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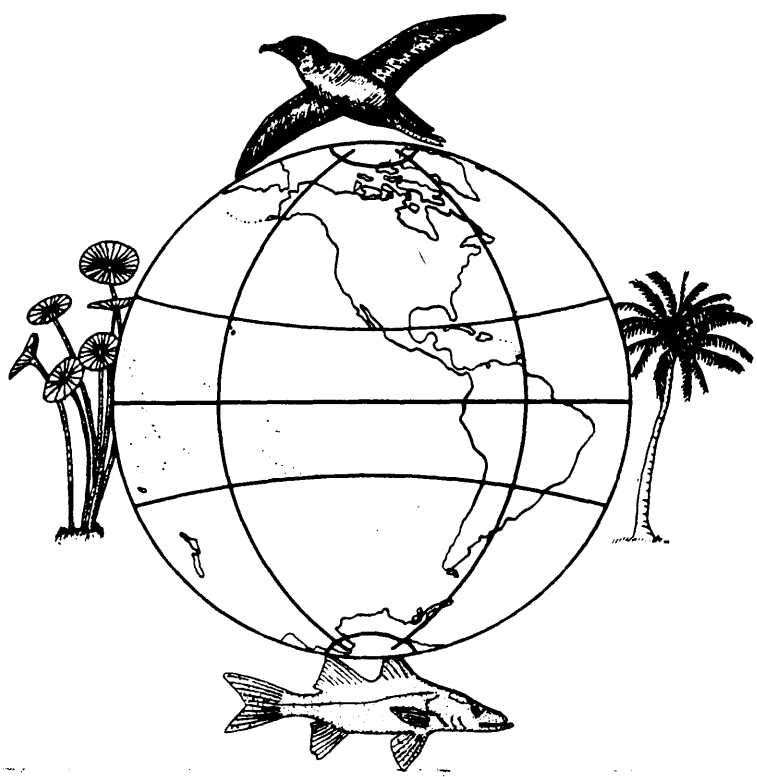
By J. LAURENS BARNARD



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FOREWORD

THE BEAUDETTE FOUNDATION FOR BIOLOGICAL RESEARCH was incorporated as a non-profit research organization in June, 1958, and has proceeded to develop a program of inquiry into the systematics, distribution, ecology and utilization of marine, littoral and coastal organisms, particularly of the eastern tropical and subtropical Pacific. The PACIFIC NATURALIST is presented as a serial medium for the publication of the results of the Foundation's research programs. It is intended to issue numbers at irregular intervals as the occasion arises. Copies are available for exchange with interested libraries, institutions and individuals. They may also be purchased by subscription at cost from the Foundation offices at Box 482, RFD 1, Solvang, California. The rate is presently set at $9.00 per volume (450-500 pages). See back page for list of titles.

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MARINE ISOPODA ON COASTAL SHELF BOTTOMS OF SOUTHERN CALIFORNIA: SYSTEMATICS AND ECOLOGY[1]

By ROBERT J. MENZIES[2] AND J. LAURENS BARNARD[3]

Introduction

The subintertidal invertebrate faunas of the Pacific Coast of North America are very poorly known. Since 1952 the Allan Hancock Foundation has been conducting a sampling program to assess the communities and the biomass of the offshore areas of southern California. These areas have been termed a borderland (Shepard and Emery 1941). A large share of the species was previously unknown, especially among the Crustacea and Polychaeta. The present paper is an assessment of the important species of isopods which inhabit the mud bottoms of the borderland coastal shelves, between 5 and 100 fms. in depth.

Acknowledgements

The writers are indebted to the Allan Hancock Foundation for providing the materials and facilities for this study; the specimens were largely collected under a contract between the Foundation and the State of California Water Pollution Control Board, the project directed by Dr. R. E. Stevenson. We are also indebted to Dr. Olga Hartman and Mr. Gilbert F. Jones of the Hancock Foundation. The assistance of Sigma Xi, Resa Research Fund, in providing a grant-in-aid to Menzies which permitted this collaboration is sincerely appreciated. The impetus and interest of the Beaudette Foundation brought the results of our research more quickly to fruition.

Results of the Sampling Program

More than 2000 bottom samples have been taken in depths from 5 to 1126 fms., using an orange-peel bucket of 0.25 m^2 and 88 liter capacity. The results of some of these samples have been reported upon by Hartman (1955 and 1956), Hartman and Barnard (1957 and 1958), Barnard, Hartman and Jones (in press) and Barnard and Hartman (1959). Isopods from about 300 of these samples were examined.

The principal populations of isopods have been collected on the shallow coastal shelves 5 to 100 fms. in depth. In comparison with some other groups of benthic invertebrates isopods are not greatly abundant. A brief summary of this relationship is as follows:

BIOMASS.—Polychaetes comprise the largest share of benthic biomass, followed by echinoderms, echiuroids, mollusks, sipunculids and other worm groups, coelenterates and finally crustaceans, which comprise only about

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2% of the biomass. The isopods constitute a very small fraction of the 2%. (Biomass quoted is determined from organisms larger than 1.0 mm.)

SPECIES.—Polychaetes and crustaceans comprise more than 75% of the total species, followed by mollusks and echinoderms. The remaining groups are of minor importance. Among the crustaceans, the amphipods comprise the largest share of species, perhaps 60%, followed in order by cumaceans, isopods, ostracods, and tanaids.

SPECIMENS.—Polychaetes and crustaceans rank together in abundance, followed by echinoderms and mollusks.

Benthic mud bottom communities contain a very small percentage of the total existing marine animal species, much less than intertidal or rocky epifaunal regions (Thorson 1957). The sampling program has been limited to depths greater than 5 fathoms so that the rich algal and epifaunal regions are only sparsely represented. Isopod species are considerably more abundant in those shallow waters than on mud bottoms. In point of fact, only seven of the species (Table 1) considered herein are abundant on a large share of mud bottoms, while the remaining 29 species are usually captured in waters shallower than 9 fms. where algae predominate. If the intertidal region and the kelp beds were represented, the number of isopod species would be considerably greater.

It is of interest that five of the seven most important species are newly described herein; twenty of the remaining 29 species were known from earlier works, and nine are provisionally identified or are described as new species.

Composition of the Isopod Fauna

A list of the marine sublittoral isopods of southern California is presented in Table 2. These are diagnosed in a key below. Only the 36

(CONT. P. 6)

TABLE 1

The important[4] mud-bottom isopod species, based on a grid of 122 stations representing a weighted proportion of 7 classes of depth of marine bottoms from 5 to 100 fms., from Pt. Conception to the Mexican border.

	Occurrence in percent of 122 samples	Animal No./m² for total area
Gnathia crenulatifrons Monod	47.0	8.0
Haliophasma geminata n. sp.	49.0	7.0
Edotea sublittoralis n. sp.	10.7	1.3
Idarcturus allelomorphus n. sp.	9.0	0.7
Synidotea magnifica n. sp.	7.3	0.8
Ilyarachna acarina n. sp.	4.1	0.7
Jaeropsis dubia Menzies[5]	6.6	0.8

[4] *Eurydice branchuropus* n. sp. apparently in a southern species whose northernmost range is at the Mexican Border of California where it is rather abundant on sandy bottoms.

[5] Associated with benthic algae.

TABLE 2

List of the Marine Isopods of the Southern California Coastal Benthos. Asterisks (*) denote common mud bottom species.

ASELLOTA

1. *Austrosignum tillerae* n. sp.
2. *Caecianiropsis* sp. (prob. *psammophila* Menzies and Pettit)
*3. *Ilyarachna acarina* n. sp.
*4. *Jaeropsis dubia* Menzies
5. *Jaeropsis dubia* var. *paucispinis* Menzies
6. *Janiralata occidentalis* (Walker)
7. *Janiralata solasteri* (Hatch)
8. *Munna ubiquita* Menzies
9. *Munna spinifrons* n. sp.
10. *Pleurogonium californiense* Menzies
11. *Pleurogonium* sp. (prob. new)
12. *Pleurogonium* sp. (prob. new)
13. New genus (near *Astrurus*)

ANTHUROIDEA

14. *Colanthura squamosissima* Menzies
15. *Cyathura munda* Menzies
*16. *Haliophasma geminata* n. sp.
17. *Paranthura elegans* Menzies
18. *Mesanthura occidentalis* n. sp.

VALVIFERA

*19. *Edotea sublittoralis* n. sp.
*20. *Idarcturus allelomorphus* n. sp.
21. *Idotea* (*Pentidotea*) *resecata* (Stimpson)
22. *Neastacilla californica* (Boone)
23. *Ronalea pseudoculata* (Boone)
*24. *Synidotea magnifica* n. sp.

GNATHIOIDEA (DECEMPEDES)

*25. *Gnathia crenulatifrons* Monod
26. *Gnathia tridens* n. sp.
27. *Gnathia productitridens* n. sp.

FLABELLIFERA

28. *Ancinus daltonae* n. sp.
29. *Ciliacea cordata* Richardson
30. *Cirolana* sp.
31. *Cirolana* sp.
32. (?) exosphaeromid
33. (?) *Exosphaeroma rhomburum* (Richardson)
*34. *Eurydice branchuropus* n. sp.
35. *Serolis carinata* Lockington
36. *Limnoria* (*Phycolimnoria*) *algarum* Menzies

most common benthic species are included. An undetermined number of other sublittoral species is represented in the Hancock collections, but the rarity of these species precludes their inclusion here due to the fact that it would be poor taxonomic practice to describe species based on only one or two specimens. Some of the 36 entities in the key are not fully described in the text for the same reasons.

It is of considerable interest to be able to rank the important benthic species quantitatively (Table 1), for it is believed that the information will have comparative zoogeographic value. The benthic isopod fauna is dominated by two species: One, *Gnathia crenulatifrons*, belongs to the polymorphic Gnathiidae in which males, females and juveniles have very different body shapes. The females and young presumably are parasites on fish, although a considerable number of young and females are collected from the bottom. The other species is a large anthurid, *Haliophasma geminata* n. sp., of unknown habits and undetermined community relationships.

Key to the Marine Isopods of the Southern California Coastal Benthos

1. Uropods ventral, operculiform, inflexed under the pleon to cover pleopods 2
1. Uropods lateral, fan-like, or styliform, not inflexed under the pleon to cover pleopods 7
2. All peraeopods similar 3
2. First four peraeopods fringed with plumose setae and directed toward mouth, the last three stout, clinging types 6
3. Coxal plates evident on peraeonal somites 2 to 7 inclusive ..... *Idothea* (*Pentidotea*) *resecata*
3. Coxal plates lacking or restricted to last two peraeonal somites 4
4. Coxal plates not visible in dorsal view on any somite 5
4. Coxal plates evident on last two peraeonal somites ..... *Ronalea pseudoculata*
5. Antennae short, both of similar length ..... *Edotea sublittoralis*
5. First antenna much shorter than second; second with multiarticulate flagellum ..... *Synidotea magnifica*
6. Cephalon with a pair of median dorsal spine-like projections ..... *Idarcturus allelomorphus*
6. Cephalon smooth dorsally ..... *Neastacilla californica*
7. Body more than seven times as long as wide 8
7. Body less than seven times as long as wide 12
8. Peraeon with seven evident segments of similar length 9
8. Peraeon with six segments plus a minute seventh ..... *Colanthura squamosissima*

9. Body with diffuse color patterns 10
9. Body with chromatophores compact and arranged into characteristic bars and cirles on dorsal surface .... *Mesanthura occidentalis*
10. Mouth parts of piercing and sucking types ..... *Paranthura elegans*
10. Mouth parts of chewing type 11
11. Telson indurated, with parallel carinae ..... *Haliophasma geminata*
11. Telson smooth, not indurated ..... *Cyathura munda*
12. Body with only 5 pairs of legs 13
12. Body with seven pairs of legs 15
13. Frontal margin of cephalon fringed with crenulations .... *Gnathia crenulatifrons*
13. Frontal margin of cephalon trifid 14
14. Outer margin of mandible tuberculate, with small tooth; pleon more than three times as long as wide .... *Gnathia productatridens*
14. Outer margin of mandible bears large tooth; pleon only twice as long as wide ..... *Gnathia tridens*
15. Pleon with 6 segments 16
15. Pleon with less than six segments 18
16. Antennae much longer than cephalon 17
16. Antennae short, not much longer than cephalon .... *Limnoria* (*Phycolimnoria*) *algarum*
17. Uropods attached under pleon, not visible in dorsal view .... *Eurydice branchuropus*.....
17. Uropods lateral, fan-like; one species dark and one species light in color .....*Cirolana* spp.
18. Pleon with one or two segments only 19
18. Pleon with more than two segments 31
19. Fifth and sixth peraeopods paddle-like ..... *Ilyarachna acarina*
19. All peraeopods ambulatory 20
20. Apex of pleotelson elongate, projecting ..... new genus of Asellota
20. Apex of pleotelson normal, not elongate and not projecting 21
21. Uropods with elongated peduncle and two similarly elongated rami 22
21. Peducle of uropods when present not elongated, the rami short, difficult to see 23
22. Frons of cephalon with pointed rostrum ..... *Janiralata solasteri*
22. Frons of cephalon scarcely produced ..... *Janiralata occidentalis*
23. Peraeon without coxal plates 24
23. Peraeon with coxal plates 25
24. Pleon lateral border with 2-3 spines .... *Jaeropsis dubia* var. *paucispinis*
24. Pleon lateral border with more than 3 spines ..... *Jaeropsis dubia*
25. Eyes lacking 28
25. Eyes present 26

26. Both antennae of similar length ..... *Austrosignum tillerae*
26. First antenna much shorter than second antenna 27
27. Apex of male first pleopod acutely pointed ..... *Munna ubiquita*
27. Apex of male first pleopod expanded ..... *Munna spinifrons*
28. Both pairs of antennae shorter than head, body markedly elongated ..... *Caecianiropsis* sp.
28. Both pairs of antennae much longer than head 29
29. Spines on lateral body margin more than twice as long as wide 30
29. Spines on lateral body margin short, less than twice as long as wide ..... *Pleurogonium* sp.
30. Terminal peduncular article of first antenna with stout recurved spine at apex ..... *Pleurogonium* sp.
30. Terminal peduncular article of first antenna without armature at apex ..... *Pleurogonium californiense*
31. Body flattened, platter-like 32
31. Body ovoid or pyriform, not flattened 33
32. Uropods biramous ..... *Serolis carinata*
32. Uropods uniramous ..... *Ancinus daltonae*
33. Apex of pleotelson deeply incised, with cordiform emargination ..... *Cilicea cordata*
33. Apex of pleotelson only slightly incised 34
34. Dorsum of pleotelson with a pair of carinae converging towards apex ..... *?Exosphaeroma rhomburum*
34. Dorsum of pleotelson trituberculate but lacks carinae ..... *exosphaeromid sp.*

ASELLOTA

Genus Austrosignum Hodgson

DIAGNOSIS.—Body oblong, with a distinct "waist" between the first four and last three peraeon segments. Eyes small, on slender eye-peduncles. Pleotelson slightly bulbous, distally pointed. Coxae visible from above on the last three peraeon segments. Antennulae with the first two peduncular joints subequal in length to, or longer than, the remaining part. Mandibles with a strong subcylindrical molar tubercle widening towards the end: mandibular palp short, three jointed. Maxillipeds with first, second and third joints of the palp wider than the first two joints, being about two-thirds as wide as the endite. First pair of peraeopods prehensile. Uropods minute, consisting of two branches (after Nordenstam 1933: 241).

Austrosignum tillerae Menzies and Barnard, new species

(Fig. 1)

DIAGNOSIS.—Margins of pleotelson smooth, no serrations. Flagellum of first antenna with 3 articles, that of second with 5 articles. Eyes on minute stalks. LACM 56-26.11

HOLOTYPE.—AHF No. 567, female, 1 mm. – missing

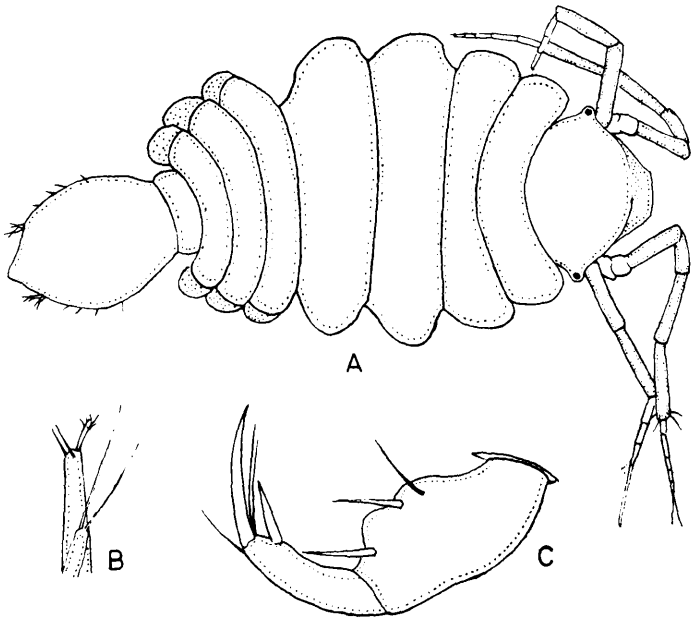

Fig. 1. *Austrosignum tillerae* n. sp. A-C Holotype, female, 1 mm. A. dorsal view; B. uropod; C. gnathopod.

TYPE LOCALITY.—Station 4753, off Pt. Loma, California, 32-41-50 N, 117-20-25 W, Dec. 8, 1956, 321 feet, green mud and shells.

RELATIONSHIP.—This species is closely related to *Austrosignum falklandicum* Nordenstam (1933: 244) from which it differs by having a wider body and one less article in each of the antennal flagella. The gnathopod also differs in having fewer stout setae on the inferior propodal margin.

MATERIAL EXAMINED.—Stations 4753 (2), 4814 (1), 4822 (1), 5176 (1), 5193 (1).

DISTRIBUTION.—Southern California: Pt. Conception to the Mexican border, 10 to 100 fms.

Ilyarachna G. O. Sars

DIAGNOSIS.—Head large, broad, truncated anteriorly, not laterally emarginate. Eyes lacking. Peraeopods 5 and 6 natatory, others ambulatory. Maxillipedal palp as wide as endite. Uropod with one ramus only.

Ilyarachna acarina Menzies and Barnard, new species

(Fig. 2)

DIAGNOSIS.—Lateral border of cephalon spinulate; dorsum of cephalon with about 18 spines, 14 on anterior margin of first peraeonal segment, 13 on second, 10 on third, 12 on fourth. Apex of pleotelson pointed. Apex of male pleopod 1 with inner angle pointed and 8 apical setae. Flagellum of first antenna with 8 articles.

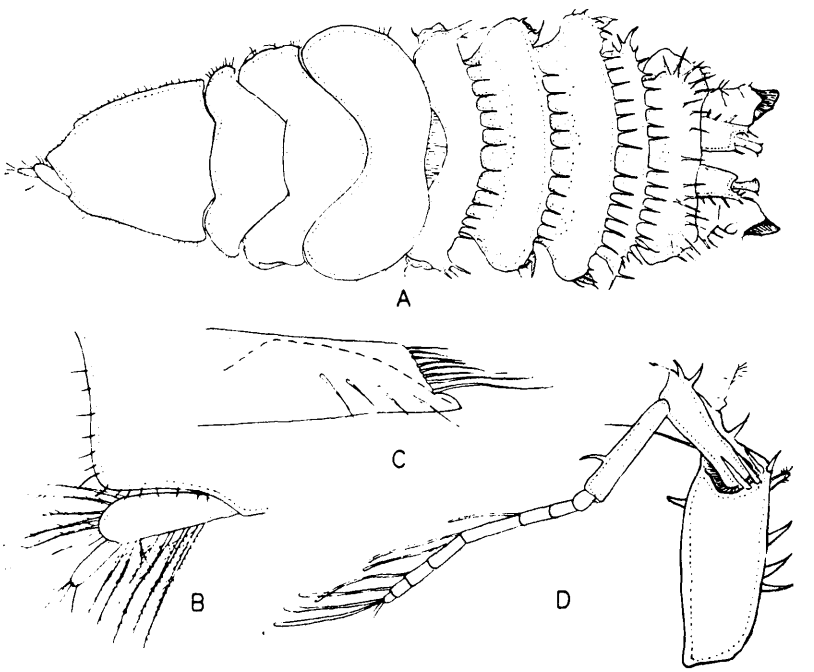

Fig. 2. *Ilyarachna acarina* n. sp. A-C Holotype, female, 4 mm. A. dorsal view; B. uropod; C. apex of male first; D. antenna 1.

HOLOTYPE.—AHF No. 578. female, 4 mm. =LACM 57-53.1

TYPE LOCALITY.—Station 4980, off Santa Barbara, California, 34-15-50 N. 119-34-28 W, April 11, 1957, 308 feet, green mud.

RELATIONSHIP.—This species bears a close resemblance to *I. denticulata* G. O. Sars (1899: 138) from the west coast of Norway. It differs from that species by having longer and more delicate spines, fewer on the cephalon and more on the margins of the peraeonal somites. The flagellum of antenna 1 has 9 articles in *I. denticulata.*

MATERIAL EXAMINED.—Stations 2845 (1), 2846 (1), 4753 (4), 4767 (1), 4824 (1), 4855 (10), 4951 (3), 4980 (13), 5510 (1), 5560 (1).

DISTRIBUTION.—Southern California coastal slopes, from Pt. Conception to Pt. Loma. 10-100 fms.; west slope of San Pedro Basin, 277 fms.; Santa Catalina Basin. 612 fms.

Jaeropsis Koehler

DIAGNOSIS.—Elongate body more than twice as long as wide, coxal plates not visible in dorsal view on any segment. Frons of cephalon with a rostrum. Endite of maxilliped about three times the width of the palp. Both pairs of antennae small. less than the length of the cephalon. Peraeopods of the walking type. Uropods biramous.

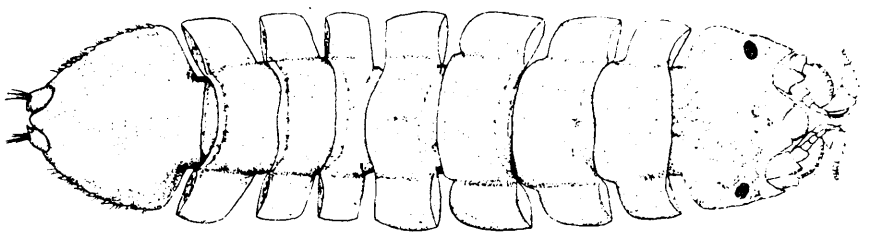

Fig. 3. *Jaeropsis dubia* Menzies. Female, 1.4 mm. After Menzies 1951.

Jaeropsis dubia Menzies

(Fig. 3)

Jaeropsis dubia Menzies 1951: 147-155, figs. 29-33.

DIAGNOSIS.—Eyes located close to lateral margin. Anterolateral angles of cephalon pointed, lacking deep anteriorly directed serrations. Rostral process evenly curved and fringed with a delicate margin of wide scales. Maxilliped endite with three coupling hooks. Both inner and outer distal angles of second article of maxillipedal palp produced distally, the inner angle bidentate. Pleotelson with a row of five to seven spines on each lateral border, and a row of three or four setae between each pleotelson spine. Head generally heavily pigmented, body and abdominal segments very lightly pigmented or without pigments. Penultimate article of second antennal peduncle with fringe of conspicuous scales on lateral margin. Exopodite of uropods with 2 articles.

MATERIAL EXAMINED.—(Asterisks mark the var. *paucispinis* Menzies 1951: 155.) Stations 4464 (1)*, 4719 (2), 4822 (5), 4845 (1)*, 4869 (2)*, 4870 (1)*, 4928 (2), 4928 (1)*, 4938 (1), 4951 (1), 4952 (1), 5164 (3), 5560 (1), 5562 (4), 5564 (3), 5564 (2)*, 5586 (1).

DISTRIBUTION.— Marin County, California to the Mexican border. In southern California on the coastal shelves, 10-50 fms., usually less than 30 fms., associated with algae. At depths greater than 30 fms. the stations are located in areas of clear water where algae grow to those depths. In general, due to the very turbid coastal waters of southern California, algae are rarely collected below 20 fms.

Janirilata occidentalis (Walker)

(Fig. 4)

Janirilata occidentalis (Walker), Menzies 1951: 135-136, figs. 23a-d.

MATERIAL EXAMINED.—Stations 3389 (2), 5164 (6), 5562 (8).

DISTRIBUTION.—San Juan Co., Washington to Laguna Beach, California. Subtidal depths recorded herein are 10, 15 and 38 fms.

Janirilata solasteri (Hatch)

(Fig. 5)

Janirilata solasteri (Hatch), Menzies 1951: 132-135, figs. 23e, f; 24.

MATERIAL EXAMINED.—Station 4808 (1).

DISTRIBUTION.—Alaska to southern California. The recorded specimen is from off Santa Barbara, 161 fms.

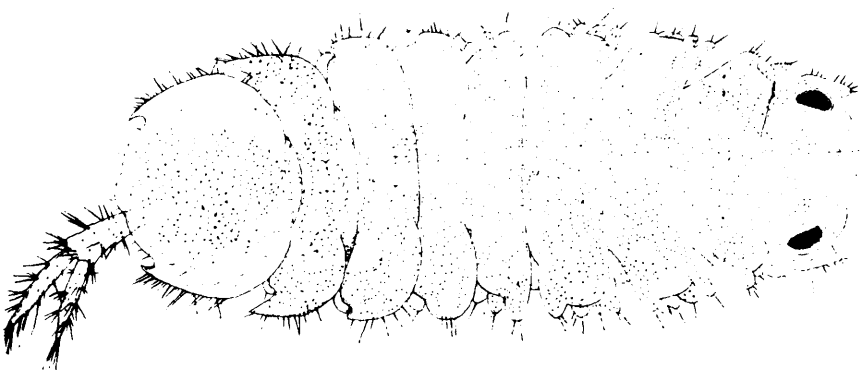

Fig. 4. *Janiralata occidentalis* (Walker). Female, 5.5 mm. After Menzies 1951.

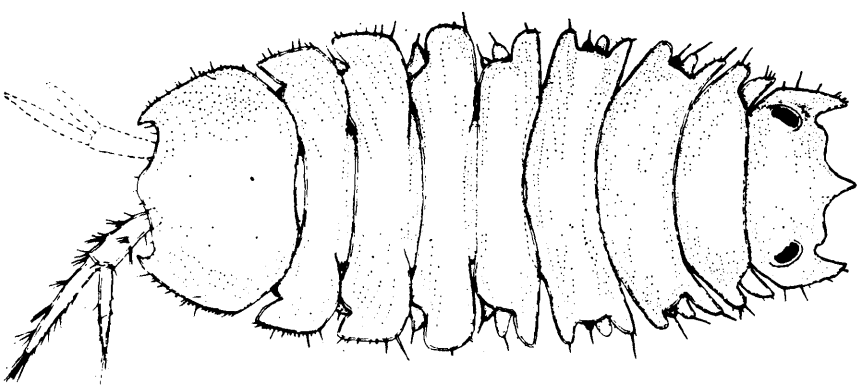

Fig. 5. *Janiralata solasteri* (Hatch). Female, 5 mm. After Menzies 1951.

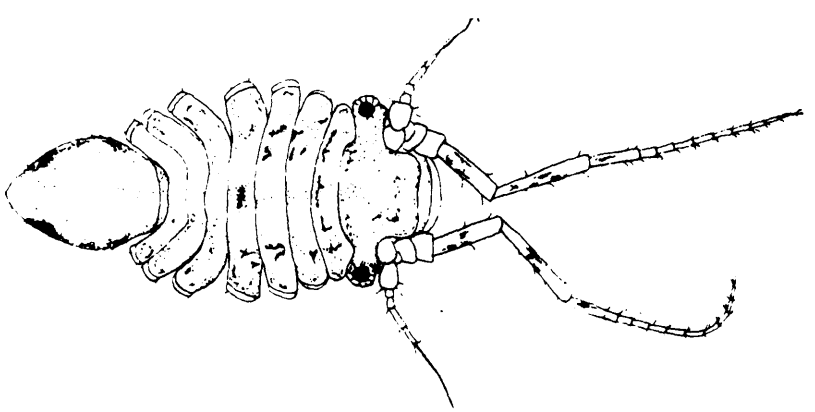

Fig. 6. *Munna ubiquita* Menzies. Male, 0.9 mm. After Menzies 1952.

Munna Krøyer

DIAGNOSIS.—Body subpyriform, with dorsal surface somewhat vaulted; last three peraeonal segments small, with lateral parts directed somewhat posteriorly. Cephalon usually broad. Pleotelson composed of two segments, the anterior short and narrow, the posterior pyriform. Eyes distinct or lacking. First antenna with a triarticulate peduncle and a flagellum composed of only a few articles. Second antenna with a 6-articulate peduncle and a multiarticulate flagellum. Molar process of mandible well developed, palp triarticulate. Maxilliped with 5 articles. Gnathopods of adult male subchelate, often enlarged and swollen. Remaining peraeopods ambulatory, not subchelate, increasing in length, with carpal and propodal articles much elongated and bordered with spine-like, 2-pointed setae; dactylar article small, biunguiculate. Uropods with two branches.

Munna ubiquita Menzies
(Fig. 6)

Munna ubiquita Menzies 1952: 120-124, figs. 46-48.

DIAGNOSIS.—Eyes on fairly long immovable stalks, preorbital lobes well developed. Pleotelson with about 6 serrations on each ventrolateral margin. Flagellum of first antenna composed of three articles, the last article slightly shorter than second, which is about twice the length of the first, the terminal article with a single terminal sensory filament. Adult male and female gnathopods similar. Male first pleopod apically pointed, not laterally expanded. Second male pleopod with apex of exopod acutely pointed. Suburopodal shelf not evident. Uropodal ventral branch thin, leaf-like, lacking spines.

MATERIAL EXAMINED.—Stations 4822 (2), 4870 (4), 4917 (1), 4922 (1), 4938 (1).

DISTRIBUTION.—Seattle, Washington to San Diego, California. In southern California the subtidal depths are 20 fms. and less.

Munna spinifrons Menzies and Barnard, new species
(Fig. 7)

DIAGNOSIS.—Eyes on well marked stalks; preorbital lobes well developed, frons of cephalon with 8 stout, 2-pointed marginal spines. Pleotelson with one stout lateral spine. Flagellum of second antenna with 5 articles, the fifth short, about one fourth the length of the fourth and third. Epimera spinous. Suburopodal shelf absent. Apex of male pleopod laterally expanded, the lateral projection sharp, the margin with 5-6 setae.

HOLOTYPE.—AHF No. 576, male, 1.5 mm. = LACM 57-28.4

TYPE LOCALITY.—Station 4822-57, 11 miles east of Pt. Conception, California, 34-27-15 N, 120-14-45 W, Jan. 17, 1957, 37 feet depth, orange-peel-grab, silty sand.

RELATIONSHIP.—This species is easily distinguished from the known American species of *Munna* by the very long fourth and fifth articles of

the first antennal flagellum and by the spines on the frontal margin of the cephalon and the coxal plates.

MATERIAL EXAMINED.—Station 4822 (5).

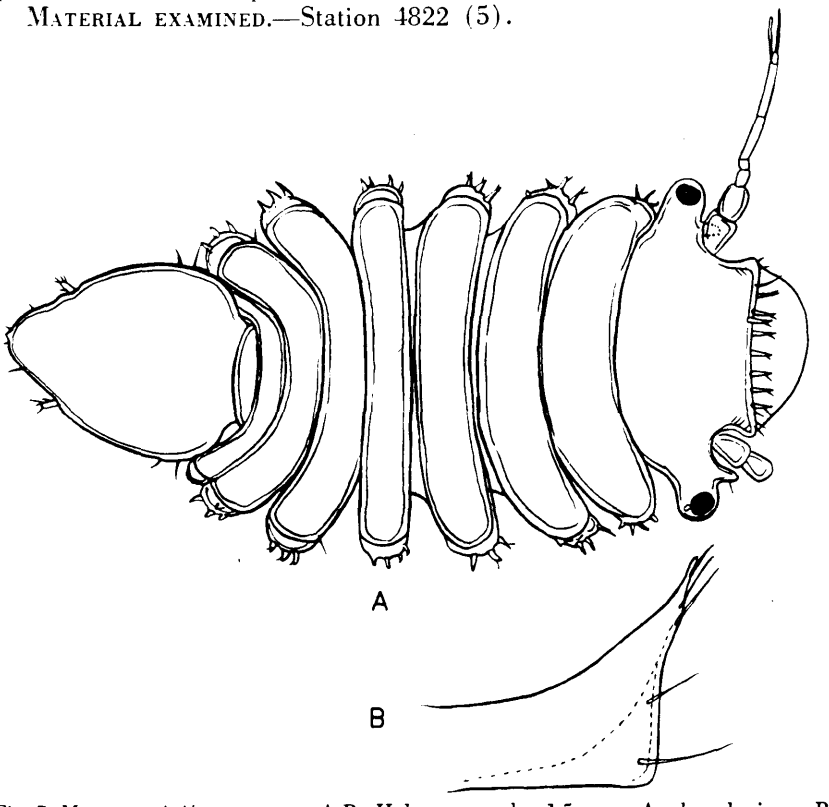

Fig. 7. *Munna spinifrons* n. sp. A-B. Holotype, male, 1.5 mm. A. dorsal view; B. apex of male first pleopod.

Pleurogonium G. O. Sars

DIAGNOSIS.—Eyes absent; both pairs of antennae of similar length; coxal plates visible in dorsal view on peraeonal segments 2-7 inclusive; uropods biramous; peraeopods 2-7 of walking type, not paddle-shaped.

Pleurogonium californiense Menzies

(Fig. 8)

Pleurogonium californiense Menzies 1951: 139-143, figs. 25, 26.

DIAGNOSIS.—First peraeon segment exceeding twice the length of second, the posterolateral edges evenly curved, lacking spine; anterolateral angles each with a large anterolaterally directed spine. Epimeral spines of second to sixth segments located at posterior angle of the epimeral plates. Pleotelson with a distinct constriction at anterior end and with smooth lateral borders beset with a few small setae. Maxilliped with two coupling hooks. Apex of male first pleopod shorter than is usual for members of the genus.

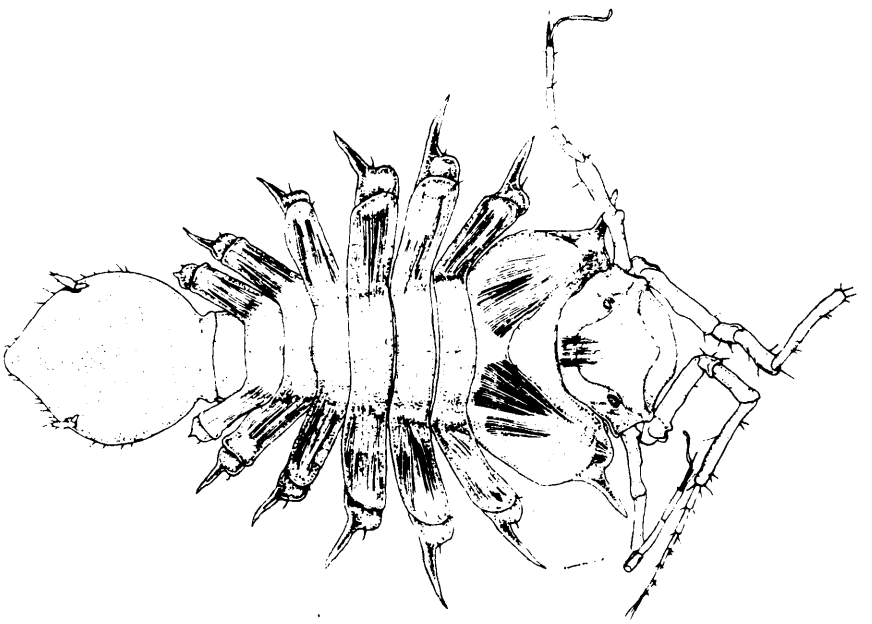

Fig. 8. *Pleurogonium californiense* Menzies. Male, 1.35 mm. After Menzies 1951.

MATERIAL EXAMINED.—Stations 4753 (2), 4980 (1).

DISTRIBUTION.—Sonoma California to Pt. Loma, California. The two records herein are from off Pt. Loma, 54 fms., and off Santa Barbara, 51 fms.

ANTHUROIDEA

Colanthura Richardson

DIAGNOSIS.—Eyes small. Peraeon not keeled dorsally, segment 7 markedly reduced in size. Pleon short, the sutures distinct dorsally. Telson flattened, not indurated, without paired statocysts. Maxilliped triarticulate. Palm of peraeopod 1 smooth, but with prominent basal tooth. Peraeopods 4-7 with fifth article cylindrical, not underriding sixth article. Pleopod 1 not indurated. Mouth parts for piercing and sucking.

Colanthura squamosissima Menzies
(Fig. 9)

Colanthura squamosissima Menzies 1951: 114-118, figs. 14-16.

DIAGNOSIS.—Rostral process very slightly exceeding forward extent of anterolateral angles. Eyes large, composed of about 14 ocelli. Endopodite of uropod extending to or very slightly beyond telson tip. Tip of stylus of male second pleopod with a simple, swollen, non-setiferous tip. Lateral pleotelson borders smooth; posterior border widely convex. Seventh peraeon segment narrower and shorter than first pleon segment. Seventh pair of peraeopods lacking. Statocysts absent. Maxilliped with one free article.

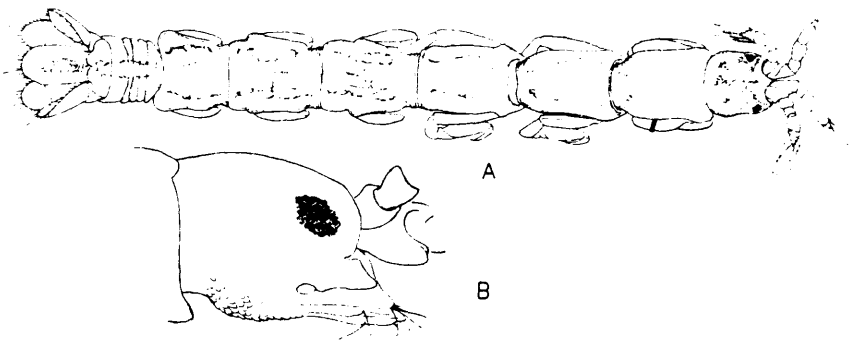

Fig. 9. *Colanthura squamosissima* Menzies. A.B. Male, 4.4 mm. A. dorsal view; B. head, lateral. After Menzies 1951.

MATERIAL EXAMINED.—Stations 4822 (1), 4828 (1), 4927 (1), 5160 (1), 5162 (1), 5564 (1).

DISTRIBUTION.—Marin County California to southern California. Southern California coastal shelves, from Pt. Conception to the Mexican border. 10-50 fms.

Cyathura Norman and Stebbing

DIAGNOSIS.—Mouth parts for chewing and biting. Statocysts of telson paired. Telson not sculptured. Article 5 of peraeopods 4-7 underriding sixth article. Maxilliped with 4 articles (3 free ones). Pleonal sutures indistinct dorsally.

Cyathura munda Menzies
(Fig. 10)

Cyathura munda Menzies 1951: 111-114, figs. 12, 13.

DIAGNOSIS.—Rostral projection equaling forward extent of cephalic anterolateral angles. Eyes small. Uropodal endopodite not extending beyond telson posterior margin, the posterolateral margin of exopodite sinuate. Tip of stylus of male second pleopod simple, lacking lobes and setae. Posterior border of telson concave, the lateral borders smooth. Body lacking dorsal pits and dorsolateral keels.

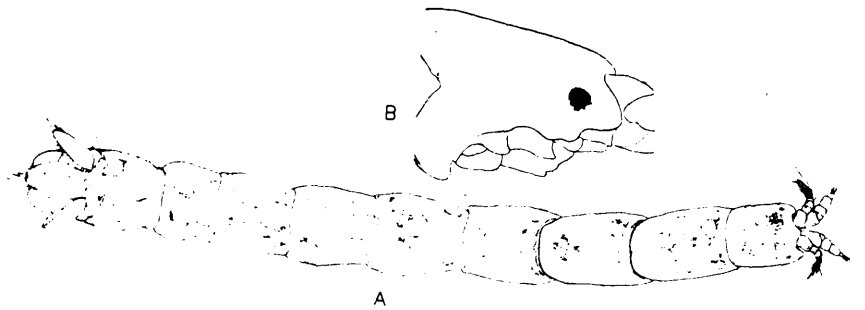

Fig. 10. *Cyathura munda* Menzies. Male, 5.2 mm. A. dorsal view; B. head, lateral. After Menzies 1951.

MATERIAL EXAMINED.—Stations 4794 (2), 4856 (5), 4928 (1), 5164 (7), 5396 (1), 5561 (2), 5562 (4).

DISTRIBUTION.—Marin County, California to the Mexican border, and Santa Cruz Island. Subtidal depths in southern California are 10-30 fms.

Haliophasma Haswell

DIAGNOSIS.—Mouth parts for piercing and sucking. Telsonic statocysts paired. Telson sculptured. Fifth article of peraeopods 4-7 not underriding article 6. Pleopod 1 operculiform. Maxilliped 4-articulate. Pleon sutures indistinct dorsally.

Haliophasma geminata Menzies and Barnard, new species
(Figs. 11, 12)

DIAGNOSIS.—Flagellum of antenna 1 composed of a long joint capped by a small terminal one. Dorsal integument with two pits, no keels. Peraeon without dorsolateral grooves. Maxilliped with 3 major articles, the distal one quite small, and a baso-lateral epipodite (counted as a fourth article by K. H. Barnard 1925), the second free article without a basal suture across it. Pleopod 1 pitted. Peraeopod 1 with palm oblique to long axis of article 6. Pleon with 4 lateral sutures, scarcely visible dorsally, producing five fused segments and a sixth segment with a dorsal suture (note: pigment patterns must not be confused with actual suture lines). Pleotelson spatulate, sculptured with a long median carina and two shorter lateral ones; the lateral carinae usually do not fuse to the base of the median one, but often curved toward it; base of median carina with a large pit; statocyst pair near base of telson. Uropod with endopod extending to base of telson and longer than wide, the apex blunt, both margins distinctly serrated; exopod pyriform, the outer margin sinusoidal, denticulate.

MALE.—Median telsonic carina becoming obsolete or indistinct at midpoint in many specimens, but fully developed in others. Appendix masculinis with simple apex, tubular, not extending beyond pleopod 2.

HOLOTYPE.—AHF No. 566, female, 8 mm.

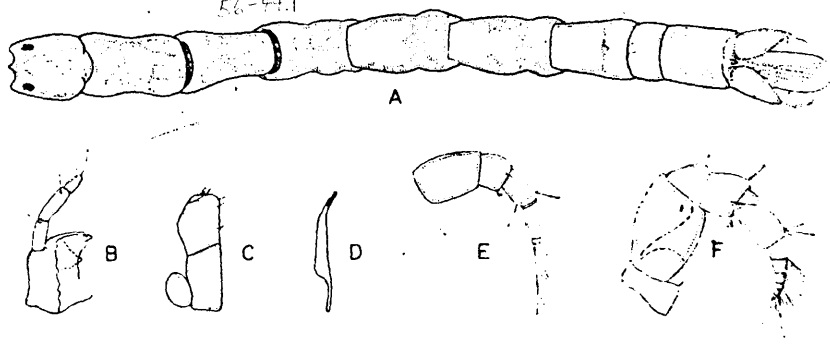

Fig. 11. *Haliophasma geminata* n. sp. A-F. A. dorsal view; B. mandible; C. maxilliped; D. maxilla; E, F. antennae 1, 2.

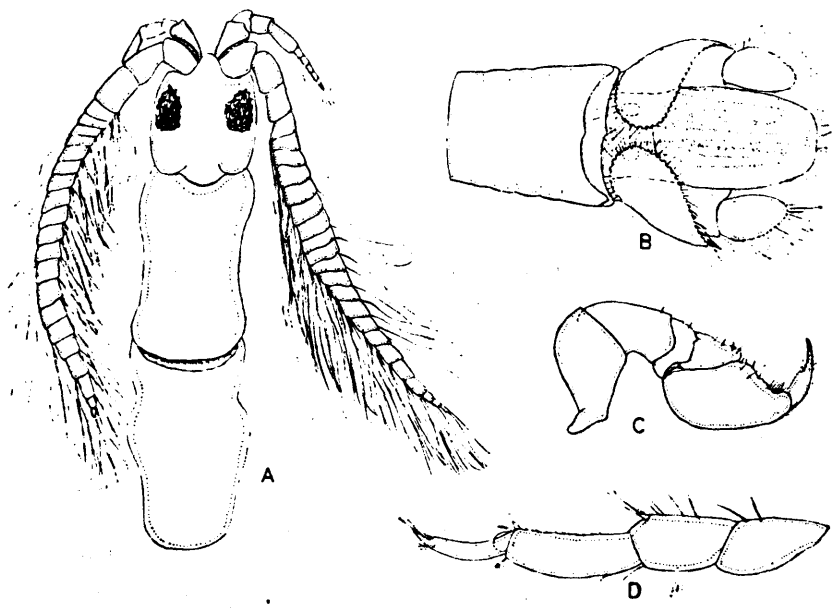

Fig. 12. *Haliophasma geminata* n. sp. A-D. Male, 5 mm. A. head; B. pleon, dorsal view; C. gnathopod; D. peraeopod.

TYPE LOCALITY.—Station 4771, off San Mateo Pt., California, 33-21-40 N, 117-35-50 W, Dec. 9, 1956, 81 feet, green-black, very fine sand.

RELATIONSHIPS.—Closely related to *H. tricarinata* K. H. Barnard (1925: 132), differing principally in having 2 (not one) articles of the second antennal flagellum and in the oblique, not transverse, palm of peraeopod 1.

REMARKS.—The telsonic ornamentation of *H. tricarinata* is not clear in all points, especially on the possible pit at the base of the middle carina.

In heavily indurated specimens of *H. geminata* the statocysts are obscure, but in decalcified animals they are easily visible.

In some specimens, such as those at sta. 5166, the lateral telsonic carinae continue to the base and coalesce with the median carina.

MATERIAL EXAMINED.—Stations 2128 (2), 2436 (1), 2630 (2), 2637 (1), 2843 (2), 2852 (1), 3389 (4), 3391 (1), 3505 (1), 4329 (1), 4330 (11), 4722 (4), 4743 (2), 4747 (1), 4753 (1), 4754 (1), 4756 (1), 4757 (2), 4762 (6), 4767 (1), 4769 (2), 4771 (3), 4772 (1), 4784 (1), 4785 (1), 4786 (2), 4817 (7), 4820 (2), 4823 (1), 4824 (3), 4827 (2), 4828 (1), 4845 (1), 4850 (8), 4854 (1), 4855 (24), 4856 (9), 4860 (1), 4868 (3), 4910 (2), 4920 (1), 4924 (2), 4927 (5), 4937 (1), 4938 (1), 4951 (8), 4954 (1), 4955 (5), 4956 (4), 4981 (1), 4983 (1), 5092 (1), 5098 (9), 5105 (2), 5111 (1), 5148 (4), 5160 (6), 5161 (2), 5162 (3), 5163 (8), 5166 (7), 5167 (3), 5168 (5), 5169 (1), 5173 (3), 5187 (1), 5191

(1), 5197 (1), 5202 (1), 5259 (4), 5261 (2), 5262 (1), 5271 (1), 5330 (2), 5331 (2), 5346 (1), 5348 (1), 5367 (5), 5370 (1), 5371 (2), 5372 (1), 5378 (2), 5400 (3), 5402 (1), 5404 (4), 5408 (1), 5409 (1), 5410 (1), 5413 (4), 5417 (1), 5419 (5), 5509 (6), 5533 (2), 5536 (6), 5537 (3), 5558 (5), 5560 (2), 5563 (2), 5564 (3), 5568 (3), 5572 (2), 5586 (1), 5628 (1), 5688 (1), 5736 (1), 5737 (2).

ECOLOGY.—Based on a grid of 122 stations in depths of 5-100 fms., this species has a frequency occurrence of 7 /m² in southern California. It occurs in 60 of the 122 grid samples, or 49%. The median occurrence of the species is between the 30 and 39 fm. contours.

The following table presents the depth distribution of the species as a percentage occurrence (one or more specimens) among the total of stations in the respective depth classes. Thus, it occurs in only 18% of the stations in the 5 to 9 fms. depth class.

Depth class in fathoms	5-9	10-19	20-29	30-39	40-49	50-69	70-99
Percentage of samples	18	71	67	59	84	71	33

DISTRIBUTION.—Southern California coastal shelves and slopes, 5 to 280 fms. Santa Catalina Island, 10-67 fms.; Santa Rosa Island, 8 fms.

Paranthura Bate and Westwood

DIAGNOSIS.—Mouth parts for piercing and sucking. Telson lacking statocysts, not sculptured. Peraeopods 4-7 with fifth article not underriding article 6. Pleopod 1 not indurated. Maxilliped triarticulate. Pleon sutures more or less distinct.

Paranthura elegans Menzies

(Fig. 13)

Paranthura elegans Menzies 1951: 106-111, figs. 9-11.

DIAGNOSIS. Anterolateral angles of cephalon very slightly exceeding forward extent of rostrum. Eyes large, composed of about 13 ocelli. Endopod of uropod extending beyond telson; exopod shorter than telson and with a slightly sinuate posterolateral border. Tip of stylus of second male pleopod with four setae and marginal cylindroid lobe. Posterolateral pleotelson borders finely dentate. Maxilliped with two free articles.

MATERIAL EXAMINED. Stations 1822 (1), 5163 (1), 5164 (1), 5562 (1).

DISTRIBUTION. Marin County, California to San Diego County, California. New records herein are from Pt. Conception, 10-30 fms.

Mesanthura K. H. Barnard

DIAGNOSIS. Mouth parts for chewing and biting. Statocysts of telson paired. Article 5 of peraeopods 4-7 underriding article 6. Maxilliped with 5 articles. Pleopod 1 operculiform. Pleon sutures indistinct dorsally. Antenna 1 brushlike in male. Body pigmented. Telson not sculptured.

REMARKS.—In K. H. Barnard's (1925: 143) diagnosis of this genus he mentions that dorsal pits are absent, but in the following species one pit is present.

The pigment pattern of each species is diagnostic, morphological differences being minor.

Mesanthura occidentalis Menzies and Barnard, new species
(Fig. 14)

DIAGNOSIS OF PIGMENT PATTERN.—Head with transverse band just behind the eyes. Body segments 1 to 6 each with a rectangular outline of pigment, characteristically discontinuous on each segment. Segment 7 with a posterior transverse band. Pleon and pleotelson dorsally spotted.

HOLOTYPE.—AHF No. 5710, female, 7 mm. =LACM 57-28.3

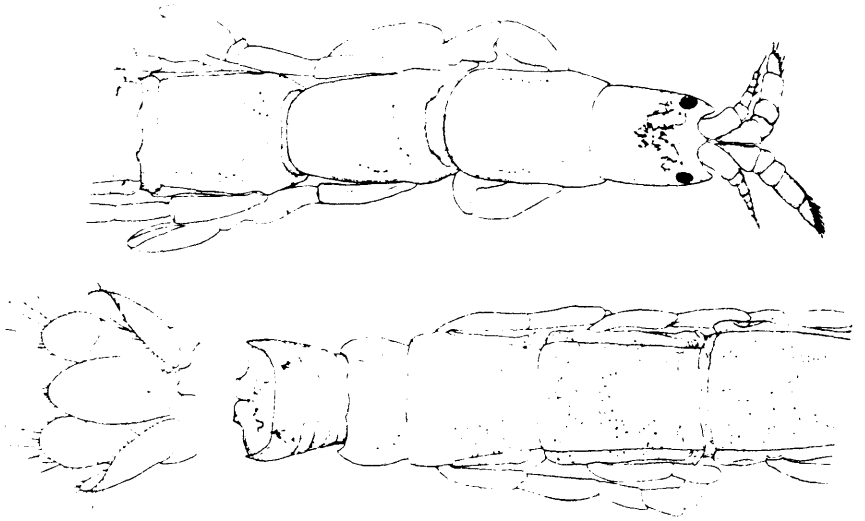

Fig. 13. *Paranthura elegans* Menzies. Male, 8.6 mm. Dorsal view in 3 sections. After Menzies 1951.

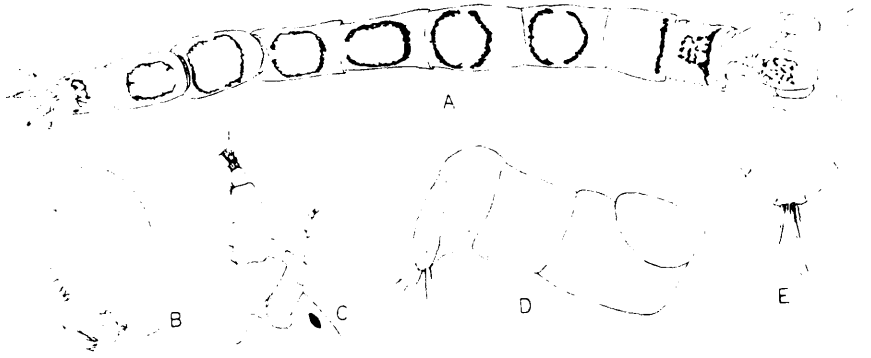

Fig. 14. *Mesanthura occidentalis* n. sp. A-E. Holotype, female, 7 mm. A, dorsal view; B, gnathopod; C, antennae 1, 2, top and bottom; D, maxilliped; E, apex of pleotelson.

TYPE LOCALITY.—Station 4822, 11 miles E of Pt. Conception, California, 34-27-15 N, 120-14-45 W. January 17, 1957, depth of 37 feet, bottom of dead kelp fragments and red algae.

REMARKS.—The pigment pattern of this species may be compared with drawings of 5 species in K. H. Barnard (1925: 144) and with one species in Miller and Menzies (1952: 7).

MATERIAL EXAMINED.—Stations 4822 (3), 5503 (1).

DISTRIBUTION.—Pt. Conception and Pt. Fermin, California, 10 fms.

VALVIFERA

Edotea Guérin-Méneville

DIAGNOSIS.—Flagellum of second antenna rudimentary. Maxillipedal palp composed of 3 articles. Epimera of all segments of thorax firmly united with the segments. Abdomen composed of a single segment, with basolateral incisions indicating another partly coalesced segment. Legs all prehensile.

Edotea sublittoralis Menzies and Barnard, new species
(Fig. 15)

DIAGNOSIS.—Anterolateral angles of head produced into small horn-like projections. Head with two dorsal tubercles. Lateral margins of

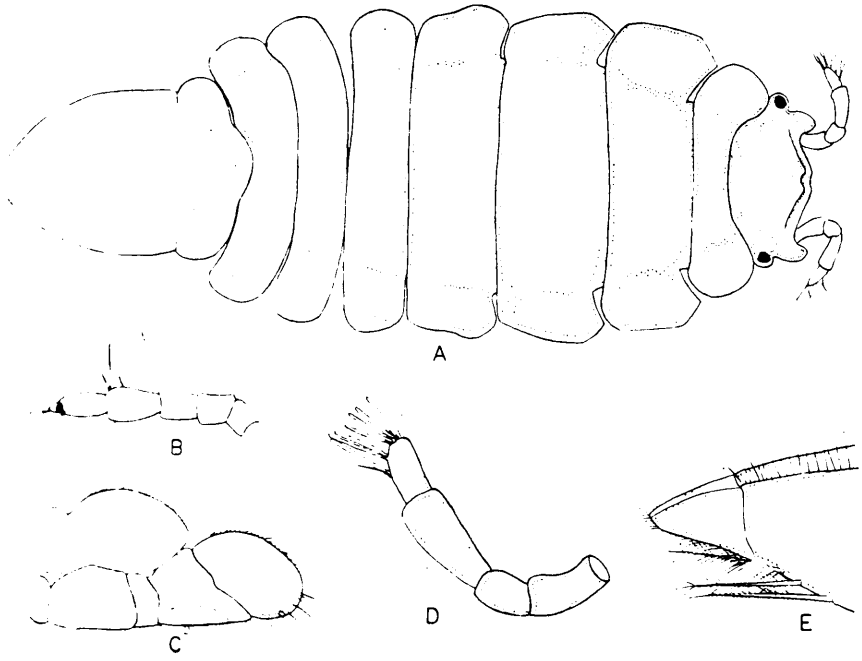

Fig. 15. *Edotea sublittoralis* n. sp. A-E. Holotype, female, 4 mm. A. dorsal view; B, D. antennae 1, 2; C. malilliped; E. end of uropod.

thoracic segments nearly straight, not produced into horns; each lateral margin bearing a low dorsal swelling. Lateral incisions of abdomen well marked, the basal part of abdomen varying from slightly wider to slightly narrower than the terminal portion which tapers evenly to a blunt apex. Abdomen bearing 3 basal swellings, the middle one quite bulbous and inflated. Terminal portion of the abdomen bearing a single very large swelling. Side view of abdomen showing it to be composed mainly of 2 large swellings, a smaller basal one, and a larger terminal one. Second antenna extends to middle of article 4 of first antenna.

HOLOTYPE.—AHF No. 565, female, 4 mm. = LACM 56-17.1

TYPE LOCALITY.—Station 4720, off Newport, California, 33-37-39 N, 117-58-16 W, Nov. 21, 1956, 50 feet depth, green to black silt.

RELATIONSHIP.—This species is related to the Atlantic *E. triloba* (Say) in Richardson (1905: 396), but differs by the lack of low dorsal tubercles and by the less pointed abdomen. It differs from the Atlantic *E. montosa* (Stimpson) in Richardson (1905: 397) by the broad basal portion of the abdomen, the evenly tapering distal portion of the abdomen and the more projecting eyes.

REMARKS.—In juvenile specimens the second, third and fourth thoracic segments are wider than they are in adults, giving the body a pyriform shape, and the abdomen is considerably more pointed.

Occasionally, the posterior abdominal swelling is marked by an elevated transverse ridge, and the abdomen is more elongated and pointed.

A specimen from sta. 4758 has a transverse ridge strongly developed on the posterior dorsal edge of each thoracic segment.

MATERIAL EXAMINED.—Stations 2312 (2), 4464 (5), 4719 (1), 4720 (5), 4746 (1), 4758 (4), 4759 (3), 4761 (7), 4762 (1), 4771 (1), 4813 (1), 4818 (2), 4825 (3), 4840 (1), 4841 (5), 4853 (1), 4862 (2), 4956 (5), 5043 (1), 5508 (1), 5583 (3).

DISTRIBUTION.—Southern California coastal shelves: Pt. Conception to the Mexican border, 7.5 to 35 fms. All but two stations are 15 fms. or shallower.

Idarcturus K. H. Barnard

DIAGNOSIS.—Body not geniculate, the head fused with first peraeon segment. All pleon segments fused into one piece. Fourth peraeon segment longer than the others in the female only, but not markedly elongate. Male appendage on seventh peraeon segment single. Appendage absent on third and fifth segments of male. Marsupial plates present as 3 pairs.

Idarcturus allelomorphus Menzies and Barnard, new species
(Fig. 16)

DIAGNOSIS.—Eyes lateral and bulging. Cephalon with 2 dorsal spines between the eyes. First peraeon segment fused indistinguishably with cephalon, bearing 2 small lateral spines which are homologous with the

small anterolateral or lateral projections of the following segments. Posterior dorsum of each of segments 2-7 with a pair of small spines, larger on segment 3. Segments 3, 5, 6, and 7 each bearing 2 smaller lateral spines. Pleotelson composed of a single segment, each lateral margin with 2 medium-sized, angulate spines; posterior margin produced, the apex blunt; dorsal anterior surface with a pair of small spines. Spine-like epimeral plates present on segments 3 and 4. Flagellum of antenna 2 with 3 articles and a terminal claw. Maxilliped with 2 coupling hooks. First peraeopod with claw lacking on distal article.

HOLOTYPE.—AHF No. 5713, female, 5.2 mm. = LACM 57-77.1

TYPE LOCALITY.—Station 4938, off Goleta, California, 34-27-25 N, 120-12-55 W, April 9, 1957, medium-coarse gray sand.

RELATIONSHIP.—This species differs from *I. hedgpethi* Menzies (1951: 119) by the lack of a fusion line between the cephalon and segment 1, by the smaller anterolateral processes and spines of the segments, and by the lack of a lateral spine pair on segments 2 and 4.

The uropod and maxilliped are similar to *I. hedgpethi*. The spines on small or poorly calcified specimens are quite reduced in size and scarcely visible.

MATERIAL EXAMINED.—Stations 4318 (1), 4464 (1), 4676 (2), 4785 (4), 4814 (1), 4822 (1), 4827 (1), 4850 (1), 4870 (5), 4938 (6), 5166 (1), 5168 (1), 5171 (1), 5173 (1), 5413 (1).

DISTRIBUTION.—Pt. Conception to Laguna Beach, California, and Cortes Bank. Depth 7 to 50 fms.

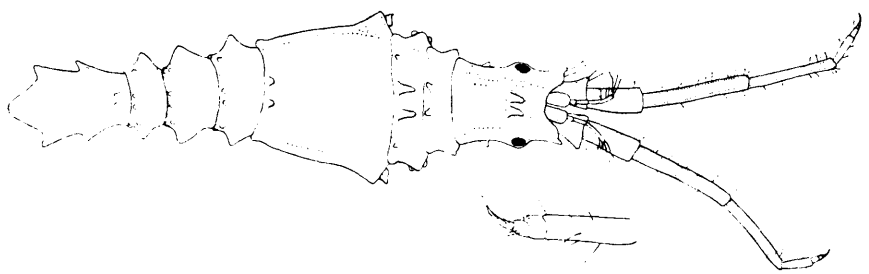

Fig. 16. *Idarcturus allelomorphus* n. sp. Holotype, female, 5.2 mm. Dorsal view and flagellum of antenna 2.

Idotea Fabricius

DIAGNOSIS.—Flagellum of second antenna multiarticulate. Maxillipeds with a palp composed of four or five articles (five in *Pentidotea*). Epimera of all the peraeonal segments, with the exception of the first, distinctly separated from the segments. Pleon composed of three segments, with a suture line on either side at the base of the terminal segment, indicating another partly coalesced segment.

Idotea (Pentidotea) resecata Stimpson
(Fig. 17)

Idotea (Pentidotea) resecata Stimpson, Menzies 1950: 182-185, pl. 8.

DIAGNOSIS.—Supra-antennal line distinctly concave but having a small median convexity; frontal process narrow, pointed, and exceeding the frontal lamina 1 in length; frontal lamina 1 broadly rounded; frontal lamina 2 not visible in dorsal view, the apex minutely cleft. Eyes pyriform with apex directed posteriorly. Eye surrounded by a clear area which is characteristically bordered by a heavily pigmented band. Maxilliped with one coupling hook. Posterolateral border of seventh epimeral plates angulate. Posterior border of telson in adult markedly concave and with projecting lateral angles above each of which is an anteriorly directed carina.

MATERIAL EXAMINED.—Stations 4822 (2), 4956 (3), 5165 (3), 5562 (1).

DISTRIBUTION.—Karta Bay, Alaska to southern California. The records herein are from Pt. Conception and Santa Barbara, 10 fms.

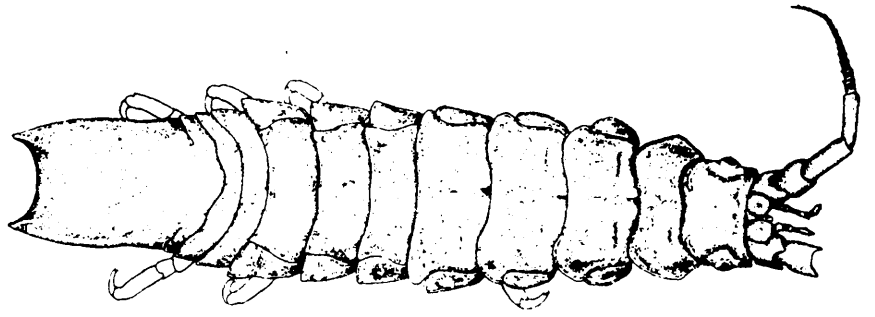

Fig. 17. *Idotea (Pentidotea) resecata* Stimpson. Male, 20.5 mm. After Menzies and Waidzunas, 1948.

Neastacilla Tattersall

DIAGNOSIS.—Inferior (concealed) ramus of uropod with one apical seta. Pleon with 3 segments, represented in dorsal grooves and lateral incisions. Flagellum of second antenna with 3 articles, the terminal one bearing a claw. Lateral lappet of first peraeonal segment not expanded forwards and downwards. Claw missing from dactyl of first peraeopod.

Neastacilla californica (Boone), new combination
(Fig. 18)

Astacilla californica Boone 1918: 600-601, pl. 89, fig. 1.

REMARKS.—Boone failed to evaluate the pleon as composed of three segments, not two.

MATERIAL EXAMINED.—Stations 4753 (1), 4755 (1), 4819 (2), 4822 (2), 4850 (1), 1872 (1), 9818 (3), 4955 (2), 5412 (3), 5413 (1), 5564 (1), 5751 (1).

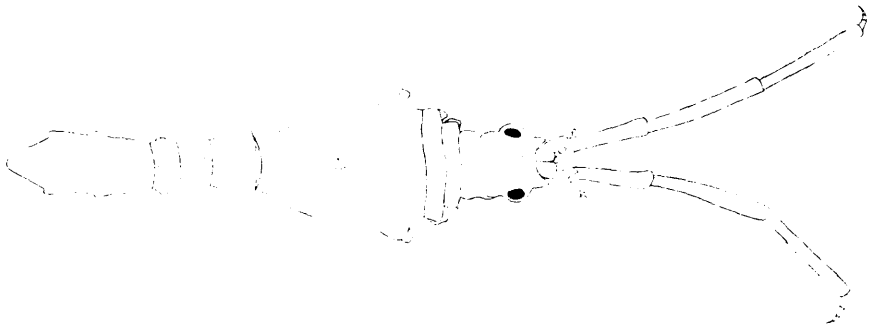

Fig. 18. *Neastacilla californica* (Boone). Male, 6 mm.

DISTRIBUTION.—Southern California coastal shelves, Pt. Conception to Pt. Loma, 10-54 fms.

Ronalea pseudoculata (Boone)

(Fig. 19)

Ronalea pseudoculata (Boone), Menzies and Bowman, 1956, p. 340.

MATERIAL EXAMINED.—Station 4819 (8).

DISTRIBUTION.—Southern California. Recorded herein from Pt. Conception, 10 fms.

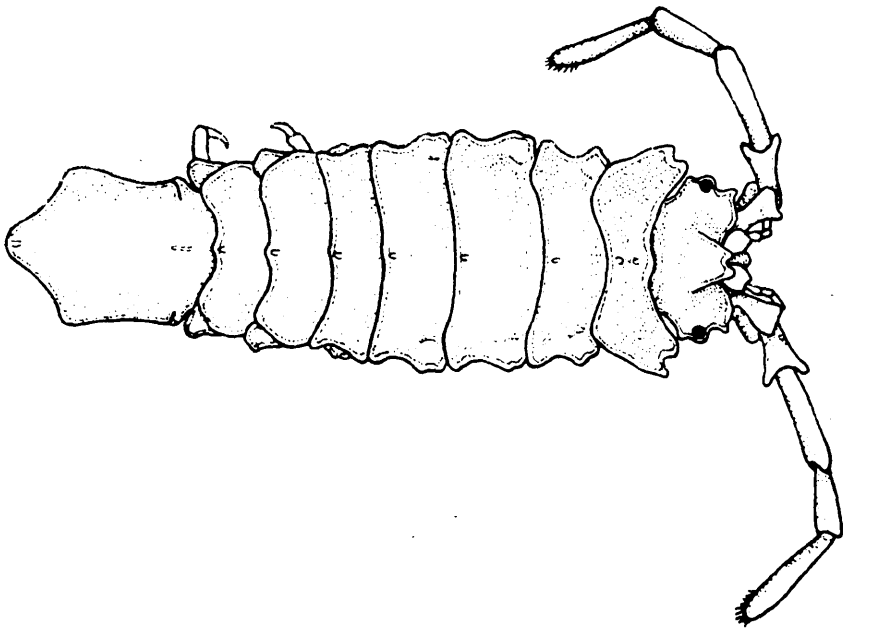

Fig. 19. *Ronalea pseudoculata* (Boone). Male, 8.2 mm. After Menzies and Bowman 1956.

Synidotea Harger

DIAGNOSIS.—Flagellum of antenna 2 multiarticulate. Palp of maxillipeds composed of 3 articles. Epimera of all thoracic segments perfectly and firmly united with the segments. In the last 3 thoracic segments a faint depression sometimes marks the place of coalescense. Abdomen composed of a single segment, with a suture line on either side at the base indicating another partly coalesced segment.

Synidotea magnifica Menzies and Barnard, new species

(Figs. 20, 21)

DIAGNOSIS.—Abdomen bluntly rounded, spatulate. Tubercle in front of eye and anteromedial tubercles submarginal; dorsum of head bearing a pair of smaller tubercles between the eyes; anterolateral preocular processes of head not horn-like. Body segments bearing 3-4 dorsolateral longitudinal rugae, the anterior segments tuberculate. Peraeopods 2-6 bearing a projecting flange on the posterior upper third of article 2.

HOLOTYPE.—AHF No. 577, female, 6 mm. = LACM 57-103.1

TYPE LOCALITY.—Station 5108, off Oceanside, California, 33-10-30 N. 117-25-25 W, June 4, 1957, 200 feet depth, dark green micaceous silt.

RELATIONSHIP.—This species may be contrasted with *S. consolidata* (Stimpson) (see Richardson 1905: 383, not Stimpson or other authors) which has a more pointed abdominal extremity with a median emargination, three dorsal rows of tubercles on the segments and a generally less rugose appearance.

This species resembles *S. bogorovi* Gurjanova (1955: 223) in the spatulate pleon, but differs from that species in having the peraeonal rugae more pronounced and the preocular processes more evident.

MATERIAL EXAMINED.—Stations 4722 (1), 4760 (1), 4785 (1), 4817 (9), 4820 (1), 1850 (1), 4981 (1), 5108 (1), 5163 (2), 5167 (3), 5168 (2), 5585 (1). missing at LACM 9/89 (HGK) Holotype

DISTRIBUTION.—Southern California coastal shelves: Pt. Conception to Oceanside, 30-50 fms.

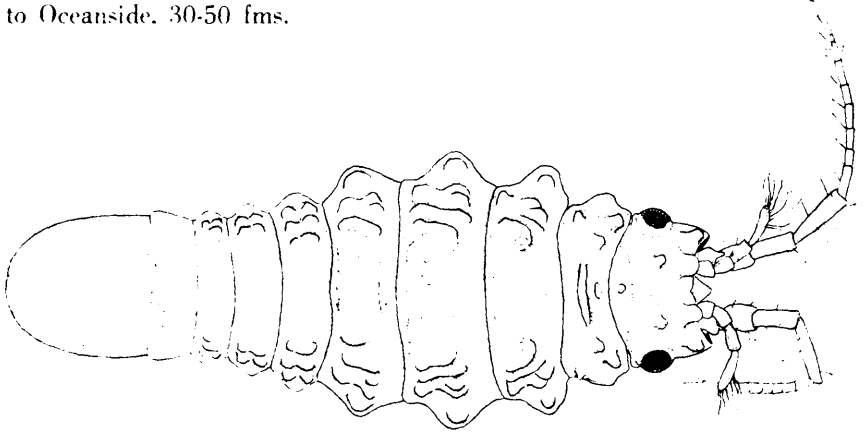

Fig. 20. *Synidotea magnifica* n. sp. Holotype, female, 6 mm. Dorsal view.

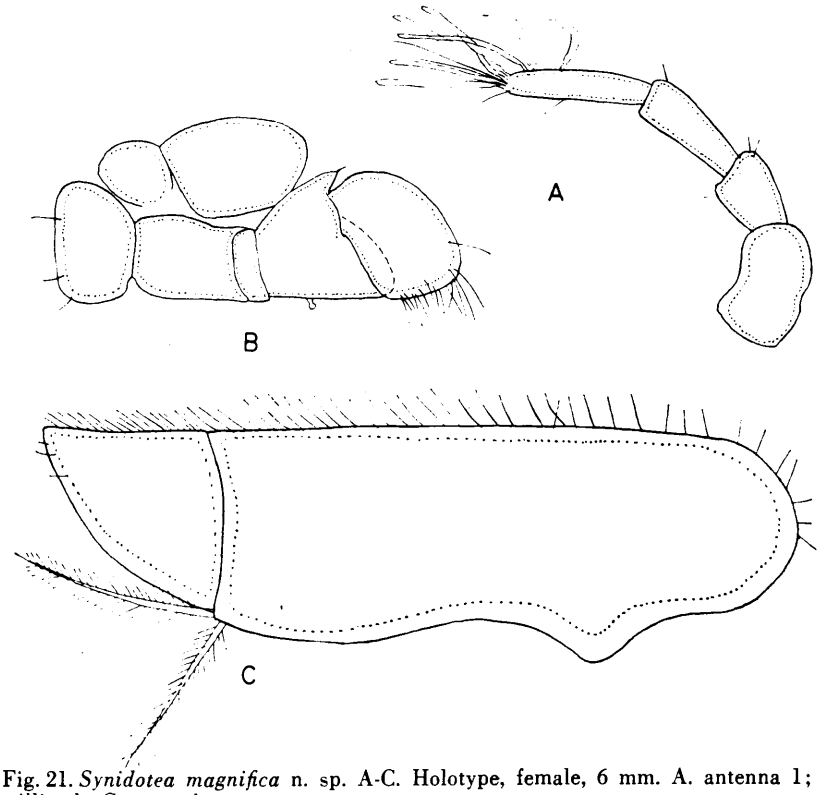

Fig. 21. *Synidotea magnifica* n. sp. A-C. Holotype, female, 6 mm. A. antenna 1; B. maxilliped; C. uropod.

GNATHIOIDEA (DECEMPEDES)

Gnathia Leach

DIAGNOSIS.—Pylopods (first peraeopods) bi- or tri- articulate, operculiform, the last article always very small. Mandibles taper to a point. Frons entire, not emarginate.

REMARKS.—Females and young of different species are difficult to distinguish.

Gnathia crenulatifrons Monod

(Fig. 22)

Gnathia crenulatifrons Monod 1926: 390-393, figs. 154-155.

DIAGNOSIS OF MALE.—Body elongated, about 3.5 times as long as broad, the sides parallel. Frons produced, broad, slightly convex, minutely crenulated, lacking dorsal projections. Inner face of mandibles bearing 3 teeth, sometimes obliterated; tooth of outer face scarcely developed.

MATERIAL EXAMINED.—Stations 2128 (1), 2130 (1), 2389 (1), 2436 (1), 2637 (3), 2638 (3), 3203 (4), 3208 (4), 3391 (1), 4318 (2), 4330 (4), 4722 (12), 4747 (3), 4753 (1), 4756 (1), 4757 (7), 4760 (2), 4762

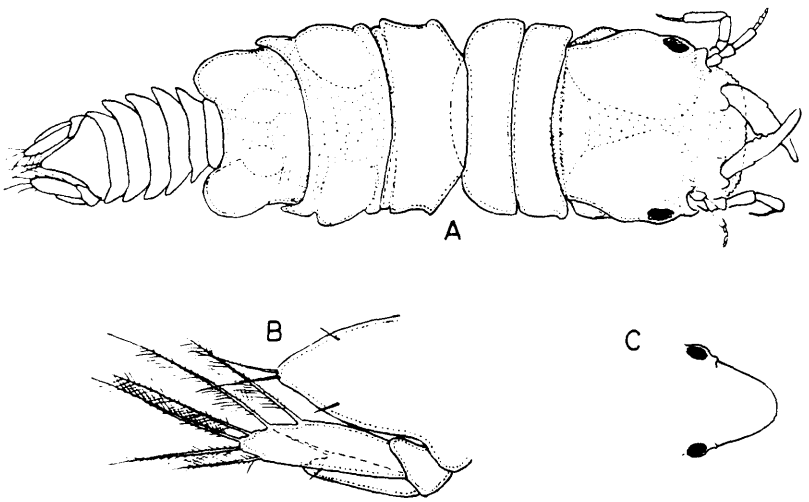

Fig. 22. *Gnathia crenulatifrons* Monod. A. male, 4 mm., dorsal view; B. male telson and uropod; C. female, 4 mm., head.

(1), 4763 (3), 4767 (8), 4768 (7), 4772 (3), 4778 (3), 4779 (1), 4781 (2), 4783 (2), 4784 (2), 4785 (4), 4817 (3), 4820 (3), 4824 (5), 4827 (1), 4828 (5), 4837 (10), 4845 (1), 4850 (4), 4855 (10), 4859 (1), 4860 (3), 4868 (1), 4871 (1), 4872 (9), 4878 (5), 4881 (5), 4886 (1), 4918 (6), 4924 (5), 4935 (8), 4936 (2), 4937 (1), 4951 (9), 4952 (5), 4954 (1), 4955 (11), 4980 (1), 4981 (1), 4982 (4), 4983 (2), 5042 (1), 5086 (3), 5092 (2), 5098 (10), 5108 (4), 5111 (1), 5160 (10), 5161 (2), 5162 (1), 5163 (1), 5166 (3), 5167 (4), 5168 (10), 5169 (2), 5171 (2), 5174 (2), 5201 (1), 5202 (5), 5206 (12), 5259 (6), 5261 (1), 5262 (11), 5269 (2), 5270 (2), 5271 (1), 5330 (5), 5331 (3), 5367 (1), 5368 (3), 5375 (1), 5376 (1), 5378 (2), 5379 (1), 5400 (6), 5402 (1), 5403 (6), 5404 (5), 5406 (1), 5407 (2), 5408 (4), 5409 (2), 5413 (6), 5418 (2), 5419 (3), 5420 (1), 5506 (1), 5509 (3), 5510 (5), 5536 (4), 5537 (1), 5558 (1), 5560 (2), 5563 (15), 5568 (10), 5572 (9), 5576 (2), 5579 (2), 5580 (3), 5581 (1), 5582 (4), 5583 (2), 5584 (3), 5585 (6), 5586 (3), 5587 (1), 5588 (2), 5594 (1), 5603 (3), 5627 (3), 5711 (1), 5728 (1), 5729 (2), 5732 (1), 5734 (1), 5735 (1), 5738 (1).

ECOLOGY.—Based on a grid of 122 stations the frequency occurrence of this species on the coastal shelf of southern California, 5-100 fms., is 8 /m^2. It occurs in 57 samples of the grid or 47%. Its median distribution by depth class is between the 30 and 39 fm. depth contours.

The following table presents the depth distribution of the species, as a percentage occurrence (one or more specimens) among the total of stations in the respective depth classes. Thus, it occurs in all stations of the 50 to 69 fms. class, but in only 74% of the stations of the 40 to 49 fms. class.

Depth class in fathoms	5-9	10-19	20-29	30-39	40-49	50-69	70-99
Percentage of samples	0.3	43	61	76	74	100	60

DISTRIBUTION.—Southern California coastal shelves and slopes, 5-100 fms.; Santa Catalina Island, 40-136 fms.; Santa Catalina Basin, 688 fms.

Gnathia tridens Menzies and Barnard, new species
(Fig. 23)

DIAGNOSIS OF MALE.—Body about 2.5 times as long as broad, the third free segment narrowed. the pleon rather small. Frons produced, trifid medially, lacking dorsal projections. Inner face of mandible bearing about 6 or 7 small teeth, the outer face bearing a large tooth.

HOLOTYPE.—AHF No. 5711, male, 3 mm. = LACM 57-28.2

TYPE LOCALITY.—Station 4822, 11 miles E of Pt. Conception, California, 34-27-15 N. 120-14-45 W, Jan., 17, 1957, depth of 37 feet, bottom of dead kelp fragments and red algae.

RELATIONSHIP.—From *G. africana* K. H. Barnard (in Monod 1926: 432) the species differs by the much shorter and broader pleon, the lack of medial ocular processes, and by the slightly wider third free peraeon segment. The immersion of the two apical setae of the telson is characteristic of *G. tridens*.

MATERIAL EXAMINED.—Stations 4822 (96), 5164 (3).

DISTRIBUTION.—Pt. Conception, 6-15 fms.

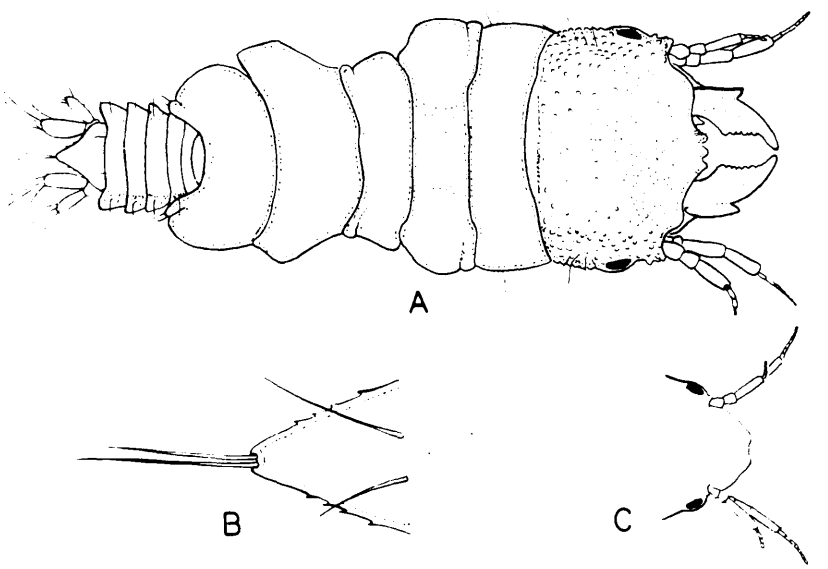

Fig. 23. *Gnathia tridens* n. sp. A-B. Holotype, male, 3 mm. A. dorsal view; B. apex of telson; C. female, 3 mm., head.

Gnathia productatridens Menzies and Barnard, new species
(Fig. 24)

DIAGNOSIS OF MALE.—Body about 3 times as long as broad, the sides parallel, the pleon small. Frons produced, trifid medially, lacking dorsal projections. Inner face of mandible bearing 4-5 small teeth, the outer face bearing a series of 3-5 setulose crenulations.

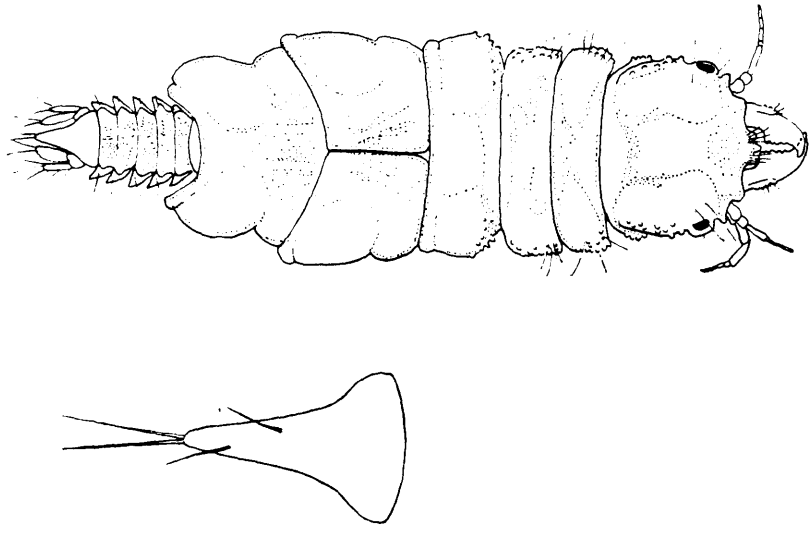

Fig. 24. *Gnathia productactridens* n. sp. Holotype, male, 3.2 mm. Dorsal view and telson.

HOLOTYPE.—AHF No. 5712, male, 3.2 mm. = LACM 57-121.1

TYPE LOCALITY.—Station 5173, off Summerland, California, 34-14-50 N. 119-32-25 W. July 3, 1957, depth of 308 feet, green silt.

RELATIONSHIP.—The species differs from *G. tridens* n. sp. by the narrower body and the broad third peraeon segment, the more elongated telson and the crenulations, not a tooth, on the outer mandibular surface. The trifid frons and mandible distinguish it from the common *G. crenulatifrons* Monod.

MATERIAL EXAMINED.—Stations 4814 (1), 5160 (1), 5173 (4), 5174 (1).

DISTRIBUTION.—Pt. Conception to Santa Barbara, 40-50 fms.

FLABELLIFERA

Ancinus Milne Edwards

DIAGNOSIS.—Platybranchiate sphaeromid with uniramous uropods; outer ramus styliform, projecting beyond pleotelsonal apex. Pleotelson triangulate. Epimera visible in dorsal view on peraeonal segments 2-7. Male peraeopods 1-2 subchelate; female with only peraeopod 1 subchelate.

First two articles of antenna 1 expanded. Front of cephalon produced. Palp of female maxilliped not as wide as endite.

Ancinus daltonae Menzies and Barnard, new species
(Fig. 25)

DIAGNOSIS.—Flagellum of antenna 1 with 7 articles, of antenna 2 with 8 articles. Inner margin of uropodal ramus crenulate, the apex sharply pointed and extending beyond pleotelsonal margin. Lateral margins of cephalon produced.

HOLOTYPE.—AHF No. 5714, female, 4 mm. = LACM 57-25.1

TYPE LOCALITY.—Station 4819, off Pt. Conception, California, 34-26-30 N, 120-28-10 W, Jan. 16, 1957, depth of 57 feet, medium-coarse gray sand.

MATERIAL EXAMINED.—The type locality, 5 specimens.

RELATIONSHIP.—This species differs from *A. depressus* (Say) (from New Jersey), the only other known member of the genus, in having larger uropods, a more pointed pleotelsonal apex and probably in other characters as well. The type needs reexamination.

Eurydice Leach

DIAGNOSIS.—Peduncle of second pair of antennae composed of four articles. Antenna 1 with basal peduncular article extended straight in front at right angles to remaining part of antenna. Maxillipedal palp article 2 lacking hooks. All six abdominal segments distinct. Pleopods 1 and 2 subequal in structure; peduncle scarcely wider than long; both rami submembranaceous, the posterior margins furnished with very long plumose setae. Posterior angle of uropodal peduncle very little produced.

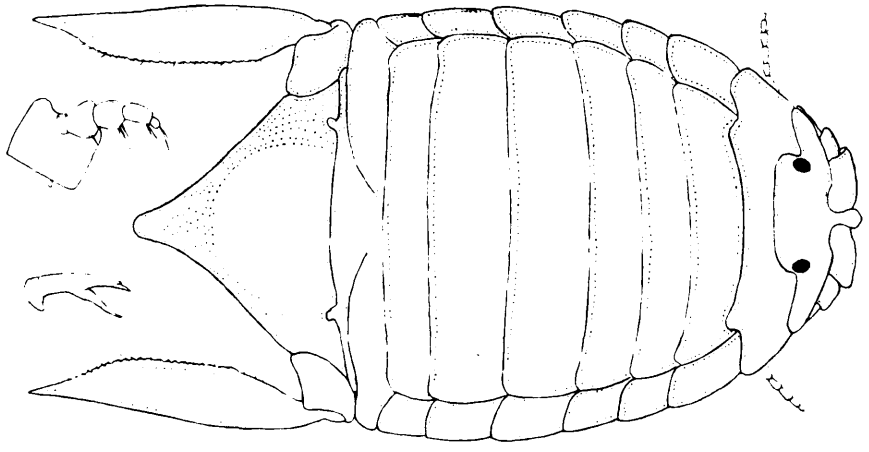

Fig. 25. *Ancinus daltonae* n. sp. Holotype, female, 4 mm. Dorsal view; maxilliped; mandible, minus palp.

Eurydice branchuropus Menzies and Barnard, new species
(Figs. 26, 27)

DIAGNOSIS.—Terminal abdominal segment not rounded posteriorly (under minute examination), truncate between the triangular lateral teeth and furnished with 4 spines; female abdomen shorter than thorax. Body surface smooth. Antenna 2 extending to middle of peraeon segment 5 in female (with 19 flagellar articles), to end of thorax in male. Uropodal rami rounded, not truncate.

HOLOTYPE.—AHF No. 579, female, 3 mm. = LACM 57-67.1

TYPE LOCALITY.—Station 4910, 10 miles S of Pt. Loma, 32-30-00 N, 117-13-15 W, March 26, 1957, 136 feet depth, coarse red (rust-colored) sand.

RELATIONSHIP.—This species differs from *E. caudata* Richardson (1905: 124) from Santa Catalina Island, California, by the shorter second antennae and the rounded uropodal rami.

The species has a peculiar resemblance to *Branchuropus littoralis* Moore (in Richardson 1905: 128) which has a biarticulate maxilliped instead of 5-articulate. It is suggested by us that the maxillipedal palp of *B. littoralis* (the type species) was broken off at the second segment and that in reality *E. branchuropus* n. sp. is synonymous with *B. littoralis*.

MATERIAL EXAMINED.—Stations 4743 (1), 4745 (3), 4746 (4), 4747 (2), 4908 (1), 4910 (5), 5187 (17), 5193 (3), 5379 (1), 5609 (1).

DISTRIBUTION.—Apparently a southern species with its northern range limit at the Mexican border on sandy bottoms, 10-50 fms.

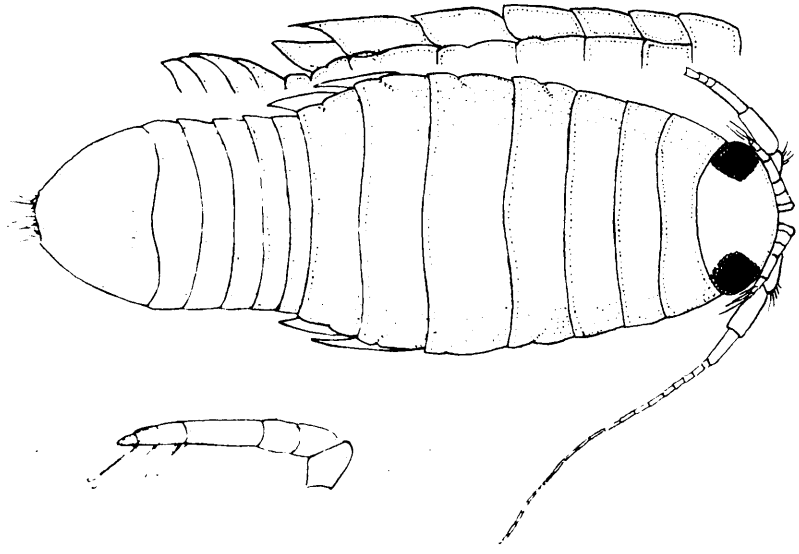

Fig. 26. *Eurydice branchuropus* n. sp. Holotype, female, 3 mm. Dorsal view and antenna 1. At top is a lateral view of corresponding segments.

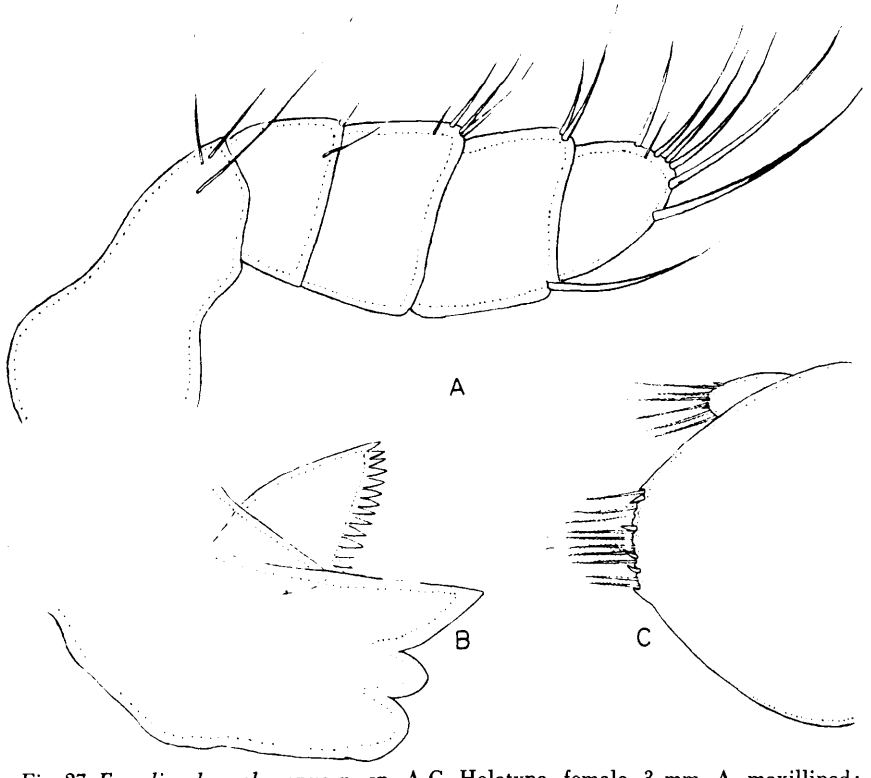

Fig. 27. *Eurydice branchuropus* n. sp. A-C. Holotype, female, 3 mm. A. maxilliped; B. mandible, lacking the triarticulate palp; C. apex of abdomen.

Serolis Leach

DIAGNOSIS OF A DIVISION OF THE SUBGENUS SEROLIS.—Coxal plates marked off from the terga of peraeon segments 2, 3, and 4. Third palp article of maxilliped well developed. Lappets of outer lobe on second pair of maxillae provided with a small number of setae. Basipoidites of the first three pairs of pleopods each provided at their inner proximal angles with a triangular extension which is furnished with setae. Endopodite of third pleopod usually entire.

REMARKS.—The above diagnosis was copied from Nordenstam (1933: 50) in group III of the subgenus *Serolis*. Nordenstam had placed the following species, *S. carinata*, in a group V by itself, but our correction, showing the presence of dorsal sutures of peraeon segments 2, 3, and 4, eliminates this group and carries *S. carinata* into group III.

Serolis carinata Lockington

(Fig. 28)

Serolis carinata Lockington, Richardson 1905: 321-322, figs. 353, 354.

DIAGNOSIS.—Serolid of group III in Nordenstam 1933, with faint

dorsal carina on pleotelson; each side of pleotelson incised, producing a sharp tooth. Dorsal midline of head, peraeon and pleon segments 1-2 with a carina ending in a bump on each segment, the bumps variably absent on peraeon segment 6 and on the head between the eyes.

REMARKS.—The posterior end of the pleotelson varies from slightly incised to truncate. The dorsal sutures of peraeon segments 2, 3 and 4 are not always clearly indicated.

MATERIAL EXAMINED.—Stations 2312 (1), 4877 (1), 5536 (1).

DISTRIBUTION.—Santa Monica Bay 30 fms.; off Newport 7 fms.; Laguna Beach 30 fms.; on rubbly bottoms. Previously recorded from San Diego.

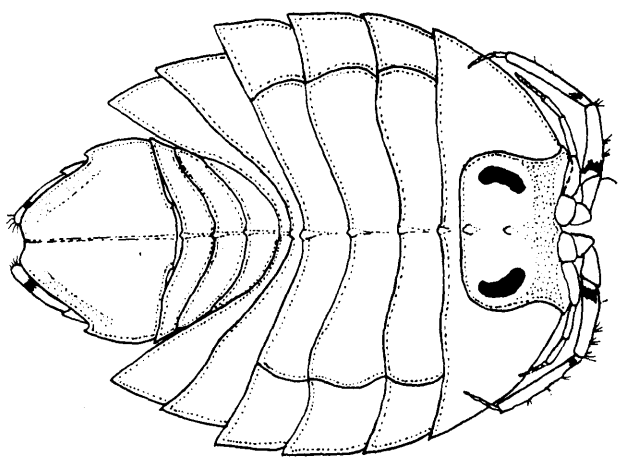

Fig. 28. *Serolis carinata* Lockington. Male, 3 mm.

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