome flat or rounded anteriorly 49

[3] Compare *Adeliella*.
[4] See note, Key N, couplet 23.

49. Gills plaited (deeply folded), labral lobe slightly dominating epistome. **Anonyx**
Gills simple (at most striate), epistome equivalent to or dominating labral lobe . . . . **Tmetonyx** (type only)
Gills simple (at most striate), labral lobe slightly dominating epistome. **Paronesimus**

Genera of Lysianassidae

The following characters are not mentioned in the diagnoses unless they have classificatory value; if not mentioned they conform to the typical condition as stated in sequel: *gnathopod 2* either minutely chelate or subchelate; *maxilla 1* with 2-articulate palp, inner lobe poorly setose; *maxilliped* with well-developed lobes and 4-articulate palp, the fourth article large and claw-like; *coxae 1 or 2* large, visible; *uropod 3* of medium length, outer ramus 2-articulate, inner slightly shorter than outer, rami lanceolate; *accessory flagellum* multiarticulate; *inner ramus of uropod 2* unconstricted or unnotched; *mouthparts* not formed into a cone-shaped bundle; *pereopod 3, article 2* not deeply indentured.

Acidostoma Liljeborg

Acidostoma Liljeborg, 1865.—Stebbing, 1906.

Type-species: *Anonyx obesus* Bate, 1862 (monotypy). See Sars, 1895.

Mouthparts forming a ventral conical bundle, styliform; *antenna 1 very stout in male;* upper lip and epistome continuous; mandible usually lacking molar, small when present, palp attached quite proximally; palp of maxilla 1 vestigial, 1-articulate, outer plate with hook-like spines; palp of maxilliped scarcely exceeding outer plate, article 4 vestigial; gnathopod 1 simple, article 6 slightly longer than 5; *gnathopod 2 lacking article 7;* uropod 3 short, outer ramus 1-articulate; telson short, cleft or emarginate. Species: 7, boreal, littoral to bathyal (1,200 m).

Acontiostoma Stebbing

Acontiostoma Stebbing, 1888; 1906.

Type-species: *A. marionis* Stebbing, 1888 (original designation).

Mouthparts forming a ventral conical bundle, styliform; mandible lacking molar, palp attached quite proximally; palp of maxilla 1 uniarticulate; maxillipedal palp scarcely exceeding outer plate, article 4 very small; gnathopod 1 simple, article 6 slightly longer than 5; coxa 1 projecting over side of head; uropod 3 lacking rami; telson short, entire or emarginate. See *Stomacontion* for remarks. Species: 1, subantarctic, littoral.

FIGURE 117.—Lysianassidae: *a, Onisimus* (=*Pseudalibrotus*) *litoralis* (Krøyer) (Sars, 1895, pl. 35); *b, Stomacontion pepinii* (Stebbing, 1888), note coxa 1 overlapping head, and eye dimly showing through.

FIGURE 118.—Lysianassidae: *a*, *Lepidepecreum umbo* (Goës) (Sars, 1895, pl. 39); *b*, *Kerguelenia borealis* Sars (1895, pl. 40).

Adeliella Nicholls

Adeliella Nicholls, 1938.

Type-species: *A. laticornis* Nicholls, 1938 (original designation).

Upper lip and epistome not differentially produced; mandible with "distinct molar", palp apparently attached level with molar; maxillipedal palp article 4 rather small; maxillae poorly spinose or setose; gnathopod 1 subchelate, short, articles 5 and 6 equal in length; telson short, emarginate or notched apically. Species: 1, antarctic, bathyal (420 m).

Alicella Chevreux

Alicella Chevreux, 1899.—Stebbing, 1906.

Type-species: *A. gigantea* Chevreux, 1899 (original designation). See Chevreux, 1935.

Upper lip and epistome not differentially produced; mandibular cutting edge with small teeth, molar conicolaminate, setulose, palp attached level with molar; inner plate of maxilla 1 densely setose on medial edge; maxillipedal palp article 4 very small; gnathopod 1 feeble, simple, articles 5 and 6 equal in length; article 6 of gnathopod 2 as long as article 5, both very elongate and linear; rami of uropod 3 long, equal, lanceolate, apparently outer ramus 1-articulate; telson of medium length, deeply cleft. Species: 1, N. Atlantic, abyssal.

[*Allogaussia* Schellenberg]

Allogaussia Schellenberg, 1926a.—K. H. Barnard, 1932.

Type-species: *A. paradoxa* Schellenberg, 1926a (selected by Stasek, 1958).

Type-species distinct from type-species of *Orchomene* by entire telson, produced posterior lobe of coxa 5, asymmetrical posterior lobe of pereopod 3. Species that have been assigned on basis of telson alone: 6 (also included in *Orchomene*).

Amaryllis Haswell

Amaryllis Haswell, 1880b.—Stebbing, 1906.

Type-species: *A. macrophthalmus* Haswell, 1880b (selected by Pirlot, 1933b; indicated by Stebbing, 1888, p. 702!, through monotypy by synonymy).

Epistome apparently projecting in front of upper lip; mandibular molar feeble, setulose, palp attached near proximal end of molar; *maxilla 1 lacking palp;* gnathopod 1 simple, article 6 longer than 5; coxa 1 partially hidden, following coxae increasingly larger; inner ramus of uropod 2 constricted; telson of medium length, half or deeply cleft; *article 2 of antenna 1 half as long as article 1 (Bathyamaryllis)*; *anteroventral corner of coxa 4 rounded (Vijaya)*. Species: 2, antiboreal, littoral.

Ambasia Boeck

Ambasia Boeck, 1871.—Stebbing, 1906.

Type-species: *Gammarus atlanticus* Milne Edwards, 1830 (monotypy and subsequent synonymy). See Sars, 1895.

Epistome and upper lip coalesced, but epistomal part greatly and sharply produced in front; mandibular molar absent, palp attached to middle of mandible; *maxillipedal palp article 2 half or less as broad as outer plate (Ambasiella)*, article 4 very small; gnathopod 1 simple, article 5 slightly longer than 6; coxa 1 slightly shortened and partially hidden by coxa 2; inner ramus of uropod 3 half as long as outer; telson of medium length, deeply cleft. Species: 1, subarctic N. Atlantic, littoral and bathyal (to 1,400 m).

Ambasiella Schellenberg

Ambasiella Schellenberg, 1935.

Type-species: *Ambasia murmanica* Brüggen, 1905 (monotypy). See Gurjanova, 1951.

Epistome and upper lip not differentially produced; mandibular molar absent, palp attached proximally; *maxillipedal palp article 2 much broader than outer plate (Ambasia, Hirondellea)*, article 4 vestigial; gnathopod 1 simple, article 5 longer than 6; coxa 1 slightly shortened, coxa 2 concealing most of it; telson of medium length, deeply cleft. Species: 1, arctic, littoral.

Ambasiopsis K. H. Barnard

Ambasiopsis K. H. Barnard, 1931; 1932.

Type-species: *A. georgiensis* K. H. Barnard, 1931 (original designation); 1932.

Upper lip lobately produced in front of epistome; mandibular molar large, truncate, not ridged, setulose, palp attached level with molar; *outer plate of maxilliped lacking spines (Neoambasia)*; gnathopod 1 poorly subchelate; coxa 1 two thirds as long as coxa 2 and partially hidden by it, but as long as article 2 of gnathopod 1; telson deeply cleft. Species: 2, subantarctic, littoral (to 342 m).

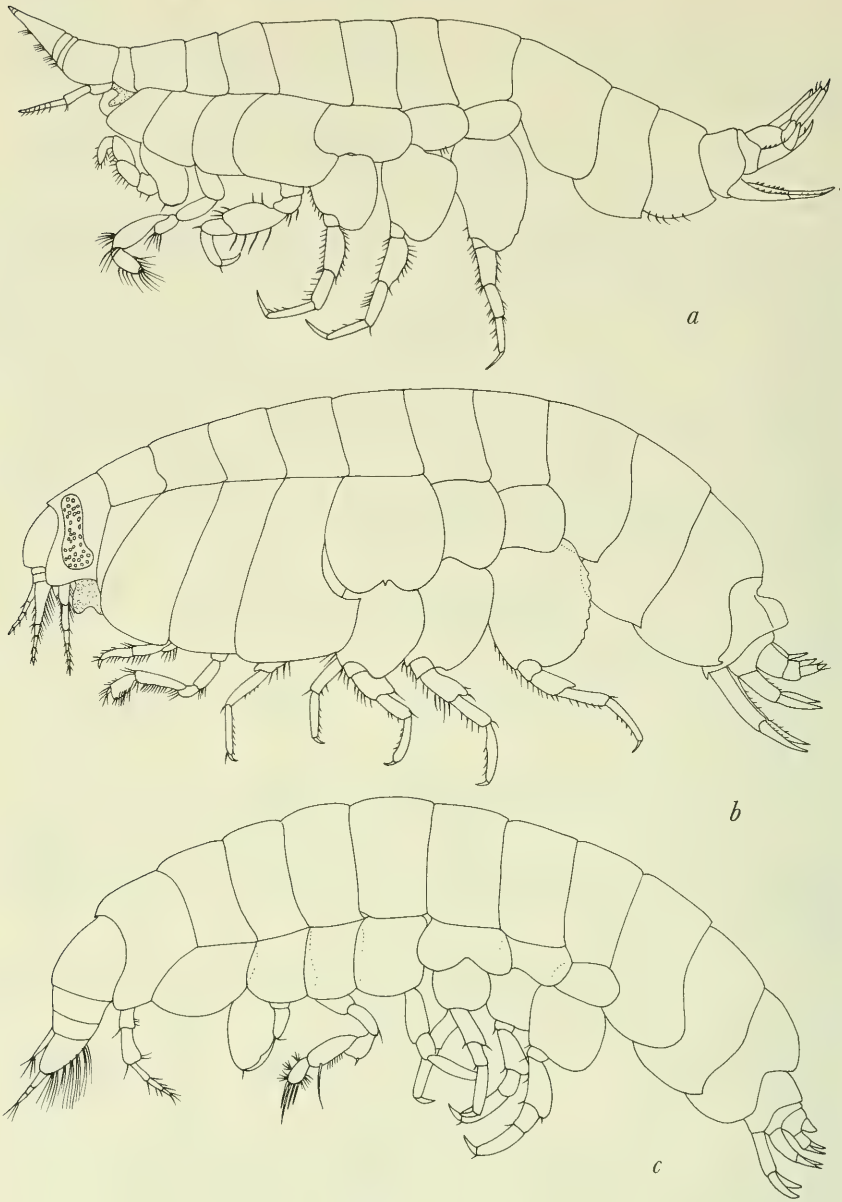
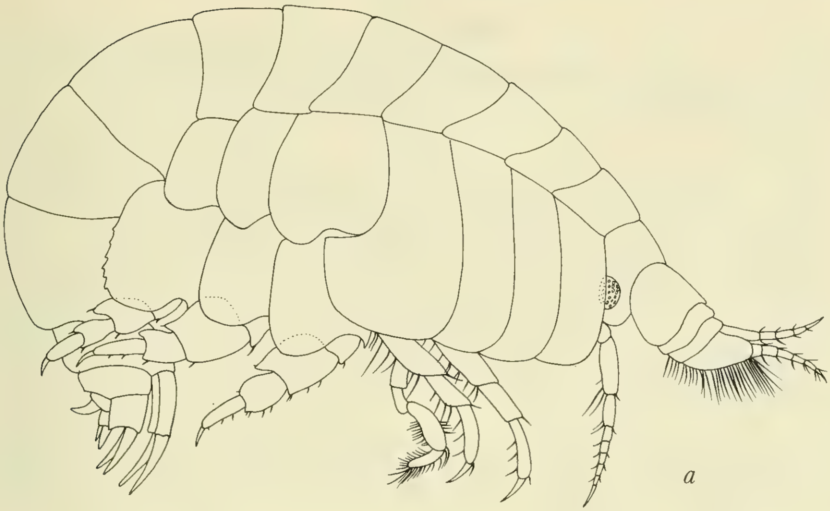


FIGURE 119.—Lysianassidae: *a*, *Eucallisoma glandulosa* J. L. Barnard (1961); *b*, *Ambasia atlantica* (Milne Edwards) (Sars, 1895, pl. 17, as *A. danielsseni*); *c*, *Pachychelium davidis* Stephensen (1925a).



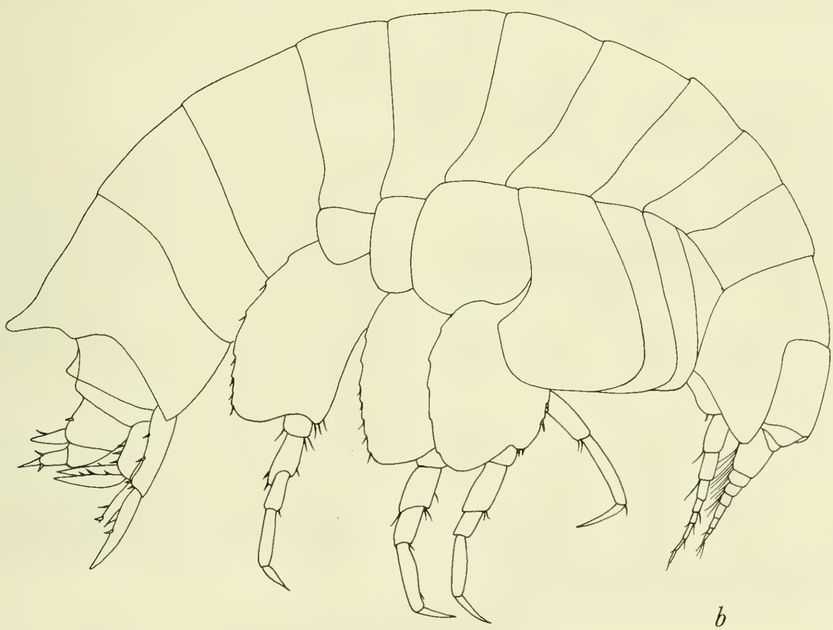


FIGURE 120.—Lysianassidae: *a*, *Acidostoma obesum* (Bate) (Sars, 1895, pl. 114); *b*, *Tryphosella coxalis* (J. L. Barnard, 1962d).

Anonyx Krøyer

Anonyx Krøyer, 1838.—Stebbing, 1906.—Gurjanova, 1962.—Hurley, 1963.
Chironesimus Sars, 1895.
Lakota Holmes, 1908.

Type-species: *Cancer nugax* Phipps, 1774 (elimination and synonymy to result in monotypy by Boeck, 1871, but firmly selected by Boeck, 1876, with subsequent synonymy). See Sars, 1895.

Upper lip projecting slightly or strongly in front of epistome; mandibular molar large, or of medium size, *subconical, unridged* (*Boeckosimus*), setulose, palp attached level with molar; gnathopod 1 subchelate, articles 5 and 6 variable in length; inner ramus of uropod 2 constricted or not; telson of medium length, deeply cleft; gills plaited except in *Lakota; eyes present; pereopods 1–2 with distal locking spines on article 6 at base of dactyls; article 4 of maxillipedal palp slender and claw-like* (*Pseudoanonyx*). Species: 30+, arctic-boreal, littoral to abyssal.

Aristias Boeck

Aristias Boeck, 1871.—Stebbing, 1906.

Type-species: *Anonyx tumidus* Krøyer 1846 (monotypy). See Sars, 1895.

Upper lip either projecting or not projecting beyond epistome, occasionally lobate, angular or poorly produced; mandibular molar a long unridged conical lamina, palp attached level with molar; inner lobe of maxilla 1 strongly setose (5+ setae) and spinose; lobes of maxilla 2 often gaping, inner much broader than outer; gnathopod 1 nearly simple or with minute palm, article 7 overlapping palm, articles 5 and 6 equal, *article 3 not elongate* (*Paralicella*); coxa 1 short, half as long as its article 2, partially hidden by coxa 2; telson of medium length or short, deeply cleft. *Differs from Eurythenes by: shorter telson, broader inner plate of maxilla 2, narrow mandibular molar, longer article 2 of pereopod 3.* Species: 16, primarily bipolar, amphiboreal (one tropical), littoral to bathyal.

Aristiopsis J. L. Barnard

Aristiopsis J. L. Barnard, 1961.

Type-species: *A. tumidus* J. L. Barnard, 1961 (original designation).

Both epistome and upper lip with short anterior humps separated by a long, flat, unnotched margin; mandible with well-developed, ridged molar, palp attached over posteroproximal corner of molar;

gnathopod 1 stout, slightly chelate; coxa 1 short, half as long as its article 2, partially concealed by coxa 2; uropod 2 with inner (not outer = error of J. L. Barnard, 1961) ramus slightly constricted; telson short, cleft one third its length. Species: 1, Pacific, bathyal-abyssal.

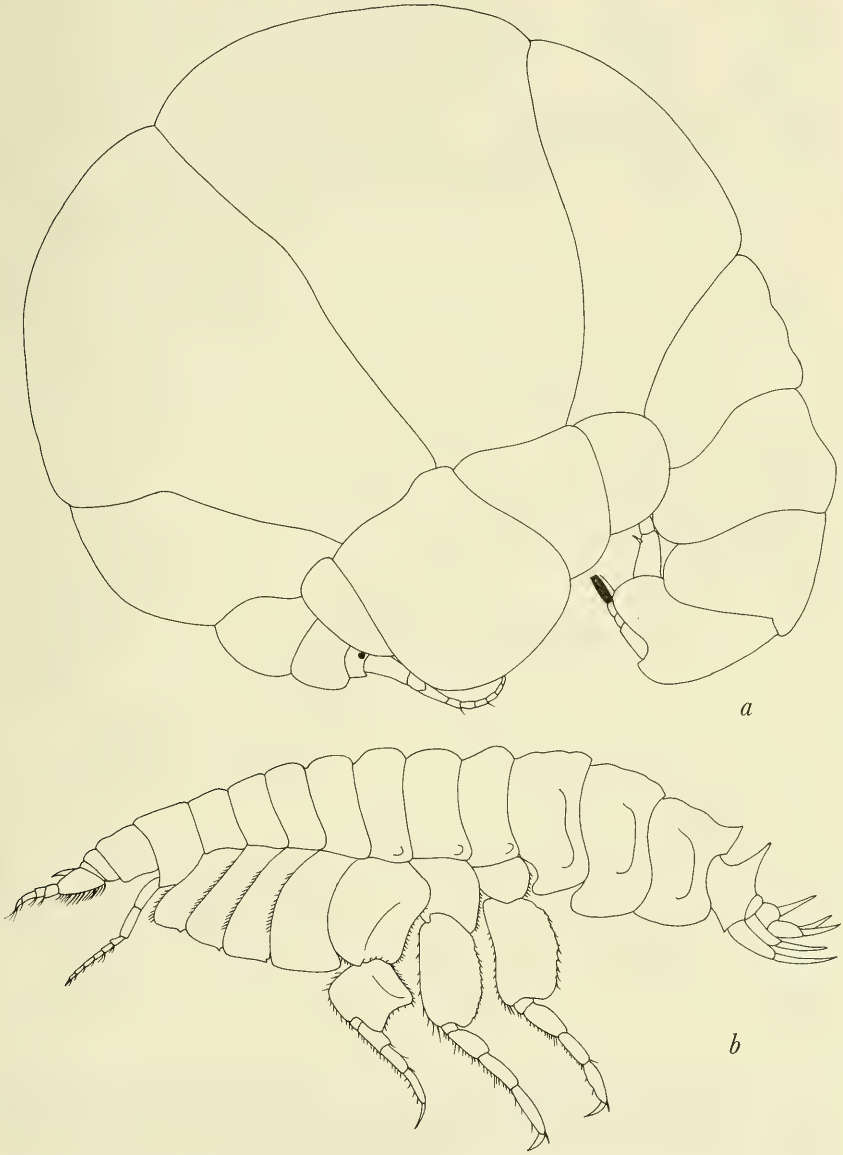


FIGURE 121.—Lysianassidae: *a*, *Danaella mimonectes* Stephensen (1925b); *b*, *Lepidepecreoides xenopus* K. H. Barnard (1932).

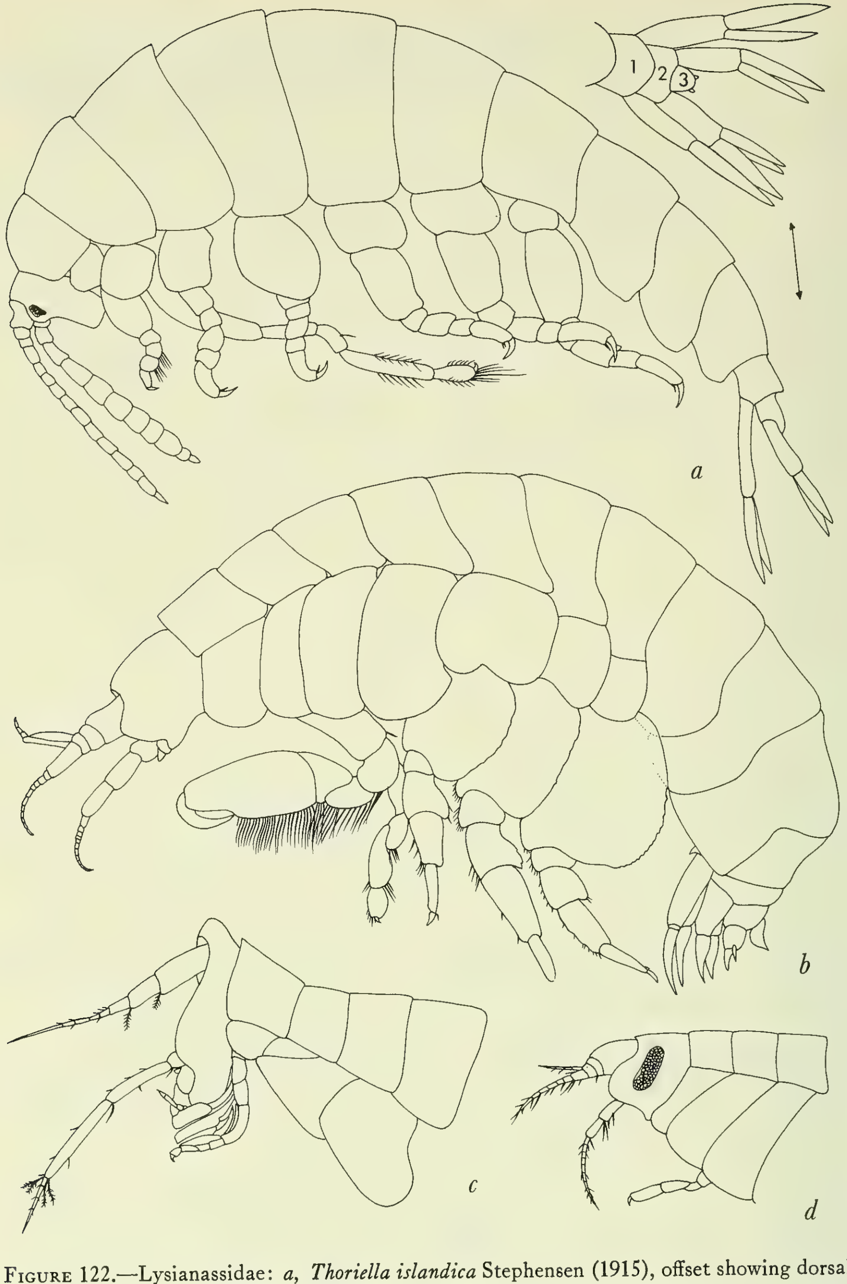


FIGURE 122.—Lysianassidae: *a, Thoriella islandica* Stephensen (1915), offset showing dorsal urosome; *b, Onesimoides chelatus* Pirlot (J. L. Barnard, 1961); *c, Crybelocyphocaris tattersalli* Shoemaker (1945a); *d, Tryphosella sarsi* Bonnier (Sars, 1895, pl. 27, as *Tryphosa nana*).

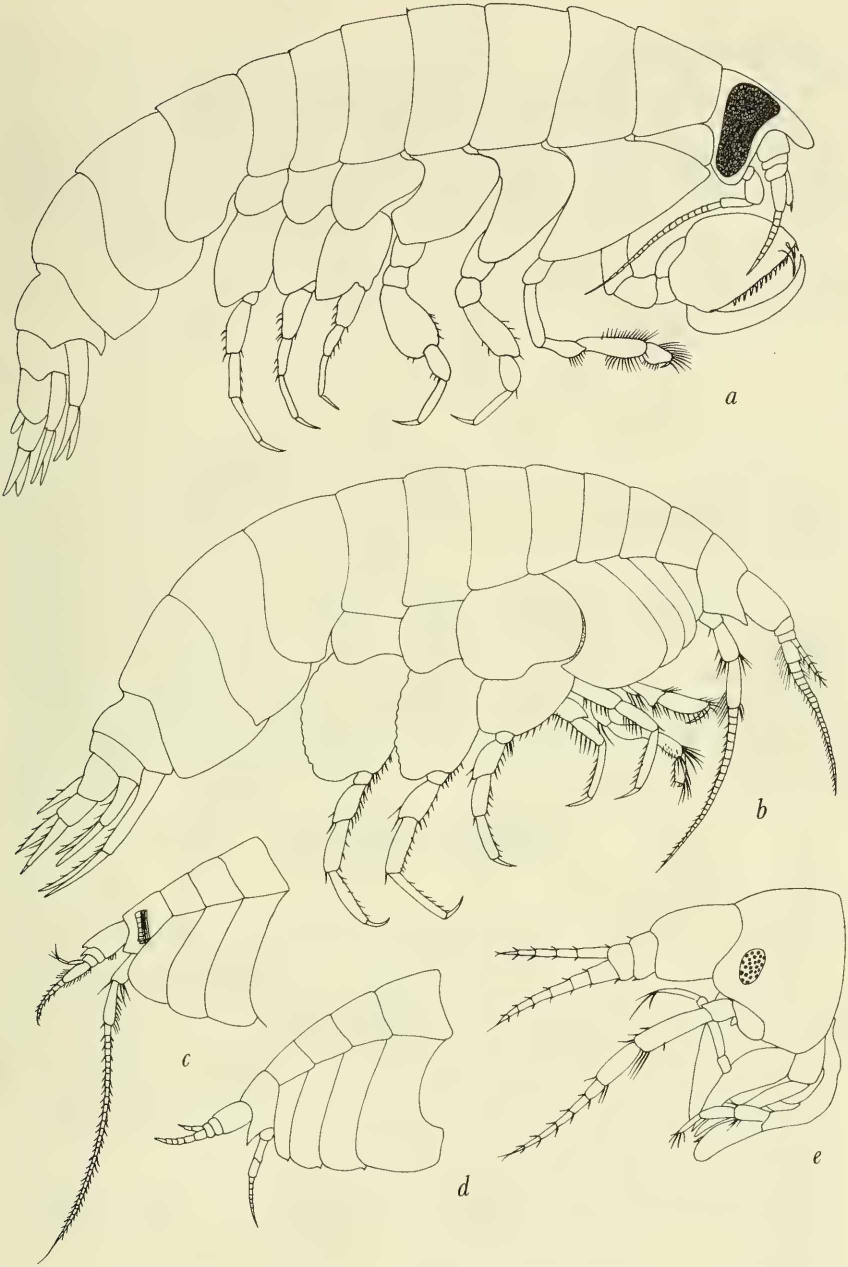


FIGURE 123.—Lysianassidae: *a, Trischizostoma nicaeense* (Costa) (Sars, 1895, pl. 12, as *T. raschi*); *b, Uristes umbonatus* (Sars, 1895, pl. 29); *c, Hippomedon denticulatus* (Bate) (Sars, 1895, pl. 20); *d, Centromedon pumilus* (Liljeborg) (Sars, 1895, pl. 34); *e, Acidostoma obesum* (Bate) (Sars, 1895, pl. 14).

Aroui Chevreux

Aroui Chevreux, 1911a.

Type-species: *A. setosus* Chevreux, 1911a (monotypy).

Upper lip and epistome not differentially produced, *epistome flat in front* (*Scopelocheirus*); mandibular molar small, cylindrical, ridged, palp attached slightly proximal to molar; inner plate of maxilla 1 extremely setose; lobes of maxilla 2 subcircular, outer shorter than inner; article 6 of gnathopod 1 terminated by short shroud of setae; article 7 vestigial; *gnathopod 2 minutely chelate* (*Paracallisoma*); telson of medium length, deeply cleft. Species: 1, Algeria, littoral.

Azotostoma J. L. Barnard

Azotostoma J. L. Barnard, 1965.

Type-species: *A. fusta* J. L. Barnard, 1965 (original designation).

Mouthparts forming a ventral conical bundle, styliform; mandible lacking molar, palp attached very proximally; palp of maxilla 1 large, exceeding outer plate, bent, 2-articulate; inner plate of maxilla 2 expanded proximally, distal tapered portion with three stout spines; inner plates of maxilliped styliform, outer very large and flagellate, palp 4-articulate, scarcely exceeding outer plate, article 2 produced distally; gnathopod 1 simple, flagelliform, article 6 much longer than 5, article 7 elongate but not as long as article 6; uropod 3 biramous, rami equal, 1-articulate; telson short, entire. Species: 1, Micronesia, littoral.

Bathyamaryllis Pirlot

Bathyamaryllis Pirlot, 1933a.

Type-species: *B. perezii* Pirlot, 1933a (original designation).

Epistome projecting slightly in front of upper lip; mandible with long, subconical, setulose molar, palp attached level with molar; *palp of maxilla 1 absent;* gnathopod 1 simple, article 6 longer than 5; coxa 1 small, partially hidden, subsequent coxae increasing in size; uropod 3 with 1-articulate outer ramus; telson of medium length, deeply cleft; *article 2 of antenna 1 equal to article 1* (*Amaryllis*). Species: 4, probably cosmopolitan, bathyal to abyssal.

Bathycallisoma Dahl

Bathycallisoma Dahl, 1959. Synonym of *Scopelocheirus* fide Birstein and Vinogradov, 1964. See also *Paracallisoma*.

Type-species: *B. pacifica* Dahl, 1959 (monotypy).

Upper lip and epistome not differentially produced; mandibular molar small, conical, unridged, palp attached level with molar but both rather proximal; *lower lip with major lobes excavate medially, forming medial gap (combining character)*; inner plate of maxilla 1 densely setose; gnathopod 1 simple, article 7 small, article 6 tipped with short setal shroud; gnathopod 2 subchelate but not distinctly chelate (*Scopelocheirus*); telson of medium length, deeply cleft. Species: 1, central Pacific, hadal.

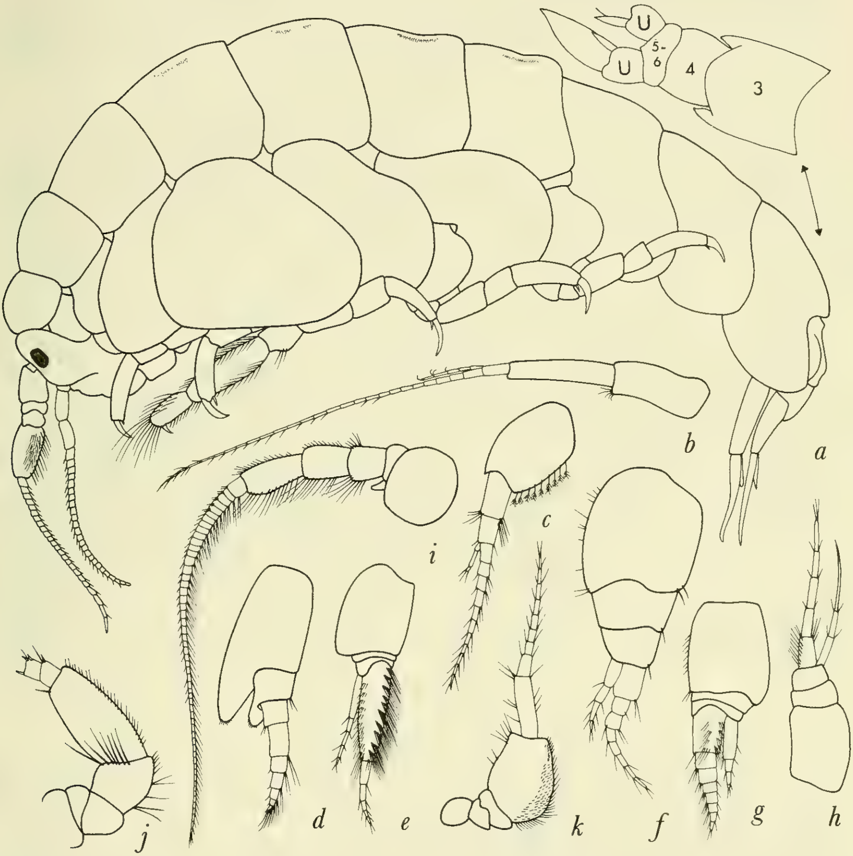


FIGURE 124.—Lysianassidae: *a*, *Chevreuxiella metopoides* Stephensen (1915), offset showing dorsal urosome (3, 4, 5–6; U=uropod). Antenna 1: *b*, *Bathyamaryllis perezii* Pirlot (1933a); *c*, *Lysianassa plumosa* Boeck (Sars, 1895, pl. 16, as *L. costae*); *d*, *Lepidepecreum longicorne* (Bate and Westwood) (Sars, 1895, pl. 38, as *L. carinatum*); *e*, *Ambasia atlantica* (Milne Edwards) (Sars, 1895, pl. 17, as *A. danielsseni*); *f*, *Socarnoides kergueleni* Stebbing (1888); *g*, *Menigrates obtusifrons* (Boeck) (Sars, 1895, pl. 38); *h*, *Normanion sarsi* Stebbing (Sars, 1895, pl. 13, as *N. quadrimana*). Antenna 2: *i*, *Eurythenes gryllus* (Lichtenstein) (Sars, 1895, pl. 30); *j*, *Parawaldeckia kidderi* (Smith) (Tattersall, 1922); *k*, *Lysianella petalocera* Sars (1895, pl. 18).

Boeckosimus, new genus

Type-species: *Anonyx edwardsii* Krøyer, 1846 (present selection). This genus embraces those species formerly included in the genus *Onisimus* Boeck, 1871, since the time of Sars (1895) and Stebbing (1906). The genus *Onisimus* must include those species having gone in the genus *Pseudalibrotus* Della Valle, 1893, since the time of Stebbing (1906). Boeck (1876) designated *Anonyx litoralis* Krøyer, 1845, as type of *Onisimus* Boeck, 1871, and *Pseudalibrotus* Della Valle is a junior synonym of *Onisimus* because of monotypy, *A. litoralis* also being the type-species of *Pseudalibrotus*. Sars (1895) designated

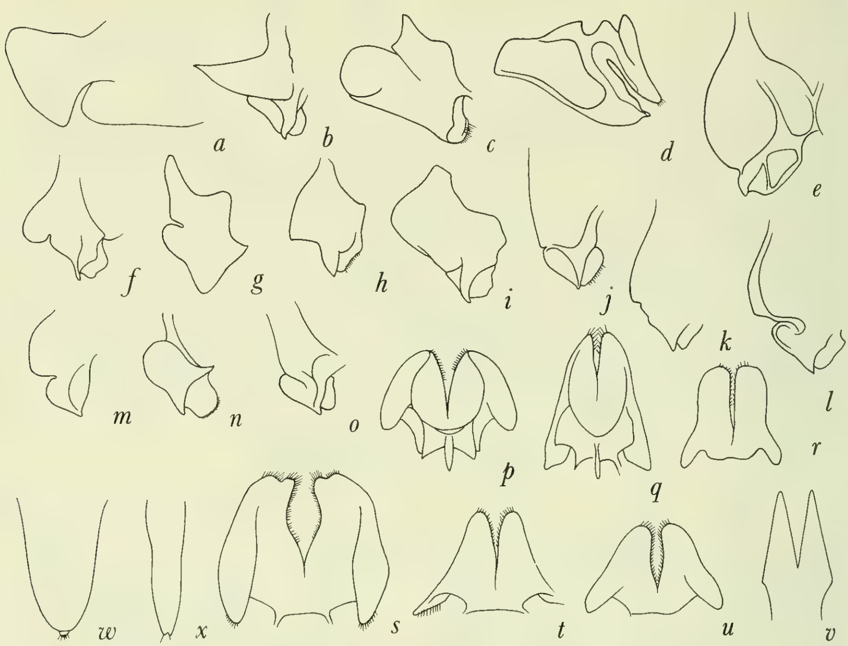


FIGURE 125.—Lysianassidae: Upper lip-epistome complex, lateral view, left sides: *a*, *Socarnoides kergueleni* Stebbing (1888); *b*, *Tryphosites longipes* (Bate and Westwood) (Sars, 1895, pl. 28); *c*, *Lysianassa plumosa* Boeck (Sars, 1895, pl. 16, as *L. costae*); *d*, *Menigrates obtusifrons* (Boeck) (Sars, 1895, pl. 38); *e*, *Eurythenes gryllus* (Lichtenstein) (Sars, 1895, pl. 30); *f*, *Orchomene batei* Sars (1895, pl. 22); *g*, *Ichnopus spinicornis* Boeck (Sars, 1895, pl. 15); *h*, *Ambasia atlantica* (Milne Edwards) (Sars, 1895, pl. 17, as *A. danielsseni*); *i*, *Lepidepecreum longicorne* (Bate and Westwood) (Sars, 1895, pl. 38, as *L. carinatum*); *j*, *Orchomene amblyops* Sars (1895, pl. 25); *k*, *Nannonyx goesi* (Boeck) (Sars, 1895, pl. 24); *l*, *Orchomene minuta* (Krøyer) (Sars, 1895, pl. 24); *m*, *Scopelocheirus crenatus* Bate (Sars, 1895, pl. 19); *n*, *Hippomedon denticulatus* (Bate) (Sars, 1895, pl. 20); *o*, *Orchomene obtusa* (Sars, 1895, pl. 26). Lower lips: *p*, *Hippomedon*; *q*, *Nannonyx*; *r*, *Normanion*; *s*, *Eurythenes*; *t*, *Ichnopus*; *u*, *Opisa eschrichti* (Krøyer) (Sars, 1895, pl. 14); *v*, *Trischizostoma nicaeense* (Costa) (Sars, 1895, pl. 12, as *T. raschi*). Upper lip, anterior view: *w*, *Acidostoma obesum* (Bate) (Sars, 1895, pl. 14); *x*, *Trischizostoma*.

A. edwardsii as type of *Onisimus*, erroneously, and I follow his precedent in using *A. edwardsii* as type of *Boeckosimus*. Gurjanova (1951) listed *Anonyx plautus* Krøyer, 1845, as type of *Onisimus* but this is also erroneous. The genus *Alibrotus* Milne Edwards, 1840, may be a senior synonym either of *Boeckosimus* or *Onisimus* but its status has remained unclear. Stebbing (1906) lists it as a dubious genus. Its type-species, *Lysianassa chauseica* Milne Edwards, 1830 (monotypy), probably cannot be a member of either *Onisimus* (=*Pseudalibrotus*) or *Boeckosimus* (="*Onisimus*" auct.) because no species of either genus has been recorded as far south as Isles Chauseay in the English Channel.

Upper lip and epistome not prominent; mandibular molar ridged (*Anonyx*), palp attached level with molar; gnathopod 1 subchelate or poorly subchelate, articles 5 and 6 subequal or article 6 longer than 5; inner ramus of uropod 2 constricted or not; *telson short* (*Hippomedon*), variable, entire or cleft one third; *outer plate of maxilla 1 with nine or more spines; palp of maxilliped elongate and slender, outer plate of maxilliped reaching to end of palp article 2* (*Rifcus*). Species: 16, arctic-boreal, mostly N. Atlantic, littoral to abyssal.

Note: This genus ("*Onisimus*" auct.) and *Onisimus* (=*Pseudalibrotus* auct.) are very close. Sars (1895) distinguished them on the more powerful gnathopod 1 and uropod 3 and longer antennae of "*Pseudalibrotus*" and Gurjanova (1962) distinguished them on the absence of bent spines on the apices of the maxillipedal outer plates in "*Pseudalibrotus*." Most species of "*Onisimus*" have slightly cleft telsons and various species of "*Pseudalibrotus*" have the epistomal portion of the prebuccal complex dominating the labral portion. All of these seem to be very weak generic characters. If the genera were synonymized the unfortunate nomenclatural problems would be solved.

Cebocaris J. L. Barnard

Cebocaris J. L. Barnard, 1964a.

Type-species: *C. grutesca* J. L. Barnard, 1964a (original designation).

Epistome large, broad, convex, but not projecting beyond upper lip from lateral view; head deformed; mandibular molar absent; gnathopod 1 simple, articles 5 and 6 subequal; article 5 of gnathopod 2 only slightly longer than article 6, appendage simple; coxae 1 and 2 small, but coxa 3 only slightly enlarged and covering coxa 2 only partially; article 2 of pereopod 3 not indentured; pereopods 1–5 strongly prehensile; telson short, entire. Species: 1, Caribbean, abyssopelagic.

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FIGURE 126.—Lysianassidae: Mandible: *a, Centromedon pumilus* (Liljeborg) (Sars, 1895, pl. 34); *b, Trischizostoma nicaeense* (Costa) (Sars, 1895, pl. 12, as *T. raschi); c, Kerguelenia borealis* Sars (1895, pl. 40); *d, Eurythenes gryllus* (Lichtenstein) (Sars, 1895, pl. 30); *e, Tryphosella sarsi* Bonnier (Sars, 1895, pl. 27, as *Tryphosa nana); f, Aristias neglectus* Hansen (Sars, 1895, pl. 17, as *A. audouinianus); g, Hippomedon denticulatus* (Bate) (Sars, 1895, pl. 20); *h, Lysianassa plumosa* Boeck (Sars, 1895, pl. 16, as *L. costae); i, Orchomene batei* Sars (1895, pl. 22); *j, Anonyx nugax* (Phipps) (Sars, 1895, pl. 31); *k, Acidostoma obesum* (Bate) (Sars, 1895, pl. 14); *l, Menigrates obtusifrons* (Boeck) (Sars, 1895, pl. 38); *m, Boeckosimus edwardsi* (Krøyer) (Sars, 1895, pl. 36); *n, Normanion sarsi* Stebbing (Sars, 1895, pl. 13, as *N. quadrimana); o, Alicella gigantea* Chevreux (1899); *p, Ichnopus spinicornis* Boeck (Sars, 1895, pl. 15); *q, Valettiopsis multidentata* J.L. Barnard (1961), distal portion to show teeth of incisor.

Centromedon Sars

Centromedon Sars, 1895.—Stebbing, 1906.

Type-species: *Anonyx pumilus* Liljeborg, 1865 (monotypy).

Upper lip and epistome small, but separated by a notch, upper lip slightly projecting; mandibular molar conicolaminate, unridged, palp attached level with molar; maxillipedal palp article 4 very small; gnathopod 1 poorly subchelate, articles 5 and 6 equal; coxa 1 slightly tapering distally; telson of medium length, deeply cleft; *head small, lateral lobes acute* (*Hirondellea*), *mouthparts hidden by coxae.* Species: 1, subarctic and boreal N. Atlantic, littoral.

Cheirimedon Stebbing

Cheirimedon Stebbing, 1888; 1906.

Type-species: *C. crenatipalmatus* Stebbing, 1888 (monotypy).

Upper lip and epistome not differentially produced; mandibular molar very small, sharp or blunt, ridged (type) or poorly ridged and sublaminate, palp attached level with molar; gnathopod 1 subchelate, article 6 broadly expanded (type) or poorly expanded, occasionally slightly chelate in appearance; coxae normal (type) or coxa 2 concealing part of slightly shortened (and occasionally strongly narrowed) coxa 1; telson of medium length, deeply cleft (type) or cleft as little as one third. Some species resembling *Anonyx*, *Boeckosimus* (="*Onisimus*" auct.), *Schisturella* (=*Pseudonesimus*), and *Tryphosella* (incl. "*Tryphosa*" auct.). Species: 5, amphiboreal, littoral to bathyal.

The type-species, *Cheirimedon crenatipalmatus* Stebbing (1888) is characterized by: lateral outline of mouthpart group quadrate; epistome and upper lip not differentially produced; head normal; mandibular palp attached level with molar, molar process columnar, triturative; other mouthparts normal; coxa 1 quadrate, not narrowed distally or covered by coxa 2; gnathopod 1 subchelate, with article 6 longer than 5 and slightly expanded distally; telson cleft more than three fourths of its length; uropod 3 normal, outer ramus 2-articulate.

Cheirimedon crenatipalmatus thus differs from *Anonyx* in (1) the nonsetulose mandibular molar which in *Anonyx* is bulging or sublaminate but lacking ridges and teeth and (2) in the expanded article 6 of gnathopod 1. It differs from *Tryphosella* (="*Tryphosa*" auct.) in the nontapering coxa 1, and the distally expanding article 6 of gnathopod 1. The type-species is joined by *C. femoratus* (Pfeffer) (=*C. dentimanus* Chevreux, 1906b) which is distinguished generically only by the telson being cleft halfway and by the poor expansion of gnathopod 1.

The other species that have been assigned to this genus depart radically from the above brief diagnosis. *Cheirimedon latimanus*

Sars, 1895, has the expanded article 6 of gnathopod 1 but coxa 1 tapers strongly to a subacute point and is partially covered by coxa 2; the mandibular molar is like that of some species of *Anonyx* in its sublaminar condition lacking teeth and ridges. The telson is deeply cleft. Except for gnathopod 1 this species could be assigned to *Uristes*, although *Uristes* has a mandibular molar more like that of *Cheirimedon crenatipalmatus*. *Cheirimedon latimanus* also bears comparison to *Centromedon pumilus* on technical grounds, and is very close to "*Tryphosa*" auct. except for the first gnathopodal expansion.

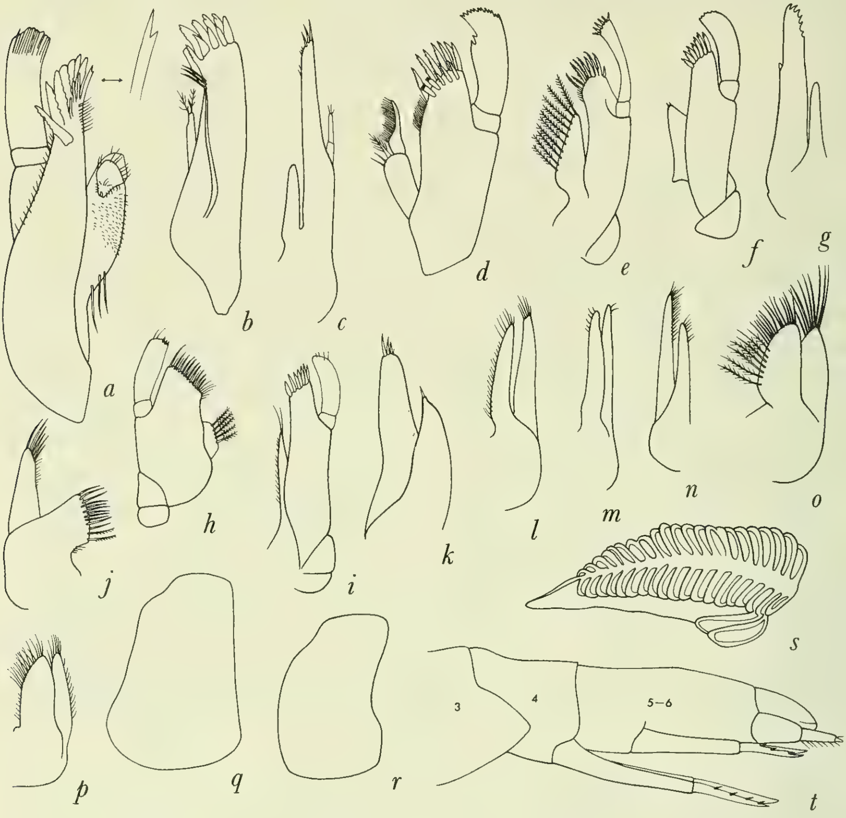

FIGURE 127.—Lysianassidae: Maxilla 1: *a*, *Lysianassa heterodonta* (Pirlot, 1936); *b*, *Bathyamaryllis perezii* Pirlot (1933a); *c*, *Trischizostoma nicaeense* (Costa) (Sars, 1895, pl. 12, as *T. raschi*) *d*, *Hirondellea trioculata* Chevreux (1900); *e*, *Scopelocheirus crenatus* Bate (Sars, 1895, pl. 19); *f*, *Lysianassa plumosa* Boeck (Sars, 1895, pl. 16, as *L. costae*); *g*, *Acidostoma obesum* (Bate) (Sars, 1895, pl. 14); *h*, *Aristias neglectus* (Bate) (Sars, 1895, pl. 17); *i*, *Orchomene batei* Sars (1895, pl. 22). Maxilla 2: *j*, *Perrierella*; *k*, *Adeliella laticornis* Nicholls (1938); *l*, *Orchomene*; *m*, *Trischizostoma*; *n*, *Acidostoma*; *o*, *Scopelocheirus*; *p*, *Lysianassa plumosa*. Coxa 1: *q*, *Anonyx nugax* (Phipps) (Sars, 1895, pl. 31). Coxa 4: *r*, *Paralibrotus setosus* Stephensen (1923). Gills: *s*, *Ichnopus spinicornis* Boeck (Sars, 1895, pl. 15). Pleonites 3–6 (5–6 fused), lateral: *t*, *Crybelocyphocaris tattersalli* Shoemaker (1945a).

Cheirimedon fougneri Walker (1903) differs from the type-species of *Cheirimedon* by the short cleft of the telson and thus resembles some species of "*Onisimus*" auct. and *Paronesimus*. *Cheirimedon pectinipalma* K. H. Barnard (1925) resembles *C. latimanus* in coxa 1 and mandible but has a poorly cleft telson, and is distinguished from *Uristes* primarily by the telson. Because these species assigned to *Cheirimedon* confound its crisp definition and bridge so many other genera it would seem prudent to isolate at least *C. latimanus* in a genus of its own and assign *C. pectinipalma* to it provisionally. The latter also has affinities with *Hirondellea* except in its head. The three species then remaining in *Cheirimedon*, *C. crenatipalmatus*, *C. fougneri*, and *C. femoratus* should be examined from time to time in light of a viewpoint that they simply represent minor departures in the evolutionary scheme of certain genera such as *Anonyx* (*C. crenatipalmatus* and *C. femoratus*) and "*Onisimus*" (*C. fougneri*) while those species of the new genus, with *C. latimanus* as type, should be considered as possible subgeneric members of *Uristes* and "*Tryphosa*." A parallel may be seen in *Pseudokoroga rima* J. L. Barnard which is simply an *Orchomene* with enlarged first gnathopod. Perhaps many of the lysianassids with enlarged first gnathopods are the rubble left behind in the differentiation of genera, now so remote from their ancestors, that their origins are unrecognizable.

Cheirimedon is mentioned often in the foregoing keys to Lysianassidae because the several species confound the couplets at vital points.

Chevreuxiella Stephensen

Chevreuxiella Stephensen, 1915.

Type-species: *C. metopoides* Stephensen, 1915 (monotypy).

Accessory flagellum absent; upper lip and epistome not differentially produced but both large and helmet-shaped; mandible lacking molar and palp; maxilliped of diverging interpretation: possibly composed of small inner and outer plates and an immense opercular palp composed of one article supporting a second minute proximal article; possibly the opercular palp article is the outer plate and the second article is the palp; gnathopod 1 simple, short, article 5 longer than 6, article 7 with apical spine; gnathopod 2 simple; coxae 1 and 2 much smaller than coxae 3 and 4, coxa 2 partially hidden by 3 and coxa 1 partially hidden by 2; coxa 4 large, not posteriorly excavate; uropods 1 and 2 flattened, inner ramus less than half of outer; telson and uropod 3 absent; urosome composed of two segments. Species: 2, Atlantic, antarctic, bathy-abyssopelagic.

FIGURE 128.—Lysianassidae: Maxilliped: *a*, *Centromedon pumilus* (Liljeborg) (Sars, 1895, pl. 34); *b*, *Kerguelenia borealis* Sars (1895, pl. 40); *c*, *Lysianassa plumosa* Boeck (Sars, 1895, pl. 16, as *L. costae*); *d*, *Acidostoma obesum* (Bate) (Sars, 1895, pl. 14); *e*, *Pachynus chelatum* Bulycheva (Gurjanova, 1962); *f*, *Lysianassa heterodonta* (Pirlot, 1936); *g*, *Normanion sarsi* Stebbing (Sars, 1895, pl. 13, as *N. quadrimana*); *h*, *Trischizostoma nicaeense* (Costa) (Sars, 1895, pl. 12, as *T. raschi*); *i*, *Ambasia atlantica* (Milne Edwards) (Sars, 1895, pl. 17, as *A. danielsseni*); *j*, *Perrierella audouiniana* (Bate) (Chevreux and Fage, 1925); *k*, *Nannonyx goesi* (Boeck) (Sars, 1895, pl. 24), *l*, *Danaella mimonectes* Stephensen (1925b), palp absent. Telson: *m*, *Acidostoma; n*, *Onisimus edwardsi* (Krøyer) (Sars, 1895, pl. 36); *o*, *Orchomene batei* Sars (1895, pl. 22); *p*, *Lysianassa; q*, *Ichnopus spinicornis* Boeck (Sars, 1895, pl. 15); *r*, *Opisa eschrichti* (Krøyer) (Sars, 1895, pl. 14); *s*, *Hippomedon abyssi* (Goës) (Gurjanova, 1962); *t*, *Eurythenes gryllus* (Lichtenstein) (Sars, 1895, pl. 30); *u*, *Hippomedon denticulatus* (Bate) (Sars, 1895, pl. 20); *v*, *Boeckosimus normani* (Sars, 1895, pl. 36); *w*, *Trischizostoma.*

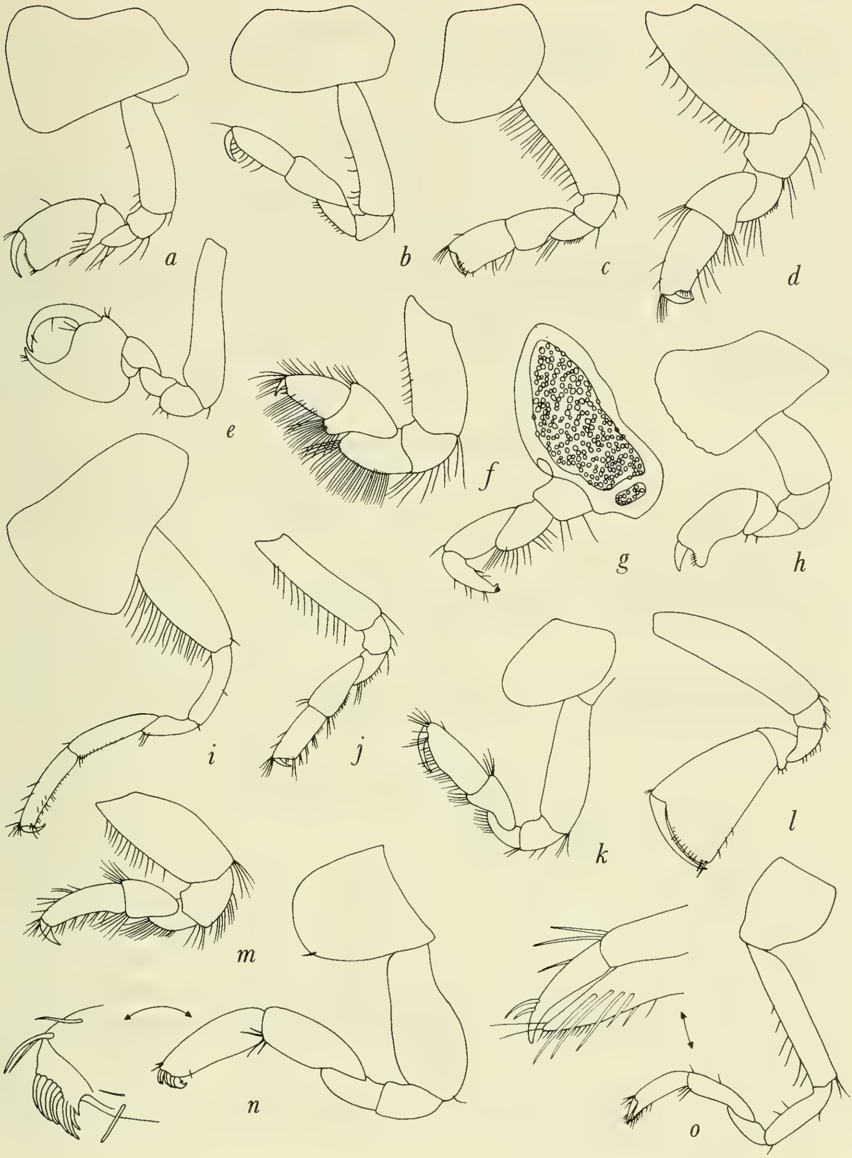

FIGURE 129.—Lysianassidae: Gnathopod 1: *a*, *Koroga megalops* Holmes (Stephensen, 1923); *b*, *Paracentromedon crenulatus* (Chevreux) (Chevreux and Fage, 1925); *c*, *Schisturella* (=*Pseudonesimus*) *abyssi* (Chevreux, 1926); *d*, *Orchomene batei* Sars (1895, pl. 22); *e*, *Opisa eschrichti* (Krøyer) (Sars, 1895, pl. 14); *f*, *Nannonyx goesi* (Boeck) (Sars, 1895, pl. 24); *g*, *Eucallisoma glandulosa* J. L. Barnard (1961); *h*, *Gainella chelata* Chevreux (1912b); *i*, *Pseudorchomene coatsi* (Chilton, 1912); *j*, *Tryphosella sarsi* Bonnier (Sars, 1895, pl. 27, as *Tryphosa nana*); *k*, *Uristes umbonatus* (Sars, 1895, pl. 29); *l*, *Cheirimedon latimanus* Sars (1895, pl. 13); *m*, *Menigrates obtusifrons* (Boeck) (Sars, 1895, pl. 38); *n*, *Paracallisomopsis beljaevi* Gurjanova (1962); *o*, *Euonyx chelatus* Norman (Sars, 1895, pl. 40).

Clepidecrella J. L. Barnard

Clepidecrella J. L. Barnard, 1962d.

Type-species: *C. cabinda* J. L. Barnard, 1962d (original designation).

Head small, partially hidden by coxa 1; article 1 of antenna 1 carinate; upper lip and epistome not differentially produced; mandibular molar vestigial, palp very long, attached level with molar; outer plates of maxilliped rather small, palp very long; gnathopod 1 simple, articles 5 and 6 equal; uropod 3 very short, inner ramus short, scale-like; telson short, apically emarginate. Species: 1, S. Atlantic, abyssal.

Crybelocephalus Tattersall

Crybelocephalus Tattersall, 1906.

Type-species: *C. megalurus* Tattersall, 1906 (original designation). See Shoemaker, 1945a.

Accessory flagellum absent; head somewhat deformed; mandible lacking both molar and palp; gnathopod 1 simple, articles 5 and 6 subequal; gnathopod 2 simple; coxae 1 and 2 small and fully hidden by coxa 3; *pereopods 1 and 2 subprehensile;* telson large, entire. Species: 3, cosmopolitan, bathy-abyssopelagic.

Crybelocyphocaris Shoemaker

Crybelocyphocaris Shoemaker, 1945a.

Type-species: *C. tattersalli* Shoemaker, 1945a (original designation).

Accessory flagellum absent; head deformed; mandible lacking molar, palp attached rather proximally; gnathopod 1 simple, articles 5 and 6 equal; gnathopod 2 simple; coxae 1 and 2 small and partially hidden by coxa 3; *pereopods 1 and 2 prehensile, pereopod 3 subprehensile;* uropod 3 small, outer ramus equal to peduncle, *2-articulate,* inner ramus one third as long as outer; urosomites 2 and 3 coalesced. Species: 1, Atlantic, bathypelagic.

Cyclocaris Stebbing

Cyclocaris Stebbing, 1888; 1906.

Type-species: *C. tahitensis* Stebbing, 1888 (monotypy).

Apparently upper lip lobately produced in front of epistome; head somewhat deformed and globular; mandible flattened, possibly with elongate, lanceolate, setulose molar or none, palp attached medially or level with molar; gnathopod 1 slender, simple; coxae 1 and 2 small and partially hidden by coxa 3; telson long, deeply cleft. Species: 2, arctic to Pacific tropics, epi- to ?abyssopelagic.

Cyphocaris Boeck

Cyphocaris Boeck, 1871.—Stebbing, 1906.

Type-species: *C. anonyx* Boeck, 1871 (monotypy). See Stebbing, 1888 (as *C. micronyx*); Schellenberg, 1926b, 1927.

Epistome and upper lip not differentially produced; head deformed; mandibular molar of medium size, ridged, palp attached level with molar; gnathopod 1 simple, articles 5 and 6 equal; gnathopod 2 nearly simple, article 5 only slightly longer than article 6; coxae 1, 2, and 3 small, partially hidden by large coxa 4; article 2 of pereopod 3 deeply indentured or not, or with long posterior cusp; pereopods 1–4 decreasingly prehensile or not prehensile; telson long, deeply cleft. Species: 7, cosmopolitan, bathy-abyssopelagic.

Danaella Stephensen

Danaella Stephensen, 1925b.

Type-species: *D. mimonectes* Stephensen, 1925b (monotypy, original designation in title).

Body globular, with pereonites 3–6 especially enlarged; accessory flagellum absent; epistome and upper lip not prominent; mandible simple, lacking molar and palp; maxilliped composed of large opercular outer plates covering smaller curved inner lobes; gnathopod 1 simple, dactyl very short; gnathopod 2 simple; coxae 1 and 2 small and hidden by following coxae; inner rami of uropods 1 and 2 short and spiniform; uropod 3 a vestigial microscopic bud; telson probably absent; urosome possibly consisting of two segments with a vestigial third. Species: 1, Atlantic, bathypelagic.

Derjugiana Gurjanova

Derjugiana Gurjanova, 1962.

Type-species: *D. insolita* Gurjanova, 1962 (monotypy).

Mouthpart group conically produced, mouthparts styliform; mandible lacking molar, palp attached proximally; maxillipedal palp not exceeding outer plate, article 4 short and not claw-shaped; gnathopod 1 chelate, article 6 longer than 5; inner ramus of uropod 2 slightly constricted, uropod 3 lacking rami; telson short, entire. Species: 1, Okhotsk Sea, littoral.

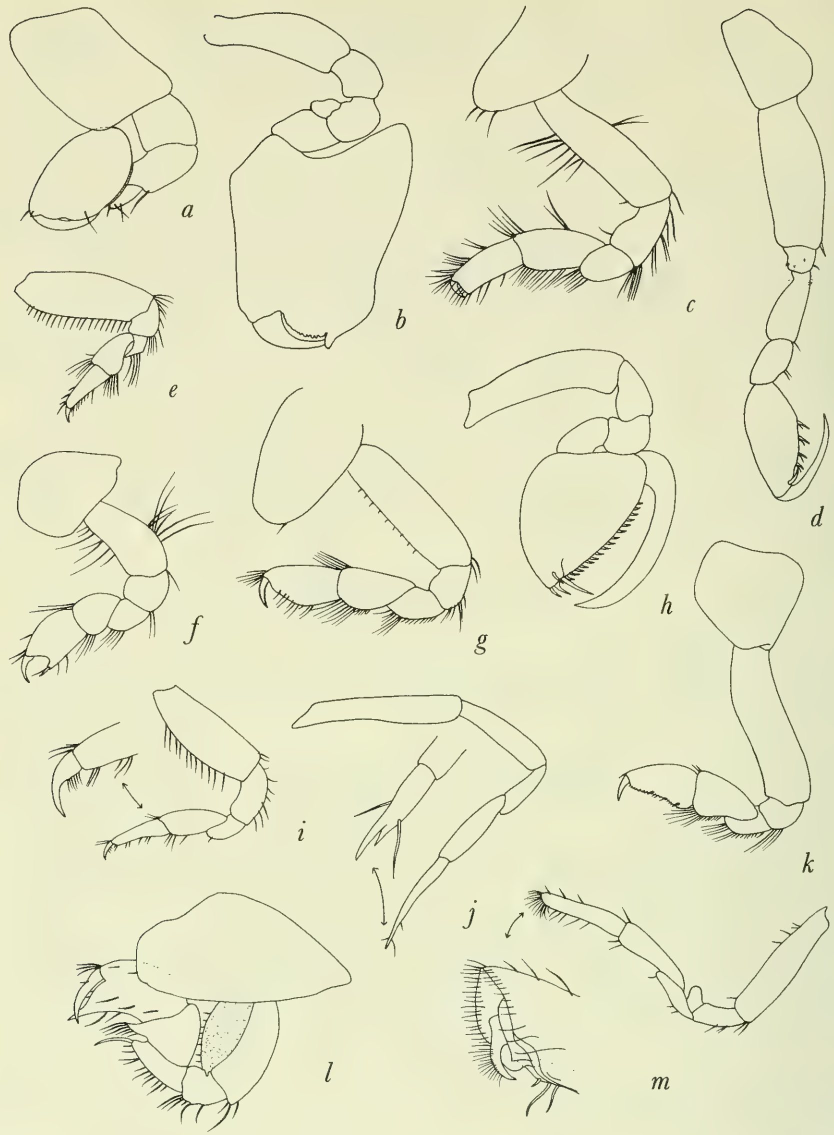

FIGURE 130.—Lysianassidae: Gnathopod 1: *a*, *Pachychelium davidis* Stephensen (1925a); *c*, *Valettiopsis dentatus* Holmes (1908); *e*, *Lysianassa plumosa* Boeck (Sars, 1895, pl. 16, as *L. costae*); *f*, *Valettia coheres* Stebbing (1888); *g*, *Neoambasia tumicornis* (Nicholls, 1938); *h*, *Trischizostoma nicaeense* (Costa) (Sars, 1895, pl. 12, as *T. raschi*); *i*, *Ichnopus spinicornis* Boeck (Sars, 1895, pl. 15); *j*, *Kerguelenia borealis* Sars (1895, pl. 40); *k*, *Aristias neglectus* Hansen (Sars, 1895, pl. 17, as *A. audouinianus*); *l*, *Sophrosyne robertsoni* Stebbing and Robertson (1891); *m*, *Scopelocheirus crenatus* Bate (Sars, 1895, pl. 19). Pereopod 1: *b*, *Endeavoura mirabilis* Chilton (1921); *d*, *Paracyphocaris praedator* Chevreux (Shoemaker, 1945a).

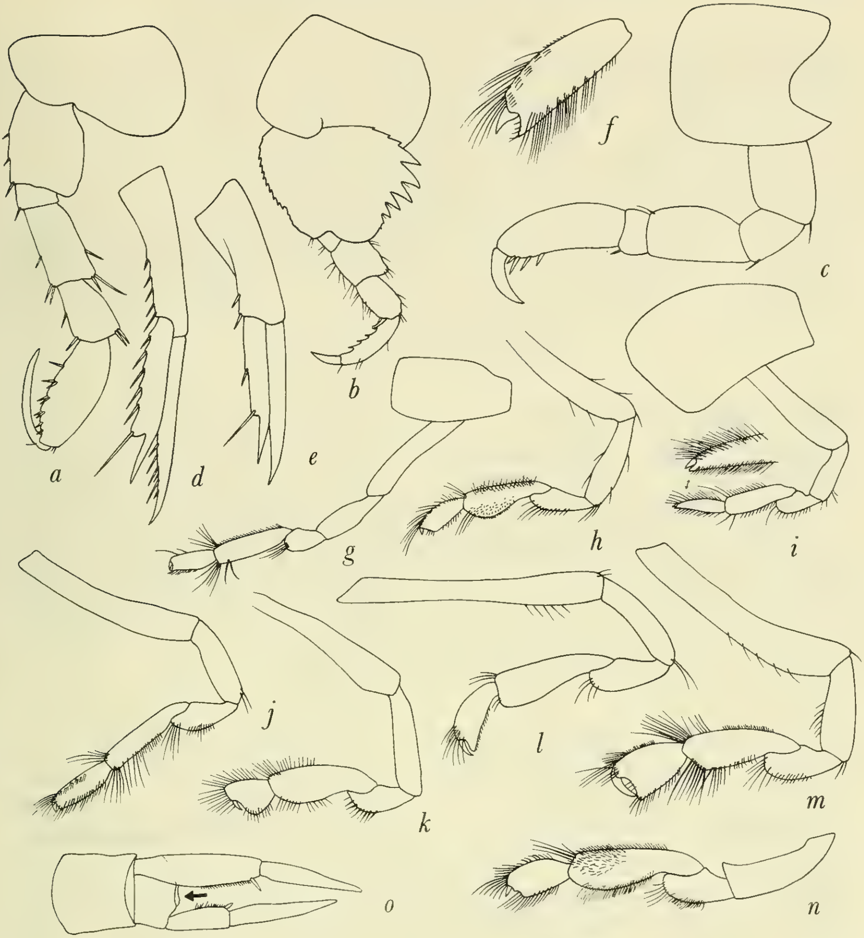

FIGURE 131.—Lysianassidae: Pereopod 3: *a*, *Paracyphocaris praedator* Chevreux (Shoemaker, 1945a); *b*, *Glycerina tenuicornis* (Haswell) (Pirlot, 1936). Pereopod 2: *c*, *Scopelocheiropsis abyssalis* Schellenberg (1926a). Uropod 2: *d*, *Tryphosites longipes* (Bate and Westwood) (Sars, 1895, pl. 29); *e*, *Orchomene groenlandica* (Hansen) (Sars, 1895, pl. 26). Gnathopod 2: *f*, *Scopelocheirus crenatus* Bate (Sars, 1895, pl. 19); *g*, *Hirondellea brevicaudata* Chevreux (1910); *h*, *Lysianassa plumosa* Boeck (Sars, 1895, pl. 16, as *L. costae*); *i*, *Gainella chelata* Chevreux (1912b); *j*, *Tryphosites*; *k*, *Trischizostoma nicaeense* (Costa) (Sars, 1895, pl. 12, as *T. raschi*); *l*, *Lepidepecreum longicorne* (Bate and Westwood) (Sars, 1895, pl. 38, as *L. carinatum*); *m*, *Anonyx debruynii* (Hoek) (Sars, 1895, pl. 37); *n*, *Hippomedon denticulatus* (Bate) (Sars, 1895, pl. 20). Urosome: *o*, *Danaella mimonectes* Stephensen (1925b), showing long uropod 1, shorter uropod 2 and arrow pointing to vestigial uropod 3 tubercles.

Endevoura Chilton

Endevoura Chilton, 1921.

Type-species: *E. mirabilis* Chilton, 1921 (original designation).

Antennal flagella very short, 2- to 5-articulate; [upper lip and epistome not described]; mandibular molar well developed, ridged, palp attached proximal to molar; maxillipedal palp article 4 bulbous; gnathopod 1 simple, dactyl very short; *pereopod 1 prehensile, subchelate, large;* telson entire, short. Species: 1, Bass Strait, littoral.

Ensayara J. L. Barnard

Ensayara J. L. Barnard, 1964d.

Type-species: *E. ramonella* J. L. Barnard, 1964d (original designation).

Antennal flagella very short, about 5-articulate; upper lip and epistome inconspicuous, latter projecting slightly; mandibular molar smooth, palp attached about level with molar; maxillipedal palp article 4 claviform; gnathopod 1 simple, dactyl short; *pereopod 1 prehensile, subchelate, large;* telson entire, short. Species: 1, Baja California, littoral.

Eucallisoma J. L. Barnard

Eucallisoma J. L. Barnard, 1961.

Type-species: *E. glandulosa* J. L. Barnard, 1961 (original designation).

Head very small but not deformed; antenna 1 immense, stout, conical, article 1 of flagellum elongate, flagellum bearing only three articles, *accessory flagellum appressed to body of antenna* (*Paracallisomopsis*); epistome and upper lip each convex in front; mandibular molar small, conical, unridged, palp attached level with molar; gnathopod 1 simple, not elongate, article 7 vestigial, shrouded by short cirri, article 2 immensely swollen; telson of medium length, deeply cleft. Species: 1, tropical Atlantic, abyssal.

Euonyx Norman

Euonyx Norman, 1867b.—Stebbing, 1906.
Leptochela Boeck, 1876 (homonym, Decapoda).

Type-species: *E. chelatus* Norman, 1867b (monotypy). See Sars, 1895.

Epistome acutely produced in front of upper lip; mandibular molar obsolete or absent, palp attached distally; gnathopod 1 slender, chelate, thumb narrow; article 7 of gnathopod 2 rather large and curved; coxa 1 short, nearly hidden by coxa 2; telson of medium length, deeply cleft. Species: 7, cosmopolitan, epi- to bathypelagic.

Eurythenes Smith

Eurytenes Liljeborg, 1865 (homonym, Hymenoptera).
Eurythenes Smith, 1884.—Stebbing, 1906.
Euryporeia Sars, 1895.
Katius Chevreux, 1905c.

Type-species: *Gammarus gryllus* Lichtenstein, 1822 (monotypy). See Sars, 1895.

Article 1 of antenna 2 tumid in adults; epistome broadly lobate in front of upper lip; mandibular molar immense, extremely broad, laminate, apically ridged, palp attached level with molar; gnathopod 1 subchelate, article 7 overlapping palm, article 6 longer than 5, *article 3 not elongate* (*Paralicella*); coxa 1 shortened, partially concealed by coxa 2; telson long, deeply cleft. See *Aristias*. Species: 2, cosmopolitan, bathyal to abyssal.

Figorella J. L. Barnard

Figorella J. L. Barnard, 1962d.

Type-species: *F. tanidea* J. L. Barnard, 1962d (original designation).

Accessory flagellum 1-articulate; [upper lip and epistome not described]; mandibular molar absent, palp attached rather distally; palp of maxilla 1 uniarticulate; gnathopod 1 slightly chelate, article 6 somewhat enlarged, much longer than article 5; uropod 3 very short, inner ramus shortened; telson short, apparently entire. Species: 1, S. Atlantic, abyssal.

Gainella Chevreux

Gainella Chevreux, 1911c; 1912a; 1912b.

Type-species: *G. chelata* Chevreux, 1912a, 1912b (designated by Chevreux, 1912a).

Epistome and upper lip not differentially produced; mandibular molar small but ridged, palp attached proximal to molar; inner plates of maxilliped styliform, palp very long, slender, article 4 densely setulose apically; gnathopod 1 chelate, thumb narrow and short, article 6 much longer than 5; gnathopod 2 styliform but minutely chelate; uropod 3 short, inner ramus a short scale, one third as long as outer ramus; telson short, deeply cleft. Species: 1, antarctic, littoral (297 m).

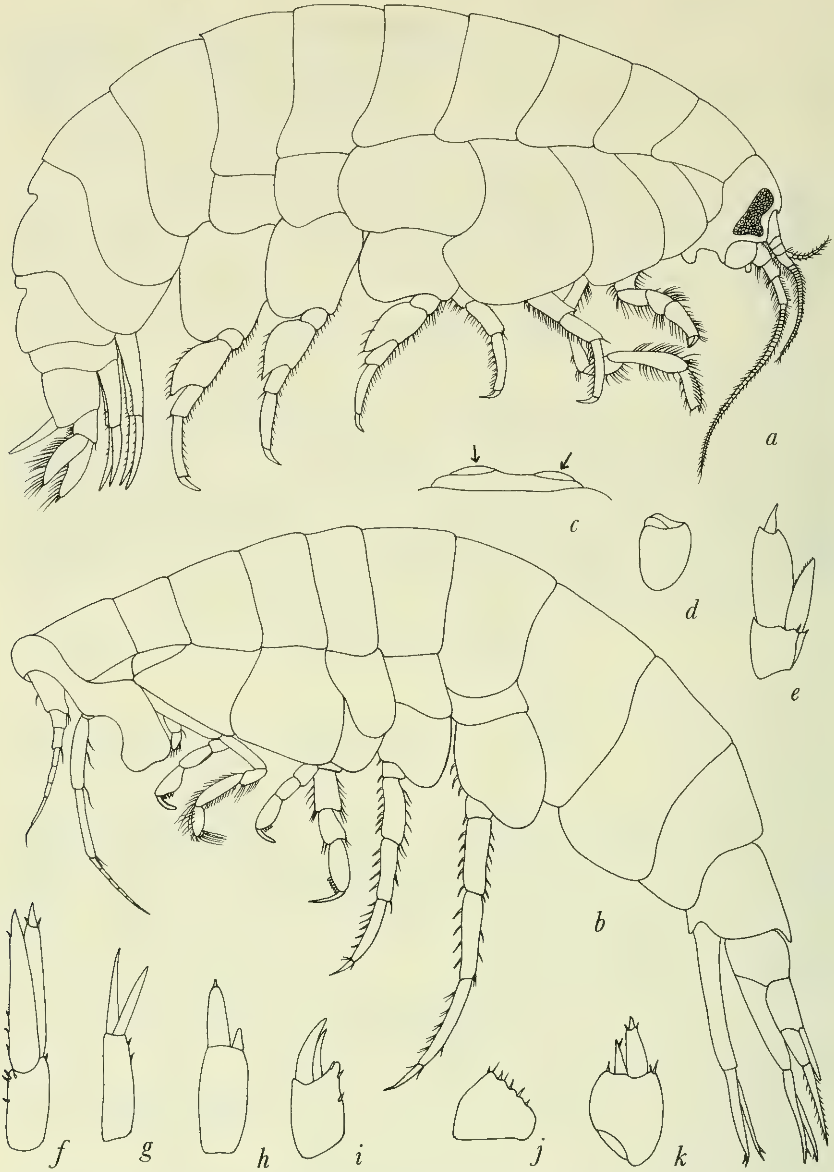

FIGURE 132.—Lysianassidae: *a*, *Eurythenes gryllus* (Lichtenstein) (Sars, 1895, pl. 30); *b* *Metacyphocaris helgae* Tattersall (1906). Uropod 3: *c*, *Danaella mimonectes* Stephensen (1925b); *d*, *Stomacontion pepinii* (Stebbing, 1888); *e*, *Aristias tumidus* (Krøyer) (Sars, 1895, pl. 18); *f*, *Hippomedon denticulatus* (Bate) (Sars, 1895, pl. 20); *g*, *Lysianassa plumosa* Boeck (Sars, 1895, pl. 16, as *L. costae*); *h*, *Lepidepecreella ctenophora* Schellenberg (1926a); *i*, *Lysianassa alba* (Holmes) (Shoemaker, 1933b); *j*, *Acontiostoma marionis* Stebbing (1888); *k*, *Nannonyx goesi* (Boeck) (Sars, 1895, pl. 24).

Glycerina Haswell

Glycera Haswell, 1880b (homonym, Polychaeta).
Glycerina Haswell, 1882.—Stebbing, 1906.

Type-species: *Glycera tenuicornis* Haswell, 1880b (monotypy). See Pirlot, 1936.

Upper lip acutely produced in front of epistome; mandibular molar prominent, setulose, palp attached proximal to molar; gnathopod 1 simple, slender, article 5 slightly longer than 6; article 2 of pereopod 3 deeply indentured; inner ramus of uropod 2 constricted; telson deeply cleft. Species: 1, Coral Sea to E. Australia, littoral.

Hippomedon Boeck

Hippomedon Boeck, 1871.—Stebbing, 1906.—Gurjanova, 1962.
Platamon Stebbing, 1888.
Paratryphosites Stebbing, 1899d.
?*Paracentromedon* Chevreux and Fage, 1925.
?*Elimedon* J. L. Barnard, 1962d.

Type-species: *Anonyx holbolli* Krøyer, 1846 (selected by Boeck, 1876; note, the *A. holbolli* of Boeck, 1871 and 1876=*Hippomedon denticulatus* [Bate, 1857a] but the type-species should stand as *A. holbolli* Krøyer). See Sars, 1895.

Head small, largely hidden by coxa 1 ("*Tryphosa*" auct.), *with distinct lateral lobes* (*Lepidepecreoides*); upper lip either distinctly or not lobate in front of epistome but both projections small, inconspicuous; mandibular molar large, ridged, palp attached level with molar; gnathopod 1 subchelate or nearly simple, article 5 longer than or equal to 6; telson short or medium, half or deeply cleft. See also *Paronesimus*. Species: 41, cosmopolitan, cold water, littoral to abyssal.

Hirondellea Chevreux

Hirondellea Chevreux, 1889.—Stebbing, 1906.—K. H. Barnard, 1930.
Tetronychia Stephensen, 1923.

Type-species: *Hirondellea trioculata* Chevreux, 1889 (original designation). See Chevreux, 1900.

When visible, eyes triple; head globular or with large lateral lobes rounded, palp article 4 of maxilliped claw-shaped (*Centromedon*); mandibular molar conical, setulose, palp attached at proximal end of molar; *inner plate of maxilla 1 with at least one enlarged sickle-seta* or seta with strong attenuation or constriction, palp article 2 often notched medially; *maxillipedal palp article 2 half or less as broad as outer plate* (*Ambasiella*); gnathopod 1 subchelate or slightly chelate, articles 5 and 6 equal; coxa 1 rather small, often partially hidden by coxa 2; inner ramus of uropod 2 constricted or not; telson of medium length or short, deeply or shortly cleft. Species: 6, cosmopolitan, primarily bathyal to abyssal, pelagic.

Ichnopus Costa

Ichnopus Costa, 1853c; 1857.—Stebbing, 1906.

Type-species: *I. taurus* Costa, 1853c (monotypy). See Chevreux and Fage, 1925.

Upper lip slightly produced in front of epistome; mandibular molar laminate, scarcely ridged, palp attached level with molar; gnathopod 1 simple, article 7 with a posterior or distal bundle of setae; telson of medium length, cleft; *gills plaited on both sides, pereopod 5 much longer than pereopod 4* (*Socarnes*). Species: 5, probably cosmopolitan, littoral to abyssal, pelagic.

Kerguelenia Stebbing

Kerguelenia Stebbing, 1888; 1906.

Type-species: *K. compacta* Stebbing, 1888 (monotypy).

Upper lip and epistome small, inconspicuous; mandible lacking distinct cutting edge and molar, palp attached distally; maxillae and maxilliped poorly developed, stunted; gnathopod 1 simple, styliform; uropod 3 tiny, rami usually shorter than peduncle, inner often vestigial or absent, outer 1- or 2-articulate; telson short, entire. Species: 6, bipolar, amphiboreal, littoral to bathyal.

Koroga Holmes

Koroga Holmes, 1908.

Type-species: *K. megalops* Holmes, 1908 (original designation). See Gurjanova, 1962.

Upper lip projecting lobately in front of epistome; mandibular molar short, conical or laminate, setulose, palp attached slightly proximal to molar; *maxillae stout, maxillipedal palp article 4 long* (*Pseudokoroga*); gnathopod 1 subchelate, palm broad, transverse, article 6 slightly broadened, much longer than article 5; telson apically notched. Species: 1, cosmopolitan, epipelagic.

Kyska Shoemaker

Kyska Shoemaker, 1964.

Type-species: *K. dalli* Shoemaker, 1964 (original designation).

Upper lip not projecting in front of epistome; mandibular molar of medium size, conical, setulose, lacking ridges, palp attached distal to molar; gnathopod 1 chelate, article 6 and chela slender, article 6 much longer than 5; inner ramus of uropod 2 unconstricted; telson of medium length, deeply cleft; gills plaited on both sides. Like *Anonyx* but gnathopod 1 chelate. Species: 1, Alaska, littoral.

Lepidepecreella Schellenberg

Lepidepecreella Schellenberg, 1926a.
Paracyclocaris K. H. Barnard, 1930.

Type-species: *L. ctenophora* Schellenberg, 1926a (monotypy).

Epistome forming immense anterior keel on head, projecting in front of upper lip but together coalesced; mouthpart field thus giving conical appearance, mandible slender, molar bulge present, palp attached proximal to molar; gnathopod 1 simple, styliform, article 7 apically (and marginally) setose; coxae 1 and 2 small, partially hidden by coxa 3; outer ramus of uropod 3 shorter than peduncle, 1- or 2-articulate, inner ramus one third (rarely one half) as long as outer or absent; telson short, entire. Species: 5, bipolar, littoral to bathyal.

Lepidepecreoides K. H. Barnard

Lepidepecreoides K. H. Barnard, 1931; 1932.

Type-species: *L. xenopus* K. H. Barnard, 1931 (original designation); 1932.

Head deeply concavotruncate from lateral view (*Hippomedon*); upper lip lobately projecting in front of epistome; mandibular molar small, palp attached level with molar; gnathopod 1 subchelate, article 5 longer than 6; article 7 of gnathopod 2 rather large, palm slightly chelate; *coxa 5 as deep as coxa 4* (*Hippomedon*); telson of medium length, deeply cleft. Species: 1, subantarctic, littoral.

Lepidepecreopsis Stephensen

Lepidepecreopsis Stephensen, 1925a.

Type-species: *L. biloba* Stephensen, 1925a (monotypy). See *Tmetonyx* Stebbing and *Tryphosella* Bonnier.

Epistome broadly rounded and dominating upper lip, latter slightly produced, both separated by deep incision; mandibular molar subcolumnar, not triturative (*Tryphosella*), palp attached level with molar or at proximal corner; coxa 1 slightly tapering distally and partially hidden by coxa 2; gnathopod 1 subchelate, articles 5 and 6 subequal in length or article 5 shorter than 6; telson of medium length, deeply cleft. Species: 1, subarctic Atlantic, abyssal.

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Lepidepecreum Bate and Westwood

Lepidepecreum Bate and Westwood, 1868.—Stebbing, 1906.

Type-species: *Anonyx longicornis* Bate and Westwood, 1863 (monotypy and subsequent synonymy). See Sars, 1895.

Article 1 of antenna 1 usually carinate (*combining characteristic*) but occasionally not; accessory flagellum absent (type) or present; epistome broadly produced in front of upper lip; *body often dorsally carinate or toothed*; mandibular molar a setulose, quadrate lamina, palp attached proximal to molar; gnathopod 1 subchelate, articles 5 and 6 subequal; telson long, deeply cleft. *Some species approach Orchomene complex.* Species: 19, bipolar, amphiboreal, littoral to bathyal.

Lysianassa Milne Edwards, provisional synonymy

Lysianassa Milne Edwards, 1830.—Stebbing, 1906.

Lysianassina Costa, 1867.

Lysianax Stebbing, 1888.

Lysianopsis Holmes, 1903; 1905. Type-species: *L. alba* Holmes, 1903 (monotypy). See Shoemaker, 1933b.

Aruga Holmes, 1908. Type-species: *A. oculata* Holmes, 1908 (monotypy).

Arugella Pirlot, 1936. Type-species: *A. heterodonta* Pirlot, 1936 (original designation).

Shoemakerella Pirlot, 1936. Type-species: *Lysianassa nasuta* Dana, 1853 (original designation). Hurley (1963) notes that Pirlot's diagnosis of *Shoemakerella* fits *Lysianax cubensis* Stebbing, 1897, and not *L. nasuta*. However, the latter should remain as type-species because it was so designated.

?*Pronannonyx* Schellenberg, 1953. Type-species: *P. minimus* Schellenberg, 1953 (monotypy). [See also in alphabetical order.]

Type-species: *L. costae* Milne Edwards, 1830 (denoted by elimination of Milne Edwards, 1840, and selected by Boeck, 1876). Species obscure. Genus based here on *L. plumosa* Boeck (*L. costae* of Sars, 1895, pl. 16, fig. 1).

Upper lip strongly lobate in front of epistome or epistome produced forward along with upper lip; mandibular molar large, conicolaminate, unridged or nearly obsolete, palp attached proximal to molar; gnathopod 1 simple, articles 5 and 6 subequal; inner ramus of uropod 2 unconstricted (*L. plumosa*), or constricted (*L. longicornis*); outer ramus of uropod 3 uniarticulate; telson entire, emarginate, or minutely notched. Species, including synonymous genera: 24, cosmopolitan, littoral (rarely in bathyal). Species with aberrant maxilla 2: *L. hypocrita* Ruffo.

Lysianella Sars

Lysianella Sars, 1882.—Stebbing, 1906.

Type-species: *L. petalocera* Sars, 1882 (original designation). See Sars, 1895.

Article 4 of antenna 2 tumid, article 5 slender; upper lip lobately produced in front of epistome; mandibular molar vestigial, palp attached proximal to molar; gnathopod 1 subchelate, often weakly, articles 5 and 6 equal; inner ramus of uropod 2 constricted or not; telson of medium length, entire or cleft 25 percent. Species: 3, boreal and subtropical Atlantic and Mediterranean, littoral to abyssal.

Menigrates Boeck

Menigrates Boeck, 1871.—Stebbing, 1906.

Type-species: *Anonyx obtusifrons* Boeck, 1861 (monotypy). See Sars, 1895.

Upper lip and epistome not differentially produced, inconspicuous; mandibular molar obsolescent, an undifferentiated lamina, palp attached slightly proximal to molar; gnathopod 1 simple, article 6 longer than 5; telson short, cleft one third (type) or a quarter or less; *peduncular articles 2 and 3 of antenna 1 short, half as long as article 1 of flagellum* (*Waldeckia* and *Socarnes*). See *Paralibrotus*. Species: 3, subarctic, littoral.

Menigratopsis Dahl

Menigratopsis Dahl, 1945.

Type-species: *M. svenillsoni* Dahl, 1945 (monotypy).

Epistome and upper lip indistinct from each other; mandibular molar well developed, but possibly not triturative, palp attached level with molar; gnathopod 1 simple, article 5 slightly longer than article 6; telson of medium length, deeply cleft. Species: 1, the Sound between Sweden and Denmark, littoral.

Mesocyclocaris Birstein and Vinogradov

Mesocyclocaris Birstein and Vinogradov, 1964.

Type-species: *M. gracilis* Birstein and Vinogradov, 1964 (monotypy).

Accessory flagellum absent; mandible lacking molar and palp; gnathopod 1 simple, article 5 longer than 6; coxae 1 and 2 much smaller than coxae 3 and 4 and probably partially hidden by coxa 3; *pereopods 1–5 prehensile;* uropod 3 elongate, rami interequal, outer 1-articulate; [telson unclear]. Species: 1, Indian Ocean, bathypelagic.

Mesocyphocaris Birstein and Vinogradov

Mesocyphocaris Birstein and Vinogradov, 1960.

Type-species: *M. longicaudatus* Birstein and Vinogradov, 1960 (original designation).

Accessory flagellum 1-articulate; head somewhat deformed; mandible lacking molar, palp attached medially on mandibular body; gnathopod 1 simple, articles 5 and 6 subequal; coxae 1 and 2 much smaller than coxae 3 and 4 and probably partially hidden by coxa 3; *pereopods 1–4 prehensile;* uropod 3 elongate, outer ramus 2-articulate, inner very short and scale-like; telson short, cleft one third its length. Species: 1, Pacific, abyssopelagic.

Metacyclocaris Birstein and Vinogradov

Metacyclocaris Birstein and Vinogradov, 1955.

Type-species: *M. polycheles* Birstein and Vinogradov, 1955 (original designation).

Mandible lacking molar, palp attached rather distally; gnathopod 1 simple, article 5 longer than 6, gnathopod 2 slender, nearly simple; coxa 2 much larger than coxa 1 and covering it, coxae 3 and 4 not enlarged as in other cyphocarid genera; *pereopods all prehensile;* telson long, deeply cleft. Species: 1, N.W. Pacific, abyssopelagic.

Metacyphocaris Tattersall

Metacyphocaris Tattersall, 1906.

Type-species: *M. helgae* Tattersall, 1906 (original designation).

Head deformed; accessory flagellum 1-articulate; mandible with very small, smooth molar, palp absent; gnathopod 1 simple, articles 5 and 6 equal; gnathopod 2 simple; coxae 1 and 2 small, partially hidden by coxa 3; *pereopods 1–3 prehensile;* outer ramus of uropod 3 elongate, 2-articulate, inner ramus very short, scale-like; telson of medium length, cleft one fourth. Species: 1, cosmopolitan, bathypelagic.

Metambasia Stephensen

Metambasia Stephensen, 1923.

Type-species: *M. faeroensis* Stephensen, 1923 (monotypy).

Article 3 of male antenna 2 tumid; upper lip projecting slightly in front of epistome; mandibular molar a long conical lamina, palp attached level with molar; gnathopod 1 simple, article 5 longer than 6; coxa 1 short, half as long as its second article, partially hidden by coxa 2; inner ramus of uropod 2 constricted; telson cleft halfway or more. See *Schisturella.* Species: 1, N. Atlantic, bathyal.

Microlysias Stebbing

Microlysias Stebbing, 1918.

Type-species: *M. xenokeras* Stebbing, 1918 (monotypy). See K. H. Barnard, 1937.

Article 4 of male antenna 2 very tumid; epistome slightly protruding in front of upper lip; mandibular molar feeble, palp attached quite proximally; maxillipedal palp 3-articulate, possibly with a minute fourth article; gnathopod 1 subchelate, article 6 slightly longer than 5; telson of medium length, deeply cleft; gills plaited. Species: 2, S. Africa, S. Arabian coast, littoral.

Nannonyx Sars

Nannonyx Sars, 1895.

Type-species: *Orchomene goesii* Boeck, 1871 (monotypy). See Sars, 1895.

Mouthparts substyliform; epistome and upper lip coalesced, epistomal portion projecting slightly in front of upper lip; mandibular molar vestigial, palp attached proximally; maxillipedal palp scarcely exceeding outer plate, article 4 very small (except *N. spinimanus* Walker); gnathopod 1 appearing simple but with microscopic palm, articles 5 and 6 short and stout; rami of uropod 3 equal to or shorter than peduncle; telson entire or slightly emarginate. Species: 4, boreal-subtropical N.E. Atlantic and Mediterranean, Kerguelen Island, littoral.

Neoambasia Dahl

Neoambasia Dahl, 1959.

Type-species: *Ambasiopsis tumicornis* Nicholls, 1938 (monotypy).

Upper lip projecting slightly in front of epistome; mandibular molar apparently well developed, setose, palp attached level with molar; *outer plate of maxilla 1 poorly spinose* (*Pseudambasia*); *outer plate of maxilliped spinose* (*Ambasiopsis*); gnathopod 1 subchelate, article 6 slightly longer than 5; coxa 1 not greatly shortened, but almost concealed by coxa 2, about as long as article 2 of gnathopod 1; rami of uropod 3 not longer than peduncle; telson short, deeply cleft. Species: 1, antarctic, bathyal.

Normanion Bonnier

Normania Boeck, 1871 (homonym, Ostracoda).
Normanion Bonnier, 1893 (new name).—Stebbing, 1906.

Type-species: *Opis quadrimana* Bate and Westwood, 1868 (monotypy). See Sars, 1895. Even though Boeck's identification of *O.*

quadrimana was in error, the type should remain that species for purposes of stability. Boeck's material was named *Normanion sarsi* by Stebbing (1906).

Mouthparts forming pseudoconical bundle or not; epistome applanated, not distinct from upper lip; mandibular molar conical or nearly obsolete, not ridged (?except *N. abyssi* Chevreux), palp attached proximal to molar; outer plates of maxilliped almost or greatly exceeding palp, palp essentially 3-articulate, scarcely or slightly exceeding inner plates, article 4 obsolete; gnathopod 1 moderately powerful, subchelate, palm transverse; peduncle of uropod 3 elongate; telson short, quadrate, entire. Species: 3, N.E. Atlantic, Mediterranean, littoral to abyssal (some fish commensalism).

Ocosingo J. L. Barnard

Ocosingo J. L. Barnard, 1964b.

Type-species: *O. borlus* J. L. Barnard, 1964b (original designation).

Mouthparts substyliform, forming ventral subconical bundle; mandible bearing vestigial molar ridge, palp attached quite proximally; palp of maxilla 1 uniarticulate; maxillipedal palp scarcely exceeding outer plate, 3-articulate, ultimate article claviform; gnathopod 1 simple, article 6 longer than 5; coxa 1 projecting over side of head; uropod 3 lacking rami; telson small, entire. Species: 1, California, littoral.

Onesimoides Stebbing

Onesimoides Stebbing, 1888; 1906.

Type-species: *O. carinatus* Stebbing, 1888 (monotypy).

Upper lip and epistome not differentially produced, mandibular molar ridged, palp attached level with molar; gnathopod 1 subchelate or slightly chelate, article 5 much longer than 6, gnathopod 1 rather enlarged in males; outer ramus of uropod 3 biarticulate, inner ramus half or less as long as outer; telson entire; *article 1 of first antennal flagellum 5 times as long as next article* (*Paronesimoides*). Species: 3, Indo-Pacific tropics, bathyal to hadal.

Onisimus Boeck, new synonymy

Onisimus Boeck, 1871.
Pseudalibrotus Della Valle, 1893.—Stebbing, 1906.

Type-species: *Anonyx litoralis* Krøyer, 1845 (selected by Boeck, 1876). Stebbing, Sars, and Della Valle apparently overlooked the fact that Boeck (1876) selected *Anonyx litoralis* as type of *Onisimus*. Della Valle erected *Pseudalibrotus* and cited only *A. litoralis*, thus making it type of the genus by monotypy. All species of *Pseudali-*

brotus, having gone under that name for over 60 years, must now be transferred to *Onisimus* and the 15 or more species of *Onisimus*, having gone under that name for nearly 100 years, must now be transferred to a new appellation, which I designate as *Boeckosimus* in honor of Axel Boeck, one of the first students of Amphipoda to understand the importance of type designations.

The genus *Alibrotus* Milne Edwards (1840) with its monotype, *A. chauseicus* Milne Edwards (1840) may be a senior synonym of either *Onisimus* (auct. =*Pseudalibrotus*) or *Boeckosimus*, new name, but the problem has never been clarified and may be insoluble. The problem should be reviewed at least once more by a student of arctic-boreal faunas and perhaps submitted to ICZN in order to cancel the genus *Alibrotus*.

Epistome broadly rounded and projecting slightly in front of upper lip; mandibular molar ridged, palp attached level with molar; gnathopod 1 subchelate, articles 5 and 6 equal; inner ramus of uropod 2 constricted or not; telson short, entire. See *Boeckosimus*. Species: 7, arctic littoral, Caspian Sea, glacial relicts.

Opisa Boeck

Opis Krøyer, 1842 (homonym, Mollusca).
Opisa Boeck,1876.—Stebbing,1906.

Type-species: *Opis eschrichtii* Krøyer, 1842 (monotypy and subsequent synonymy; Boeck (1876) cited *O. typica* Krøyer as type-species, probably as a technical error for he recognized it was a junior synonym of *O. eschrichtii*).

Upper lip rounded, slightly projecting in front of epistome; mandibular molar obsolete, palp attached proximally; gnathopod 1 powerful, chelate, chela broad, palm excavate to form thumb; coxa 1 slightly shortened and partially hidden by coxa 2; telson long, deeply cleft. Species: 2, boreal, littoral (to 432 m).

Orchomene Boeck, new synonymy

Orchomene Boeck, 1871.—Stebbing, 1906.
Tryphosa Boeck, 1871.—Stebbing, 1906.
Orchomenella Sars, 1895.*—Stebbing, 1906.
Orchomenopsis Sars, 1895.—Stebbing, 1906.
?*Allogaussia* Schellenberg, 1926a. [See also in alphabetical order.]

Type-species: *Anonyx serratus* Boeck, 1861 (selected by Boeck, 1876). See Sars, 1895* (as *Orchomenella ciliata*). Regrettably Sars and Stebbing overlooked the fact that Boeck (1876) had selected the type-species of *Tryphosa* as *Anonyx nanus* Krøyer (1846) a species un-

*This portion of Sars' monograph was published in 1891.

doubtedly congeneric with the type-species of *Orchomenella*, *Anonyx minutus* Krøyer, 1846 (original designation). Sars had incorrectly identified *Anonyx nanus* and his material later was named *Tryphosella sarsi* by Bonnier (1893); indeed Sars had in hand *Anonyx nanus* but he erected for the material the name *Orchomenella ciliata*, later shown by Stebbing (1906) to be a synonym of *A. nanus*. Unfortunately Stebbing did not therefore synonymize *Orchomenella* with "*Tryphosa*," since the two type-species were congeneric. Thus, *Orchomenella* must fall to *Tryphosa* and all species of *Tryphosa* (auct.), so well known since the time of Sars (1895) and Stebbing (1906) must be given a different generic name, which is *Tryphosella* Bonnier.

Epistome generally broadly lobate in front, occasionally acute, or flat and unproduced, lobe of upper lip generally prominent but rarely projecting far in front of epistome; mandibular small, poorly ridged or weakly setulose, palp attached proximal to molar; gnathopod 1 subchelate, article 6 longer than 5; telson variable, entire (*Allogaussia*) or minutely and deeply cleft. See *Lepidepecreum* for intergrading species. Species (including *Allogaussia*): 61+, cosmopolitan, cold-water, littoral to abyssal. "*Orchomenella*" *groenlandica* (Hansen) is treated in Keys L, N, O, and P as a distinct generic taxon.

***Pachychelium* Stephensen**

Pachychelium Stephensen, 1925a.

Type-species: *P. davidis* Stephensen, 1925a (original designation).

Antenna 1 very stout, body slender; mandibular molar absent, palp attached rather distally; maxilla 1 lacking palp; maxilla 2 with vestigial inner plate; maxilliped lacking inner plate or inner plate very small; gnathopod 1 enlarged, subchelate, article 6 large, ovate; telson short, entire. Species: 3, bipolar, littoral to bathyal.

***Pachynus* Bulycheva**

Pachynus Bulycheva, 1955.

Type-species: *P. chelatum* Bulycheva, 1955 (original designation).

Upper lip and epistome apparently not differentially produced; mandibular molar absent, palp attached rather distally; maxillipedal palp 3-articulate, or with a small fourth article, article 3 elongate or not; gnathopod 1 chelate; telson short, entire. Species: 2, boreal Pacific, littoral to bathyal.

***Paracallisoma* Chevreux**

Paracallisoma Chevreux, 1903.

Type-species: *P. alberti* Chevreux, 1903 (original designation).

[Upper lip and epistome not studied]; mandibular molar small, simple, palp attached level with molar, both molar and palp attached proximally; inner plate of maxilla 1 densely setose; gnathopod 1 simple, with apical setal shroud, article 7 vestigial; *gnathopod 2 subchelate* (*Aroui*, *Scopelocheirus*); telson long, deeply cleft. Species: 2, Atlantic-Pacific, bathypelagic.

Paracallisomopsis Gurjanova

Paracallisomopsis Gurjanova, 1962.

Type-species: *P. beljaevi* Gurjanova, 1962 (monotypy).

Head lacking lateral lobes; upper lip and epistome not differentially produced; mandibular molar conical, unridged, palp attached level with molar; gnathopod 1 simple, article 7 vestigial, shrouded with cirri; telson of medium length, deeply cleft.

Differs from *Eucallisoma* J. L. Barnard (1961) by: the larger head, smaller first antenna with its less elongate flagellar base, the accessory flagellum conspicuous (in *Eucallisoma* it is appressed to inner face of the immense antenna and is brush-like); the less styliform first gnathopod, the cirri more dense, dactyl not distinct from cirri; more spines on the outer plate of the maxilliped; the shorter second article on the outer ramus of uropod 3. Species: 1, Bering Sea, ?epipelagic.

[*Paracentromedon* Chevreux and Fage]

Paracentromedon Chevreux and Fage, 1925. Presumed synonym of *Hippomedon*.
Elimedon J. L. Barnard, 1962d.

Type-species: *Centromedon crenulatum* Chevreux, 1900 (original designation).

Head small, partially hidden by coxa 1 (*Tryphosella*); upper lip and epistome not differentially produced or inconspicuous; mandibular molar ridged, palp attached level with molar; gnathopod 1 nearly simple, articles 5 and 6 equal, article 7 greatly overlapping minute palm; telson of medium length, deeply cleft. See *Paronesimus*. Species: 3, Atlantic, bathyal-abyssal.

Paracyphocaris Chevreux

Paracyphocaris Chevreux, 1905a.

Type-species: *P. praedator* Chevreux, 1905a (original designation).

Head deformed; mandible lacking molar, palp attached medially; gnathopod 1 simple or very minutely subchelate, article 5 slightly longer than 6; gnathopod 2 nearly simple; coxae 1 and 2 small, partially hidden by coxa 3; *pereopods 1–4* (*or 5*) *prehensile;* telson long, deeply cleft. Species: 2, Atlantic-Pacific, bathy-abyssopelagic.

Paralibrotus Stephensen

Paralibrotus Stephensen, 1923.

Type-species: *P. setosus* Stephensen, 1923 (monotypy).

Epistome and upper lip not differentially produced; mandibular molar small but distinct, possibly triturative, palp attached over proximal end of molar; gnathopod 1 simple, rather stout, article 6 slightly longer than 5; article 2 of outer ramus on uropod 3 minute; telson short, entire. Merges with some species of *Menigrates*. Species: 1, subarctic, littoral.

Paralicella Chevreux

Paralicella Chevreux, 1908a.

Type-species: *P. tenuipes* Chevreux, 1908a (original designation).

Upper lip and epistome not described; mandible lacking molar in type-species or bearing conical setulose lamina in other species; palp attached rather distally; *inner plate of maxilla 1 densely setose, with 10 or more setae* (*combining character*); gnathopod 1 subchelate, article 6 slightly longer than 5, *article 3 elongate, nearly as long as article 6* (*Aristias, Eurythenes*); telson of medium length, deeply cleft. Species: 4, Atlantic-Pacific, bathyal-abyssal.

Paralysianopsis Schellenberg

Paralysianopsis Schellenberg, 1931.
Austronisimus K. H. Barnard, 1931.

Type-species: *P. odhneri* Schellenberg, 1931 (monotypy).

Upper lip produced acutely in front of epistome, but almost fully coalesced with epistome; mandibular molar obsolescent, palp attached slightly proximal to molar; gnathopod 1 nearly simple, with minute oblique palm; inner ramus of uropod 2 constricted; telson entire, with minutely notched apex. Species: 1, subantarctic, littoral.

Parambasia Walker and Scott

Parambasia Walker and Scott, 1903.

Type-species: *P. forbesi* Walker and Scott, 1903 (monotypy).

Diagnosis based partially on *P. rossi* Stephensen (1927) assuming it to be congeneric. [Epistome and upper lip poorly known], probably fused together; mandibular molar small, setulose, palp attached proximal to molar; gnathopod 1 simple, article 5 slightly longer than article 6; inner ramus of uropod 2 constricted (possibly not on type); outer ramus of uropod 3 uniarticulate; telson entire. Species: 2, Arabian Sea, Auckland Islands, littoral. Possibly congeneric: *Lysianassa anomala* Nicholls, 1938, subantarctic.

Parawaldeckia Stebbing

Parawaldeckia Stebbing, 1910.

Type-species: *Nannonyx thomsoni* Stebbing, 1906 (monotypy).

Article 5 of male antenna 2 slightly dilated and longer than article 4; [prebuccal area and mandible unknown but presumably similar to *Waldeckia*]; gnathopod 1 simple, articles 5 and 6 equal; uropod 3 short, outer ramus not longer than peduncle, peduncle sublamelliform, inner ramus scarcely half as long as outer; telson entire or slightly emarginate. Species: 2,* antiboreal, littoral.

**Parawaldeckia kidderi* (Smith).—Generic diagnosis: to some extent mouthparts bundled conically, upper lip and epistome confluent, slightly convex anteriorly, lacking sinus; mandibular molar conical, unridged, distally setose, palp attached very proximally; gnathopod 1 simple; uropod 3 with vestigial inner ramus; telson short, entire. Diagnosis based on Monod (1926) and cotypes examined in U.S. National Museum; general appearance of cotypes, without dissection, similar to Monod's figures and not to concepts of Chilton (1909, 1921), Stephensen (1927), and Tattersall (1922) in the following characters: general appearance including coxae and pleon, (antenna 2 slightly shorter than shown by Monod), prebuccal region, telson, and uropod 3.

Paronesimoides Pirlot

Paronesimoides Pirlot, 1933a.

Type-species: *P. lignivorus* Pirlot, 1933a (original designation).

Apparently upper lip projecting and dominating epistome; mandibular molar not strongly produced, setulose, poorly ridged, palp attached at proximal end of molar; gnathopod 1 subchelate, palm transverse, article 6 slightly enlarged and much larger than article 5; uropod 3 very small, outer ramus 2-articulate, equal to peduncle, inner ramus reduced to a minute spiniform process; telson short, entire; *articles 1 and 2 of flagellum of antenna 1 equal in length* (*Onesimoides*). Species: 1, Indonesia, abyssal.

Paronesimus Stebbing

Paronesimus Stebbing, 1894; 1906.

Type-species: *P. barentsi* Stebbing, 1894 (monotypy). See Gurjanova, 1962.

[Upper lip and epistome not described, presumably like *Onisimus*]; mandibular molar small, weakly ridged, palp attached level with molar; gnathopod 1 with very small palm, appearing simple, articles 5 and 6 subequal; telson of medium length, cleft about halfway. Very close to *Hippomedon*. See *Paracentromedon*. Species: 2, arctic, littoral.

Perrierella Chevreux and Bouvier

Perrierella Chevreux and Bouvier, 1892.
Pararistias Robertson, 1892.

Type-species: *Lysianassa audouiniana* Bate, 1857a (original designation and subsequent synonymy). See Sars, 1895.

Upper lip and epistome not differentially produced; mand bular molar a vestigial hump, palp attached level with molar; lobes of maxilla 2 slightly gaping, inner broader than outer; maxillipedal palp not exceeding outer plate, 3-articulate or with vestigial fourth article, inner plates vestigial; gnathopod 1 nearly simple, with poorly defined palm; coxa 1 very small and largely hidden by coxa 2; telson of medium length, entire, apically truncate. Species: 1, boreal and warm-temperate E. Atlantic and Mediterranean, littoral.

Phoxostoma K. H. Barnard

Phoxostoma K. H. Barnard, 1925.

Type-species: *P. algoense* K. H. Barnard, 1925 (monotypy).

Mouthparts forming conical bundle; upper lip and epistome continuous; mandible slender, molar obsolete, palp attached quite proximally; maxillipedal palp slightly exceeding outer plate, article 4 very small; gnathopod 1 simple, article 6 longer than 5; telson short, deeply insinuate. Species: 1, S. Africa, littoral.

Podoprion Chevreux

Podoprion Chevreux, 1891.—Stebbing, 1906.

Type-species: *P. bolivari* Chevreux, 1891 (monotypy). See Chevreux and Fage, 1925.

Epistome and upper lip not differentially produced; mandible lacking molar, palp attached rather distally, ?*cutting edge dentate;* gnathopod 1 chelate, thumb narrow; *article 2 of pereopod 3 deeply indentured;* coxa 1 shorter than coxa 2 and partially hidden by it; telson of medium length, deeply cleft. See *Euonyx.* Species: 1, warm-temperate E. Atlantic, littoral.

Podoprionella Sars

Podoprionella Sars, 1895.—Stebbing, 1906.

Type-species: *P. norvegica* Sars, 1895 (monotypy).

Epistome and upper lip not differentially produced; mandible lacking molar, palp attached rather proximally; maxillipedal palp shorter than outer plate, 3-articulate; gnathopod 1 chelate; *article 2 of pere-*

opods 3–5 deeply indentured; outer ramus of uropod 3 uniarticulate; telson entire. Species: 1, boreal N. E. Atlantic, littoral.

Podoprionides Walker

Podoprionides Walker, 1906a.

Type-species: *P. incerta* Walker, 1906a (monotypy). See Walker, 1907.

Epistome and upper lip not differentially produced; mandible lacking molar, palp attached rather proximally; maxillipedal palp not exceeding outer plate, 3-articulate; gnathopod 1 chelate; *article 2 of pereopods 3–5 deeply indentured;* telson of medium length, cleft more than halfway. Species: 1, antarctic, littoral.

Prachynella J. L. Barnard

Prachynella J. L. Barnard, 1964b.

Type-species: *P. lodo* J. L. Barnard, 1964b (original designation).

Upper lip and epistome small, not differentially produced; mandibular molar absent, palp attached about in middle of mandibular body; maxilla 1 lacking palp; maxillipedal palp with three articles, article 3 long and claw-like; gnathopod 1 chelate; telson short, entire. Species: 1, California, littoral.

Procyphocaris J. L. Barnard

Procyphocaris J. L. Barnard, 1961.

Type-species: *P. primata* J. L. Barnard, 1961 (original designation).

Head not deformed; epistome and upper lip not differentially produced; mandibular molar ridged, palp attached level with molar; gnathopod 1 scarcely subchelate, palm very oblique; coxae 1 and 2 small, largely hidden by coxa 3; telson long, deeply cleft. Species: 1, Australia, bathypelagic.

[*Pronannonyx* Schellenberg]

Pronannonyx Schellenberg, 1953. Presumed synonym of *Lysianassa.*

Type-species: *P. minimus* Schellenberg, 1953 (monotypy).

Upper lip lobately produced forward (possibly including the epistome); mandibular molar vestigial, palp attached quite proximally; *maxilla 1 with two kinds of spines on the outer plate* (*combining character*)*;* gnathopod 1 simple, article 6 longer than 5; uropod 3 with 1-articulate outer ramus equal to peduncle, peduncle with plate-like expansion; telson short, entire; *inner ramus of uropod 2 simple.* Species: 1, S. W. Africa, littoral.

Pseudambasia Stephensen

Pseudambasia Stephensen, 1927.

Type-species: *P. bipartita* Stephensen, 1927 (monotypy).

Article 2 of antenna 1 elongate, two thirds as long as article 1; epistome obtusely produced in front of upper lip; [mandible and maxilla 1 undescribed]; gnathopod 1 subchelate, article 6 slightly longer than 5, *palm excavate* (*combining character*); outer ramus of uropod 3 uniarticulate, rami equal to each other and peduncle; telson of medium length, entire; *urosomal segments apparently coalesced.* Species: 1, Auckland Islands, littoral.

Pseudoanonyx Kudrjaschov

Pseudoanonyx Kudrjaschov, 1965.

Type-species: *P. caecus* Kudrjaschov, 1965 (original designation).

Apparently upper lip projecting slightly in front of epistome [from analogy to *Anonyx*]; mandibular molar large, *unridged* (*Onisimus*), setulose, palp apparently attached level with molar; gnathopod 1 subchelate, articles 5 and 6 stout, subequal in length, *dactyl very small and like dactyl of gnathopod 2;* inner ramus of uropod 2 simple; telson of medium length, deeply cleft; gills plaited; *eyes absent; pereopods 1–2 without distal locking spines on article 6 at base of dactyl; article 4 of maxillipedal palp very short, tumid* (*Anonyx*). Species: 1, Okhotsk Sea, littoral.

Pseudokoroga Schellenberg

Pseudokoroga Schellenberg, 1931.

Type-species: *P. barnardi* Schellenberg, 1931 (monotypy).

Upper lip and epistome produced forward together; mandibular molar small, ridged, palp attached proximal to molar; *maxillae slender, article 4 of maxillipedal palp short* (*Koroga*); gnathopod 1 subchelate, article 6 enlarged, much longer than article 5; inner ramus of uropod 2 constricted; telson of medium length, entire. Species: 2, subantarctic, Baja California, littoral.

Pseudorchomene Schellenberg

Pseudorchomene Schellenberg, 1926a.

Type-species: *Orchomenopsis coatsi* Chilton, 1912 (monotypy).

Epistome broadly lobate in front of upper lip; mandibular molar small, poorly ridged, palp attached proximal to molar; gnathopod 1 poorly subchelate, articles 5 and 6 equal, *article 3 as long as 5 or 6,* *all these articles slender and elongate* (*combining character*); telson deeply cleft. Species: 1, antarctic, littoral.

Rifcus Kudrjaschov

Rifcus Kudrjaschov, 1965.

Type-species: *R. auspicatus* Kudrjaschov, 1965 (original designation).

Upper lip and epistome apparently not prominent; *accessory flagellum 2-articulate;* mandibular molar ridged (*Anonyx*), palp attached level with molar; gnathopod 1 weakly subchelate, articles 5 and 6 subequal in length; inner ramus of uropod 2 not constricted; telson short (*Hippomedon*), cleft less than halfway; *outer plate of maxilla 1 with only five spines* (*Tryphosoides*)*; palp of maxilliped very stout and short, outer plate of maxilliped reaching nearly to end of palp article 3* (*Boeckosimus*). Species: 1, Okhotsk Sea, littoral.

Schisturella Norman, new synonymy

Schisturella Norman, 1900a.
Pseudonesimus Chevreux, 1926.

Type-species: *Tryphosa pulchra* Hansen, 1887 (monotypy). See Shoemaker, 1930.

Upper lip lobately produced in front of epistome or *not* (*Pseudonesimus*) but both separated by a notch; mandibular molar well developed or small, blunt, ridged, palp attached level with or at proximal end of molar; gnathopod 1 weakly or strongly subchelate, article 5 longer than or equal to 6; coxa 1 slightly or strongly shortened, often half as long as its article 2, largely hidden by coxa 2; inner ramus of uropod 2 constricted; telson of medium length, cleft one third to three quarters of its length; (article 3 of antenna 2 slightly tumid). See *Metambasia*. Species: 3, Atlantic-Pacific, coldwater, littoral to hadal.

Scopelocheiropsis Schellenberg

Scopelocheiropsis Schellenberg, 1926a.

Type-species: *S. abyssalis* Schellenberg, 1926a (monotypy).

Epistome lobately produced slightly in front of upper lip; mandible lacking molar, palp attached rather distally; inner plate of maxilla 1 densely setose; maxillipedal palp article 4 vestigial; gnathopod 1 linear, simple, articles 5 and 6 equal, dactyl vestigial and shrouded with a short tuft of setae; pereopods 1–2 subprehensile, *article 6 longer than articles 4–5 combined* (*combining character*); telson deeply cleft. Species: 1, tropical Atlantic, abyssal (?pelagic).

Scopelocheirus Bate

Callisoma Costa, 1851a, b (homonym, Coleoptera) [type species: *Callisoma hopei* Costa, 1851a, b, selected by Boeck, 1876].
Scopelocheirus Bate, 1857a.—Stebbing, 1906.—Birstein and Vinogradov, 1964.
Bathycallisoma Dahl, 1959 [see also this genus in alphabetical order].

Type-species: *S. crenatus* Bate, 1857a (monotypy). See Sars, 1895.

Epistome slightly and lobately produced in front of upper lip (*Aroui*); mandibular molar conical, simple, palp attached level with molar; inner plate of maxilla 1 densely setose on inner edge; gnathopod 1 simple, linear, article 7 shrouded in setae or cirri, article 6 longer than 5; *gnathopod 2 minutely chelate* (*Paracallisoma, Bathycallisoma*); telson medium to long, deeply cleft. Species: 3 or 4, probably cosmopolitan, bathy-abyssopelagic.

Shackletonia K. H. Barnard

Shackletonia K. H. Barnard, 1931; 1932.

Type-species: *S. robusta* K. H. Barnard, 1931 (original designation); 1932.

Mouthparts presumed to be produced in a ventral conical bundle; epistome and upper lip not differentially produced, apparently coalesced; mandibular molar slightly conical, palp attached slightly proximal to molar; *outer plate of maxilla 1 with hook-like spines;* gnathopod 1 simple, stout; rami of uropod 3 ovate, outer with a minute, spine-like article 2; telson of medium length, deeply cleft. Species: 1, antarctic, deep littoral.

Socarnella Walker

Socarnella Walker, 1904.

Type-species: *S. bonnieri* Walker, 1904 (monotypy).

[Upper lip and epistome not described]; mandibular molar absent, palp attached proximally; gnathopod 1 simple, article 6 longer than 5; outer ramus of uropod 3 uniarticulate; telson short, emarginate or slightly cleft; *mandibular palp article 2 about 5 times as long as article 1* (*Socarnopsis*). Related to *Lysianassa* [=*Lysianopsis, Arugella*, etc.] Species: 1, Ceylon, littoral.

Socarnes Boeck

Socarnes Boeck, 1871.—Stebbing, 1906 (in part, not *Ephippiphora* White, see *Waldeckia* herein).

Type-species: *Lysianassa vahlii* Krøyer, 1838 (monotypy). See Sars, 1895.

Diagnosis based only on type-species. Upper lip lobately produced in front of epistome or both prominently produced; mandibular molar conicolaminate, unridged, palp attached proximal to molar; gnathopod 1 simple, articles 5 and 6 equal; *outer ramus of uropod 3 biarticulate* (*Socarnopsis*); telson of medium length, cleft slightly more than halfway; *gills plaited on one side only* (*Ichnopus* and *Socarnopsis*), [or two sides in *S. obesa* (Chevreux)]; *pereopod 5 not longer than pereopod 4* (*Ichnopus*). See *Waldeckia*. Species: 5 or 6, amphiboreal, subtropical, littoral to bathyal.

Socarnoides Stebbing

Socarnoides Stebbing, 1888; 1906.—Schellenberg, 1931.
Acidostomella Schellenberg, 1926b.

Type-species: *S. kergueleni* Stebbing, 1888 (monotypy).

Epistome forming broad, flabellate lobe in front of somewhat lobate upper lip (type) or upper lip forming lobe exceeding unproduced epistome; mandibular molar low, moderately long, apparently ridged (type) or setulose, palp attached proximal to molar; maxillipedal palp scarcely exceeding outer plate (type only); gnathopod 1 simple, articles 5 and 6 subequal; inner ramus of uropod 3 constricted; telson of medium length, cleft one third (type) or deeply. Species: 4 or 5, possibly cosmopolitan (except polar), littoral.

Socarnopsis Chevreux

Socarnopsis Chevreux, 1911a.

Type-species: *S. crenulata* Chevreux, 1911a (monotypy).

Upper lip and epistome together produced forward lobately; mandibular molar blunt, ridged, palp attached slightly proximal to molar; gnathopod 1 simple; outer ramus of uropod 3 uniarticulate; telson of medium length, deeply cleft; *gills plaited on both sides* (*Socarnes*); *mandibular palp article 2 about 3 times as long as article 1* (*Socarnella*). Species: 1, eastern Atlantic, littoral.

Sophrosyne Stebbing

Sophrosyne Stebbing, 1888; 1906.
Paropisa Stebbing, 1899d.

Type-species: *S. murrayi* Stebbing, 1888 (monotypy).

Upper lip and epistome not differentially produced; mandibular molar absent, palp attached rather distally; outer plate of maxilla 1 poorly spinose; gnathopod 1 slightly chelate, article 6 longer than 5; telson short, deeply cleft. Species: 3, boreal-antiboreal, littoral to bathyal, coldwater.

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Stephensenia Schellenberg

Stephensenia Schellenberg, 1928a.

Type-species: *S. haematopus* Schellenberg, 1928a (monotypy).

Upper lip and epistome not differentially produced; mandibular molar large, blunt, palp absent; gnathopod 1 nearly simple, article 5 longer than 6; outer ramus of uropod 3 uniarticulate; telson of medium length, deeply cleft. Species: 1, antiboreal, littoral.

Stomacontion Stebbing

Stomacontion Stebbing, 1899d; 1906.

Type-species: *Acontiostoma pepinii* Stebbing, 1888 (original designation).

Mouthparts forming conical bundle, styliform; mandibular molar absent, palp attached very proximally; palp of maxilla 1 biarticulate but very small; maxillipedal palp article 4 vestigial; gnathopod 1 simple, article 6 longer than 5; coxa 1 projecting over side of the head; uropod 3 uniramous, ramus vestigial; telson short, apically notched. [Based only on type-species.]

Note: Species assigned to this genus intergrade with *Acontiostoma* and two of the species have coxa 1 ventrally subconical. *Stomacontion capense* K. H. Barnard (1916) lacks any first maxillary palp and *S. insigne* K. H. Barnard (1932) has the first maxillary palp 1-articulate but combined with a vestigial fourth maxillipedal palp article, and these characters obfuscate the generic limits of *Acontiostoma* and *Stomacontion*. Both species, however, have a subconical first coxa, perhaps in itself a useful generic or subgeneric character. Species: 5, subantarctic, antiboreal, littoral.

Thoriella Stephensen

Thoriella Stephensen, 1915.

Type-species: *T. islandica* Stephensen, 1915 (original designation).

Accessory flagellum absent; flagellum of antenna 2 with especially inflated articles; apparently epistome broadly rounded and produced in front of upper lip; mandibular molar obsolete, palp absent; maxilliped opercular, inner plates apparently large and subrectangular, outer plates narrower and triangular, palp apparently composed of single large opercular article with deep lateral incision [open to different interpretation]; gnathopod 1 simple, short; gnathopod 2 simple; coxae small, short, not touching serially, coxa 4 not excavate posteriorly; uropod 3 lacking rami; telson absent. Species: 1, N. Atlantic, Indian, abyssopelagic.

Tmetonyx Stebbing

Hoplonyx Sars, 1895 (homonym, Coleoptera).
Tmetonyx Stebbing, 1906 (new name).

Type-species: *Oniscus cicada* O. Fabricius, 1780 (original designation). See Sars, 1895.

This genus was synonymized with *Tryphosa* by J. L. Barnard, 1962d, but *Tryphosa* must be synonymized with *Orchomenella*, of which *Orchomene* is a senior synonym, because Boeck designated as type-species of *Tryphosa* a taxon later proved to be congeneric with the designated type-species of *Orchomenella*. The *Tryphosa* concept is now given the next available name, *Tryphosella* Bonnier, but *Tmetonyx* is reinstated on the condition of coxa 1 to include only its type-species.

Epistome broadly rounded, upper lip broadly rounded, *both projecting together slightly* (*Anonyx*), but separated by distinct notch; mandibular molar subcolumnar, slightly attenuated, apparently mostly setulose and poorly or not ridged, palp attached level with molar; *coxa 1 perfectly quadrate, neither expanded nor tapered distally* (*Anonyx, Tryphosella*); gnathopod 1 subchelate, articles 5 and 6 subequal in length; telson of medium length, deeply cleft; *head of normal size* (*Uristes*); *dactyl of gnathopod 1 with inner tooth* (*Anonyx*). Species: 1 or 2, N.E. Atlantic Ocean, littoral to abyssal.

Trischizostoma Boeck

Guerinia Costa, 1853b, 1857 (homonym, Diptera).
Trischizostoma Boeck, 1861.—Stebbing, 1906.
Guerina Della Valle, 1893 (new name for *Guerinia*).

Type-species: *Guerinia nicaeensis* Costa, 1853b (monotypy and subsequent synonymy). See Sars, 1895.

Mouthparts forming a ventral conical bundle, styliform; epistome and upper lip not differentially produced; mandibular molar absent, palp attached about medially; lobes of lower lip sublanceolate, lacking mandibular processes; palp of maxilla 1 very short; gnathopod 1 very powerful, articles 6 and 7 generally inverted in adult so that article 7 closes on article 6 from below; coxa 1 short, dominated by coxa 2; telson short, entire or cleft to middle; branchiae apparently plaited; eyes enormous. Species: 6, cosmopolitan, bathy-abyssopelagic.

Tryphosella Bonnier (="*Tryphosa*" auct.)

Tryphosella Bonnier, 1893 [not Stebbing, 1906].
Tryphosa.—Sars, 1895.*—Stebbing, 1906 (not Boeck, 1871).

*Sars' book is cited herein under the date 1895 but it was printed in parts from 1891 to 1895 and the section on *Tryphosa* was printed in 1891, two years before Bonnier's work.

Type-species: *Tryphosella sarsi* Bonnier, 1893 (present selection), (=*Tryphosa nana* of Sars, 1895, not of Boeck, 1861). Bonnier intended the name *Tryphosella* to replace Sars' usage of the name *Tryphosa* for a group of species distinct from *Orchomenella* Sars (=*Orchomene* Boeck). Sars did not realize that those species he called *Orchomenella* were congeneric with *Tryphosa*. Stebbing (1906) also failed to recognize Bonnier's perception and restricted *Tryphosella* to a single species, *Tryphosa barbatipes* Stebbing, 1888, which later has been considered to be congeneric with *Uristes* Dana. Thus J. L. Barnard's (1962d) move of *Tryphosella* to *Uristes* was illegal because the type-species of *Tryphosella* had never been selected. Legalization of Bonnier's intent by selection of the type-species that he obviously would choose through his comments and his listing of it in primary position now permits reinstatement of a "tryphosa" group to be called a "tryphosella" group of species. They are close to *Tmetonyx* Stebbing, 1906, but have coxa 1 distinctly tapering distally. *Lepidepecreopsis* Stephensen may be a synonym of *Tryphosella* as Gurjanova (1951) removed the former to *Tryphosa*. See discussion with *Tmetonyx*.

Epistome broadly rounded and dominating upper lip, both separated by a notch; mandibular molar subcolumnar or cuboid, *weakly setulose and poorly ridged if at all* (*Lepidepecreopsis*), palp attached level with molar; *coxa 1 slightly shortened, distinctly tapering* (*Anonyx, Tmetonyx*) and partially hidden by coxa 2; gnathopod 1 subchelate, articles 5 and 6 subequal in length; telson of medium length, deeply cleft; *head of normal size* (*Uristes*); (dactyl of gnathopod 1 with or without inner tooth). Species: ca. 63, cosmopolitan coldwater, littoral to hadal, in low latitudes primarily bathyal-abyssal. Composition: all species formerly known under "*Tryphosa*" and "*Tmetonyx*" since 1895 except their type-species.

Tryphosites **Sars**

Tryphosites Sars, 1895.—Stebbing, 1906.

Type-species: *Anonyx longipes* Bate and Westwood, 1863 (original designation).

Epistome acutely produced in front of upper lip, upper lip also slightly lobate; mandibular molar ridged, palp attached level with molar; gnathopod 1 subchelate, article 5 longer than 6; inner ramus of uropod 2 constricted; telson of medium length, deeply cleft. Species: 5, bipolar, coldwater submergent, littoral to abyssal.

Tryphosoides Schellenberg

Tryphosoides Schellenberg, 1931.

Type-species: *T. falcata* Schellenberg, 1931 (monotypy).

Epistome not produced (apparently not as in "*Tryphosa*"); mandibular molar ridged, palp attached level with molar; gnathopod 1 subchelate, article 6 longer than 5; coxa 1 scarcely narrowed, slightly beveled anteroventrally; *outer ramus of uropod 3 uniarticulate* ("*Tryphosa*"); *accessory flagellum vestigial, 2-articulate;* telson of medium length, deeply cleft. Species: 1, antiboreal S. America, littoral. Possibly synonymous with *Uristes*. See *Rifcus*.

Uristes Dana

Uristes Dana, 1849.—Stebbing, 1906.
?*Pseudotryphosa* Sars, 1895.
Uristoides Schellenberg, 1931.

Type-species: *U. gigas* Dana, 1852a; 1853 (monotypy of Dana, 1852a). See Stebbing, 1888 (as *Tryphosa antennipotens*).

Head small, mouthparts largely covered by coxae 1–2 (*Tmetonyx and Tryphosella*); epistome and upper lip generally small and inconspicuous, *often slightly produced differentially* (*Tmetonyx and Tryphosella*); mandibular molar setulose, palp attached level with molar; gnathopod 1 subchelate or nearly simple, article 6 longer than 5 (*Tmetonyx usually*); *coxa 1 narrowing slightly distally* (*Hippomedon*); telson of medium length, deeply cleft. Species: 23, cosmopolitan, coldwater submergent, littoral to abyssal.

Valettia Stebbing

Valettia Stebbing, 1888; 1906.

Type-species: *V. coheres* Stebbing, 1888 (monotypy).

Apparently epistome and upper lip not prominent; mandibular molar ridged, primary cutting edge of mandible toothed, palp attached level with molar; *setae of inner plate of maxilla 1 mostly terminal* (*Valettiopsis*); outer plates of maxilliped acutely produced apically; *coxa 2 short, broad, subrounded, scarcely concealing coxa 1, latter not shorter than coxa 2 and of similar shape* (*Valettiopsis*); gnathopod 1 weakly chelate, palm transverse; gnathopod 2 rather stout, article 5 shorter than 6; inner ramus of uropod 2 slightly constricted; telson short, deeply cleft. Species: 1, antarctic, abyssal.

Valettiopsis Holmes

Valettiopsis Holmes, 1908.

Type-species: *V. dentatus* Holmes, 1908 (original designation).

Apparently upper lip and epistome not prominent; mandibular molar ridged, primary cutting edge of mandible toothed, palp attached level with molar; *inner edge of inner plate of maxilla 1 densely setose; coxa 2 rectangular and elongate, almost covering coxa 1 completely, latter short, subtriangular* (*Valettia*); gnathopod 1 subchelate; telson of medium length, deeply cleft. Species: 3, Atlantic-Pacific, bathyal-abyssal.

Vijaya Walker

Vijaya Walker, 1904.—Gurjanova, 1962.

Type-species: *V. tenuipes* Walker, 1904 (monotypy).

[Epistome and upper lip unknown]; mandibular molar presumably feeble, palp attached ?level with molar; maxilla 1 presumably lacking palp; gnathopod 1 simple, article 6 longer than 5, article 3 slightly elongate; coxa 1 presumably partly hidden, following coxae increasingly larger; inner ramus of uropod 2 possibly constricted; telson of medium length, cleft one third; *article 2 of antenna 1 half as long as article 1* (*Bathyamaryllis*); *anteroventral corner of coxa 4 acutely produced* (*Amaryllis*). Species: 1, Ceylon, littoral.

Waldeckia Chevreux

Ephippiphora White, 1847b (homonym, Lepidoptera).
Charcotia Chevreux, 1905b (homonym, Mollusca).
Waldeckia Chevreux, 1906b (new name).

Type-species: *Charcotia obesa* Chevreux, 1905b (monotypy).

Epistome broadly rounded and slightly produced in front of upper lip, both together prominent; mandibular molar subconical, smooth, palp attached proximal to molar; gnathopod 1 simple, article 6 longer than 5; telson long, deeply cleft; *gills unplaited but with accessory lobes* (*Menigrates*). Species: 2, antiboreal, antarctic, littoral. See *Socarnes*.

Melphidippidae

Figure 133

Diagnosis.—Accessory flagellum vestigial or multiarticulate; peduncle of uropod 3 greatly elongate, as long as or longer than rami of uropods 1–2, and more than twice as long as telson and peduncle of uropod 2, uropod 3 also greatly exceeding apices of uropods 1–2, rami of uropod 3 elongate, subequal and nearly as long as rami of uropods 1–2; gnathopods feeble; *body posterodorsally carinate and toothed*. See Gammaridae, Oedicerotidae.

Description.—Accessory flagellum vestigial or multiarticulate; body slender, posterodorsally carinate and toothed; rostrum poorly developed; head with lateral ocular bulges; coxae short and scarcely touching serially; mouthparts basic; gnathopods feeble, intermediate between subchelate and simple; pereopods greatly elongate; uropod 3 immensely elongate as in diagnosis above and Gammaridea Key A, couplet 7 (p. 107); telson of medium length, deeply cleft or emarginate.

Relationship.—Uropod 3 usually falls off of preserved individuals of this family as it often does on individuals of Oedicerotidae and *Megaluropus* (Gammaridae). Some oedicerotids have uropod 3 elongate as in melphidippids but they lack posterodorsal pleonal teeth. Melphidippids may also be recognized by the lateral ocular bulges of the cephalon and the very short coxae. Gammaridae with elongate uropod 3 have one or more of the following exceptions to the melphidippid pattern: inner ramus of uropod 3 shortened and scale-like; uropod 3 not exceeding apices of uropods 1–2; peduncle of uropod 3 shorter than rami of uropods 1–2 and not twice as long as telson or urosomite 3; rami of uropod 3 much shorter than peduncle. Melphidippids lack sexual dimorphism in the gnathopods common to most Gammaridae.

The Vitjazianidae have a short peduncle of antenna 1.

My interpretation of Walker's description of *Hornellia* is that it lacks the melphidippid condition of uropod 3, for he mentions the medium length of the uropods and that the inner ramus of uropod 3 is twice as long as the peduncle; if the peduncle were of the normal melphidippid length the total uropod would be two-thirds the length of the body, a condition so remarkable that Walker would have mentioned it. Indeed, *Hornellia* Walker was removed to the Gammaridae by Pillai (1957).

The calliopiid *Metaleptamphopus* may belong in the Melphidippidae.

Key to the Genera of Melphidippidae

1. Accessory flagellum long, 2- or more articulate (fig. 133*b*) . . **Melphidippa**
   Accessory flagellum very short, 1-articulate (fig. 133*c*) 2
2. Telson cleft (fig. 133*m*) . . . . **Melphidippella**
   Telson entire, emarginate (fig. 133*n*) . . . . **Melphisana**

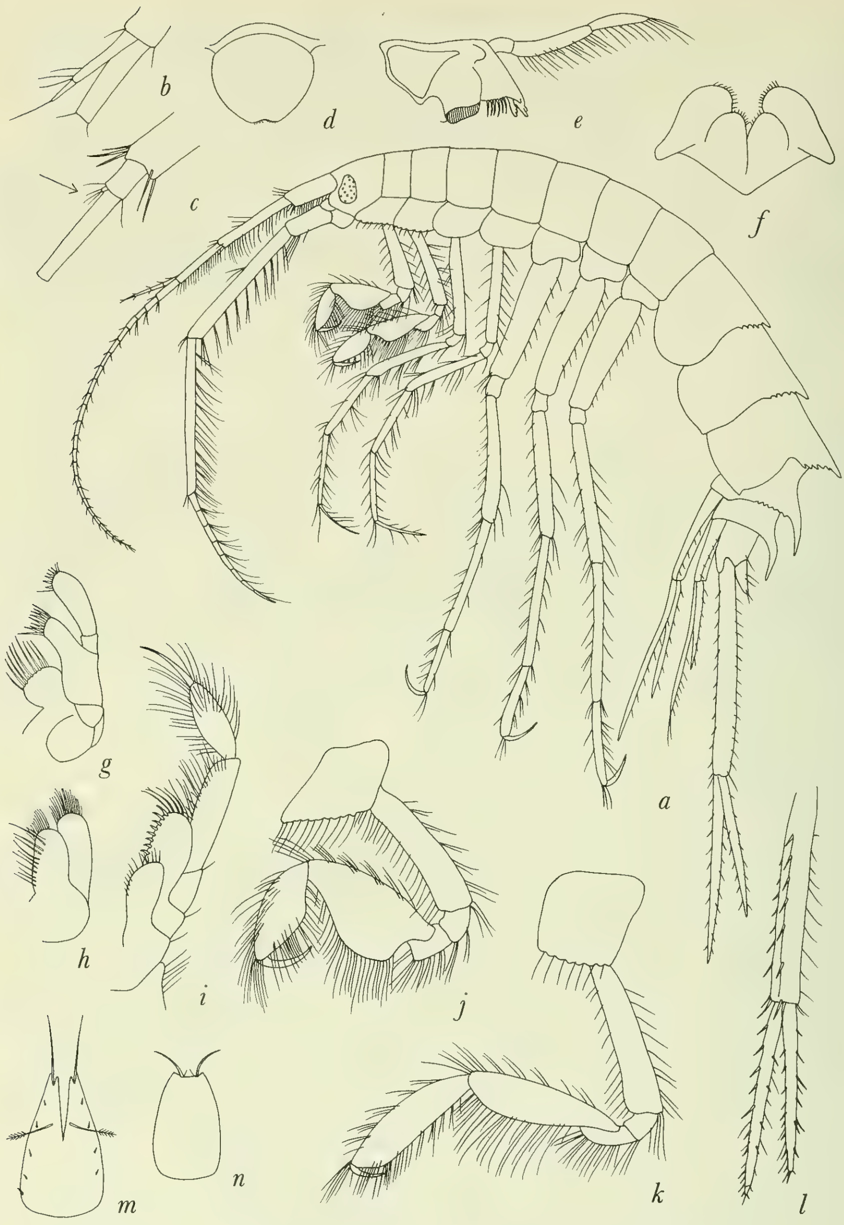

FIGURE 133.—Melphidippidae: *a*, *Melphidippa macrura* Sars (1895, pl. 170). Accessory flagella: *b*, *Melphidippa goesi* Stebbing (Sars, 1895, pl. 169, as *M. spinosa*); *c*, *Melphidippella macra* (Norman) (Sars, 1895, pl. 171). Mouthparts, *M. goesi: d*, upper lip; *e*, mandible; *f*, lower lip; *g,h*, maxillae 1, 2; *i*, maxilliped. *M. goesi: j,k*, gnathopods 1, 2; *l*, uropod 3; *m*, telson. Telson: *n*, *Melphisana bola* J. L. Barnard (1962b).

Genera of Melphidippidae

Melphidippa Boeck

Melphidippa Boeck, 1871.—Stebbing, 1906.

Type-species: *Melphidippa goesi* Stebbing, 1899a (=new name for homonym, *Gammarus spinosus* Goës, 1866) (type indicated by Boeck, 1876, considered as type by Sars, 1895, but selected by Gurjanova, 1951). See Sars, 1895.

Accessory flagellum long, 2- or more articulate; mandibular palp article 3 twice as long as article 1; maxillipedal palp article 4 claw-shaped; gnathopod 2 with linear fifth and sixth articles; telson cleft. Species: 7, bipolar, littoral to bathyal (750 m).

Melphidippella Sars

Melphidippella Sars, 1895.—Stebbing, 1906.

Type-species: *Atylus macer* Norman, 1869a (original designation).

Accessory flagellum short, 1-articulate; mandibular palp article 3 equal to article 1; maxillipedal palp article 4 claw-shaped; gnathopod 2 with linear fifth and sixth articles; telson cleft. Species: 2, boreal N. E. Atlantic, Japan, littoral.

Melphisana J. L. Barnard

Melphisana J. L. Barnard, 1962b.

Type-species: *M. bola* J. L. Barnard, 1962b (original designation).

Accessory flagellum short, 1-articulate; mandibular palp article 3 equal to article 1; maxillipedal palp article 4 short, stout, not claw-shaped; gnathopod 2 with articles 5 and 6 intermediate between linear and oval; [uropod 3 unknown]; telson entire, emarginate. Species: 2, California, Japan, littoral.

Ochlesidae

Figure 134

Diagnosis.—Accessory flagellum absent; *palp of maxilliped absent;* mouthpart group projecting subconically; mandible lacking molar, coxae 1–4 subacuminate; telson entire. Monogeneric. See Lysianassidae, Acanthonotozomatidae.

Description.—Body massive, processiferous; accessory flagellum absent; flagella of antennae reduced to a few articles; rostrum large; coxae 1–4 subacuminate; mouthparts projecting in a subconical

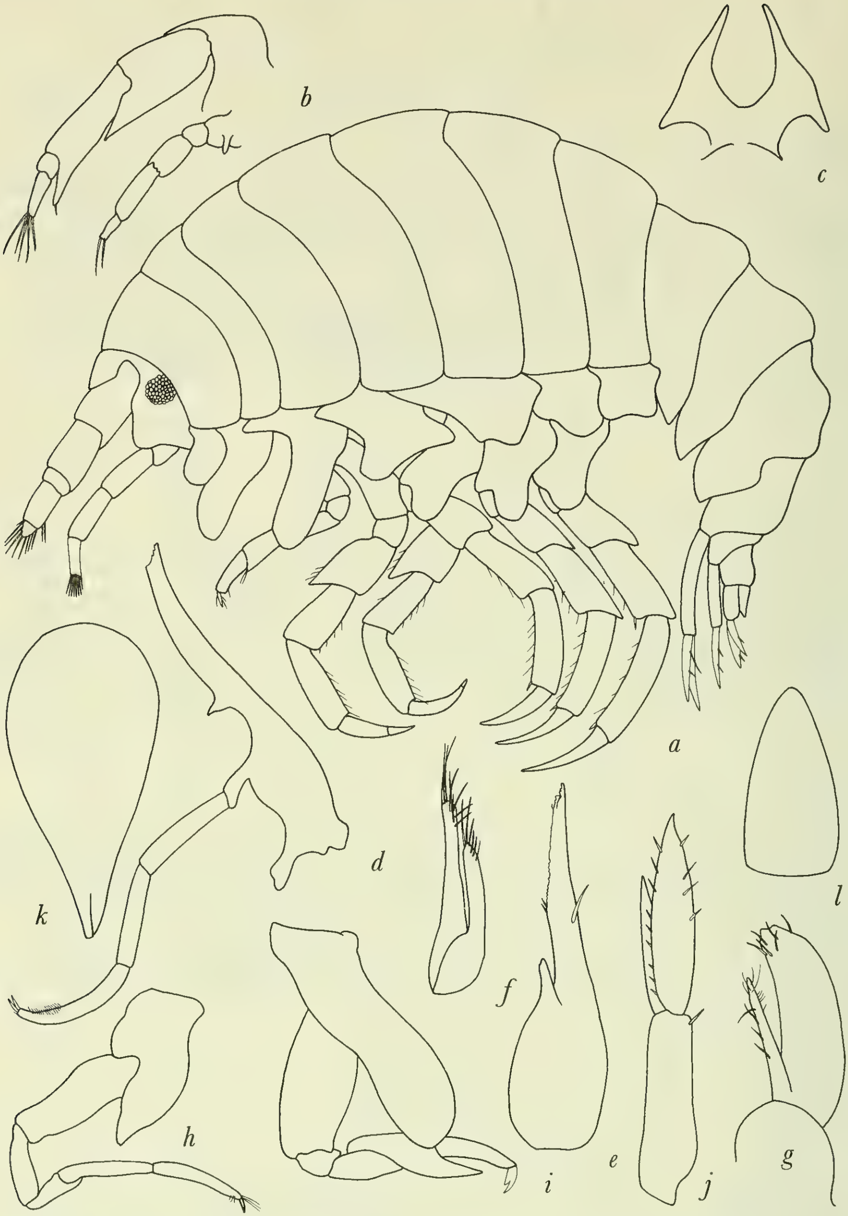

FIGURE 134.—Ochlesidae: *a*, *Ochlesis levetzowi* Schellenberg (1953). Antennae 1, 2: *b*, *O. innocens* Stebbing (1910). Lower lip: *c*, *O. lenticulosus* K. H. Barnard (1940). *O. innocens* (after Pirlot, 1936): *d*, mandible; *e*, maxilla 1; *f*, maxilla 2; *g*, maxilliped; *h,i*, gnathopods 1, 2. Uropod 3: *j*, *O. innocens* Stebbing (1910). Telson: *k*, *O. innocens* (after Pirlot, 1936); *l*, *O. lenticulosus*.

bundle, elongate; upper lip elongate; mandible lacking molar, palp long, 3-articulate, article 1 elongate; lower lip lacking inner lobes, outer lobes apically acuminate; maxilla 1 with minute, vestigial palp or none; maxilla 2 elongate; maxillipeds lacking palps, inner plates acuminate, outer lobes operculiform; gnathopods simple or mero- and carpochelate; uropod 3 biramous; telson of medium length, entire.

Relationship.—Of the suborder Gammaridea, only the Ochlesidae and the genus *Danaella* (see also *Thoriella* and *Chevreuxiella*) in the Lysianassidae lack a maxillipedal palp. This lack is characteristic of all members of the suborder Hyperiidea but Ochlesidae appear in other respects to be so closely related to gammarideans that they are retained therein. The large coxae are especially characteristic of gammarideans but the general body shape resembles that of the Acanthonotozomatidae and Stilipedidae.

Genera of Ochlesidae

Ochlesis Stebbing

Ochlesis Stebbing, 1910.

Type-species: *O. innocens* Stebbing, 1910 (monotypy).
Species: 3, S. Africa, Indonesia, Australia, littoral.

Oedicerotidae

Figures 135–138

Diagnosis.—Accessory flagellum absent or vestigial; telson entire or emarginate, very short; eyes when present usually coalesced dorsally; head often massive and galeate (see glossary); anoculate members assigned to the family on basis of aspects similar to shallow water genera having coalesced eyes; pereopod 5 immensely longer than pereopod 4; *rami of uropod 3 scarcely longer than the elongate peduncle.* See Calliopiidae, Pleustidae, Isaeidae, Ampithoidae, Synopiidae, Laphystiopsidae.

Description.—Accessory flagellum absent; head often galeate and massive, conspicuous rostrum usually present but occasionally completely absent; mouthparts basic except for mandibular molar which varies from strongly triturative to nontriturative and nearly obsolescent; one genus lacking mandibular palp; gnathopods powerful to weak, highly variable; coxae of medium size; rami of uropod 3 narrowly lanceolate, scarcely longer than the elongate peduncle;

telson entire or emarginate; pereopods strongly setose (fossorial), pereopod 5 immensely longer than pereopod 4.

RELATIONSHIP.—In gross morphology, this family is scarcely distinct from the Calliopiidae and Pleustidae in which the telson is

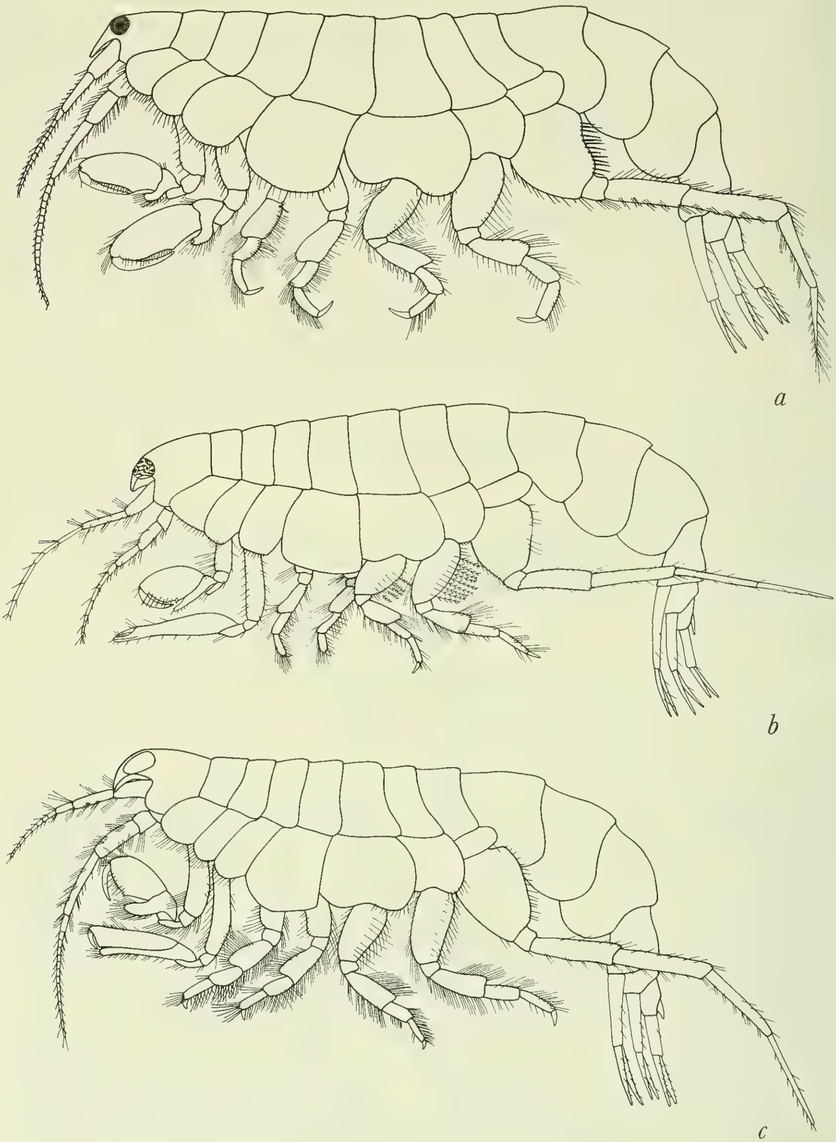

FIGURE 135.—Oedicerotidae: *a*, *Oediceros saginatus* Krøyer (Sars, 1895, pl. 102); *b*, *Synchelidium halpocheles* (Grube) (Sars, 1895, pl. 112); *c*, *Monoculodes carinatus* (Bate) (Sars, 1895, pl. 105).

also entire and the accessory flagellum vestigial or absent. The relatively longer peduncle of uropod 3 in oedicerotids is a reliable character as is the aspect of those oedicerotids having massive heads and projecting rostra; often they have pereopods adapted for burrowing by enlarged and spinose articles and pereopod 5 is much longer than pereopod 4. Since the eyes are lost in many species the taxonomist requires some experience in differentiating these families.

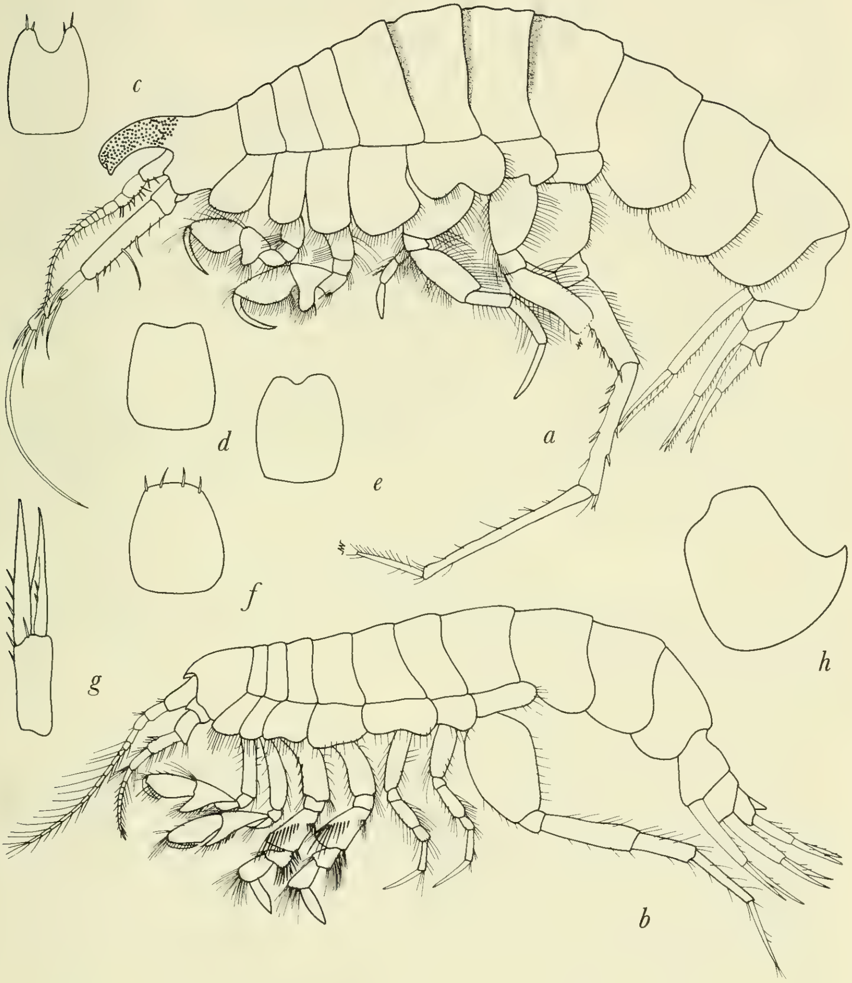

FIGURE 136.—Oedicerotidae: *a, Oediceroides apicalis* K. H. Barnard (J. L. Barnard, 1961); *b, Aceroides latipes* Sars (1895, pl. 120). Telson: *c, Paroediceroides sinuata* Schellenberg (1931); *d, Monoculodes borealis* Boeck (Sars, 1895, pl. 106); *e, Monoculodes tesselatus* Schneider (Sars, 1895, pl. 106); *f, Oediceros saginatus* Krøyer (Sars, 1895, pl. 102). Uropod 3: *g, Oediceros.* Coxa 4: *h, Perioculodes longimanus* (Bate and Westwood) (Sars, 1895, pl. 110).

The Synopiidae and Pardaliscidae usually have a well-developed accessory flagellum in contrast to its absence in oedicerotids.

The Isaeidae (=Photidae) differ from Oedicerotidae in their glandular pereopods, fleshy telson, and tube-dwelling habits but some Oedicerotidae, lacking rostra, are morphologically similar to photids and differ from them by disparate shortening of pereopods 3–4 in relation to pereopod 5.

Oedicerotids need extensive generic revision. Ocular shapes are useful for those genera having oculate type-species but deep-sea species lacking eyes often are difficult to classify. If eyes were to be ignored various genera might be combined, such as *Oediceropsis* and *Paroediceroides* (but note that the type-species of *Oediceropsis* has a swollen article 1 of antenna 1); *Paroediceroides* might be included with *Oediceroides* except for its acutely produced coxa 4 (a feature which is present or absent in species of other genera); *Paraperioculodes* might be congeneric with *Oediceroides* and *Paroediceroides* as coxa 4 is not specifically described, or with *Oediceropsis* as antenna 2 article 1 is not described; *Oediceroides brevirostris* may belong with *Paraperioculodes* (fide Ruffo, 1949); *Oediceropsis proxima* may belong with *Paroediceroides.* Numerous other examples could be cited.

Metoediceros Schellenberg (1931) lacks a mandibular palp, uropod 3 has a simple peduncle without rami, appears to have lateral, uncoalesced eyes and probably should form the type of a new family with affinities near the Dogielinotidae.

Key to the Genera of Oedicerotidae [1]

This key attempts to minimize the characteristics of eyes but several genera cannot remain separate without some reference to eyes, as seen in the later portion of the key.

1. Gnathopod 2 chelate (fig. 138*k*) 2
   Gnathopod 2 subchelate or simple 3
2. Mandibular molar triturative (fig. 137*k*), gnathopod 2 with long lobe on article 5 guarding article 6 . . . . **Pontocrates**
   Mandibular molar degraded, not triturative, often bearing articulate spine(s), article 5 of gnathopod 2 not lobate (fig. 137*l*) . . . . . . **Synchelidium**
3. Primary cutting edge of mandible short, poorly projecting, untoothed (fig. 137*k*) 4
   Primary cutting edge of mandible strongly projecting, toothed (fig. 137*l*) . 8
4. Gnathopod 2 with posterior lobe of article 5 partially or fully guarding article 6 (figs. 138*i,j,l*) 6
   Gnathopod 2 with posterior lobe of article 5 projecting at right angles, not guarding article 6 (figs. 138*d,h,m*) 5

[1] *Oedicerina* Stephensen (1931) is not included; many of its features are not described because the type is a broken specimen.

5. Gnathopod 1 palm oblique . . . . **Westwoodilla and Bathymedon**
Gnathopod 1 palm transverse . . . . **Carolobatea**
6. Mandibular molar unridged, with a few setae . . . . **Perioculopsis**
Mandibular molar large, ridged 7
7. "Mandibular palp article 2 strongly curved" (fig. 137*k*), article 2 of antenna 1 as long as or longer than article 1 . . . . **Arrhis**
"Mandibular palp article 2 straight" (fig. 137*l*) (type-species), article 2 of antenna 1 shorter than article 1 . . . . **Aceroides**
8. Uropod 2 reaching only to end of peduncle of uropod 3 9
Uropod 2 reaching halfway or more along rami of uropod 3 (or rami of uropod 3 absent) 12
9. Gnathopods 1–2: article 5 strongly lobate 11
Gnathopods 1–2: article 5 not lobate (figs. 138*f,i*) 10
10. Gnathopod 2 simple (fig. 138*i*) . . . . **Bathyporeiapus**
Gnathopod 2 subchelate . . . . **Parhalimedon**
11. Eyes contiguous, appearing as one body, pereopods 1 and 2 with article 7. **Halicreion**
Eyes not contiguous, pereopods 1 and 2 lacking article 7 . . . **Exoediceros**
12. Mandible lacking palp, uropod 3 lacking rami. **Metoediceros** (Incertae Sedis)
Mandible bearing palp, uropod 3 bearing rami 13
13. Mandibular molar lacking triturating surface, often with articulate spine(s) (fig. 137*l*) 14
Mandibular molar bearing teeth and ridges (fig. 137*k*) 19
14. Lower lip: inner lobes coalesced (fig. 137*t*) 15
Lower lip: inner lobes separate (fig. 137*u*) 16
15. Telson entire (fig. 136*f*) . . . . **Perioculodes**
Telson emarginate (fig. 136*a*) . . . . **Perioculopsis**
16. Gnathopods 1–2 structurally alike 17
Gnathopods 1–2 structurally dissimilar . . . . **Paroediceros**
17. Gnathopods lacking posterior lobe on article 5 . . . . **Exodiceropsis**
Gnathopods bearing posterior lobe on article 5 18
18. Gnathopods 1–2: lobe of article 5 long, fully guarding article 6 . **Arrhinopsis**
Gnathopods 1–2: lobe of article 5 short, scarcely guarding article 6. **Oediceros**
19. Gnathopod 1, palm transverse . . . . **Carolobatea**
Gnathopod 1, palm oblique 20
20. Gnathopods 1–2: article 5 not distinctly lobate 21
Gnathopods 1–2: article 5 grossly lobate 23
21. Gnathopod 2 subchelate 22
Gnathopod 2 simple (fig. 138*i*) . . . . **Bathyporeiapus**
22. Eyes unpaired, coalesced; article 2 of pereopod 5 broadly lobed posterodistally . . . . **Methalimedon**
Eyes paired; article 2 of pereopod 5 sharply narrowed posterodistally. **Parhalimedon**
23. Back multicarinate . . . . **Acanthostepheia**
Back not multicarinate, usually smooth, occasionally tuberculate . . . 24
24. Coxa 4 produced subacutely posterodistally 25
Coxa 4 not produced posterodistally 28
25. Eyes coalesced dorsally or absent 26
Eyes paired and lateral . . . . **Oediceropsis** (typical)
26. Article 1 of antenna 2 swollen 27
Article 1 of antenna 2 not swollen . . **Oediceroides** and **Paroediceroides**

27. Posterior lobe on article 5 of gnathopod 2 guarding article 6 (fig. 138*l*). **Monoculodes**
    Posterior lobe on article 5 of gnathopod 2 projecting at right angles. **Oediceropsis**
28. Pereopods 1–2: article 7 absent . . . . **Exoediceros**
    Pereopods 1–2; article 7 present 29
29. Eyes completely coalesced 30
    Eyes separated by a median line or space, or absent 31
30. Eyes forming a semicircular ring . . . . **Gulbarentsia**
    Eyes forming a circle or oval . . . . **Paraperioculodes**
31. Gnathopod 2: lobe of article 5, if large, projecting erectly at nearly right angles, not guarding article 6 32
    Gnathopod 2: lobe of article 5 projecting distally at angle of 45° or less, guarding article 6 36
32. Eyes paired and lateral (theoretical possibility) . . . . . . **Oediceropsis**
    Eyes contiguous at midline or absent. 33
33. Maxilla 2, outer plate lacking stout spine 34
    Maxilla 2, outer plate bearing stout spine (often bifid) . . . **Anoediceros**
34. Basal portion of flagellum on antenna 2 swollen. Subgenus **Lopiceros** (see Oediceroides)
    Basal portion of flagellum on antenna 2 slender 35
35. Coxae 3 or 4 excavate ventrally (fig. 136*b*), antennae subequal in length. **Aceroides** (incl. subgenus *Patoides*)
    Coxae 3 or 4 not excavate ventrally, antenna 1 very disproportionately shorter than antenna 2 . . . . **Oediceroides** (=*Oediceropsoides*)
36. Coxa 4 excavate ventrally, rostrum very small or obsolete (fig. 137*d*), eyes absent . . . . **Aceroides**
    Coxa 4 not excavate ventrally; either rostrum large, extending more than halfway along article 1 of antenna 1, or eyes present 37
37. Article 3 of antenna 1 less than half as long as article 1 . . . . **Monoculodes**
    Article 3 of antenna 1 as long as article 1 . . . . **Monoculopsis**

Genera of Oedicerotidae

Acanthostepheia Boeck

Acanthostepheia Boeck, 1871.—Stebbing, 1906.

Type-species: *Amphithonotus malmgreni* Goës, 1866 (monotypy). See Stephensen, 1938.

Cutting edge of mandible projecting and toothed, molar apparently ridged; inner lobes of lower lip separate; gnathopods similar to each other, subchelate, stout, article 5 with large posterior lobe projecting at right angles; uropod 2 reaching end of uropod 3; body dorsally *multicarinate* (*combining character*). Species: 3, arctic, littoral to bathyal (552 m).

Aceroides Sars

Aceroides Sars, 1895.—Stebbing, 1906.
Aceropsis Sars, 1895.
(*Patoides*) J. L. Barnard, 1964a (subgenus).

Type-species: *Halicreion latipes* Sars, 1882 (monotypy). See Sars, 1895.

Cutting edge of mandible scarcely projecting, teeth obsolescent, molar large, ridged; inner lobes of lower lip separate; gnathopods similar, subchelate, moderately stout, article 5 with sharp posterior lobe projecting distalwards; uropod 2 reaching end of uropod 3; *mandibular palp article 2 straight* (*Arrhis*). Probably *Aceroides limicola* K. H. Barnard, 1925, is incorrectly assigned here; its mandible apparently has cutting teeth. Species: 4, arctic-boreal, littoral to bathyal (1,110 m) and S. Atlantic (1,280 m).

FIGURE 137.—Oedicerotidae: Head: *a*, *Oedicerojsis brevicornis* Liljeborg (Sars, 1895, pl. 114); *b*, *Monoculodes longirostris* (Goës) (Sars, 1895, pl. 108); *c*, *Oediceros saginatus* Krøyer (Sars, 1895, pl. 102); *d*, *Aceroides latipes* (Sars, 1895, pl. 120); *e*, dorsal, *Oediceros; f*, *Monoculodes carinatus* (Bate) (Sars, 1895, pl. 105); *g*, *Arrhis phyllonyx* (M. Sars) (Sars, 1895, pl. 119); *h*, *Westwoodilla caecula* (Bate) (Sars, 1895, pl. 115, as *Halimedon mulleri); i*, *Westwoodilla acutifrons* (Sars, 1895, pl. 116); *j*, *Monoculodes packardi* Boeck (Sars, 1895, pl. 109). Mandible: *k*, *Westwoodilla caecula; l*, *Oediceros; m*, *Synchelidium haplocheles* (Grube) (Sars, 1895, pl. 112, as *S. brevicarpum*). Upper lip: *n*, *Oediceros*. Maxilliped: *o*, *Oediceros*. Maxillae 1, 2: *p*,*q*, *Oediceros*. Gnathopod 1: *r*, *Westwoodilla caecula; s*, *Synchelidium*. Lower lip: *t*, *Perioculodes longimanus* (Bate and Westwood) (Sars, 1895, pl. 110); *u*, *Oediceros*.

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Anoediceros Pirlot

Anoediceros Pirlot, 1932.

Type-species: *A. hanseni* Pirlot, 1932 (original designation).

Cutting edge of mandible projecting, toothed, molar medium, ridged; inner lobes of lower lip separate; *outer plate of maxilla 2 bearing a stout spine (combining character);* gnathopods similar, subchelate, stout, article 5 with posterior lobe projecting at right angles; uropod 2 reaching end of uropod 3. Species: 1, Indo-Pacific, bathyal-abyssal.

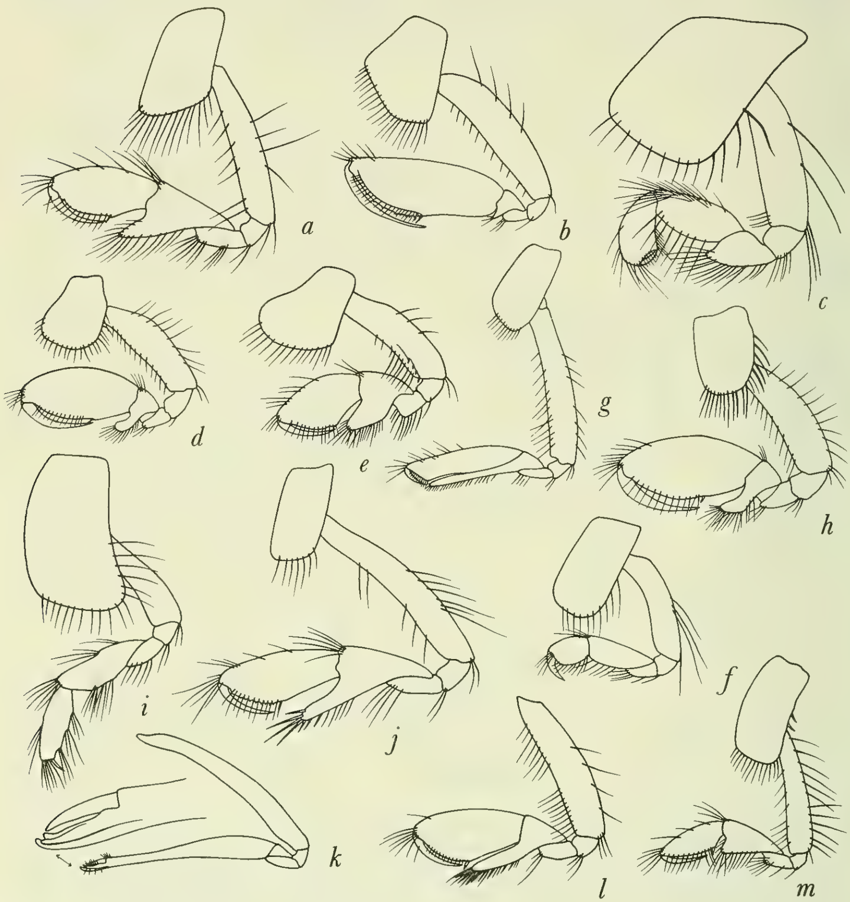

Figure 138.—Oedicerotidae: Gnathopod 1: *a, Aceroides latipes* (Sars, 1895, pl. 120); *b, Paroediceros lynceus* (M. Sars) (Sars, 1895, pl. 103); *c, Exoediceropsis chiltoni* Schellenberg (1931); *d, Oediceros saginatus* Krøyer (Sars, 1895, pl. 102); *e, Monoculodes tenuirostratus* Boeck (Sars, 1895, pl. 109); *f, Bathyporeiapus magellanicus* Schellenberg (1931). Gnathopod 2: *g, Monoculodes carinatus* (Bate) (Sars, 1895, pl. 105); *h, Oediceros; i, Bathyporeiapus; j, Aceroides; k, Synchelidium haplocheles* (Grube) (Sars, 1895, pl. 112); *l, Monoculodes tenuirostratus; m, Westwoodilla caecula* (Bate) (Sars, 1895, pl. 115, as *Halimedon mulleri*).

Arrhinopsis Stappers

Arrhinopsis Stappers, 1911.

Type-species: *A. longicornis* Stappers, 1911 (monotypy). See Gurjanova, 1951.

Cutting edge of mandible projecting, toothed, molar bulging, setulose, but unridged; inner lobes of lower lip separate; gnathopods similar to each other, subchelate, moderately stout, lobe of article 5 long and guarding article 6; uropod 2 reaching end of uropod 3. Species: 1, arctic, littoral.

Arrhis Stebbing

Aceros Boeck, 1861 (homonym, Aves).
Arrhis Stebbing, 1906 (new name).

Type-species: *Leucothoe phyllonyx* M. Sars, 1858 (original designation and subsequent synonymy). See G. O. Sars, 1895.

Cutting edge of mandible not projecting, untoothed, molar large, ridged; inner lobes of lower lip separate; gnathopods similar, subchelate moderately stout, article 5 with sharp posterior lobe pointing distally; uropod 2 reaching end of uropod 3; *mandibular palp article 2 strongly curved* (*Aceroides*). Species: 3, arctic, littoral to abyssal.

Bathymedon Sars

Bathymedon Sars, 1895.—Stebbing, 1906

Type-species: *Halimedon longimanus* Boeck, 1871 (original designation). See Sars, 1895.

Cutting edge of mandible not projecting, untoothed, molar large, ridged; inner lobes of lower lip separate; gnathopods somewhat similar to each other, usually gnathopod 2 more slender, posterior lobe of article 5 moderately developed in gnathopod 1, becoming obsolescent occasionally in gnathopod 2; uropod 2 reaching end of uropod 3; "*article 2 of mandibular palp not as curved as in Westwoodilla.*" Species: 16, cosmopolitan coldwater, littoral to abyssal.

Bathyporeiapus Schellenberg

Bathyporeiapus Schellenberg, 1931.

Type-species: *B. magellanicus* Schellenberg, 1931 (monotypy).

Cutting edge of mandible projecting, toothed, molar large, ridged; inner lobes of lower lip separate; gnathopods somewhat dissimilar, slender, gnathopod 1 subchelate, gnathopod 2 simple; uropod 2 apparently only slightly exceeding peduncle of uropod 3. Species: 1, antiboreal, littoral.

Carolobatea Stebbing

Carolobatea Stebbing, 1899d.—Stebbing, 1906.

Type-species: *Halimedon schneideri* Stebbing, 1888 (original designation).

Cutting edge of mandible projecting slightly, teeth obsolescent, molar medium, cup-shaped, dentate; inner lobes of lower lip separated; gnathopods similar to each other, subchelate, small, article 5 with small posterior lobe, *palm of gnathopod 1 transverse* (*combining character*); uropod 2 reaching end of uropod 3. Species: 1, New Zealand, littoral.

Exoediceropsis Schellenberg

Exoediceropsis Schellenberg, 1931.

Type-species: *E. chiltoni* Schellenberg, 1931 (monotypy).

Cutting edge of mandible projecting, toothed, molar small, leaf-like, produced into a spine; inner lobes of lower lip separate; gnathopods similar to each other, subchelate, slender, article 5 not lobed; uropod 2 reaching end of uropod 3; *coxa 4 produced acutely posteriorly* (*combining character*). Species: 1, antiboreal, S.W. Atlantic, littoral.

Exoediceros Stebbing

Exoediceros Stebbing, 1899d.—Stebbing, 1906.

Type-species: *Oedicerus fossor* Stimpson, 1855 (original designation). See Haswell, 1880c (as *Oedicerus arenicola*).

Cutting edge of mandible projecting, toothed, molar large, ridged; [lower lip unknown]; gnathopods similar to each other, subchelate, article 5 lobed; uropod 2 apparently not reaching far along uropod 3; *eyes not contiguous* (*Halicreion*); *article 7 of pereopods 1 and 2 absent.* Species: 2, S.E. Australia, littoral.

Gulbarentsia Stebbing

Barentsia Stebbing, 1894 (homonym, Bryozoa).
Gulbarentsia Stebbing, 1894 (new name, footnote, p. 2).

Type-species: *Barentsia hoeki* Stebbing, 1894 (monotypy). See Gurjanova, 1951.

Cutting edge of mandible projecting slightly, toothed; molar medium, cup-shaped, dentate; inner lobes of lower lip separate; gnathopods similar to each other, subchelate, stout, lobe of article 5 projecting strongly but not especially guarding article 6; uropod 2 reaching end of uropod 3; *eyes completely fused, forming a semicircular ring* (*Paraperioculodes*). Species: 2, arctic, littoral.

Halicreion Boeck

Halicreion Boeck, 1871.—Stebbing, 1906.

Type-species: *Oediceros aequicornis* Norman, 1869a (monotypy and subsequent synonymy). See Sars, 1895 (as *H. longicaudatus*).

Cutting edge of mandible projecting slightly, poorly but distinctly toothed, molar large, ridged; inner lobes of lower lip separate; gnathopods similar to each other, subchelate, stout, article 5 strongly lobate, lobe on gnathopod 2 sufficiently long to appear to be guarding article 6; uropod 3 very long, uropod 2 not exceeding peduncle of uropod 3; *eyes contiguous* (*Exoediceros*). Species: 3, bipolar, coldwater littoral to bathyal (730 m, S. Atlantic).

Methalimedon Schellenberg

Methalimedon Schellenberg, 1931.

Type-species: *M. nordenskjoldi* Schellenberg, 1931 (monotypy).

Cutting edge of mandible projecting, toothed, molar large, ridged; inner lobes of lower lip separate; gnathopods similar to each other, feeble, subchelate, article 5 not lobate; uropod 2 apparently reaching end of uropod 3; *eyes unpaired, coalesced, base of pereopod 5 broadly lobed distally* (*Parhalimedon*). Species: 1, subantarctic, littoral (to 310 m).

Monoculodes Stimpson

Monoculodes Stimpson, 1853.—Stebbing, 1906.
Kroyera Bate, 1857a, 1858a.

Type-species: *M. demissus* Stimpson, 1853 (monotypy). Species obscure.

Antenna 1 not longer than antenna 2, article 3 less than half as long as article 1 (*Monoculopsis*); *antenna 2 neither enlarged nor elongate* (*Oediceroides*); cutting edge of mandible projecting, toothed, molar large, ridged; gnathopods dissimilar, subchelate, gnathopod 1 usually stout, lobe of article 5 long or short, but usually not appearing to guard article 6; gnathopod 2 usually slender, lobe of article 5 usually very long and guarding article 6; *both gnathopods merging to those of Oediceroides;* uropod 2 reaching end of uropod 3. Species: 46, cosmopolitan in N. Hemisphere, littoral to bathyal (only 2 species in S. Hemisphere, Tasman Sea, 610 m, and S. Georgia area).

Monoculopsis Sars

Monoculopsis Sars, 1895.—Stebbing, 1906.

Type-species: *Monoculodes longicornis* Boeck, 1871 (monotypy).

Antenna 1 longer than antenna 2, article 3 as long as article 1 (*Monoculodes*); cutting edge of mandible projecting and sharp but poorly toothed, molar large, ridged; inner lobes of lower lip separate; gnathopods dissimilar or similar, subchelate, article 5 with lobe guarding article 6 on gnathopod 2, lobe not guarding as closely on gnathopod 1; uropod 2 reaching end of uropod 3. Species: 2, bisubpolar, littoral.

Oedicerina **Stephensen**

Oedicerina Stephensen, 1931.

Type-species: *O. ingolfi* Stephensen, 1931 (monotypy). See Gurjanova, 1951.

Cutting edge of mandible slightly projecting, toothed, molar large, ridged; inner lobes of lower lip separate; [gnathopods unknown]; *coxa 4 with a large blunt posterior lobe. Type specimen badly damaged.* Species: 1, N. Atlantic (1,802 m).

Oediceroides **Stebbing**

Oediceroides Stebbing, 1888; 1906.
Oediceropsoides Shoemaker, 1925.
(*Lopiceros*) J. L. Barnard, 1961 [a valid subgenus].

Type-species: *Oediceropsis rostrata* Stebbing, 1883 (selected by Pirlot, 1932).

Cutting edge of mandible projecting, toothed, molar large, ridged; inner lobes of lower lip separate; gnathopods similar to each other, stout, subchelate, posterior lobes of article 5 well developed, projecting at right angles or nearly so, *or not guarding article 6* (*Monoculodes*), lobes becoming obsolescent; uropod 2 reaching end of uropod 3; *inner plate of maxilla 1 with three or more setae* (*Paroediceroides*); *antenna 2 usually enlarged and elongate* (*Monoculodes*). Species: 24, cosmopolitan cold-water, littoral to abyssal. *Oediceroides cystifera* and *O. brevirostris* Schellenberg (1931) probably incorrectly assigned here.

Oediceropsis **Liljeborg**

Oediceropsis Liljeborg, 1865.—Stebbing, 1906.

Type-species: *O. brevicornis* Liljeborg, 1865 (monotypy). See Sars, 1895.

Eyes lateral; cutting edge of mandible projecting, toothed, molar large, ridged; inner lobes of lower lip separate; gnathopods similar to each other, subchelate, stout, lobe of article 5 projecting at right angles; uropod 2 reaching end of uropod 3. Article 1 of antenna 2 swollen in type-species. Bridged through *O. proxima* Chevreux (1908c) to *Parodiceroides.* Species: 2, boreal N. Atlantic, bathyal.

Oediceros Krøyer

Oediceros Krøyer, 1842.—Stebbing, 1906.

Type-species: *O. saginatus* Krøyer, 1842 (monotypy). See Sars, 1895.

Cutting edge of mandible projecting and well toothed, molar lacking ridges; inner lobes of lower lip separate; gnathopods similar to each other, subchelate, lobes of article 5 well developed and projecting at right angles; uropod 2 reaching end of uropod 3. Species: 3, arctic-boreal N. Atlantic, littoral.

Paraperioculodes K. H. Barnard

Paraperioculodes K. H. Barnard, 1931; 1932.

Type-species. *P. brevimanus* K. H. Barnard, 1931 (original designation); 1932.

Eyes completely fused, *forming a circle or oval* (*Gulbarentsia, Oediceroides*); cutting edge of mandible apparently projecting, toothed, molar ridged; inner lobes of lower lip separate; gnathopods similar to each other, moderately stout, subchelate, posterior lobes of article 5 projecting somewhat distally; uropod 2 reaching end of uropod 3; *coxa 4 apparently only bluntly and poorly or not produced posteriorly* (*Paroediceroides*). Species: 3, antarctic, littoral to bathyal (569 m).

Parhalimedon Chevreux

Parhalimedon Chevreux 1906a; 1906b.

Type-species: *P. turqueti* Chevreux, 1906a (original designation); 1906b.

Eyes paired; base of pereopod 5 sharply narrowed distally (*Methalimedon*); cutting edge of mandible projecting, toothed, molar large, ridged; inner lobes of lower lip separate; gnathopods similar to each other, feeble, subchelate, elongate, fifth articles lacking posterior lobes; uropod 2 reaching only to end of peduncle of uropod 3. Species: 2, antarctic littoral and tropical bathyal (230 m).

Paroediceroides Schellenberg

Paroediceroides Schellenberg, 1931.

Type-species: *P. sinuata* Schellenberg, 1931 (monotypy).

Cutting edge of mandible projecting, toothed, molar large, ridged; inner lobes of lower lip separate; gnathopods similar to each other, stout, subchelate, posterior lobe of article 5 well developed, partially guarding article 6; uropod 2 reaching end of uropod 3; *inner plate of maxilla 1 with one seta* (*Oediceroides*); telson deeply emarginate in type-species. Species: 2, subantarctic littoral and E. Pacific bathyal.

Paroediceros Sars

Paroediceros Sars, 1895.—Stebbing, 1906.

Type-species: *Oediceros lynceus* M. Sars, 1858 (original designation).

Cutting edge of mandible projecting, toothed, molar unridged; inner lobes of lower lip separate; gnathopods dissimilar, subchelate, article 5 of gnathopod 1 scarcely lobed, of gnathopod 2 with a long posterior lobe guarding article 6; uropod 2 reaching end of uropod 3. Species: 5, arctic-subarctic, littoral to deep bathyal.

Perioculodes Sars

Perioculodes Sars, 1895.—Stebbing, 1906.

Type-species: *Monoculodes longimanus* Bate and Westwood, 1868 (monotypy).

Cutting edge of mandible projecting, toothed, molar very small, conical, unridged; inner lobes of lower lip coalesced; gnathopods similar to each other, subchelate, article 5 produced into a lobe guarding article 6; uropod 2 reaching end of uropod 3; *telson entire* (*Perioculopsis*). Species: 3, Ceylon, Red Sea, boreal E. Atlantic, littoral.

Perioculopsis Schellenberg

Perioculopsis Schellenberg, 1925b.

Type-species: *P. lophopus* Schellenberg, 1925b (monotypy).

Cutting edge of mandible projecting, not distinctly toothed, molar small, unridged; inner lobes of lower lip apparently coalesced; gnathopods similar to each other, subchelate, article 5 produced into a lobe guarding article 6; uropod 2 reaching end of uropod 3; *telson emarginate* (*Perioculodes*). Species: 1, W. Africa, littoral.

Pontocrates Boeck

Pontocrates Boeck, 1871.—Stebbing, 1906.

Type-species: *Kroyera arenaria* Bate, 1858a (selected as *Oedicerus norvegicus* Boeck, 1861, by Boeck, 1876, a species now synonymous with *K. arenaria*). See Sars, 1895 (as *P. norvegica*).

Cutting edge of mandible projecting, toothed, molar medium, ridged; inner lobes of lower lip poorly developed but separated by an incision; gnathopods dissimilar, gnathopod 1 stout, subchelate, article 5 produced into a long posterior lobe partially guarding article 6, gnathopod 2 slender, chelate, long lobe of article 5 guarding article 6; uropod 2 reaching end of uropod 3. Species: 3, subantarctic, boreal, littoral.

Synchelidium Sars

Synchelidium Sars, 1895.—Stebbing, 1906.

Type-species: *Kroyeria haplocheles* Grube, 1864b (selected by Chevreux and Fage, 1925). See Sars, 1895 (as *S. brevicarpum*).

Cutting edge of mandible projecting, toothed, molar small, conical, with apical spine, unridged; inner lobes of lower lip flat but separate; gnathopods dissimilar, gnathopod 1 subchelate, stout, article 5 forming a lobe guarding article 6, gnathopod 2 slender, chelate, article 5 unproduced;* uropod 2 reaching end of uropod 3. Species: 7, boreal, littoral to bathyal.

*Possibly a long lobe of article 5 has been amalgamated with the posterior margin of article 6.

Westwoodilla Bate

Westwoodia Bate, 1857a (homonym, Hymenoptera).
Westwoodilla Bate, 1862 (new name).—Stebbing, 1906.
Halimedon Boeck, 1871.

Type-species: *Westwoodia caecula* Bate, 1857a (monotypy). See Sars, 1895 (as *Halimedon mulleri*).

Cutting edge of mandible poorly produced, poorly toothed, molar large, ridged; "*article 2 of palp more strongly curved than in Bathymedon*"; inner lobes of lower lip separate; gnathopods similar to each other, feeble, subchelate, article 5 scarcely lobed; uropod 2 reaching end of uropod 3. Species: 9, arctic, warm-temperate, littoral to abyssal.

Pagetinidae

FIGURE 139

DIAGNOSIS.—Accessory flagellum absent; mandibular molar evanescent; coxae short, all visible; outer lobes of maxillipeds poorly developed, inner obsolete; uropod 3 uniramous; telson short, entire; urosomites 2–3 coalesced. See Stenothoidae, Thaumatelsonidae, Sebidae, Phliantidae, Cressidae, Kuriidae.

DESCRIPTION.—Accessory flagellum absent; urosomites 2–3 coalesced; coxae short, all visible; upper lip probably incised; mandible with 3-articulate palp, molar evanescent; lower lip as in Pleustidae, with tilted, oval outer lobes astride coalesced inner lobes; maxilla 1 weak, with 1-articulate palp, inner lobe possibly absent, outer weakly setose! or spinose; maxillipeds slender, outer lobes small, inner lobes vestigial; gnathopods small, subchelate; uropod 3 uniramous, telson short, entire.

Relationship.—The Stenothoidae, Cressidae, and Thaumatelsonidae have enlarged coxae 2–4, more elongate telsons than do Pagetinidae and coxa 1 is small and hidden by the following coxae.

The Pardaliscidae have biramous third uropods.

The Eophliantidae and Phliantidae lack mandibular palps, the former having cylindrical bodies, the latter having depressed bodies.

The Pagetinidae bear some resemblance to Sebidae in mouthparts, uropods, telson, and coxae but Sebidae have chelate gnathopods, elongate third artcles of gnathopod 2 (with one exception) and well-formed plates of the maxillipeds.

Key to the Genera of Pagetinidae

These genera, possibly synonymous, are based on characters which may be conditions due to different methods of preservation, mounting technique, and observation.

Figure 139.—Pagetinidae: *a*, head and gnathopod 1 of *Pagetina genarum* K. H. Barnard (1932). Upper lip: *b*, *Heterocressa monodi* Nicholls (1938). Mandible: *c*, *Heterocressa.* Maxilla 1: *d*, *Pagetina*, *e*, *Heterocressa.* Maxilliped: *f*, *Pagetina; g*, *Heterocressa.* Pereopods 1,3,5: *h,j,k*, *Pagetina.* Gnathopod 2: *i*, *Pagetina.* *l*, *Pagetina*, dorsal view of telson and uropod 3. Uropod 3: *m*, *Heterocressa.* Telson: *n*, *Heterocressa.* Lower lip: *o*, *Pagetina.*

1. Uropod 3 with 2-articulate ramus . . . . **Heterocressa**
   Uropod 3 with 1-articulate ramus . . . . **Pagetina**

Genera of Pagetinidae

Heterocressa Nicholls

Heterocressa Nicholls, 1938.

Type-species: *H. monodi* Nicholls, 1938 (original designation).
Species: 1, Macquarie Island, littoral.

Pagetina K. H. Barnard

Pagetina K. H. Barnard, 1931; 1932.

Type-species: *P. genarum* K. H. Barnard, 1931 (original designation); 1932.
Species: 1, S. Georgia Island, littoral.

Paramphithoidae

[including Amathillopsidae Pirlot, 1934]

FIGURES 140–142, FRONTISPIECE

DIAGNOSIS.—One or more of coxae 1–4 (usually all) acutely pointed midventrally, occasionally bifid, accessory flagellum vestigial or absent, at most composed of two articles. See Acanthonotozomatidae, Lepechinellidae, Pleustidae, Calliopiidae (especially *Oradarea*), Eusiridae, Haustoriidae, Astyridae.

DESCRIPTION.—Rostrum usually well developed; body often processiferous; accessory flagellum vestigial or absent; coxae large, 1–4 usually acuminate, or coxae slightly excavate ventrally to form weak anterior-posterior points (weak bifidation); mouthparts variable, mandible always with molar (except *Bathypanoploea*) and 3-articulate palp, molar varying in extent and degree of trituration surface; lower lip with or without inner lobes; plates of maxillipeds well developed but palp varying from three to four articles; gnathopods feeble, either subchelate or simple; uropod 3 with elongate lanceolate rami; telson entire or partially cleft, slightly elongate or not.

RELATIONSHIP.—Most Acanthonotozomatidae, also with pointed coxae, differ from Paramphithoidae by the lack of a distinct mandibular molar and the conically grouped mouthparts. The genus *Bathypanoploea* (*Acanthonotozoma australis* Chilton, 1912) in the Acanthonotozomatidae does not have conically grouped mouthparts and so

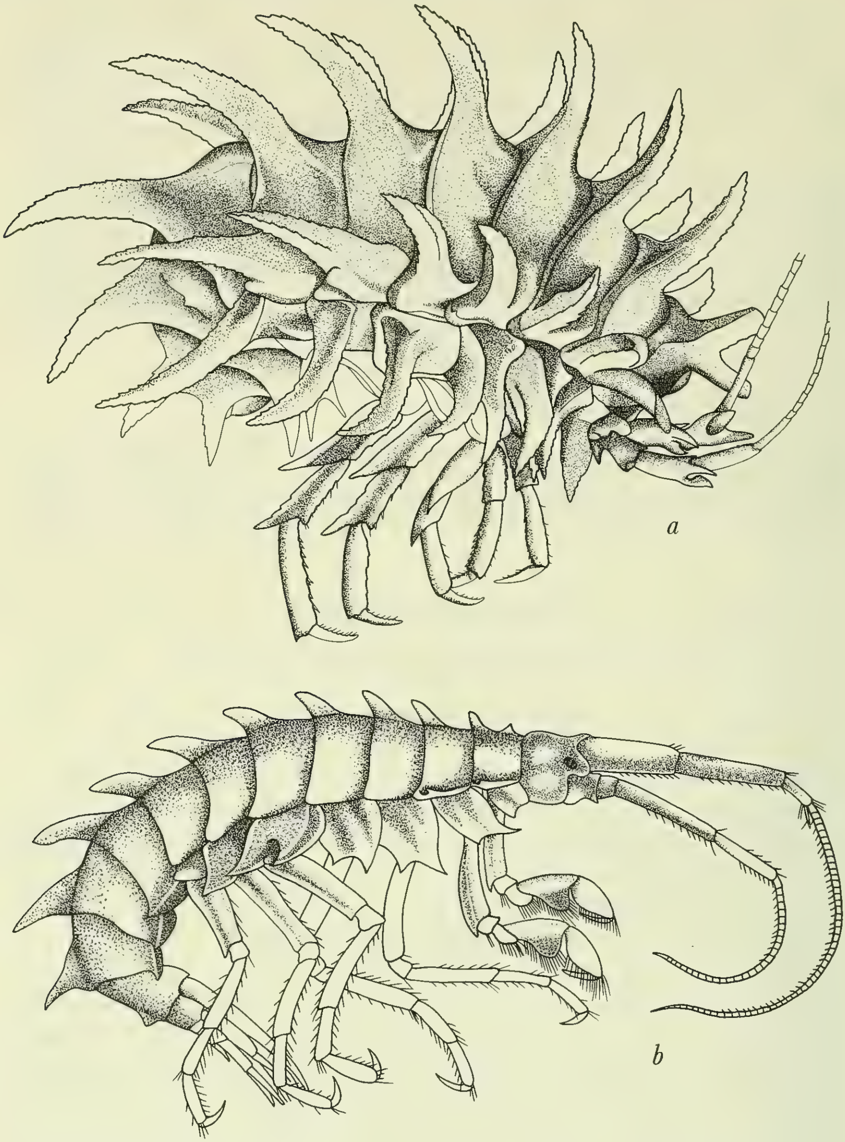

FIGURE 140.—Paramphithoidae: *a*, *Actinacanthus tricarinatus* (Stebbing, 1888); *b*, *Amathillopsis spinigera* Heller (Sars, 1885).

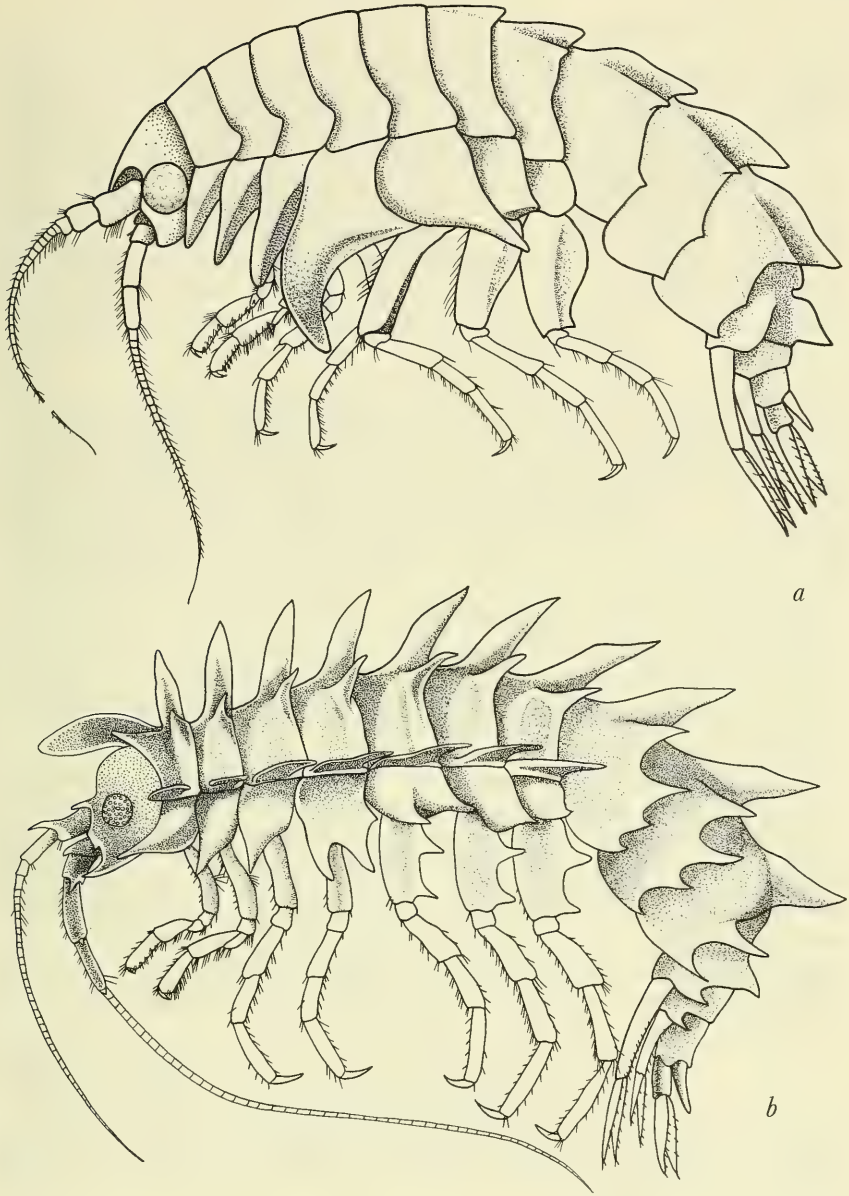

FIGURE 141.—Paramphithoidae: *a, Epimeria cornigera* (Fabricius) (Sars, 1895, pl. 128); *b, Paramphithoe hystrix* (Ross) (Sars 1895 pl. 130. as *Acanthozone cuspidata*).

confounds the distinctions between the two families. I include that genus also in the key of Paramphithoidae although retaining Schellenberg's (1931, 1939) assignment of it to the Acanthonotozomatidae.

A few paramphithoids like *Amathillopsis grevei* J. L. Barnard (1961) have very weak acuminations on coxae 1–4 and might be keyed into the Calliopiidae. *Cleippides* of the latter family may also have subacuminate coxae.

The Lepechinellidae differ from Paramphithoidae mainly by the slender second articles of pereopods 3–5, the possession of coalesced inner lobes on the lower lip, and apparently the fusion of pleonites 5 and 6.

The genus *Amathillopleustes* Pirlot (1934) described in the Amathillopsidae was preoccupied by *Cleonardopsis* K. H. Barnard (1916). Since this genus bears rounded coxae it cannot be retained in the Paramphithoidae (=Amathillopsidae); it bears an elongate 1-articlate accessory flagellum and cleft telson, hence should be transferred to the Eusiridae. Note that the Eusiridae and Pontogeneiidae have been amalgamated.

The Pleustidae are very closely related to Paramphithoidae but have characteristic lower lips. *Mesopleustes* is an intermediate genus because of its weakly pleustid lower lip and tendency to coxal acumination.

Haustoriids have a well-developed accessory flagellum and fossorial appendages.

Eusiridae lack fully acuminate coxae. *Rhachotropis,* however, intergrades Eusiridae and Paramphithoidae.

Oradarea Walker, originally described in the Calliopiidae but transferred to Paramphithoidae by Pirlot (1934) usually lacks the pointed coxae of paramphithoids although male *O. shoemakeri* Pirlot has slightly acuminate coxae, *Oradarea* should be returned to the Calliopiidae. *Parepimeriella* Schellenberg (1931) also has rounded, untapering coxae, bears the lower lip characteristic of Pleustidae, and should be transferred to that family.

Eclysis K. H. Barnard (1932) and *Epimeriella* Walker (1907) probably should be assigned to the Astyridae and the Paramphithoidae amended to include only genera with triturative molars. *Eclysis* is particularly close to *Astyra,* differing from the latter in the absence of an accessory flagellum.

One species of Gammaridae, *Weyprechtia heuglini* (Buchholz), has coxae 4–5 forming a ventral crescentic curve like some paramphithoids but that genus may be distinguished in its multiarticulate accessory flagellum.

Nomenclatural Changes in Paramphithoidae

Amathillopsis Heller (1875) is removed from Gammaridae and Amathillopsidae and assigned to Paramphithoidae, thus resulting in amalgamation of Amathillopsidae with Paramphithoidae.

Amathillopleustes Pirlot (1934) is a synonym of *Cleonardopsis* K. H. Barnard (1916) and they are removed to the Eusiridae.

Oradarea Walker (1903) is removed to the Calliopiidae.

Parepimeriella Schellenberg (1931) is removed to the Pleustidae.

Key to the Genera of Paramphithoidae

1. Body densely covered with articulate spines (see frontispiece) . **Uschakoviella**
   Body lacking articulate spines 2
2. Molar of mandible absent . . . . **Bathypanoploea** [1]
   Molar of mandible only a setose lamina or cone (fig. 142*p*) 3
   Molar of mandible well developed, large, ridged (fig. 142*j*) 4
3. Pereopod 5 as long as or longer than pereopod 4 . . . . **Eclysis**
   Pereopod 5 shorter than pereopod 4 . . . . **Epimeriella**
4. Maxillipedal palp bearing only three articles [2] (fig. 142*q*) 5
   Maxillipedal palp bearing four articles (fig. 142*n*) 6
5. Lower lip with inner lobes (fig. 142*o*) . . . . **Parepimeria** [3]
   Lower lip lacking inner lobes (fig. 142*k*) . . . . **Metepimeria**
6. Coxae 4–5 together forming a crescentic curve below (fig. 141*a*) . . . . 7 [4]
   Coxae 4–5 together not forming a crescentic curve below (fig. 140*b*) . . . 8
7. Gnathopods subchelate, dactyl slender, simple (fig. 142*b*) . . . **Epimeria** [4]
   Gnathopods simple, dactyl stout, spinose (fig. 142*e*) . . . **Pseudepimeria** [4]
8. Accessory flagellum present 9
   Accessory flagellum absent 10
9. Accessory flagellum long and spiniform, gnathopods strongly subchelate . . . . **Amathillopsis**
   Accessory flagellum short, scale-like or barrel-like, gnathopods simple even though portions occasionally stout . . . . **Parepimeria**
10. Article 5 of gnathopods shorter than article 6 . . . . **Paramphithoe** [5]
    Article 5 of gnathopods much longer than article 6 . . . . **Actinacanthus**

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[1] Assigned to Acanthonotozomatidae provisionally.
[2] Chevreux (1912b).
[3] K. H. Barnard (1932) states maxillipedal palp article 4 is present.
[4] Note resemblance in coxae 4–5 of *Weyprechtia* (Gammaridae).
[5] See also *Halirages stebbingi* Schellenberg (1931) (=*H. huxleyanus* Stebbing, 1888, not Bate), in the Calliopiidae, a species with acuminate anterior coxae; it differs from paramphithoids and other members of *Halirages* in its stout gnathopods with ovate articles.

Genera of Paramphithoidae

Actinacanthus Stebbing

Acanthechinus Stebbing, 1888 (homonym, Echinodermata).
Actinacanthus Stebbing, 1906 (new name).

Type-species: *Acanthozone tricarinata* Stebbing, 1883 (monotypy).

Accessory flagellum absent; mandibular molar large, ridged; lower lip lacking inner lobes; maxillipedal palp 4-articulate; gnathopods poorly subchelate, articles 5 and 6 slender and very elongated, *article 5 longer than 6* (*Paramphithoe*); telson entire. Species: 1, S. Indian Ocean (282 m).

Amathillopsis Heller

Amathillopsis Heller, 1875.—Stebbing, 1906.—Pirlot, 1934.—J. L. Barnard, 1964c.
Acanthopleustes Holmes, 1908.

Type-species: *A. spinigera* Heller, 1875 (original designation). See Sars, 1885; Gurjanova, 1951.

Accessory flagellum spine-like, 2-articulate, article 2 tiny; mandibular molar large, ridged; lower lip apparently with coalesced inner lobes; maxillipedal palp 4-articulate; gnathopods subchelate, articles 5 and 6 ovoid, article 5 with posterior lobe; telson slightly emarginate. Species: 7, cosmopolitan, (cold littoral) bathyal and abyssal.

Eclysis K. H. Barnard

Eclysis K. H. Barnard, 1932.

Type-species: *E. similis* K. H. Barnard, 1932 (monotypy).

Accessory flagellum absent; mandibular molar a setulose conical lamina; lower lip lacking inner lobes; maxillipedal palp 4-articulate; gnathopods scarcely subchelate, article 5 with small posterior lobe; *pereopod 5 equal to or longer than pereopod 4* (*Epimeriella*); telson cleft halfway. Species: 1, S. Georgia Islands, littoral.

Epimeria Costa

?*Vertumnus* White, 1847a (nomen nudum).
Epimeria Costa, 1851b.—Stebbing, 1906.

Type-species: *Gammarus corniger* J. C. Fabricius, 1779 (monotypy and subsequent synonymy). See Sars, 1895.

Accessory flagellum absent; mandibular molar large, ridged; lower lip lacking inner lobes; maxillipedal palp 4-articulate; gnathopods subchelate, *dactyl slender, simple* (*Pseudepimeria*); telson emarginate or notched; *coxae 4–5 together forming a crescentic curve below* (*combining character*). Species: 19, cosmopolitan cold-water, littoral to abyssal.

Epimeriella Walker

Epimeriella Walker, 1906b; 1907.

Type-species: *E. macronyx* Walker, 1906b; (monotypy) 1907.

Accessory flagellum absent; mandibular molar a setose conical lamina; [lower lip unknown]; maxillipedal palp 4-articulate; gnathopods subchelate, short article 5 with slight posterior lobe; *pereopod 5 shorter than pereopod 4 (Eclysis);* telson incised. Species: 3, antarctic, littoral to bathyal.

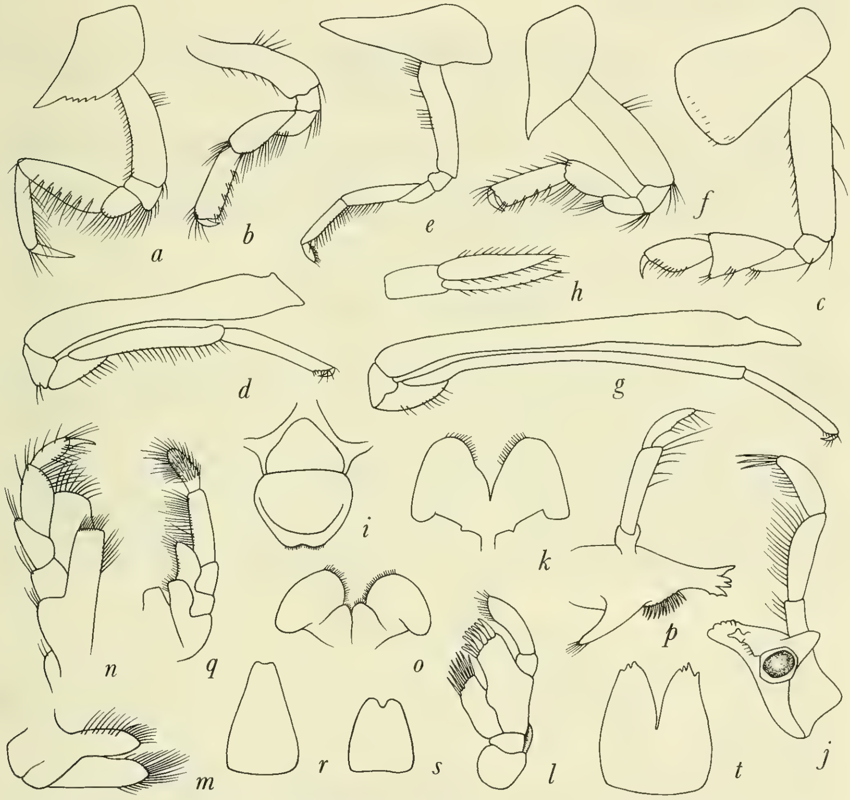

FIGURE 142.—Paramphithoidae: Gnathopod 1: *a, Parpimeria crenulata* Chevreux (1912b); *b, Paramphithoe hystrix* (Ross) (Sars, 1895, pl. 130, as *Acanthozone cuspidata*); *c, Eclysis similis* K. H. Barnard (1932); *d, Actinacanthus tricarinatus* (Stebbing, 1888). Gnathopod 2: *e, Pseudepimeria grandirostris* Chevreux (1912b); *f, Paramphithoe; g, Actinacanthus.* Uropod 3: *h, Paramphithoe.* Mouthparts, *Paramphithoe: i,* upper lip; *j,* mandible; *k,* lower lip; *l,m,* maxillae 1, 2; *n,* maxilliped. Lower lip: *o, Parepimeria.* Mandible: *p, Eclysis.* Maxilliped: *q, Parepimeria.* Telson: *r, Paramphithoe; s, Epimeria loricata* Sars (1895, pl. 129); *t, Eclysis.*

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Metepimeria Schellenberg

Metepimeria Schellenberg, 1931.

Type-species: *M. acanthurus* Schellenberg, 1931 (monotypy).

Accessory flagellum absent; mandibular molar large, ridged; lower lip lacking inner lobes; maxillipedal palp 3-articulate; gnathopods simple; telson deeply notched. Species: 1, antiboreal, littoral.

Paramphithoe Bruzelius

Acanthosoma Ross, 1835 (homonym, Hemiptera).
Paramphithoe Bruzelius, 1859.—Stebbing, 1906.
Acanthozone Boeck, 1871.

Type-species: *Acanthosoma hystrix* Ross, 1835 (selected by Bate, 1862, p. 377!; possible synonym of *Oniscus cuspidatus* Lepechin, 1780, fide Gurjanova, 1951; et al).

Accessory flagellum absent; mandibular molar large, ridged; lower lip lacking inner lobes; maxillipedal palp 4-articulate; gnathopods subchelate, *article 5 shorter than article 6* (*Actinacanthus*)*;* telson truncate. Species: 4, arctic, littoral to bathyal.

Parepimeria Chevreux

Parepimeria Chevreux 1911c; 1912a; 1912b.

Type-species: *P. crenulata* Chevreux, 1912a; 1912b (designated by Chevreux, 1912a).

Accessory flagellum 1-articulate; mandibular molar large, ridged; lower lip with inner lobes; maxillipedal palp 3-articulate (or 4-articulate: K. H. Barnard, 1932); gnathopods simple, articles 5 and 6 slightly elongate; telson entire. Species: 3, antarctic, littoral to bathyal.

Pseudepimeria Chevreux

Pseudepimeria Chevreux, 1912a; 1912b.

Type-species: *P. grandirostris* Chevreux, 1912a (original designation); 1912b.

Accessory flagellum 1-articulate; mandibular molar large, ridged; lower lip lacking inner lobes; maxillipedal palp 4-articulate; gnathopods simple, *dactyl stout, spinose* (*Epimeria*)*;* telson cleft; *coxae 4–5 together forming a crescentic curve below* (*combining character*). Species: 1, antarctic, bathyal.

Uschakoviella Gurjanova

Uschakoviella Gurjanova, 1955.

Type-species: *U. echinophora* Gurjanova, 1955 (original designation). See Shoemaker, 1964.

Body covered with articulate spines; accessory flagellum absent; lower lip lacking inner lobes; mandibular molar large, ridged; maxillipedal palp 4-articulate; gnathopods scarcely subchelate, but palms transverse; telson cleft slightly. Species: 1, boreal N. Pacific, littoral to abyssal.

Pardaliscidae

FIGURES 143, 144

DIAGNOSIS.—Mandible lacking molar; inner plates of maxillipeds small or vestigial; coxae all short; accessory flagellum present, well developed, often sexually dimorphic. See Stilipedidae, Acanthonotozomatidae.

DESCRIPTION.—Accessory flagellum multiarticulate, often sexually dimorphic ("lacking" in one genus), base of primary flagellum often conjoint in male; rostrum usually prominent, head occasionally like that of *Pseudotiron* in Synopiidae; upper lip incised or rounded; mandibles flat, almost elytriform; molar of mandible absent, palp 3-articulate or absent, article 3 often shortened; inner plates of maxillipeds evanescent, outer plates occasionally small; coxae very short; gnathopods powerful or feeble; rami of uropod 3 elongate, lanceolate or subfoliaceous; telson rarely elongate but often of medium length, deeply cleft or entire; mouthparts grouped quadrately (except conically in *Halicella*).

RELATIONSHIP.—The Stilipedidae differ from the Pardaliscidae in the complete absence of an accessory flagellum. *Halicoides*, assigned to Pardaliscidae, also lacks an accessory flagellum (but see Birstein and Vinogradov, 1960), bears a peculiar process on article 2 of antenna 1 but has other aspects of the Pardaliscidae. Both pairs of maxillae in stilipedids are highly foliaceous, unlike those of pardaliscids.

Halicella of the Pardaliscidae has its mouthparts formed into a conical bundle like the Acanthonotozomatidae but its coxae are short, and the inner plates of its maxilliped are absent. Acanthonotozomatids have long coxae and well-developed inner plates of the maxillipeds, as do Astyridae.

Laphystiopsidae have well-developed inner plates of the maxilliped, a distinct mandibular molar and lack an accessory flagellum.

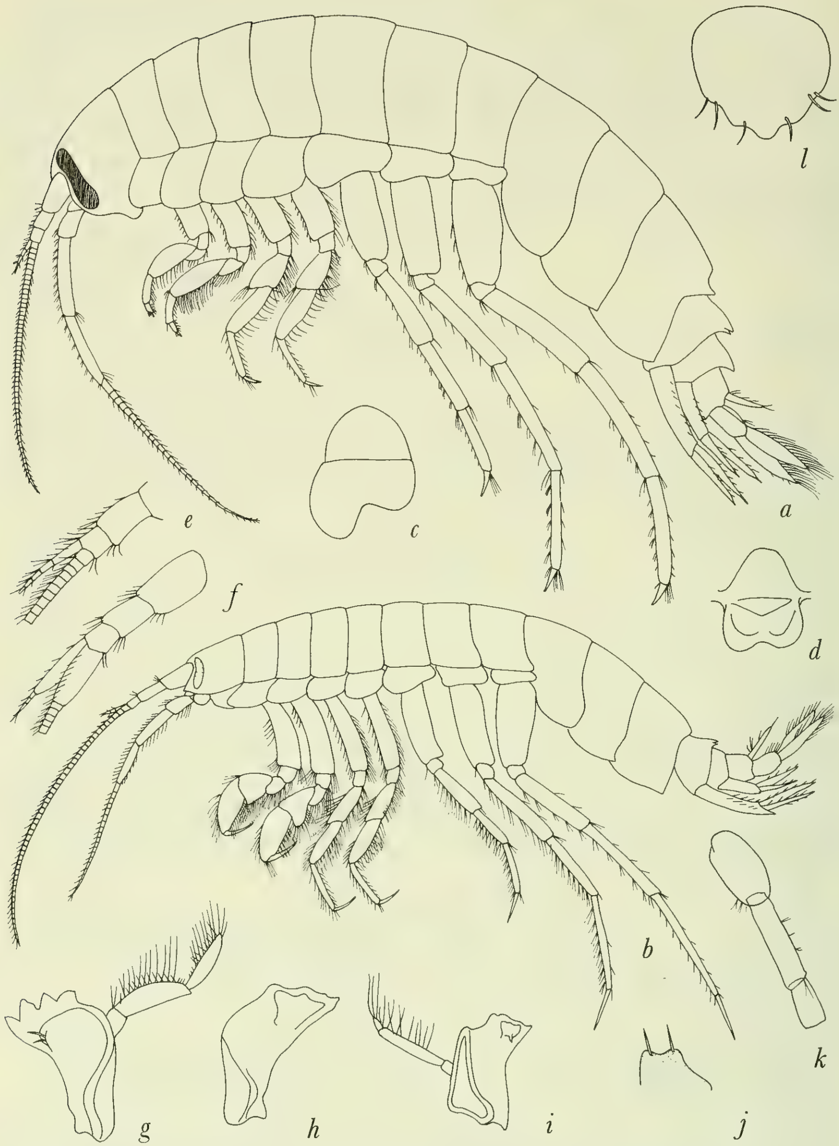

FIGURE 143.—Pardaliscidae: *a*, *Pardalisca cuspidata* Krøyer (Sars, 1895, pl. 141); *b*, *Nicippe tumida* Bruzelius (Sars, 1895, pl. 144). Upper lip: *c*, *Pardalisca; d*, *Nicippe*. Accessory flagella, *Pardalisca: e*, female; *f*, male. Mandibles: *g,h*, right and left, *Pardalisca; i*, *Halice abyssi* Boeck (Sars, 1895, pl. 145). Maxilla 2: *j*, *Necochea pardella* J. L. Barnard (1962d). Antenna 1, peduncle: *k*, *Pardaliscoides tenellus* Stebbing (1888). Telson: *l*, *Parpano cebus* J. L. Barnard (1964a).

Revisionary Notes on Pardaliscidae

Halicoides Walker poses a problem because pleonites 4–5 of the type-specimen of the type-species were injured and never clarified. It was described as lacking an accessory flagellum but bearing a unique scale on article 2 of antenna 1. Presumably these are also injuries. If

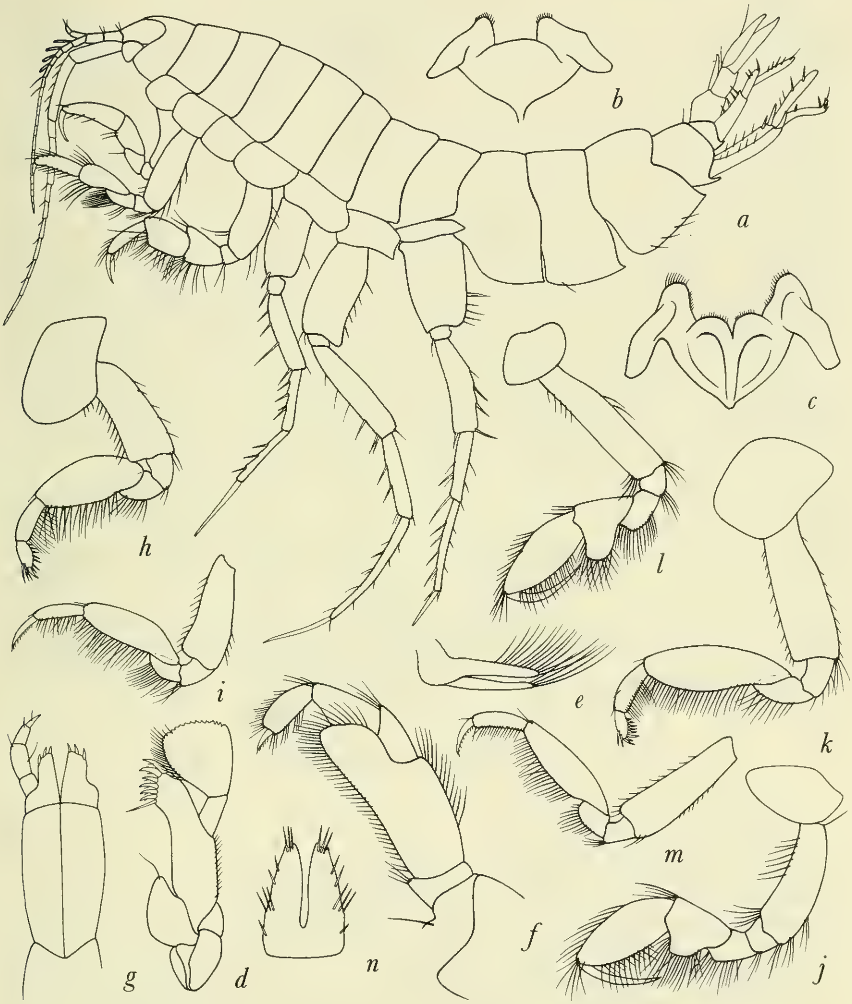

FIGURE 144.—Pardaliscidae: *a*, *Pardisynopia tambiella* J. L. Barnard (1961). Lower lip: *b*, *Pardaliscella boecki* (Malmgren) (Sars, 1895, pl. 143); *c*, *Pardalisca cuspidata* Krøyer (Sars, 1895, pl. 141). *Pardalisca: d,e*, maxillae 1–2; *f*, maxilliped. Maxilliped: *g*, *Halicella parasitica* Schellenberg (1926a). Gnathopod 1: *h*, *Pardalisca; i*, *Pardaliscella; j*, *Nicippe tumida* Bruzelius (Sars, 1895, pl. 144). Gnathopod 2: *k*, *Pardalisca; l*, *Nicippe; m*, *Pardaliscella.* Telson: *n*, *Pardalisca.*

an accessory flagellum does exist and if pleonites 4–5 do bear large teeth then the genus would be referable to *Halice*. Meanwhile it is treated as distinct in the following key. Birstein and Vinogradov (1960, 1962, 1964) have referred their species, *Halice nana* and *H. indica*, to *Halicoides;* and *Synopioides tertia* Stephensen (1931) to *Halice* (see Birstein and Vinogradov, 1962) but suggest the latter also might be assigned to *Halicoides*. A different point of view seems more reasonable until some of these species, including *Halice anacantha* K. H. Barnard (1925) have been more thoroughly described. Birstein's and Vinogradov's (1962) diagnosis of *Halice* is reasonable, except that they include *Halice tertia* and *H. anacantha* which spoil the definition, because *H. tertia* does not have a conjoint article 1 of the primary flagellum of antenna 1, and both *H. tertia* and *H. anacantha* have obsolescent teeth on pleonites 4–5. The flagellum of *H. anacantha* is unknown except for K. H. Barnard's statement that the complete antenna resembles that of *Halice abyssi*. If these two aberrant species were removed from *Halice* the diagnosis could be strongly tightened and should be so done as a provisional measure until further light can be shed by redescriptions and discovery of expected new abyssal pardaliscids. Undoubtedly *H. tertia* is congeneric with *Pardisynopia tambiella* J. L. Barnard (1961) and *P. synopiae* J. L. Barnard (1962b) but scarcely with *Halicoides anomalus* (type) if conjointing of the primary first antennal flagellum and obsolescence of pleonal teeth are diagnostic. Thus, *Pardisynopia* is retained as a genus distinct from *Halice* and *Halicoides* which have conjoint flagella. *Halice anacantha* K. H. Barnard is temporarily removed to *Pardisynopia* until the condition of antenna 1 is verified. *Halicoides indica* and *H. nana* also are provisionally assigned to *Pardisynopia*, even though uropod 3 of *H. nana* appears to lack article 2 on the outer ramus.

Key to the Genera of Pardaliscidae

1. Telson entire (fig. 143*l*) . . . . **Parpano**
   Telson deeply cleft (fig. 144*n*) 2
2. Articles 4–5 of pereopods 1–2 inflated (fig. 144*a*) 3
   Articles 4–5 of pereopods 1–2 not inflated (fig. 143*a*) 5
3. Antenna 1 lacking accessory flagellum (or bearing scale on article 2). **Halicoides**
   Antenna 1 bearing accessory flagellum 4
4. Antenna 1: basal part of flagellum inflated or narrow, but segmented (fig. 143*e*), flagellar article 1 scarcely longer than article 3 of peduncle, urosomal teeth vestigial . . . . **Pardisynopia**
   Antenna 1: basal part of flagellum inflated, conjoint [1] (fig. 143*f*), thus flagellar article 1 nearly as long as peduncle, urosomal teeth strong . . . **Halice**

[1] Incompletely segmented.

5. Mouthparts forming a cone-like bundle below head . . . . . . **Halicella**
Mouthparts not forming a cone-like bundle below head 6
6. Article 6 of both gnathopods 1 and 2 much longer than article 5, article 5 with long narrow posterior lobe (fig. 144*l*) . . . . **Nicippe**
Article 5 of either gnathopods 1 or 2 subequal to or longer than 6, but posterior lobe of article 5 broad and shallow if present 7
7. Antenna 1 with elongate peduncular article 2 (fig. 143*k*) . . **Pardaliscoides**
Antenna 1 with short peduncular article 2 (fig. 143*a*) 8
8. Mandible lacking palp, pereopods prehensile . . . . **Parahalice**
Mandible with palp, pereopods not prehensile 9
9. Maxilla 2 obsolescent (fig. 143*j*) . . . . **Necochea**
Maxilla 2 well developed (fig. 144*e*) 10
10. Article 5 of gnathopods much longer than 6 (figs. 144*h,k*) 11
Articles 5 and 6 of gnathopods subequal, or article 6 slightly longer than 5 (figs. 144*i,m*) 12
11. Gnathopodal dactyls normally claw-shaped, not spinose (figs. 144*j,l*), maxillipedal palp more than 3 times as long as medial edge of outer plate. **Princaxelia**
Gnathopodal dactyls short, spinose (figs. 144*h,k*), medial edge of outer plate on maxilliped nearly as long as palp (fig. 144*f*) . . . . **Pardalisca**
12. Upper lip grossly incised asymmetrically (fig. 143*c*) . . . . **Pardaliscopsis**
Upper lip nearly symmetrically incised (fig. 143*d*). 13
13. Antenna 1: basal part of flagellum narrow, segmented (fig. 143*e*), flagellar article 1 scarcely longer than article 3 of peduncle . . . . **Pardaliscella**
Antenna 1: basal part of flagellum inflated, unsegmented (fig. 143*f*), flagellar article 1 nearly as long as peduncle 14
14. Gnathopod 2 simple . . . . **Halice**
Gnathopod 2 subchelate . . . . **Arculfia**

Genera of Pardaliscidae

The upper lip and lower lip may have important generic characters but they have not been adequately described for most species. They are included when possible in the generic diagnoses to follow.

Arculfia J. L. Barnard

Arculfia J. L. Barnard, 1961.

Type-species: *A. trago* J. L. Barnard, 1961 (original designation).

Article 2 of antenna 1 shorter than article 1; upper lip rounded below; inner lobes of lower lip coalesced; gnathopod 1 simple, articles 5 and 6 subequal, article 5 not lobed, gnathopod 2 subchelate, dactyls simple; telson deeply cleft. Species: 1, Tasman Sea (610 m).

Halice Boeck

Halice Boeck, 1871.—Stebbing, 1906.—Birstein and Vinogradov, 1962.
Synopioides Stebbing, 1888; 1906.

Type-species: *H. abyssi* Boeck, 1871 (selected by Boeck, 1876). See Sars, 1895.

Article 2 of antenna 1 shorter than article 1, *article 1 of primary flagellum as long as or longer than peduncular article 1* (*Pardisynopia*); [upper and lower lips not described]; gnathopods simple, article 6 slender, longer than 5, article 5 not lobed, dactyls simple or rarely half spinose (*H. macronyx*); *urosomal teeth strong* (*Pardisynopia*); telson cleft 40 percent or more; *head usually normal in appearance, with projecting lateral lobes and narrow rostrum but occasionally formed into blunt anterior "shark nose" condition like Pseudotiron* (*Synopiidae*). Species: 11, cosmopolitan, bathy-abyssopelagic.

Halicella Schellenberg

Halicella Schellenberg, 1926a.

Type-species: *H. parasitica* Schellenberg, 1926a (monotypy).

Mouthparts forming a cone-like bundle below head; article 2 of antenna 1 shorter than article 1; [upper lip and lower lip not described]; gnathopods simple, article 6 longer than 5, 5 not lobed, dactyls simple; telson deeply cleft. Species: 1, antarctic, littoral.

Halicoides Walker

Halicoides Walker, 1896.—Stebbing, 1906.

Type-species: *H. anomala* Walker, 1896 (monotypy). See Chevreux and Fage, 1925.

Antenna 1 lacking accessory flagellum (*but see Birstein and Vindogradov, 1960*), article 2 shorter than article 1; [upper lip and lower lip not described]; gnathopods simple, articles 5 and 6 subequal, dactyls simple; telson deeply cleft. Species: ?1+, Bay of Biscay, littoral (possibly also tropical-bathypelagic). See "Revisionary Notes on Pardaliscidae."

Necochea J. L. Barnard

Necochea J. L. Barnard, 1962d.

Type-species: *N. pardella* J. L. Barnard, 1962d (original designation).

Article 2 of antenna 1 shorter than article 1; [upper and lower lip not described]; *maxilla 2 obsolescent;* gnathopods simple, article 6 shorter than 5, 5 not lobed, dactyls with a few setules; telson deeply cleft; *coxa 5 with nearly twice as much surface area as other coxae.* Species 1, subantarctic, abyssal.

Nicippe Bruzelius

Nicippe Bruzelius, 1859.—Stebbing, 1906.

Type-species: *N. tumida* Bruzelius, 1859 (monotypy). See Sars, 1895.

Article 2 of antenna 1 shorter than article 1; upper lip slightly bilobed; lower lip with coalesced inner lobes; gnathopods slightly subchelate, articles 5 and 6 stout, article 6 longer than 5, 5 with a large posterior lobe, dactyls simple; telson deeply cleft. Species: 2, bipolar, bathyal.

Parahalice Birstein and Vinogradov

Parahalice Birstein and Vinogradov, 1962.

Type-species: *P. mirabilis* Birstein and Vinogradov, 1962 (original designation).

Article 2 of antenna 1 shorter than article 1; *mandible lacking palp;* [upper lip and lower lip not described]; gnathopods simple, article 6 slightly longer than 5, 5 not lobed, dactyls simple; *all pereopods prehensile;* telson cleft one third. Species: 1, central Pacific, bathyal or abyssopelagic.

Pardalisca Krøyer

Pardalisca Krøyer, 1842.—Stebbing, 1906.

Type-species: *P. cuspidata* Krøyer, 1842 (monotypy). See Sars, 1895.

Article 2 of antenna 1 shorter than article 1; upper lip very asymmetrically lobed; lower lip with inner lobes separate; gnathopods simple, article 6 much shorter than article 5, dactyls spinose; telson deeply cleft; *medial edge of inner plate on maxilliped nearly as long as palp* (*Princaxelia*). Species: 7, bipolar, littoral to bathyal.

Pardaliscella Sars

Pardaliscella Sars, 1895.—Stebbing, 1906.

Type-species: *Pardalisca boeckii* Malm, 1871 (monotypy).

Article 2 of antenna 1 shorter than article 1, *base of flagellum segmented* (*combining character*); upper lip weakly incised and slightly asymmetrical; lower lip with inner lobes coalesced; gnathopods simple, article 6 slightly shorter than 5, dactyl with one spine; telson cleft only halfway; [*rostrum obsolete*]. Species: 5, boreal, littoral to abyssal.

Pardaliscoides Stebbing

Pardaliscoides Stebbing, 1888; 1906.

Type-species: *P. tenellus* Stebbing, 1888 (monotypy). See Stebbing, 1897.

Article 2 of antenna 1 longer than article 1; [upper and lower lips not described]; gnathopods simple, article 6 shorter than 5, 5 not lobed, dactyls with tiny setules; telson deeply cleft. Species: 2, N. Atlantic, S. Pacific, bathyal to hadal.

Pardaliscopsis Chevreux

Paradaliscopsis Chevreux, 1911b.

Type-species: *P. tenuipalpa* Chevreux, 1911b (original designation).

Article 2 of antenna 1 shorter than article 1; upper lip very asymmetrically lobed; lower lip with coalesced inner lobes; gnathopods simple, articles 5 and 6 subequal, 5 not lobed, dactyls lacking spines; telson deeply cleft. Species: 1, N. Atlantic, abyssal.

Pardisynopia J. L. Barnard

Pardisynopia J. L. Barnard, 1961.

Type-species: *P. tambiella* J. L. Barnard, 1961 (original designation).

Article 2 of antenna 1 shorter than article 1; *article 1 of primary flagellum half or less as long as peduncular article 1* (*Halice and Halicoides*); upper lip scarcely incised below; lower lip with coalesced inner lobes; gnathopods simple, article 6 longer than 5 or subequal, 5 scarcely lobed posteriorly on gnathopod 1, dactyls simple; *pleonites 4–5 with teeth obsolescent* (*Halice*); telson deeply cleft. Species: 6 (3 provisional), probably cosmopolitan, bathyal.

Parpano J. L. Barnard

Parpano J. L. Barnard, 1964a.

Type-species: *P. cebus* J. L. Barnard, 1964a (original designation).

Article 2 of antenna 1 equal to or shorter than article 1; upper lip symmetrically lobed; lower lip apparently with coalesced inner lobes; gnathopods simple, article 6 much longer than 5, latter obsolescent, dactyls simple; telson entire; uropod 3 much reduced in size. Species: 2, Caribbean, abyssal.

Princaxelia Dahl

Princaxelia Dahl, 1959.

Type-species: *P. stephenseni* Dahl, 1959 (original designation).

Article 2 of antenna 1 shorter than article 1; upper lip scarcely incised, lobes slightly asymmetrical; [lower lip unknown]; *maxillipedal palp more than three times as long as medial edge of outer plate* (*Pardalisca*); gnathopods simple, article 5 longer than 6, dactyls simple; telson deeply cleft. Species: 2, N. Atlantic, S. W. Pacific, bathyal to hadal.

Phliantidae, revised

[see J. L. Barnard, 1964c]

FIGURES 145–147

DIAGNOSIS.—Accessory flagellum absent; body dorsally depressed, at least anterior coxae splayed; mandible lacking palp, molar degraded; palp of maxilla 1 degraded or absent; gnathopods feeble; usually uropod 3 lacking inner ramus, often lacking both rami. See Prophliantidae, Eophliantidae, Kuriidae, Dogielinotidae, Talitroidea, Dexaminidae, Pagetinidae, Acanthonotozomatidae, Colomastigidae, Cressidae.

DESCRIPTION.—Phliantidae are depressed dorsally, except *Phlias* which is "compressed" (Stebbing, 1906), with pleon flexed below remainder of body, segments armored and coxae projecting laterally; accessory flagellum absent; mandible lacking palp, molar absent or represented by a smooth protuberance or spine; lower lip with or without inner lobes; maxilla 1 with degraded palp, 1-articulate or represented by a spine when present; maxilla 2 small, often with coalesced lobes; plates of maxilliped well developed, palp 2- to 4-articulate; gnathopods feeble, usually simple, but subchelate in genera *Plioplateia* and *Ceina*, article 3 of gnathopod 2 elongate; uropod 1 biramous (except *Temnophlias*), uropod 2 usually biramous (except *Temnophlias* and *Pereionotus*), uropod 3 uniramous in most genera or rami absent; telson usually entire (or cleft in *Ceina*).

Some students, particularly Chevreux (1911a) have considered that uropod 2 is missing in *Pereionotus* and that the last biramous uropod in that genus is uropod 3. However, *Pereionotus* as stated by Stebbing (1906) probably has a small uropod 3 lacking rami, perhaps overlooked by Chevreux. Uropod 3 has not been clearly described in some genera (especially *Ceina*).

RELATIONSHIP.—The Prophliantidae have biramous third uropods, a cleft telson, and often have a degraded flagellum on antenna 2.

Ceina bridges the Phliantidae and Prophliantidae in its subchelate gnathopods and cleft telson but is retained in Phliantidae because of its nonbiramous third uropods and presence of a flagellum on antenna 2.

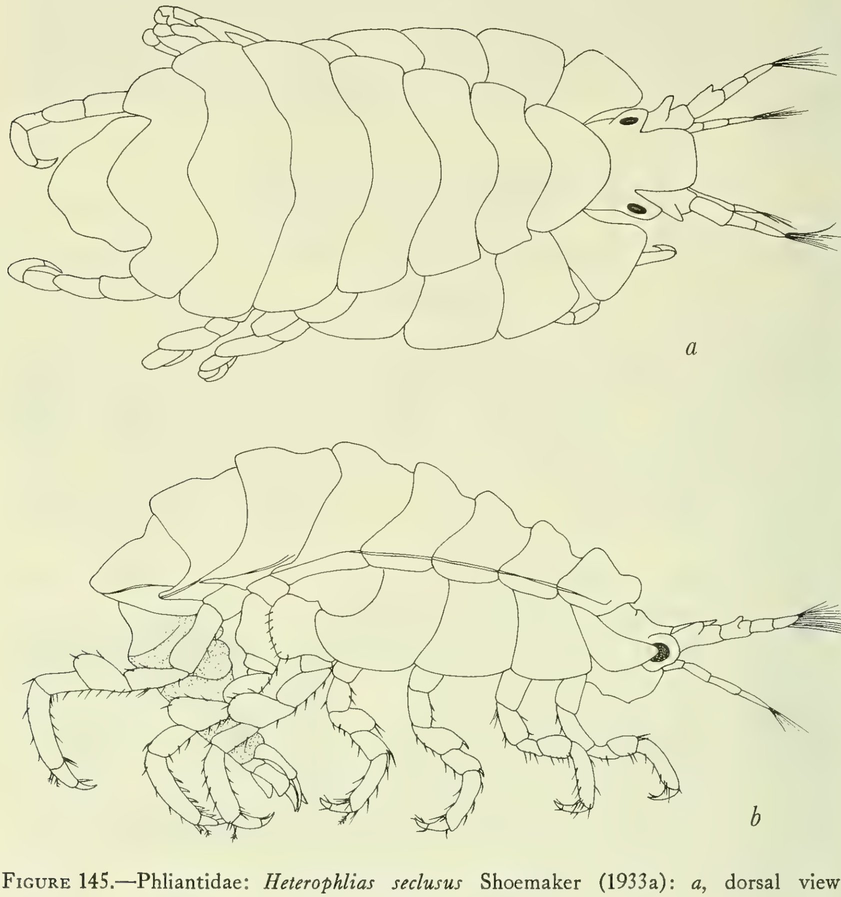

FIGURE 145.—Phliantidae: *Heterophlias seclusus* Shoemaker (1933a): *a*, dorsal view; *b*, lateral view.

The Podoceridae have a mandibular palp and molar. The Talitroidea have well-developed triturating mandibular molars (except for *Najna* which otherwise has the talitroid facies).

The Kuriidae have a well-developed triturating molar and poorly developed outer plates of the maxilliped. The Dexaminidae, less Anatylinae, have well-developed triturating molars. The palp of maxilla 1 is normal in all dexaminids and segments 2–3 of the urosome are coalesced.

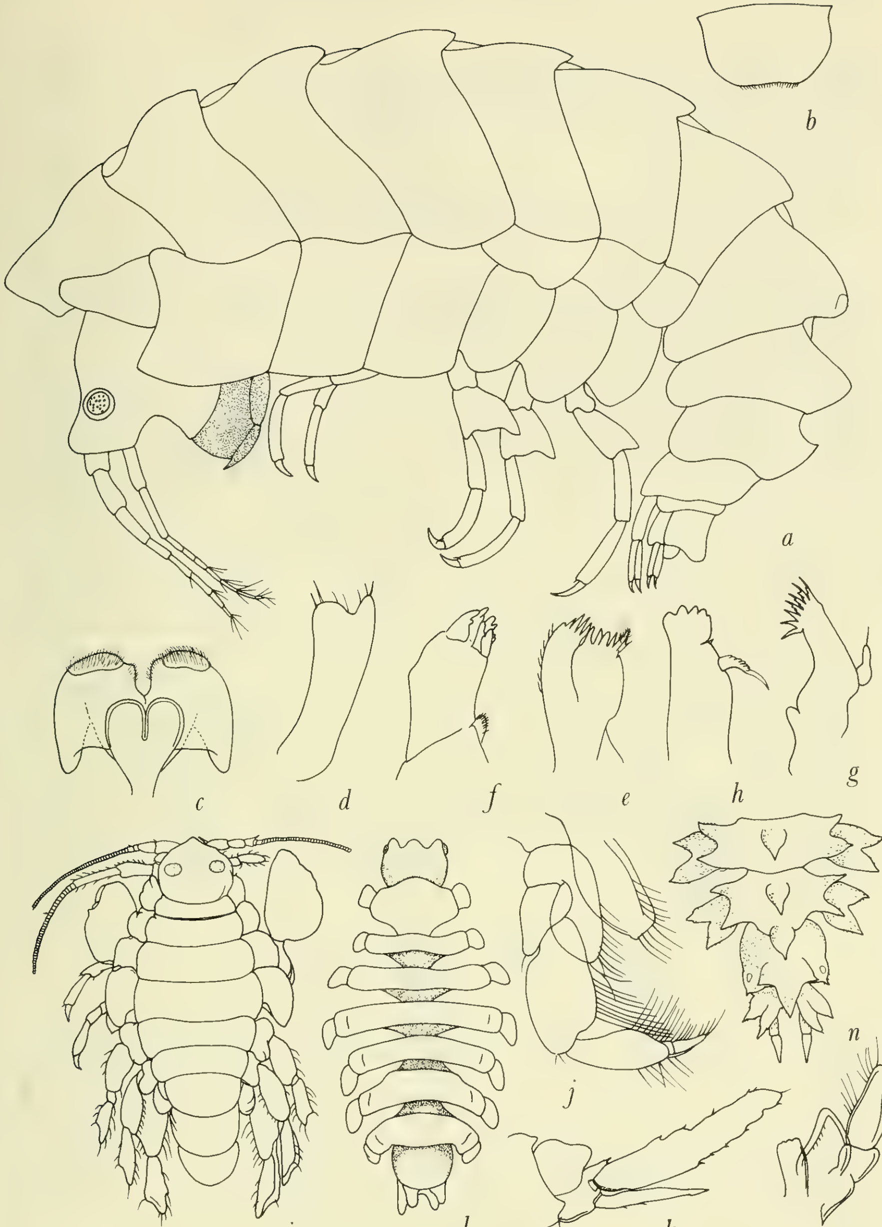

FIGURE 146.—Phliantidae and Calliopiidae: *a*, *Ceina carinata* (Pirlot, 1936, as *Periphlias carinatus*). Upper lip: *b*, *Pereionotus testudo* (Montagu) (Chevreux and Fage, 1925). Lower lip: *c*, *Heterophlias seclusus* Shoemaker (1933a). Maxilla 2: *d*, *Pereionotus; e*, *Heterophlias*. Maxilla 1: *f*, *Heterophlias; g*, *Plioplateia triquetra* K. H. Barnard (1916). Mandible: *h*, *Heterophlias*. Body, dorsal: *i*, *Sancho platynotus* Stebbing (1897) [Calliopiidae]; *l*, *Temnophlias capensis* K. H. Barnard (1916); *n*, *T. hystrix* K. H. Barnard (1954). Maxilliped: *j*, *Sancho; m*, *T. capensis*. Telson and uropod 3: *k*, *Sancho*.

The Acanthonotozomatidae have conically bundled mouthparts, normal uropod 3, and a mandibular palp.

Gnathopod 2 of some phliantids faintly resembles that of Lysianassidae because of the elongate article 2.

The *Temnophlias-Sancho* Problem

Gurjanova (1962) discussed at length the interrelationships of *Sancho* Stebbing, *Chosroes* Stebbing, and *Temnophlias* K. H. Barnard and their relationships to the Phliantidae. *Sancho* and *Chosroes* have been placed in or near the Calliopiidae despite the clear development of what Gurjanova calls a dorsal shield which is another way of denoting their extreme dorsoventral depression. They are even more depressed than typical phliantids. Gurjanova develops the Phliantidae from

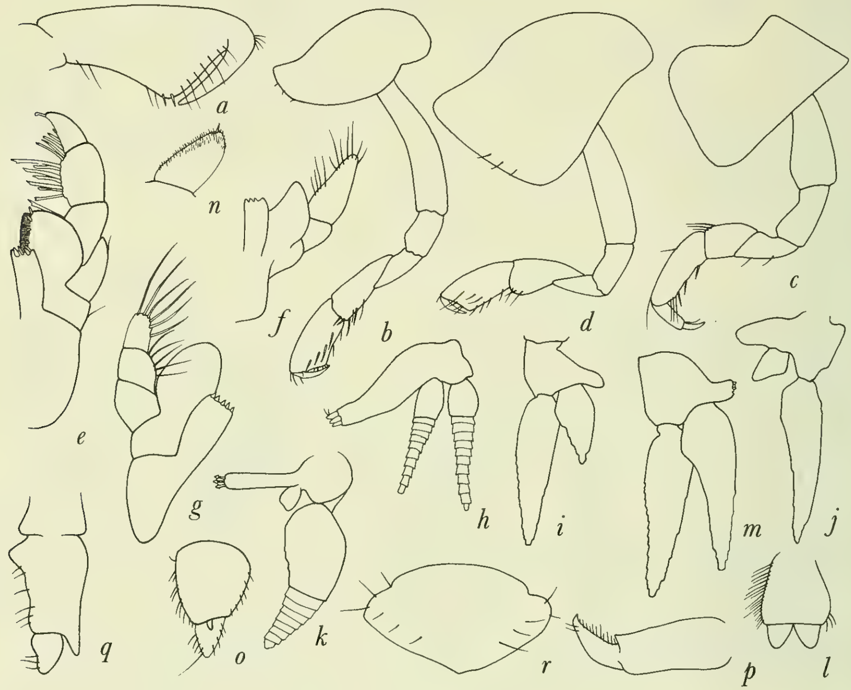

FIGURE 147.—Phliantidae: Gnathopod 1: *a*, *Plioplateia triquetra* K. H. Barnard (1916); *b*, *Ceina carinata* (Pirlot, 1936 as *Periphlias carinatus*); *c*, *Heterophlias seclusus* Shoemaker (1933a). Gnathopod 2: *d*, *Ceina*. Maxilliped: *e*, *Heterophlias*; *f*, *Temnophlias capensis* K. H. Barnard (1916); *g*, *Pereionotus testudo* (Montagu) (Chevreux and Fage, 1925). Pleopod 3: *h*, *Iphinotus typicus* (Thomson) (Stebbing, 1899a, as *I. chiltoni*); *i*, *Heterophlias*; *j*, *Quasimodia capricornis* Sheard (1936a); *k*, *Iphiplateia whiteleggei* Stebbing (1899a); *l*, *Plioplateia*. Pleopod 1: *m*, *Heterophlias*. Uropod 3: *n*, *Heterophlias*; *o*, *Iphinotus*; *p*, *Temnophlias*. Uropod 2: *q*, *Temnophlias*. Telson: *r*, *Iphinotus*.

organisms like *Sancho* and *Chosroes*, which unlike typical phliantids still bear triturative mandibular molars, mandibular palps, well-developed biramous third uropods, free urosomal segments, and, except for female *Sancho*, typical uropods 1 and 2. *Sancho* and *Chosroes*, however, apparently flex the abdomen under the thorax like phliantids and have somewhat splayed coxae. *Temnophlias* is linked to *Sancho* and *Chosroes* and Gurjanova suggests that all three should be joined together as an entity separate from the Phliantidae and Calliopiidae. *Temnophlias* has the flexed abdomen, the degradation of the urosome, its appendages and the simplification of mouthparts unlike *Sancho* and *Chosroes*, but it differs from the Phliantidae in the (presumably secondary) reduction of the coxae and the extension of the lateral pereonal margins as pleurae, presumably as a substitute for the reduced coxae. In this way *Temnophlias* resembles various isopods like *Munna* and *Pleurogonium* and amphipods like *Podocerus*. This modification is far more extreme in the unornamented type-species *Temnophlias capensis* K. H. Barnard (1916) than its so-called congener, *T. hystrix* K. H. Barnard (1954) which has a thick, triquetral body with strong dorsal ornamentation and bifidly acuminate coxae.

I suggest that *Sancho* and *Chosroes* together should be allocated to a new family and *Temnophlias* to another new family in recognition of these strong differences from Calliopiidae, Phliantidae, and each other. *Temnophlias* can be segregated from Phliantidae by the munnid-like body which seems to be a secondary depression and lateral pleuronization of a cylindrioid body. In this respect *Temnophlias* may be more closely related to the cylindrioid Eophliantidae than to the Phliantidae.

Key to the Genera of Phliantidae

1. Palp of maxilliped 2-articulate (fig. 147*f*) . . . . **Temnophlias**
   Palp of maxilliped 3-articulate (fig. 147*g*) 2
   Palp of maxilliped 4-articulate (fig. 147*e*) 4
2. Uropod 3 "biramous" . . . . **Phlias**
   Uropod 3 not biramous 3
3. Lobes of maxilla 2 coalesced (fig. 146*d*), maxilla 1 lacking palp (fig. 146*f*). **Pereionotus**
   Lobes of maxilla 2 separate (fig. 146*e*), maxilla 1 with spine representing palp. **Palinnotus**
4. Gnathopods subchelate or male gnathopod 2 chelate 5
   Gnathopods simple 6
5. Maxilla 1 lacking palp; pleopod 3 apparently with rami subequal to each other and with about seven setose articles each; uropod 3 with one ramus. **Ceina**
   Maxilla 1 with palp; pleopod 3 with vestigial, short, oval rami lacking setae; uropod 3 lacking rami . . . . **Plioplateia**

6. Uropod 3: peduncle distinct from ramus (fig. 147*o*) 7
   Uropod 3: peduncle not distinct from ramus (fig. 147*n*) 8
7. Pleopod 3: inner ramus well developed (fig. 147*h*) . . . . **Iphinotus**
   Pleopod 3: inner ramus vestigial (fig. 147*j*) . . . . **Quasimodia**
8. Pleopod 3: inner ramus setose, half as long as outer. **Pariphinotus** and **Heterophlias**
   Pleopod 3: inner ramus a tiny nonsetose scale (fig. 147*k*) . . . **Iphiplateia**

Genera of Phliantidae

Ceina Della Valle

Ceina Della Valle, 1893.—Stebbing, 1906.—Nicholls, 1939.
Periphlias Pirlot, 1936.

Type-species: *Nicea egregia* Chilton, 1883 (monotypy).

Maxilla 1 lacking palp; maxillipedal palp 4-articulate; gnathopods subchelate; [pleopod 3 unknown, apparently biramous, rami subequal to each other]; uropod 3 with one ramus. Species: 2, Sulu Sea, New Zealand, Juan Fernandez Island, littoral.

Heterophlias Shoemaker

Heterophlias Shoemaker, 1933a.

Type-species: *H. seclusus* Shoemaker, 1933a (monotypy).

Maxilla 1 lacking palp; maxillipedal palp 4-articulate; gnathopods simple; inner ramus of pleopod 3 half as long as outer; uropod 3 lacking rami. Possibly not distinct from *Pariphinotus*. Species: 1, pan-America, tropical, littoral.

Iphinotus Stebbing

Iphigenia Thomson, 1882 (homonym, Mollusca).
Iphinotus Stebbing, 1899a; 1906.

Type-species: *Iphigenia typica* Thomson, 1882 (monotypy and subsequent synonymy).

Maxilla 1 lacking palp; maxillipedal palp 4-articulate; gnathopods simple; rami of pleopod 3 well developed, equal; uropod 3 uniramous. Species: 1, New Zealand, littoral.

Iphiplateia Stebbing

Iphiplateia Stebbing, 1899a; 1906.

Type-species: *I. whiteleggei* Stebbing, 1899a (monotypy).

Maxilla 1 lacking palp; maxillipedal palp 4-articulate; gnathopods simple; inner ramus of pleopod 3 a tiny, nonsetose scale; uropod 3 lacking rami. Species: 1, E. Australia, littoral.

Palinnotus Stebbing

Palinnotus Stebbing, 1900; 1906.

Type-species: *Pereionotus thomsoni* Stebbing, 1899a (original designation).

Maxilla 1 bearing a spine-like palp; *lobes of maxilla 2 separate (Pereionotus);* maxillipedal palp 3-articulate; gnathopods simple; rami of pleopod 3 equal; uropod 3 lacking rami. Species: 3, Japan Sea, S. Africa, E. Australia, littoral.

Pariphinotus Kunkel

Pariphinotus Kunkel, 1910.

Type-species: *P. tuckeri* Kunkel, 1910 (monotypy).

Maxilla 1 lacking palp; maxillipedal palp 4-articulate; gnathopods simple; inner ramus of pleopod 3 half as long as outer; "uropod 3 absent." Possibly synonymous with *Heterophlias*. Species: 1, Bermuda, littoral.

Pereionotus Bate and Westwood

Pereionotus Bate and Westwood, 1863.—Stebbing, 1906.
Icridium Grube, 1864a.

Type-species: *Oniscus testudo* Montagu, 1808 (monotypy). See Chevreux and Fage, 1925.

Maxilla 1 lacking palp; *lobes of maxilla 2 coalesced (Palinnotus);* maxillipedal palp 3-articulate; gnathopods simple; rami of pleopod 3 equal in length; uropod 3 apparently absent or not detected; uropod 2 with two rami in male, one ramus in female. Species: 1, tropical E. Atlantic, Mediterranean, Red Sea, littoral.

Phlias Guerin

Phlias Guerin, 1836.—Stebbing, 1906.

Type-species: *P. serratus* Guerin, 1836 (monotypy).

Obscure genus resembling Pereionotus. Maxilla 1 lacking palp; maxillipedal palp 3-articulate; gnathopods simple; pleopod 3 with rami equal in length; uropod 3 "biramous," but probably confused with uropod 2. Guerin's dorsal figure of urosome shows a setose pair of "uropods" probably representing a pair of pleopods. Species: 1, between Iles Malovines* and Port Jackson, Australia, ?littoral.

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*Falkland Islands; thus, type-locality of this species obscure.

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Plioplateia K. H. Barnard

Plioplateia K. H. Barnard, 1916.

Type-species: *P. triquetra* K. H. Barnard, 1916 (monotypy).

Maxilla 1 with palp; maxillipedal palp 4-articulate; gnathopods subchelate; pleopodal peduncles not expanded; both rami of pleopod 3 vestigial, short, oval, lacking setae; uropod 3 lacking rami. Species: 1, S. Africa, littoral.

Quasimodia Sheard

Quasimodia Sheard, 1936a.

Type-species: *Q. womersleyi* Sheard, 1936a (present selection).

Maxilla 1 lacking palp; maxillipedal palp 4-articulate; gnathopods simple; inner ramus of pleopod 3 vestigial; uropod 3 with a single ramus, occasionally with a vestigial second ramus. Species: 3, S. Australia, littoral.

Temnophlias K. H. Barnard

Temnophlias K. H. Barnard, 1916.

Type-species: *T. capensis* K. H. Barnard, 1916 (monotypy).

Maxilla 1 lacking palp; maxillipedal palp 2-articulate; gnathopods simple or parachelate with chela subdistal; rami of pleopod 3 equal in length; ramus of uropod 3 completely fused to peduncle; body extraordinarily depressed and unornamented or triquetral and bearing dorsal segmental teeth, pereonal segments laterally discontiguous as in munnid isopods, coxae either small and simple or of medium size and acuminately bifid, pereopods parachelate or simple, chela subdistal; antennal flagella of three or four or fewer articles; uropods 1–2 uniramous. Probably should be removed to a new family, see remarks in "Relationship." Species: 2, S. Africa, littoral.

Phoxocephalidae

Figures 148–151

Diagnosis.—Accessory flagellum well developed and multiarticulate; pereopod 5 shorter than pereopod 4 and structurally dissimilar to it; head elongate, with overhanging rostrum, usually large, flat, and hoodlike, occasionally reduced in size or dorsoventrally thickened, but always distinct; pereopods strongly spinose for burrowing; *uropod 3 biramous; telson cleft.* See Haustoriidae, Gammaridae.

Description.—Accessory flagellum well developed; peduncles of antennae very short, flagella very short except occasionally in males, antenna 2 peduncle usually heavily spinose; rostrum often hood-shaped and enveloping base of antenna 1 or narrowed and projecting between first antennae, usually flattened dorsoventrally; body without carinae except on urosome; mouthparts basic, mandibular molar triturative or not, often spinose; palp of maxilla 1 uni- or biarticulate; lower lip with inner lobes; gnathopods subchelate, small or of medium

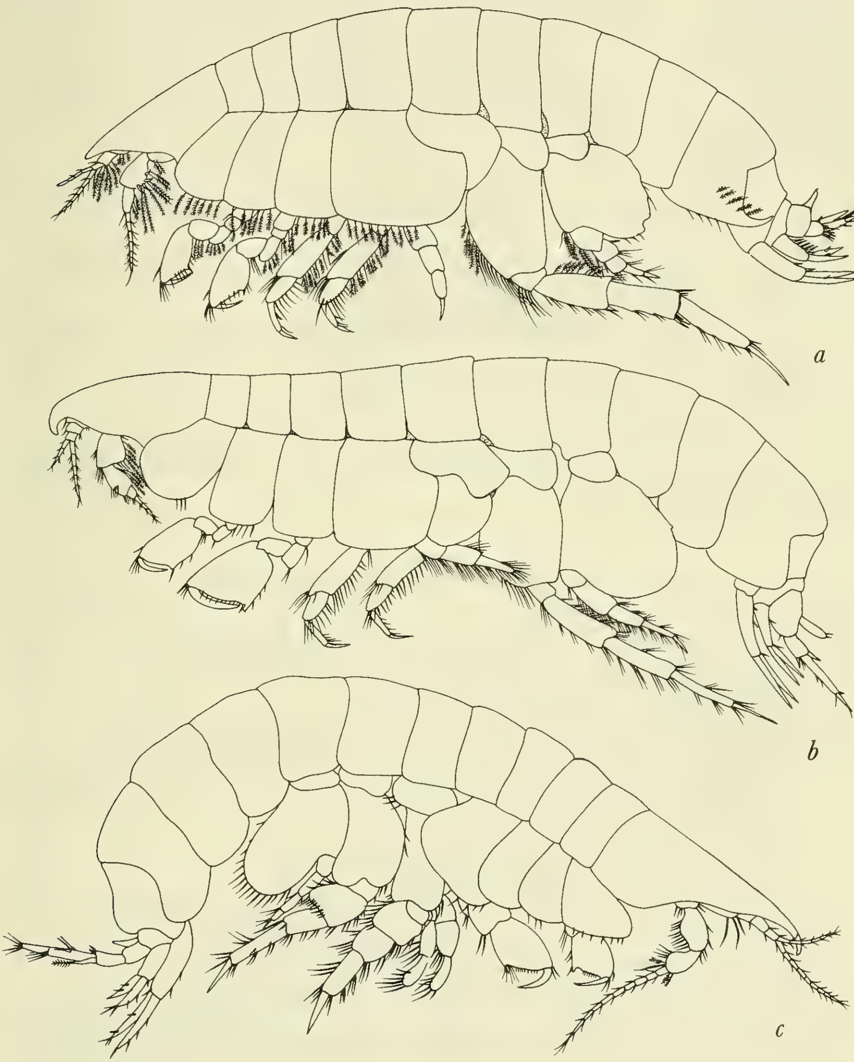

FIGURE 148.—Phoxocephalidae: *a*, *Harpinia plumosa* (Krøyer) (Sars, 1895, pl. 52); *b*, *Leptophoxus falcatus* Sars (1895, pl. 50); *c*, *Mandibulophoxus uncirostratus* (Giles) (Pillai, 1957).

size (in one genus, *Joubinella*, gnathopod 1 larger than gnathopod 2); uropod 3 biramous, outer ramus often reduced in size; telson short, or of medium length, cleft.

Relationship.—Most Haustoriidae lack a conspicuous rostrum but intergradations occurring in genera such as *Platyischnopus* prevent absolute distinction; many haustoriids have pereopod 5 as long as or longer than pereopod 4 and of structure similar to each other, but genera such as *Pontoporeia* have pereopods 4 and 5 like those of the Phoxocephalidae. Those haustoriids having semblance of a rostrum never have pereopod 5 smaller and of different structure than 4 and are restricted arbitrarily from the Phoxocephalidae. Probably the families should be reorganized on the basis of pereopod 5 and by disregarding the condition of the rostrum.

Nomenclatural Changes in Phoxocephalidae

Phoxocephalus capuciatus Oliveira (1955) is synonymized with *Platyischnopus gracilipes* Schellenberg (1931).

Seven species of *Harpinia* and *Harpiniopsis* are removed to *Pseudharpinia;* they have a basal ensiform process on antenna 2 and distal spines or setae on the rami of uropod 2.

Several other species of *Harpinia* lacking a basal ensiform process on antenna 2 and presumably bearing elongate male antenna 2 are removed to *Harpiniopsis*.

Key to the Genera of Phoxocephalidae

1. Article 2 of pereopod 3 more than twice as wide as article 3 (fig. 151*c*) . . . 2
   Article 2 of pereopod 3 about as wide as article 3 (fig. 151*d*) 10
2. Palp of maxilla 1 biarticulate (fig. 150*j*) 3
   Palp of maxilla 1 uniarticulate (fig. 150*i*) 7
3. Gnathopod 1 larger than gnathopod 2 and *Eusirus*-like (fig. 150*o*), mandibular molar triturative (fig. 150*e*) . . . . **Joubinella**
   Gnathopods 1 and 2 similar in size, or gnathopod 2 larger than 1, mandibular molar not triturative (fig. 150*f*) 4
4. Palp article 4 of maxilliped bearing two stout distal setae, not claw-like, (fig. 150*m*), rostrum minute (fig. 149*c*) 5
   Palp article 4 of maxilliped not bearing large distal setae or bearing one nail, claw-like (fig. 150*n*), rostrum well developed (figs. 149*a,d*) 6
5. Mandibular molar vestigial, a small spinose protuberance . **Microphoxus**
   Mandibular molar very large, minutely setulose (fig. 97*d*). **Urothoides** (Haustoriidae)
6. Mandibular palp sickle-shaped, borne on a large process of the mandibular body (fig. 150*g*) . . . . **Mandibulophoxus**
   Mandibular palp not sickle-shaped, not borne on a large process of the mandibular body (fig. 150*e*) . . . . **Paraphoxus**

7. Article 3 of maxillipedal palp produced (fig. 150*l*) 8
   Article 3 of maxillipedal palp unproduced (fig. 150*n*) 9
8. Molar of mandible triturative, large (fig. 150*e*) . . . . . . **Leptophoxoides**
   Molar of mandible nontriturative, small (fig. 150*f*) . . . . . **Leptophoxus**
9. Molar of mandible triturative (fig. 150*e*) . . . . **Phoxocephalus**
   Molar of mandible nontriturative, smooth (or spiny) (fig. 150*f*) . **Metaphoxus**
10. Eyes absent 11
    Eyes present 13
11. Antenna 2 with basal ensiform process (fig. 150*a*) 12
    Antenna 2 lacking basal ensiform process (fig. 150*b*) . . . . . **Harpiniopsis**
12. Rami of uropod 2 with apical spines (fig. 151*f*) . . . . . . **Pseudharpinia**
    Rami of uropod 2 lacking apical spines (fig. 151*e*) . . . . **Harpinia**
13. Antenna 2 with basal ensiform process (fig. 150*a*) . . . . . **Heterophoxus**
    Antenna 2 lacking basal ensiform process (fig. 150*b*) . . . . 14 [1]
14. Dactyl of maxillipedal palp composed of long curved claw bearing short nail-like spine . . . . **Mandibulophoxus**
    Dactyl of maxillipedal palp composed of short curved or straight body bearing elongate, curved, claw-like spine . . . . **Proharpinia**

[1] And see *Phoxocephalus coxalis* K. H. Barnard (1932) to be relegated to a new genus.

Genera of Phoxocephalidae

Harpinia Boeck

Harpina Boeck, 1871 (homonym, Coleoptera).
Harpinia Boeck, 1876 (new name).—Stebbing, 1906.

Type-species: *Phoxus plumosus* Krøyer, 1842 (selected by Boeck, 1876). See Sars, 1895.

Antenna 2 with basal ensiform process, male antenna 2 short (*Harpiniopsis*)*;* mandibular molar a small, occasionally weakly spinose, nontriturative protuberance; palp of maxilla 1 biarticulate; maxillipedal palp article 3 not produced, article 4 short, with one or a few apical spines or setae; article 2 of pereopod 3 slender, scarcely wider than article 3; eyes absent; *rami of uropod 2 lacking distal spines or setae* (*Pseudharpinia*). Species: about 21, N. Atlantic, ? N. Pacific, cold-water, primarily deep sublittoral and bathyal.

Harpiniopsis Stephensen

Harpiniopsis Stephensen, 1925a.

Type-species: *H. similis* Stephensen, 1925a (monotypy).

Antenna 2 lacking basal ensiform process, male antenna 2 as long as body (*Harpinia, Pseudharpinia*)*;* mandibular molar a small, occasionally weakly spinose, nontriturative protuberance; palp of maxilla 1 biarticulate (often obscurely); maxillipedal palp article 3 not produced, article 4 short, with one or a few apical spines or setae;

article 2 of pereopod 3 slender, scarcely wider than article 3; eyes absent. Species: about 19, cosmopolitan, bathyal and abyssal.

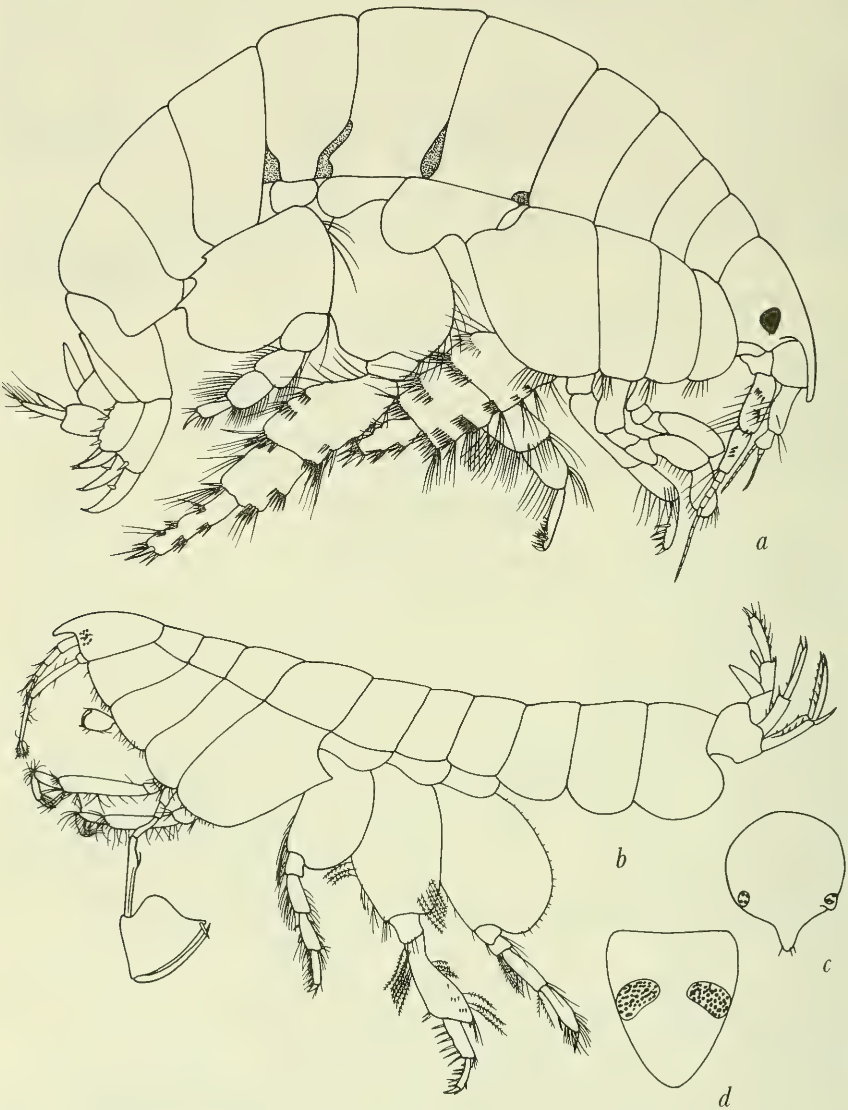

FIGURE 149.—Phoxocephalidae: *a, Paraphoxus tridentatus* J. L. Barnard (1960); *b, Joubinella traditor* Pirlot (1932). Head, dorsal: *c, Microphoxus minimus* J. L. Barnard (1960); *d, Paraphoxus oculatus* Sars (1895, pl. 51).

Heterophoxus Shoemaker

Heterophoxus Shoemaker, 1925.

Type-species: *Harpinia oculata* Holmes, 1908 (monotypy and subsequent synonymy).

Mandibular molar a spinulose nontriturative protuberance; palp of maxilla 1 biarticulate; maxillipedal palp article 3 not produced, article 4 short, with a stout apical spine and setae; article 2 of pereopod 3 slender, scarcely wider than article 3; eyes present or absent; *antenna 2 with basal ensiform process* (*Proharpinia*). Species: 4, E. Pacific, S. Africa, antarctic, littoral to deep bathyal.

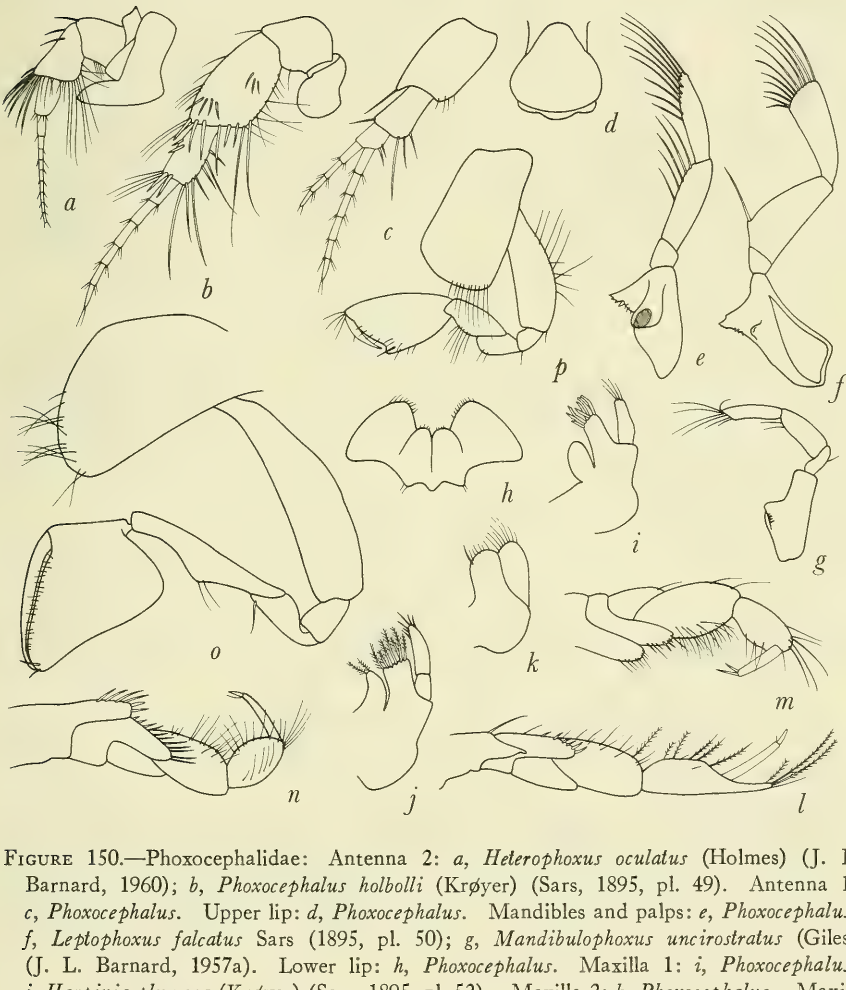

FIGURE 150.—Phoxocephalidae: Antenna 2: *a*, *Heterophoxus oculatus* (Holmes) (J. L Barnard, 1960); *b*, *Phoxocephalus holbolli* (Krøyer) (Sars, 1895, pl. 49). Antenna 1: *c*, *Phoxocephalus*. Upper lip: *d*, *Phoxocephalus*. Mandibles and palps: *e*, *Phoxocephalus; f*, *Leptophoxus falcatus* Sars (1895, pl. 50); *g*, *Mandibulophoxus uncirostratus* (Giles) (J. L. Barnard, 1957a). Lower lip: *h*, *Phoxocephalus*. Maxilla 1: *i*, *Phoxocephalus; j*, *Harpinia plumosa* (Krøyer) (Sars, 1895, pl. 52). Maxilla 2: *k*, *Phoxocephalus*. Maxillipeds: *l*, *Leptophoxus; m*, *Microphoxus minimus* J. L. Barnard (1960); *n*, *Phoxocephalus*. Gnathopod 1: *o*, *Joubinella strelkovi* Gurjanova (1952); *p*, *Phoxocephalus*.

Joubinella Chevreux

Joubinella Chevreux, 1908a.

Type-species: *J. ciliata* Chevreux, 1908a (original designation). Mandibular molar well developed, ridged; palp of maxilla 1 biarticulate; maxillipedal palp article 3 not produced, article 4 long, subobtuse or claw-like, setulose or spinulose; article 2 of pereopod 3 more than twice as wide as article 3; *gnathopod 1 larger than gnathopod 2; gnathopods resembling those of Eusirus; flagellum of antenna 2 reduced to two or three articles.* Species: 5, Atlantic-Pacific, epi- to bathypelagic.

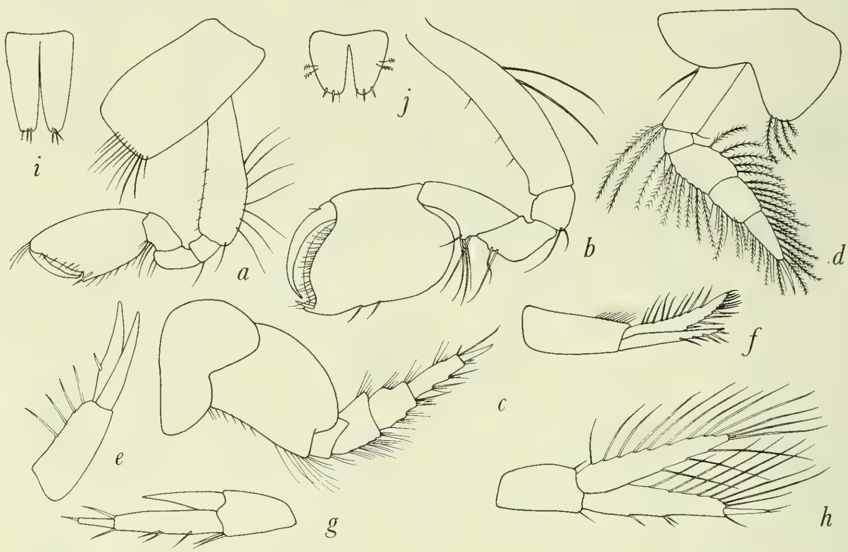

FIGURE 151.—Phoxocephalidae: Gnathopod 2: *a, Phoxocephalus holbolli* (Krøyer) (Sars, 1895, pl. 49); *b, Joubinella strelkovi* Gurjanova (1952). Pereopod 3: *c, Phoxocephalus; d, Harpinia plumosa* (Krøyer) (Sars, 1895, pl. 52). Uropod 2: *e, Phoxocephalus; f, Pseudharpinia dentata* Schellenberg (J. L. Barnard, 1960). Uropod 3, *Phoxocephalus: g,* female; *h,* male. Telson: *i, Phoxocephalus; j, Harpinia.*

Leptophoxoides J. L. Barnard

Leptophoxoides J. L. Barnard, 1962d.

Type-species: *L. molaris* J. L. Barnard, 1962d (original designation). Mandibular molar well developed, ridged; palp of maxilla 1 uniarticulate; maxillipedal palp article 3 apically produced, article 4 of medium length, subclaviform, with two apical setae; article 2 of pereopod 3 broad, more than twice as wide as article 3; eyes absent. Species: 1, S. Atlantic, abyssal.

Leptophoxus Sars

Leptophoxus Sars, 1895.—Stebbing, 1906.

Type-species: *Phoxus falcatus* Sars, 1882 (monotypy).

Mandibular molar a small nontriturative protuberance; palp of maxilla 1 biarticulate; maxillipedal palp article 3 apically produced, article 4 long, claw-like; article 2 of pereopod 3 more than twice as wide as article 3; eyes absent. Species: 1, subarctic-boreal, littoral to abyssal.

Mandibulophoxus J. L. Barnard

Mandibulophoxus J. L. Barnard, 1957a; 1960.

Type-species: *Phoxus uncirostratus* Giles, 1890 (original designation and subsequent synonymy).

Mandibular molar a setulose, nontriturative protuberance; palp of maxilla 1 biarticulate; maxillipedal palp article 3 not produced, article 4 long, claw-like, tipped with short nail; article 2 of pereopod 3 more than twice as wide as article 3 (type) or not; eyes present or absent; *mandibular palp set on extension of mandibular body* (*combining character*). Species: 2, Indo-E. Pacific tropical, S. Africa, littoral.

Metaphoxus Bonnier

Metaphoxus Bonnier, 1896.—Stebbing, 1906.

Type-species: *M. typicus* Bonnier, 1896 (monotypy).

Mandibular molar a setulose, nontriturative protuberance; palp of maxilla 1 uniarticulate; maxillipedal palp article 3 not produced, article 4 long, claw-like; article 2 of pereopod 3 more than twice as wide as article 3; eyes present. Species: 4, boreal-warm temperate, littoral to deep bathyal.

Microphoxus J. L. Barnard

Microphoxus J. L. Barnard, 1960.

Type-species: *M. minimus* J. L. Barnard, 1960 (original designation).

Mandibular molar a setulose nontriturative protuberance; palp of maxilla 1 biarticulate; maxillipedal palp article 3 not produced, article 4 long, but with two large apical setae; article 2 of pereopod 3 more than twice as wide as article 3; eyes present. Species: 1, Pacific Costa Rica, littoral.

Paraphoxus Sars

Paraphoxus Sars, 1895.—Stebbing, 1906.—J. L. Barnard, 1960.
Pontharpinia Stebbing, 1897.
Parharpinia Stebbing, 1899d.
Protophoxus K. H. Barnard, 1930.
Trichophoxus K. H. Barnard, 1930.
Metharpinia Schellenberg, 1931.

Type-species: *Phoxus oculatus* Sars, 1879 (monotypy).

Mandibular molar a setulose nontriturative protuberance; palp of maxilla 1 biarticulate; maxillipedal palp article 3 not produced, article 4 long, claw-like; article 2 of pereopod 3 more than twice as wide as article 3; eyes present. Species: 46, cosmopolitan, mainly littoral, occasionally bathyal in high latitudes.

Phoxocephalus Stebbing

Phoxus Krøyer, 1842 (homonym, Coleoptera).
Spinifer Krøyer, 1842 (homonym, Mollusca).
Phoxocephalus Stebbing, 1888 (new name); 1906.

Type-species: *Phoxus holbolli* Krøyer, 1842 (selected by Boeck, 1876). See Sars, 1895.

Mandibular molar well developed, ridged; palp of maxilla 1 uniarticulate; maxillipedal palp article 3 not produced, article 4 long, claw-like; article 2 of pereopod 3 more than twice as wide as article 3; eyes present or vestigial. Species: 7 (one dubious), cosmopolitan cold-water, littoral to bathyal.

Proharpinia Schellenberg

Proharpinia Schellenberg, 1931.

Type-species: *P. antipoda* Schellenberg, 1931 (monotypy).

Mandibular molar a setulose nontriturative protuberance; palp of maxilla 1 biarticulate; maxillipedal palp article 3 not produced, article 4 of medium length or short, with a long apical spine and accessory setae, but appearing long and claw-like because of the long spine; article 2 of pereopod 3 slender, scarcely wider than article 3; eyes present; *antenna 2 lacking basal ensiform process* (*Heterophoxus*). Species: 4, Galapagos, antiboreal, littoral.

Pseudharpinia Schellenberg

Pseudharpinia Schellenberg, 1931.

Type-species: *P. dentata* Schellenberg, 1931 (monotypy).

Antenna 2 with basal ensiform process, male antenna 2 unknown in type and elongate in some species (*Harpiniopsis*); mandibular molar a small, occasionally weakly spinose, nontriturative protuberance; palp of maxilla 1 biarticulate (often obscurely); maxillipedal palp article 3 not produced, article 4 short, with one or a few apical spines or setae; article 2 of pereopod 3 slender, scarcely wider than article 3; eyes absent; *rami of uropod 2 bearing distal spines or setae* (*Harpinia and Harpiniopsis*). Species: about 8, antarctic littoral and probably cosmopolitan in bathyal-abyssal.

Pleustidae

FIGURES 152, 153

DIAGNOSIS.—Accessory flagellum composed of a small scale or absent; lower lip formed of two oval outer lobes obliquely astride nearly coalesced inner lobes; telson entire; upper lip incised. See Calliopiidae, Paramphithoidae, Liljeborgiidae, Isaeidae, Eusiridae, Ampithoidae, Amphilochidae, Ischyroceridae, Laphystiopsidae, Oedicerotidae.

DESCRIPTION.—Body with or without dorsal processes; rostrum long or inconspicuous; accessory flagellum vestigial; upper lip incised; mandibles bearing a 3-articulate palp, molar triturative or nontriturative; lower lips characteristic (see diagnosis); remaining mouthparts basic, article 3 of palp of maxilliped occasionally produced; gnathopods subchelate, feeble or powerful; coxae of medium length or long; uropod 3 with rami much longer than peduncle, lanceolate, outer ramus usually shorter than inner; telson entire or apically sculptured, cleft nearly one fifth in one species of *Austropleustes*.

RELATIONSHIP.—One genus of Amphilochidae, *Amphilochoides*, possesses a lower lip like those of pleustids but most amphilochids can be characterized by the small, partially hidden coxa 1, and some amphilochids have both coxae 1 and 2 concealed. *Pseudamphilochus* however has a normal coxa 1 and cleft telson and thus resembles one species of *Austropleustes*. See family key G for distinctions.

Only the shape of the lower lip separates this family from the Calliopiidae. Two genera, *Harpinioides* and *Mesopleustes*, have lower lips intermediate between the two families.

The Laphystiopsidae are very similar to the Pleustidae and further study is needed to clarify their systematic position.

Key to the Genera of Pleustidae

1. Mandibular molar with a triturating surface composed of ridges and teeth (fig. 153*b*) 2
   Mandibular molar a simple, small, smooth hump (fig. 153*c*) 5
2. Maxillipedal palp article 3 bearing a distal process (fig. 153*i*). **Stenopleustes**
   Maxillipedal palp article 3 lacking a distal process (fig. 153*h*) 3

3. Gnathopods simple, slender (fig. 153*o*) . . . . **Parepimeriella**
   Gnathopods subchelate, stout (figs. 153*l,m*) 4
4. Rostrum less than one fourth as long as article 1 of antenna 1. **Pleusymtes,** new genus
   Rostrum nearly as long as article 1 of antenna 1 . . . . . . **Mesopleustes**

5. Maxillipedal palp article 3 bearing a distal process (fig. 153*i*) 6
   Maxillipedal palp article 3 lacking a distal process (fig. 153*h*) 7
6. Uropod 3 with a large peduncular process supporting the rami (fig. 153*q*). **Austropleustes**
   Uropod 3 lacking accessory peduncular process . . . . **Neopleustes**
7. Gnathopods with distally bent, slender, tapering sixth articles, essentially simple (fig. 72*o*) . . . . **Harpinioides** [1]
   Gnathopods subchelate, with ovate or subrectangular, unbent sixth articles . 8
8. Antennae short, gnathopods bearing lobate article 5 (fig. 153*m*) . **Pleustes** [2]
   Antennae long, gnathopods usually lacking lobate article 5 (fig. 153*p*). **Parapleustes** [2]

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[1] See this genus in the Calliopiidae.
[2] The differences between *Pleustes* and *Parapleustes* are subjective. See Barnard and Given (1960, p. 39) for discussion.

Genera of Pleustidae

Austropleustes K. H. Barnard

Austropleustes K. H. Barnard, 1931; 1932.

Type-species: *A. cuspidatus* K. H. Barnard, 1931 (original designation); 1932.

Mandibular molar a small smooth protuberance; article 3 of maxillipedal palp distally produced; gnathopods slender but subchelate; *uropod 3 with a large peduncular process supporting the rami* (*Neopleustes*). Species: 2, antarctic, deep littoral.

Mesopleustes Stebbing

Mesopleustes Stebbing, 1899d; 1906.

Type-species: *Pleustes abyssorum* Stebbing, 1888 (original designation).

Mandibular molar well developed, ridged; article 3 of maxillipedal palp not distally produced; gnathopods subchelate; *rostrum nearly as long as article 1 of antenna 1* (*Pleusymtes*). Because lower lip is not typical of other pleustids this genus probably should be assigned to the Calliopiidae, noting that it also has affinities with Paramphithoidae because of the tendency of the coxae toward acumination. Species: 1, probably cosmopolitan, bathyal-abyssal.

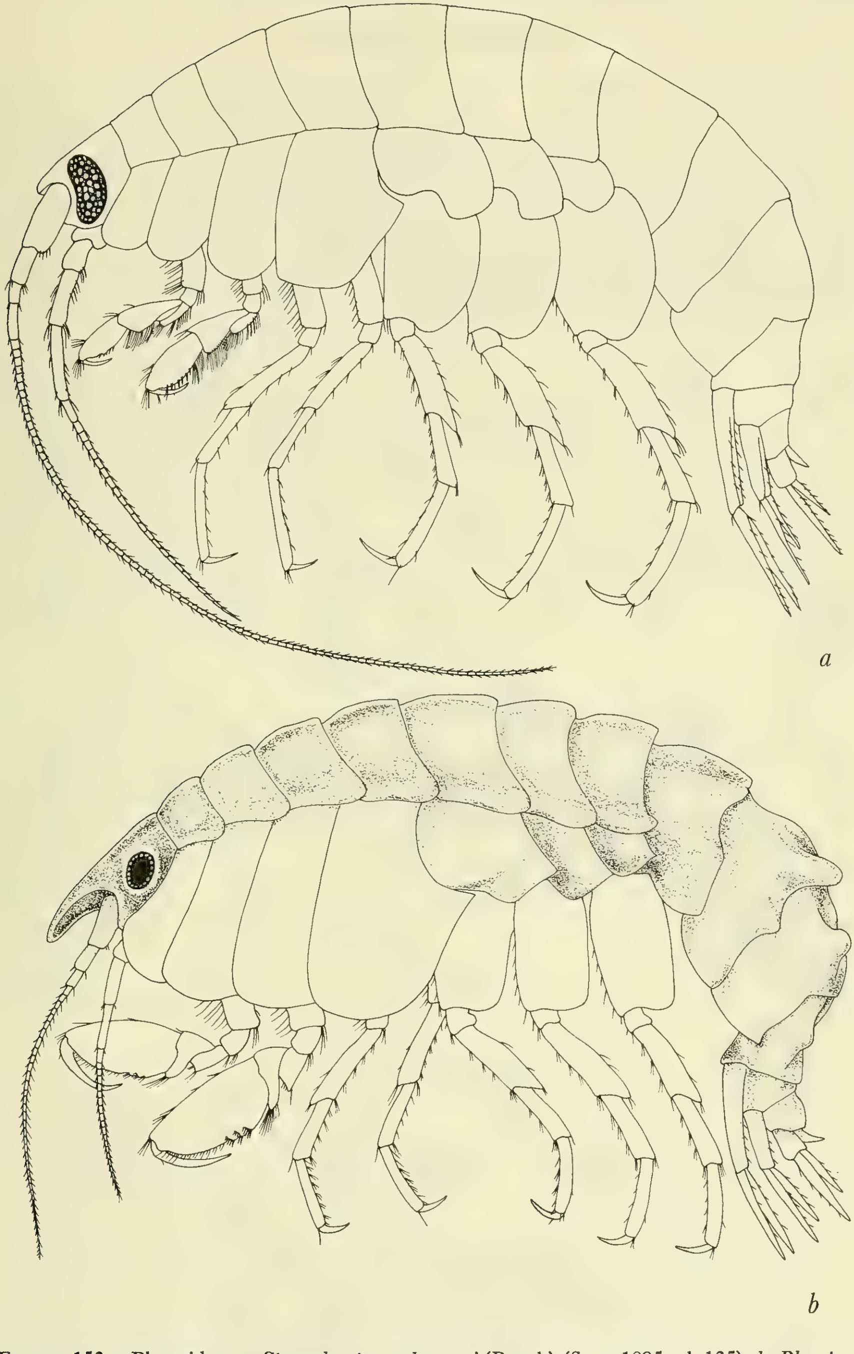

FIGURE 152.—Pleustidae: *a*, *Stenopleustes malmgreni* (Boeck) (Sars, 1895, pl. 125); *b*, *Pleustes panopla* (Krøyer) (Sars, 1895, pl. 121).

Neopleustes Stebbing

Neopleustes Stebbing, 1906.

Type-species: *Amphitoe pulchella* Krøyer, 1846 (original designation). See Sars, 1895 (as *Paramphithoe*).

Mandibular molar a small smooth protuberance; article 3 of maxillipedal palp produced distally; gnathopods subchelate; *uropod 3 lacking a large peduncular process* (*Austropleustes*). Species: 6, arctic-boreal, littoral to bathyal (1416 m).

FIGURE 153.—Pleustidae: Upper lip: *a*, *Pleustes panopla* (Krøyer) (Sars, 1895, pl. 121). Mandible: *b*, *Sympleustes glaber* (Boeck) (Sars, 1895, pl. 126); *c*, *Pleustes*. Lower lip: *d*, *Pleustes; e*, *Mesopleustes abyssorum* (Stebbing, 1888). Maxillae 1, 2: *f,g*, *Pleustes*. Maxillipeds: *h*, *Pleustes; i*, *Stenopleustes latipes* (M. Sars) (Sars, 1895, pl. 127); *j*, *Mesopleustes*, palp. Gnathopod 1: *k*, *Austropleustes cuspidatus* K. H. Barnard (1932); *l*, *Neopleustes pulchellus* (Krøyer) (Sars, 1895, pl. 122); *m*, *Pleustes*. Gnathopod 2: *n*, *Pleustes; o*, *Parepimeriella irregularis* Schellenberg (1931); *p*, *Neopleustes*. Uropod 3: *q*, *Austropleustes*, showing peduncular process [shaded]; *r*, *Pleustes*. Telson: *s*, *Neopleustes; t*, *Pleustes*.

Parapleustes Buchholz

Parapleustes Buchholz, 1874.—Sexton, 1909.
Incisocalliope J. L. Barnard, 1959a.

Type-species: [*P. glacilis* Buchholz, 1874, =*lapsus*] *P. gracilis* Buchholz, 1874 (monotypy). See Sars, 1895 (as *Paramphithoe brevicornis*).

Mandibular molar a small smooth protuberance; article 3 of maxillipedal palp not distally produced; gnathopods subchelate; *antennae "long," gnathopods usually lacking a lobe on article 5, rostrum reaching only one third along article 1 (Pleustes).* Species: 14, arctic-boreal, littoral.

Parepimeriella Schellenberg

Parepimeriella Schellenberg, 1931.

Type-species: *P. irregularis* Schellenberg, 1931 (monotypy).

Mandibular molar large, ridged; article 3 of maxillipedal palp not distally produced; gnathopods simple, slender. Species: 1, Falkland Islands, littoral.

Pleustes Bate

Pleustes Bate, 1858b.—Stebbing, 1906.

Type-species: *Amphithoe panopla* Krøyer, 1838 (monotypy and subsequent synonymy). See Sars, 1895.

Mandibular molar a small smooth protuberance; article 3 of maxillipedal palp not distally produced; gnathopods subchelate, stout; *antennae "short," gnathopods bearing a strong posterior lobe on article 5, rostrum usually reaching apex of peduncle of antenna 1 in typical species [except Pleustes behningi (Gurjanova, 1938) which should be transferred to Parapleustes].* Species: 7, arctic-boreal, littoral.

Pleusymtes, new genus

Type-species: *Amphithopsis glaber* Boeck, 1861 (present selection). See Sars, 1895.

Species included: All species listed by Barnard and Given (1960, p. 40) under the name "*Sympleustes.*"

Mandibular molar large, ridged; article 3 of maxillipedal palp not produced; gnathopods subchelate; *rostrum extending less than one quarter along article 1 of antenna 1 (Mesopleustes).* Species: 17, arctic-boreal, littoral to abyssal.

Stenopleustes Sars, new synonymy

Stenopleustes Sars, 1895.—Stebbing, 1906.
Sympleustes Stebbing, 1899d (type: *Amphithoe* [sic] *latipes* M. Sars, 1858).

Type-species: *Amphithopsis malmgreni* Boeck, 1871 (selected by Chevreux and Fage, 1925).

Mandibular molar large, ridged; article 3 of maxillipedal palp apically produced; gnathopods subchelate. Species: 7, arctic-boreal, littoral to bathyal.

Podoceridae

Figures 154-156

Diagnosis.—Accessory flagellum variable, often absent; urosome markedly depressed, segment 1 more than twice as long as segment 2, often considerably longer; telson entire; pereopods not glandular. See Corophiidae, Cheluridae.

Description.—Accessory flagellum variable, multiarticulate, vestigial or absent; body variable, broadly depressed or slender and subcylindrical, often carinate and toothed, urosome strongly depressed, segment 1 more than twice as long as any following segment, occasionally segment 6 apparently fused with segment 5, segments 5 and 6 reduced in length; coxae usually small and serially discontiguous, occasionally splayed; mouthparts basic, except upper lip slightly bilobed; gnathopods of medium size or large, subchelate; uropod 1 normal; uropods 2 and 3: one or the other often missing, vestigial or abnormal; uropod 3 biramous only in *Icilius*, generally with one or no rami, telson circular or oval, short, entire; pereonites 6–7 coalesced in *Dulichia* and *Paradulichia*.

Relationship.—The elongation of pleonite 4 distinguishes this family from the Corophiidae.

Podoceridae often have the subcylindrical bodies of Eophliantidae and Colomastigidae but the latter two families may be distinguished by their degraded mandibles lacking palps.

Runanga J. L. Barnard (1961) is removed to the Corophiidae.

Key to the Genera of Podoceridae

1. Antenna 1 lacking accessory flagellum 2
   Antenna 1 bearing accessory flagellum 4
2. Pleon with only five distinct segments preceding the telson (fig. 156*a*).
   Laetmatophilus[1]
   Pleon with six distinct segments preceding the telson (fig. 156*b*) 3
3. Pleonite 5 carrying well-formed uropods . . . . **Cyrtophium**
   Pleonite 5 lacking uropods . . . . **Leipsuropus**[2]

[1] See *Dryopoides* (Aoridae or Ischyroceridae) bearing distinct uropod 3.

[2] Analysis of *Leipsuropus* may be defective; the loss of uropod 2 but the retention of uropod 3 seems illogical; the so-called third uropod may indeed be the second and this genus would then be referable to *Laetmatophilus*.

4. Three pairs of uropods present (third often minute) (fig. 156*b*), pereonites 6–7 free 5
   Two pairs of uropods present (fig. 156*a*), pereonites 6–7 coalesced 8
5. Uropod 3 biramous[3] (figs. 156*i,j*) . . . . **Icilius**
   Uropod 3 uniramous or lacking rami (figs. 156*a,k*) 6
6. Antenna 1 shorter than antenna 2 (fig. 154*c*) . . . . **Podocerus**
   Antenna 1 as long as or longer than antenna 2 (figs. 154*a,b*) 7
7. Coxae 1–4 tiny, separated from each other by a distance more than their width (fig. 154*b*), pereopods 1–2 shorter than the gnathopods (fig. 154*b*). **Neoxenodice**[4]
   Coxae small, separated from each other by a distance of one half their width (fig. 155*a*), pereopods 1–2 longer than the gnathopods (fig. 155*a*). **Xenodice**[4]
8. Uropod 2 biramous, large (fig. 156*e*) . . . . **Dulichia**
   Uropod 2 uniramous, very small (fig. 156*c*) . . . . **Paradulichia**

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[3] Inner ramus of uropod 3 fragile and often missing from specimens but its presence is indicated by a supporting process of the peduncle.

[4] *Uncinotarsus* (Aoridae) keys to this position but gnathopod 1 is larger than 2.

Genera of Podoceridae

Cyrtophium Dana

Cyrtophium Dana, 1852b.—Stebbing, 1906.

Type-species: *C. orientale* Dana, 1853 (selected by monotypy of Dana, 1853). See Bate, 1862.

Accessory flagellum absent; antennae subequal in length; pleon with six segments and three pairs of uropods; uropod 2 with two rami, uropod 3 lacking rami. Species: 2, Singapore, E. Australia, littoral.

Dulichia Krøyer

Dulichia Krøyer, 1845.—Stebbing, 1906.
Dyopedos Bate, 1857a,b.

Type-species: *D. spinosissima* Krøyer, 1845 (monotypy). See Sars, 1895.

Accessory flagellum present; antenna 1 slightly longer than 2; pleon with only five segments and only two pairs of uropods; uropod 2 biramous; uropod 3 absent; *pereonites 6–7 coalesced.* Species: 17, arctic-boreal, littoral to abyssal.

Icilius Dana

Icilius Dana, 1849; 1852a.—Stebbing, 1906.

Type-species: *I. ovalis* Dana, 1852a (selected by monotypy of Dana, 1852a). See Stebbing, 1888 (as *I. danae*, *I. ellipticus*, and *I. australis*).

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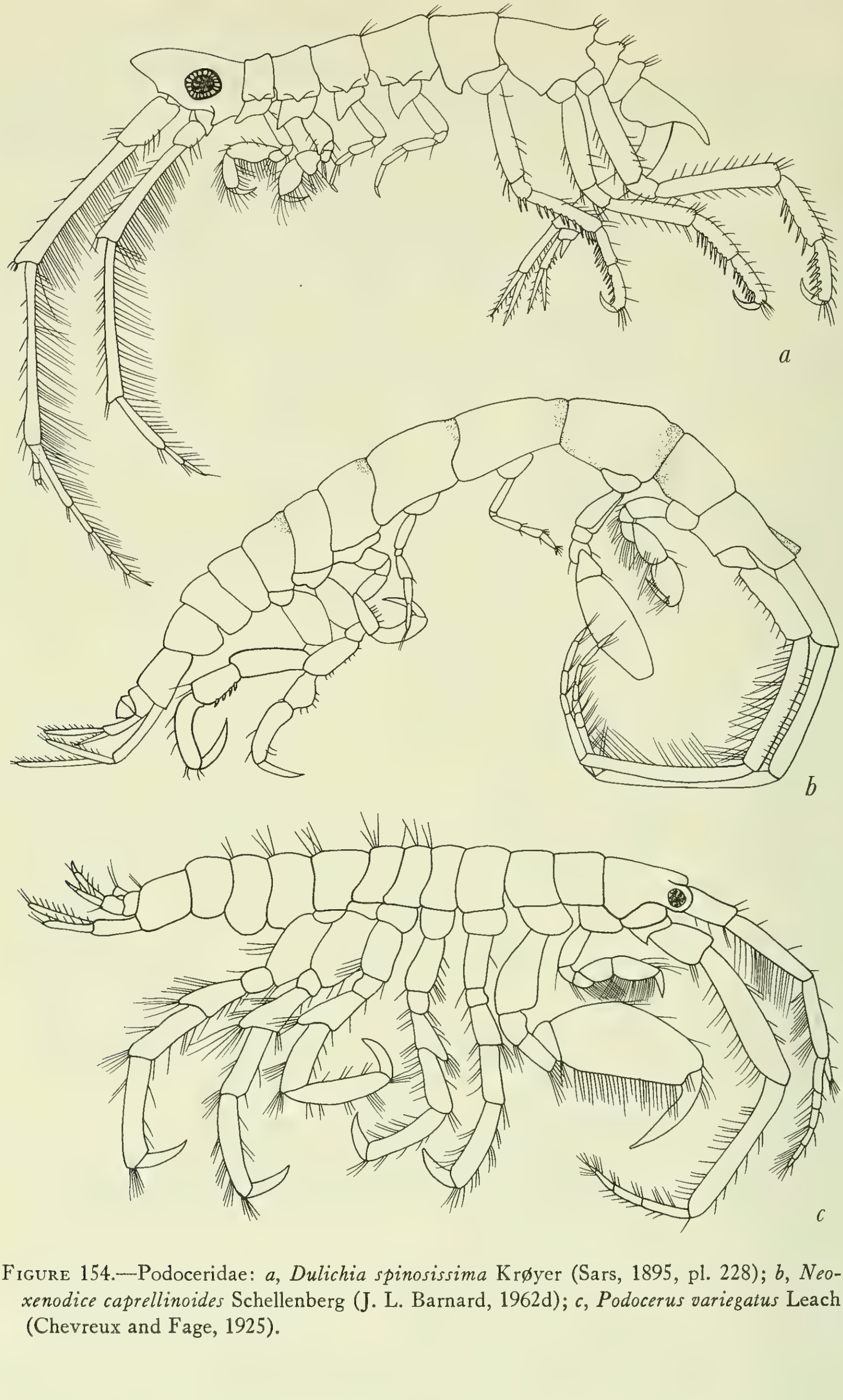

FIGURE 154.—Podoceridae: *a*, *Dulichia spinosissima* Krøyer (Sars, 1895, pl. 228); *b*, *Neoxenodice caprellinoides* Schellenberg (J. L. Barnard, 1962d); *c*, *Podocerus variegatus* Leach (Chevreux and Fage, 1925).

Accessory flagellum present; antenna 1 much shorter than 2; pleon with six segments and three pairs of uropods; uropod 2 biramous; uropod 3 "biramous," *inner ramus fragile, often missing but indicated by a supporting process on peduncle.* Species: 4, Indonesia, Australia, littoral.

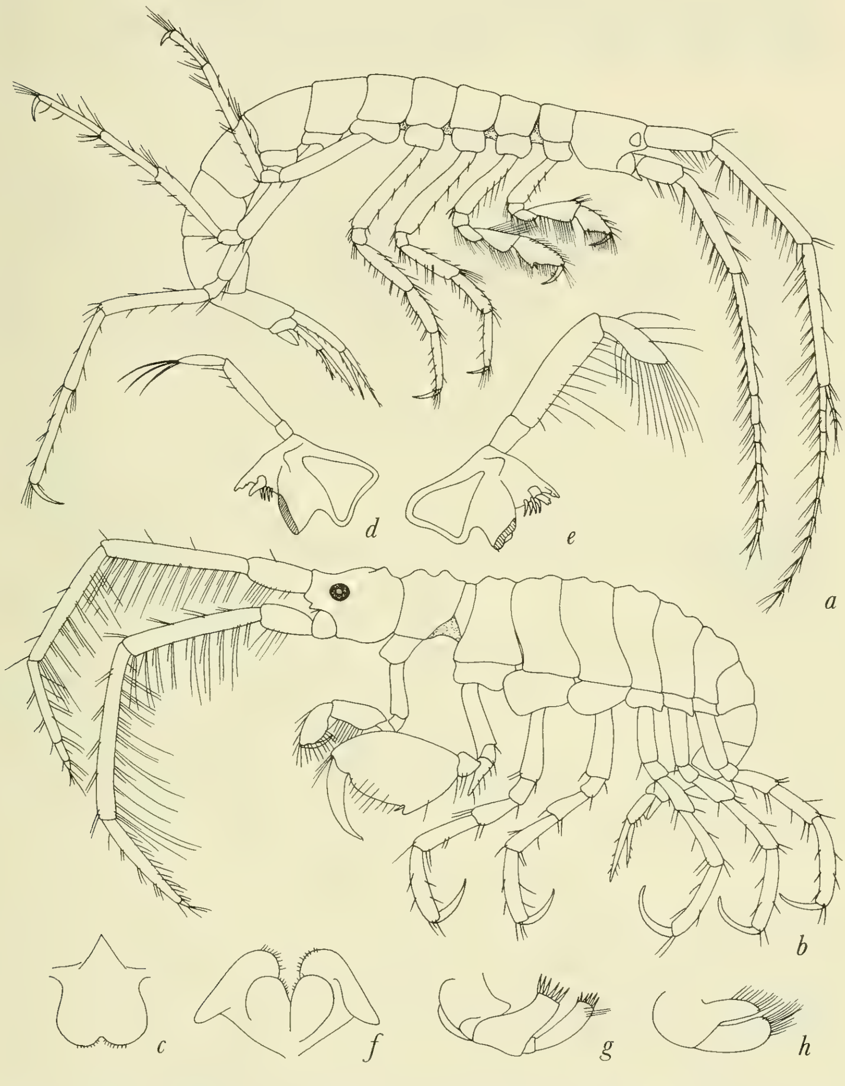

FIGURE 155.—Podoceridae: *a, Xenodice frauenfeldti* Boeck (Sars, 1895, pl. 227); *b, Laetmatophilus tuberculatus* Bruzelius (Sars, 1895, pl. 226). Upper lip: *c, Laetmatophilus.* Mandible: *d, Paradulichia typica* Boeck (Sars, 1895, pl. 232); *e, Laetmatophilus. Laetmatophilus: f,* lower lip; *g,h,* maxillae 1, 2.

Laetmatophilus Bruzelius

Laetmatophilus Bruzelius, 1859.—Stebbing, 1906.

Type-species: *L. tuberculatus* Bruzelius, 1859 (monotypy). See Sars, 1895.

Accessory flagellum absent; antennae subequal; pleon with only five segments and only two pairs of uropods; uropod 2 lacking rami, uropod 3 absent. Species: 7, cosmopolitan, littoral to bathyal.

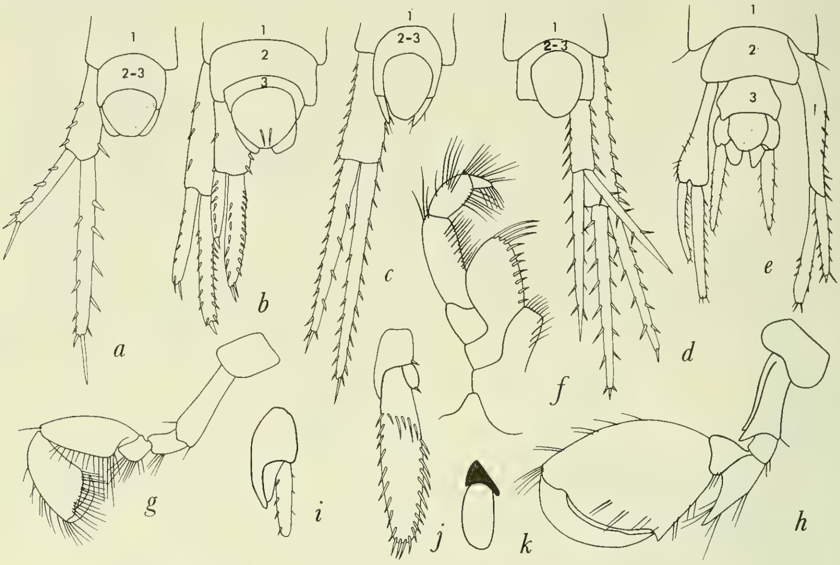

FIGURE 156.—Podoceridae: Urosome, uropods and telson, dorsal view: *a*, *Laetmatophilus tuberculatus* Bruzelius (Sars, 1895, pl. 226); *b*, Podocerus chelonophilus (Chevreux and de Guerne) (Chevreux and Fage, 1925); *c*, *Paradulichia typica* Boeck (Sars, 1895, pl. 232); *d*, *Dulichia spinosissima* Krøyer (Sars, 1895, pl. 228); *e*, *Icilius ovatus* Dana (Stebbing, 1906). Maxilliped: *f*, *Laetmatophilus*. Gnathopods 1, 2: *g,h*, *Laetmatophilus*. Uropod 3: *i*, *Icilius danae* Stebbing (1910); *j*, *Icilius punctatus* Haswell (Stebbing, 1910); *k*, *Laetmatophilus*.

Leipsuropus Stebbing

Leipsuropus Stebbing, 1899d; 1906.

Type-species: *Cyrtophium parasiticum* Haswell, 1880b, 1885 (monotypy).

Accessory flagellum absent; antenna 1 shorter than 2; pleon with (6?) segments: "*uropod 2 absent, uropod 3 short, foliaceous, ovate, lacking rami*": *these facts probably erroneous; probably uropod 3 is absent, uropod 2 lacks rami, hence referring the genus to Laetmatophilus.* Species: 1, E. Australia, littoral.

Neoxenodice Schellenberg

Neoxenodice Schellenberg, 1926c.

Type-species: *N. caprellinoides* Schellenberg, 1926c (monotypy).

Accessory flagellum present: antennae equal in length; pleon with six segments and three pairs of uropods; uropod 2 with two rami, uropod 3 lacking rami; *coxae tiny, separated by a distance more than their width, pereopods 1–2 shorter than the gnathopods* (*Xenodice*). Species: 1, antiboreal, abyssal.

Paradulichia Boeck

Paradulichia Boeck, 1871.—Stebbing, 1906.

Type-species: *P. typica* Boeck, 1871 (monotypy). See Sars, 1895.

Accessory flagellum present; antenna 1 longer than 2; pleon with only five segments and two pairs of uropods; uropod 2 uniramous, very small, uropod 3 absent; *pereonites 6–7 coalesced.* Species: 3, arctic-boreal, N. Atlantic, littoral to bathyal.

Podocerus Leach

Podocerus Leach, 1814b.—Stebbing, 1906.
Platophium Dana, 1852b.
Dexiocerella Haswell, 1885.

Type-species: *P. variegatus* Leach, 1814b (monotypy). See Chevreux and Fage, 1925.

Accessory flagellum present; antenna 1 shorter than 2; pleon with six segments and three pairs of uropods; uropod 2 with two rami; uropod 3 lacking rami. Species: 21, cosmopolitan, littoral (rarely bathyal, 569 m in antarctic).

Xenodice Boeck

Xenodice Boeck, 1871.—Stebbing, 1906.

Type-species: *X. frauenfeldti* Boeck, 1871 (monotypy). See Sars, 1895.

Accessory flagellum present; antenna 1 slightly longer than 2; pleon with six segments and three pairs of uropods; uropod 2 with two rami; uropod 3 lacking rami; *coxae small, separated by a distance half their width, pereopods 1–2 longer than the gnathopods* (*Neoxenodice*). Species: 1, subarctic, N. Atlantic, littoral to bathyal.

Prophliantidae, revised

FIGURES 157, 158

DIAGNOSIS.—Accessory flagellum absent; *body laterally compressea;* mandible lacking palp, molar smooth or evanescent; gnathopods feeble but clearly subchelate; *telson deeply cleft; uropod 3 biramous;* all of urosomal segments coalesced; antennae very short, not longer than head. See Phliantidae, Eophliantidae, Dexaminidae, Atylidae, Colomastigidae, Kuriidae.

DESCRIPTION.—Body laterally compressed, urosomites 1–3 coalesced; mandible lacking palp, molar smooth or evanescent; lower lip with inner lobes; palp of maxilla 1 uniarticulate; maxilla 2 normal; maxillipedal inner plates small, outer greatly elongate; gnathopods feeble, subchelate; coxae of medium size or large (coxa 5); antennae very short, not longer than head, antenna 2 in type-genus lacking flagellum, in second genus bearing flagellum; uropod 3 biramous; telson deeply cleft.

RELATIONSHIP.—The Eophliantidae have cylindrical bodies and reduced coxae and the gnathopods are simple or parachelate, not subchelate.

The Talitroidea have distinct urosomal segments and a well-developed mandibular molar.

The Phliantidae have uniramous or aramous third uropods. The genus *Ceina* in that family forms a bridge to the Prophliantidae.

The Kuriidae have a flagellum on antenna 2 and a uniramous third uropod.

The Atylidae have a mandibular palp.

The Dexaminidae (including Anatylidae) have only urosomites 2 and 3 fused.

The Prophliantidae are characterized especially by coalesced urosomal segments, biramous third uropods, lack of mandibular palps, and cleft telsons.

Haustoriopsis Schellenberg, 1938, is removed from the Haustoriidae to this family. It resembles the type-genus in all respects except that it bears a 3-articulate antennal flagellum whereas *Prophlias* lacks a flagellum. The coalesced urosomal segments, large coxa 5, similar maxilliped with small inner plates and elongate outer plates, 1-articulate first maxillary palp, absence of mandibular palp, smooth and bulging mandibular molar, all point to the close relationship of these two genera. Ruffo (1959) suggested that *Haustoriopsis* be removed to the Dexaminidae but I believe that the Prophliantidae should be segregated from that family on the distinctive urosome. Presumably Prophliantidae have been derived from dexaminid-like ancestors.

Nomenclatural Changes in Prophliantidae

The following genera are removed to the Eophliantidae: *Biancolina* Della Valle (1893), *Bircenna* Chilton (1884), *Ceinina* Stephensen (1933), *Cylindryllioides* Nicholls (1938), *Eophliantis* Sheard (1936a), and *Wandelia* Chevreux (1906a).

Ceina Della Valle (1893) is removed to the Phliantidae.

Kuria Walker and Scott (1903) is removed to the Kuriidae.

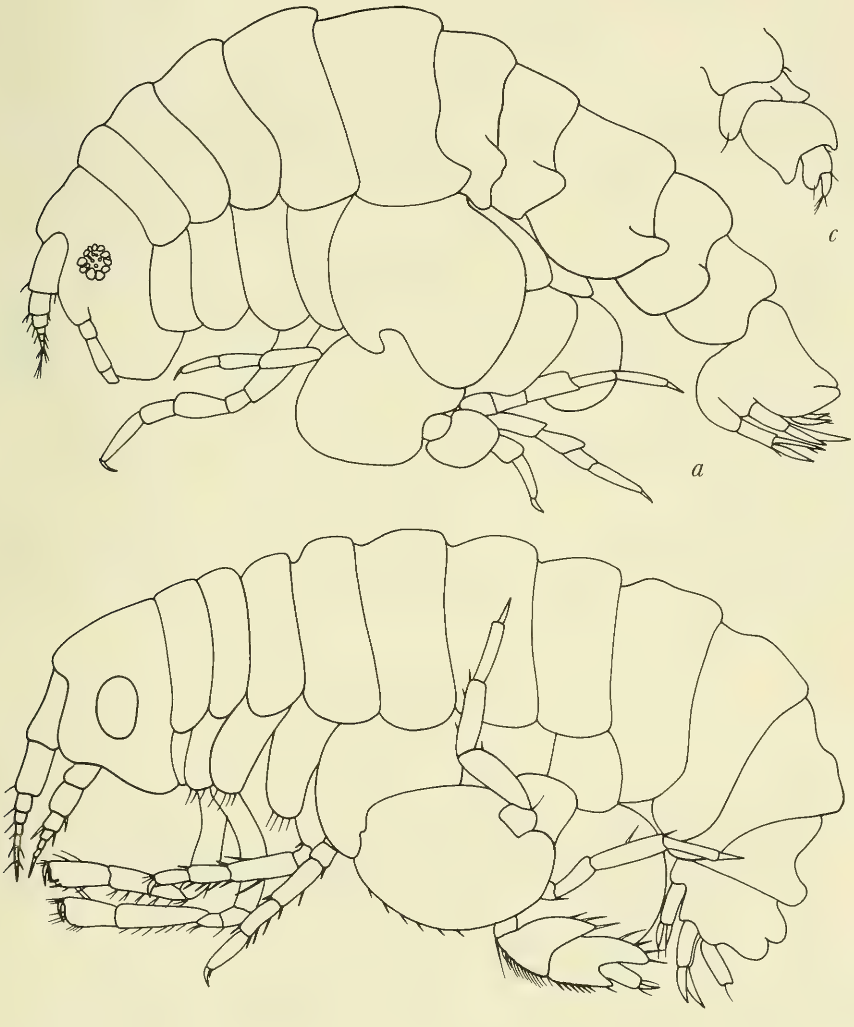

FIGURE 157.—Prophliantidae: *a*, *Prophlias anomalus* Nicholls (1939); *b*, *Haustoriopsis reticulatus* Schellenberg (1938); *c*, *Prophlias*, antenna 2.

Key to the Genera of Prophliantidae

1. Antenna 2 with flagellum (fig. 157*b*) . . . . **Haustoriopsis**
   Antenna 2 lacking flagellum (fig. 157*a*) . . . . **Prophlias**

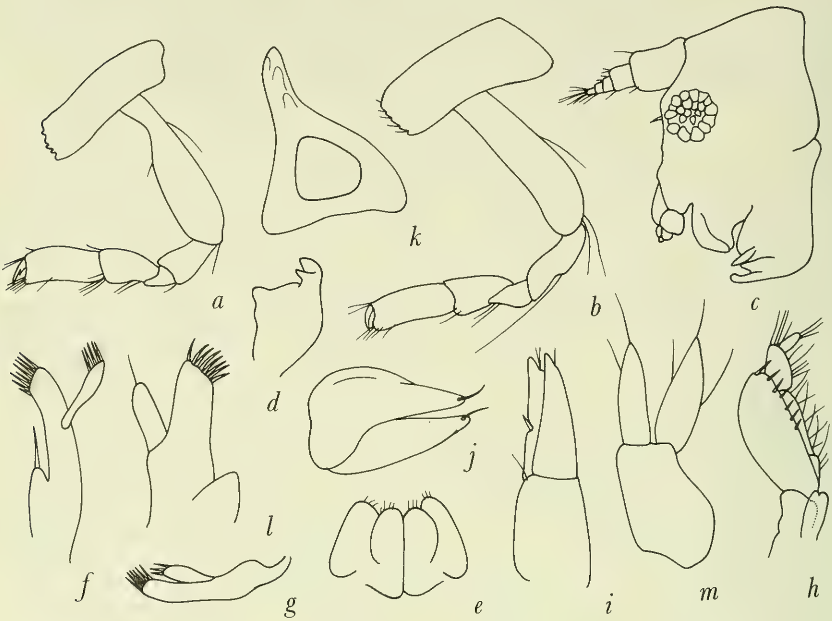

FIGURE 158.—Prophliantidae: *Prophlias anomalus* Nicholls (1939): *a,b*, gnathopods 1, 2; *c*, head; *d*, mandible; *e*, lower lip; *f,g*, maxillae 1, 2; *h*, maxilliped; *i*, uropod 3; *j*, telson. *Haustoriopsis reticulatus* Schellenberg (1938): *k*, mandible; *l*, maxilla 1; *m*, uropod 3.

Genera of Prophliantidae

Haustoriopsis Schellenberg

Haustoriopsis Schellenberg, 1938.

Type-species. *H. reticulatus* Schellenberg, 1938 (monotypy).
Species: 1, Bismarck Archipelago, littoral.

Prophlias Nicholls

Prophlias Nicholls, 1939.

Type-species: *P. anomalus* Nicholls, 1939 (monotypy).
Species: 1, W. Australia, littoral.

Sebidae

Figure 159

Diagnosis.—Accessory flagellum 2-articulate, elongate; molar of mandible obsolescent; plates of maxillipeds of medium size; gnathopods 1 and 2 chelate, gnathopod 1 larger than 2, article 3 of gnathopod 2 elongate; *antenna 1 peduncle elongate;* uropod 3 uniramous; telson entire; urosomites 2–3 coalesced. Monogeneric. See Lysianassidae, Leucothoidae, Anamixidae, Pagetinidae.

Description.—Accessory flagellum 2-articulate, elongate; body smooth or with poorly developed carinae, urosomites 2–3 coalesced; mandibular palp article 3 short, molar evanescent; remaining mouthparts basic although plates of maxillipeds somewhat small; coxae of medium length, rounded-quadrate below; gnathopods chelate, rather

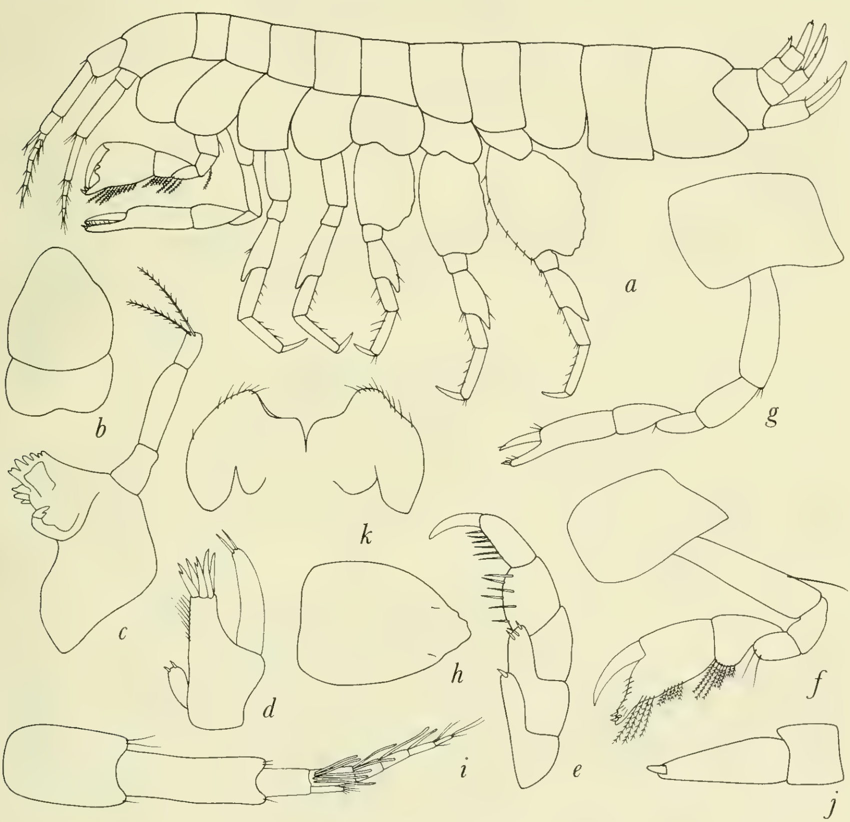

Figure 159.—Sebidae: *Seba armata* Chevreux (1900): *a*, lateral view; *b*, upper lip; *c*, mandible; *d*, maxilla 1; *e*, maxilliped; *f,g*, gnathopods 1, 2; *h*, telson; *i*, antenna 1; *j*, uropod 3. *Seba saundersi* Stebbing (1888): *k*, lower lip.

slender, first larger than second, and occasionally weakly chelate, article 3 of gnathopod 2 elongate; uropod 3 with its single ramus longer than the short peduncle; telson entire.

Relationship.—The Leucothoidae have biramous third uropods. The Lysianassidae have a short peduncle of antenna 1 with article 2 much shorter than 1 whereas the Sebidae not only have an elongate peduncle but article 2 is much longer than 1. Few Lysianassidae have a uniramous uropod 3 and when so it is never elongate.

The Stenothoidae have subchelate gnathopods and coxa 1 is concealed by coxa 2, but mouthparts and uropod 3 indicate a close relationship of the two groups.

Platyischnopus in the Haustoriidae resembles the Sebidae in its subchelate gnathopods but differs from sebids in its biramous third uropods, much larger outer plates of the maxilliped and cleft telson

Genera of Sebidae

Seba Bate

Seba Bate, 1862.—Stebbing, 1906.—K. H. Barnard, 1957.
Teraticum Chilton, 1884.
Grimaldia Chevreux, 1889.
Paravalettia K. H. Barnard, 1916.

Type-species: *S. innominata* Bate, 1862 (monotypy).
Species: 7, probably cosmopolitan cold-water, littoral to bathyal.

Stegocephalidae

Figures 160, 161

Diagnosis.—Mouthparts projecting in a conical bundle below head; mandible lacking palp and molar; accessory flagellum 1- or 2-articulate; gnathopods feeble, simple or weakly subchelate. See Amphilochidae, Lysianassidae.

Description.—Peduncle of antenna 1 short; mouthparts variable; upper lip bilobed, mandible lacking palp and molar, lower lip without inner lobes; palp of maxilla 1 large or small, with one or two articles, maxilla 2 usually with two plates, outer plate occasionally absent, often set on extended base so as to appear geniculate; maxillipedal palp with three or four articles; gnathopods feeble, simple or scarcely subchelate; coxae quadrate or rounded below, or first three often acuminate below, first four usually forming a continuous shield, coxa 1 never hidden by coxa 2; uropod 3 variable, peduncle long or short, rami long or short; telson short, or medium, entire or cleft.

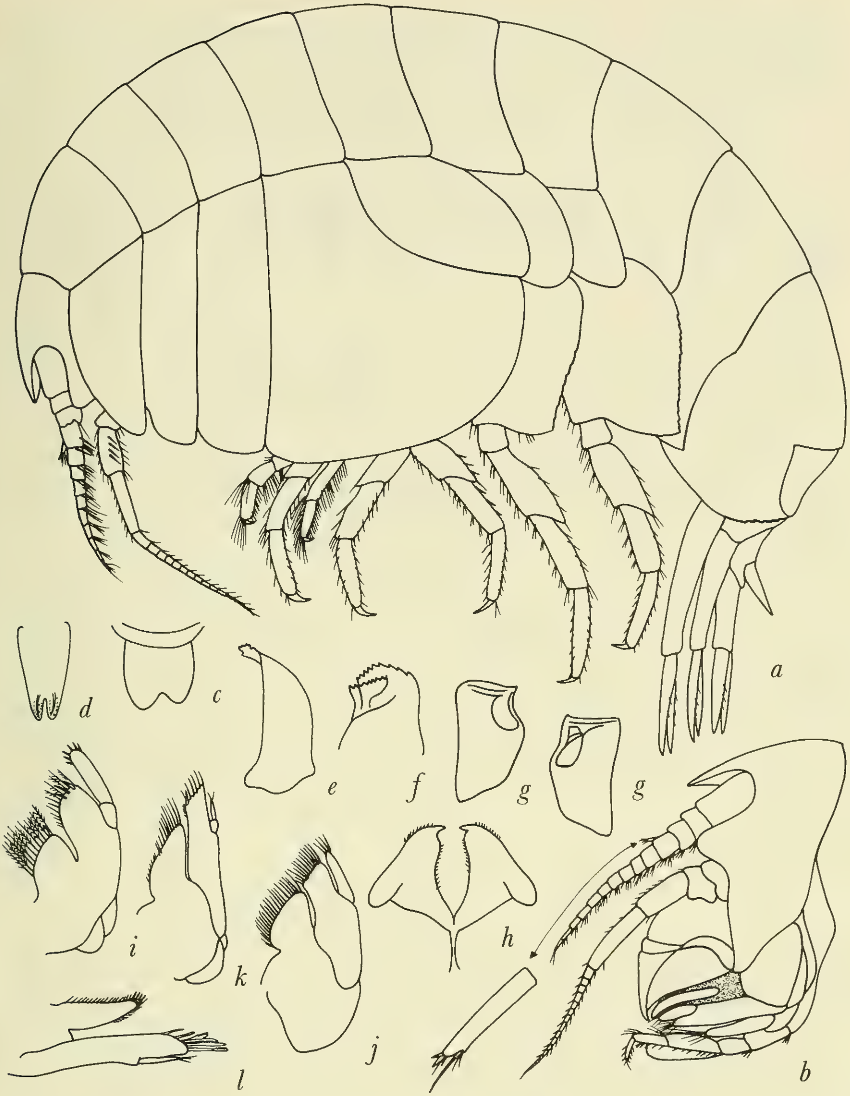

FIGURE 160.—Stegocephalidae: *a*, *Stegocephalus inflatus* Krøyer (Sars, 1895, pl. 69). Head: *b*, *Stegocephalus*. Upper lip: *c*, *Stegocephalus; d*, *Stegocephalina ingolfi* Stephensen (1925a). Mandible: *e*, *Stegocephalus; f*, *Andaniella pectinata* Sars (1895, pl. 72); *g*, pair, *Andaniexis abyssi* (Boeck) (Sars, 1895, pl. 71). Lower lip: *h*, *Stegocephalus*. Maxilla 1: *i*, *Andaniexis; j*, *Stegocephalus;*, *k*, *Phippsia gibbosa* (Sars, 1895, pl. 71); *l*, *Stegocephalina*.

Relationship.—The loss of both mandibular palp and molar is approached only in the Phliantidae, Eophliantidae, and Prophliantidae but in those families the accessory flagellum is absent. The characteristic coxae and globular shape of stegocephalids plus the conical grouping of the mouthparts are unmistakable characters.

Figure 161.—Stegocephalidae: Maxilla 2: *a*, *Phippsia gibbosa* (Sars, 1895, pl. 71); *b*, *Stegocephalina ingolfi* Stephensen (1925a); *c*, *Stegocephalus inflatus* Krøyer (Sars, 1895, pl. 69); *d*, *Andaniexis abyssi* (Boeck) (Sars, 1895, pl. 71). Maxilliped: *e*, *Phippsia; f*, *Andaniotes simplex* K. H. Barnard (1930); *g*, *Andaniella pectinata* Sars (1895, pl. 72); *h*, *Stegocephalus*. Telson: *i*, *Stegocephalus; j*, *Andaniopsis nordlandica* (Boeck) (Sars, 1895, pl. 72). Pereopod 4: *k*, *Andaniopsis; l*, *Stegocephalus*. Pereopod 5: *m*, *Andaniopsis; n*, *Stegocephalus; o*, *Tetradeion crassum* (Chilton, 1924). Pereopod 5: *p*, *Stegocephalus*. Uropod 3: *q*, *Stegocephalus; r*, *Andaniella*. Pereopod 2: *s*, *Parandaniexis mirabilis* Schellenberg (1929b). Gnathopod 1: *t*, *Stegocephalus*. Gnathopod 2: *u*, *Stegocephalus*.

Some Stenothoidae lack a mandibular palp and all have a shield-like coxa 4 but the first coxa is always very small and hidden by the second coxa and the accessory flagellum is a vestigial scale or absent.

The Amphilochidae have a small coxa 1 partially hidden by following coxae and the mouthparts project in a quadrate bundle.

The general aspect, head, coxae, body shape, mouthpart bundle, telson, uropods, pereopods, and gnathopods of Stegocephalidae suggest affinities with the Acanthonotozomatidae but the absence of mandibular palps and molars and the elytriform mandibular body distinguish the Stegocephalidae.

Stegocephalidae have considerable resemblance to Lysianassidae. Some stegocephalid species have an elongate article 3 on gnathopod 2 which resembles that of those Lysianassidae having gnathopod 2 simple (not subchelate). However, most lysianassids have a mitten-shaped or minutely chelate article 6. All Stegocephalidae lack mandibular palps and molars, have some foliaceous portions on the maxillae, have a 1- or 2-articulate accessory flagellum and a highly characteristic configuration of coxae 1–4. This combination of characters never occurs in Lysianassidae.

Andaniotes ingens Chevreux (1906c) probably should form the type of a new genus because of its reduced first maxillary palp and narrow article 2 of pereopod 4 in combination but in other special characters it fits *Euandania* more than *Andaniotes* and so is transferred to the former. *Andaniotes simplex* K. H. Barnard (1930) also should be distinguished as a new genus by its 3-, not 4-articulate maxillipedal palp, having articles 1 and 2 coalesced.

Key to the Genera of Stegocephalidae

1.	Mandible bearing multitoothed (often minutely) incisor (fig. 160*f*) . . .	2
	Mandible bearing smooth incisor (fig. 160*g*)	14
2.	Telson cleft (fig. 161*i*)	3
	Telson entire (fig. 161*j*)	11
3.	Maxilla 2 lacking outer plate	**Bathystegocephalus**
	Maxilla 2 bearing outer plate	4
4.	Palp article 2 of maxilliped produced distomedially (fig. 161*e*) . .	**Phippsia**
	Palp article 2 of maxilliped not produced	5
5.	Palp of maxilla 1 biarticulate (figs. 160*i,k*)	6
	Palp of maxilla 1 uniarticulate (fig. 160*j*)	8
6.	Article 2 of pereopod 4 broad (fig. 161*l*)	7
	Article 2 of pereopod 4 slender (fig. 161*k*)	**Stegocephalopsis**
7.	Outer plate of maxilla 2 gaping and geniculate (figs. 161*a,b,c*) . .	**Phippsiella**
	Outer plate of maxilla 2 normal (fig. 161*d*)	**Pseudandaniexis** [1]
8.	Article 2 of pereopod 4 slender (fig. 161*k*)	9
	Article 2 of pereopod 4 broad (fig. 161*l*).	10

[1] Telson unknown.

9. Outer plate of maxilla 2 gaping and geniculate (figs. 161*a,b,c*). **Stegocephaloides**
Outer plate of maxilla 2 normal (fig. 161*d*) . . . . **Steleuthera**
10. Upper and lower lips and maxilla 1 not elongate (figs. 160*c,h*), spines of outer plate on maxilla 2 with hooks (fig. 161*c*) . . . . **Stegocephalus**
Upper and lower lips and maxilla 1 elongate (fig. 160*d*), spines of outer plate on maxilla 2 lacking hooks (fig. 161*d*) . . . . **Stegocephalina**
11. Pereopod 5 with seven articles (figs. 161*m,n*) 12
Pereopod 5 with three articles (fig. 161*o*) . . . . **Tetradeion**
12. Inner plate of maxilliped reaching end of palp article 1 (fig. 161*h*). **Andaniopsis**
Inner plate of maxilliped scarcely reaching base of palp article 1 (figs. 161*f,g*) 13
13. Palp of maxilla 1 uniarticulate, article 2 of pereopod 4 slender (fig. 161*k*). **Andaniella**
Palp of maxilla 1 biarticulate, article 2 of pereopod 4 broad (fig. 161*l*). **Pseudandaniexis** [1]
14. Telson cleft deeply 15
Telson entire or apically slit 16
15. Flagellar article 1 of antenna 1 subequal to or shorter than peduncle; peduncular article 5 of antenna 2 subequal to or shorter than article 4; pleonite 6 longer than peduncle of uropod 3 . . . . . **Andaniotes** (=*Metandania*)
Flagellar article 1 of antenna 1 much longer than peduncle; peduncular article 5 of antenna 2 longer than article 4; pleonite 6 shorter than peduncle of uropod 3 . . . . **Euandania**
16. Pereopod 2 distinctly subchelate (fig. 161*s*) . . . . **Parandaniexis**
Pereopod 2 simple 17
17. Palp of maxilla 1 biarticulate . . . . **Andaniexis**
Palp of maxilla 1 uniarticulate . . . . **Parandania**

Genera of Stegocephalidae

Andaniella Sars

Andaniella Sars, 1895.—Stebbing, 1906.

Type-species: *Andania pectinata* Sars, 1882 (monotypy).

Mandibular incisor toothed; palp of maxilla 1 uniarticulate; outer plate of maxilla 2 not geniculate nor gaping; *inner plate of maxilliped scarcely reaching base of palp article 1* (*Andaniopsis*), article 2 of palp not produced; article 2 of pereopods 3–4 slender, of pereopod 5 broad; telson entire. Species: 1, boreal N. Atlantic, littoral to bathyal.

Andaniexis Stebbing

Andania Boeck, 1871 (homonym, Lepidoptera).
Andaniexis Stebbing, 1906 (new name).

Type-species: *Andania abyssi* Boeck, 1871 (selected by Boeck, 1876). See Sars, 1895.

Mandibular incisor not toothed; palp of maxilla 1 biarticulate; outer plate of maxilla 2 not geniculate nor gaping; palp article 2 of maxilliped not produced; article 2 of pereopod 3 slender, of pereopods 4–5 broad; telson entire. Species: 6, cosmopolitan, bathy-abyssopelagic.

Andaniopsis Sars

Andaniopsis Sars, 1895.—Stebbing, 1906.

Type-species: *Andania nordlandica* Boeck, 1871 (monotypy). See Sars, 1895.

Mandibular incisor toothed; palp of maxilla 1 uniarticluate; outer plate of maxilla 2 not geniculate nor gaping; *inner plate of maxilliped reaching distal end of palp article 1* (*Andaniella*), palp article 2 not produced; article 2 of pereopods 3–4 slender, of article 5 broad; telson entire. Species: 1, boreal N. Atlantic, littoral.

Andaniotes Stebbing, new synonymy

Andaniotes Stebbing, 1897; 1906.
Metandania Stephensen, 1925a.

Type-species: *Anonyx corpulentus* Thomson, 1882 (monotypy). See Stebbing, 1888 (as *Andania abyssorum*).

Mandibular incisor not toothed; palp of maxilla 1 uniarticulate; outer plate of maxilla 2 not geniculate nor gaping; palp article 2 of maxilliped not produced; article 2 of pereopod 3 slender, of pereopods 4–5 broad; telson cleft one third; *flagellar article 1 of antenna 1 equal to or shorter than peduncle; peduncular article 5 of antenna 2 equal to or shorter than article 4; pleonite 6 longer than peduncle of uropod 3* (*Euandania*). Species: 4, antarctic, N. Atlantic, littoral to bathyal.

Bathystegocephalus Schellenberg

Bathystegocephalus Schellenberg, 1926b.

Type-species: *Stegocephalus globosus* Walker, 1909 (monotypy).

Mandibular incisor toothed; palp of maxilla 1 uniarticulate; outer plate of maxilla 2 absent; palp article 2 of maxilliped not produced; article 2 of pereopods 3–4 slender, of pereopod 5 broad; telson cleft one third. Species: 1, Indo-Pacific, S. Atlantic, bathypelagic.

Euandania Stebbing

Euandania Stebbing, 1899d; 1906.

Type-species: *Andania gigantea* Stebbing, 1888 (original designation).

Mandibular incisor not toothed; palp of maxilla 1 uniarticulate; outer plate of maxilla 2 not geniculate nor gaping; palp article 2 of maxilliped not produced; article 2 of pereopod 3 slender, of pereopod 4 either broad [or slender *E. ingens* (Chevreux)], of pereopod 5 broad; telson cleft one third; *flagellar article 1 of antenna 1 much longer than peduncle; peduncular article 5 of antenna 2 longer than article 4; pleonite 6 shorter than peduncle of uropod 3* (*Andaniotes*). Species: 2, cosmopolitan, bathypelagic.

Parandania Stebbing

Parandania Stebbing, 1899d; 1906.

Type-species: *Andania boecki* Stebbing, 1888 (original designation).

Mandibular incisor not toothed; palp of maxilla 1 uniarticulate; outer plate of maxilla 2 not geniculate nor gaping; palp article 2 of maxilliped not produced; article 2 of pereopod 3 slender, of pereopods 4–5 broad; telson entire. Species: 1, cosmopolitan, bathypelagic.

Parandaniexis Schellenberg

Parandaniexis Schellenberg, 1929b.

Type-species: *P. mirabilis* Schellenberg, 1929b (monotypy).

Mandibular incisor not toothed; palp of maxilla 1 biarticulate; outer plate of maxilla 2 not geniculate nor gaping; palp article 2 of maxilliped not produced; article 2 of pereopods 3–4 slender, of pereopod 5 broad; telson entire; *pereopod 2 subchelate.* Species: 1, tropical E. Pacific, abyssal.

Phippsia Stebbing

Aspidopleurus Sars, 1895 (homonym, Pisces).
Phippsia Stebbing, 1906 (new name).

Type-species: *Stegocephalus gibbosus* Sars, 1882 (monotypy).

Mandibular incisor toothed; palp of maxilla 1 biarticulate; outer plate of maxilla 2 geniculate, gaping; palp article 2 of maxilliped produced distomedially; article 2 of pereopods 3–4 slender, of pereopod 5 broad; telson cleft one third. Species: 2, arctic-boreal, bathypelagic.

Phippsiella Schellenberg

Phippsiella Schellenberg, 1925a.

Type-species: *Stegocephalus similis* Sars, 1895 (monotypy).

Mandibular incisor toothed; palp of maxilla 1 biarticulate; outer plate of maxilla 2 geniculate, gaping; palp article 2 of maxilliped not produced; article 2 of pereopod 3 slender, of pereopods 4–5 broad; telson cleft more than halfway. Species: 7, probably cosmopolitan coldwater, littoral to abyssal.

Pseudandaniexis Nicholls

Parandaniexis Nicholls, 1938 (homonym, Amphipoda).
Pseudandaniexis Nicholls, 1938, Corrigenda (new name).

Type-species: *Parandaniexis mixtus* Nicholls, 1938 (original designation).

Mandibular incisor toothed; palp of maxilla 1 biarticulate; outer plate of maxilla 1 not geniculate nor gaping; *inner plate of maxilliped reaching proximal end of palp article 1* (*Andaniopsis*), palp article 2 of maxilliped unproduced; article 2 of pereopod 3 slender, of pereopod 5 broad; [telson broken and not clearly analyzed]. Species: 1, antarctic, bathyal.

Stegocephalina Stephensen

Stegocephalina Stephensen, 1925a.

Type-species: *S. ingolfi* Stephensen, 1925a (monotypy).

Mandibular incisor toothed; palp of maxilla 1 uniarticulate; outer plate of maxilla 2 geniculate and gaping; palp article 2 of maxilliped not produced; article 2 of pereopod 3 slender, of pereopods 4–5 broad; telson cleft halfway; *upper lip, lower lip, and maxilla 1 elongate; outer plate of maxilla 2 lacking hooks* (*Stegocephalus*). Species: 1, boreal N. Atlantic, bathyal.

Stegocephaloides Sars

Stegocephaloides Sars, 1895.—Stebbing, 1906.

Type-species: *Stegocephalus christianiensis* Boeck, 1871 (original designation).

Mandibular incisor toothed; palp of maxilla 1 uniarticulate; *outer plate of maxilla 2 geniculate, gaping* (*Steleuthera*); palp article 2 of maxilliped not produced; article 2 of pereopods 3–4 slender, of pereopod 5 broad; telson cleft. Species: 7, cold-water, N. and S. Atlantic, primarily bathyal.

Stegocephalopsis Schellenberg

Stegocephalopsis Schellenberg, 1925a.

Type-species: *Cancer ampulla* Phipps, 1774 (monotypy). See Gurjanova, 1962.

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Mandibular incisor toothed; palp of maxilla 1 biarticulate; outer plate of maxilla 2 geniculate, gaping; palp article 2 of maxilliped not produced; article 2 of pereopods 3–4 slender, of pereopod 5 broad; telson cleft halfway or more. Species: 3, arctic-boreal, littoral to bathyal.

Stegocephalus Krøyer

Stegocephalus Krøyer, 1842.—Stebbing, 1906.

Type-species: *S. inflatus* Krøyer, 1842 (monotypy). See Sars, 1895.

Mandibular incisor toothed; palp of maxilla 1 uniarticulate; outer plate of maxilla 2 geniculate, gaping; palp article 2 of maxilliped not produced; article 2 of pereopod 3 slender, of pereopods 4–5 broad; telson cleft halfway; *upper lip, lower lip, and maxilla 1 not elongate; spines of outer plate of maxilla 2 with hooks* (*Stegocephalina*). Species: 2, subarctic-boreal, littoral to bathyal.

Steleuthera J. L. Barnard

Steleuthera J. L. Barnard, 1964a.

Type-species: *S. maremboca* J. L. Barnard, 1964a (original designation).

Mandibular incisor toothed; palp of maxilla 1 uniarticulate; *outer plate of maxilla 2 not geniculate* (*Stegocephaloides*); palp article 2 of maxilliped not produced; article 2 of pereopods 3–4 slender, of pereopod 5 broad; telson poorly cleft. Species: 1, Peru, hadal.

Tetradeion Stebbing

Tetradeion Stebbing, 1899d; 1906.

Type-species: *Cyproidia crassa* Chilton, 1883 (original designation). See Hurley, 1955.

Mandibular incisor toothed; palp of maxilla 1 biarticulate; outer plate of maxilla 2 geniculate, gaping; palp article 2 of maxilliped distomedially produced; article 2 of pereopods 3–4 slender, of pereopod 5 broad; *pereopod 5 with only three articles;* telson entire. Species: 1, New Zealand, littoral.

Stenothoidae

Figure 162

Diagnosis.—Accessory flagellum absent or composed of one or two vestigial articles; mandibular molar evanescent; coxa 1 very small, always partially covered by following coxae; coxa 4 enlarged, shield-like, not posterodorsally excavate; uropod 3 uniramous; outer lobes of maxilliped vestigial; telson entire; *pereopod 3 with article 2 slender*. See Amphilochidae, Thaumatelsonidae, Cressidae, Leucothoidae, Anamixidae, Phliantidae, Pagetinidae.

Description.—Rostrum inconspicuous; accessory flagellum absent or 1- or 2-articulate, vestigial; body smooth or carinate; coxa 1 small, hidden by following coxae; coxa 4 enlarged, shield-like, not posterodorsally excavate; upper lip incised; mandible with weak, sparsely spinose molar, not triturative, palp absent and when present 1-, 2-, or 3-articulate; lower lip usually with inner lobes amalgamated, outer lobes with blunt extremities; maxilla 1 with 2- or 1-articulate palp; maxilla 2 small, stout; maxillipeds slender, with outer lobes vestigial; gnathopods usually powerful, subchelate, occasionally feeble, gnathopod 1 often simple; uropod 3 uniarticulate, ramus 2-articulate; telson of medium length, entire; pereopod 3 with slender article 2.

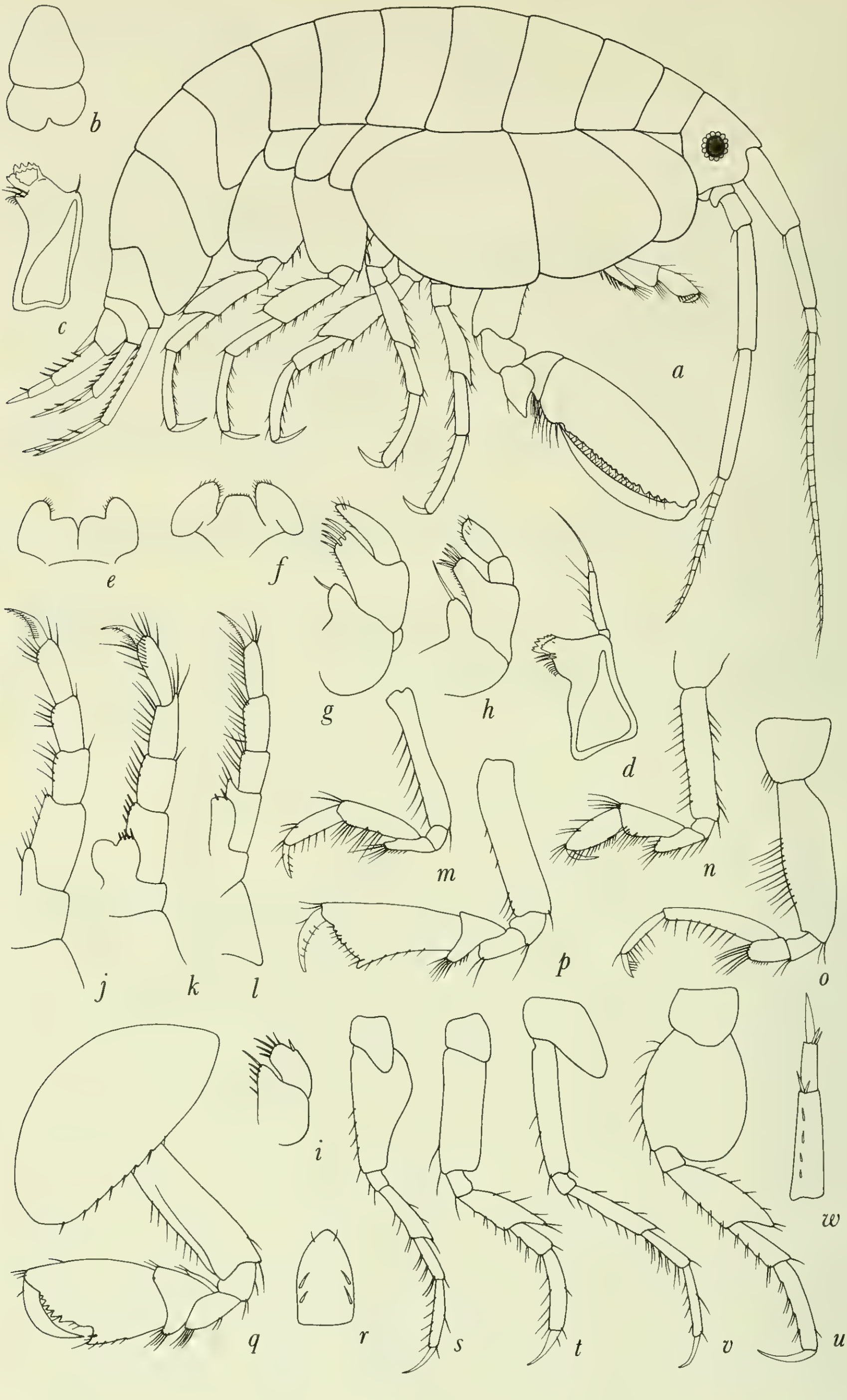
Relationship.—The Amphilochidae resemble stenothoids but have a biramous uropod 3 and well-developed outer lobes on the maxilliped.

The Thaumatelsonidae have some urosomal segments coalesced and the telson usually strongly thickened. Perhaps the Thaumatelsonidae deserve only subfamily status as members of the Stenothoidae. The Cressidae differ from the Stenothoidae by the coalescence of the telson with pleonite 6 and the expanded article 2 of pereopod 3.

Classification of Genera of Stenothoidae

The genera of Stenothoidae seem to be segregated from each other by very unsatisfactory means, such as conditions of mandibular palp, maxilla 1, accessory flagellum, and to some extent breadth of article 2 on pereopods 3–5. In other families these characters (see following key) often distinguish species-groups into natural genera but in the Stenothoidae such "pigeon-holing" throws together species with great diversity in gnathopods. Several genera thus represent grades of structure rather than clades. In these small organisms mandibular palps are very difficult to work with taxonomically as palps are hard to observe and may break off during dissection. There is a strong possibility that some species may indeed have palps in some populations and lack them in others. It is prudent to mount the head of the animal on a slide and look for the mandibular palp before dissection. Often the articulation line separating palp articles 1 and 2 of the first maxillae is difficult to resolve.

Shoemaker (1955) in his key to Stenothoidae shows the logic in reestablishing the genera *Prometopa* and *Microstenothoe* which were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formerly synonymous with *Metopa* and *Stenothoe*, for his key points out the fact that *Proboloides* and *Metopoides* are characterized only by the presence or absence of an accessory flagellum. Because *Prometopa* and *Microstenothoe* bear accessory flagella, it is inconsistent to reduce them without also eliminating the genera *Proboloides* and *Metopoides*.

Nomenclatural Changes in Stenothoidae

Mesostenothoides Gurjanova (1938) is removed to *Stenothoides*.
Metopoides Della Valle (1893) (Stebbing, 1906) is reestablished.
Metopella nasutigenes (Stebbing, 1888) is removed to *Probolisca*.
Microstenothoe Pirlot (1933b) is reestablished.
Parametopella stelleri Gurjanova (1948) omitted from index by J. L. Barnard (1958a).
Parametopella minuta (Holmes), erroneously assigned to this genus, is removed to *Stenothoe*.
Prometopa Schellenberg (1931) is reestablished.
Stenothoe minuta Holmes, (Stebbing, 1906; Kunkel, 1918), erroneously assigned to *Parametopella* previously.
Stenula J. L. Barnard (1962c) was erected for species previously assigned to *Mesostenothoides*.

Key to the Genera of Stenothoidae

(emended after Shoemaker, 1955)

1. Pereopods 4 and 5: article 2 linear (figs. 162*t,v*) . . . . Key A
   Pereopod 4: article 2 linear (fig. 162*v*); pereopod 5, article 2 expanded (figs. 162*s,u*) . . . . Key B
   Pereopods 4 and 5: article 2 expanded (figs. 162*a,u*) . . . . Key C

KEY A

1. Palp of maxilla 1 uniarticulate (fig. 162*g*) 2
   Palp of maxilla 1 biarticulate (fig. 162*h*) . . . . **Probolisca**
2. Mandibular palp absent (fig. 162*c*) . . . . **Parametopella**
   Mandibular palp 1-articulate . . . . **Metopelloides**
   Mandibular palp 2- or 3-articulate (fig. 162*d*) . . . . **Metopella**

←

FIGURE 162.—Stenothoidae: *a*, *Stenothoe marina* (Bate) (Sars, 1895, pl. 80). Upper lip: *b*, *Stenothoe*. Mandible: *c*, *Stenothoe; d*, *Proboloides gregarius* (Sars, 1895, pl. 84). Lower lip: *e*, *Stenothoe; f*, *Proboloides*. Maxilla 1: *g*, *Metopa alderi* (Bate) (Sars, 1895, pl. 86); *h*, *Stenothoe*. Maxilla 2: *i*, *Stenothoe*. Maxilliped: *j*, *Stenothoe; k*, *Metopa; l*, *Proboloides*. Gnathopod 1: *m*, *Metopa pusilla* (Sars, 1895, pl. 90); *n*, *Metopa alderi; o*, *Metopa robusta* (Sars, 1895, pl. 96). Gnathopod 2: *p*, *Metopella longimana* (Boeck) (Sars, 1895, pl. 97); *q*, *Metopa alderi*. Telson: *r*, *Stenothoe*. Pereopod 5: *s*, *Mesometopa neglecta* (Hansen) (Sars, 1895, pl. 97); *t*, *Metopella; u*, *Stenothoe*. Pereopod 4: *v*, *Metopella*. Uropod 3: *w*, *Stenothoe*.

KEY B

1.	Palp of maxilla 1 uniarticulate	2
	Palp of maxilla 1 biarticulate.	**Mesoproboloides**
2.	Mandibular palp 1-articulate or absent	**Stenothoides**
	Mandibular palp 2- or 3-articulate	**Mesometopa**

KEY C

1.	Palp of maxilla 1 uniarticulate	2
	Palp of maxilla 1 biarticulate	4
2.	Mandibular palp absent.	**Parametopa**
	Mandibular palp 1-articulate	**Stenula**
	Mandibular palp 2- or 3-articulate	3
3.	Accessory flagellum absent	**Metopa**
	Accessory flagellum 1-articulate	**Prometopa**
4.	Mandibular palp absent	5
	Mandibular palp present	6
5.	Accessory flagellum 1-articulate	**Microstenothoe**
	Accessory flagellum absent	**Stenothoe**
6.	Mandibular palp 1-articulate	**Prostenothoe**
	Mandibular palp 2- or 3-articulate	7
7.	Accessory flagellum absent	**Proboloides**
	Accessory flagellum 1- or 2-articulate	**Metopoides**

Genera of Stenothoidae

Mesometopa Gurjanova

Mesometopa Gurjanova, 1938.

Type-species: *Metopa esmarki* Boeck, 1872 (original designation).

Mandibular palp 2- or 3-articulate; palp of maxilla 1 uniarticulate; article 2 of pereopod 4 linear, of article 5 expanded. Species: 4, arctic-boreal, littoral.

Mesoproboloides Gurjanova

Mesproboloides Gurjanova, 1938.

Type-species: *Metopella cornuta* Schellenberg, 1926a (original designation).

Mandibular palp 3-articulate; palp of maxilla 1 biarticulate; article 2 of pereopod 4 linear, of pereopod 5 expanded. Species: 2, subantarctic, littoral.

Metopa Boeck

Metopa Boeck, 1871.—Stebbing, 1906.
Metopina Norman, 1900b (homonym, Diptera).
Sthenometopa Norman, 1902.

Type-species: *Leucothoe clypeata* Krøyer, 1842 (selected by Boeck, 1876). See Gurjanova, 1948, 1951; Shoemaker, 1955.

Mandibular palp 2- or 3-articulate; palp of maxilla 1 uniarticulate; article 2 of pereopods 4–5 expanded; *accessory flagellum absent* (*Prometopa*). Species: 49, subarctic-boreal, littoral to abyssal, (one species *Prometopa tuberculata* is subantarctic).

Metopella Sars

Metopella Sars, 1985.—Stebbing, 1906.

Type-species: *Metopa longimana* Boeck, 1871 (selected by Gurjanova, 1938). See Sars, 1895.

Mandibular palp 2- or 3-articulate; palp of maxilla 1 uniarticulate; article 2 of pereopods 4–5 linear. Species: 8, arctic-boreal, littoral.

Metopelloides Gurjanova

Metopelloides Gurjanova, 1938, 1951.

Type-species: *Metopella micropalpa* Shoemaker, 1930 (original designation).

Mandibular palp 1-articulate; palp of maxilla 1 uniarticulate; article 2 of pereopods 4–5 linear. Species: 9, arctic-boreal, littoral.

Metopoides Della Valle

Metopoides Della Valle, 1893.—Stebbing, 1906.

Type-species: *Metopa magellanica* Stebbing, 1888 (selected by Gurjanova, 1938).

Mandibular palp 2- or 3-articulate; palp of maxilla 1 biarticulate; article 2 of pereopods 4–5 expanded; *accessory flagellum 1-articulate* (*Proboloides*). Species are combined with *Proboloides;* most *Metopoides* are subantarctic.

Microstenothoe Pirlot

Microstenothoe Pirlot, 1933b.

Type-species: *M. ascidiae* Pirlot, 1933b (original designation).

Mandibular palp absent; palp of maxilla 1 biarticulate; article 2 of pereopods 4–5 expanded; *accessory flagellum 1-articulate* (*Stenothoe*). Species combined with *Stenothoe.*

Parametopa Chevreux

Parametopa Chevreux, 1901b.

Type-species: *P. kervillei* Chevreux, 1901b (original designation). See Chevreux and Fage, 1925.

Mandibular palp absent; palp of maxilla 1 uniarticulate; article 2 of pereopods 4–5 expanded. Species: 3, subarctic and warm-temperate in Atlantic, littoral.

Parametopella Gurjanova

Parametopella Gurjanova, 1938, 1951.

Type-species: *Stenothoe cypris* Holmes, 1905 (original designation). See Kunkel, 1918.

Mandibular palp absent; palp of maxilla 1 uniarticulate; article 2 of pereopods 4–5 linear. Species: 3, subarctic-boreal, littoral.

Probolisca Gurjanova

Probolisca Gurjanova, 1938.

Type-species: *Metopa ovata* Stebbing, 1888 (original designation).

Mandibular palp 2- or 3-articulate; palp of maxilla 1 biarticulate; article 2 of pereopods 4–5 linear. Species: 3, antiboreal, littoral.

Proboloides Della Valle

Proboloides Della Valle, 1893.—Stebbing, 1906.—K. H. Barnard, 1932.
Proboliella Walker, 1906b, 1907.

Type-species: *Metopa gregaria* Sars, 1882 (selected by Gurjanova, 1938). See Sars, 1895.

Mandibular palp 2- or 3-articulate; palp of maxilla 1 biarticulate; article 2 of pereopods 4–5 expanded; *accessory flagellum absent* (*Metopoides*). Species (incl. *Metopoides*): 34, bipolar, littoral to abyssal.

Prometopa Schellenberg

Prometopa Schellenberg, 1926a.

Type-species: *P. tuberculata* Schellenberg, 1926a (monotypy).

Mandibular palp 2- or 3-articulate; palp of maxilla 1 uniarticulate; article 2 of pereopods 4–5 expanded; *accessory flagellum 1-articulate* (*Metopa*). Species: 1; included with *Metopa*.

Prostenothoe Gurjanova

Prostenothoe Gurjanova, 1938.

Type-species: *P. sextonae* Gurjanova, 1938 (original designation); 1951.

Mandibular palp 1-articulate; palp of maxilla 1 biarticulate; article 2 of pereopods 4–5 expanded. Species: 1, Japan, Okhotsk Sea, littoral.

Stenothoe Dana

Stenothoe Dana, 1852b.—Stebbing, 1906.
Probolium Costa, 1853c, 1857.
Montagua Bate, 1857a (homonym, Decapoda).
Montaguana Chilton, 1883.

Type-species: *S. validus* Dana, 1853 (selected by monotypy of Dana, 1853). See Chevreux and Fage, 1925.

Mandibular palp absent; palp of maxilla 1 biarticulate; article 2 of pereopods 4–5 expanded; *accessory flagellum absent* (*Microstenothoe*). Species: 32, cosmopolitan, littoral to bathyal.

Stenothoides Chevreux

Stenothoides Chevreux, 1900.—J. L. Barnard, 1962c.
Mesostenothoides Gurjanova, 1938.

Type-species: *S. perrieri* Chevreux, 1900 (monotypy).

Mandibular palp 1-articulate or absent; palp of maxilla 1 uniarticulate; article 2 of pereopod 4 linear, of article 5 expanded. Species: 6, subarctic-boreal, littoral.

Stenula J. L. Barnard

Stenula J. L. Barnard, 1962c.

Type-species: *Stenothoides latipes* Chevreux and Fage, 1925 (original designation).

Mandibular palp 1-articulate; palp of maxilla 1 uniarticulate; article 2 of pereopods 4–5 expanded. Species: 10, arctic-boreal, littoral to bathyal.

Stilipedidae

FIGURES 163, 164, FRONTISPIECE

DIAGNOSIS.—Accessory flagellum absent or vestigial, less than 3-articulate; mandible broad and lacking molar; maxillae foliaceous (figs. 163*c*,*d*); gnathopods simple but not especially slender. See Pardaliscidae Hyperiopsidae, Laphystiopsidae, Astyridae.

DESCRIPTION.—Peduncles of antennae very short, accessory flagellum vestigial or absent; upper lip asymmetrically bilobed; mandible very broad, pardaliscid in appearance, palp 3-articulate, thin, lacking molar; lower lips variable; maxilla 1 variable, some parts always foliaceous; maxilla 2 foliaceous; plates of maxilliped large, palp variable in length; gnathopods simple but not especially slender; coxae long; uropod 3 biramous, peduncle short, rami elongate, lanceolate; telson apically emarginate, short.

RELATIONSHIP.—Differing from the Acanthonotozomatidae by the foliaceous maxillae (except *Maxilliphimedia* in that family) and the mouthparts not being arranged in a conical bundle.

The Astyridae differ from the Stilipedidae by the weaker foliaceousness of the first maxilla but intergradation occurs in the genus

Alexandrella assigned to the Stilipedidae, for its first maxillae are not as foliaceous as those of the type-genus *Stilipes*. The palp is especially strongly geniculate, resembling species of Hyperiopsidae. Astyridae bear a distinct but nontriturative mandibular molar. *Astyroides* is removed from the Astyridae and synonymized with *Alexandrella*.

The Laphystiopsidae have normal maxillae, a mandibular molar, and small maxillipedal plates.

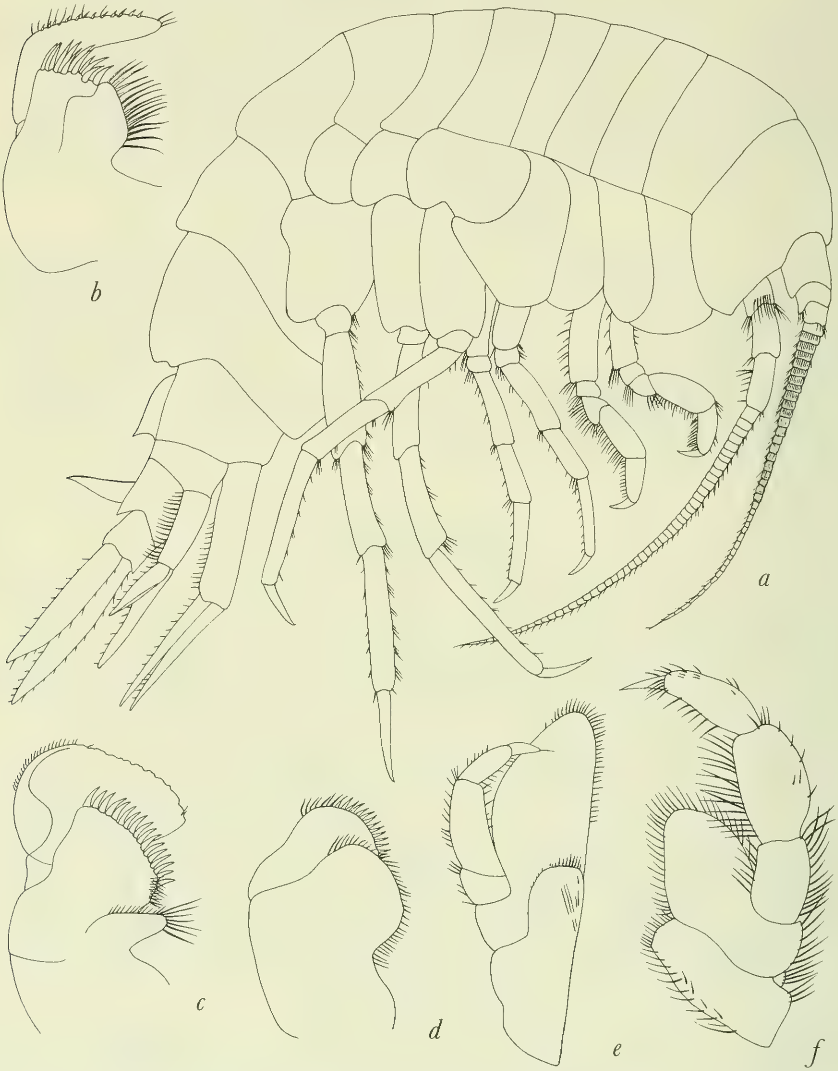


FIGURE 163.—Stilipedidae: *a*, *Alexandrella dentata* Chevreux (1912b). Maxilla 1: *b*, *Alexandrella; c*, *Stilipes sanguineus* (Hurley, 1954e). Maxilla 2: *d*, *Stilipes*. Maxilliped: *e*, *Alexandrella; f*, *Stilipes*.

The absence of a mandibular molar distinguishes Stilipedidae from the Synopiidae and Hyperiopsidae. Stilipedids resemble the Pardaliscidae in the mandible but differ by the long coxae and the foliaceous second maxillae. The first maxillary palp of some pardaliscids is foliaceous but not the inner plate. Pardaliscids have a multiarticulate accessory flagellum (except *Halicoides*).

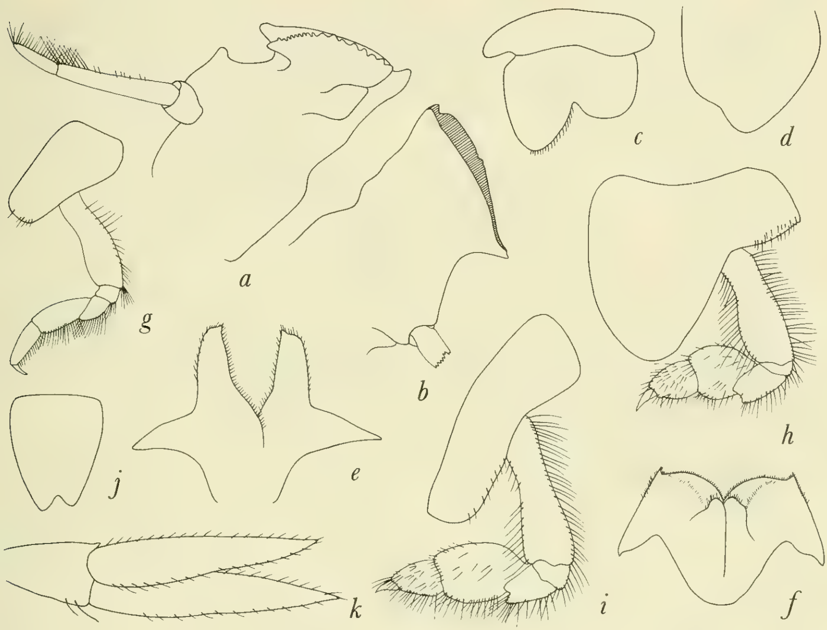


FIGURE 164.—Stilipedidae: Mandible: *a,b*, *Stilipes sanguineus* (Hurley, 1954e). Upper lip: *c*, *Alexandrella dentata* Chevreux (1912b); *d*, *Stilipes sanguineus*. Lower lip: *e*, *Stilipes sanguineus;* *f*, *Alexandrella.* Gnathopod 2: *g*, *Alexandrella.* Gnathopods 1, 2: *h,i*, *Stilipes sanguineus.* Telson: *j*, *Stilipes distincta* Holmes (1908). Uropod 3: *k*, *Stilipes distincta.*

Key to the Genera of Stilipedidae

1. Palp of maxilliped greatly exceeding outer plate (fig. 163*f*), upper lip very weakly emarginate (fig. 164*d*) . . . . **Stilipes**

   Palp of maxilliped not exceeding outer plate (fig. 163*e*), upper lip deeply incised (fig. 164*c*) . . . . **Alexandrella**

Genera of Stilipedidae

Alexandrella Chevreux, new synonymy

Alexandrella Chevreux, 1911c; 1912a; 1912b.
Astyroides Birstein and Vinogradova, 1960.

Type-species: *A. dentata* Chevreux, 1912a; 1912b (designated by Chevreux, 1912a).

Species: 2, antarctic to N.W. Pacific, littoral to hadal.

Stilipes Holmes

Stilipes Holmes, 1908.
Cacao K. H. Barnard, 1931; 1932.

Type-species: *S. distincta* Holmes, 1908 (original designation). See Shoemaker, 1964.

Species: 3, N.E. Pacific, antiboreal, littoral to bathyal.

Synopiidae, revised

[including Tironidae]

FIGURES 165–167

DIAGNOSIS.—Head massive,* and often galeate, produced into a downturned or deflexed rostrum; gnathopods feeble, scarcely subchelate, often simple; telson elongate (rarely short), but always as long as peduncle of uropod 1; eyes when present coalesced. See Astyridae, Vitjazianidae, Argissidae, Hyperiopsidae, Oedicerotidae.

DESCRIPTION.—The characters of this family are so subtle that they are practically indefinable, yet taxonomists have little trouble in recognizing a synopiid. An inclusive diagnosis has to be interspersed with the words "most species" since there are so many exceptions to any pair of character alternatives, yet the majority of species shares anyone of the following characters and all species share the majority of them.

Antenna 1 with multiarticulate accessory flagellum (except *Jeddo*); base of primary flagellum conjoint in male; eyes when present coalesced dorsally; mandible with poorly developed, slender palp (except *Synopia*), molar well developed, often extraordinarily large, smooth and dominating mandible, article 3 usually shortened considerably (except in *Bruzeliopsis*); outer lobes of lower lip frequently notched; mouthparts otherwise like basic gammaridean; coxa 4 never much larger than coxa 3; coxae long (as contrasted with Pardaliscidae); uropods 1–2 with outer ramus shortened; telson cleft (except in *Bruzelia*, *Bruzeliopsis*, and some *Synopia*), elongate (except *Synopia*), as long as peduncle of uropod 1; head massive, produced into a deflexed or

*As tall as or taller than long (length from posterior margin of head to anterior margin of lateral lobe), head (except *Tiron*) as long as pereonites 1–3 combined.

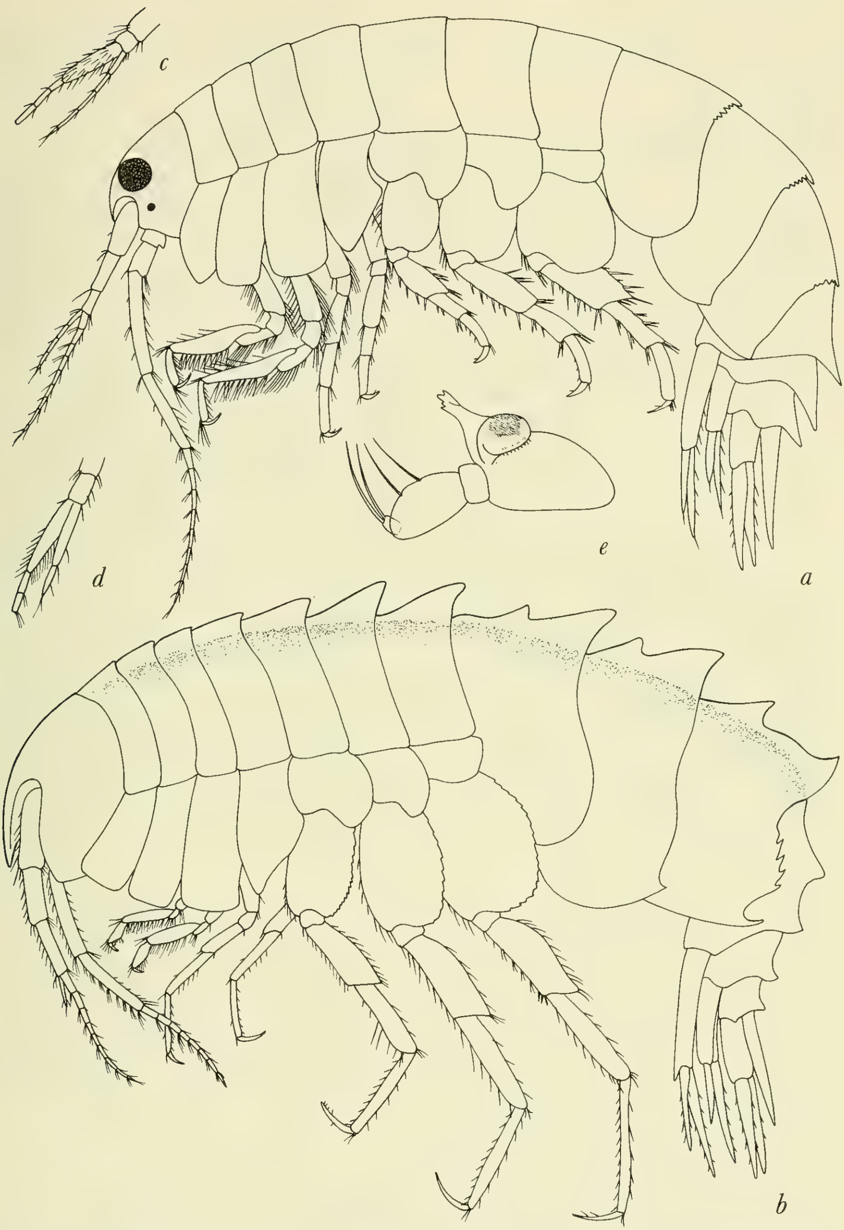


FIGURE 165.—Synopiidae: *a*, *Tiron spiniferum* (Stimpson) (Sars, 1895, pl. 140, as *T. acanthurus*); *b*, *Syrrhoites serratus* Sars (1895, pl. 137). Accessory flagella: *c*, *Tiron;* *d*, *Syrrhoe crenulata* Goës (Sars, 1895, pl. 136). Mandible: *e*, *Synopia variablis* Spandl (J. L. Barnard, 1965).

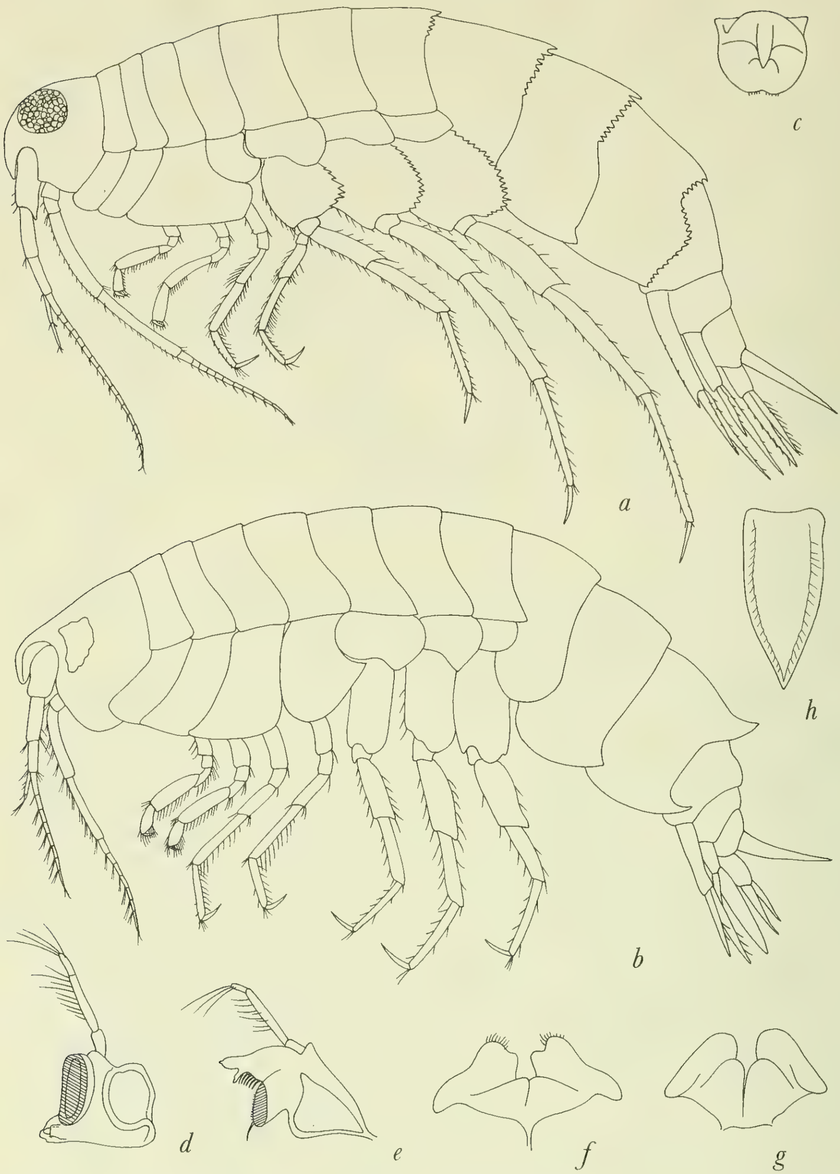


FIGURE 166.—Synopiidae: *a*, *Syrrhoe crenulata* Goës (Sars, 1895, pl. 136); *b*, *Bruzelia typica* Boeck (Sars, 1895, pl. 138). Upper lip: *c*, *Tiron spiniferum* (Stimpson) (Sars, 1895, pl. 140, as *T. acanthurus*). Mandible: *d*, *Bruzelia; e*, *Tiron.* Lower lip: *f*, *Syrrhoites serratus* Sars (1895, pl. 137); *g*, *Tiron.* Telson: *h*, *Bruzelia tuberculata* Sars (1895, pl. 139).

downturned rostrum; pereonites 1–4 often very short; gnathopods feeble, slender, scarcely subchelate; eyes when present dorsally confluent.

Relationship.—Synopiids differ from the basic gammaridean mainly by the massive head with large rostrum, poorly developed mandibular palp in most genera, feeble gnathopods, and elongated telson. From the Eusiridae they differ by the combination of the same characters, except for the elongate telson. They are similar to the Oedicerotidae in head, eyes, and general appearance, but all Oedicerotidae have a vestigial or no accessory flagellum, usually powerful gnathopods and short, uncleft telson.

Synopiidae differ from Pardaliscidae by the possession of a mandibular molar but often appear similar in other ways, except that the coxae of Pardaliscidae are always very short.

The Vitjazianidae differ from Synopiidae by the small, poorly rostrate head.

The Argissidae have a normal gammaridean head, practically no rostrum, and a unique pattern in the shapes of coxae 1–4.

Astyridae resemble Synopiidae closely and differ from them in the occurrence of just one or two articles in the accessory flagellum, the setose, laminate, and not triturative mandibular molar. All synopiids, except *Bruzeliopsis*, have a reduced palp article 3 on the mandible, whereas astyrids have an elongated article 3. All Astyridae have short telsons and widely spaced outer lobes on the lower lip.

A revision of Synopiidae is presented herein and where generic composition has been changed, the species have been listed.

Key to the Genera of Synopiidae

1. Mandibular molar very large and smooth (minutely setulose or fuzzy occasionally), completely dominating mandible, body of mandible extremely bulky, subglobular, dwarfing palp (fig. 166*d*) 2
   Mandible as in first triplet but palp absent . . . . **Jeddo**
   Mandibular molar of medium size, occasionally smooth and minutely fuzzy but usually triturative, body of mandible usually stout but not extraordinarily bulky or subglobular, palp relatively strong (fig. 166*e*) . . . 5
2. Coxa 3 strongly expanded anteroposteriorly and much larger than coxa 4 (fig. 166*a*) (more than twice as much surface area), coxa 3 with strong posterodorsal excavation dorsal to expansion, article 1 of antenna 1 very elongate and bearing long subconical distal process, articles 2 and 3 short and subequal in length, coxa 4 very small and shaped like a comma (fig. 166*a*) . . . . **Bruzeliopsis**
   Coxae 3 and 4 subequal in size and length, coxa 3 never with more than 1.5 times as much surface area as 4, coxa 3 weakly expanded or not expanded distally, lacking distinct posterodorsal excavation, coxa 4 adze-shaped or quadrate, its posteroventral lobe or midposterior cusp distinctly directed

posteriorwards and at right angles to anterior margin, posterodorsal excavation almost right-angular, articles 2 and 3 of antenna 1 even if shortened always together as long as article 1, distal tooth of latter if present short and hook-like 3

3. Telson entire 4
   Telson cleft . . . . **Syrrhoites**
4. Palms of gnathopods bearing one or two serrate spines, coxa 4 adze-shaped, tooth distinctly posteroventral . . . . **Bruzelia**
   Palms of gnathopods with 4 nonserrate blunt spines, coxa 4 rectangular and bearing midposterior cusp . . . . **Stephobruzelia,** new genus
5. Both telson and peduncle of uropod 3 very short and subequal in length, mandibular palp extremely stout (fig. 165*e*) . . . . **Synopia**
   Telson elongate, twice as long as peduncle of uropod 3 even when peduncle elongate, mandibular palp slender (figs. 166*d*,*e*) 6
6. Coxa 3 strongly expanded distally, some portion of distal half at least twice as broad as proximal end, expansion directed posteriorly, posterodorsal margin strongly excavate, coxa 4 much smaller than 3, comma-shaped and usually with less than half as much surface area as coxa 3 7
   Coxa 3 rectangular or quadrate, scarcely expanded distally, occasionally with anteroventral corner attenuated only, posterior margin nearly parallel with anterior margin, coxa 4 almost as long as 3, its surface area scarcely smaller than that of coxa 3, coxa 4 adze-shaped or chisel-shaped . . . 9
   Coxa 3 rectangular or subquadrate, scarcely expanded distally, coxa 4 noticeably shorter than 3 and weakly comma-shaped . . . . some species of **Tiron**
7. Article 6 of gnathopods linear, slender, rectangular, simple, lacking strong serrate spines . . . . **Pseudotiron**
   Article 6 of gnathopods, if simple not linear or rectangular, either ovate and tumid or bearing distinct transverse palms, palms bearing one or two serrate spines 8
8. Telson cleft more than halfway, palms of gnathopods transverse . **Syrrhoe**
   Telson cleft less than 20%, palms of gnathopods oblique or indistinct. **Ileraustroe, new genus**
9. Article 6 of both gnathopods linear, slender, rectangular, simple, lacking strong serrate spines . . . . **Tiron**
   Article 6 of gnathopod 1 tumid but article 6 of gnathopod 2 perfectly linear and rectangular . . **Syrrhoe fimbriatus**[1] Stebbing and Robertson, 1891
   Article 6 of both gnathopods, if simple not linear or rectangular, either ovate and tumid or bearing transverse palms, palms bearing one or two serrate spines 10
10. Palms of gnathopods transverse, each bearing one very large spine giving chelate appearance to palms . . . . **Garosyrrhoe**
    Palms of gnathopods oblique or obsolescent, bearing one or two serrate spines but not appearing chelate . . . . **Austrosyrrhoe**

[1] Currently assigned to *Austrosyrrhoe.*

Genera of Synopiidae

Austrosyrrhoe K. H. Barnard

Austrosyrrhoe K. H. Barnard, 1925.

Type-species: *A. crassipes* K. H. Barnard, 1925 (monotypy). Poorly known species.

Composition: *A. septentrionalis* Stephensen, 1931.

Mandible of medium size, molar of medium size and not dominating mandible, apparently weakly triturative or fuzzy; coxa 3 rectangular or subquadrate, scarcely expanded distally, posterior margin nearly parallel with anterior margin and not strongly excavate; coxa 4 adze-shaped, nearly as long as coxa 3, its surface area scarcely smaller than coxa 3; article 6 of gnathopods not a perfectly linear rectangle, palms oblique or obsolescent and bearing one or two large serrate spines; telson elongate and deeply cleft. Species: 2, Atlantic, bathyal-abyssal.

Bruzelia Boeck

Bruzelia Boeck, 1871.—Stebbing, 1906.

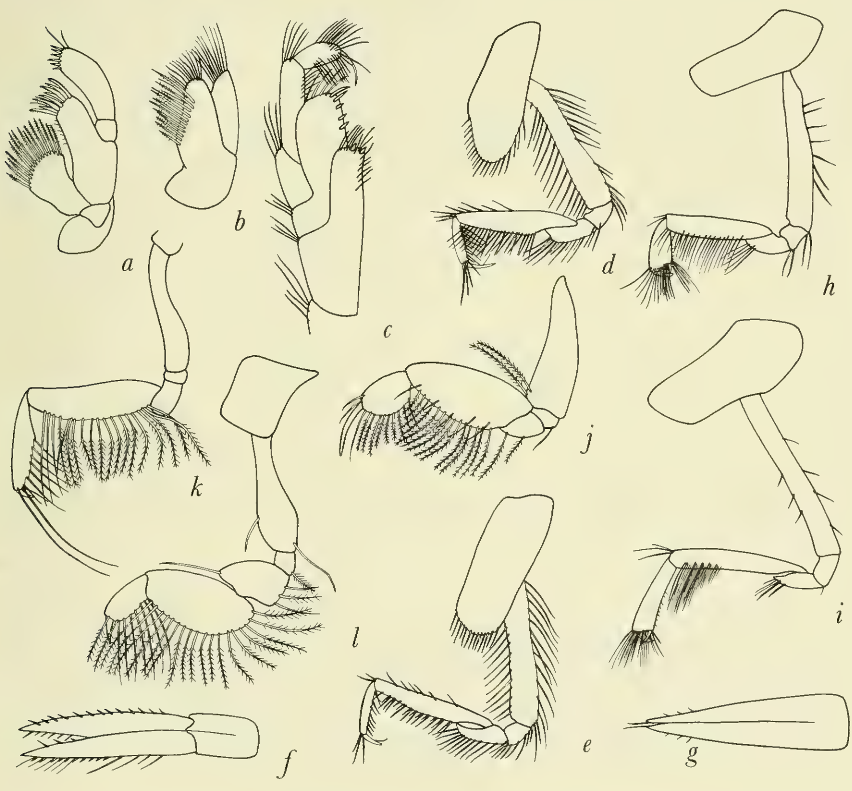


FIGURE 167.—Synopiidae: *Tiron spiniferum* (Stimpson) (Sars, 1895, pl. 140, as *T. acanthurus*): *a,b*, maxillae 1, 2; *c*, maxilliped; *d,e*, gnathopods 1, 2; *f*, uropod 3; *g*, telson. *Syrrhoe crenulata* Goës (Sars, 1895, pl. 136): *h,i*, gnathopods 1, 2. *Synopia scheeleana* Bruzelius (Stebbing, 1888): *j,k*, gnathopods 1, 2; *l*, pereopod 2.

285-135 O - 69 - 30

Type-species: *B. typica* Boeck, 1871 (monotypy). See Sars, 1895.

Composition: *B. australis* Stebbing, 1910; *B. diodon* K. H. Barnard, 1916; *B. tuberculata* Sars, 1882, 1895.

Mandible enlarged, molar enlarged, dominating mandible, smooth or fuzzy; coxa 3 rectangular, not distally expanded except for anteroventral cusp, posterior margin parallel with anterior margin and not excavate; coxa 4 nearly as long as coxa 3, surface area subequal to coxa 3, adze-shaped; article 6 of gnathopods trapezoidal or subovate, palms oblique, bearing one or two large serrate spines; telson elongate and entire. Species: 4, probably cosmopolitan, mainly cold-water, bathyal-abyssal (*B. australis* is littoral).

Bruzeliopsis Chevreux

Bruzeliopsis Chevreux, 1911b.

Type-species: *B. alberti* Chevreux, 1911b (original designation).

Composition: *B. turba* J. L. Barnard, 1964a; *Bruzelia cuspidata* J. L. Barnard, 1962d.

Mandible enlarged, molar enlarged, dominating mandible, smooth or fuzzy; coxa 3 distally expanded, with broad quadrate posterior lobe, posterodorsal margin excavate; coxa 4 much smaller than 3, comma-shaped; article 6 of gnathopods trapezoidal or subovate, palms oblique, bearing one or two nonserrate or distally flagellate locking spines; telson elongate and entire or minutely cleft apically; *article 1 of antenna 1 elongate and bearing conical distal cusp.* Species: 3, Atlantic, bathyal-abyssal.

Garosyrrhoe J. L. Barnard

Garosyrrhoe J. L. Barnard, 1964a.

Type-species: *Syrrhoites bigarra* J. L. Barnard, 1962a (original designation).

Mandible of medium size, molar of medium size and not dominating mandible, apparently weakly triturative or fuzzy; coxa 3 softly rectangular, posterior margin nearly parallel with anterior margin and not excavate; coxa 4 expanded midposteriorly, posterodorsal margin sloping, not concave but giving appearance of posterodorsal excavation, coxa 4 with larger surface area than coxa 3; article 6 of gnathopods trapezoidal or subovate, palms transverse and each defined by one large serrate spine lending chelate appearance; telson elongate and deeply cleft. Species: 1, California, littoral.

Ileraustroe, new genus

Type-species: *Austrosyrrhoe ilergetes* J. L. Barnard, 1964a (present selection).

Composition: *Austrosyrrhoe ?torpens* J. L. Barnard, 1964a (not J. L. Barnard, 1962d) (=new species).

Mandible of medium size, molar of medium size or slightly enlarged and not dominating mandible [palp large], fuzzy; coxa 3 strongly expanded distally, with midposterior or posteroventral lobe, posterodorsal margin excavate; coxa 4 much smaller than 3, comma-shaped; article 6 of gnathopods trapezoidal or subovate, palms oblique, bearing at least one large serrate spine; telson elongate but cleft only 20 percent or less. Species: 2, Mediterranean, Caribbean, abyssal.

Jeddo J. L. Barnard

Jeddo J. L. Barnard, 1962d.

Type-species: *J. simplisyrrhis* J. L. Barnard, 1962d (original designation).

Mandible enlarged, molar enlarged, dominating mandible, smooth or fuzzy; *mandibular palp absent;* coxa 3 distally expanded, with large posteroventral lobe, posterodorsal margin excavate; coxa 4 much smaller than 3, hemi-ovate; article 6 of gnathopods essentially linear and rectangular but not strongly elongate, simple, lacking distinct locking spines; telson elongate and cleft about halfway. Species: 1, S. Atlantic, deep bathyal.

Pseudotiron Chevreux

Pseudotiron Chevreux, 1895.—Stebbing, 1906.

Type-species: *P. bouvieri* Chevreux, 1895 (original designation).

Mandible of medium size, molar of medium size, columnar and triturative; coxa 3 strongly expanded distally, with quadrate posteroventral lobe, posterodorsal margin forming quadrate excavation, coxa 4 much smaller than 3, comma-shaped; article 6 of gnathopods a nearly perfectly linear rectangle, simple and lacking spine(s); telson elongate and deeply cleft. Species: 3, Indo-Atlantic, Mediterranean, bathy-abyssopelagic.

Stephobruzelia, new genus

Type-species: *Bruzelia dentata* Stephensen, 1931 (present selection).

Mandible enlarged, molar enlarged, dominating mandible, smooth or fuzzy; coxa 3 rectangular, not distally expanded except for anteroventral cusp, posterior margin parallel with anterior and not excavate; coxa 4 as long as and as large as coxa 3, rectangular, with midposterior cusp; article 6 of gnathopods trapezoidal or subovate, palms oblique, bearing four large, nonserrate, distally blunt spines; telson elongate and entire. Named for K. Stephensen. Species: 1, subarctic, bathyal.

Synopia Dana

Synopia Dana, 1852b.—Stebbing, 1906.

Type-species: *S. ultramarina* Dana, 1853 (present selection). See Stebbing, 1888 (*as S. scheeleana*).

Mandible of medium size, molar of medium size, triturative or fuzzy, *palp extremely tumid* (fig. 165*e*); coxa 3 strongly expanded distally, with quadrate posteroventral lobe, posterodorsal margin excavate; coxa 4 much smaller than 3, very short, weakly comma-shaped; article 6 of gnathopods slender or tumid, subovate, not perfectly linear, simple, posterior margins setose but lacking distinct locking spines, *dactyl of gnathopod 2 vestigial* (fig. 167*k*); *telson and peduncle of uropod 3 both short and subequal in length*, telson cleft or entire, distally castellate in forms with entire telson; *maxillipeds foliaceous*. Species: 3, tropical, epipelagic.

Syrrhoe Goës

Syrrhoe Goës, 1866.—Stebbing, 1906.

Type-species: *S. crenulata* Goës, 1866 (selected by Boeck, 1876). See Sars, 1895.

Mandible of medium size, molar of medium size and not dominating mandible, apparently weakly triturative or fuzzy; coxa 3 strongly expanded distally, with posteroventral lobe, posterodorsal margin excavate; coxa 4 much smaller than 3, comma- or weakly adze-shaped; article 6 of gnathopods trapezoidal, subovate and elongate, palm nearly transverse and armed with serrate spine not giving chelate appearance; telson elongate and deeply cleft. Species: 8, probably cosmopolitan, littoral to bathyal.

Syrrhoites Sars

Syrrhoites Sars, 1895.—Stebbing, 1906.

Type-species: *Bruzelia serrata* Sars, 1879 (original designation). See Sars, 1895.

Composition: *S. anaticauda* K. H. Barnard, 1930; *Kindia lorida* J. L. Barnard, 1962d; *S. pacificus* Nagata, 1965; *S. pusillus* Enequist, 1950; *K. sorpresa* J. L. Barnard, 1962d; *S. tenellus* K. H. Barnard, 1925; *S. terceris* J. L. Barnard, 1964a; *S. walkeri* Bonnier, 1896.

Mandible enlarged, molar enlarged, dominating mandible, smooth or fuzzy; coxa 3 rectangular, not distally expanded, posterior margin parallel with anterior margin and not excavate; coxa 4 nearly as long as coxa 3, surface area subequal to coxa 3, adze-shaped; article 6 of gnathopods trapezoidal or subovate, palms oblique, bearing one or two large, nonserrate or distally flagellate locking spines; telson elongate and deeply cleft. Species: 9, cosmopolitan, cold-water, deep littoral to abyssal.

Tiron Liljeborg

Tiron Liljeborg, 1865.—Stebbing, 1906.—Shoemaker, 1955.
Tessarops Norman, 1868 (homonym, Arachnida).

Type-species: *Lysianassa spinifera* Stimpson, 1853 (monotypy and subsequent synonomy). See Sars, 1895 (as *T. acanthurus*).

Mandible of medium size, molar of medium size, strongly projecting, columnar and triturative; coxa 3 softly rectangular, posterior margin almost parallel with anterior margin and not strongly excavate; coxa 4 variable, typically adze-shaped and almost as long as coxa 3, surface area of coxa 4 nearly equal to coxa 3; rarely coxa 4 distinctly shorter and smaller than 3 and weakly comma-shaped; article 6 of gnathopods a nearly perfectly linear rectangle, simple and lacking distinct locking spine(s); telson elongate and deeply cleft. Species: 8, cosmopolitan, littoral (rarely to bathyal).

Superfamily Talitroidea

[includes Talitridae, Hyalidae, and Hyalellidae]

Figures 168, 169

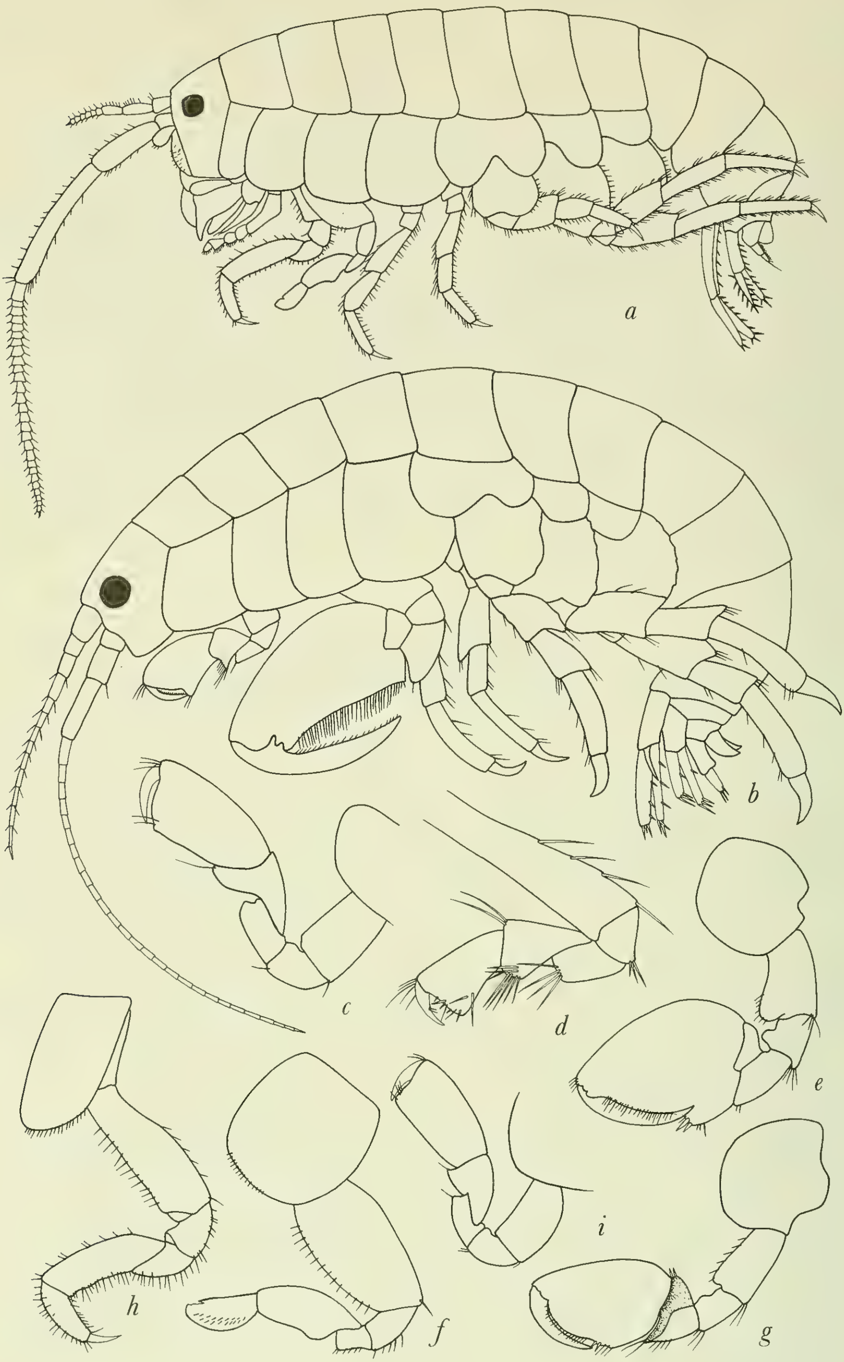
Diagnosis.—Accessory flagellum absent; mandible lacking palp; uropod 3 essentially uniramous; tiny scale-like inner ramus rarely present. See Phliantidae, Dogielinotidae, Eophliantidae.

Description.—Accessory flagellum absent; body rarely with teeth or carinations; coxae of medium size; mandible lacking palp, molar large and strongly triturative (except *Najna*); lower lip without inner lobes; palp of maxilla 1 often reduced or absent; maxilliped occasionally with fewer than four palp articles; gnathopods usually powerful, occasionally simple or feeble; uropod 3 small, usually with one ramus, inner ramus reduced to a scale when present; telson very short, entire, apically emarginate, cleft, or appearing completely bilobate.

Relationship.—The following families, lacking mandibular palps, differ from the Talitroidea in their coalesced fifth and sixth pleonites: Dexaminidae, Prophliantidae, and Kuriidae.

The Dogielinotidae, which probably should be assigned to the Talitroidea, differ by their haustoriid-phoxocephalid aspect, with multispinose antennae, short spinose pereopods and shape of head, bearing a conspicuous but small rostrum. Their epistome has a nasiform anterior lobe.

The Eophliantidae differ from talitroids by their cylindrical bodies,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short coxae which generally do not touch each other, and degraded mandibular molars.

The Phliantidae differ from Talitroidea by their degraded mandibular molars and the general aspect of their depressed, massive, often processiferous bodies with laterally splayed coxae. Phliantids* never have enlarged male second gnathopods as do most talitroids, especially marine ones.

*See supplement.

Classification of Talitroidea

Bulycheva (1957) partitioned the Talitridae, emended and restricted the concept of the Talitridae and removed several genera to two new families, the Hyalidae and Hyalellidae. Morphologically there are some small conflicts in her arrangement but they detract little from what appears to be a sensible and logical arrangement, although the classificatory criteria used are to a large extent not qualitative and indeed to some extent are concerned with the ecology of the organisms.

As so outlined, in her extensive paper, the Talitridae are confined to entirely terrestrial genera, many species of which dwell on the strand but nevertheless are not aquatic. The Hyalidae are exclusively marine, being characterized by cleft telsons. The Hyalellidae inhabit both marine and fresh waters, with more genera but few species in the oceans than in freshwater, where one genus, *Hyalella*, has 27 species. Morphologically, it is impossible strictly and qualitatively to separate the terrestrial Talitridae from the concepts of the other two families. Bulycheva (1957) in her figure 22 has given an excellent synopsis of the telsons of the three families, showing Talitridae with generally uncleft, heavily spinose telsons; Hyalidae with cleft, poorly spinose telsons; and Hyalellidae with uncleft, poorly spinose telsons. She shows the fluvial *Chiltonia mihiwaka* in the Hyalellidae with uncleft telson but Hurley (1954a) shows it with partially cleft telson, although other chiltonias may have the telson uncleft. *Chiltonia* is not assignable to Talitridae because of the poorly spinose telson. *Najna* shows both uncleft and minutely cleft telsons in the same species; Bulycheva assigned the genus to the Hyalidae, but it should be removed to a new family because of its mandibular molar.

←

FIGURE 168.—Talitroidea: *a*, *Talitrus saltator* (Montagu) (Sars, 1895, pl. 9, as *T. locusta*); *b*, *Hyale chevreuxi* K. H. Barnard (Chevreux 1901a, as *H. macrodactylus*). Gnathopod 2: *c*, *Insula antennulella* Kunkel (1910); *d*, *Chiltonia mihiwaka* (Chilton) (Hurley, 1954a); *e*, *Hyale bassargini* Derjavin (Gurjanova, 1951); *f*, *Talitrus*; *g*, *Allorchestes plumicornis* (Heller) (Gurjanova, 1951, as *A. ptilocerus*). Gnathopod 1: *h*, *Talitrus*; *i*, *Insula*.

When present the first maxillary palp is supposed to be 2-articulate in Talitridae and 1-articulate in the other two families, but the marine *Parallorchestes*, obviously related to Hyalidae, has a 2-articulate first maxillary palp, hence bridges the gap to the terrestrial Talitridae.

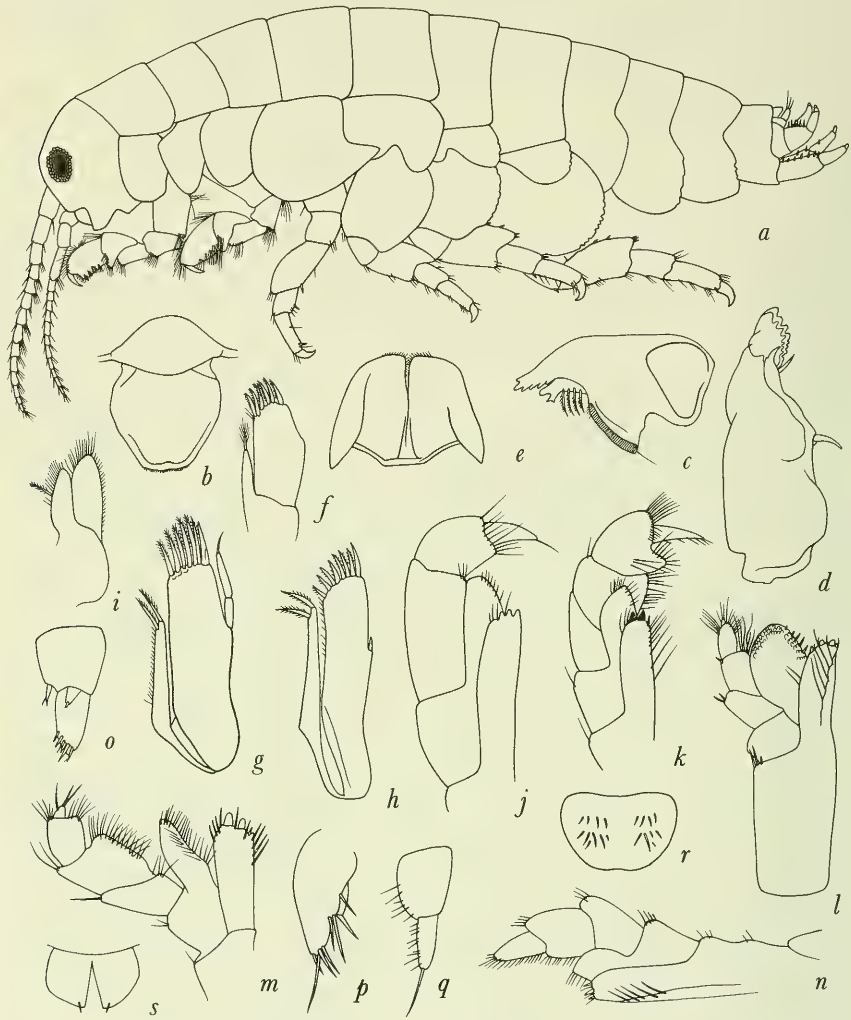

FIGURE 169.—Talitroidea: *a*, *Najna* sp. (J. L. Barnard, 1962c). Upper lip: *b*, *Talitrus saltator* (Montagu) (Sars, 1895, pl. 9, as *T. locusta*). Mandible: *c*, *Talitrus*; *d*, *Najna*. Lower lip: *e*, *Talitrus*. Maxilla 1: *f*, *Parhyalella batesoni* Kunkel (1910); *g*, *Hyale nilssoni* (Rathke) (Sars, 1895, pl. 11); *h*, *Talitrus*. Maxilla 2: *i*, *Talitrus*. Maxilliped: *j*, *Insula antennulella* Kunkel (1910); *k*, *Parhyale hawaiensis* (Dana) (Chevreux, 1901a, as *Hyale brevipes*); *l*, *Najna*; *m*, *Chiltonia mihiwaka* (Chilton) (Hurley, 1954a); *n*, *Talitrus*. Uropod 3: *o*, *Parhyale* (Shoemaker, 1956b); *p*, *Chiltonia*; *q*, *Talitrus*. Telson: *r*, *Talitrus*; *s*, *Hyale*.

There are exceptions to the neat morphological partitioning of talitrid-like animals but there are definitely three or more facies and perhaps three lines of evolution as Bulycheva's arrangement points out. She did not assign all existing genera to families, which I do in the following scheme, considering for the uses of this handbook that they are subfamilies.

Subfamily Talitrinae: *Talitrus, Talorchestia, Orchestia, Orchestoidea.*
Subfamily Hyalellinae: *Hyalella, Parhyalella, Insula, Chiltonia, Afrochiltonia, Neobule, Austrochiltonia,* [*Najna?*] but see below.
Subfamily Hyalinae: *Hyale, Parhyale, Allorchestes, Parallorchestes.*
?(Subfamily Najninae): *Najna.*
?(Subfamily Dogielienotinae): See as a family, p. 207.

Probably *Neobule* Haswell was improperly described and classified. It has not been recovered since its original description in 1880. It has the aspect of a *Parhyalella* but may belong to another family, such as the Kuriidae, Prophliantidae, or Lysianassidae. Its "biramous posterior pleopoda" (presumably uropoda) may be an erroneous observation and the condition of the mandibular molar was not stated. It is the only talitrid presumed to have clearly biramous third uropods and so confuses what would otherwise be a clear diagnosis of the family.

Key to the Genera of Talitroidea

Neobule Haswell, a dubious genus, is not included.

1. Terminal maxillipedal palp article unguiform (claw-shaped) (figs. 169*j*,*k*) . 2
   Terminal maxillipedal palp article not unguiform (figs. 169*l*,*m*,*n*) 8
2. Uropod 3 with minute inner ramus (fig. 169*o*) 3
   Uropod 3 uniramous (fig. 169*q*) 4
3. Palp of maxilla 1 uniarticulate (fig. 169*h*) . . . . **Parhyale**
   Palp of maxilla 1 biarticulate (often faintly so) (fig. 169*g*) . . **Parallorchestes**
4. Telson entire (fig. 169*r*) 5
   Telson cleft (fig. 169*s*) 7
5. Maxilla 1 lacking palp (fig. 169*f*) . . . . **Parhyalella**
   Maxilla 1 bearing palp (figs. 169*g*,*h*) 6
6. Male gnathopods 1 and 2 similar to each other in size and morphology (fig. 169*a*) . . . . **Najna** and **Insula**
   Male gnathopod 2 much larger and of different morphology than gnathopod 1 (fig. 168*b*) . . . . **Hyalella** (freshwater)
7. Article 5 of male gnathopod 2 masked by articles 4 and 6 (fig. 168*e*) . **Hyale**
   Article 5 of male gnathopod 2 produced between articles 4 and 6 (fig. 168*g*) . . . . **Allorchestes**
8. Male gnathopod 1 simple (fig. 168*h*) 9
   Male gnathopod 1 subchelate (fig. 168*l*) 10
9. Male gnathopod 2 feebly chelate (fig. 168*f*) . . . . . **Talitrus** (terrestrial)
   Male gnathopod 2 large and strongly subchelate (fig. 168*e*).
   Orchestoidea (terrestrial)

10. Female gnathopod 1 simple (fig. 168*h*) . . . . . **Talorchestia** (terrestrial)
    Female gnathopod 1 subchelate 11
11. Article 5 of male gnathopod 2 produced between articles 4 and 6 (fig. 169*a*) . . . . **Najna**
    Article 5 of male gnathopod 2 masked between articles 4 and 6 (fig. 168*e*) . 12
12. Antenna 1 shorter than peduncle of antenna 2 (fig. 168*a*), female gnathopod 2 mitten-shaped (fig. 168*f*), maxilla 1 usually with palp (even though minute), uropod 3 with ramus . . . . **Orchestia** (terrestrial)
    Antennae 1 and 2 subequal in length, female gnathopod 2 normally subchelate (fig. 168*d*), maxilla 1 lacking palp, uropod 3 usually lacking a ramus (fig. 169*p*) 13
13. Gnathopods 1 and 2 alike in both sexes, hence male gnathopod 2 not enlarged . . . . **Afrochiltonia** (freshwater)
    Gnathopod 2 of male enlarged, unlike that of female 14
14. Male pleopod 1 normal . . . . **Austrochiltonia** (freshwater)
    Male pleopod 1 with inner ramus attenuated to backturned, whip-like lash . . . . **Chiltonia** (freshwater)

Genera of Talitroidea

Afrochiltonia K. H. Barnard

Afrochiltonia K. H. Barnard, 1955.

Type-species: *Chiltonia capensis* K. H. Barnard, 1916 (original designation).

Maxilla 1 lacking palp; article 4 of maxillipedal palp short, conical; gnathopods of both sexes subchelate, male gnathopod 2 not larger than 1, female gnathopod 2 like gnathopod 1; *male pleopod 1 normal* (*Chiltonia*); uropod 3 lacking inner ramus; telson entire. Species: 1, S. Africa, freshwater.

Allorchestes Dana

Allorchestes Dana, 1849.—Stebbing, 1906.
Aspidophoreia Haswell, 1880d.

Type-species: *A. compressa* Dana, 1852a (selected by Chevreux and Fage, 1925). See Stebbing, 1899a.

Maxilla 1 bearing palp; article 4 of maxillipedal palp unguiform; gnathopods of both sexes subchelate, male gnathopod 2 larger than 1, article 5 produced between articles 4 and 6, female gnathopod 2 like gnathopod 1; uropod 3 lacking inner ramus; telson cleft. Species: 12, cosmopolitan, littoral. At least two kinds of telson occur in this genus, one like that of *Hyale*, with subconical lobes fully split from each other and set at an angle to each other forming a tent; and the other a quadratiform flat plate with partial cleft. Reorganization of this genus needs investigation.

Austrochiltonia Hurley

Austrochiltonia Hurley, 1958.

Type-species: *Hyalella australis* Sayce, 1901 (original designation).

Maxilla 1 lacking palp; article 4 of maxillipedal palp short, conical; gnathopods subchelate in both sexes, male gnathopod 2 much larger than 1, article 5 not projecting between 4 and 6, female gnathopod 2 like 1; *male pleopod 1 normal* (*Chiltonia*); uropod 3 lacking inner ramus; telson entire. Species: 2, Australia, freshwater.

Chiltonia Stebbing

Chiltonia Stebbing, 1899a.—Stebbing, 1906.

Type-species: *Hyalella mihiwaka* Chilton, 1898 (original designation). See Hurley, 1954a.

Maxilla 1 lacking palp; article 4 of maxillipedal palp short, conical; gnathopods subchelate in both sexes, male gnathopod 2 much larger than 1, article 5 not projecting between articles 4 and 6, female gnathopod 2 like 1; *male pleopod 1 with inner ramus attenuated to a backturned whip-like lash* (*Afrochiltonia* and *Austrochiltonia*); uropod 3 lacking ramus; telson entire. Species: 3, New Zealand, freshwater.

Hyale Rathke

Hyale Rathke, 1837.—Stebbing, 1906.
Nicea Nicolet, 1849.
(*Allorchestina*) Brandt, 1851a (valid subgenus). Type by present selection: *Amphithoe* [sic] *prevostii* Milne Edwards, 1830.
Galanthis Bate, 1857a.

Type-species: *H. pontica* Rathke, 1837 (monotypy). See Sars, 1895 (as *H. lubbockiana*).

Maxilla 1 with 1-articulate palp (but note Sars, 1895, pl. 11); article 4 of maxillipedal palp unguiform; gnathopods subchelate in both sexes, male gnathopod 2 larger than 1, article 5 not projecting between articles 4 and 6, female gnathopod 2 like gnathopod 1; uropod 3 lacking inner ramus; telson cleft. Species: 48, cosmopolitan, especially tropics, littoral.

Hyalella Smith

Hyalella Smith, 1874.—Stebbing, 1906.

Type-species: *Amphitoe aztecus* Saussure, 1858 (monotypy and subsequent synonymy). See Bulycheva, 1957.

Maxilla 1 with short 1-articulate palp; article 4 of maxillipedal palp unguiform; gnathopods of both sexes subchelate, male gnathopod 2 larger than 1, article 5 produced between articles 4 and 6; female gnathopod 2 like gnathopod 1 or minutely chelate; uropod 3 lacking inner ramus; telson entire. Species: 27, primarily S. America, freshwater.

Insula Kunkel

Insula Kunkel, 1910.

Type-species: *I. antennulella* Kunkel, 1910 (montypy).

Maxilla 1 bearing a palp; article ?4 (Kunkel claims 3 and figures only 3 articles) of maxillipedal palp unguiform; gnathopods subchelate in male (female unknown), relatively alike in size, rather slender (possibly juvenile), article 5 lobed between articles 4 and 6; uropod 3 lacking inner ramus; telson entire. Species: 1, Bermuda, littoral.

Najna Derzhavin

Najna Derzhavin, 1937.—Gurjanova, 1951.

Type-species: *N. consiliorum* Derzhavin, 1937 (monotypy).

Mandibular molar obsolete; maxilla 1 with vestigial palp; article 4 of maxillipedal palp tiny, short, not unguiform; gnathopods similar in both sexes, subchelate, gnathopod 2 not larger than 1, article 5 lobed between articles 4 and 6; uropod 3 lacking inner ramus; telson entire or slightly notched [probably requires erection of new family]. Species: 1, boreal, N. Pacific, littoral.

[*Neobule* Haswell]

Neobule Haswell, 1880b.—Stebbing, 1906.

Type-species: *N. algicola* Haswell, 1880b (monotypy).

A problematical genus, probably not a talitroid; uropod 3 biramous, rami equal in size but small; gnathopods subchelate, gnathopod 2 larger than 1, palms nearly transverse. Species: 1, Australia, littoral.

Orchestia Leach

Orchestia Leach, 1814a.—Stebbing, 1906.
Scamballa White, 1847a.
Parorchestia Stebbing, 1899a.

Type-species: *Oniscus gammarellus* Pallas, 1766 (monotypy and subsequent synonymy). See Sars, 1895 (as *Orchestia littorea*).

Maxilla 1 usually with palp, 2-articulate or absent; article 4 of maxillipedal palp a vestigial bud or absent; gnathopods subchelate in both sexes, male gnathopod 2 much larger than 1, female gnathopod 2 mitten-like; uropod 3 lacking inner ramus; telson entire. Species: 69, cosmopolitan, primarily tropical, terrestrial (beachhoppers).

Orchestoidea Nicolet

Orchestoidea Nicolet, 1849.—Stebbing, 1906.
Talitronus Dana, 1850, 1852a.
Megalorchestia Brandt, 1851b.

Type-species: *O. tuberculata* Nicolet, 1849 (monotypy).

Maxilla 1 with small 2-articulate palp; palp article 4 of maxilliped a vestigial bud or absent; male gnathopod 1 subchelate but often poorly, gnathopod 2 larger than 1, subchelate, article 5 not produced between articles 4 and 6, female gnathopod 1 simple, gnathopod 2 mitten-like; uropod 3 lacking inner ramus; telson entire. Species: 12, primarily E. Pacific, terrestrial (beachhoppers).

Parallorchestes Shoemaker

Parallorchestes Shoemaker, 1941a.

Type-species: *Allorchestes ochotensis* Brandt, 1851c (original designation). See J. L. Barnard, 1962c.

Maxilla 1 with large 2-articulate palp; palp article 4 of maxilliped unguiform; gnathopods subchelate, male gnathopod 2 much larger than 1, article 5 produced between articles 4 and 6, female gnathopod 2 like 1; uropod 3 with small scale-like inner ramus; telson cleft. Species: 1, boreal N. Pacific, littoral.

Parhyale Stebbing

Parhyale Stebbing, 1897; 1906.
Hyaloides Schellenberg, 1939.

Type-species: *P. fasciger* Stebbing, 1897 (monotypy). See Shoemaker, 1956b.

Maxilla 1 with 1-articulate palp; article 4 of maxillipedal palp unguiform; gnathopods subchelate, male gnathopod 2 larger than 1, article 5 produced between articles 4 and 6, female gnathopod 2 like gnathopod 1 and slightly larger; uropod 3 with small scale-like inner ramus; telson cleft. Species: 2, circumtropical, littoral.

Parhyalella Kunkel

Parhyalella Kunkel, 1910.—Schellenberg, 1938.
Exhyalella Stebbing, 1917.

Type-species: *P. batesoni* Kunkel, 1910 (monotypy).

Maxilla 1 lacking palp; article 4 of maxillipedal palp unguiform; gnathopods subchelate, male gnathopod 2 larger than 1, article 1 produced between articles 4 and 6, female gnathopod 2 like male but smaller; uropod 3 uniramous; telson entire. Species: 7, pantropical, freshwater and marine.

Talitrus Latreille

Talitrus Latreille, *in* Bosc, 1802.—Latreille, 1802.
?(*Talitrorchestia*) Brandt, 1851a (subgenus). Type-species: *Orchestia cloqueti* Audouin, 1826 (obscure species).
Talitroides Bonnier, 1898.—Stebbing, 1906. Type-species: *T. bonnieri* Stebbing, 1906 (monotypy).
Talitriator Methuen, 1913.

Type-species: *Cancer* (*Gammarus*) *saltator* Montagu, 1808 (new name for *Oniscus locusta* Pallas, 1766), selected by Boeck (1876). This designation remains questionable. When Bosc (1802), in copying Latreille's manuscript, erected *Talitrus* (for which the latter deserves nomenclatural credit in Bosc), two species "*Gammarus locusta* Fab." and "*Oniscus gammarellus* Pallas" were assigned to it (vol. 1 of Bosc, p. 78). In vol. 2 of the same work, the assigned species were stated as *Talitrus grillus*, a new species later attributed to Bosc, but which, as indicated in the description, should be attributed to Latreille. By strict adherence to rules, and without either original description, Bosc's second volume or Latreille's work of a few months later in 1802, we would expect the genus *Talitrus* to be composed of two species, one of which is precisely the type-species of the earlier genus *Gammarus*, the other of which later came to be a species of *Orchestia*. Only by reference to volume 2 do we assume Latreille was referring earlier to the species described by Pallas and not that described by Fabricius. They become homonyms when thrown together in *Cancer* by other authors. Thus by elimination, now outmoded, *Oniscus gammarellus* Pallas could yet be selected as the type-species of *Talitrus* and *Orchestia* would fall as a synonym to *Talitrus*, a highly undesirable occurrence at this late day in amphipodan taxonomy. And, *G. locusta* Fabricius (identical with *Cancer locusta* Linnaeus) could also be selected. If necessary, the case should be submitted to the ICZN in the hope that they would fix *Oniscus locusta* Pallas as type-species, and eliminate the ambiguity of Latreille (in Bosc) having used Fabricius' name as author of the species.

Maxilla 1 with small 2-articulate palp; article 3 of maxillipedal palp a vestigial bud; gnathopod 1 of both sexes simple, gnathopod 2 of both sexes small, feebly chelate, mitten-shaped; uropod 3 lacking inner ramus; telson entire or slightly notched. Species: 11, (terrestrial, circumtropical, biboreal).

Talorchestia Dana

(*Talorchestia*) Dana, 1852b (subgenus).—Stebbing, 1906.

Type-species: *Talitrus gracilis* Dana, 1852a (selected by Chevreux and Fage, 1925).

Maxilla 1 with small 2-articulate palp; article 4 of maxillipedal palp a vestigial bud or absent; gnathopod 1 of both sexes simple or poorly subchelate, male gnathopod 2 larger than 1, subchelate, article 5 not produced between articles 4 and 6, female gnathopod 2 small, mitten-shaped; uropod 3 lacking inner ramus; telson entire or slightly notched. Species: 39, circumtropical, amphiboreal terrestrial (some beach-hoppers).

Thaumatelsonidae

Figures 170, 171

Diagnosis.—Accessory flagellum absent or vestigial; mandibular molar evanescent; coxa 1 very small or absent, always partially covered by following coxae; coxa 4 large, shield-like, not excavate posteriorly; uropod 3 uniramous; outer lobes of maxilliped vestigial; telson entire, greatly thickened dorsoventrally; urosomal segments coalesced or partially so; *article 2 of pereopod 3* (and 4–5) *linear.* See Stenothoidae, Cressidae, Pagetinidae, Leucothoidae, Anamixidae, Amphilochidae.

Description.—Rostrum inconspicuous; accessory flagellum absent or vestigial; body smooth or pleon with dorsal carinae; coxa 1 small or absent, hidden by following coxae; coxa 4 large, shield-like, not excavate posteriorly; upper lip probably incised; mandible with evanescent molar, palp present or absent; lower lips unknown; maxilla 1 with 2-articulate palp; maxilla 2 normal; maxilliped slender, outer plates small or vestigial; gnathopods moderately powerful, subchelate or chelate; uropod 3 uniramous, the ramus 2-articulate; telson greatly thickened dorsoventrally; urosomal segments coalesced or partially so, or urosomite 1 often with large dorsal process covering remainder of urosome dorsally.

Relationship.—The Stenothoidae have distinct urosomal segments and unthickened telsons.

The Cressidae have the unthickened telson fused with urosomite 3.

Parathaumatelson Gurjanova (1938) is synonymized with *Pseudothaumatelson* Schellenberg (1931).

Key to the Genera of Thaumatelsonidae

1. Gnathopod 2 chelate (fig. 171*j*) . . . . **Prothaumatelson**
   Gnathopod 2 subchelate (figs. 171*h*,*i*) 2
2. Palp of mandible 1-articulate or absent
   Pseudothaumatelson (=**Parathaumatelson**)
   Palp of mandible 3-articulate . . . . **Thaumatelson**

FIGURE 170.—Thaumatelsonidae: *a*, *Thaumatelson walkeri* Chilton (1912), side of telson stippled; *b*, *Thaumatelson herdmani* Walker (1907).

Genera of Thaumatelsonidae

Prothaumatelson Schellenberg

Prothaumatelson Schellenberg, 1931.—Gurjanova, 1938.

Type-species: *Thaumatelson nasutum* Chevreux, 1912a; 1912b (monotypy).

Species: 2, bipolar, littoral.

Pseudothaumatelson Schellenberg

Pseudothaumatelson Schellenberg, 1931.—Gurjanova, 1938.
Parathaumatelson Gurjanova, 1938.

Type-species: *P. patagonicum* Schellenberg, 1931 (present selection).

Species: 3, subantarctic, littoral.

FIGURE 171.—Thaumatelsonidae: Mouthparts, *Thaumatelson herdmani* Walker (1907): *a*, mandible; *b,c*, maxillae 1, 2; *d*, maxilliped. *Prothaumatelson nasutum* (Chevreux, 1912b): *e*, maxilliped. Gnathopod 1: *f*, *Thaumatelson walkeri* Chilton (1912b); *g*, *Prothaumatelson carinatum* Shoemaker (1955). Gnathopod 2: *h*, *Thaumatelson herdmani;* *i*, *Thaumatelson walkeri;* *j*, *Prothaumatelson carinatum.* Uropod 3: *k*, *Prothaumatelson nasutum.* Urosome and pleonite 3, urosomites coalesced, bearing 3 uropods and large telson: *l*, *Thaumatelson walkeri.*

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Thaumatelson Walker

Thaumatelson Walker, 1906b, 1907.

Type-species: *T. herdmani* Walker, 1906b; 1907 (monotypy). See Schellenberg, 1931.

Species: 3, subantarctic, littoral.

Vitjazianidae

Figure 172

Diagnosis.—Accessory flagellum long, composed of a few long articles; base of primary flagellum conjoint; gnathopod 1 simple, gnathopods feeble, anterior members intersimilar; coxae short. See Synopiidae, Astyridae, Eusiridae, Liljeborgiidae, Hyperiopsidae, Melphidippidae, Argissidae.

Description.—Accessory flagellum long, composed of only a few articles; base of primary flagellum of antenna 1 conjoint, forming an article nearly as long as peduncle; body smooth except for slight carinations on urosome; rostrum slightly developed; coxae very short to medium in length, scarcely touching; upper lip minutely incised; lower lip with or without inner lobes; mouthparts otherwise basic; gnathopods feeble, gnathopod 1 simple, gnathopod 2 simple or subchelate; uropods biramous; telson short, cleft.

Relationship.—The Hyperiopsidae differ from Vitjazianidae by the bent first maxillary palps, the poorly toothed primary cutting edge and small molar of the mandible and the elongate fourth articles of pereopods 1 and 2.

The Eusiridae have an elongate peduncle of antenna 1 and usually large subchelate gnathopods. Liljeborgiidae have large subchelate gnathopods.

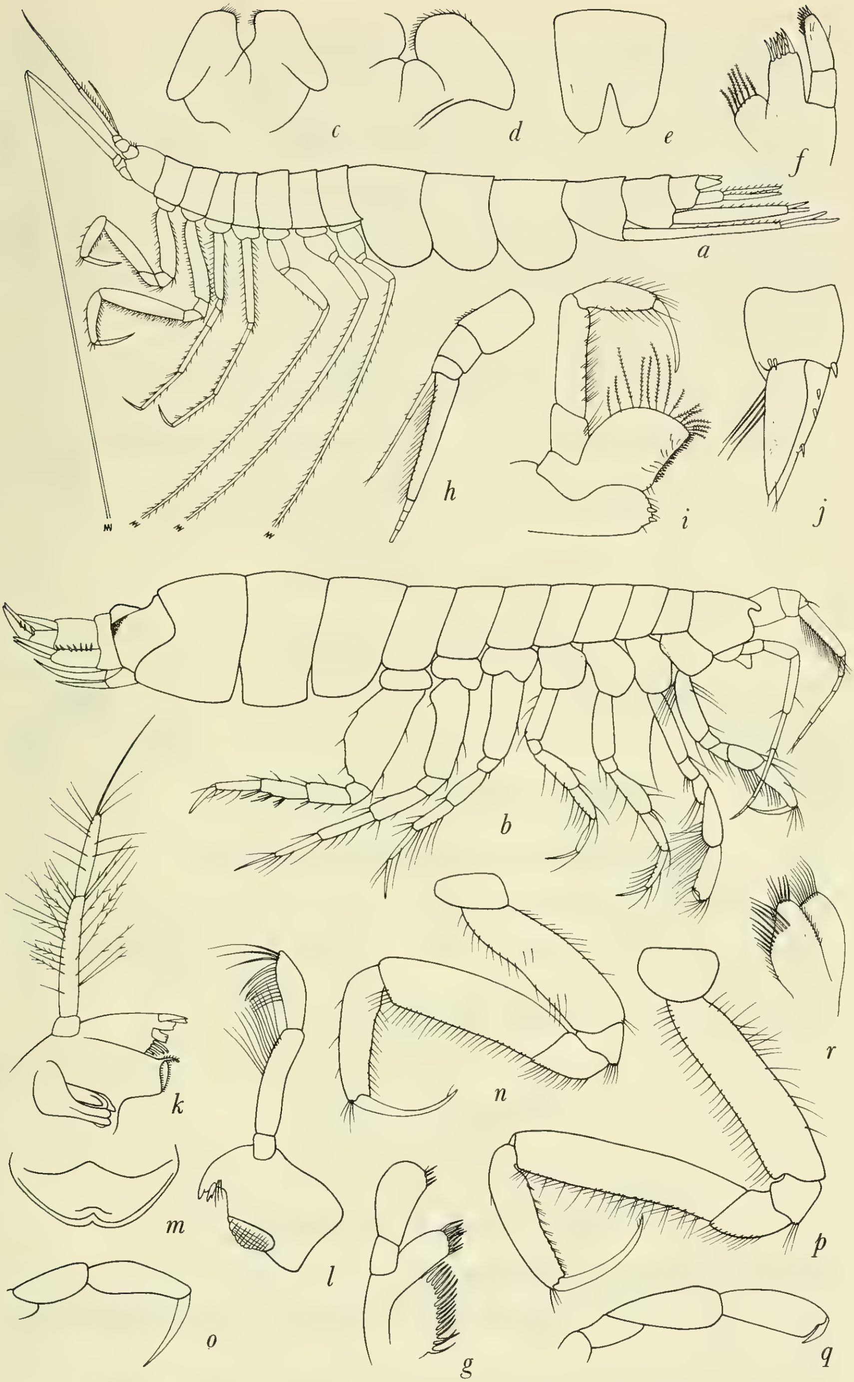
The Melphidippidae have an elongate uropod 3, and an elongate peduncle of antenna 1.

The Astyridae have a 1-articulate accessory flagellum, a reduced mandibular molar, and gaping lower lip.

The Stilipedidae lack an accessory flagellum, have foliaceous first maxillae, short gnathopods, and no mandibular molar.

→

Figure 172.—Vitjazianidae: *a*, *Vitjaziana gurjanovae* Birstein and Vinogradov (1955); *b*, *Vemana compressa* J. L. Barnard (1964a). Lower lip: *c*, *Vemana; d*, *Vitjaziana.* Telson: *e*, *Vitjaziana.* Maxilla 1: *f*, *Vitjaziana; g*, *Vemana.* Antenna 1, basal portion: *h*, *Vitjaziana.* Maxilliped: *i*, *Vitjaziana.* Uropod 3: *j*, *Vemana.* Mandible: *k*, *Vitjaziana; l*, *Vemana.* Upper lip: *m*, *Vitjaziana.* Gnathopod 1: *n*, *Vitjaziana; o*, *Vemana.* Gnathopod 2: *p*, *Vitjaziana; q*, *Vemana.* Maxilla 2: *r*, *Vitjaziana.*



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A few setae of pereopods 1–5 are elongate in some vitjazianids and the term "fossorial" might be applied to them but other fossorial families do not have a basally conjoint primary flagellum on antenna 1.

Vitjazianids have definitive similarity to Gammaridae and Eusiridae, from which they differ by the very short peduncle and the long conjoint base of the primary flagellum on antenna 1. By evidence of gnathopods and mandible, but not of telson and head the vitjazianids are closely related to synopiids (tironids) and demonstrate again the difficulty in defining families because of the centripetal radiation of evolutionary lines around the Gammaridae.

Key to the Genera of Vitjazianidae

1. Gnathopod 2 subchelate; coxae of medium length; mandibular palp claviform. **Vemana**

   Gnathopod 2 simple; coxae minute; mandibular palp linear . . . **Vitjaziana**

Genera of Vitjazianidae

Vemana J. L. Barnard

Vemana J. L. Barnard, 1964a.

Type-species: *V. compressa* J. L. Barnard, 1964a (original designation).

Species: 2, Caribbean, bathy-abyssopelagic.

Vitjaziana Birstein and Vinogradov

Vitjaziana Birstein and Vinogradov, 1955.

Type-species: *V. gurjanovae* Birstein and Vinogradov, 1955 (original designation).

Species: 1, N. W. Pacific, abyssopelagic.

Incertae Sedis

Figure 173

Didymocheila K. H. Barnard

Didymocheila K. H. Barnard, 1931; 1932.

Type-species: *D. spongicola* K. H. Barnard, 1931 (original designation); 1932.

Having all characteristics of Lysianassidae except article 3 of gnathopod 2 not elongate and article 6 strongly elongate, gnathopods

1 and 2 slender, subequal in size and weakly chelate; mouthparts from lateral view conically grouped, upper lip substyliform, entire, mandible substyliform, cutting edge slightly toothed, molar well developed, ?barrel-shaped or cup-shaped, unknown if triturative, 3-articulate palp attached level with molar; lower lip with *Trischizostoma* appearance; inner plate of maxilla 1 heavily setose medially, palp 2-articulate; maxilla 2 and maxillipeds normal; uropod 3 lacking rami, composed of a simple, ovate peduncle; telson broader than long, entire, apically concave.

With strong resemblance to Sebidae in gnathopods but article 2 of antenna 1 peduncle not elongate, upper lip elongate, mandibular molar and palp strong, uropod 3 lacking any rami, telson very short, etc. Species: 1, S. Georgia Islands, littoral.

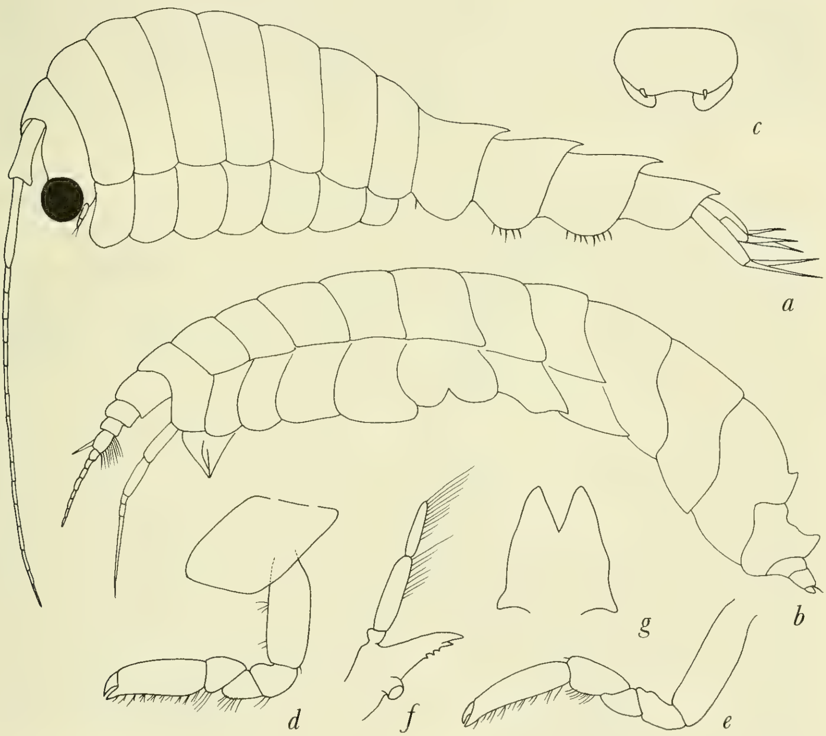

FIGURE 173.—Incertae Sedis: *a*, *Sphaerophthalmus grobbeni* Spandl (1924). *Didymocheila spongicola* K. H. Barnard (1932): *b*, lateral aspect; *c*, telson and third uropods; *d,e*, gnathopods 1, 2; *f*, mandible; *g*, lower lip.

Metoediceros Schellenberg

Metoediceros Schellenberg, 1931.

Type-species: *M. fuegiensis* Schellenberg, 1931 (monotypy).

Head poorly rostrate, not massive; eyes lateral; antennae short, subequal in length, peduncle of antenna 1 slightly longer than head, articles 1–3 successively shorter, male antenna 2 with calceoli, accessory flagellum absent; upper lip not incised; [epistome unknown]; mandible lacking palp, with large triturative molar and toothed incisor; lower lip with inner lobes separate, outer lobes with mandibular extensions; inner plate of maxilla 1 with one terminal seta, outer plate with 10 spines, palp 4-articulate, article 4 unguiform; coxae long as in normal gammaridean, coxa 4 not excavate posteriorly; gnathopods 1–2 weakly subchelate, of medium size, similar to each other, articles 5–6 subequal in length; pereopods generally like those of *Oediceros saginatus* (see Sars, 1895, pl. 102), thus fossorial, pereopods 1–4 with vestigial dactyls; uropods 1–2 normal, apices of rami spinose; uropod 3 reduced to a small simple triangular peduncle; telson nearly circular, entire. Affinities with Dogielinotidae but epistome unknown. Species: 1, Tierra del Fuego, brackish water.

Sphaerophthalmus Spandl

Sphaerophthalmus Spandl, 1923; 1924.

Type-species: *S. grobbeni* Spandl, 1923; 1924 (monotypy).

Probably assignable to the Dexaminidae.

Head and thorax very tall, eye forming a large bead; apparently urosomal segments 2–3 coalesced, very small and flat; metasome dorsally carinate; accessory flagellum apparently absent, antenna 1 long, slender, article 2 longer than 1, flagellar articles numerous, antenna 2 "3-articulate"; maxillipeds apparently with medium sized inner lobes, enormous subclavate outer lobes nearly exceeding the moniliform 4- (?3-) articulate palp, the terminal article of which lacks distinction; other mouthparts not described; gnathopod 1 stout, like that of stegocephalids, gnathopod 2 more slender, elongate, article 6 expanded and bearing transverse palm as in gnathopod 1; pereopods of medium length, second articles of pereopods 3–5 expanded; uropods 1–2 normal, rami interequal, apically spinose, uropod 3 with short peduncle and leaf-like rami; telson elongate, cleft nearly to base. Species: 1, Red Sea, littoral.

Supplement

Recent studies by the writer in Hawaii, New Zealand, and Australia suggest the following changes and additions to the classificatory scheme of Gammaridea.

The Eusiridae and Calliopiidae must be amalgamated.

The Aoridae must be amalgamated with the Isaeidae; most genera of the Corophiidae should also be placed in the greater Isaeidae but *Corophium* and *Paracorophium* might be retained within a subfamily.

Ceina is to be removed from the Phliantidae to form the type of a new family with close affinities to the Hyalidae; the family will be characterized by the loss of rami on uropod 3 and the rough skin texture; it has affinities with various freshwater chiltonias that may require removal from the Hyalellidae to form a group distinct from the American hyalellas.

Biancolina is to be removed from the Eophliantidae to form the type of a new family. The biramous uropod 3 of *Biancolina* is one mark of its distinction from Eophliantidae. *Amphitholina* should also be removed from Eophliantidae and returned to the Ampithoidae as type of a new subfamily.

The freshwater genus *Paracalliope* is added to the list of marine genera as one of its species, *Oedicerus novizealandiae* Dana (1853), is definitely intertidal in New Zealand. That species is not a member of *Carolobatea* as heretofore considered (Chilton, 1909). Stebbing (1906) had already suggested Dana's species to be identical with *P. fluviatilis* (Thomson) but the two are definitely distinct.

Paracalliope Stebbing

Paracalliope Stebbing, 1899d; 1906.

Type-species: *Calliope fluviatilis* Thomson, 1879 (original designation).

Eusirid-calliopiid with incipient characters of Oedicerotidae, especially in the disproportionately elongate pereopod 5 with elongate, terminally setose dactyl and elongate uropod 3.

Eyes paired, discontiguous; accessory flagellum vestigial; inner plates of maxillae 1–2 heavily setose medially, maxilla 2 with additional submarginal row of medial setae; female gnathopods weak, those of male stout, with erect lobes on fifth articles, hands twisted mediad, palms bearing large spines; coxa 4 weakly or not posterodorsally excavate; telson ovoid, thin, uncleft; *urosomites 2–3 coalesced.* Species: 5 (2 undescribed), New Zealand, Australia, Philippine Islands, India, marine littoral, brackish and freshwaters.

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Appendix I

Dissection of an Amphipod

For Right-handed Operators.

In a flat-bottomed syracuse dish, the amphipod is laid on its left side with its legs projecting away from the operator, so that it appears up-side down through the oculars of the stereoscope. The body is covered to more than twice its depth with alcohol to prevent the effects of surface tension during dissection and to ameliorate the glare of reflected light from projecting legs.

A pair of jeweler's forceps with very fine points, a fine dissecting needle such as an insect pin mounted on a stick of wood, and a coarse, standard dissecting needle are used. At least five standard glass slides, one depression slide, and six thin cover slips are needed. A small drop of glycerine is placed on two of the flat slides, a tiny drop each on three of the flat slides, and the depression-slide concavity is sparingly filled with glycerine (other media are used for permanent mounts; permanent slides have the disadvantage of restricting the manipulation of mounted parts for 3-dimensional observation; parts from glycerine slides may be stored permanently in alcohol in a tiny vial made of a bit of capillary tubing with one end closed by melting in a fire, the other end stoppered with cotton, pith, or plastic foam).

One commences removing the pereopods (legs) of the amphipod at either the fourth or fifth coxa (sideplate) depending on which of these coxae is largest or would pull away from the body without entangling other legs or coxae. The amphipod is up-side down on its left side, being held with a coarse needle in the left hand through a body segment or with forceps or a blunt stick, and the coxa is being pulled and ripped gently at its base with the fine forceps. In most cases the coxa can be pulled free of the body carrying some of its proximal musculature. Occasionally the firmness of the attachment dictates the use of a fine scalpel.

When the coxa is removed, the remainder of the leg and gill (and if a female the brood lamella) will come with it. As the legs are excised identifying marks are noted in order to record the leg sequence for positioning on the slide. Particularly confusing are coxae 3 and 4 because they are often similar in size and shape, as are the last three pereopods.

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Pereopods and gnathopods are removed to one side of the dish until all seven legs have been collected. Antennae 1 and 2 are dissected at their bases (right side only). Care in removal of antenna 2 at its juncture is needed because it often breaks easily at joint 2 or 3.

The seven coxae-legs and two antennae are removed in a group from the dish of alcohol to the flat slide with the largest drop of glycerine. When placed in the glycerine the parts will disperse the drop, but a light breath of air will accelerate evaporation of the alcohol and the amalgamation of the puddle. The legs must be fully immersed in the glycerine to prevent drying and uptake of air bubbles. Do *not* put on the cover slip.

The right uropods 1, 2, and 3, both lobes of the telson, and one member of each pair of the pleopods are removed and placed on two of the flat slides with tiny drops of glycerine; the parts are manipulated, while the glycerine puddles coalesce, and arranged so that their respective dorsal (uropods) and anterior (pleopods) sides are up. A clean cover slip, gripped in the forceps, is lowered horizontally over the glycerine until it can be dropped smartly onto the puddle without engaging air bubbles. Glycerine is to be applied sparingly so as to prevent excessive sliding of the cover slip. If the perimeter of the cover slip lacks glycerine it may be added later by placing a small drop at the edge.

Before removing mouthparts determine whether they are grouped in a coniform or quadratiform bundle from lateral view.

Mouthparts are removed from the head, again with the amphipod head pointing away from the observer so that motion to the right with the forceps can be used to snap off the mouthparts. The maxillipeds, which are the most posterior mouthparts, cover all the other mouthparts and must be removed at their base first; both maxillipeds will come off together. More anteriorly, a pair of bilobed second maxillae is to be removed and then the first maxillae, each of which appears to have three lobes (inner lobe, outer lobe, and palp but in a few genera lacking a palp). The inner lobes are difficult to remove in connection with the outer unless special care is taken and caution must be exercised not to damage the lower lip. Mandibles are removed next; they are usually brittle and easily broken; they are most easily removed by rotating them to ascertain the basal muscular attachment and snipping this with forceps. Sclerotic connections to upper and lower lips also must be broken to avoid their damage. Usually each mandible will have a palp. After maxilla 1 and the mandibles are removed, a lower lip and an upper lip will remain; the lower lip is extensive and for removal must be grabbed deeply in its muscular and tendon attachments without separating the inner and outer lobes. After practice one may desire to remove lower lips before dissecting mandibles as the two mouthparts often are closely connected with tissues and the mandibles will tear the lower lip when being removed.

The upper lip and epistome are not removed from the head at this time. Their interrelationship from lateral view must be preserved. The observer should note the condition of the ventral margin of the upper lip from anterior view (rounded, incised, truncated) before mounting the carcass on the depression slide.

Mouthparts are transferred to a tiny drop of glycerine on a flat slide, arranged in sequence and fitted with a cover slip. Preferably the mouthparts are arranged so that the following parts project upward or are on top: mandibular molars and the inner lobes of lower lip, maxillae, and maxillipeds. If the base of the maxillipeds curves upward, it may be cut off so that the cover slip will set firmly. The mandibles should be arranged with the molars projecting obliquely toward the observer or directly lateral, if the center of gravity so permits. Often mandibles are placed on a separate slide with supports for the cover slip to prevent crushing. Supports may be made of wire or sand grains.

Because a unilateral dissection has been made, the remaining amphipod carcass has a complete set of pereonal and pleonal parts remaining on one side (the left if done by a right-handed operator). Coxa 1 and any other (left) legs are removed which would obscure the head and pleon from lateral view. The carcass is mounted right side down in the glycerine of the depression slide and a cover slip firmly set. If the amphipod is so large that it will be crushed by the cover slip or lie in a tilted position, two pieces of wire of appropriate thickness (or variously thick insect needles, pins, paper clips cut with nipping pliers) are placed on each side of the amphipod, which is covered with sufficient glycerine to fill the area between the two wires, and the cover slip set on the supports. The top glass should fit the carcass snugly so as to hold it in place but not to crush it. Glycerine has sufficient surface tension so that it will not leak out from under the elevated coverslip as long as the slide is kept in a horizontal position.

One now returns to the first flat slide on which were placed the seven right pereopods (including gnathopods) and the two right antennae. They are arranged in order from anterior to posterior in two rows. Gills from legs 2 to 7 (or 2–6 or 2–5) are removed and placed in sequence on the fourth flat slide of glycerine. If the animal is a female, the brood lamellae are removed in sequence and placed in a row on another slide. At this stage one is working from glycerine to glycerine without the effects of a change in surface tension so that it is easy to keep the parts in order, making notes of characteristics that will permit proper orientation. Cover slips are set in place.

If the amphipod species is dimorphic, a slide of antennae, gnathopods, and uropod 3 of the other sex should be prepared for rapid identification; but a full dissection should be prepared for descriptive purposes.

Parts of greatly differing thickness should not be intermingled on the same slide as the thinner parts will not be properly fitted by the cover slip. Delicate parts may need artificial support of the cover slip as noted above in discussion of the mandibles. Dirt may be removed from heavily setose appendages by use of a fine camel's-hair brush.

Eventually the student will gain sufficient experience for examination of most parts without dissection. Even mouthparts can be partially to fully examined by careful manipulation under a fine stereoscope with adequate 2-directional light sources. Mandibles often can be rotated for viewing molars without their complete removal. This protects unique specimens from unnecessary damage or loss of parts, or the need to mount parts permanently.

The taxonomist anticipating a need to illustrate the organism will leave the telson and the left first coxa attached to the carcass so that a full lateral view of the amphipod is preserved. The telson can be removed for flat mounting after the lateral view is drawn. Usually the left legs distal to their coxae are removed and mounted. The lateral in toto drawing represents a composite reconstruction of body and coxae drawn first, with legs superimposed on the drawing by use of a microprojector or camera lucida in which degree of magnification can be replicated. In this way legs are attached to the body drawing in perfectly flat but somewhat unnatural condition. One must determine accurately the attachment loci of the legs to their coxae by study of the proposed slides 5 and 6 noted below. Generally, it is preferable to make slides of the following composition if illustrations are to be made.

1. Depression slide with carcass.
2. Mandible, maxilliped, lower lip, with support for cover slip.
3. Maxillae, 1, 2.
4. Antennae 1, 2, with support for cover slip to allow rotation and examination of all surfaces by movement of cover slip.
5. Gnathopod 2, if especially thick.
6. Gnathopod 1 and pereopods 1–5.
7. Pleopods 1–3.
8. Uropods 1–3, with support for cover slip to allow rotation of parts.
9. Telson (removed from carcass after lateral illustration).
10. Upper lip and epistome (removed from carcass after lateral illustration).
11. Left legs, except for their coxae.

12. Gills, with support for cover slip.
13. Brood lamellae.

Very frequently, preserved amphipods have broken appendages. Sometimes the loss of uropod 3 is a consistent occurrence especially in gammarids and oedicerotids. So few Gammaridea lack a third uropod that the first assumption always should be that the part has been removed accidently and close examination should be made for sockets and musculature indicating the loss.

Antennae are often broken and such specimens should be avoided until experience is sufficient to recognize amphipods by other means. In the photid-corophiid complex, legs (except gnathopods) and antennae are frequently autotomized when the animals are preserved, and specialists usually have found other means of identification in those families.

The ecologist making a study of a single species should be prepared to take special care in preservation of his material to ensure completeness of the specimens. He may find slow dilution of seawater or special anesthetics suitable to kill the organisms slowly and to prevent autotomy.

Appendix II

Amphipod Analytical Sheet

A Checklist of Characters to be Examined Before Using Keys

Before the keys are utilized for the identification of an amphipod, the morphological characteristics of the organism should be determined. This requires a complete dissection, mounting, and examination of parts on microscope slides as discussed in Appendix I. The following checklist may be useful as a guide to characters that should be determined. This procedure is very laborious at first but pays dividends in the final result and makes familiar, more rapidly, those characters which ultimately are most important. Principal characters are italicized.

The checklist is designed to indicate the characters present by circling the pertinent items in the sentences, or adding percentages to blanks or zeros to the ends of inappropriate sentences. Descriptive phrases applied to various shapes are minimal in number; the observer may have to compose further refinements. But descriptive refinements can be overextended to the unnecessary wastage of time, for this checklist applies to initial analysis of the generic position and not to fine details necessary for specific identity.

One may find it useful to replicate copies of this checklist for the keeping of records.

BODY

(Pereon and Pleon [metasome and urosome])

General, segments:

Abnormal disproportion or enlargement (example, *Danaella*).

Cylindricalization (examples, Colomastigidae, Eophliantidae).

Dorsal depression with or without splaying of coxae.

Ornamentation:

Teeth, dorsal and lateral; pereon 1, 2, 3, 4, 5, 6, 7; pleon 1, 2, 3, 4, 5, 6.

Spine groups, dorsal, especially on pleon 1, 2, 3, 4, 5, 6.

Elongation of metasome: example, is it as long as 5 or 6 pereonites? (for distinguishing a few Gammaridae and Eusiridae).

Urosome:

Coalescence of segments: 1–2, 1–3, 2–3 (examples: Ampeliscidae, Kuriidae Podoceridae).

Dorsal depression (examples, Corophiidae, Cheluridae).

Elongation of urosomite 1 (example, Podoceridae).

Pleonal epimera:

Shape and ornamentation from lateral view, especially of epimeron 3 (primarily for identification to species).

COXAE

Size:

Normal: like basic gammaridean; 1–4 of medium length, subquadrate, 5–7 shorter, successively smaller, 5–6 slightly lobed.

Elongation (example, Stegocephalidae).

Reduction (example, Podoceridae).

Disproportional sizes of 1–4: 1 long, 2 shorter, 3 shorter, 4 long (example, Argissidae).

Coxa 1 absent or vestigial (rare examples, Bateidae, *Anamixis*).

Coxa 1 reduced in size and partially to fully covered by following coxae (example, Stenothoidae). (Caution: keep amphipod specimen in unflexed condition for proper observation.)

Coxae 1–2 or 1–3 reduced in size and covered by following coxae (primarily genera of Lysianassidae).

Coxa 3 larger than 4 (example, Synopiidae).

Coxa 5 as long as 4 (rare).

Position:

Serial contiguity: coxae contiguous or overlapping.

Serial discontiguity (example, Podoceridae, Eophliantidae).

Concealment of one coxa by another (see above).

Lateral splaying (Phliantidae).

Shape:

Coxae 1–4 subquadrate.

Acumination of coxae 1, 2, 3, 4.

Excavation posteriorly of coxa 4: posterior margin straight, concave or deeply excavate and/or bearing posterior lobe (contrast Stegocephalidae and Isaeidae).

Coxa 1 tapered, expanded, oval, semicircular, quadrate, conical, acutely lobed.

Ventral serrations.

Special patterns:

Disproportional sizes of 1–4 (Argissidae, see above).

Crescentic curve formed ventrally by coxae 4–5 together (example *Epimeria*).

HEAD

Size:

Length as a function of one or more pereonites (1, 1–2, 1–3), head measured on horizontal axis from front of lateral lobe to perpendicular line from posterior cephalic extent.

Massive (see definition in glossary).

Shape:

Normal gammaridean: head cuboidal, with lateral lobes.

Globular: subspheroid; neck cylindrical.

Galeate (see definition in glossary).

Rostrum:

Length in relation to head (%) and to article 1 of antenna 1 (%).

Shape: acute, spatulate; horizontal, deflexed.

Lateral lobe:

Shape and extent of projection.

Notch or ornamentation.

Ocular bulge on side of head.

Marginal details of anteroventral corner of head near insertion of antenna 2.

EYES

Composition:
- Presence or absence (careful examination required because eyes often lose pigment in preservative).
- Paired ommatidial mass below cephalic cuticle (common).
- *Cuticular lenses* in lateral pairs (Ampeliscidae almost exclusively). Occasionally lenses occupy anterior surface of head.
- Diffused pigment or stain.
- *Quadrigeminous lenticular bodies* (example, Argissidae).
- Bright pigmentary masses enveloping brain (especially Ampeliscidae).

Shape: ovoid, flask-like, reniform.

Position:
- Near lateral cephalic surface.
- In lateral lobes.
- In rostrum (especially Oedicerotidae).
- *Dorsally confluent* (especially Oedicerotidae).
- Accessory detached ommatidia (pattern often confused by preservational accidents).
- Occupying cephalic extent almost fully (Hyperiopsidae).

ANTENNA 1

Length:
- As percent of total body (front of head to base of telson (%).
- In relation to antenna 2 and to its peduncle (%).

Flagellum:
- Proportion to peduncle (%).
- Elongation of basal article (often conjoint, composed of incompletely segmented articles).
- Proportion to peduncular article 3, especially when latter elongated (%).
- Number of articles: 0, 1, 2, 3, 4, 5, 6–10, 11–15, 16+.

Peduncle: Proportion to head.
- Relative lengths of all three articles (value of 100 assigned to length of article 1): 1=100%; 2=(%); 3=(%).
- Ornamentation on any article, all sides.
- Distinctive spines or setal bundles.
- Possible geniculation between articles (example, several Haustoriidae).

Accessory flagellum (attached to article 3 of peduncle, medial):
- *Number of articles:* 0, 1, 2, 3, 4, 5–10, 11+.
- *A fused scale.*
- *Special shape.*
- *Elongation of basal article.*

Accessory organs:
- Calceoli.
- Aesthetascs, if especially enlarged or in dense bundles.

ANTENNA 2

Length as percent of body length (including head) (%).

Peduncle: proportion to head (%).
- Relative proportions of articles: 4=100%; 5=(%).
- *Tumidity of articles 3, 4, or 5;* article 1 large and subspherical.
- Gland cone and/or *ensiform process* on articles 2 and 1; extreme enlargement and shape. (Ensiform process generically important primarily in Phoxocephalidae. Gland cone often medial and hidden from lateral view.)

Flagellum: proportion to peduncle (%) or article 5 (%).
Number of articles: 0, 1, 2, 3, 4, 5, 6–10, 11–15, 16+.
Ornaments:
Aesthetascs, calceoli on peduncle and/or flagellum.
Distinctive spine groups.
"Fossorial" condition, with long plumose setae.

MOUTHPARTS

From lateral view forming a *conical bundle* below head (rare) *or a quadrate* bundle (common). To be examined before dissection.
Amalgamation of mandibles and maxillae into ventral keel (Anamixidae).

EPISTOMAL-LABRAL COMPLEX (prebuccal)

Lateral view (primarily of generic importance in Lysianassidae):
Epistome and labrum separated by notch (common) or coalesced.
Epistome formed as lobe dominating labrum, vice versa, or produced together.
Shape of lobes:
Epistome: flat, rounded, acute.
Labrum: flat, rounded, acute.
Prebuccal mass inconspicuous and of normal gammaridean proportions.

UPPER LIP (anterior view)

Ventral margin: rounded, truncate, incised, lobed asymmetrically or symmetrically.

MANDIBLE

Shape and size of body: bulky (Synopiidae), styliform (Acanthonotozomatidae), elytriform (Stegocephalidae, Pardaliscidae), OR normal (Gammaridae).
Incisor: normal, extremely broadened; needle-like, toothed, untoothed, teeth separated by flat margin.
Lacinia mobilis, if present on either right or left mandible: toothed, special shape such as vermiform.
Spines proximal to lacinia mobilis: 1–2; 3–6; 7+.
Molar: Absent.
Size: small (fig. 126*i*), medium (fig. 126*e*), large (fig. 126*g*), fully dominating mandible (fig. 166*d*).
Shape: cylindrical, cuboidal, laminate, conical, tuberous.
· *Texture:* triturative (rasp-like), spinose (spines articulate), setulose, minutely fuzzy, striate, smooth.
Accessory seta or spine on triturative molar.
Palp:
Number of articles: 0, 1, 2, 3.
Attachment position relative to molar: over (level with), distal to, proximal to (variation from "level" primarily in Lysianassidae).
Relative length of articles: 1=(%); 2=100%; 3=(%).
Shape:
Article 3: cylindrical, falconiform, tuberculiform.
Article 2: occasionally curved strongly.
Article 1: rarely with distal cusp.
Setation: article 3: distal only, medial.
Disymmetry of right and left members (especially lacinia mobilis, incisor, spine-row).

LOWER LIP

Normal gammaridean (fig. 2).
Inner lobes: *weak* (fig. 71*d*), *absent.*
Mandibular projection of outer lobes: pointed, obtuse, absent.
Outer lobes: *distally notched;* medially excavate (Ampithoidae, figs. 50*c*,*d*).
Special shapes: Pleustidae (fig. 37*a*), *Trischizostoma* (fig. 125*v*).

MAXILLA 1

Inner plate:
- Size: absent (very rare), small (fig. 127*f*), medium (fig. 127*e*), as large (broad and bulky) as outer plate (rare).
- Setation: *terminal*, *medial*, or both.
- Number of setae: 1, 2, 3, 4–6, 6–12.
- Structure of setae: normal; sickle-shaped or strongly constricted.

Outer plate:
- Number of spines: 1–4, 5–6, 7–8, 9–11+.
- Shape of spines: normally slender, extremely stout, some bifid, some serrate, in two distinct groups by position or structure.

Palp:
- *Number of articles:* 0, 1, 2.
- Normal structure: article 1 short, article 2 long.
- Article 1 long, article 2 short.
- *Modifications: strongly bent* (geniculate), *foliaceous*, bearing scales (examples: Stilipedidae, Hyperiopsidae).

MAXILLA 2

Normal gammaridean (fig. 127*o*).
Abnormally small, plates partially coalesced, setae very sparse.
Breadth of lobes: subequal, inner broader, outer broader.
Axial divergence of lobes (fig. 127*j*).
Extension of outer plate on basal article (fig. 161*a*).
Specialized spines (rare).
Extent of medial setation on inner plate: strong, sparse, absent.

MAXILLIPED

Inner lobes (proximal):
- *Size:* vestigial (fig. 128*e*), normal (fig. 128*a*).
- *Abnormal shape:* foliaceous (rare), styliform (note: inner lobes often appear styliform if not fully depressed by cover slip).

Outer lobes:
- Size relative to inner: usually larger, *vestigial* (fig. 114*d*), foliaceous (rare).
- Spination: absent, medial, distal.

Palp:
- Extension in relation to outer plate: shorter, equal, longer.
- *Number of articles:* 0, 2, 3, 4.
- Medial or terminal extensions of articles, e.g., lobes, cusps: articles 1, 2, 3.
- Elongation of articles 1, 2, 3.
- *Terminal palp article* (usually 4): claw-like (normal); barrel-shaped; vestigial; bearing distal nail, spine, or setae.

GNATHOPODS

Judgment of gnathopods 1–2 as: feeble together (fig. 165*a*), *normal* (basic gammaridean with gnathopod 2 powerful), *powerful together* (fig. 115*a*).

GNATHOPOD 1 (excluding coxa 1)

Present, *vestigial*, or *absent* (Bateidae and *Paranamixis* only).
Size (or length) relative to gnathopod 2: smaller, equal, larger.
Sexual dimorphism: similar or different in male and female.
Articles:
2: Length in relation to coxa 1 (rarely important except when coxa 1 abnormal).
3: Length normal; or elongate (like fig. 3*a*).
4: Merochelation: with strong thumb-like extension (rare).
5: Length relative to article 6 (%).
Posterior lobe: present, weak, absent.
Carpochelation: with strong distoposterior tooth or teeth forming thumb or guarding article 6.
6: Breadth: relative to article 5; wider, equally wide, narrower.
Shape: ovate, pyriform, quadrangular, rectangular, linearly rectangular, styliform.
Palm:
Present, absent, undecided.
Slope: transverse, oblique: slight; moderate; extreme.
Chela if present: parachelate (describe if strongly chelate).
Definition of proximoposterior corner of palm: spines, protuberance, tooth, change in slope only.
Ornamentation: special spines, teeth.
7: Fit of the dactyl to palm: congruent, overlapping, not fitting.
Shape and ornaments: claw-like (normal); vestigial; absent (rare); with special setae or spines; hidden in setae or cirri; flagelliform.
Distal articles especially scaly or with small stiff setae (Lysianassidae).

GNATHOPOD 2

Articles:
3: *Length normal; elongate (fig. 3*a).
4: Merochelation: with strong thumb-like extension.
5: *Length relative to article 6 (%).*
Posterior lobe: present, weak, absent.
Carpochelation: with strong distoposterior tooth or teeth forming thumb or guarding article 6.
Scales or stiff setae (pineapple cushion of Lysianassidae).
General shape: cup-like, elongate rectangle, ovate.
6: Breadth relative to article 5: wider, equal, narrower.
Shape: ovate, pyriform, rectangular, linearly rectangular, mitten-like (Lysianassidae, Talitroidea), quadrangular.
Palm:
Present, absent, undecided.
Slope: transverse; oblique: slight, moderate, extreme.
Chela if present: parachelate (describe if strongly chelate).
Definition of proximoposterior corner of palm: spines, protuberance, tooth, change in slope only.
Ornamentation: special spines, teeth.

7: Fit of this dactyl to palm: congruent, overlapping, not fitting. Shape and ornaments: claw-like (normal); vestigial; absent (rare); with special setae, spines, or processes.

Sexual dimorphism in female: gnathopod 2 like male but much smaller, like gnathopod 1 and of similar size, like gnathopod 1 but larger.

PEREOPODS 1–2

Internal glands present or absent.
Orientation of pereopod 2 like that of pereopod 3 (*Eohaustorius*).
Chelate or prehensile.
Articles 4–5, 4–6, or 4, 5, 6 inflated strongly (rare).
Article 4 extraordinarily elongate (Ampeliscidae, Hyperiopsidae).
Special spines on article 6 near claw: spines striate, hooked.
Article 7 absent (Haustoriidae).

PEREOPODS 3–5

Relative lengths: pereopod 3 (%); 4=100%; 5=(%).
General stucture:
All similar in structure and slightly longer successively (normal).
Article 2 expanded: pereopod 3 ( ), 4 ( ), 5 ( ).
Expanded lobe of article 2 of pereopod 5 different from pereopods 3 and 4.
Chelate, subchelate, or prehensile: pereopods 3, 4, 5.
Fossorial setation (see glossary) present, absent.
Article 7 absent (Haustoriidae, Stegocephalidae): pereopds 3, 4, 5.
Pereopod 5 reduced to fewer than 6 articles.

PLEOPODS

(Rarely significant in marine Gammaridea [but see Phliantidae especially]).
Relative length (size) of each pair: 1=100%; 2=(%); 3=(%).
Length of longest ramus relative to peduncle (%).
Length of inner ramus to outer (%) (note absence of rami or low number of articles).
Shape of coupling hooks on peduncles.
Lobation of peduncles.

UROPODS 1 and 2

Absence (rare) or presence.
Projection along following uropods.
Uropod 1 reaching (%) along uropod 2; (%) along uropod 3.
Uropod 2 reaching (%) along uropod 3.
Relative length of rami: outer or inner shortened (occasional), inner absent or vestigial (rare).
Spination density of peduncle and rami (usually of specific value only).
Incision of inner ramus (example *Anonyx*).

UROPOD 3

Absence (rare) or presence.
Rami absent (rare).
Length relative to other uropods; extension beyond longest of other uropods (% of its own length).

Length of peduncle relative to urosomal segment 3 (%), *to peduncles of other uropods* (% *of peduncle of uropod 1*), *or to telson* (%).
Length of longest ramus relative to peduncle (%).
Length of inner ramus to outer (%).
Shape of rami: styliform, lanceolate, barrel-shaped, foliaceous.
Articles of outer ramus (1 or 2).
Minute ornamentation and hooks on rami (especially Ischyroceridae and Ampithoidae).
Special peduncular processes.

TELSON

Absence (rare) or presence.
Fused to urosomite 3 (rare).
General shape and length (make sketch).
Length in relation to urosomite 3 (%) *or uropod 3* (%).
Degree of cleft between lobes (%), emarginate only.
Ornamentation: apically pointed, notched, trifid, truncate, rounded, concave.
Greatly enlarged and with ventral keel (rare), forming dorsoventral plate.
Dorsoventrally thickened (*"fleshy"*) (example, Isaeidae), bearing lateral nobs, scales, hooks.

SEXUAL DIMORPHISM

(primarily for identification to species)

Especially:
- Antennae:
- Eyes:
- Gnathopods:
- Coxae:
- Pleonal epimera 1–3:
- Uropod 3:
- Urosomal teeth:

Appendix III

Glossary

accessory flagellum. The secondary ramus of antenna 1, often absent or vestigial (fig. 1), and attached medially to peduncular article 3.

aesthetasc, aesthete. Sensory setae of antennae, flattened and nontapering.

article. The segment of an appendage (fig. 1).

calceolus. A small globular or helmet-shaped, articulate sense organ on the antennae; presumably a modified aesthetasc; of rare occurrence in Gammaridea and most often seen in Eusiridae (fig. 89*j*).

carpochelate. Immovable finger of prehensile appendage occurring on carpus (article 5); examples: *Leucothoe, Microdeutopus.*

chela. Immovable finger of prehensile appendage.

chelate. Descriptive of the palm of a gnathopod protruding as an immovable finger on which the dactyl closes (fig. 129*h*). See parachelate, carpochelate, propodochelate, merochelate, complexly chelate.

claw, claw-like. Descriptive of a talon or simple, tapering nail. [Not descriptive of chelae as used in decapod terminology.]

compressed. Flattened from side to side.

conjoint. Describing the basal amalgamation of flagellar articles on antennae.

corneal lens. A biconvex cuticular body occurring directly in or on the chitinous cephalic surface in Ampeliscidae; contrasted with subcuticular ommatidia.

coxa, coxal plate. [Terms used synonymously herein.] Article 1 of a pereonal appendage, expanded into a lateral lamella (fig. 1). [Terms for other articles of the appendages such as basis, ischium, merus carpus, propodus, and dactyl are frequently but not universally used in Gammaridea; instead, the articles are simply numbered.]

dactyl. Talon-like terminal article of pereopods (article 7) or maxillipeds (articles 3 or 4).

depressed. Flattened dorsoventrally.

emarginate. Descriptive of the concave posterior end of an uncleft telson (fig. 42*e*).

entire. Descriptive of an uncleft telson (fig. 38*f*).

epimeron. A lateral pleuron of pleonites 1–3; the ventrolateral plate-like extension of the body segment (fig. 1).

epistome. The anterior surface of the head above the labrum; this area is often extended ventrally to appear as a part of the labrum and may be anteriorly produced as a cusp or lobe (fig. 4*a*).

flagellum. The distal portion of either antenna 1 or 2; on antenna 1 it commences with article 4, on antenna 2 with article 6; because basal peduncular articles of antenna 2 are often difficult to resolve, the juncture may be recognized between the elongated final peduncular article and the shortened first flagellar article which is followed by similar short articles; on antenna 1, however, article 1 of the flagellum is occasionally elongate and apparently composed of non-segregated (thus conjoint) daughter articles (fig. 1).

fossorial. Associated with the habit of burrowing, often referring to the excessively spinose or setose condition of appendages used for burrowing by Gammaridea; especially applicable to Haustoriidae, Oedicerotidae, Phoxocephalidae with some setae of articles 4–6 of pereopods 3–5 more than half as long as those articles; and some spines in groups forming submarginal rows perpendicular to margins; long setae also occur on "filter" feeders such as Ampeliscidae.

galeate. Descriptive of the helmet-shaped heads of various oedicerotids and synopiids.

gamopod. A gnathopod; referring to the use of gnathopods for grasping members of the opposite sex during amplexus.

geniculate. Permanently bent, usually in reference to the flexeda ntennae of some haustoriids, or the outer lobes of maxilla 2 in some stegocephalids in which the bend occurs between articles; or applicable to bent palps of maxilla in Hyperiopsidae in which the bend occurs on one article.

gnathopod. One member of the first two pairs of free thoracic appendages; these appendages differ in function and usually in appearance from following pereopods; often called pereopods.

incisor. The apical portion of the mandible usually formed into a toothed chewing edge or untoothed chopping plate.

joint. The juncture between two articles of an appendage.

labrum. (See upper lip.)

lacinia mobilis. An articulated accessory plate proximal to the mandibular incisor, often absent or missing on either left or right mandibles, occasionally indistinguishable from a spine of the spine-row.

low lip (labium). A fleshy complex posterior to the mandibles, always composed of at least one pair of lobes (outer), often with a medioproximal pair of inner lobes; the lateroproximal ends of the outer lobes are often attentuated as alae and are denoted as mandibular lobes (fig. 2*g*).

mandible. The anterior movable appendage of the buccal group; usually composed of a body bearing a distal incisor, a lacinia mobilis, spine row, molar, and 3-artculate palp (fig. 2*f*).

massive. A term applied to the heads of Synopiidae and Oedicerotidae; head as long as pereonites 1–3 combined and as tall as or taller than long (length not including rostrum). Heads of Ampeliscidae and Phoxocephalidae are elongate but not massive; heads of Acanthonotozomatidae are as tall as long but are not as long as pereonites 1–3 combined.

maxilla 1. A pair of cephalic appendages posterior to the lower lip; for taxonomic purposes only three portions of each member are named: the medial lobe (plate) usually bearing marginal setae, the lateral and larger lobe (plate) bearing terminal spines, and, attached to the outer lobe, a palp usually composed of two articles but occasionally absent (fig. 2*g*).

maxilla 2. A pair of cephalic appendages posterior to maxilla 1; for taxonomic purposes each member recognized as a pair of lobes (plates) medial and lateral, usually strongly setose (fig. 2*i*).

maxillipeds. The posteriormost pair of "cephalic" appendages, representing the primitive first thoracic segment now amalgamated with the head but in amphipod taxonomy not included in the sequential numbering of thoracic appendages; for taxonomic purposes recognized as a pair of basally amalgamated appendages, each member composed of a proximal (inner) plate, a distal (outer) plate, and a palp of four articles, rarely reduced to 3 or 2 articles or absent (fig. 2*l*).

merochelate. Immovable finger of prehensile appendage occurring on merus (article 4); example: gnathopod 1 of *Aora*.

mesosome. The pereon or thorax. [Term rarely used.]

metasome. Pleonites 1–3. [Term rarely used.]

molar. A process of the mandible, located on the midmedial margin; when completely developed it is a large, massive, subcylindrical body with a surface of ridges and teeth used for grinding (triturative) (fig. 2*f*).

ommatidium (singular), **ommatidia** (plural), **ommatidial** (adjective). Terms applying to the parts of the subintegumentary compound eye, not to be confused with the corneal lenses of the integument of Ampeliscidae.

palm. A posterior surface or margin of article 6 of a gnathopod or pereopod on which article 7 (dactyl) closes for the purpose of prehension; usually recognizable because of expansion of article 6 or by occurrence of special spines or ornamentation and usually with a proximal defining limit marked by a change in marginal slope or occurrence of special spines (fig. 2*e*).

palp. Terminal articles of a buccal appendage, in Amphipoda occurring only on mandibles, first maxillae, and maxillipeds as the stenopodous terminal articles distal to the expanded outer plates or main body.

parachelate. A rarely used term in Amphipoda applied to propodochelate gnathopods and pereopods in which the immovable finger is distinct, but article 6 is otherwise unexpanded or nonpalmate and the dactyl strongly overlaps the apex of the immovable finger; gnathopods of various Eophliantidae are good examples but the term may also be applied to numerous other cases, such as those linear, chelate gnathopods of Sebidae, *Didymocheila*, and various second gnathopods of Lysianassidae.

peduncle. The basal articles of a fundamentally biramous appendage; in Amphipoda applied to antennae, pleopods, and uropods; antenna 1 with three peduncular articles, antenna 2 with five peduncular articles (but appendage not biramous); pleopods with one definitive peduncular article but remnants of others occurring proximally; uropods each with one peduncular article (fig. 1).

pereon. The complex of seven free thoracic segments bearing gnathopods and pereopods, not including the maxillipeds (fig. 1).

pereonite. A segment of the pereon.

pereopod. A walking, grasping, standing, or feeding appendage attached to a pereonite; normally composed of seven articles, including coxa; in Amphipoda the first two pairs are often termed gnathopods and only the last five pairs of thoracic legs are called pereopods (fig. 1).

plate. A flattened lobe on an article of a maxilla or maxilliped.

pleopod. A biramous swimming appendage on pleonites 1–3, one pair for each pleonite (fig. 1).

pleon. The abdomen (of six free segments in Gammaridea, rarely with some segments coalesced). See metasome and urosome.

pleonite. A segment of the pleon.

prebuccal complex. The labrum and epistome together.

prehensile. Adapted for seizing or grasping; applicable to but rarely used for gammaridean gnathopods; especially useful in denoting pereopods of cyphocarids *Isaea*, *Pleonexes*, etc., which either are subchelate or chelate, or have distinct, spinose palms or nonskid surfaces indicating their use in grasping.

propodochelate. Synonymous with chelate.

propodus. The sixth article of a thoracic appendage (especially used to denote the palmar article of a gnathopod).

scale, scale-like. Terms applied to the accessory flagellum when forming a small lamella immovably fused to article 3 of antenna 1; and to the inner ramus of uropod 3 when strongly reduced and plate-like.

simple. Used in amphipod taxonomy to denote the absence of spines or setae on appendages; or the occurrence of but a single article in the ramus of a uropod; or especially to the absence of a palm on a gnathopod or pereopod. Distinction between subchelate and simple is often weak.

splayed. Descriptive of the lateral spreading of coxae, especially in Phliantidae.

subchelate. Article 6 of a gnathopod or pereopod having a distal palm against which article 7 closes; a prehensile condition in which the palm is not produced to form a finger; intermediate in condition between chelate and simple. Complexly subchelate or complexly chelate are terms referring to the formation of a false chela by protrusion of teeth, cusps, or lobes from articles other than the sixth and upon which article 7 impinges to form a prehensile condition; occurring especially in Aoridae, Corophiidae, and Leucothoidae (fig. 2*e*). See "simple."

telson. A flap dorsal to the anus attached to pleonite 6, primitively bilobed but usually in Amphipoda with bases coalesced and often with lobes completely coalesced to form a single plate (figs. 1, 2*d*).

triturative. Descriptive of the rasp-like surface of a mandibular molar, composed of teeth, ridges, and cusps.

upper lip (labrum). A fleshy lobe attached to the anterior cephalic margin in front of the mandibles; occasionally the anterior surface of the labrum protrudes as a lobe or cusp; often the cephalic area to which the labrum is attached is recognizable as an "epistome" and may also be lobed; or both labrum and epistome may be indistinguishable and produced together as a single lobe.

uropod. One member of the three pairs of terminal pleonal appendages, each formed of a peduncle and two rami (fig. 1) (occasionally rami of uropod 3 reduced or absent, rarely rami of uropods 1–2 absent or reduced).

urosome. The complex of pleonites 4, 5, 6, carrying uropods, and telson. Often numbered as urosomites 1, 2, 3 (fig. 1).

urosomite. A segment of the urosome.

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Index and Familial Assignment of Gammaridean Genera

[Valid genera in capitals; subgenera in capitals and parentheses; dubiously valid genera in brackets. See Stebbing (1888, 1906) for additional nomina dubia and nuda not assignable to valid genera. Page numbers of primary citations of genera in boldface.]

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