Pelagic Amphipods of the Sub-Order *Hyperiidea* in New Zealand Waters*

I.—Systematics

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Abstract

Fifteen species of Hyperiidea from New Zealand waters are re-described and figured. Six of these, *Cyllopus macropis*, *Hyperia spinigera*, *Parathemisto gracilipes*, *Hyperoche mediterranea*, *Paralycaea gracilis* and *Parascelus typhoides?* are new records from the New Zealand region. *Cyllopus macropis* is considered a valid species. Fifty-eight species of Hyperiidea are known from these waters; keys are given to all families, genera and species represented. *Parathemisto gracilipes*, *P. gaudichaudii* and *P australis* cannot be separated definitively on differences established by measurement, but the three species are considered distinct on morphological and ecological grounds. The material dealt with represents all of the Hyperiid material available in New Zealand at the time of study.

Introduction and Acknowledgments

Plankton collections made along the New Zealand coast during 1951 by the Survey ship H.M.N.Z.S. Lachlan, under the command of Commander J. M. Sharpey Schafer, R.N., have resulted in large collections of valuable zoological material. At the invitation of Lieut.-Commander B. M. Bary, R.N.Z.N., I undertook identification of amphipod material from these collections. This paper details the Hyperiid amphipods from waters around the New Zealand coast, especially the south-east of the South Island, and south to the Subantarctic Islands. For the purposes of this paper I have followed Barnard (1930) and included specimens taken in subantarctic waters south to latitude 60° in the New Zeal d fauna. This includes the Campbell Island region.

Since it soon became obvious that the collections were far more extensive than any previous Hyperiid collections in New Zealand waters with the possible exception of " Terra Nova " material, I took the opportunity to include all other Hyperiid material to which I had access. Because of the importance of the Hyperiidea oceanographically, I have given a check list and keys to all species recorded from New Zealand waters Also, since the material embraces all previous species recorded from New Zealand, again with the sole exception of " Terra Nova " collections, which were excellently dealt with by Barnard (1930), I have found it a very convenient basis for a complete revisory account of the New Zealand Hyperiidea.

A number of important ecological and distributional conclusions which have resulted from the systematic studies will be discussed in a later paper by Lieut.-Commander Bary.

* This is No. 11 of the series " Studies on the New Zealand Amphipodan Fauna," and is part of an investigation carried out at the Zoology Department, Victoria University College, Wellington, during the tenure of a New Zealand University Research Fund Fellowship.

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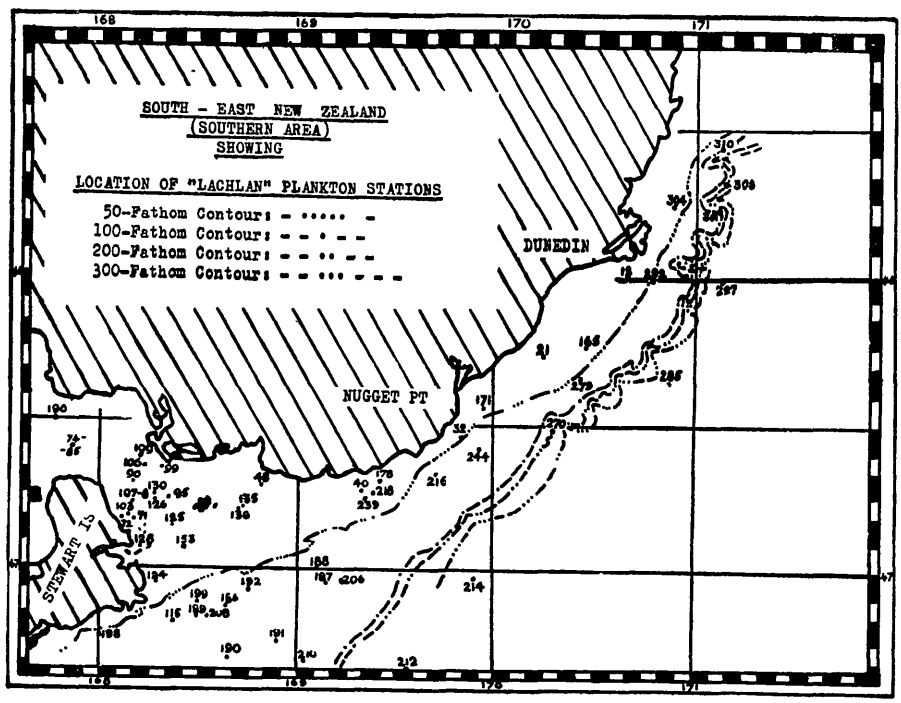
Unless otherwise indicated, the station numbers mentioned in the paper all refer to " Lachlan " material. The " Lachlan " stations were located as shown in Chart 1, which is reproduced by courtesy of Lieut.-Commander Bary. Slides mounted from "Lachlan" material are indicated by the letter "L" followed by a serial number, and will be deposited in the Dominion Museum, Wellington.

S.O. HYPERIIDEA

The Hyperiidea are a sub-order of pelagic amphipoda, usually semi-transparent, and characterised by their large eyes, lack of a maxilliped palp, and the absence or small size of sideplates on the seven peraeopods.

Thirteen families, representing some 33 genera and 58 species, have been recorded from New Zealand. Few of these were known from New Zealand waters before the *Terra Nova* Report (Barnard, 1930). I have described 15 species below, of which 6 are new records for the New Zealand area. Seven families and 10 genera are represented.



KEY TO NEW ZEALAND FAMILIES OF HYPERIIDEA
(Adapted from Barnard, 1940)

1.	Antenna 1 straight, 1st segment of flagellum large, the rest inserted terminally; ant 2 straight in both sexes		2
	Antenna 1 curved, 1st segment of flagellum large, the rest inserted subterminally; ant. 2 in male angularly folded (in *Lycacopsidae* rudimentary in male, absent in female)		7
2.	Antenna 1 flagellum with few segments		3
	Antenna 1 flagellum in male with many segments, filiform; in female very small, rudimentary or absent		5
3.	Head large, swollen, mandible without palp	*Paraphronimidae*	
	Head not swollen		4
4.	Antenna 1 flagellum elongate, styliform; mandible without palp; inner rami of uropods fused with peduncles; outer rami rudimentary in uropods 1 and 2, small in uropod 3	*Scinidae*	
	Antenna 1 flagellum short, laminar, oval or lanceolate (terete in *Cyllopus*); mandible with palp; all rami of uropods well-developed, the inner rami not fused with the peduncles	*Vibiliidae*	
5.	Uropods foliaceous, without rami; last peraeopod reduced	*Phrosinidae*	
	Uropods normal, with rami; last peraeopod normal		6
6.	Mandible with palp	*Hyperiidae*	
	Mandible without palp	*Phronimidae*	
7.	Peraeopod 4, 2nd segment not operculiform, the following segments articulated terminally		8
	Peraeopod 4, 2nd segment operculiform, the following segments articulated subterminally		11
8.	Antenna 1 attached to anterior surface of head; peraeopod 3 very slender; peraeopod 4 robust	*Lycaeopsidae*	
	Antenna 1 attached to inferior surface of head		9
9.	Head not (or very slightly) produced in a rostral point		10
	Head more or less produced in a rostral point	*Oxycephalidae*	
10	Gnathopods 1 and 2 simple	*Lycaeidae*	
	Gnathopods 1 and 2 prehensile, the expanded 5th segment forming a chela with the dactylos	*Brachyscelidae*	
11.	Peraeopod 3, second segment normal	*Pronoidae*	
	Peraeopod 3, second segment operculiform		12
12.	Peraeopod 5 normal	*Scelidae*	
	Peraeopod 5 rudimentary	*Platyscelidae*	

Note.—In this paper, I have reckoned gnathopods 1 and 2 and peraeopods 1 to 5, as is usual with Gammaridae, and now common in many Hyperiid papers. It replaces the older custom of reckoning peraeopods 1 to 7.

CHECKLIST OF NEW ZEALAND SPECIES

Family SCINIDAE

Scina borealis (G. O. Sars), 1882. Barnard, 1930. Shoemaker, 1945.
Scina crassicornis (Fabr.), 1775. Barnard, 1930. Shoemaker, 1945.
Scina curvidactyla Chevreux, 1914. Barnard, 1930. Shoemaker, 1945.

Family VIBILIIDAE

Vibilia chuni Behning, 1913 Barnard, 1930.
Vibilia propinqua Stebbing, 1888. Barnard, 1930.
Vibilia antarctica Stebbing, 1888. Barnard, 1930.
Vibilia armata Bovallius, 1887. Barnard, 1930.
Vibilia pyripes Bovallius, 1887. Barnard, 1930.
Vibilia stebbingi Behn. & Wolt., 1912. Barnard, 1930. See below.
Vibilia viatrix Bovallius, 1887. Barnard, 1930. Shoemaker, 1945.

Vibilia robusta Bovallius, 1887. Barnard, 1930.
Cyllopus magellanicus Dana, 1853 and 1855. Barnard, 1930. See below.
Cyllopus macropis (Bovallius), 1887. See below.

Family PARAPHRONIMIDAE

Paraphronima crassipes Claus, 1879a. Barnard, 1930. Shoemaker, 1945.

Family HYPERIIDAE

Hyperia spinigera Bovallius, 1889. Shoemaker, 1945. See below.
Hyperia bengalensis (Giles), 1887. Thomson, 1889, as *Hyperia (Tauria) macrocephala*. Barnard, 1930, as *H. promontorii*. Shoemaker, 1945. See below.
Hyperia fabrei (M.-Edw.), 1830. Barnard, 1930.
Hyperia luzoni Stebbing, 1888. Stewart, 1913. Barnard, 1930.
Parathemisto gaudichaudii (Guér.), 1825. Barnard, 1930. See below.
Parathemisto australis Stebbing, 1888. Barnard, 1930. See below.
Parathemisto gracilipes (Norman), 1869. See below.
Hyperoche medusarum (Kroy.), 1838. Barnard, 1930. Pirlot, 1939. See below.
Hyperoche mediterranea Senna, 1908. See below
Hyperiella antarctica Bovallius, 1887. Stewart, 1913. Barnard, 1930.
Hyperioides longipes Chevreux, 1900. Barnard, 1930.
Iulopis loveni Bovallius, 1887. Barnard, 1930.

Family PHRONIMIDAE

Phronima sedentaria (Forsk), 1775. Powell, L., 1874 and Powell, A. W. B, 1947, as *P. novaezealandiae*. Shoemaker, 1945. See below.
Phronima atlantica Guér., 1836. Barnard, 1930. Shoemaker, 1945.
Phronimella elongata (Claus), 1862. Barnard, 1930. Shoemaker, 1945.

Family PHROSINIDAE

Phrosina semilunata Risso, 1822. Barnard, 1930. Shoemaker, 1945.
Primno macropa Guér., 1836. Chilton, 1921, as *Euprimno macropus*. Barnard, 1930. Shoemaker, 1945. See below.
Anchylomera blossevillei M.-Edw, 1830. Barnard, 1930. Shoemaker, 1945.

Family LYCAEOPSIDAE

Lycaeopsis themistoides Claus, 1879. Barnard, 1930.

Family PRONOIDAE

Eupronoë minuta Claus, 1879. Barnard, 1930. Shoemaker, 1945.
Eupronoë maculata Claus, 1879. Barnard, 1930. Shoemaker, 1945.
Parapronoë crustulum Claus, 1879. Barnard, 1930, as *P. campbelli*. Shoemaker, 1945.
Paralycaea gracilis Claus, 1879. See below.

Family LYCAEIDAE

Tryphana malmi Boeck, 1870. Barnard, 1930. Shoemaker, 1945.
Lycaea pauli Stebbing, 1888. Barnard, 1930.
Lycaea nasuta Claus, 1887. Barnard, 1930.
Lycaea pulex Marion, 1874. Barnard, 1930, as *L. bajensis*. Shoemaker, 1945.

Family BRACHYSCELIDAE

Brachyscelus crusculum Bate, 1861. Barnard, 1930. Shoemaker, 1945.
Brachyscelus rapacoides Stephensen, 1925. Barnard, 1930.

Family OXYCEPHALIDAE

Simorhynchotis antennarius (Claus), 1871. Barnard, 1930.
Oxycephalus piscator M.-Edw, 1830 Thomson, 1884, as *O. edwardsii.* Barnard 1930. Shoemaker, 1945.
Calamorhynchus pellucidus Streets, 1878. Barnard, 1930. Shoemaker, 1945.
Leptocotis tenuirostris Claus, 1871. Barnard, 1930. Shoemaker, 1945.
Streetsia porcella (Claus), 1879. Barnard, 1930, as *S porcellus.* Shoemaker, 1945.
Streetsia challengeri Stebbing, 1888. Barnard, 1930. Shoemaker, 1945.

Family SCELIDAE

Parascelus typhoides ? Claus, 1879. Shoemaker, 1945. See below

Family PLATYSCELIDAE

Platyscelus ovoides (Claus), 1879. Thomson, 1879, as *P. intermedius.* Barnard, 1930. Shoemaker, 1945. See below.
Platyscelus serratulus Stebbing, 1888. Barnard, 1930. Shoemaker, 1945.
Hemityphis rapax (M.-Edw.), 1830. Barnard, 1930. Shoemaker, 1945.
Amphithyrus bispinosus Claus, 1879. Barnard, 1930. Shoemaker, 1945.
Paratyphis parvus Claus, 1887 Stewart, 1913. Barnard, 1930. Shoemaker, 1945, considers *P. parvus* probably a synonym of *P. maculatus* Claus, 1879.
Paratyphis spinosus Spandl, 1924. Barnard, 1930.
Tetrathyrus pulchellus Barnard, 1930.
Tetrathyrus forcipatus Claus, 1879. Barnard, 1930. Shoemaker, 1945.

A. HYPERIIDEA GAMMAROIDEA

Tribe DERIVATA, Wolt

Family SCINIDAE

Stebbing, 1888: 1270
Stephensen, 1918· 16
Wagler, 1926. 324
Pirlot, 1929· 53.

" Head deeper than long; eyes small and separated Pleon narrower than peraeon, 5th and 6th segments fused, telson short. Superior antennae strong, erect, not very flexible, fixed at an angle to the head. Inferior antennae fixed below and behind the superior antennae, variable with age and sex. Mandibles without palp. Maxillae well developed Gnathopods simple and slender Third peraeopod generally the strongest, fifth the shortest; dactylos sharp, not retractile. Inner rami of uropods generally fused with the peduncles." (Translated from Pirlot.)

Only one genus, *Scina,* has been recorded from New Zealand waters. Three species were taken by the "Terra Nova".

Genus SCINA Prestandrea, 1833

Prestandrea, 1833: 10.
Stephensen, 1918: 19.
Wagler, 1926· 324 (Key to Species)
Pirlot, 1929. 62 (Key to Species).

" Head anteriorly truncated. Superior antennae very robust, their bases occupying almost all the anterior face of the head. Maxillae with inner plates divided. Gnathopods slender, simple. Third pair of peraeopods generally the strongest. Inner rami of the uropods fused with the peduncles which are long but not smooth." (Translated from Pirlot.)

KEY TO NEW ZEALAND SPECIES OF SCINA

1. Peraeopod 5 much more than ½ length of peraeopod 4; basos of peraeopod 3 about ⅔ total length of following segments, basos anterior margin smooth or very finely denticulated; antenna 1 as long as body .. .. *Scina crassicornis* (Fabr.), 1775.
   Peraeopod 5 less than ½ length peraeopod 4; basos of peraeopod 3 with both anterior and posterior margins strongly toothed 2
2. Peraeopod 3, basos about ½ total length of following segments, anterodistal angle produced to small spine, shorter than and not reaching far along ischium; uropod 1 inner ramus (peduncle) with strong teeth on inner margin; antenna 1 half length of body .. .. . . *Scina borealis* (G O. Sars), 1882.
   Peraeopod 3, basos about ⅔ total length of following segments, anterodistal angle produced to strong spine much longer than and reaching well past ischium; uropod 1 inner ramus with a few small spines on inner margin; antenna 1 about ⅔ body length .. .. *Scina curvidactyla* Chevreux, 1914

Family VIBILIIDAE
Pirlot, 1929: 91.
Barnard, 1930: 402

" Head small to large. Eyes medium to large First pair of antennae rigid, fixed to the anterior part of the head. Flagellum compressed, 1st segment very large, following ones few in number, small and terminal. Second pair of antennae filiform, fixed anteriorly or inferiorly to head. Mouthparts adapted for mastication; mandibles with palps. Peraeopods simple, walking legs, 5th pair transformed. Uropod rami free."

Barnard (1930) discusses the relationship of this family to the family *Cyllopodidae,* and concludes that the latter must be abolished. Accordingly, in translating Pirlot's diagnosis, I have taken this into account. There are in New Zealand waters 2 genera and 10 species (including *Cyllopus macropis,* to which further reference is made below). The "Lachlan" material included one species of *Vibilia* and two of *Cyllopus.* Barnard also treats the relationships between *Vibilia* and *Cyllopus* in some detail.

KEY TO NEW ZEALAND GENERA OF VIBILIIDAE
(After Barnard, 1930.)

1. Eyes often large but not occupying nearly whole of head. Antenna 1 with broad laminate flagellum. Antenna 2 inserted anteriorly. Peduncle of uropod 3 shorter than that of uropod 1. Peraeopods 3 and 4 usually not much longer than peraeopods 1 and 2 .. .. . . *Vibilia*
   Eyes occupying whole of head. Flagellum of antenna 1 not laminate. Antenna 2 inserted inferiorly. Peduncle of uropod 3 as long as or longer than that of uropod 1. Peraepods 3 and 4 considerably longer than peraeopods 1 and 2 . *Cyllopus*

Genus VIBILIA Milne-Edwards

Vibilia Bovallius, 1887a: 43.

" The head is small, almost quadrangular. The eyes are ovate or subovate. The first pair of pereiopoda are simple, not cheliform, the second pair are more

or less subcheliform. The femora of the seventh pair are not much longer than the following joints together. The telson is large, tongue-shaped." (Bovallius.)

KEY TO NEW ZEALAND SPECIES OF VIBILIA
(Adapted from Pirlot, 1929.)

1.	Hind corners of the last urosome segment not produced distally	2
	Hind quarters of the last urosome segment distally produced	6
2.	Peduncle of uropod 3 not much longer than rami	*V. robusta* Bovallius, 1887
	Peduncle of uropod 3 much longer than the rami	3
3.	Distal extremities of the sides of the 1st urosome segments completely rounded, without serrations	4
	Distal extremities of the sides of the 1st urosome segments finely toothed	5
4.	Peraeopods strong. Dactylos of peraeopods 1 and 2 almost as long as the propod; basos of peraeopod 5 large; posterior angle rounded; uropods 1 and 2, inner margin of outer ramus equally toothed throughout	*V. viatrix* Bovallius, 1887
	Peraeopods slender Dactylos of peraeopods 1 and 2 short. Both anterior and posterior distal angles of basos of peraeopod 5 sharp and produced. Uropods 1 and 2, inner margin of outer ramus with large teeth distally, small teeth proximally	*V. stebbingi* Behn. & Wolt., 1912
5.	Carpal process of gnathopod 2 almost as long as the propod	*V. antarctica* Stebbing, 1888.
	Carpal process of gnathopod 2 only reaching halfway along propod	*V. propinqua* Stebbing, 1888
6.	Basos of peraeopod 5 longer than following segments combined	*V. chuni* Behning, 1913
	Basos of peraeopod 5, shorter than following segments combined	7
7.	Peduncle of uropod 3 longer than rami	*V. armata* Bovallius, 1887
	Peduncle of uropod 3 not longer than rami	*V. pyripes* Bovallius, 1887

Vibilia stebbingi ? Behn. & Wolt., 1912. (Figs. 1–22.)

Behning & Woltereck, 1912: 5–6, Figs. 1–3.
Behning, 1913: 217.
Behning, 1925: 482, Figs. 13–22.
Stephensen, 1918: 40, Fig. 12.
Barnard, 1930. 403–404.

Description of Female

Station 212/51, 1 female. Colour in formalin white, eyes yellowish-brown. Length 6 mm., depth 1 mm, width 2 mm.

ANTENNAE *First*: Length, 1 mm. Peduncle ½ length flagellum; 1st segment twice length 2nd and 3rd, fine bristles inferiorly. Flagellum of 2 segments, 1st nearly as long as head and 1st 2 segments of body; broadly ovate, somewhat truncate inferodistally, small single setae on both margins, margins finely bristled inferodistally to apex, 2 tracts of long flaccid sensory setae horizontally along surface in rows of 2 and 3, the superior tract nearly entire length of segment; 2nd segment has a few end bristles. *Second*: Length ⅔ mm., of about 6 segments, all longer than wide but longest no more than 3 times width, a few marginal bristles on each.

MOUTHPARTS. *Upper Lip*: Quite deeply emarginate, lobes bristled. *Lower Lip*: Inner lobes small, distally setose; outer lobes with small inwardly turned acute

TEXT-FIG. 1.—*Vibilia stebbingi* ? Behn. & Wolt. Female. 1—Adult. 2—Antenna 2 3—Antenna 1. 4—Antenna 1, end segment. 5—Upper lip. 6—Lower lip. 7—Maxilla 1 8—Maxilla 2. 9—Mandible. 10—Mandibular palp. 11—Maxilliped, left side. 12—Gnathopod 1 13—Gnathopod 1, propod posterior margin. 14— Gnathopod 2. 15—Gnathopod 2, propod posterior margin and carpal process anterior margin. 16—Peracopod 1. 17—Peraeopod 3 18—Peraeopod 4, carpus and propod. 19—Peraeopod 5. 20—Scale from peraeopod 5. 21—Epimeral plates. 22—Uropods and telson.

apex, median and distal margins bristled. *First maxillae*: Outer plate narrow, base less than ½ width of inner plate, margins and ends strongly bristled, reaches past base of inner plate teeth. Inner plate square-ended with 6 or so strong teeth, strongly setose. *Second maxillae*: Cleft in 2 pronounced lobes; outer subtriangular and setose with 1 or 2 end teeth; inner slightly longer, distally rounded, with similar teeth and setae. *Mandibles*: Cutting edge of 2 plates, lower the smaller, both with incised distal margins; spine row of 7 or 8 small, strong spines; molar process strongly produced inwardly, has a round terminal disc with rim of long fine teeth. Palp unfortunately detached during dissection; of 3 segments, 1st less than ½ length 2nd; 3rd longer than 1st and 2nd combined, tract of small setae medially along surface, terminally acute. *Maxilliped:* Basos and ischium with several strong setae on surface, inner median plate rounded, a few minute spines on surface; outer plate with irregular row of short, single spines on surface near inner margin, a few bristles, outer margin convex, with 3 or 4 small spines, distally rounded and margin finely toothed, inner margin straight and strongly toothed, with several fine setae.

GNATHOPODS. *First*: Sideplate small, angles rounded. Basos widest medially, greatest width nearly ½ length, 3 strong spines on posterodistal angle. Ischium ⅕ basos, 2 setose spines on posterodistal angle. Merus anterior margin short, posterior nearly ⅓ basos length, produced ½ along carpus, 4 setose spines posterodistally. Carpus barely more than ⅓ basos length, distal width ¾ length; 2 setose spines on anterodistal angle and 3 on posterodistal. Propod ovate, narrowing to dactylos, as long as carpus, greatest width more than ½ length; 3 or 4 short setose spines on distal ½ of anterior margin; posterior margin toothed. *Second*: Chelate. Basos length 4 times width. Ischium less than ¼ basos length, 2 setose spines on posterodistal angle. Merus produced along carpus almost to propod as scoop-like process with about 8 setose spines distally, 5 or so on posterior margin; anterior margin very short; total length ⅓ basos. Carpus has 2 small setose spines anterodistally, anterior margin is slightly shorter than merus, posterodistal angle produced along propod to dactylos in sharp knife-like process, inner margin toothed, surface minutely toothed at apex. Propod as long as merus, 2 single setose spines on convex anterior margin; posterior more or less straight and finely toothed. Dactylos as before.

PERAEOPODS. *First*: Basos posterior margin greatly convex, width ⅖ length. Ischium subrectangular, ¼ basos Merus anterior margin convex, distal width ½ length, length ½ basos. Carpus narrower, width ⅓ length, length ½ basos. Propod width ⅕ length, barely longer than merus. Dactylos stout, ½ propod length. *Third*. Sideplate small, subrectangular, angles rounded. Basos length slightly more than twice width, not widening greatly; anterior margin with about 5 short, strong single spines distally. Ischium subrectangular, ⅓ basos length, 2 minute spines anteriorly. Merus widening slightly distally, ¾ basos length, width ⅓ length, spine at posterodistal angle, a few small setae on anterior margin. Carpus slightly narrower, as long, margins parallel, spine on anterodistal angle, a few fine setae anteriorly. Propod slender, width ⅐ length, slightly longer than basos, a few fine setae on each margin, anterior margin very finely combed, with slender teeth. Dactylos ⅓ propod length, anterior margin minutely toothed. *Fourth*: Similar, but carpus has 6 spines on anterior margin; carpus, propod and dactylos anterior margins are all minutely toothed. *Fifth*: Reduced Basos anterior margin straight, posterior convex with a few fine bristles; posterodistal angle

sharply rounded; acute anterodistal angle has single spine; width slightly more than ½ length. Ischium small, spine on anterodistal angle, less than ⅛ basos length. Merus ¼ basos, length nearly twice width; single spine on each distal angle. Carpus nearly ½ basos length, as wide as merus. Propod slightly narrower, slightly longer than carpus. Dactylos ½ carpus width, as long, distally rounded. Last 3 segments with very small scales on surface, mostly near margins; scales with strongly serrated margins, very hard to see. Peraeopod altogether as long as combined length of merus, carpus and propod of Pr. 3.

PLEOPODS: Biramous and normal, rami longer than peduncles.

EPIMERAL PLATES: Roughly subrectangular, angles rounded, ventrodistal margins may be finely bristled.

UROPODS: Tips of rami of 1st reaching as far as tips of 3rd; 2nd reaching ⅔ along rami of 3rd. *First*: Outer margin of peduncle with 10 strong serrations along distal ½. Outer ramus, outer margin finely toothed proximally, distal ¾ strongly toothed; inner margin distal ⅓ with about 3 strong teeth, remainder finely toothed. Inner ramus, inner margin with proximal ½ finely toothed, rest has about 9 strong teeth; outer margin has about 8 strong teeth distally, proximal ½ smooth. Rami subequal; peduncle-rami proportions 9:5. *Second*: Peduncle margins smooth, distal angles produced to strong teeth. Rami subequal, outer ramus with proximal ½ of outer margin smooth, distally about 3 strong spines, inner margin has 1 strong tooth distally, remainder is finely toothed; inner ramus outer margin finely spined proximally, distal ⅓ has about 3 strong spines; inner margin has 3 strong teeth distally. Peduncle-rami ratio 5:4. *Third*: Peduncle stout, width nearly ½ length; rami (in what appears to be normal condition—the rami of right and left uropods differ in my specimen) lanceolate, subequal, median margins finely toothed, inner margin of inner ramus finely toothed distally; outer margin of outer ramus smooth, with a few single bristles. Peduncle-rami ratio 9:13. *Telson*: Broadly subtriangular, slightly wider than long, reaching ½ along uropod 3 peduncle.

HYPOTYPES: Slides L.24.

DISTRIBUTION: Mediterranean, Atlantic about 35° N.–30° S.; Eastern Pacific, New Zealand.

DISCUSSION

I have identified this specimen as *Vibilia stebbingi* with considerable trepidation. The numerous species of *Vibilia* appear from the literature to be very much alike, at least in detail. It may be that the lack of distinguishing characteristics which makes me hesitate to identify this specimen with any one particular species is not borne out in gross facies (cf. species of *Parathemisto* and *Cyllopus*) so that the different species may be more easily distinguished when one has a range of species material for comparison.

Pirlot (1929) gives a key based on Behning's (1913) which is somewhat difficult to use because one or two of the more important dichotomies do not seem to me well defined and because the features referred to are not figured in descriptions of the species. For example, *V. antarctica* and *V. propinqua* are separated from *V. stebbingi* and *V. viatrix* as follows: " distal extremities of the sideplates of the 1st ural segment completely rounded, without ornamentation " in *V. stebbingi* and *V. viatrix*, and " finely toothed " in *V. antarctica* and *V. propinqua*. Since these particular characteristics do not seem to have been figured for any of the species, there is no real indication of how distinct the teeth are.

If, as I take it, my specimen lacks them, then it falls into the first complex. In that case, it agrees closely with *V. stebbingi* in the uropods and, as Stephensen (1918) suggests, is easily distinguished from *V. viatrix*. The inner side of the outer ramus of the first two uropods has large teeth distally, small ones proximally, whereas in *V. viatrix* the teeth are of equal size throughout. The antennae agree perfectly with Behning's figures. But the second gnathopod carpal process reaches the dactylos, characteristic of *V. antarctica* which falls into the other dichotomy. It is not mentioned as characteristic of *V. stebbingi*—indeed all figures show it at most ⅔ the propod length. And although the original descriptions of *V. viatrix* show a similar short process, Shoemaker's figures (1945) show the process as in my specimen which agrees with *V. viatrix* in several other points. The fifth peraeopod agrees closely with Behning's for *V. stebbingi*. The third and fourth agree much more closely with *V. antarctica*—so much so that I would not be surprised if eventually the specimen proved to be *V. antarctica*, which has similar uropods to *V. stebbingi*.

When specimens separated by the key into one dichotomy appear in all other characteristics to belong to the other, one begins to doubt the validity of the diagnostic features concerned. However, if my specimen is mature, the size ranges which Barnard gives (1930) suggest *V. stebbingi*, to which I refer it very doubtfully.

Genus CYLLOPUS Dana, 1853 and 1855.

Bovallius, 1889. 4.

"The head is globular, tumid. The eyes are large, occupying almost the whole head. The first pair of pereiopoda with the carpus not dilated, the second pair are subcheliform, with the carpus more or less produced. The femur of the seventh pair is very large, longer than the following joints together The telson is small, semicircular." —Bovallius.

KEY TO NEW ZEALAND SPECIES OF CYLLOPUS

1	Fifth peraeopod with 3 segments besides basos	*C. macropis*
	Fifth peraeopod with 5 segments besides basos	*C. magellanicus*

Barnard (1930 405–408) discusses the various forms of *C. magellanicus* at some length. I disagree with him only when he includes *Vibilia macropis* in this synonymy. There is no doubt that *macropis* belongs in *Cyllopus* and not in *Vibilia*, but for the reasons given below I consider it a separate species.

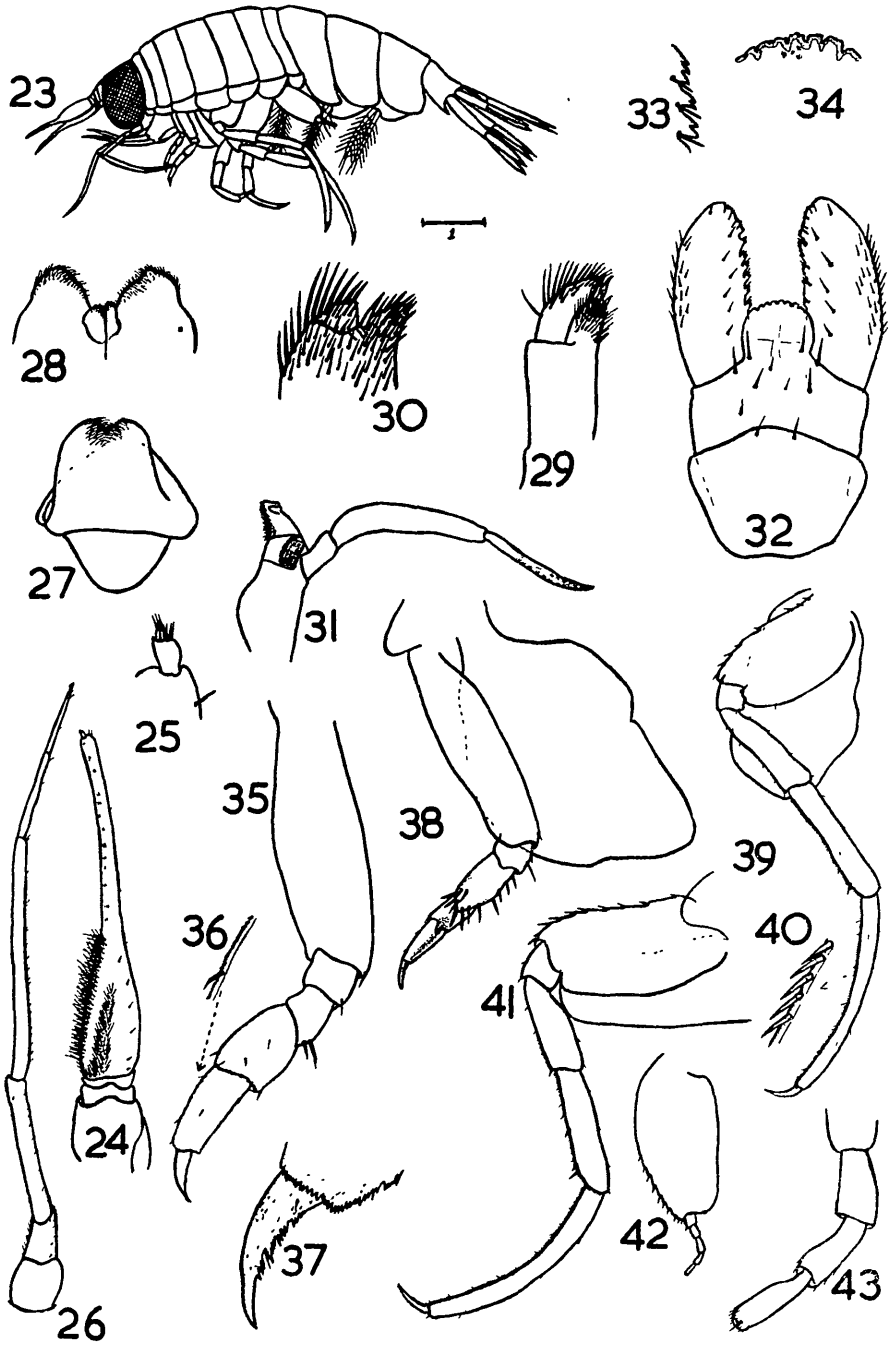
Cyllopus magellanicus Dana, 1853 and 1855. (Figs 23–50.)

Cyllopus magellanicus Dana. 1853 and 1855: 990, Pl. 68, Fig. 1.
Vibilia serrata Stewart, 1913. 248, Pl. 4, 5, Figs. 1-6.
Cyllopus magellanicus Barnard, 1930· 405-409.

Description

Colour, in formalin, white, eyes brownish-black, large, nearly meeting dorsally. Male, length, 9¼ mm.; depth, 2 mm.; width, 2 mm. Female, length, 6 mm.; depth, 2 mm ; width, 2½ mm.

ANTENNAE. *First* Short, stout, reaching ⅔ along flagellum of 2nd; length, 2¼ mm. Flagellum of 3 segments, 1st 3 or 4 times peduncle length, proximally swollen; long U-shaped double tract of setae proximally on ventral margin; distally cylindrical with scattered setae and bristles on surface; 2nd and 3rd segments terminal, minute, a few setae on end margins. Peduncle, 1st segment slightly wider than long, 2nd and 3rd subequal, together ½ length 1st, almost as



TEXT-FIG. 2.—*Cyllopus magellanicus* Dana. 23—Adult ♀. 24—Antenna 1. ♀ 25—Antenna 1. ♀, end segments. 26—Antenna 2, ♀. 27—Upper lip. 28—Lower lip. 29—Maxilla 1 30—Maxilla 2. 31—Mandible. 32—Maxilliped. 33—Maxilliped, outer lobe, inner margin. 34—Maxilliped. inner lobe, end margin. 35—Gnathopod 1, ♂. 36—Gnathopod 1, ♂, propod anterior margin. 37—Gnathopod 1, ♂, propod end margin and dactylos 38—Gnathopod 2, ♂. 39—Peraeopod 3, ♂. 40—Peraeopod 3, ♂. propod anterior margin 41—Peraeopod 4, ♂. 42—Peraeopod 5, ♂. 43—Peraeopod 5. ♂, end segments.

wide as 1st. In female, fewer sensory setae; flagellar 1st segment has shorter non-setose portion; length, 1 mm. *Second*: Inserted inferiorly to eyes; of 7 segments; 2nd to 7th with scattered short bristles marginally, occasionally on surface. Length, 3½ mm. in male, ½ mm. in female. Proportions of segments in male 13 :12 :40 :63 :23 :18, and in female 14 :16 :22 :38 :16 :18.

MOUTHPARTS. *Upper Lip*: Margin medially cleft, cleft margins strongly bristled. *Lower Lip*: Inner lobes small; both outer and inner lobes strongly bristled on end and inner margins. *First Maxillae*: Inner plate slightly shorter than outer, tending to conical, several short stout end teeth, most of plate strongly setose. Outer plate strongly setose marginally. *Second Maxillae*: Small, terminally cleft to 2 small boss-like plates, the outer marked off by a suture; both strongly setose; surface below them setose. *Mandibles*: Cutting edge of 2 sections; a strongly setose and spinose margin extending to base of molar process which has many long, fine teeth Palp reaches base of 1st antennae; of 3 segments, 1st ⅔ length 2nd and ⅔ 3rd; segments cylindrical, 3rd tapering to bristled tip, many small combs of usually 3 bristles each on surface. *Maxilliped*: Basos and ischium with several scattered spines. Broad median inner lobe semicircular. reaching about ⅓ length of outer lobes; distal margin complexly involuted. Outer lobes, inner margin more or less straight, complexly serrate in combs of 3 or more incised teeth, combs with a single spine distally, margin terminally rounded; outer margin convex, numerous fine setae and bristles on margin and outer surface medially. Inner surface of lobe has row of 6 or so spines parallel to inner margin.

GNATHOPODS. *First* Basos margins somewhat convex, length 3 times median width, single short spine posterodistally. Ischium about ⅓ basos length, slightly wider than long, short spine posterodistally. Merus posterior margin twice length anterior and about ¼ basos length; 2 spines posterodistally. Carpus margins convex, widening distally, anterior margin ⅔ basos length, slightly less than twice width, almost as wide as posterior margin is long; a minute spine on each distal angle; both margins slightly serrate distally; end margin finely toothed. Propod narrower, as long as carpus, anterior margin has 3 short spines, margins especially anterior and end strongly serrate and irregularly toothed. Dactylos ½ propod length, proximal ⅔ of inner margin serrate and irregularly toothed; surface strongly scabrous *Second*: Gill ovate, much longer than basos, greatest width ⅔ length. Basos length about 4 times median width, small spine posterodistally. Ischium narrower, slightly wider than long, 2 spines on posterior margin. Merus proper slightly larger than ischium, inferiorly produced in an equally long spoon-like process ½ along carpus so merus total length nearly ⅓ basos; process has about 7 stout marginal spines, 2 more on distal surface, 4 on posterior margin of merus proper. Carpus as long as complete merus, posteriorly produced a little in sharp projection; projection, end margin and posterodistal surface toothed and serrate. Propod narrower, posterior and end margins serrate and irregularly toothed; dactylos posterior margin similar. Proportions of dactylos to propod and carpus in male are 1 :2 :2 and in female 2 :3 :4.

PERAEOPODS. *First*: Like Pr. 2. *Second*: Basos width ⅓ length, 3 or so small spines posterodistally. Ischium ⅕ basos length, wider than long. Merus piriform, a few minute setae on margins; length twice width and nearly ⅔ basos. Carpus narrower, 1 or 2 minute setae on margins; as long as merus and slightly narrower, end margin finely toothed. Propod as long as carpus, 5 times width, posterior margin and surface with strong irregular teeth, especially distally. Dactylos

very fine, ½ propod length, proximal ½ of surface and posterior margin irregularly toothed. *Third:* Basos somewhat expanded, width ⅔ length, margins slightly convex, about 9 strong spines on anterior, 2 or 3 minute setae distally on posterior. Ischium subsquare, ⅕ basos length. Merus ¾ basos length, width ⅓ length, a few small setae on margins, a few fine teeth on anterior distally. Carpus as long as basos, slightly narrower than merus, a few small setae on surface and margins, short strong spine anterodistally, comb of long fine regular teeth along anterior and end. Propod ½ as long again, narrower; small setae on surface and margins, comb of fine teeth anteriorly. Dactylos about ⅕ propod length, proximal ½ of anterior margin irregularly toothed. *Fourth*: Like 3rd, but for proportions. Basos length twice width; ischium ¼ basos length; merus ½ basos length, width ⅖ length; carpus ¾ basos and ⅗ propod; dactylos ⅕ propod. *Fifth*: Basos ovate, slightly smaller than in Pr. 4; margins convex, narrowing distally, length nearly twice width; distal ½ of anterior margin has 10 stout single spines. Other 5 segments greatly reduced, their total length less than ½ basos length; subequal; 2nd has three spines on anterior margin; 5th is distally bristled, has single spine.

Epimeral Plates: Ovate, ventrally convex, distal angles absent; posteroventral margin serrated; in this male, 6, 12, 15 serrations in 1st to 3rd plates, but varying with individuals.

Pleopods: Biramous, rami lanceolate, as long as peduncle although outer ramus tends to be slightly longer than inner; of about 12 or 13 segments each with pair of plumose setae; outer ramus has small papilla on surface proximally: peduncle inner distal angle produced a little downwards; 2 coupling spines.

Uropods: Biramous, rami lanceolate; peduncle inner distal angle produced downwards somewhat to sharp tooth; 3rd uropod tooth a little serrate. *First*: Inner ramus almost reaching tip of 3rd; peduncle widening distally; peduncle, outer ramus and inner in ratio 10:12:13 in length; rami margins broadly serrate, outer margins finely serrated between broad serrations; inner margin, each serration has seta; on outer ramus inner margin finely serrate proximally for short distance. *Second*: Peduncle not reaching end of telson; peduncle widening distally: peduncle-rami ratio 8:14:15; outer margin of outer ramus and inner margin of inner ramus broadly serrate; inner margin of outer ramus and outer margin of inner ramus finely serrate. Tip of outer ramus reaches end of 3rd uropod peduncle. *Third*: Peduncle stout; peduncle-rami ratio 7:12:12. Rami finely serrate, inner margin of outer ramus showing broad divisions also. *Telson*: Evenly convex, length ⅔ basal width, slightly more than ⅕ peduncle length

Urosome: Last segment distinct, with posterodistal angle produced to acute tooth.

Hypotypes: Slides L.4 (male, station 5/51).

Localities: Station 2/51, 1 specimen; 5/51, 25; 6/51, 1; 40/51, 2; 103/51, 1; 130/51, 3; 135/51, 3; 138/51, 3; 171/51, 3; 178/51, 27; 187/51, 2; 188/51, 8; 189/51, 4; 191/51, 4; 210/51, 1; 212/51, 4; 214/51, 2; 216/51, 2; 279/51, 36; 285/51, 8; 292/51, 10; 308/51, 1; 310/51, 1; 330H/51, 1; 330B/51. 1, 326/51, 143.

Distribution: Southern Atlantic from 30° S.; Indian and Pacific Oceans.

Discussion

Most of the *Cyllopus* specimens taken by the Lachlan come well within the range of variation of *C. magellanicus*. My material suggests no substantial dis-

agreement with Barnard's remarks. However, the proportions of segments to one another, particularly in the uropods (cf. Barnard, 1930: 408) vary somewhat allometrically with size, so it is well to remember that the description refers to a 9¼ mm. male—presumably adult. With any great difference in size, certain differences in proportions are also to be expected. According to Barnard, there are also differences in the serration of the epimeral plates.

Cyllopus macropis (Bovallius), 1887. (Figs. 51–69.)

Vibilia macropis Bovallius, 1887: 7. Bovallius, 1887a: 51, Pl. 8, Figs. 1–8. Behning. 1913: 214–215 Behning, 1925: 480–481, Figs. 3–11

(non) *Cyllopus magellanicus* Dana. Barnard, 1930: 408

Description of Female

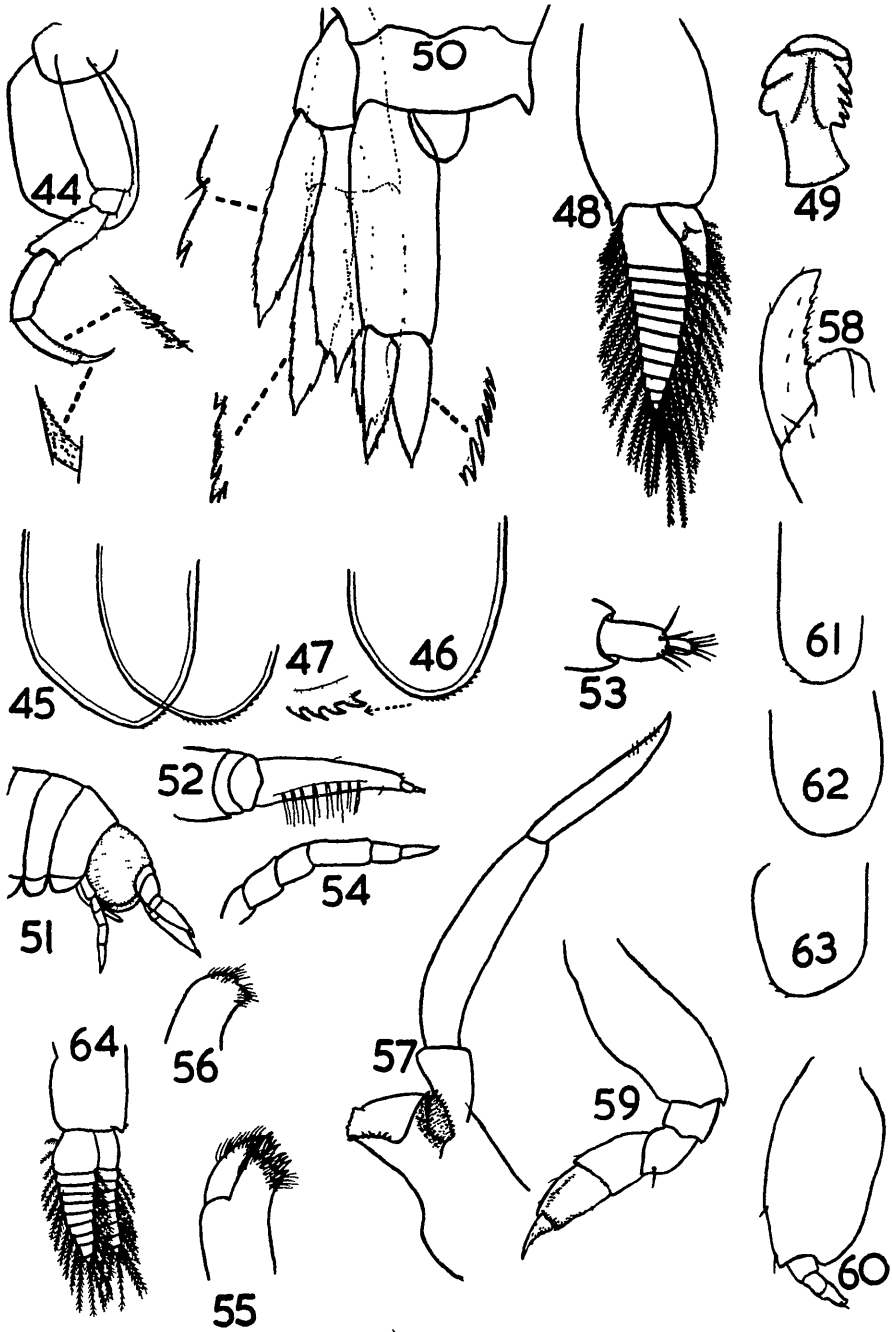
Colour in formalin white; eyes orange, covering head and noticeably rounded. Length, 5 mm.; depth, 1¼ mm.; width, 1½ mm.

ANTENNAE. *First*: Length, 1 mm. Flagellum of 3 segments, last 2 minute with setae on end margins; 1st large, tapering, length nearly twice peduncle, 3 times proximal width; inferior margin sparsely fringed with paired long flaccid sensory setae *Second*: Arising inferiorly, as is usual in *Cyllopus*, and well back. Of 6 segments, 4th the longest, segments comparatively strong, length not more than twice their width.

MOUTHPARTS *First Maxillae*: Outer plate distally narrowing to point, distally setose, reaching ½ along inner plate teeth; inner plate noticeably square, with several strong distal teeth, distally setose also. *Second maxillae*: Simple distally emarginate structure, each of indistinct apical lobes setose. *Mandibles*: Cutting edge a single lightly-incised plate; spine row of numerous very short setae, extending to strongly produced molar process which has incised marginal rim. Palp strong, 2nd segment 3 to 4 times length 1st; 3rd narrower, distally pointed and with a few bristles, nearly as long as 2nd. *Maxilliped*: Like *C magellanicus* but outer plate inner margin less incised; outer margin has only about 2 setae, is more slender and somewhat more acute distally.

GNATHOPODS *First*: Like *C. magellanicus* but basos between 4 and 5 times ischium length; merus with strong spine near posterodistal angle, length ⅓ basos, anterior carpus margin ⅔ basos; propod slightly shorter, width about ⅔ length; dactylos ⅔ propod length; anterior propod margin smooth. *Second*: Ischium ⅕ basos length, spine at posterodistal angle; merus distally produced ½ along carpus; total merus length about ⅓ basos length; posterior merus margin has 2 strong spines, process has 4 marginal spines. Carpus total length ⅔ basos, posterodistally produced about ¼ along propod and minutely toothed. Propod ¼ basos length, posterior surface minutely toothed; dactylos similar, more than ½ propod length.

PERAEOPODS. *First*: Ischium ⅓ basos length; merus length twice width and ½ basos length; carpus width ¾ length, length ⅔ merus; propod posterior surface with a few scattered minute teeth, posterior margin as long as merus, length 3 times width; dactylos more than ½ propod length. *Third*: Basos expanded, margins convex, anterior has 4 small spines, posterior 3 or 4 minute setae: width ⅔ length. Ischium more than ⅓ basos length, single spine anterodistally. Merus ⅔ basos length, margins parallel, 1 or 2 small spines anteriorly. Carpus subrectangular, width ⅔ length, length ¾ basos, 2 spines anteriorly, end margin minutely toothed. Propod length nearly twice carpus, about 6 times own width, comb of fine teeth along anterior margin; dactylos ⅓ propod length. *Fifth:*



TEXT-FIG. 3.—*Cyllopus magellanicus* Dana. 44—Peraeopod 2, ♂. 45—Epimeral plates 1 and 3 46—Epimeral plate 2. 47—Epimeral plate 2, serrated margin. 48—Pleopod 49—Coupling spine of pleopod 50—Uropods and telson. *Cyllopus macropis* (Bovallius). Female. 51—Head and 1st 3 peraeon segments. 52—Antenna 1. 53—Antenna 1, end segments. 54—Antenna 2. 55—Maxilla 1. 56—Maxilla 2. 57—Mandible. 58—Maxilliped. 59—Gnathopod 1. 60—Peraeopod 5. 61–63—Epimeral plates 1–3. 64—Pleopod.

Large ovate basos, length nearly twice greatest width, only 2 spines anterodistally; remaining 3 small segments together ½ basos length; last segment has strong end spine.

EPIMERAL PLATES: Deeper than wide, distal angles rounded; posterodistal angles of 2 (but not all 3), with 3 or 4 distinct teeth.

PLEOPODS: Normal, rami much longer than peduncles.

UROPODS: Tips of 1st reaching slightly past tips of 3rd; inner ramus of 2nd ½ along rami of 3rd. Margins of all rami finely but strongly toothed except outer margin of uropod 2 outer ramus which has only about 4 strong serrations, each serration with a minute seta Inner distal angles of each peduncle produced to strong tooth. *First*: Peduncle outer margin finely but strongly serrate distally. Peduncle, inner ramus, outer ramus in ratio 18:21:19. *Second*: Ratio 5:8:7. *Third*: Ratio 4:3.3. *Telson*: Semicircular although slightly wider than long, reaching ⅓ along uropod 3 peduncle.

HYPOTYPES: Slides L.22 (female); L.23 (female).

LOCALITIES: Station 1/51, 2 females; station 75/51, 1 female.

DISTRIBUTION. New Zealand; between Kapstadt and Bouvet Island.

DISCUSSION

I have three specimens in all, from two stations, corresponding very well with Behning's figures for this species. Barnard (1930) considers it belongs in *Cyllopus* and not *Vibilia*, and in this I certainly agree. However, I disagree with placing it in the synonymy of *C. magellanicus*, although certainly on the basis of published figures there was good reason for so doing. The species is one of those which have a quite distinctive facies, but in detail are remarkably similar to closely related species in almost all characteristics. The specimens were sorted out as being distinct from *C magellanicus* before dissection, but, with the possible exception of the first antennae and certainly the fifth peraeopods, the dissected appendages do not show marked differences from those of *C. magellanicus* The differences which Barnard attributed to size are not the differences, in my opinion, between adult and juveniles, but valid differences between adults of species with different size ranges There is only one detail in which they do not completely agree with Bovallius's and Behning's specimens; that is the greater number of spines on the second gnathopod merus process. (The maxilliped agrees perfectly with Behning's figure.)

Differences between *C. magellanicus* and *C. macropis* appear to be: the comparatively stronger shorter peraeopods in *C. macropis;* the much more rounded (and in my specimens, lighter-coloured) eyes of *C. macropis;* the comparatively shorter and stronger second antennae and shorter first antennae; the lack of spines on the maxilliped outer plate outer margin; the squarer inner plate of the first maxillae (but this may be an artifact or distortion); the differences in proportion of all gnathopods and peraeopods; differences in proportions of uropods. All of these could possibly fall within the limits of size and sex variation as suggested by Barnard (p. 407) if we were indeed dealing only with the juvenile of *C magellanicus.* However, most noticeable of all is the reduction in number of segments in the fifth peraeopod from 5 plus basos in *C. magellanicus* to 3 plus basos in *C. macropis.* In all three of my specimens there are only the three plus basos. The proportions are strikingly constant and differ from *C. magellanicus*, and in each specimen the last segment has a single strong

spine. There is a tendency in some Hyperiidea for the 5th peraeopod to degenerate with age; this might account for the difference here, but Barnard's specimens ranged in size from 6 mm. to 11 mm., and since he did not draw attention to variation in segment number it may be assumed there were none evident. He suggests that reduction of segments in Behning's specimens was due to their being juvenile, but if the normal course of degeneration is followed in these species, one would expect complete segmentation in the juvenile form. The degree of agreement between mine and Behning's specimens is not easily overlooked, and the difference in general facies between *C. macropis* and *C. magellanicus* which makes it possible to separate them without the aid of a microscope is most characteristic of the two species.

B. HYPERIIDEA GENUINA

Family PARAPHRONIMIDAE

Bovallius, 1887: 13.
Pirlot, 1929: 103.
Barnard, 1930: 409.

"Head very large, swollen, almost cubic. Eyes large, occupying the sides of the head. First pair of antennae straight, fixed to the anterior of the head, with swollen flagellum; first segment of flagellum very large, following segments small, few in number and terminal. Inferior antennae compressed, of few segments, fixed to the head inferiorly; rudimentary in female. Mouthparts adapted for mastication, mandibles lack palp, the five pairs of peraeopods ambulatory, last pair not transformed. Uropods have rami." (Translated from Pirlot.)

Barnard records one species, *Paraphronima crassipes*.

Genus PARAPHRONIMA Claus, 1879.

Claus, 1879a: 65.
Pirlot, 1929: 104.

"Body slender, a little compressed, with distinct epimeral plates. First pair of gnathopods subchelate, second simple. Dactylos of second pair lodged in a small cavity at the end of the propod." (Translated from Pirlot)

Family HYPERIIDAE Dana, 1852.

Bovallius, 1889: 74.
Pirlot, 1929: 117.

"Head large, more or less globular. Eyes large, occupying the sides of the head. First pair of antennae gross to hardly swollen; male has multi-articulate flagellum. Second pair of antennae rather like first, not bent, fixed to anterior part of head. Mandibles with palp. Fifth pair of peraeopods normal. Uropods normal." (Translated from Pirlot.)

Six genera and 12 species of this family are known from New Zealand waters. Of the seven species described and figured from Lachlan material, four are new records for New Zealand.

KEY TO NEW ZEALAND GENERA OF HYPERIIDAE

(Adapted from Bovallius, 1889, and Spandl, 1927.)

1. Gnathopod 2 has 5th segment process compressed, knife-like . . . . . *Hyperoche* Bovallius, 1887.
   Gnathopod 2 has 5th segment process gauge- or spoon-shaped 2
2. Body more or less hirsute . . . . . *Iulopis* Bovallius, 1887
   Body smooth 3

3.	Pr. 1 and 2, 5th segment narrow, not dilated	. . 4
	Pr. 1 and 2, 5th segment dilated, together with 6th forming a folding prehensile organ	*Parathemisto* Boeck, 1870.
4	Pr. 3 not elongated, as long as Pr. 4	*Hyperia* Latreille, 1823.
	Pr. 3 elongated, much longer than Pr. 4	*Hyperiella* Bovallius, 1887.
	Pr. 3 and 4 elongated; 5th also elongated but reaching only about $\frac{2}{3}$ the length of the preceding peraeopods	*Hyperioides* Chevreux, 1900.

Genus HYPERIA Latreille, 1825.

Latreille, 1825: 347.
Bovallius, 1889: 129.
Spandl, 1927: 153.
Pirlot, 1929: 120

"Epimerals distinct, articulating with segments Gnathopods chelate or subchelate; carpal process has more or less concave inner margin. Carpus of Pr. 1 and 2 not dilated; Pr. 3, 4 and 5 subequal in length."

(Translated from Pirlot)

KEY TO NEW ZEALAND SPECIES OF HYPERIA

1.	Uropod 3 rami very broad, rounded, with terminal finger .	*H. spinigera* Bovallius, 1889
	Uropod 3 rami elongate, sharp-pointed, comparatively slender . .	 2
2	Gn 1 carpus very dilated and distinctly produced; Pr. 3, hind margin of 5th segment without 2 large spines	*H bengalensis* (Giles), 1887
	Gn 1 carpus only a little dilated and scarcely produced; Pr 3, hind margin of 5th segment with 2 large spines	. . 3
3.	Pr. 3-5, basos at most half as broad as long	*H. luzoni* Stebbing, 1888
	Pr. 3-5, basos clearly more than half as broad as long	*H fabrei* (M Edw.), 1830

It is difficult to construct a good key to this genus without examining specimens of all species concerned. Bovallius gives a key to which later authors refer, but the vast amount of subsequent work on the group and later changes in synonymy completely outdate it. Shoemaker (1945), for instance, includes 6 of Bovallius' species in the synonymy of *H. bengalensis*. These represent each of the 6 primary categories of his key. As well, Shoemaker includes a species which Bovallius placed in an entirely different genus. I think the above key, based on my own specimens, on Barnard's remarks (1932) concerning the third uropods of *H. spinigera*, and on Stephensen's (1924) description of *H luzoni*, will prove valid for the New Zealand species.

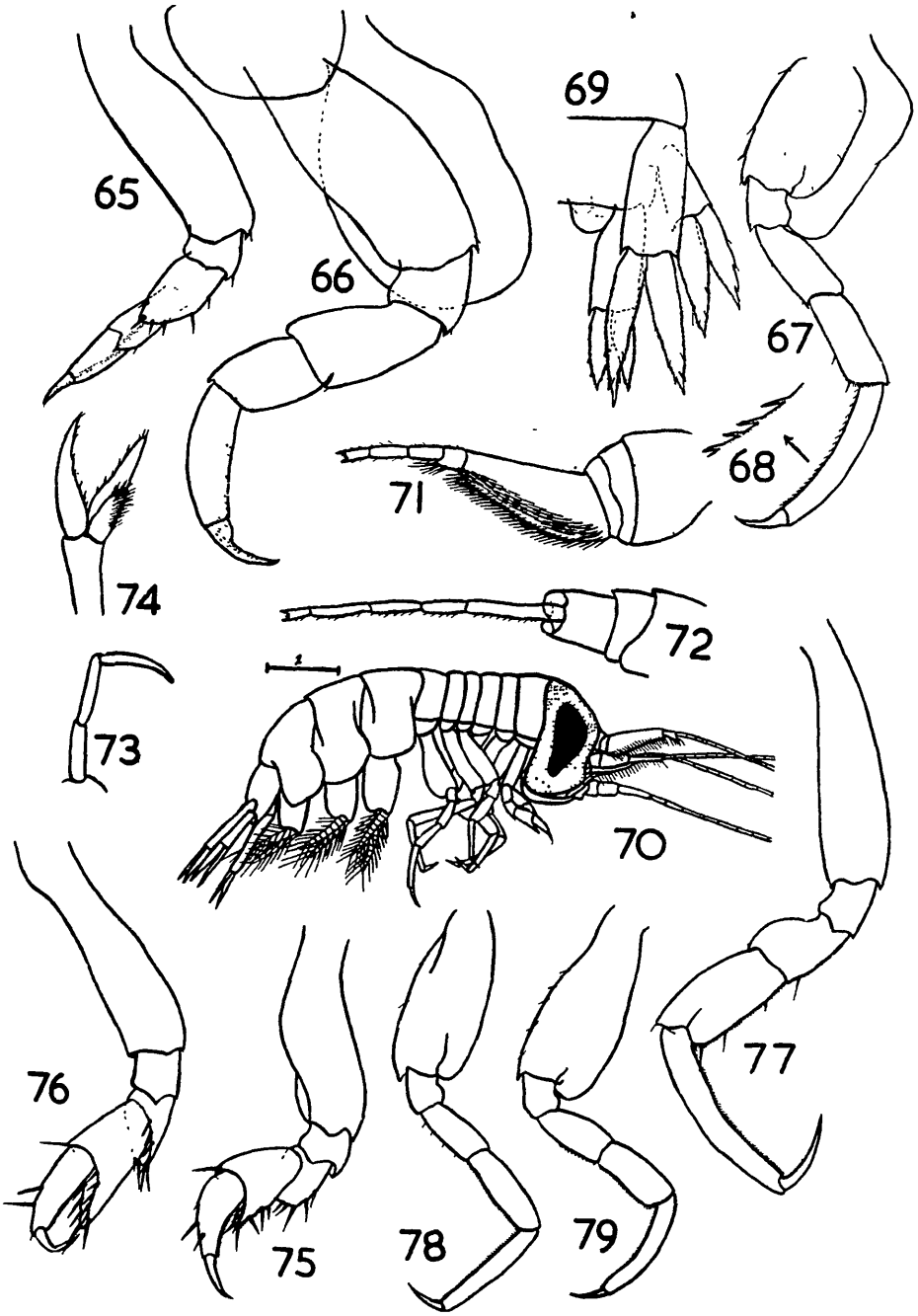
Hyperia bengalensis (Giles), 1887. (Figs. 70–82.)

Lestrigonus bengalensis Giles, 1887: 224, Pl. 6, Figs. 1–10; Pl. 7, Figs. 1–9
Hyperia promontorii Barnard, 1930: 411.
Hyperia latissima Barnard, 1930: 410.
Hyperia bengalensis Pirlot, 1939: 35 (literature)
Hyperia bengalensis Shoemaker, 1945: 238.

Description of Male

Colour in formalin white, eyes yellowish with orange nucleus. Length, 5½ mm.; depth, 1¼ mm.; width, 1½ mm.

ANTENNAE. *First*: Length about 5 mm., reaching to pleon segments, filiform. Peduncle segments small, 1st twice length 2nd and 3rd combined. Flagellum of 23 segments, each longer than wide, 1st large, as long as peduncle, anterior margin convex, widest proximally, with U-shaped tract of flaccid sensory setae along



TEXT-FIG. 4.—*Cyllopus macropis* (Bovallius). Female. 65—Gnathopod 2. 66—Peraeopod 1. 67—Peraeopod 3. 68—Peraeopod 3, propod anterior margin. 69—Uropods and telson. *Hyperia bengalensis* (Giles). Male. 70—Adult. 71—Antenna 1. 72—Antenna 2. 73—Mandibular palp. 74—Maxilliped. 75—Gnathopod 1. 76—Gnathopod 2. 77—Peraeopod 1. 78—Peraeopod 3. 79—Peraeopod 5.

inferior surface, inferodistal angle may be a little produced; 2nd has inferodistal angle somewhat produced, about 3 pairs of flaccid sensory setae on inferior margin, superior margin and remaining segments with scattered fine bristles. *Second*: Length about 6 mm., flagellum filiform, of about 25 cylindrical segments, all much longer than wide, with marginal bristles. Peduncle small, 3rd segment ¾ 5th; 4th ⅔ 5th.

MOUTHPARTS: As in *Parathemisto gracilipes* (see below) except that mandibular palp 1st segment is ¾ length 2nd; 2nd is slightly shorter than 3rd. No long setae on maxilliped outer plate surface

GNATHOPODS. *First*: Basos length 3 times width; ischium subsquare, length ¼ basos. Merus subtriangular, extending ½ down carpus, ⅓ basos length, posterior margin has 5 or so strong spines. Carpus anterior margin ½ basos length, greatest width ¾ length, single stout spine at anterodistal angle, posterodistally produced in short spoon-like process nearly ½ along propod; posterior margin has about 4 stout spines with fringe of very fine long teeth between them; process inner margin also has short strong spines, margin likewise finely toothed Convex propod narrowing distally to dactylos, barely longer than carpus anterior margin; anterior margin has 2 or 3 strong spines; posterior is finely toothed. Dactylos more than ½ propod length, most of inner margin finely toothed. *Second*: Basos width ¼ length; subsquare ischium barely narrower. Merus anterior margin less than ½ ischium length; posterior margin ⅓ basos length, produced along carpus in broad scoop-like process Carpus anterior margin ⅓ basos length, posterior produced distally ⅔ along propod as scoop-like process, posterior margin ½ basos length, in both segments scoop-like process has finely toothed margin with 8 or so strong spines. Propod narrowing to dactylos, length about ⅖ basos, 3 times greatest width; 2 strong spines anteriorly, finely toothed posteriorly Dactylos slender, slightly more than ½ propod length, inner margin finely toothed.

PERAEOPODS. *First*: Basos length nearly 4 times width; ischium subrectangular, length ¼ basos, width ¾ length. Merus anterior margin convex, proximally constricted, ⅓ basos length, greatest width ¾ length, 1 or 2 minute spines on posterodistal angle. Carpus ½ basos length, width ½ length, anterior margin slightly convex; posterior straight, finely toothed with about 3 spines. Propod width ⅐ length, length about ⅖ basos, posterior margin finely toothed. Slender dactylos not quite ½ propod length, inner margin finely toothed. *Second*: Similar. *Third*: Basos width ½ length, margins slightly convex, anterior with a few setae. Ischium ¼ basos, slightly narrower than long. Merus anterior margin has a few fine setae, ⅖ propod length, length twice width. Carpus ½ basos length, width less than ⅓ length, anterior margin finely toothed. Propod width ⅛ length, length ¾ basos, anterior margin finely toothed. Dactylos not ½ propod length, inner margin finely toothed proximally. *Fourth*: Like Pr. 3. *Fifth*: Carpus and merus subequal, merus inner margin finely toothed distally; otherwise similar.

EPIMERAL PLATES First tending to circular, 2nd and 3rd somewhat subrectangular.

UROPODS. Biramous, inner margins of outer rami and outer margins of inner rami finely toothed and proximally excavate, especially 2nd; 1st and 3rd finely bristled alongside excavation. *First*: Rami subequal, approximately ⅔ peduncle length; peduncle width not quite ⅓ length; rami reaching tips of rami of uropod 3 *Second*: Outer ramus, inner ramus and peduncle lengths in ratio 7:8:9; peduncle narrowing proximally, tips of rami reaching ¾ along rami of uropod 1.

Third: Peduncle widest medially, width $\frac{2}{5}$ length; rami subequal; rami-peduncle ratio 6:11. *Telson*: Longer than wide, narrowing to subacute apex, not quite reaching $\frac{1}{2}$ along uropod 3 peduncle.

HYPOTYPES. Slides L.12.

LOCALITIES. Station 83/51, 14 males.

DISTRIBUTION. North and South Atlantic; Mediterranean; Arabian Sea; South Pacific (off Cape Howe, Australia); New Zealand; Bermuda; New South Wales.

DISCUSSION

Pirlot gives the following list of synonyms which Shoemaker (1945) accepts. *Hyperia promontorii, H. disschystus, H. zebui, H. schizogeneios, H. gilesi, H. latissima, H. thoracica, H. hydrocephala, H macrophthalma,* and *Themistella steenstrupi.* My specimens agree reasonably well with the various descriptions of this species. The same station, 83/51, yielded 14 males of *H. bengalensis* and 4 specimens of *Hyperoche mediterranea*—the latter may be visually separated by their thicker body. The degree of fusion of the body segments appears from Pirlot's synonymy to be no longer accepted as a valid species characteristic for this genus. Even in these specimens I found it difficult to decide whether the 1st and 2nd segments were coalesced, and often the 6th and 7th appeared to be fused.

Hyperia spinigera Bovallius, 1889. (Figs. 83–95.)

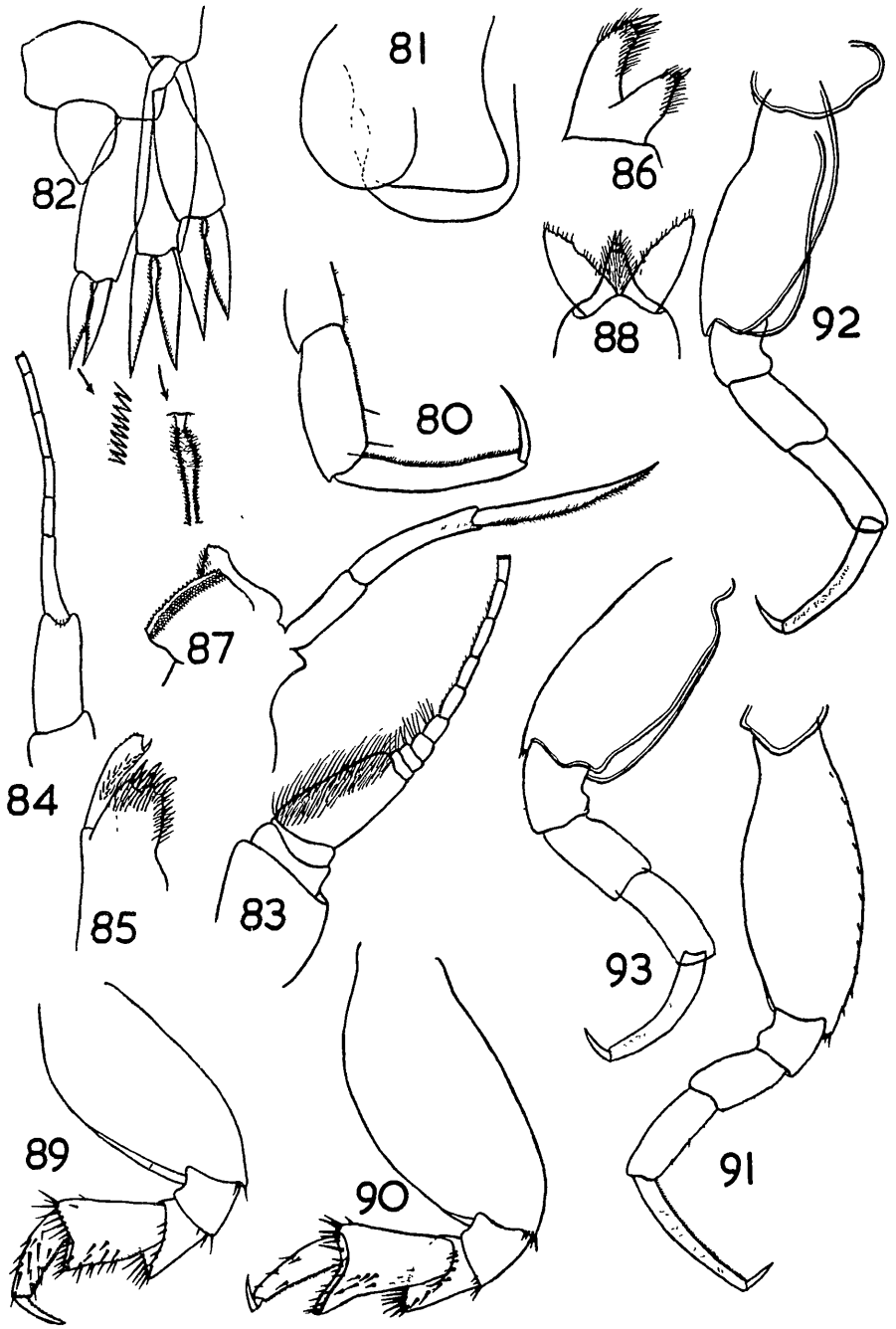
Hyperia spinigera Bovallius, 1889: 191, Pl. X. Fig. 33–39 Barnard, 1932: 274. Shoemaker, 1945: 238, Text-fig. 35. a-d.

Description of Male

Length 18 mm.; depth, $2\frac{3}{4}$ mm.; width, 5 mm. Colour in formalin orange-yellow, eyes transparent with orange nucleus.

ANTENNAE. *First*: Length, 11 mm. Flagellum of about 30 segments; 1st strong, as long as peduncle, inferior margin and surface densely fringed with extremely fine sensory setae; 2nd and 3rd flagellum segments wider than long, a few sensory setae on each; rest filiform, length 2 or 3 times width, with very fine spine on inferior margin Peduncle, 1st segment slightly wider than long, twice combined length 2nd and 3rd. *Second*. Length, 13 mm., flagellum of about 30 segments. Peduncle 1st segment twice length rest, all very long and slender. Last peduncle segment as long as 1st flagellar, much stouter.

MOUTHPARTS. *First Maxillae*: Short stout inner plate has 5 strong teeth distally. Inner and end margins and outer surface strongly setose. Outer plate slender, reaching past spines of inner, outer margin has very small teeth distally, surface has area of small setae; inner distal angle has single short strong spine. *Second Maxillae*: Inner plate somewhat the shorter, both plates marginally and distally setose, inner has stout end spine, outer has 2. *Mandibles*: Cutting edge a finely incised narrow plate; spine row of numerous fine short setae and spines, molar process a strong, squarish plate with granular surface and finely toothed rim. Palp very long, slender, 1st 3 segments in approximate ratio 2:3:4, a few fine bristles distally on 2nd; 3rd distally tapering to acute point, outer margin finely bristled. *Maxilliped*: Median plate reaching $\frac{1}{2}$ along outer plates, narrowing to 2 strong distal teeth, surface strongly setose, appears to have small 2nd segment. Outer plates distally pointed, margins convex, inner with numerous small fine setae.



TEXT-FIG 5—*Hyperia bengalensis* (Giles). Male 80—Peraeopod 4, end segments 81—Epimeral plates. 82—Uropods and telson *Hyperia spinigera* Bovallius Male 83—Antenna 1. 84—Antenna 2 85—Maxilla 1 86—Maxilla 2 87—Mandible 88—Maxilliped 89—Gnathopod 1. 90—Gnathopod 2. 91—Peraeopod 1. 92—Peraeopod 3 93—Peraeopod 5.

GNATHOPODS. *First*: Basos expanded, ovate, margins convex; greatest width ½ length, 2 or 3 spines on posterodistal angle. Ischium less than ¼ basos length, subsquare, 3 or 4 spines on posterodistal angle. Merus anterior margin short, posterior and end margins subequal, less than ⅓ basos length; posterodistal angle acute, produced somewhat outwards, end margin strongly spined. Carpus ⅔ basos length, widening somewhat distally to ⅔ length; posterodistal angle acute, produced downwards a little about ⅓ along propod, 1 or 2 small spines on anterior margin; posterior and end margins strongly spined, several short spines on posterior surface, end margin finely bristled between spines. Propod anterior margin ⅓ basos length, width less than anterior margin, which is slightly convex, has 3 or 4 strong spines; strong spines on surface; posterior margin finely toothed. Dactylos slender, more than ½ propod length; posterior margin finely toothed *Second*: Basos ovate, strongly expanded, greatest width ½ length, posterodistal angle spined. Ischium not quite ¼ basos length, posterodistal angle spined. Merus anterior margin short, posterior as long as end, slightly more than ¼ basos length, end margin strongly spined. Carpus expanded distally by forwardly produced posterodistal angle, which extends ½ down propod; anterior margin slightly shorter than posterior, which is nearly ½ basos length; end margin strongly spined, several spines on posterodistal surface. Propod ⅓ basos length, a few spines on anterior margin and surface, slender, posterior margin finely toothed. Dactylos slender, ½ propod length, posterior margin finely toothed.

PERAEOPODS. *First*: Gill large, subtriangular. Basos greatest width ⅔ length, margins convex, posterior with several short stout spines, posterodistal angle spined. Ischium subrectangular, less than ¼ basos length. Merus almost linear, width slightly more than ⅓ length, length ¼ basos. Carpus width ⅔ length, length nearly ⅔ basos, linear, posterior margin has 2 small spines. Propod width about ⅛ length, narrowing to slender dactylos, length ½ basos, surface minutely toothed, posterior margin with comb of fine teeth. Dactylos about ¼ propod length. *Second*: Basos proportionately narrower, propod posterior margin without comb. *Third*· Very similar, but reverted, proportions different; basos has two posterior margins, a flange effect, one flange widening distally and the other proximally, giving crossed appearance Basos greatest width ⅔ length, ischium ¼ basos length. Merus linear, ⅓ basos, width more than ⅓ length. Carpus linear, width ⅓ length, length nearly ½ basos. Propod about ⅛ basos length, width about ⅙ length, no sign of spines on any segment. *Fourth* and *Fifth* Segments wider, posterior margin of basos flanged, but flanges not crossed; propod surface with area of minute teeth.

EPIMERAL PLATES Broadly rounded but with distinct and slightly produced posterodistal angle, posterior margin tending to concave distally immediately above angle, convex proximally, a strong median ridge running in convex arc from posterodistal angle (which may be almost median in position).

PLEOPODS. Peduncle stout, longer than wide, rami slightly longer than peduncles

UROPODS Rami of uropod 1 not reaching quite as far as rami of 3rd; inner ramus of 2nd reaching as far as outer ramus of 1st. Outer rami all lanceolate with outer margin smooth, almost straight; inner margin slightly convex and finely pectinate; inner ramus of 1st similar in shape but inner margin smooth, outer pectinate; inner ramus of 2nd and 3rd in shape more ovate, both margins pectinate; each distally produced to narrow finger. Inner margin of peduncle

of 3rd finely toothed distally, inner distal angle of 2nd and 3rd produced to small sharp tooth. *First*: Inner margin of outer ramus and outer margin of inner proximally excavate and finely bristled. Length of peduncle, inner and outer rami in ratio 24:15:14. *Second*: Ratio 28:21:18. *Third*: ratio 29:17:16. *Telson*: Not quite reaching ½ down uropod 3 peduncle, ovate, tending to triangular, apically rounded

HOLOTYPE. Slides L.28.

LOCALITY. Station 210/51.

DISTRIBUTION. Spitzbergen; off the northern coast of Norway; the Labrador Current; west coast of Ireland; south coast of England; east mid-Atlantic; South Georgia; Friday Harbour, Washington; Bermuda; New Zealand.

DISCUSSION

The specimen described agrees closely with Shoemaker's figures of a male *H. spinigera* from Bermuda in the epimeral plates and uropods, less well with the figures of the gnathopods. However, the differences in this last regard could easily be accounted for—as suggested by Barnard—by distortion due to pressure exerted by the cover-slip. My specimen agrees well enough with the gnathopods described and figured by other authors (e.g., Bovallius). Barnard considers the uropods to be the most important characteristics, and they agree closely with Shoemaker's and Barnard's figures. The epimeral plates, in their extremely close agreement with Shoemaker's figures, make me certain of the specimen's affinity with *H. spinigera.*

Shoemaker (1945) and Barnard (1932) discuss this species and its relationship to *H galba.* I lack sufficient material to pass comment on this question. The same station, however, does contain a female *Hyperia,* 6¾ mm. long This would be considered as immature if either *H. galba* or *H spinigera.* It agrees most closely, as far as I can see, with Bovallius's figures of *H. gaudichaudii,* now considered synonymous with *H. galba* The most notable difference from the male *H. spinigera* is in the shape of the uropods, but the 1st and 2nd peraeopods are also noteworthy in having 3 or 4 well-developed spines on the carpus The gnathopods have much shorter and stubbier propods—in fact it agrees very closely with *H. gaudichaudii.* Its presence with a male *H. spinigera* suggests that it might possibly be the female of that species, but the small size and single state of the specimen rather limit more definite conclusions.

Genus HYPERIELLA Bovallius, 1887

Bovallius, 1889: 241.
Barnard, 1930: 413.

"Head large, much deeper than long. Peraeon smooth, with distinct epimerals. First pair of gnathopods subchelate, carpus dilated Second pair chelate; carpus dilated and produced; carpal process narrowly concave and narrowly spoon-shaped. Carpus of peraeopods 1 and 2 not dilated. Third pair much longer than rest; the propod very elongate. Last two pairs equal in length, not longer than 1st and 2nd. Uropods somewhat elongated" (After Bovallius.)

Barnard records one species, *Hyperiella antarctica.*

Genus HYPERIOIDES Chevreux, 1900

Chevreux, 1900: 143.
Pirlot, 1929: 124.
Barnard, 1930: 414.

" Body much more compressed than in species of the genus *Hyperia.* Head prolonged anteriorly, above the superior antennae. Eyes occupying only the superior part of the head. Coxal plates fused with segments."
(Translated from Pirlot.)

Barnard records one species, *Hyperioides longipes.*

Genus IULOPIS Bovallius, 1887
Bovallius, 1889: 116.
Pirlot, 1929: 120.
Barnard, 1930: 418.

" Epimeral plates distinct, articulating with segments; second pair of gnathopods chelate; body more or less covered with hairs." (Translated from Pirlot.)

Barnard records one species, *Iulopis loveni.*

Genus HYPEROCHE Bovallius, 1887
Bovallius, 1877: 18; 1889: 83.
Senna, 1908: 154.
Pirlot, 1929: 118.
Barnard: 1930: 415.

" Gnathopods 1 and 2 chelate, carpal prolongation of gnathopod 2 thinning out in a blade." (Translated from Pirlot.)

Barnard (1930) says that members of this genus appear to be distinctly rare in comparison with other Hyperiids. Two species were taken in the Lachlan collections. One was represented by a single female only, but the other was taken at a number of stations. It is *Hyperoche mediterranea* which has not hitherto been found in the southern hemisphere. The one specimen of *Hyperoche* which Barnard recorded from New Zealand was a juvenile, too badly damaged for specific identification. These are the first definite records of the genus from New Zealand waters.

KEY TO NEW ZEALAND SPECIES OF HYPEROCHE

1. Pleon segments 1–3 with small points posteriorly — *H. medusarum*
   Pleon segments 1–3 rounded posteriorly — *H. mediterranea*

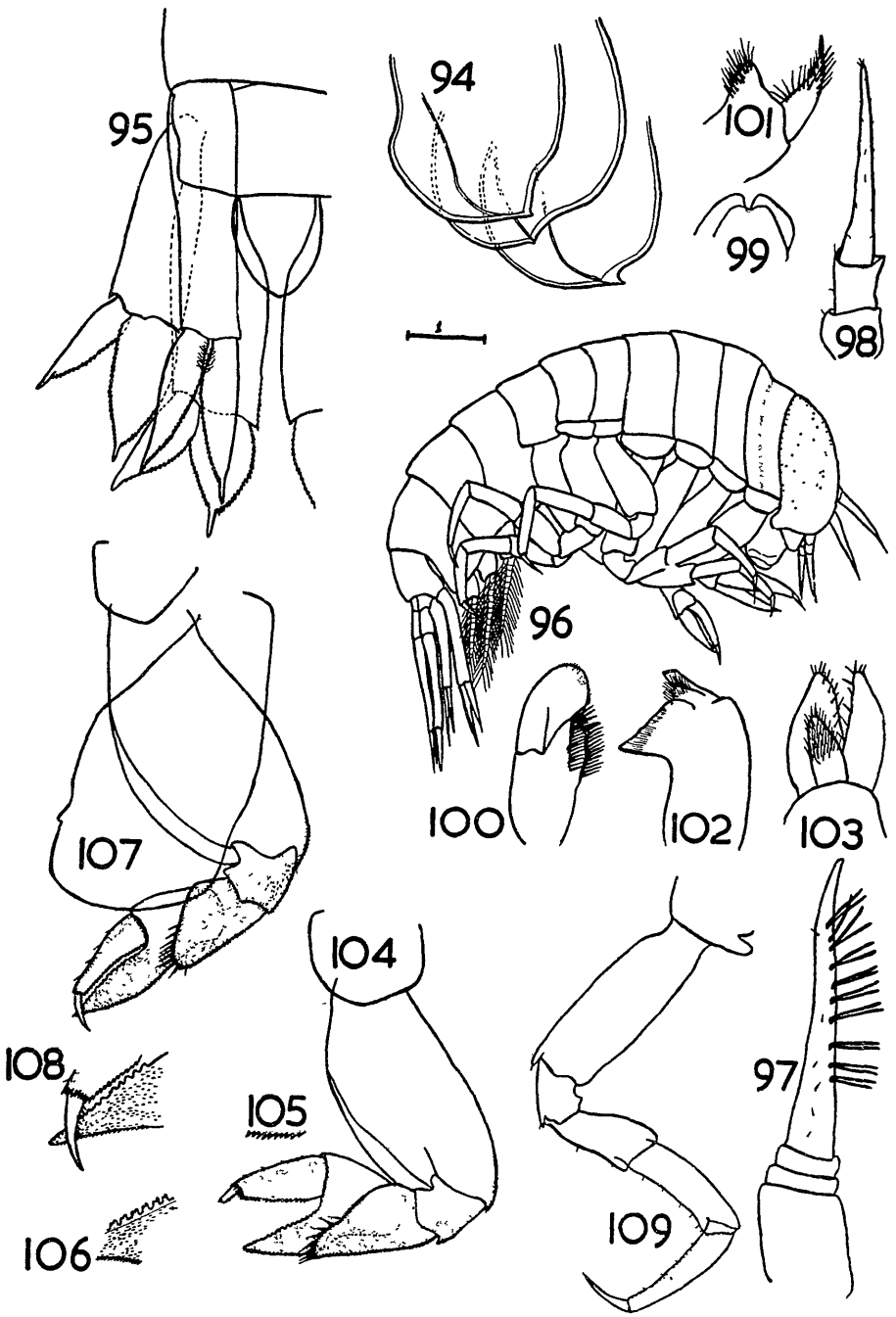
Hyperoche medusarum (Kröyer), 1838. (Figs. 96–114.)
Hyperia kroeyeri Bovallius, 1889: 87–92.
Hyperoche medusarum Barnard, 1930: 415. Pirlot, 1929. 118 (lit. and syn).

Description of Female

Colour in formalin, white. Head not wide, 1st segment of body constricted to much narrower head; thoracic region tumid. Length about 6 mm., depth 2 mm.; width, 2½ mm.

ANTENNAE. *First*: Peduncle, 1st segment more than twice total length 2nd and 3rd; flagellum of 1 segment, more than twice peduncle length, a few scattered bristles on surface; inferior margin has row of long flaccid sensory setae, mostly paired. Length about 1½ mm. *Second*: Length about 1 mm Flagellum of 1 segment, a few scattered bristles and numerous minute hairs on surface, twice length 4th and 5th peduncle segments; 5th segment narrowed and slightly longer than 4th.

MOUTHPARTS. *Upper Lip*: Distally emarginate. *First Maxillae*: Outer plate large, oval, very minute teeth on inner surface distally. Inner plate ovate, not reaching ½ along outer, a circlet of fine setae on inner and end margin and surface. *Second Maxillae*: Inner plate almost subrectangular, inner distal angle a little bluntly produced with area of fine setae; outer plate a small subtriangular palp



TEXT-FIG. 6.—*Hyperia spinigera* Bovallius Male. 94—Epimeral plates. 95—Uropods and telson. *Hyperoche medusarum* (Kròyer). Female. 96—Adult. 97—Antenna 1. 98—Antenna 2. 99—Upper lip. 100—Maxilla 1. 101—Maxilla 2. 102—Mandible. 103—Maxilliped. 104—Gnathopod 1. 105—Gnathopod 1, propod posterior margin. 106—Gnathopod 1, carpal process inner margin. 107—Gnathopod 2. 108—Gnathopod 2 dactylos, ends of propod and carpal process. 109—Peraeopod 5.

arising distally from outer distal angle, as long as inner basal plate, finely setose distally and most of length. *Mandible*: Palp broken off both mandibles. Cutting edge, upper plate a narrow rectangular projection with 6 or so small incised teeth distally; molar process a large inwardly directed triangular process; between the two a small subtriangular process with numerous fine setae corresponding to spine row. *Maxilliped*: Outer plates large, ovate, outer margins convex, greatest width medially more than $\frac{1}{2}$ length, apically rounded; inner margin has 12 or so roughly paired small setae; median lobe a narrow subtriangular plate, more than $\frac{1}{2}$ length of outer, 2 small end spines, distal $\frac{3}{4}$ of surface with fine setae.

GNATHOPODS. *First*: Sideplate small, ovate. Basos somewhat expanded, margins convex, greatest width $\frac{1}{2}$ length, surface of posterodistal angle somewhat minutely toothed. Ischium subsquare, $\frac{1}{4}$ basos length, posterior margin and posterodistal surface finely toothed. Merus anterior free margin small, segment produced posteriorly along carpus to propod in broad scoop-like process, posterodistal margin has about 8 spines, greatest width $\frac{1}{2}$ length posterior margin; posterodistal surface and posterior margin finely toothed. Carpus anterior margin $\frac{1}{3}$ basos length, posteriorly produced in strong knife-like process to end of propod, anterior margin has molar-like teeth, surface and posterior margin are minutely toothed; posterior margin twice length of anterior. Propod widest proximally, margins convex, as long as carpus anterior margin, more than twice width; inner and end margins toothed; anterior $\frac{1}{2}$ of surface minutely toothed, inner surface has several fine bristles Dactylos slender, inner margin toothed, $\frac{1}{2}$ propod length. *Second*: Large gill somewhat subrectangular Ischium less than $\frac{1}{4}$ basos length; merus posterior margin about $\frac{1}{3}$ basos length, not as narrowly produced as in Gn. 1, almost reaching propod base. Carpus posteriorly produced to sharp triangular process, process margins slightly convex, process extending a little past propod; posterior margin more than twice length anterior. Propod barely longer than carpus anterior margin, narrowing to slender dactylos, inner toothed margin slightly concave . Otherwise like Gn. 1.

PERAEOPODS. *First*: Basos medial width $\frac{2}{5}$ length, margins slightly convex. Ischium subrectangular, $\frac{1}{4}$ basos length. Merus anterior margin slightly convex, length $\frac{1}{3}$ basos, width $\frac{1}{2}$ length, a few bristles on margins; distal margin finely toothed, ischium similar. Carpus widening slightly distally, slightly longer than merus, distal width $\frac{1}{2}$ length, distal margin finely toothed, surface minutely toothed, posterior surface has several scattered bristles, posterodistal angle produced in small sharp process, posterior margin finely toothed. Propod slightly more than $\frac{1}{2}$ basos length, narrowing slightly distally, width about $\frac{1}{5}$ length, anterior margin has a few bristles, anterior surface is minutely toothed, posterior has a few fine bristles, posterior and end margins finely toothed. Dactylos slender, 3 or 4 teeth on inner margin proximally, $\frac{1}{3}$ propod length. *Second*: Similar. *Third and Fourth*: Like fifth. *Fifth*: Basos margins relatively straight, width $\frac{1}{3}$ length. Ischium subrectangular, $\frac{1}{3}$ basos length. Merus posterior margin slightly convex, $\frac{1}{2}$ basos length, distal width more than $\frac{1}{2}$ length, a few scattered bristles on anterior margin. Carpus end margin and anterior surface finely toothed, rest very minutely toothed. Propod $\frac{2}{3}$ basos length, proximal width $\frac{1}{3}$ length, narrowing to slender dactylos which is nearly $\frac{1}{2}$ propod length; propod anterior surface finely toothed.

EPIMERAL PLATES. *First*: Ovate, shield-like, with mediodistal apex, as wide as deep. *Second and Third*: More or less subrectangular, anterior margin slightly

concave, anterodistal angle rounded, ventral margin straight, posterior slightly convex; posterodistal angles produced a little to sharp point. A fine distally-toothed suture running in arc from posterodistal angle towards anteroproximal.

PLEOPODS: Normal and biramous.

UROPODS: Biramous. Inner margins of peduncle of 2nd and 3rd finely toothed most of length; margins of rami toothed most of length except outer margin of 2nd and 3rd; outer margin of peduncle of 1st finely bristled; outer surface of 1st and 2nd peduncles and outer ramus of 2nd minutely toothed. Outer ramus of 1st reaching as far as inner of 2nd does, outer ramus of 2nd shorter; inner ramus of second reaching $\frac{3}{4}$ along outer of 3rd. *First*: Peduncle, inner ramus and outer in ratio 23:18:21. *Second*: Peduncle widening a little distally, inner distal angle produced a little in sharp point. Ratio 7:6:4. *Third*: Peduncle stout Ratio 18:10:11. *Telson*: Subtriangular, width $\frac{7}{8}$ length; reaching nearly $\frac{1}{2}$ along uropod 3 peduncle.

HYPOTYPES: Slides L.21. (Station 75/51).

LOCALITIES: Station 75/51.

DISTRIBUTION: North Atlantic and adjacent seas, about 55°–77° N; North of Alaska; South Georgia; New Zealand.

DISCUSSION

Barnard gives the following synonyms for this species: *kroeyeri, tauriformis, prehensilis, abyssorum* and *luetkeni.* All of these are listed as distinct species by Bovallius with the exception of *H tauriformis,* for which he lacked sufficient information for specific identification.

One specimen, a female, was taken at Station 75/51. It agrees exceedingly well with Bovallius's figures for *H. luetkeni* which, as already noted, is considered a synonym of *H medusarum* The only difference noted was the greater prolongation of the carpus posterodistal angle in the first and second peraeopods.

Hyperoche mediterranea Senna, 1908. (Figs. 115–132.)

Senna 1908: 159-168.
Barnard 1930: 415.

Description of Male

Length, 4½ mm.; depth, 1 mm.; width, 1¼ mm. Colour in formalin, white. General appearance like *Hyperia bengalensis,* taken at the same station, but somewhat more solid and squarish.

ANTENNAE. *First*: Of more than 20 segments; length 5 mm. *Second*: Angles of 1st and 2nd flagellar segments not produced as in *Hyperia bengalensis;* flagellum of more than 19 segments; length 6¼ mm.; otherwise antenna like *H. bengalensis.* Other appendages also like *H. bengalensis* except as below.

MOUTHPARTS. *First Maxillae*: Inner plate a blunt lobe with circlet of slender setae, part of the circlet forming a fringe distally along inner margin. Outer large lamellar plate extending well past inner plate, ovate, inner surface and margin with a few setae, outer margin and surface distally very minutely toothed. *Mandible*: Cutting edge a narrow chisel-shaped plate with fimbriated end margin; margin at base and extending to molar process finely bristled and fimbriated also; a setose triangular process alongside cutting edge, below these a small palp-like well-bristled process corresponding to molar process. Palp long, slender, of 3 segments, 2nd about $\frac{3}{4}$ length 3rd, outer margin of 3rd finely bristled. *Maxilliped*: A median narrow blunt and finely setose process extends not quite $\frac{1}{2}$ along outer

TEXT-FIG. 7.—*Hyperoche medusarum* (Kroyer). Female. 110—Peraeopod 1. 111—Peraeopod 1 carpus. 112—Peraeopod 2, end segments. 113—Epimeral plates. 114—Uropods and telson. *Hyperoche mediterranea* Senna Male. 115—Maxilla 1. 116—Maxilla 2. 117—Mandible. 118—Maxilliped. 119—Gnathopod 1. 120—Gnathopod 2. 121—Peraeopod 1. 122—Peraeopod 2. 123—Peraeopod 3. 124—Uropods and telson.

lanceolate plates, which have finely bristled outer margin and surface; inner margin slightly serrate with several fine setae; apices acute.

GNATHOPODS *First*: Basos width ⅓ length Ischium subrectangular, ¼ basos length; posterior margin and surface finely bristled. Merus anterior margin small, posterior ½ basos length, produced distally in sharp knife-like triangular process ⅔ along carpus to propod. Carpus anterior margin about ⅖ basos length, twice width; posterior margin produced in sharp knife-like process a little past end of propod so posterior margin about ⅔ basos length; propod narrowing distally to dactylos, as long as carpus anterior margin. Dactylos slender, about ⅓ propod. Merus, carpus and propod margins and surface all finely bristled; short bristles on propod posterior surface grade imperceptibly into short strong teeth along margin; to lesser extent distal margins of other segments are similarly toothed. *Second*: Gill ovate, large much longer than basos. Otherwise like Gn. 1.

PERAEOPODS *First*· Gill ovate, simple, much longer than basos. Basos width ⅓ length; posterior margin finely bristled distally. Ischium subrectangular, ⅓ basos length; posterior surface and margin finely bristled. Merus less than ½ basos length, width ½ length. Carpus subrectangular, slightly longer than merus, width ⅖ length, sharp posterodistal angle almost right-angled. Propod ¾ basos, width ⅛ length, posterior margin finely toothed like carpus posterodistal angle. Dactylos slender, ⅓ propod length. Merus, carpus and dactylos surface and margins finely bristled as in gnathopods *Third*· Basos width ⅖ length. Ischium subrectangular, posterior margin ⅖ basos length. Merus ⅔ basos, posterior margin widening convexly distally, distal width ½ length. Carpus narrower, as long as merus Propod as long as basos, width ⅕ length. Dactylos slender, ½ propod length Ischium to propod segments all finely bristled along posterior margin and surface (this bristling not figured). *Fourth and Fifth*: Like third.

EPIMERAL PLATES. Somewhat distorted in specimen but showing no sign of sharp point to posterodistal angle, broadly rounded instead.

UROPODS. Biramous, rami lanceolate Inner margin of each ramus and outer margin of inner ramus of each uropod finely pectinate. Rami of 1st with inner margins excavate proximally, margin about excavation finely bristled. Outer margins and surface of peduncles and outer rami finely bristled. Tips of rami of 1st and 2nd uropods reaching tips of 3rd. *First*: Rami subequal, ratio to peduncle length 8:11. *Second*: Rami as long as uropod 1 rami, ratio to peduncle 5:6. *Third*: Rami wider in proportion to length than in other uropods; rami-peduncle ratio approximately 2:3. *Telson*: Subtriangular, as wide as long, not quite reaching ½ along uropod 3 peduncle.

Description of Female

Length, 3 mm.; depth, 1½ mm.; width, 1 mm. Body very rotund. Gnathopods and peraeopods as in male. Carpus posterodistal angle in Pr. 1 possibly more sharply produced than in male.

MANDIBLE Palp much smaller, 3rd segment barely longer than 2nd, a few short bristles on surface.

ANTENNAE *First*: Peduncle segments ⅔ length single flagellum segment; flagellum has a few bristles, several long flaccid sensory setae inferiorly. *Second*: Last 3 peduncle segments ¾ length of single flagellum segment; flagellum conical, surface bristled, as long as 1st antenna.

EPIMERAL PLATES. Posterodistal angle finely serrated.

UROPODS. Margins more strongly serrate than in male. Tip of 1st uropod extending ½ down rami of 3rd; inner ramus of 2nd extending almost as far. *First*: Peduncle, rami in ratio 16:15. *Second*: Peduncle, outer and inner ramus in ratio 10:8:7. *Telson*: Slightly longer than wide, nearly reaching ½ along peduncle of uropod 3.

HYPOTYPES. Slides L.15 (male, Station 83/51); L.19 (female, Station 95/51).

LOCALITIES. Station 75/51, 2 ♂♂; 76/51, 1 ♂; 78/51, 7 ♂♂, 2 juv.; 79/51, 52 ♂♂; 80/51, 16 ♂♂; 81/51, 8 ♂♂; 99/51, 1 ♂; 95/51, 1 ♀; 100/51, 24 ♂♂; 106/51, 2 ♂♂; 103/51, 1 ♂; 128/51, 1 ♂; 48/51, 8 ♂♂; 83/51, 4 ♂♂.

DISTRIBUTION New Zealand; Messina, Mediterranean.

DISCUSSION

According to Barnard's key, these specimens fall into *Hyperoche mediterranea* Senna, and Senna's figures confirm this.

The specimens differ quite markedly from *H. capucinus* Barnard, the only species of *Hyperoche* definitely identified by him amongst Terra Nova material. In several features, notably the uropods and the pleon segments, they differ from *H. cryptodactylus* as figured by Stebbing (1888, Pl. 170). They come closest of all the species to *H. medusarum* but differ in having the pleon segments rounded posteriorly, the characteristic used to separate the two major groups of species within the genus. They also differ from *H. medusarum* in the maxilliped. I do not place much reliance on the bristling of the gnathopod and peraeopod segments because, although very extensive, it is not outstandingly obvious and may show up better here due to the greater effectiveness of the mounting medium (polyvinyl alcohol) in showing this particular type of bristling. Certainly, in illustrating the bristling it is difficult to give it true significance—my figures over-emphasize the prominence, though not the quantity. However, Senna's figures show an equally extensive bristling in his specimens. The specimens differ from *H. medusarum* also in that there is a definite serration of the segment margins in *H. medusarum*, whereas in these specimens of *H. mediterranea* there is a bristling or fringe of fine teeth which merges imperceptibly into the bristles on the surface.

Only two species of *Hyperoche* have the pleon segments posteriorly rounded, *H. martinezii* and *H. mediterranea*, and *H. martinezii* does not have the 4th segment of gnathopods 1 and 2 produced.

H. mediterranea occurs only in a very localised and comparatively well-defined area in Foveaux Strait, within which temperature and salinity are relatively constant. At the stations at which it was taken, temperature ranged from 13·7° to 14 6°, and salinity from 34 05 to 34 58 parts per thousand. The species seems to be a shallow-water one, at least as far as New Zealand is concerned, confined within the 50 fathom line, and not apparently extending up the east coast at all.

The distribution of this species, around New Zealand and in the Mediterranean, may seem anomalous, but the Terra Nova Report shows that a considerable number of Hyperiids occur in the Mediterranean and New Zealand waters, and these have usually been taken in the Atlantic and Indian Oceans as well. The most likely explanation is that the Mediterranean has been very extensively worked for plankton. Probably, when the other oceans have been equally as well worked, the distribution will show a much more continuous trend.

Genus PARATHEMISTO Boeck, 1870

Boeck, 1870: 87.
Bovallius, 1889: 248–311.
Pirlot, 1929. 126 (*Themisto*)
Barnard. 1930: 419–420.

"Carpus of peraeopods 1 and 2 dilated and forming a prehensile organ with propod." (Translated from Pirlot)

A number of authors still refer to this genus as *Themisto*. Barnard (1930) has pointed out that this name is pre-occupied and cannot be used.

KEY TO NEW ZEALAND SPECIES OF PARATHEMISTO
(After Barnard, 1930.)

1	Inner ramus of uropod 3 pectinate only on outer margin	*P. gaudichaudii* (Guér.), 1825
	Inner ramus of uropod 3 pectinate on both margins	2
2.	Inner margin of uropod 3 peduncle smooth throughout	*P. gracilipes* (Norman). 1869
	Inner margin of uropod 3 peduncle distally serrulate	*P. australis* Stebbing. 1888

Parathemisto australis-gracilipes-gaudichaudii

This is an exceedingly difficult complex to deal with, but it now seems general to treat *P. australis, P. gracilipes* and *P. gaudichaudii* as distinct and valid species

Thomson (1879) recorded from New Zealand specimens which he ascribed to *Themisto antarctica* Chilton (1926) pointed out that these were really *Parathemisto gaudichaudii* as Stephensen (1923) had already suggested. Stebbing (1888) described a species from New Zealand which he called *Euthemisto thomsoni* Bovallius (1889) showed that this was also *P. gaudichaudii* Barnard records *P australis* from New Zealand waters (1930) and notes that Stewart (1913) may have had *P gracilipes* from the South Atlantic (15° S.).

Barnard's key to the genus enables three species to be separated out from the Lachlan material, *P gracilipes, P. australis*, and *P. gaudichaudii*. The last is identical in all details with Stebbing's *E. thomsoni*. Barnard's separation on pectination of the inner ramus of the third uropod (*gracilipes*) and of the peduncle as well (*australis*), or lack of pectination altogether (*gaudichaudii*) does not at first application seem very satisfactory. After examining *P. gracilipes* specimens before having seen *P. australis* I was prepared to believe that the two species were identical and that variations in pectination were due to age, sex or locality, or all three. The specimens, whilst showing quite distinct pectination on the ramus in adult males, had only indications of minute teeth on the peduncle (and not at all in some of the females). However, it was not the type of pectination figured by Barnard at all. His remark that " the serrulation is stronger in the male than in the female but is not always easily seen " confused the issue further It was doubtful whether serrulation, which could be seen only under very high power, was really serrulation in the sense of which he wrote.

When further material was examined, it became evident that there was indeed a different form (or species) present which was of the size indicated as normal for *P australis* with serrulate peduncle as indicated by Barnard. These specimens were set apart by a marked difference in general facies; shorter, stockier, much thicker animals, with shorter and wider uropods, no sign of dorsal spines, and a somewhat differently shaped cephalon. Furthermore, the serration on the

third uropod rami was such that it could best be described as "coarse", very definite and deep. So that *P. australis* was definitely present, and also a species which it seemed could only be *P. gracilipes.* Having regard to the cosmopolitan distribution of *P. gaudichaudii,* there seems no good reason why *P. gracilipes* should not be found in the Southern Hemisphere. The possibility that these specimens could be *P. japonica* was not supported by Bovallius's descriptions and figures, which show considerable differences in the uropods—especially since the 3rd uropod rami of *P. japonica* are equal in length, and the inner ramus of the 2nd uropod is, according to the description, serrate on both margins instead of only one as in these specimens There is, however, considerable similarity between the two species. Should further work lead to the conclusion that they are synonymous, *P. gracilipes* has precedence of nomenclature.

A third set of specimens was distinguishable within the material. These were animals with a generally larger size (up to 18 mm.) with distinct dorsal spination, and no sign of serration or pectination on the inner ramus or peduncle of the 3rd uropod. They proved to be identical with Stebbing's *E. thomsoni* and so with *P. gaudichaudii,* into which species Barnard's key separates them.

From a practical viewpoint, separation proved much easier than would be expected when dealing with large numbers. The doubts which arise mostly do not concern confusion of *P gracilipes* and *P. australis* but *P. gracilipes* and *P. gaudichaudii* Small specimens of *P. australis* showed large coarse pectination; larger specimens of *P. gaudichaudii* had no pectination; but many *P. gracilipes,* particularly females, were so devoid of pectination on the inner ramus of the 3rd uropod as to raise doubts about their correct identification.

Here, however, comparison of the station lists shows that *P. gaudichaudii* specimens, as we had identified them, fell almost completely outside that 50-fathom zone; and that our *P. australis* and *P. gracilipes* fell into clearly defined areas on the other side of the *P. gaudichaudii* zone with only odd incursions into it. It does appear likely that *P. australis* tends to be concentrated a little in the 50–100 fathom area, but evidence on this point is not conclusive. There was definitely a clear separation of *P. australis* and *P. gracilipes* from *P. gaudichaudii.* Graphs of diurnal variation and plots of temperature and salinity to show habitat grouping show the same phenomenon. There is, in view of this evidence, no doubt in my mind that we are dealing at least with three separate populations of animals, showing some differences in morphology and considerable differences in ecology.

It is extremely difficult to set down in words further crucial differences than these: *P. australis* may be separated from *P gracilipes* and *P. gaudichaudii* by its stockier build and the serration of the 3rd uropod peduncle; and its pleon segments, excluding telson, are in ratio to total length of 1·3 8, whereas *P. gracilipes* shows a ratio of 1 : 3·0 That is, in a specimen of approximately 10 mm. the three pleon segments in *P. australis* are 2½ mm. long, and in a similarly sized *P. gracilipes* they are nearer 3⅛ mm. *P. gaudichaudii* may be separated from *P. gracilipes* and *P. australis* by the lack of serration along the inner margin of the 3rd uropod inner ramus and peduncle, and by the extremely obvious dorsal spination of the adults (But as noted above, young *P. gaudichaudii* and young and female *P. gracilipes* may be hard to distinguish.) There are numerous differences in the specimens which I have figured, but they are all small and few, if any, could not be attributed to sex or age differences. I have, however,

given first in the specific descriptions a list of the semi-diagnostic characteristics which are of most value in separating the species. In using these, it should be remembered not to place too much reliance on the constancy of absolute proportions for reasons given below. The species are such that once a person has seen all three and has them at hand to check constantly one against the other when in doubt, there should be no great difficulty in separating the adults at least, but great care must be taken until all three have been seen together.

The immature males, of *P. gracilipes* at least, at a certain size (about 5–6 mm.) show the characteristics of an intersex in as much as the first antenna may have only a one-segmented flagellum whereas the second has a several-segmented flagellum. They can be distinguished as males by the lack of processes on the inferior margin of the first antennae.

Parathemisto (Euthemisto) gracilipes (Norman), 1869. (Figs. 133, 158, 176, 178.)

Hyperia gracilipes ♂ *(?) H. oblivia* Norman. 1869: 287
Themisto gracilipes Stephensen, 1924: 97–103, Figs. 39–42 (lit. & syn.)
Parathemisto (Euthemisto) gracilipes Barnard, 1930: 421.

Diagnostic Features

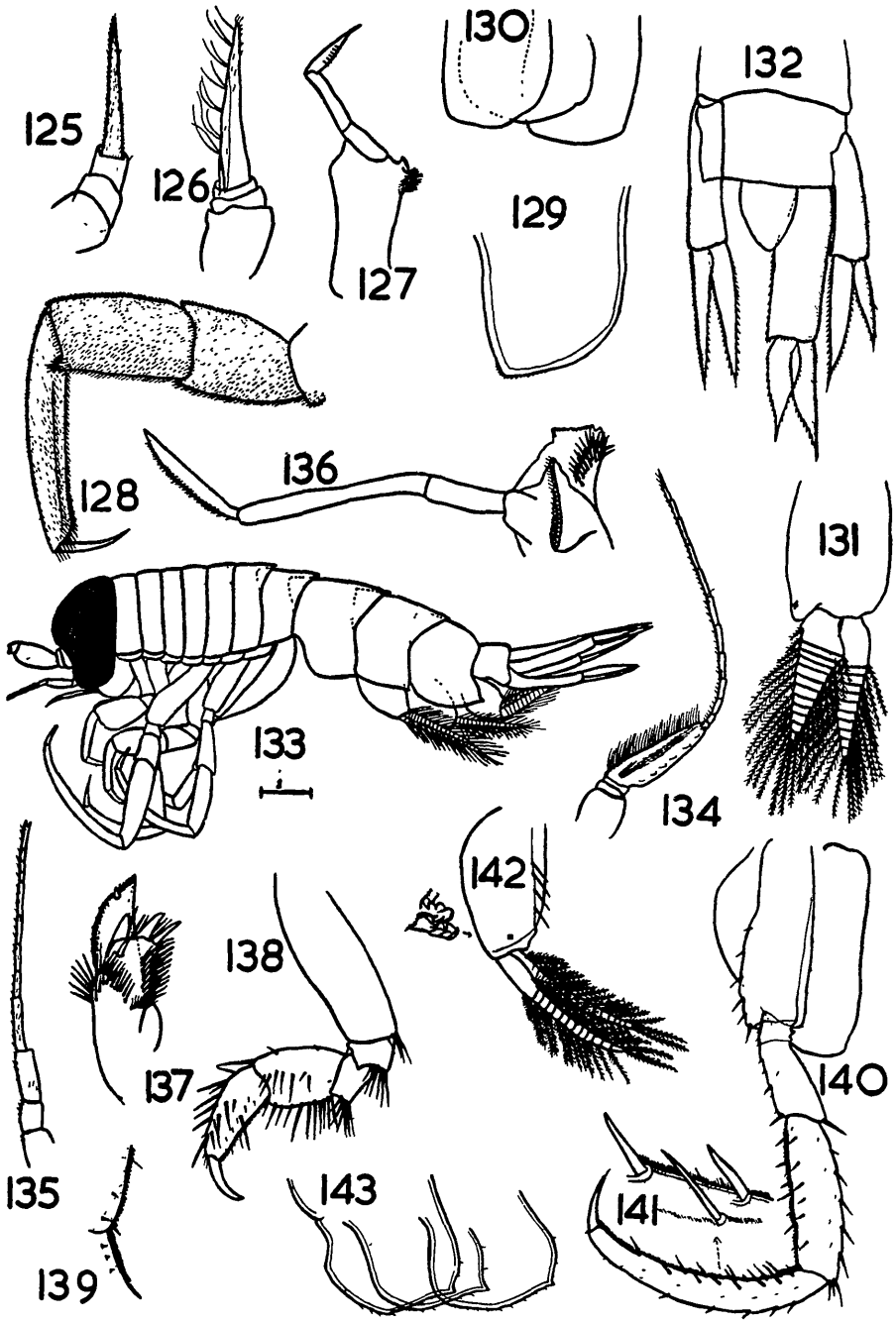
Slight tendency to dorsal spination of segments 6–9. Gnathopod 2, male, carpus extends $\frac{2}{3}$ along propod and process has 1 stout end spine. Peraeopod 1, male, carpus ovate, widest medially, width $\frac{3}{4}$ length; small even fringe of bristles along carpus posterior margin; carpus $\frac{3}{5}$ propod length. Pr. 2, male, carpus oblong-ovate, width $\frac{2}{5}$ length. Pr. 3, male, propod about $\frac{5}{8}$ length Pr. 5 propod. Uropod 2, outer ramus $\frac{3}{4}$ inner Uropod 3, outer ramus $\frac{2}{3}$ inner; ratio of peduncle width to length of inner margin is 17:60; inner ramus inner margin pectinate; peduncle inner margin finely toothed. Peraeopod 1, female, carpus ovate, widest proximally, width $\frac{2}{3}$ length; about 12 spines on surface, 6 marginally, a few marginal bristles Pr 2, female, carpus has about 8 spines on surface. Head tending to subtriangular, anterior margin rounding smoothly. Ratio of pleon segments to total body length 1:3·0.

Description of Male (Subsidiary details)

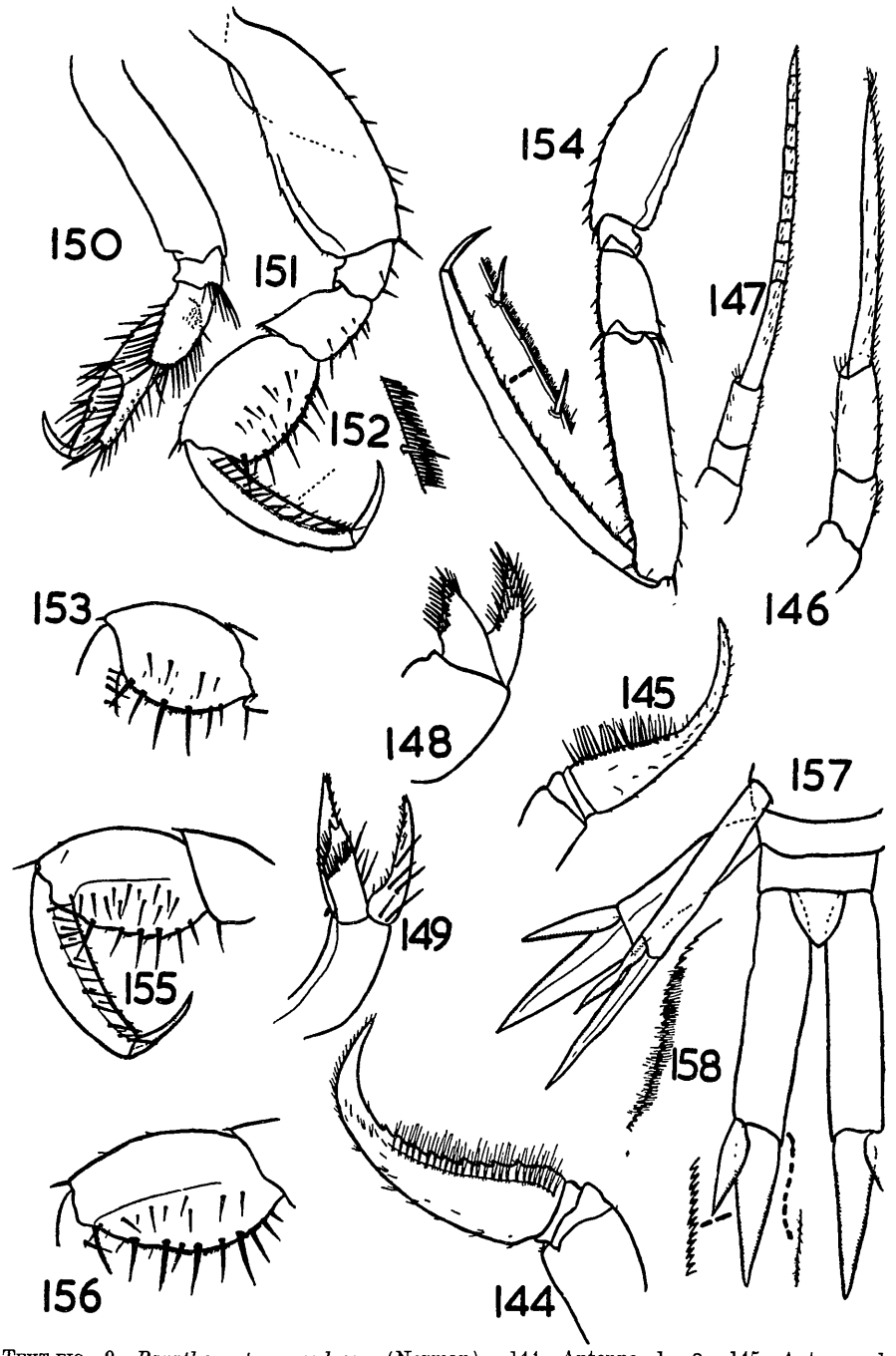
Colour in formalin white, eyes clear with orange nucleus. Length 10 mm.; depth, 2 mm.; width, 2 mm. Cephalon as long as 1st 3 segments of body; peraeon as long as pleon plus urosome Peraeopod 3 much the longest; 1st uropods longer than 2nd but not reaching as far as 3rd

ANTENNAE *First*: Filiform, shorter than 2nd, length 3 mm. Flagellum of 12 segments. 1st large and nearly twice peduncle length; straight inferior margin has U-shaped tract of setae; superior margin slightly convex; other segments mostly much longer than wide with scattered fine setae. Peduncle, 2nd and 3rd segments very short, wide; together about $\frac{1}{2}$ length 1st. *Second*: Filiform. length about 5 mm. Flagellum about 5 times peduncle length, of 17 segments: segments much longer than wide, 1st twice length of rest, all with small scattered setae. Peduncle 3rd and 4th segments subequal, $\frac{3}{4}$ length 5th, a few scattered setae on each.

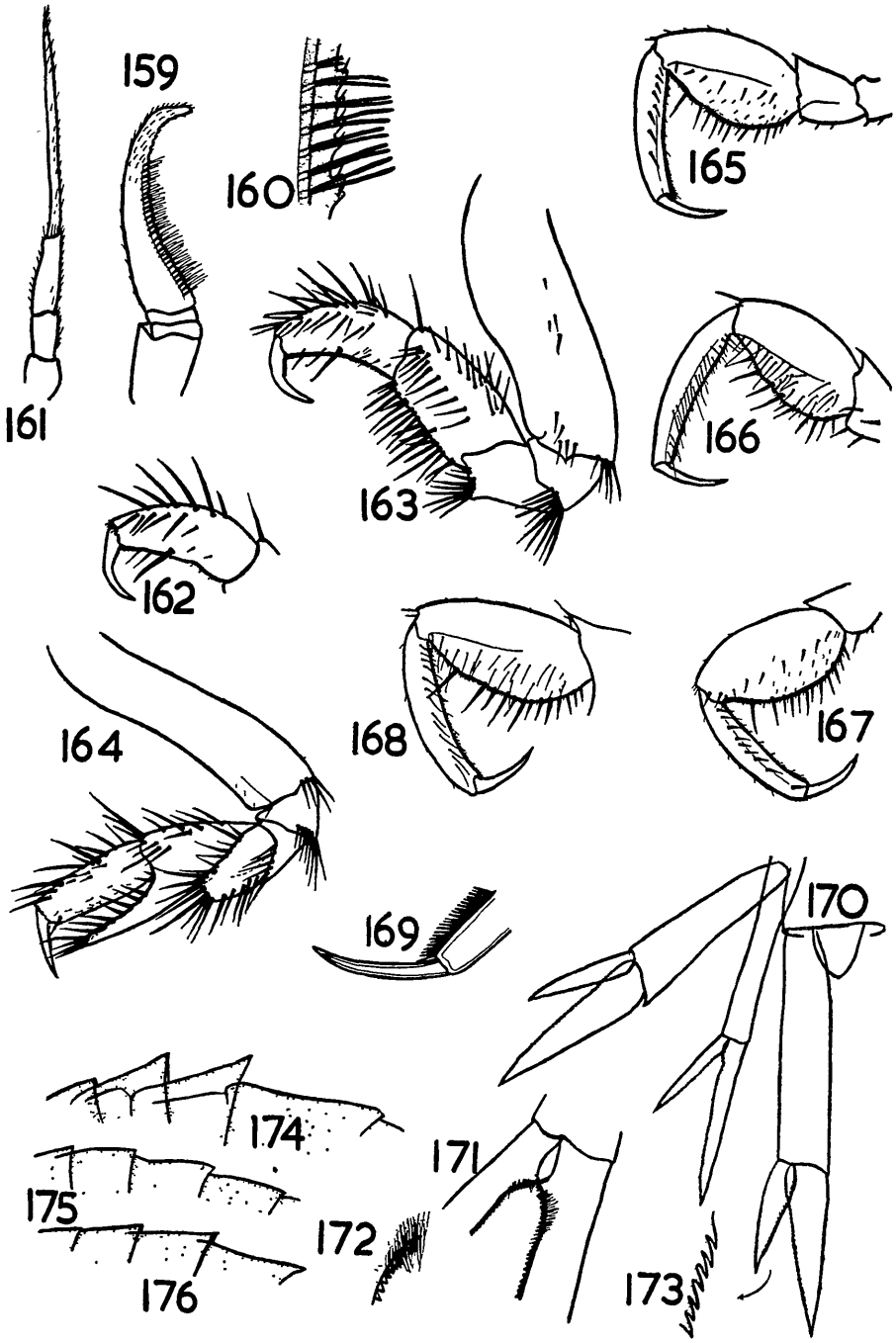
MOUTHPARTS *First Maxillae*: Subrectangular inner plate shorter than outer, long setae on outer and inner margin meeting in row across surface medially; 3 strong teeth distally. Outer plate ovate, tending to lanceolate; a short boss-like spine distally, outer margin strongly serrated, a series of much shorter spines inside boss distally. *Second Maxillae*: Inner plate slightly the shorter,



TEXT-FIG. 8—*Hyperoche mediterranea* Senna. 125—Antenna 1, ♀. 126—Antenna 2, ♀. 127—Mandible, ♀. 128—Peraeopod 1, ♀. 129—Epimeral plate, ♀. 130—Epimeral plates 1–3, ♂. 131—Pleopod 132—Uropods and telson, ♀. *Parathemisto gracilipes* (Norman). Male. 133—Adult. 134—Antenna 1. 135—Antenna 2 136—Left mandible. 137—Maxilla 1 138—Gnathopod 1. 139—Gnathopod 1, dactylos and propod posterior margins 140—Peraeopod 4. 141—Peraeopod 4, propod anterior margin. 142—Pleopod and coupling spines. 143—Epimeral plates.



TEXT-FIG. 9—*Parathemisto gracilipes* (Norman). 144—Antenna 1, ♀ 145—Antenna 1, juvenile ♂. 146—Gnathopod 2, ♀. 147—Gnathopod 2, juvenile ♂ 148—Maxilla 2. 149—Maxilliped 150—Gnathopod 2, ♂ 151—Peraeopod 1, ♂. 152—Peraeopod 1, ♂, propod anterior margin. 153—Peraeopod 1, juvenile ♂, carpus. 154—Peraeopod 3, ♂. 155—Peraeopod 1, ♀, carpus and propod. 156—Peraeopod 2, ♀. 157—Uropods and telson 158—Uropod 1, inner ramus, excavation margin.



TEXT-FIG. 10.—*Parathemisto gaudichaudii* (Guér.). 159—Antenna 1, ♀. 160—Antenna 1. ♀, inner margin. 161—Antenna 2, ♀. 162—Gnathopod 1, ♂, end segments. 163—Gnathopod 1, ♀. 164—Gnathopod 2, ♂. 165—Peraeopod 1, ♂, end segments. 166—Peraeopod 1, ♀ (f. *thomsoni*). 167—Peraeopod 2, ♂. 168—Peraeopod 2, ♀. 169—Peraeopod 2, ♂, propod and dactylos. 170—Uropods and telson. 171—Uropod 1, rami showing excavation 172—Uropod 1, excavation margin. 173—Uropod 3, outer ramus, inner margin 174—Dorsum of female, length 13 mm. *Parathemisto australis* (Stebbing). 175—Dorsum of female, length 9 mm. *Parathemisto gracilipes* (Norman). 176—Dorsum of male, length 11 mm.

ovate, longer than wide, brush of long setae distally, a long end spine and 3 or so very short spines. Outer plate narrowing to 2 strong end spines, distal $\frac{1}{2}$ has brush of long setae. *Mandibles*: Cutting edge a rectangular plate with about 16 incised teeth; molar process strong, some of process teeth bristled; a strong brush of setae between cutting edge and molar process. Palp of 3 segments, segments long and narrow; 1st about $\frac{2}{5}$ and 3rd about $\frac{3}{5}$ length 2nd; 3rd lanceolate, outer margin fringed with short bristles. *Maxilliped:* Inner lobe shorter than outer, 2 short sharp end spines, the margin between them excavate, fork-like; surface has horseshoe-shaped field of long setae Outer lobes crescentic, tapering, short setae on inner margin, about 5 long setae on proximal $\frac{1}{2}$ of surface.

GNATHOPODS. *First*: Basos width not $\frac{1}{3}$ length, long setae on posterodistal angle. Ischium length $\frac{1}{5}$ basos, posterior $\frac{1}{2}$ of distal margin has long spines, end margin V-shaped; wider than long. Merus more or less subrectangular, posterior margin straight, $\frac{1}{4}$ basos length; anterior margin convex, overlying carpus, meeting straight end margin in acute angle; posterodistal angle with 6 or so long spines. Carpus ovate, margins convex; length nearly twice width and $\frac{1}{2}$ basos length; anterior margin has 2 small setae and spine; posterior fringed with long spines, row of 5 or 6 long spines medially down each surface; posterior margin not showing bristles. Propod slightly longer, tapering; greatest width not $\frac{1}{2}$ length; anterior margin convex with several long spines; posterior straight with several small setae on finely serrated margin; several on surface. Fine curved dactylos $\frac{1}{2}$ propod length, a few minute spines on surface, proximal $\frac{1}{2}$ of margin finely serrated. *Second*: Basos width $\frac{1}{4}$ length, 1 or 2 long spines posterodistally. Ischium $\frac{1}{5}$ to $\frac{1}{3}$ basos length, wider than long; long spines posteriorly on distal margin. Merus ovate, a spoon-like process more than $\frac{1}{2}$ along carpus; length nearly twice width and nearly $\frac{1}{2}$ basos length; lateral margins rounding to distal evenly except for slight V-shaped angle terminally; margins with long spines, finely bristled between spines. Carpus process narrow, margins with long slender spines, bristled between spine bases; total carpus length $\frac{3}{4}$ basos. Propod hollowed to spoon-like scoop; length nearly $\frac{1}{2}$ basos; narrowing distally to dactylos, long spines on one margin, other finely serrate with a few short spines; a few small spines on surface. Long fine dactylos slightly more than $\frac{1}{2}$ propod length, inner margin finely serrate.

PERAEOPODS. *First*· Basos margins convex, proximally constricted, width $\frac{2}{5}$ length; anterior margin has a few single spines; posterior 6 or so longer ones. Ischium subrectangular, 2 or 3 small spines; length not $\frac{1}{4}$ basos. Merus piriform; $\frac{1}{3}$ basos length, width $\frac{3}{4}$ length, convex anterior margin is finely bristled, has 5 or so spines, a few on surface Carpus margins evenly convex, length $\frac{1}{2}$ basos, 1 or 2 small spines on anterior margin and distal angle; posterior margin has about 7 long spines with smaller ones interspersed; a little serrate distally. Propod $\frac{3}{4}$ basos length, width $\frac{1}{3}$ length anterior margin convex, a few fine setae; posterior margin straight and serrate, serrations long and fine with several interspersed single setae; 15 or so long, fine spines with very fine bristles between their bases medially on surface. Long fine dactylos about $\frac{2}{5}$ propod length, inner margin smooth. *Second*: Carpus slightly longer in proportion to width than in 1st *Third*· Basos width $\frac{1}{3}$ length; anterior margin sigmoid, 6 or so strong single spines distally; posterior margin has single minute spines. Ischium subrectangular, $\frac{1}{5}$ basos length, wider than long, a few minute spines anteriorly. Merus a little expanded distally, margins slightly convex, width $\frac{2}{3}$ length, length $\frac{1}{2}$ basos,

posterodistal angle has 2 or 3 spines; anterior margin has several increasingly larger single spines, finely bristled. Carpus longer than basos, margins relatively straight, posterior with small spines, anterior with about 12 spines, margin between them finely bristled and with small setae. Propod much narrower, slightly concave, length between 1 2 and 1·4 times carpus length; and 12 to 13 times greatest width, a few minute spines on posterior margin; anterior margin has 10 or so spines, small setae between them, is bristled throughout except at dactylos base where bristles give way to a few very fine long comb-like teeth. Dactylos inner margin smooth, length from 1½ times propod length in juvenile to ⅔ in adult. (N.B.: All these proportions are qualified by later remarks indicating that they vary with size; the carpus propod relationship tends to remain the same but the dactylos grows much slower than the other segments. The distal comb on the propod tends to be proportionately larger in smaller specimens also.) *Fourth*: Basos and ischium as in Pr. 3. Basos width ⅓ length Merus width ⅔ length; length less than ½ basos; strong spine at distal angles; a few smaller spines on anterior margin. Carpus slightly shorter than basos; width ⅓ length; margins with numerous long spines, a parallel row of spines on anterior surface, anterior margin bristled right along, bristles also at bases of surface spines. Propod-basos lengths in ratio 7:5, propod slightly concave, width ⅕ length, convex posterior margin has 5 or so short single spines; anterior margin has 8 or so spines interspersed with small setae, entire margin has long stout bristles which are almost comb-like teeth; a parallel row of spines on anterior surface with bristles between spine bases. Dactylos ⅔ propod length in adults. *Fifth*: Like Pr. 4 with fewer spines on carpus and propod posterior margins

Gills. Broad, ovate, slightly longer than basos of corresponding limb; width about ¾ length.

Epimeral Plates. Subrectangular. Anterior margins sigmoid, tending to concave, rounding broadly, ventral margin serrate and minutely spined; posterodistal angle acute and produced a little posteriorly; posterior margin sigmoid, tending to convex, 2 or 3 minute spines distally.

Pleopods. Biramus, rami longer than peduncles, about 14-segmented Peduncle subrectangular, a few spines on posterior margin, peduncle width ½ length, as wide as deep, 2 coupling spines.

Uropods. *First*: Rami lanceolate, reaching ½ along rami of 3rd; outer narrow, slightly more than ½ peduncle length in adult male, inner margin expanded proximally, then immediately excavate for short distance; outer ramus about ⅔ length inner; inner ramus outer margin similarly expanded and excavate proximally; inner ramus outer margin and outer ramus inner margin strongly pectinate; margins bristled about excavations. *Second*: Stouter than 1st, reaching almost as far; rami lanceolate, ½ width of inner, inner as long as peduncle; outer ramus inner margin and inner ramus outer margin strongly pectinate, not proximally excavate. *Third*: Outer and inner rami and peduncle in ratio 2·3·5 in length; peduncle inner distal angle produced to sharp tooth as in 2nd; margins of inner ramus and inner margin of outer ramus pectinate *Telson*: Subtriangular, distally rounded, as wide as long, ⅕ length uropod 3 peduncle in adult.

Description of Female.

Length, 7½ mm.; depth, 1 mm.; width, 2 mm.

Antennae. *First*: Peduncle less than ½ single flagellar segment; 2nd and 3rd peduncle segments together not ½ length 1st; flagellum short, curved, superior

margin and surface with fine scattered bristles; sharply raised concave inferior margin has forwardly-directed projections each with small seta anteriorly along proximal ¾; parallel to this portion of margin on surface a row of single or paired long flaccid sensory seta. *Second*: Peduncle 4th segment ¾ length 3rd: flagellum of 1 segment, twice length 5th peduncle segment; flagellum and last 2 peduncle segments have finely bristled superior surface, a few bristles on peduncle superior margin.

PERAEOPODS. *First*: Carpus posterior margin has a few scattered bristles; otherwise not greatly different from male. *Second*· Carpus posterior margin finely bristled almost entire length, carpus widest proximally.

Juvenile Male (Intersex)

Length, 7½ mm.; depth, 1 mm.; width, 2 mm. Slides L.3.

ANTENNAE. *First*: Reaching ½ along flagellum of 2nd; total length 1½ mm. Flagellum about 3 times peduncle length, of 1 segment, with characteristic stout hooked shape of male, fringe of setae on proximal ½ of lower margin, rest of margins and surface with small irregularly scattered bristles. Peduncle, 2nd and 3rd segments together ⅓ length 1st, as wide as 1st is long. *Second*: Flagellum of 11 segments, 1st slightly shorter than peduncle and ½ total length of other segments, peduncle 3rd and 4th segments subequal, together as long as 5th, peduncle and flagellar segments have scattered bristles on margins and surfaces.

HYPOTYPES. Slides L.1., male; L.2, female. Station 3/51.

LOCALITIES.

Station	Male.	Female	Sizes. m.m.	Station	Male	Female	Sizes. m.m.
208/51	1		12 7	3/51	1	6	6.5–11.4
40 /51	8		12.8	107/51	1		10.7
130/51	1	2	6.0–12.3	124/51	18	43	6 4–11.4
125/51	11	35	6.0–14.0	138/51	2	6	6.8–11.8
178/51	8	47	6.6–11.6	189/51	56	128	6.1–11.8
198/51	1	2	7.0–13.1	206/51	1	1	7.0–13 0
292/51		20	6.5– 9 0	80/51	1		
82 /51	1			308/51	8	4	8 5–10 5
310/51	2		7 7	322/51		1	10.1
330/51	1		7.5				

DISTRIBUTION. Mediterranean; North Atlantic (about 55°–39° N); ? South Atlantic, 15° S. (Stewart); New Zealand.

DISCUSSION

Barnard (1930) records one specimen of *P. gracilipes*, a 6 mm. ovigerous female from Station 1 (48° 21′ N. 9° 58′ W. 17.vi.1910. Surface, 6.30 p.m.). In general, *P. gracilipes* is considered a northern form with *P. australis*, Barnard suggests, the corresponding southern form.

According to Barnard's key, the above specimens from Station 3/51 are *P gracilipes* Under extremely high power, uropod 3 peduncle in the very largest specimens appears serrulate, but its distinctness in the females is very unsatisfactory, and in neither males nor females does it achieve anything like the shape which Barnard figures (f.55, e). The serration of the rami of all the uropods is not uniform—that of the inner margin of the inner ramus of uropod 3 (which Barnard uses to distinguish *P gracilipes* and *P australis* from *P. libellula* and *P. gaudichaudii*) is not very marked in the females. However,

all things taken into account, the specimens are almost certainly *P. gracilipes*, and agree well with the size range which Barnard gives.

A careful comparison with Stephensen's figures for *P. gracilipes* suggests close agreement in all respects allowing for certain proportional differences due to size. These differences are more a function of growth than specific differences, except possibly for the very indeterminate serrulation on the inner peduncle margin of the 3rd uropod. They appear to be, in the main, intermediary forms between his "short-legged" and "long-legged" forms, but, as he points out, the forms which he distinguishes are merely the extremes of a population.

The carpus of the 1st and 2nd peraeopods is also much more like *P. gracilipes* than *P. gaudichaudii*.

I have described here specimens from a particular station, rather than attempt to describe the species as a universal group. Because of the discrepancy in one or two proportions between the figures in Stephensen's papers and these specimens, a number of observations were made on relative proportions of segments of the 3rd peraeopod and of the uropods and telson at various ages. It would appear that most of these discrepancies can be explained away in terms of allometric growth—e.g., the dactylos of peraeopod 3, which is greater than the propod in very small specimens, is less than $\frac{1}{5}$ its length in adult males. Some of the conclusions reached are given below.

Proportional Differences in Segments

Whilst a number of general conclusions may be drawn to aid separation of *P. australis*, *P. gracilipes* and *P. gaudichaudii* from the relative proportions of the uropods, telson and 3rd peraeopods, it would seem that there is no empirical formula for specific distinction to be derived from these appendages.

Specimens of *P. gracilipes* ranging in length from $1\frac{3}{4}$ mm. to $7\frac{1}{2}$ mm., females as far as could be recognised, were selected from Lachlan material, and uropod proportions compared. From the results obtained, the following generalisations can be made about the specimens.

(1) The telson varies from $\frac{1}{3}$ to $\frac{1}{5}$ the length of uropod 3 peduncle
(2) The inner rami of uropods 2 and 3 are usually subequal; the inner ramus of uropod 3 remains slightly shorter than that of uropod 1.
(3) The outer rami of all three uropods vary from about $\frac{3}{4}$ the length of the inner in juveniles to $\frac{1}{2}$ in adults.
(4) The outer ramus of uropod 1 varies from about $\frac{3}{4}$ the length of the peduncle in juveniles to $\frac{1}{2}$ in adults.
(5) From being approximately equal to the outer ramus in juveniles, the peduncle of uropod 2 approaches to slightly less than twice in adults; that of uropod 3 to slightly more than twice the length of the outer ramus in adults.
(6) The inner ramus of uropods 1 and 2 tends to be as long as the respective peduncle; that of uropod 3 varies from as long as the peduncle in juveniles to $\frac{3}{4}$ in adults.

Stephensen (1924) gives figures of the urosome for both male and female "short-legged" forms of *Parathemisto gracilipes*, male "long-legged" form of *P. gracilipes*, and male of *P. compressa* f. *bispinosa*. If the same ratios are worked out for these figures we find that the proportions of the uropods and telson in all three show similar growth rates and proportions to those given above. For

that reason, they are of little use for specific determination, and, unless taken in conjunction with other features of the animals, are of little use for indicating the various forms within the species.

Measurements of the segments of peraeopod 3 indicate that the dactylos, from being longer than the propod in the juvenile, is as little as $\frac{1}{8}$ the propod length in the adult. The same tendency to a lesser degree is shown by the carpus and dactylos ratios, but more interesting is the carpus-propod ratio which remains constant. It is obvious from this that dactylos length in proportion to carpus or propod length has little value, but that carpus and propod lengths comparative to one another have some factual validity and may be of use in determining species. More important are the general morphology, and the nature of the pectination and spination of the appendages.

Although the three groups of *Parathemisto* here recorded from New Zealand can be separated quite distinctly by the pectination of the uropods, the general facies and by ecological preferences and habits, it is still possible that they do not warrant specific status. That is a problem which has yet to be resolved, and one which can only be satisfactorily solved by an intimate study of the various species and forms from what might be called a "living and vital" basis.

Parathemisto (Euthemisto) gaudichaudii (Guér.), 1825. (Figs. 159–174.)

Bovallius, 1889: 299, Text-figs. 1–5, Pl. 13, Figs. 44–46.
Barnard, 1930: 420. 1932: 280–282.

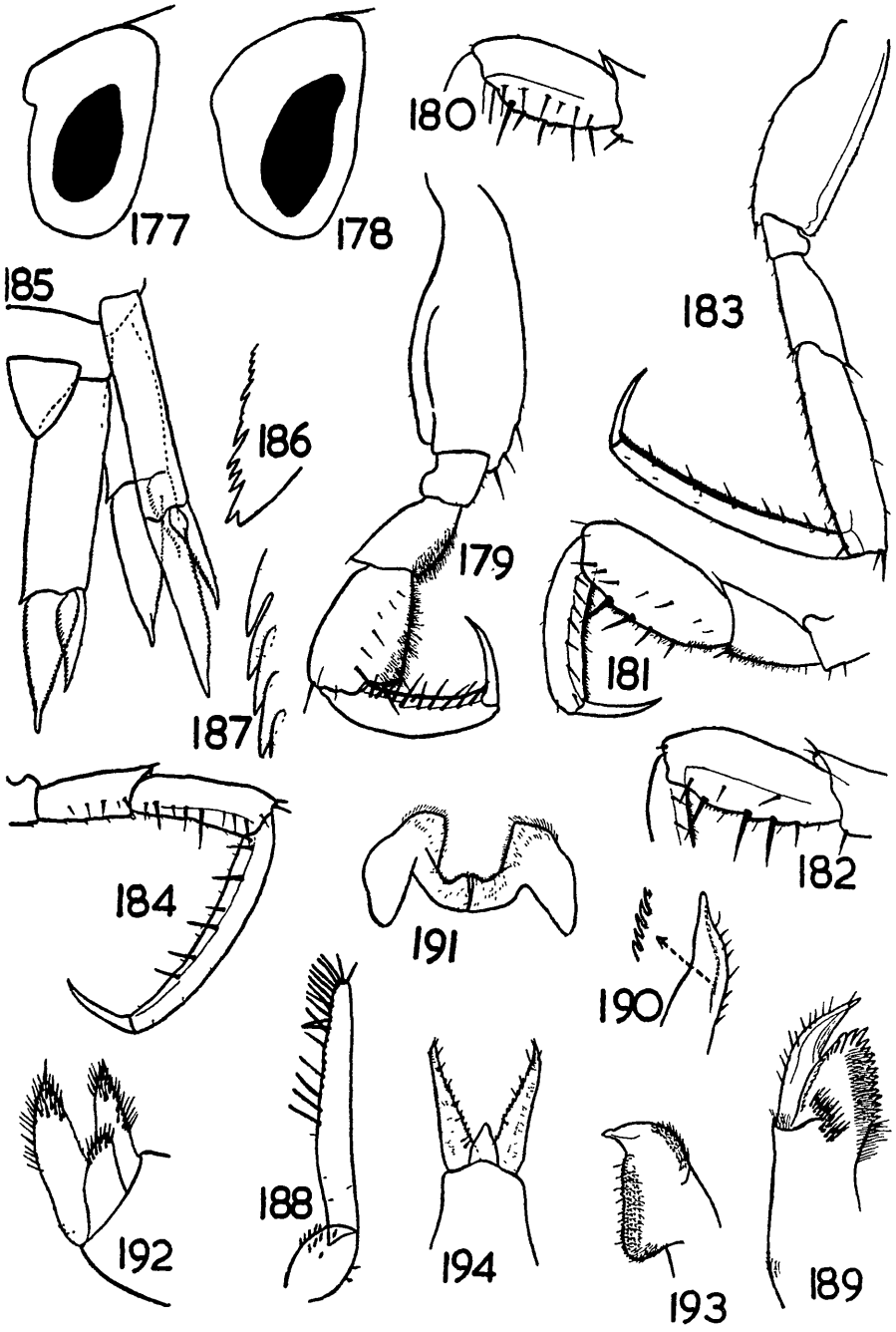
Diagnostic Features

Strong dorsal spines in animals of more than 10 mm. total length. Gnathopod 2, male, carpus extends $\frac{3}{4}$ along propod, has several end spines. Pr. 1, male, carpus widest proximally, width nearly $\frac{1}{2}$ length; like *P. gracilipes* but rather more spines on surface and margin; carpus and propod subequal. Pr. 2, male, carpus oblong-ovate; width slightly more than $\frac{1}{2}$ length; fringe of small even bristles on posterior margin; about 12 strong spines. Uropod 2 outer ramus about $\frac{3}{5}$ length inner. Uropod 3, outer ramus $\frac{2}{3}$ length inner; width to length ratio of peduncle 14:60; inner ramus has smooth inner margin; inner margin of peduncle entirely smooth. Peraeopod 1, female, carpus oblong-ovate, and widest proximally; width about $\frac{3}{5}$ length; numerous fine surface spines, 10 marginally, marginal bristles throughout. Peraeopod 2, female, has about 18 surface spines on carpus.

Subsidiary Details

ANTENNAE. *First*: (Female). Peduncle, last 2 segments $\frac{1}{2}$ length 1st. Flagellum curved, inner margin has projections and setae as in *P. gracilipes;* the one segment more than twice peduncle length; distal portion finely bristled all over. *Second*: (Female). Peduncle, last 3 segments $\frac{3}{4}$ flagellum length; 3rd segment $\frac{1}{2}$ length 5th, slightly shorter than 4th, all finely bristled.

GNATHOPODS. *First*: (Male.) Propod slightly curved, width $\frac{2}{5}$ length; 3 spines and comb on posterior margin, 6 long spines on anterior, about 6 on anterodistal surface. Curved dactylos $\frac{1}{2}$ propod length, inner margin finely toothed. (Female.) Basos width $\frac{1}{3}$ length, a few setae on surface, tuft of stout spines on posterodistal angle. Ischium wider than long, $\frac{1}{4}$ basos length, strong rank of spines on posterodistal angle. Merus subrectangular, width nearly $\frac{3}{5}$ length, free distal margin with rank of very long spines. Carpus oblong-ovate, width $\frac{1}{2}$ length; anterior margin, median surface and posterior margin very strongly spined. Propod



TEXT FIG. 11.—*Parathemisto australis* (Stebbing). 177—Head of female *Parathemisto gracilipes* (Norman). 178—Head of male. *Parathemisto australis* (Stebbing). 179—Peraeopod 1, ♂. 180—Peraeopod 1, ♀, carpus. 181—Peraeopod 2, ♂. 182—Peraeopod 2, ♀. carpus. 183—Peraeopod 3. ♂. 184—Peraeopod 5. ♂ 185—Uropods and telson 186—Uropod 3 peduncle inner distal angle 187—Uropod 3, inner margin of inner ramus *Phronima sedentaria* (Forsk.). Female 188—Antenna 1 189—Maxilla 1 190—Maxilla 1, outer plate 191—Upper lip. 192—Maxilla 2. 193—Mandible. 194—Maxilliped.

barely shorter, width $\frac{2}{5}$ length, slightly convex, anterior margin and surface strongly spined; posterior margin with a few strong spines, finely toothed; dactylos $\frac{1}{2}$ propod length, inner margin finely toothed proximally. *Second*. Basos width $\frac{1}{4}$ length, strong spines at posterodistal angle. Ischium $\frac{1}{5}$ basos, strong spines on posterodistal angle, wider than long. Merus ovately spoon-shaped, $\frac{2}{5}$ basos length, and reaching nearly $\frac{1}{2}$ along carpus, process as long as merus proper, its margins strongly spined. Carpus proper $\frac{1}{2}$ basos length, process extending $\frac{1}{4}$ along propod, anterior margins of carpus and propod strongly spined; carpus posterior margin free, process inner margins strongly spined, several spines at process end. Propod as long as carpus proper, a few setae on finely toothed posterior margin. Dactylos inner margin proximally toothed, length $\frac{1}{2}$ propod.

PERAEOPODS. *First*: (Male.) Merus less than $\frac{1}{2}$ carpus length, about 3 fine spines on posterior margin, as wide distally as long. Carpus margins strongly convex, widest a little before midpoint, width $\frac{1}{2}$ length, a few fine setae anteriorly, fine spines on posterior surface and margin, comb of fine teeth on posterior margin. Propod as long as carpus, width about $\frac{1}{5}$ length, about 8 small spines on surface, posterior margin finely toothed, dactylos $\frac{1}{2}$ propod length (Female.) Propod slightly more than $\frac{1}{2}$ carpus, carpus widest proximally, fine bristles on carpus and propod surfaces. Dactylos not $\frac{1}{2}$ propod length, carpus width more than $\frac{1}{2}$ length. *Second*· (Male.) Not greatly different from Pr. 1, male. (Female.) Like male, carpus width $\frac{1}{2}$ length, propod as long as carpus.

UROSOME. Outer rami inner margins and inner rami outer margins finely toothed. Uropod 2 has these margins excavate and proximally bristled; peduncle and inner margin of uropod 3 inner ramus, smooth. *First*: Peduncle, inner ramus and outer ramus in ratio 5:4:3. *Second*: Ratio 3:3·2 *Third* Ratio approximately 4:3:2 Telson reaching about $\frac{1}{4}$ along peduncle of uropod 3.

The dorsum is strongly spined in specimens from about 12 mm. upwards. In *P. gracilipes*, specimens of 9 mm. and 11 mm. show very slight signs of dorsal spination.

HYPOTYPES. Slides L.6, male; L.7, female.

LOCALITIES.

Station	Male.	Female.	Sizes. mm.	Station	Male.	Female.	Sizes mm.
208/51	6	40	8.0–15.3	2/51		1	6.0
103/51	1		8.0	124/51		1	10 0
125/51	1		8.7	191/51		17	6.5– 9.5
279/51	5	32	6.7–18.3	171/51		2	6.5– 7.5
175/51	2	2	7.5– 8.8	210/51	8	80	7.3–12.5
187/51	1	12	6.3–10.1	188/51		224	6.5–14.1
189/51		80	7 1–14.1	198/51		1	9.5
206/51	1	8	7.0–10.3	292/51		1	9.4
308/51	92	284	8.0–16.6	310/51		5	9.0
330/51		3	6.3– 9.5	337/51		1	9.0
342/51	2	5	7.0–14 2	921/51		8	2.5– 6.5

The largest specimen, 18 3 mm., was a female.

DISTRIBUTION. Southern Atlantic (35°–68° S.); Northern Atlantic (40°–76° N.); Australasian region (48°–63° S.); Southern Indian Ocean (40°–50° S.).

DISCUSSION

It is evident from its New Zealand distribution that this species is here a cold deep water one. It is taken in considerable numbers off the New Zealand coast south of the convergence.

The inner ramus of uropod 3 shows no sign of pectination whatsoever. Confusion between *P. gaudichaudii* and *P. gracilipes* arises with females and immature forms of *P. gracilipes* where it cannot be certain that serration is present. However, plots of the distribution of these two forms show that they frequent quite different water-masses and show different diurnal movement.

Parathemisto (Euthemisto) australis (Stebbing), 1888. (Figs. 175, 177, 179–187.)

Stebbing, 1888: 1417.
Barnard, 1930: 421.

Diagnostic Features

No dorsal spination. Gnathopod 2 like *P. gracilipes*. Peraeopod 1, male, carpus widest distally, almost subtriangular; width $\frac{4}{5}$ length, a few strong spines on surface; merus and carpus strongly bristled on posterior margin and surface; carpus 7/10 propod. Pr. 2, male, carpus more linear than ovate; width $\frac{1}{2}$ length, bristled especially proximally on surface, about 4 strong spines. Propod of Pr. 3 only slightly longer than in Pr. 5. Uropod 2 outer ramus about $\frac{1}{2}$ inner. Uropod 3 outer ramus $\frac{3}{4}$ length inner; width-length ratio of peduncle 21:60; inner ramus inner margin pectinate; peduncle inner margin distally serrulate. Peraeopod 1, female, oblong carpus widest medio-distally; width not $\frac{1}{2}$ length; 6 or 7 spines on surface, 5 marginally; a very few bristles. Pr. 2, female, about 2 surface spines. Head anterior and posterior margins subparallel; slightly produced above insertion of antennae. Pleon to total body length ratio is 1:3 8

Description (*Subsidiary details*).

Male: length, $9\frac{3}{4}$ mm.; depth, 2 mm.; width, 2 mm. Female: length, $9\frac{1}{2}$ mm.; depth, $2\frac{1}{4}$ mm.; width, $2\frac{3}{4}$ mm.

ANTENNAE. *First*: Male, reaching $\frac{1}{2}$ along antenna 2 flagellum, length $3\frac{1}{4}$ mm.; female, length 1 mm. *Second*: Male, length 4 mm.; female, length $1\frac{1}{2}$ mm.

GNATHOPODS. *Second*: Male, merus a little more than $\frac{1}{2}$ carpus length, carpus width $\frac{2}{5}$ length, oblong-ovate, about 4 spines on posterior margin, 8 or so on surface in straight line; propod barely shorter than carpus; dactylos $\frac{1}{2}$ propod Female, carpus oblong-ovate, width $\frac{2}{5}$ length, about 5 spines on anterior margin, 3 or so on surface, a fine comb of short teeth.

PERAEOPODS. *Third*: Merus $\frac{1}{2}$ basos length, carpus as long as basos. *Fifth*: Male, merus anterior margin $\frac{3}{4}$ carpus length; about 4 long spines on anterior surface. Carpus almost $\frac{3}{4}$ propod, about 8 strong spines on anterior surface Propod has about 6 spines in line along surface, no comb on posterior margin, dactylos a little more than $\frac{1}{3}$ propod.

UROSOME. Male, outer rami with inner margin coarsely pectinate, inner rami with outer margin pectinate; 3rd uropod inner ramus coarsely pectinate and peduncle inner margin likewise pectinate distally. Uropod 1 peduncle, inner ramus and outer ramus in ratio 6·5:3. Uropod 2 ratios 2:2:1. Uropod 3 ratios 6:4:3. Peduncle of uropods 2 and 3 with inner distal angle produced downwards a little in sharp tooth. Telson reaching about $\frac{1}{3}$ along uropod 3 peduncle.

HYPOTYPES. Slides L.10, female (Station 124/51); L.11, male (Station 292/51).

LOCALITIES.

Station.	Male.	Female.	Sizes. mm.	Station.	Male.	Female.	Sizes. mm.
208/51		1	10.1	83/51	12	1	6.0– 8.9
75/51	4	5	5.0– 7.6	100/51		8	7.5
107/51	1		8.5	128/51	1	2	7.4– 8.4
130/51	1	2	6.0– 9.5	135/51		1	8.8
5/51	1			124/51		6	6 0– 9 0
125/51	1	6	5.0– 8 8	279/51		12	5 0– 9.4
138/51	1		7.8	178/51	1	5	4.5– 7.5
187/51		1	6.3	189/51		40	4.9– 9.0
292/51	1		8.0	78/51			2 juv
81/51	2			308/51	16	8	7.0– 9.8
310/51	7	8	4.9– 8.0	322/51	1	1	7.2– 7 5

DISTRIBUTION. S.W. of Melbourne (39° 45′ S. 140° 40′ E); Bass Strait; Foveaux Strait, New Zealand.

DISCUSSION

In view of evidence from New Zealand, it seems possible that Barnard's records of *P. australis* from S.W. of Melbourne and Bass Strait may represent not a warm-water fauna, but strays from below the subantarctic convergence. Their distribution around New Zealand suggests that they inhabit mainly coastal waters, and show a tendency to congregate in the 50–100 fathom zone south of the convergence.

The question of their distinctness from *P. gracilipes* has already been fairly fully discussed. There is no doubt about the extremely marked serration of the uropods and peduncle; the difficulty about using Barnard's key is not the distinctness of *P. australis* serration, but in deciding whether or not *P. gracilipes* is serrated.

Family PHRONIMIDAE

Dana, 1852: 315.
Chevreux & Fage, 1925· 392
Pirlot, 1929: 108.

" Head conical, deeper than long; eyes strongly developed; antenna 1 very short with 2 segments in the female, more strongly developed in the male where the first segment of the flagellum is dilated; antenna 2 rudimentary or absent in the female and sometimes in the male, but often very slender and greatly elongated in the latter; mandible without palp, moral process finely serrulate; maxilliped outer plate finely serrulate along the inner margin and much greater than fused inner plates; coxal plates indistinct; peraeopods 1–5 ambulatory except 3rd which has end segments transformed into a claw or a prehensile grasping organ; gills on segments 4–6; brood-plates on segments 2–5."

(Translated from Chevreux & Fage.)

Two genera and three species are known from New Zealand waters.

KEY TO NEW ZEALAND GENERA OF PHRONIMIDAE
(After Chevreux & Fage, 1925.)

1. Body more or less elongated; the first 2 segments of peraeon free; legs relatively short; end segments of peraeopod 3 form a perfect subchelate hand; uropod 2 well-developed .. *Phronima* Latreille, 1802.
   Body slender; first 2 peraeon segments fused; legs greatly elongated; end segments of peraeopod 3 imperfectly subchelate; uropod 2 absent or rudimentary . . .. *Phronimella* Claus, 1871

Genus PHRONIMA Latreille, 1802.

Latreille, 1802: 38.
Chevreux & Fage, 1925: 392.

"First 2 body segments shorter and deeper than the following ones; maxilla 1 inner lobe finely serrated; all uropods are well-developed with 2 articulated rami."
(Translated from Chevreux & Fage.)

KEY TO NEW ZEALAND SPECIES OF PHRONIMA
(After Stephensen, 1924.)

1.	Males	2
	Females	3
2.	Antenna 2 rudimentary	*P. sedentaria* (Forsk.), 1775
	Antenna 2 well-developed	*P. atlantica* Guér., 1836
3.	First pleon segment about as long as 7th peraeon segment	*P. sedentaria* (Forsk.), 1775
	First pleon segment distinctly shorter than 7th peraeon segment (often only ¾ as long)	*P. atlantica* Guér., 1836

Phronima sedentaria (Forsk.) 1775 (Figs. 188–218)

Cancer sedentarius Forskal, 1775: xxi and 95.
Phronima sedentaria Chilton, 1921: 233. Pirlot, 1929: 110. Barnard, 1930: 422.
Phronima novae-zealandiae L. Powell, 1874: 21, Figs. 1-2. Chilton, 1911 308-309 Chilton, 1912: 131. A. W. B. Powell, 1947: 36, Fig. 178.

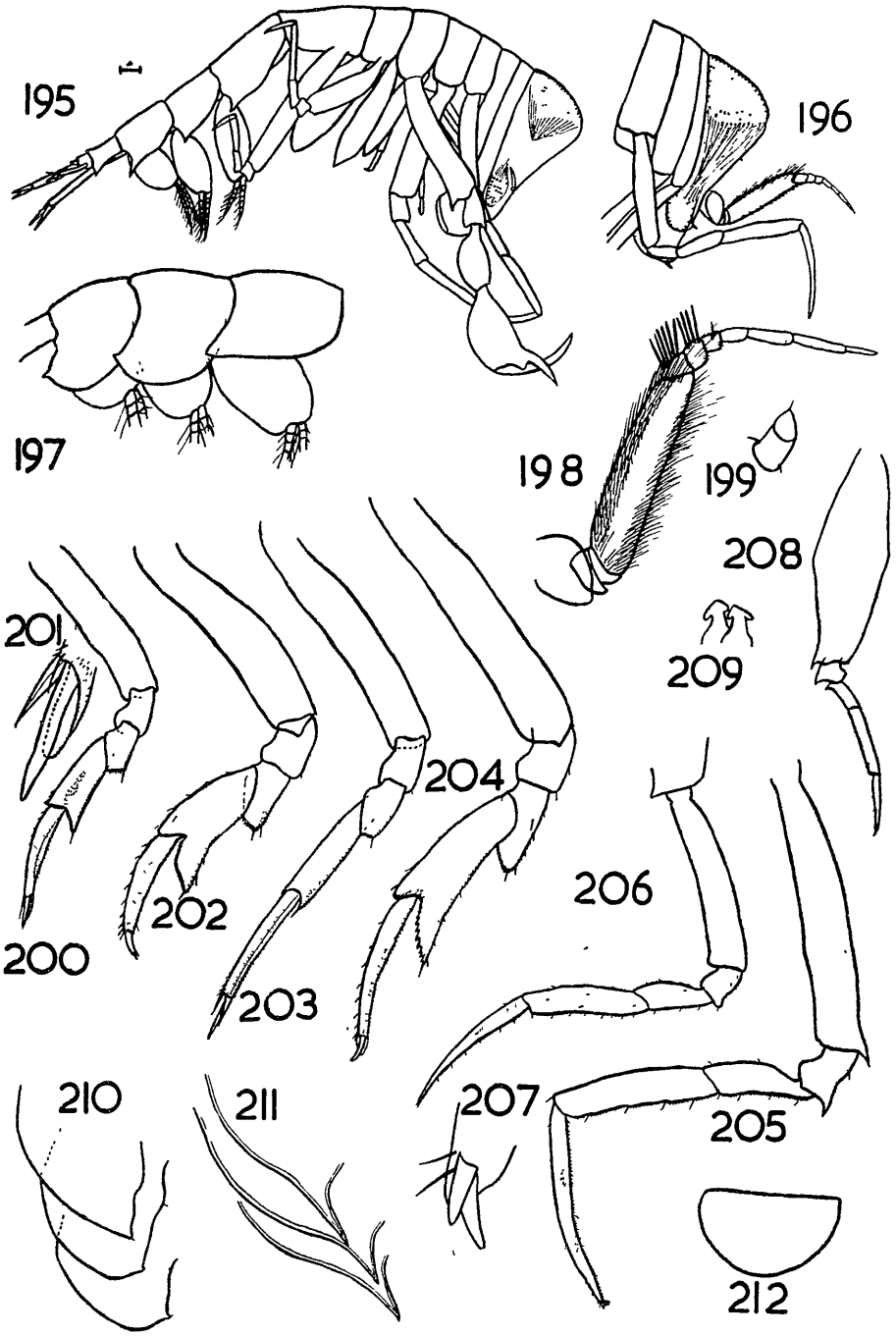
Description of Female

Length, 24 mm.; depth, 4 mm.; width, 7 mm. Transparent in formalin. Ovigerous. First pleon segment only slightly shorter than last peraeon segment; head as deep as 1st 6 peraeon segments are long; 3rd peraeopod much the longest; 7th peraeon segment nearly equal to 4th, 5th and 6th; 1st 2 peraeon segments much deeper than rest. Ocelli somewhat localised dorsally and ventrally on head

ANTENNAE. *First*: Length 1 mm. Of 2 segments, 1st ovate with a few small setose spines; 2nd nearly 3 times as long, fringed with long flaccid sensory setae inferiorly. *Second*: Absent.

MOUTHPARTS. *Lower Lip*: Inner lobes practically absent. Outer lobes and long connecting bar finely bristled. *First Maxillae*: Outer plate much longer than inner, outer margin finely toothed, inner margin with small setae, a stout end tooth. Inner plate ovate, tending to spoon-shaped, both margins with strong incised teeth, inner with a strong tract of fine bristles; tract of fine setae at base on outer margin. *Second Maxillae*: Outer plate barely longer than inner, both distally and marginally setose; a 3rd and median small distally setose lobe extending ½ along inner lobe. *Mandibles*: Cutting edge of 1 or 2 distal teeth; molar process strong, plate-like, with strongly toothed and bristled surface; a short tract of strong fine seta-like teeth on outer mandible margin. *Maxilliped*: Outer plates long, narrow, subtriangular; inner margins with strong teeth and a few setae; distal outer surface minutely toothed. Median plate subtriangular, reaching about ⅓ along outer plates.

GNATHOPODS. *First*: Basos slender, width less than ¼ length. Ischium more than ¼ basos, 2 or 3 setae posteriorly. Merus as long as ischium, anterior margin mostly oblique, contiguous with carpus proximal margin; free distal margin and distal ½ of posterior margin toothed; posterodistal angle right-angled, with setae; convex carpus anterior margin ½ basos length, with a few setae; posterior surface distally produced as triangular lobe about ½ along propod, posterior margin



TEXT-FIG. 12.—*Phronima sedentaria* (Forsk.). 195—Adult female. 196—Head of ♂, length 9 mm. 197—Pleon segments, ♂. 198—Antenna 1, ♂. 199—Antenna 2, ♂ 200—Gnathopod 1. ♂. 201—Gnathopod 1, ♂, dactylos. 202—Gnathopod 1, ♀ 203—Gnathopod 2, ♂. 204—Gnathopod 2, ♀. 205—Peraeopod 1, ♂. 206—Peraeopod 1. ♀. 207—Peraeopod 1, ♀, dactylos. 208—Peraeopod 5, ♂. 209—Pleopod coupling spines, 210—Epimeral plates, ♂. 211—Epimeral plates, ♀. 212—Telson, ♀.

slightly concave and finely toothed; end margin with strong teeth, acute posterodistal angle; free distal margin convex, tending to sigmoid; carpus greatest width $\frac{1}{2}$ length anterior margin. Propod slender, slightly shorter than carpus anterior margin, width about $\frac{1}{4}$ length, narrowing to dactylos; anterior margin has several setae, posterior margin toothed, surface has tracts of minute teeth. Stubby dactylos less than $\frac{1}{3}$ propod length, apparently distally bifurcate. *Second*: Basos width $\frac{1}{5}$ length, linear. Ischium nearly $\frac{1}{4}$ basos length, posterior margin has a few setae. Merus and carpus as before but comparatively longer and narrower; merus posterodistal angle less than 90°; total merus length nearly $\frac{1}{3}$ basos. Carpus greatest width $\frac{2}{5}$ length anterior margin; anterior margin slightly longer than $\frac{1}{2}$ basos; posterodistal angle not reaching $\frac{1}{2}$ along propod. Propod barely shorter than carpus anterior margin, greatest width about $\frac{1}{6}$ length; anterior margin with setae, surface minutely toothed, posterior margin toothed. Dactylos about $\frac{1}{5}$ length, partially surrounded by spoon-like sheath with fimbriated margins.

Peraeopods. *First*: Basos width about $\frac{1}{5}$ length. Ischium less than $\frac{1}{4}$ basos; posterior margin and surface with a few setae. Merus about $\frac{2}{5}$ basos length, width $\frac{2}{5}$ length, anterior margin convex, posterior straight, minutely toothed; margins and surface with a few fine setae. Carpus $\frac{2}{3}$ surface, with scattered fine setae; posterior margin has fine comb of short teeth. Propod slender, somewhat dactylos-like, $\frac{4}{5}$ basos length, tapering to 2 short strong spines; posterior margin finely toothed; margins and surface with scattered setae; surface has median tract of minute teeth. *Third*: Chelate. Basos greatest width between $\frac{1}{3}$ and $\frac{1}{4}$ length; posterodistally produced to short narrow spur-like process, scattered fine marginal setae. Ischium globose, greatest length slightly more than $\frac{1}{4}$ basos; anterodistal angle produced downwards in short thumb. Merus globose, with narrow proximal neck, posterior margin more strongly convex than anterior, greatest width $\frac{1}{2}$ length, length more than $\frac{2}{5}$ basos. Carpus greatly expanded, ovate, short slender neck proximally, expanded so greatest width distally is subequal with merus length; anterior margin proximally almost straight, posterior margin convex; anterodistally produced to long finger increasing length $\frac{1}{2}$ as much again so total length subequal with basos; end margin forming concave palm with smaller median tooth regularly fringed with single setae. Propod closing against palm and reaching well past long finger, inner margin has median tooth fringed with setae, total propod length $\frac{3}{4}$ basos; terminally a short spine-like dactylos. A few scattered setae on all segments but most numerous on carpal processes and propod. *Fourth*: Ischium $\frac{1}{8}$ basos length; merus $\frac{1}{4}$ basos, carpus more than $\frac{1}{2}$ basos; propod $\frac{1}{3}$ basos; otherwise like 5th. *Fifth*: Width of basos about $\frac{1}{8}$ length; anterodistal angle produced as short spur. Ischium total length about 1/12 basos; anterior margin produced a little as squarish flange with distinct angles. Merus $\frac{1}{8}$ basos length, subrectangular, width $\frac{1}{2}$ length, anteroproximal angle produced a little, acute. Carpus as wide, length $\frac{1}{4}$ basos, subrectangular Propod $\frac{1}{5}$ basos length, width $\frac{1}{8}$ length, tapering. Dactylos minute, spine-like, with sheath.

Pleopods. Normal. Rami and peduncle subequal.

Epimeral Plates. Shallow, ventral margins somewhat sigmoid, posterodistal angles produced as long, slender, backwardly directed processes, posterior margin concave.

Uropods. Long, slender, peduncles much longer than rami; tips of rami of 1st reaching as far as those of 3rd; 2nd with tips reaching to end of peduncle of

1st. Rami lanceolate, outer margins smooth, inner margins of outer rami and outer margins of inner rami convex, finely pectinate. *First*: Peduncle, rami in ratio 13:6. *Second*: Peduncle, rami in ratio 2:1. *Third*: Peduncle, rami in ratio 11:5. *Telson*: Small, regularly convex, barely reaching past base of uropod 3 peduncle.

DESCRIPTION OF MALE

This specimen is the largest in the Lachlan and Canterbury Museum Collections. It is not fully mature, but does not differ significantly from other described males except perhaps in the degree of development of the gnathopod carpal processes.

Transparent in formalin. Length, 9 mm.; depth, 1 mm.; width, 2 mm.

ANTENNAE. *First*: Length, 1½ mm. Flagellum of 8 segments, 1st stout, long, inferior and superior surfaces with extensive tracts of long setae; inferodistal angle produced somewhat forward; 2nd, 3rd and 4th segments small with long flaccid sensory setae superiorly, inferodistal angles bristled; other segments long and slender with a few surface setae; 1st as long as rest of flagellum. Peduncle small. *Second*: Rudimentary, of 2 segments, 2nd with a terminal seta.

GNATHOPODS. *First*: As in female but posterodistal angle of carpus not produced as much; dactylos a long stout spine accompanied by smaller spine-like process and partially surrounded by sheath-like process with toothed margins. *Second:* As in female but merus as in Gn. 1, male; carpus posterodistal angle barely produced and only as short, slender, minutely toothed process, not widening to any appreciable degree distally. Dactylos as in Gn. 1.

PERAEOPODS. *First and Second*: Posterodistal angles of basos and ischium produced downwards in sharp spur. *Third*: Basos greatest width ¼ length; distal angles produced in short, sharp processes. Ischium ¼ basos; anterodistal angle produced in sharp spur. Merus globose, neck proximally constricted; greatest length nearly ⅓ basos; anterior margin concave, posterior convex. Carpus subtriangular, length about ½ basos and width distally ¾ length; anterior margin concave and posterior strongly convex; anterodistal angle a short, sharp tooth, distal margin then strongly excavated to 2 smaller median teeth; small excavation between them also; margins with several setae. Propod with scattered marginal bristles; acting as dactylos and greatly overlapping horizontal carpus palmar margin; curved, as long as carpus posterior margin; small nail-like terminal dactylos. *Fourth and Fifth*: As in female but anterodistal angle of basos, ischium and anteroproximal angle of merus produced forwards in sharp spur-like processes; basos of 5th strongly expanded medially, longer than remaining segments; basos of 4th as long as merus, ischium and carpus combined.

EPIMERAL PLATES. Somewhat ovate, deeper than in female; anterior margin rounding broadly to convex ventral margins; posterodistal angle sharp with small seta, produced backwards a fraction in 2nd and 3rd; posterior margin slightly concave and irregular.

HYPOTYPES. Slides L.27, female, Station 326/51; L.30, male, Station 206/51.

LOCALITIES. *Lachlan Station*: 82/51, 1 ♀, 18 mm.; 206/51B, 2 ♂ ♂, 6½–9 mm.; 279/51, 2 ♂ ♂, 9½–7 mm.; 1 ♀, 13 mm.; 214/51 H, 1 ♂, 7 mm.

Canterbury Museum Material

1. Oamaru, coll. C. Barham Morris. 4 ♀ ♀ in tests.
2. Dunedin (*Phronima novae-zealandiae*) 2 ♀ ♀ in tests.

3. Stewart Island, "Nora Niven" (*Phronima novae-zealandiae*) numerous juveniles and 2 ♀ ♀ in tests.
4. Puysegur Point, R. Speight, Feb., 1920 (*Phronima novae-zealandiae*).
5. *Phronima* collected by Miss Ritchie about 1890, Chatham Islands. 9 ♀ ♀.

DISTRIBUTION. Mediterranean; North and South Atlantic, 60° N.–36° S.; Indo-Pacific.

DISCUSSION

Barnard (1930) records both *P. sedentaria* and *P. atlantica* from New Zealand waters, whereas previously only *P. sedentaria* had been known from this region. According to Chilton (1921) specimens in their gelatinous "salp-houses" are frequently washed up on the shore. The Lachlan material contains few males, and what there are are mostly immature—one gathers from the literature that males are not common.

It should perhaps be pointed out that, at first glance, and particularly in reference to the 3rd peraeopod, the males of *P. sedentaria* are much closer to the males and females of *P. atlantica* than to the female of *P. sedentaria*.

Genus PHRONIMELLA Claus, 1871.

Claus, 1871: 149.
Bovallius, 1889: 386.
Pirlot, 1929. 116.
Barnard, 1930· 423

"Body elongated, transparent; head deep, narrow and conical. Thorax compressed, 1st 2 segments of peraeon fused. Third pair of peraeopods subchelate. Three pairs of gills (on segments 4, 5, 6). Second pair of uropods reduced in the male, disappearing in the female." (Translated from Pirlot.)

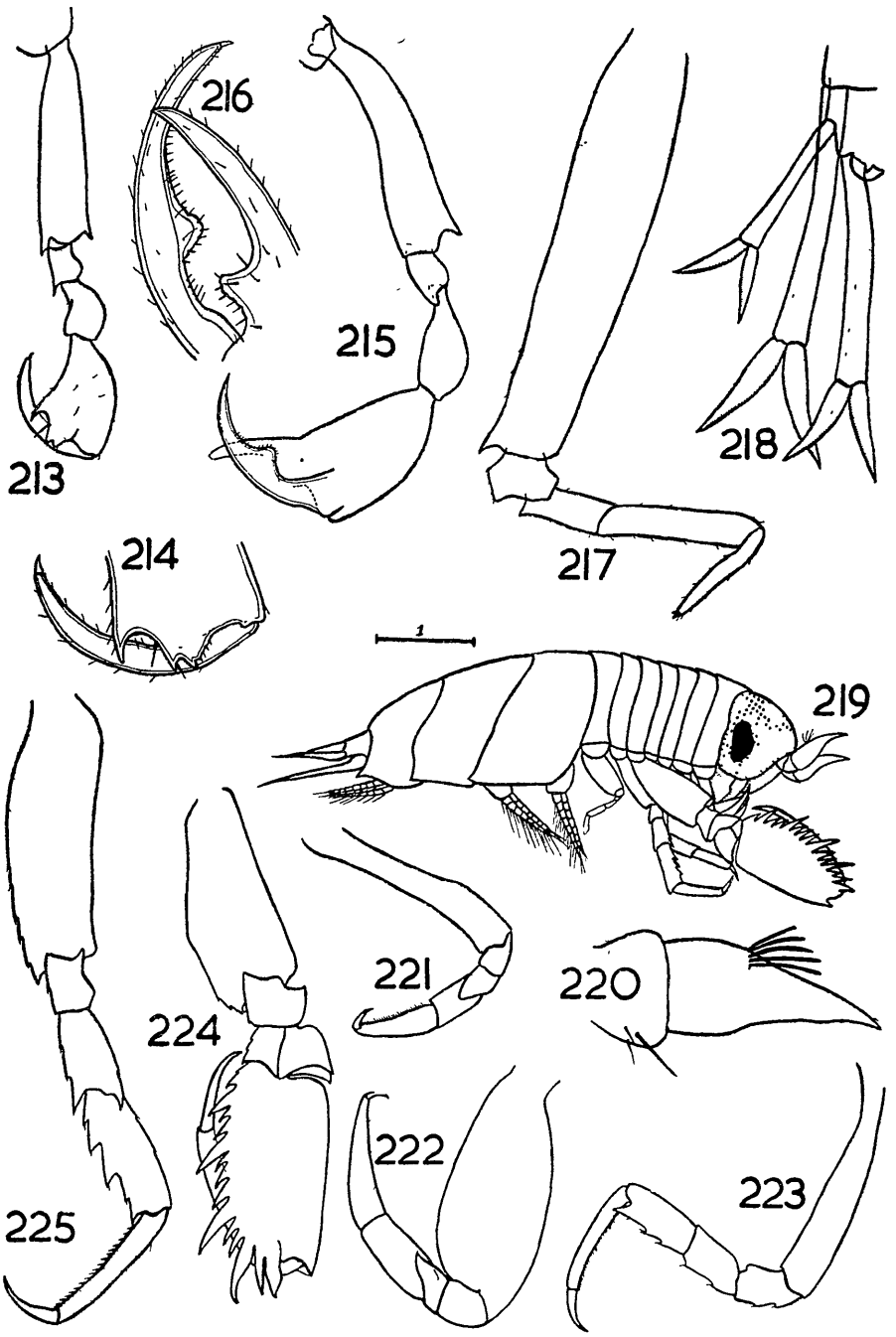
Barnard records one species, *Phronimella elongata*.

Family PHROSINIDAE

Phrosinidae Bovallius, 1889: 396 (key to genera).
Chevreux and Fage, 1925: 412.
Spandl, 1927: 167 (key to genera).
Barnard, 1932· 287.
Anchylomeridae Shoemaker, 1945: 234.

"The head is large, tumid, more or less globose. The eyes are large. The first pair of antennae are straight, fixed on the front side of the head; the first joint of the flagellum is thick and elongated; the following are more or less numerous in the male and filiform, in the female they are wanting. The second pair of antennae in the male are long and filiform, fixed on the front side of the head, in the female they are obsolete. The mouth-organs are adapted for mastication; the mandibles in the male are furnished with a palp, in the female without a palp. The four middle pairs of peraeopods, or only the fifth pair, are prehensile; the seventh pair are more or less transformed or reduced. The uropoda want distinct rami." —Bovallius.

Barnard records three genera of one species each from New Zealand waters. One of these three was present in the Lachlan Collections. Chilton (1921) records one specimen of *Primno macropa* washed up on Ocean Beach, Dunedin; and remarks that Stebbing (1888) also recorded it from the neighbourhood of New Zealand as *Primno latreillei*. The species and genera are widely distributed.



TEXT-FIG. 12.—*Phronima sedentaria* (Forsk.) 213—Peraeopod 3, ♂. 214—Peraeopod 3, ♂, palm and dactylos. 215—Peraeopod 3, ♀. 216—Peraeopod 3, ♀, palm and dactylos. 217—Peraeopod 4, ♂. 218—Uropods and telson. *Phronia macropa* Guér. Female. 219—Adult. 220—Antenna 1. 221—Gnathopod 1. 222—Gnathopod 2. 223—Peraeopod 1. 224—Peraeopod 3. 225—Peraeopod 4.

Key to New Zealand Genera of Phrosinidae
(After Spandl and Bovallius.)

1. Gn. 1 and 2 and Pr. 1 and 2 simple not prehensile; Pr. 3 has a folding hand; Pr. 4 and 5 simple; Pr. 5 dactylos transformed, occasionally dactylos absent	*Primno* Guérin, 1836
Gn. 1 and 2 simple; Pr. 1, 2 and 3 subcheliform; Pr. 4 with folding hand; Pr. 5 only exceptionally in the male has 7 segments, in the female only the 2nd (and sometimes the 3rd) segment present	*Anchylomera* M.-Edw., 1830. .
Gn. 1 and 2 simple; Pr. 1, 2 and 3 more or less subchelifoim; Pr. 5 has only the 2nd segment present	*Phrosina* Risso, 1822.

Genus Primno Guér., 1836

Primno Guérin, 1836: 2.
Barnard, 1930: 424.
Euprimno Bovallius, 1889: 397.
Chevreux & Fage, 1925: 415.
Pirlot, 1929: 129.

"Gnathopods 1 and 2 and peraeopods 1 and 2 simple. Peraeopod 3 chelate. Peraeopods 4 and 5 simple, dactylos of peraeopod 5 modified."

(Translated from Pirlot.)

Primno macropa Guér., 1836. (Figs. 219–235)

Euprimno macropus Bovallius, 1889: 400–407, Pl. xvii, Fig. 23–40; Pl. xviii, Figs. 1–2. Chilton, 1921: 234. Chevreux & Fage, 1925: 416, Fig. 411. Pirlot, 1929: 130
Primno macropa Monod, 1926: 50, Fig. 49. Barnard, 1930: 424–425. Barnard, 1932. 287–288.

Description of Female

Length, 5 mm.; depth, ¾ mm.; width, 1¼ mm.

Antennae. *First*: Of 2 segments; 1st ½ length 2nd, a few slender setae inferiorly; 2nd proximally wide, tapering acutely; superior margin has about 5 long flaccid sensory setae in the middle. *Second*: Rudimentary, of 1 segment.

Mouthparts. *Lower Lip*: Inner lobes very small, outer large, distally bristled. *First Maxillae*: Outer plate the longer, distal and outer margin with small teeth, inner plate has about 4 strong teeth distally, smaller ones continued down both margins; setae proximally on inner margin. *Second Maxillae*: Inner lobe slightly the shorter; both tolerably long and narrow, distally and marginally bristled. *Maxilliped*: Inner plate a rudimentary lobe; outer plate shorter than peduncle, proximal width about ⅓ length, not narrowing greatly, distally rounded, a few setae on margins and end. *Mandibles*: Palp lost in dissection. Cutting edge a squarish plate with numerous small incisions distally, molar process strongly bristled.

Gnathopods. *First*: Basos width about ⅛ length, tending to be narrowest medially. Ischium barely longer than basos is wide. Merus produced ½ along carpus distally in triangular process; total merus length barely more than ischium. Carpus length ¼ basos, width ½ length, margins parallel. Propod ⅔ basos length, narrowing to slender dactylos, fringe of small bristles anteriorly; dactylos at least ⅓ propod length with 1, if not 2, terminal nails. *Second*: Basos ovate, glandular, margins convex, medial width nearly ½ length. Merus short, triangularly produced about ⅖ along carpus, total length twice width, margins parallel. Propod ½ basos length, narrowing to small dactylos, 2 or 3 marginal bristles; dactylos at least ⅕ propod length.

Peraeopods. *First*: Basos like Gn. 1, width ⅓ length Ischium slightly less than ⅓ basos in length, posterior margin has 2 seta-tipped serrations. Merus

subequal with ischium, posterior margin similar. Carpus width $\frac{2}{5}$ length, length $\frac{1}{3}$ basos, posterior margin has 2 seta-tipped serrations, posterodistal angle produced in pronounced acute tooth. Propod $\frac{1}{2}$ basos length, slender, linear, posterior margin fringed with small bristles. Dactylos $\frac{2}{5}$ propod length. *Third*: Basos narrowing proximally, posterior margin straight; anterior has 2 small serrations proximally, greatest width nearly $\frac{1}{2}$ length. Ischium length about $\frac{1}{4}$ basos, posterior margin produced as flange, slightly wider than long, anterior has 1 or 2 small serrations. Merus somewhat m-shaped, width nearly twice length and nearly $\frac{1}{2}$ basos length; anterior margin has 2 or 3 small serrations, anterodistal angle a sharp tooth; posterior surface a proximally rounded and distally concave flange, posterodistally acute. Carpus ovate, as long as basos, greatly expanded, greatest width more than $\frac{1}{2}$ length, posterior margin straight, posterodistal angle acute; anterior strongly serrated with about 14 (Bovallius, 10–18) short and long seta-tipped teeth. Propod slender, reaches $\frac{3}{5}$ along carpus anterior margin, width about $\frac{1}{8}$ length. Slender dactylos about $\frac{1}{2}$ propod length. *Fourth*: Basos width nearly $\frac{1}{3}$ length, anterior margin has about 5 small serrations, anterodistal angle sharp. Ischium nearly $\frac{1}{4}$ basos length, minute serrations anteriorly. Merus a little constricted proximally, width $\frac{1}{2}$ length, total length $\frac{1}{3}$ basos; both distal angles strongly produced downwards in sharp teeth, each margin has 1 or 2 fine serrations. Carpus $\frac{1}{2}$ basos length; greatest width $\frac{2}{5}$ length; posterior margin has 2 or 3 fine serrations; anterior about 5 strong teeth, including sharp distal angle; anterodistal surface minutely toothed. Propod linear, slightly more than $\frac{1}{2}$ basos length, width $\frac{1}{8}$ length; anterior margin has comb of fine teeth; anterior and posterior surfaces with minute teeth. Dactylos nearly $\frac{1}{2}$ propod length. *Fifth*: Basos posterior margin slightly concave, anterior strongly convex, finely and inversely crenulate, greatest width $\frac{1}{2}$ length. Carpus width about $\frac{1}{3}$ length, barely shorter than propod, which is $\frac{1}{3}$ basos. Dactylos $\frac{3}{4}$ propod length, widening slightly distally to obliquely truncate end margin; propod and dactylos end margins fringed with fine bristles.

EPIMERAL PLATES. Subrectangular, 1st and 2nd have rounded anterodistal angles, posterodistal angle almost right-angled, sharp; posterior margin sigmoid; 1st wider than deep, 2nd deeper than wide and smaller; 3rd much the smallest, anterodistal angle rounded, posterodistal sharp, both lateral margins straight, parallel, slightly oblique.

PLEOPODS. Biramous, normal.

UROPODS. Vary with age. One-segmented. *First:* Somewhate lanceolate, reaching almost as far as 3rd; greatest width nearly $\frac{1}{4}$ length; outer margin finely toothed throughout; inner finely toothed for distal $\frac{1}{3}$; apically acute with small secondary apex on inner margin. *Second*: Reaching as far as 1st, lanceolate, outer margin has 4 or 5 fine seta-tipped serrations, both margins very finely toothed distally, rest of inner margin smooth; apically acute; outer margin convex, greatest width $\frac{1}{3}$ length, proximally very narrow. *Third*: Almost subrectangular, width $\frac{2}{5}$ length; outer margin has about 4 fine serrations, distal margin finely toothed and medially produced to broad point, inner smooth. *Telson*: Subtriangular, wider than long, about $\frac{1}{5}$ length uropod 3.

Description of Male

Very like female. *First Antennae*: Of 3 segments; 1st with several long, fine setae inferiorly; 2nd twice length 1st, width $\frac{1}{3}$ length, surface has several long,

flaccid, sensory setae; 3rd tapering, slender, nearly twice length 2nd, a few bristles superiorly.

HYPOTYPES. Slides L.26, male (Station 75/51); Slides L.25, female (Station 74/51).

LOCALITIES. Station 74/51, 1 ♀; 75/51, 1 ♂, 9½ mm., 1 ♀, 5½ mm. (both damaged).

DISTRIBUTION. Mediterranean; Atlantic, 47° N.–36° S.; Indian and North and South Pacific Oceans; Antarctic, 58°–66° S., 85°–89° E.

DISCUSSION

The above specimens agree closely with previously described ones, although all seem somewhat immature. The female antennae are like those figured by Monod (1926).

Genus PHROSINA Risso, 1822.

Risso, 1822. 244.
Bovallius, 1889: 421.
Pirlot, 1929: 132.

" Gnathopods 1 and 2 simple; peraeopods 1, 2, 3 and 4 more or less subchelate; peraeopod 5 reduced to basos." (Translated from Pirlot.)

Barnard records only *Phrosina semilunata*.

Genus ANCHYLOMERA M-Edw., 1830.

Milne-Edwards, 1830. 394
Bovallius, 1889: 408.
Pirlot, 1929: 131.

" Gnathopods 1 and 2 simple; peraeopods 1, 2 and 3 subchelate, peraeopod 4 chelate, peraeopod 5 simple with a modified dactylos." (Translated from Pirlot)

Barnard records one species, *Anchylomera blossevillei*.

Family PRONOIDAE

Claus, 1879: 168 (22).
Stephensen, 1925: 155.
Chevreux and Fage, 1925: 425.
Spandl, 1927: 216.
Barnard, 1930: 426.

" Body more or less compressed; head globular or produced slightly forward; eyes occupying the greater part of the head; 1st flagellar segment of antenna 1 dilated, the others subterminal; antenna 2 slender; folded in a zig-zagging manner (male) or a little inwardly curved (female); mandibles with a 3-segmented palp; coxal plates distinct; basos in Pr. 3 and 4 enlarged but not transformed into an operculum; Pr. 5 basos the only segment normally developed, gills on segments 2–6, simple or lobed; uropods biramous."

(Translated from Chevreux and Fage.)

Barnard (1930) records 3 genera and 4 species of this family from New Zealand waters. The Lachlan material contained one species, *Paralycaea gracilis*.

KEY TO NEW ZEALAND GENERA OF PRONOIDAE

(Compiled from Pirlot, 1929.)

1 Gn 1 and 2 simple, Pr. 3 greatly elongated; Pr. 5 rudimentary . . *Paralycaea* Claus, 1879.
Gn. 2 chelate, complex; double urosome segment (5th and 6th abdominal) relatively short; uropod rami very long and large . . . . . *Eupronoe* Claus, 1879.

Gn. 1 simple; Gn. 2 chelate, complex; double urosome segment (5th and 6th abdominal) elongated; peduncle of uropods very short, rami lanceolate .. . *Parapronoe* Claus, 1879.

Genus EUPRONOE Claus, 1879.

Claus, 1879: 172 (26).
Pirlot, 1929: 147.
Barnard, 1930: 426.

" Gnathopod 1 subchelate, complex. Gnathopod 2 chelate, complex. Double urosome segment (5th and 6th abdominal) relatively short. Uropod rami laminar, very long and very large." (Translated from Pirlot.)

KEY TO NEW ZEALAND SPECIES OF EUPRONOE

1. Gn. 1 carpus distally widened, as wide as propod is long and forming with it a subchelate appendage; Gn. 2 strongly chelate, carpal process longer than propod, lightly toothed, under margin of carpus concave; telson terminally sharp .. .. *E. maculata* Claus, 1879.
   Gn. 1 carpus distally not as wide as propod is long; Gn. 2 chelate, with strongly toothed carpal process, under margin of carpus convex; telson distally not sharp, almost reaching middle of uropod 3 .. .. *E. minuta* Claus, 1879.

Genus PARAPRONOE Claus, 1879.

Claus, 1879: 175 (29).
Pirlot, 1929: 149.
Barnard, 1930: 427.

" Gnathopod 1 simple. Gnathopod 2 chelate, complex Double urosome segments (5th and 6th abdominal) elongated. Peduncle of uropods very short, rami lanceolate." (Translated from Pirlot.)

Barnard records one species, *Parapronoë campbelli.*

Genus PARALYCAEA Claus, 1879.

Claus, 1879: 186 (40).
Pirlot, 1929: 135.

" Gnathopods simple; 3rd pair of peraeopods greatly elongated; 5th pair rudimentary." (Translated from Pirlot.)

Paralycaea gracilis Claus, 1879. (Figs. 236–251)

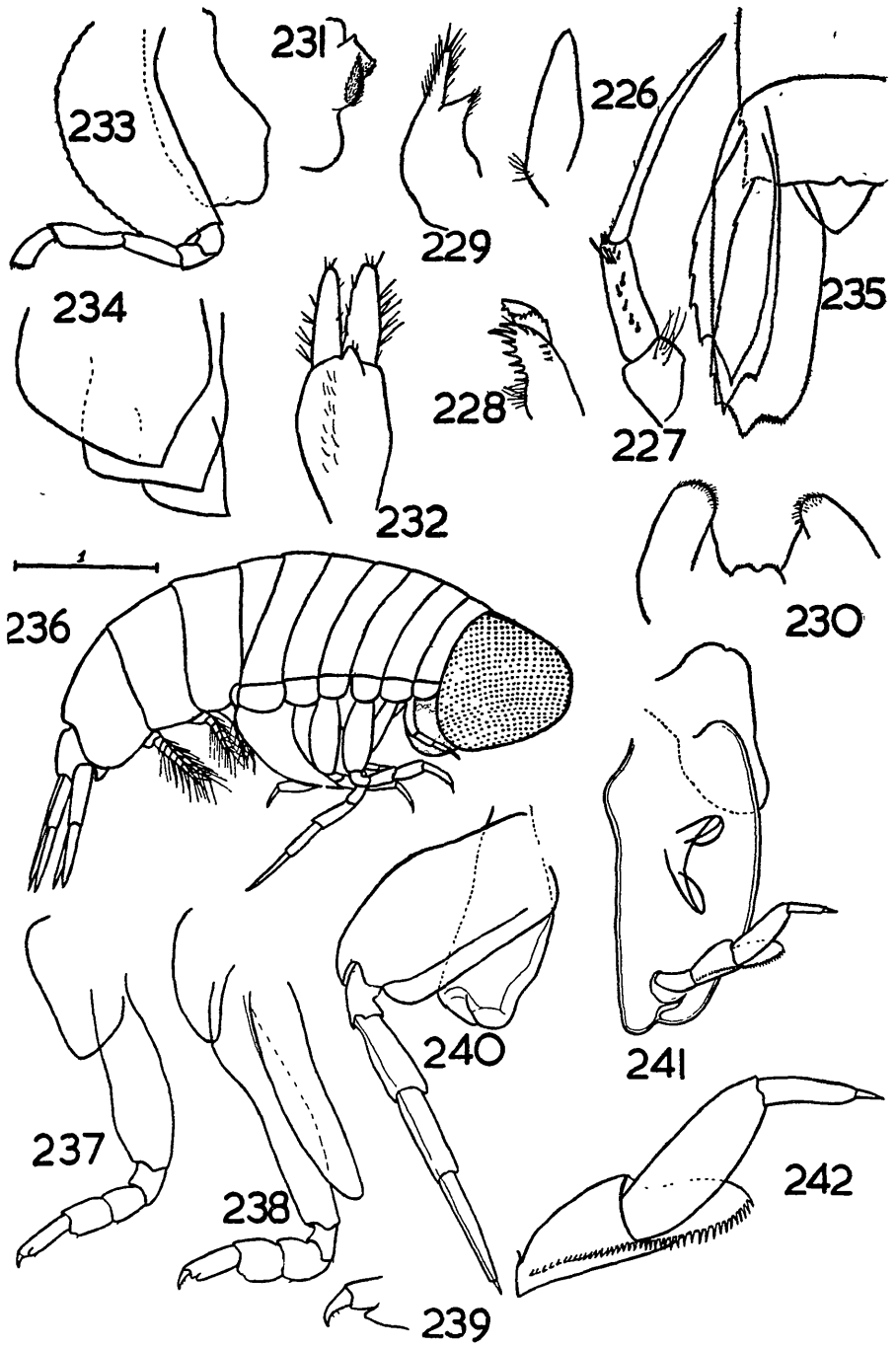
Paralycaea gracilis Claus, 1879: 186 (40). Claus, 1887: 64, Pl. 20, Fig. 1-11. Stebbing 1888: 1568–9. Tattersall, 1906: 27. Stephensen, 1925: 165–167, Fig. 52. Pirlot, 1929: 135.
Paralycaea newtoniana Bovallius, 1887: 33.
Paralycaea hoylei Stebbing, 1888: 1570, Pl. 120, Fig. e. Chevreux, 1927: 146, Pl. 14, Fig. 20–22.
Paralycaea gracilis newtoniana Pirlot, 1932: 30–31, Fig. 10

Description of Female

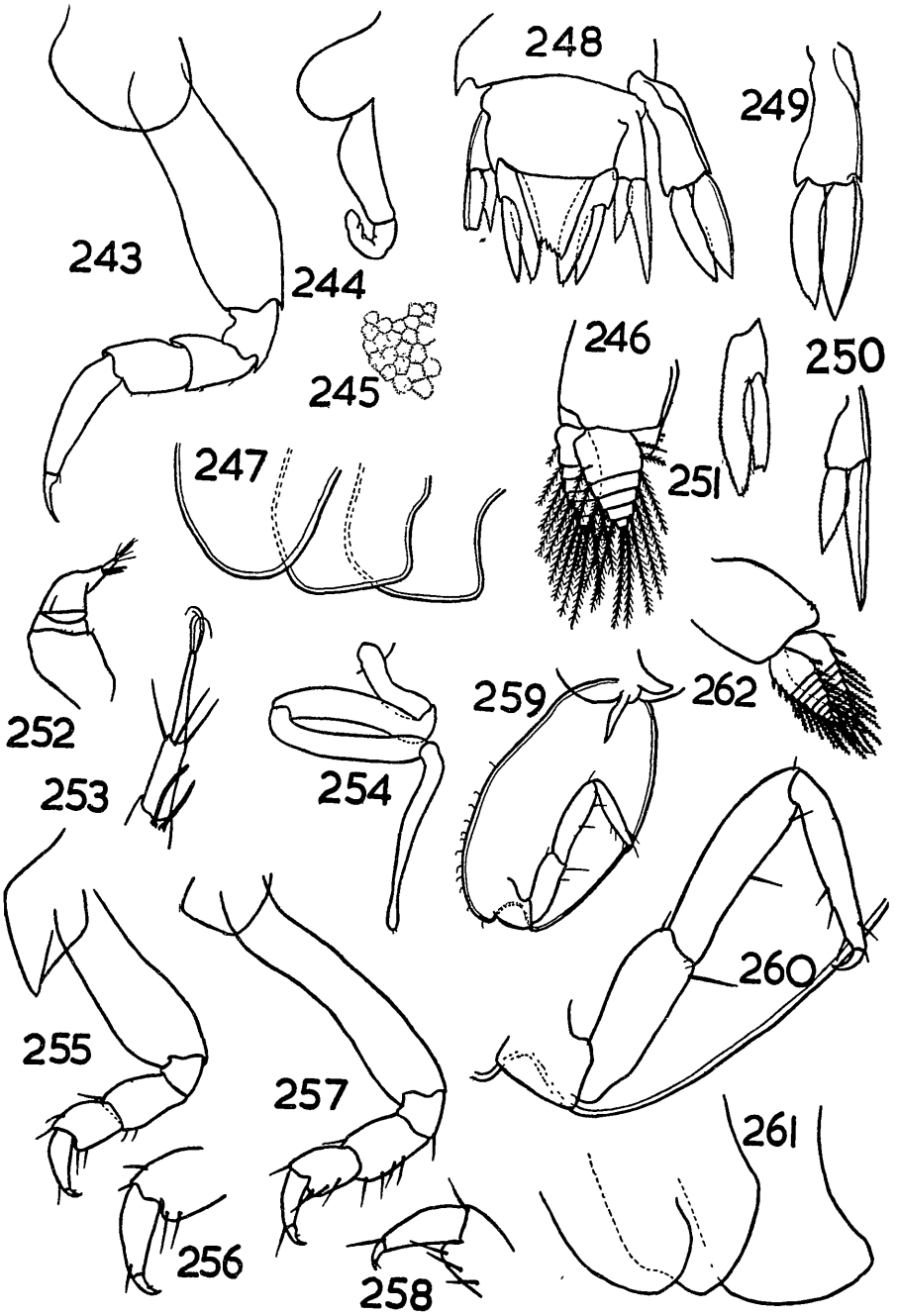
Length, 3½ mm.; depth, 1 mm.; width, 1¼ mm.

The head is bullet-shaped, as long as deep, deeper than 1st peraeon segments and as long as 1st 4 peraeon segments; head flattening dorsally; eyes dorsally continuous, covering all head except for narrow ventral groove. Body surface and appendages covered with a network of small hexagonal and pentagonal sculpturing, like that figured by Stephensen (1925) for *Sympronoë parva* and *Apronoë reinhardtii.*

ANTENNAE AND MOUTHPARTS. I was unable to dissect these out of this specimen, nor for that matter to discern them at all.



TEXT-FIG. 14.—*Primno macropa* Guér. 226—Antenna 2, ♀ 227—Antenna 1, ♂ 228—Maxilla 1. 229—Maxilla 2. 230—Lower lip. 231—Mandible. 232—Maxilliped. 233—Peraeopod 5, ♀. 234—Epimeral plates. 235—Uropods and telson, ♀. *Paralycaea gracilis* Claus. Female 236—Adult. 237—Gnathopod 1. 238—Gnathopod 2. 239—Gnathopod 2, end of propod and dactylos. 240—Peraeopod 3. 241—Peraeopod 4. 242—Peraeopod 4, end segments.



TEXT-FIG. 15.—*Paralycaea gracilis* Claus. Female. 243—Peraeopod 1. 244—Peraeopod 5. 245—Exoskeleton sculpturing. 246—Pleopod. 247—Epimeral plates. 248—Uropods and telson. 249—Uropod 1. 250—Uropod 2. 251—Uropod 3. *Parascelus typhoides?* Claus. Male. 252—Antenna 1. 253—Antenna 1, end segments. 254—Antenna 2. 255—Gnathopod 1. 256—Gnathopod 1, end segments. 257—Gnathopod 2. 258—Gnathopod 2, end segments. 259—Peraeopod 3. 260—Peraeopod 3, end segments. 261—Epimeral plates. 262—Pleopod.

GNATHOPODS. *First*: Sideplate subrectangular, angles rounded. Basos margin slightly convex, greatest width $\frac{1}{3}$ length. Ischium less than $\frac{1}{4}$ basos length. Merus $\frac{1}{5}$ basos length, only slightly less wide than long. Carpus $\frac{1}{4}$ basos length, width $\frac{3}{4}$ length, subrectangular. Propod length $\frac{1}{3}$ basos, width less than $\frac{1}{3}$ length; linear to about $\frac{3}{4}$ along posterior margin where there is a small, strong boss forming a thumb, then narrowing to a very short dactylos. One or 2 bristles on segment margins. *Second*: Sideplate similar. Basos greatest width about $\frac{1}{3}$ length. Ischium $\frac{1}{7}$ basos. Merus margins slightly convex, width $\frac{3}{4}$ length, length $\frac{1}{3}$ basos. Carpus like merus. Propod width $\frac{2}{5}$ length, length nearly $\frac{1}{4}$ basos; small thumb posterodistally. Curved dactylos about $\frac{2}{5}$ propod length.

PERAEOPODS. *First*: Sideplate ovate. Basos widening distally, width slightly more than $\frac{1}{3}$ length. Ischium $\frac{1}{4}$ basos. Merus widening slightly distally, distal width $\frac{3}{4}$ length, length nearly $\frac{1}{3}$ basos. Carpus similar. Propod narrowing to dactylos, anterior margin convex, $\frac{1}{2}$ basos, width not $\frac{1}{3}$ length. Dactylos very slender, $\frac{2}{5}$ propod length, 1 or 2 fine scattered setae. *Third*: Basos ovate, expanded, width slightly more than $\frac{1}{2}$ length. Ischium $\frac{1}{4}$ basos length, longer than wide. Merus width $\frac{2}{5}$ length, length slightly more than $\frac{1}{3}$ basos. Carpus slightly longer and narrower. Propod narrowing to a very small dactylos, length barely $\frac{1}{2}$ basos, proximal width about $\frac{1}{8}$ length. *Fourth*: Basos operculiform, greatly expanded, ovate; widest proximally; anterior margin slightly concave, posterior convex, slightly concave ventrally; greatest width about $\frac{1}{2}$ length, ischium inserted distally in midline of basos, below it what appears to be a small incision; in midline above ischium are what seem to be 2 further incisions guarded by an anterior flap connecting them, 2 smaller posterior flaps, one to each incision. Gills much smaller than basos. Ischium arising in circular pocket, about $\frac{1}{7}$ basos length. Merus distally expanded; convex anterior margin about $\frac{1}{3}$ basos length, distal width $\frac{3}{8}$ length; posteriorly produced as large lanceolate process forming shield reaching half along carpus, doubling length of posterior margin, which is strongly toothed; carpus $\frac{2}{7}$ basos length, width $\frac{1}{3}$ length. Propod $\frac{1}{2}$ carpus length and width. Short, stout dactylos $\frac{1}{2}$ propod length, straight. *Fifth*: Greatly reduced. Anterior basos margin convex, width $\frac{1}{3}$ length, remaining segments reduced to formless extension.

EPIMERAL PLATES. Ovate, tending to subrectangular.

PLEOPODS. Rami and peduncles subequal in length, short and squat, rami of 5 to 6 segments.

UROPODS. First, 2nd and 3rd reaching approximately the same distance along telson; rami lanceolate, telson itself subtriangular, longer than wide, distally damaged in specimen. *First*: Biramous, peduncle and outer ramus of this and 2nd with ridge along outer margin giving in effect 2 outer margins; peduncle has slender stalk, widens distally, inner distal angle produced to short, blunt tooth; distal width $\frac{1}{2}$ length, almost as long as outer ramus; outer margins of peduncle and outer ramus minutely fimbriated; inner ramus faintly toothed distally. *Second*: Peduncle proximally constricted to short neck, subtriangular, distal width more than $\frac{1}{2}$ length, inner distal angle rounded and finely toothed. Rami distinct, inner much the shorter; inner margin of outer ramus and both margins of inner ramus toothed. Peduncle, inner and outer ramus in ratio 11:11:20. *Third*: Inner ramus and peduncle fused; outer margin of outer ramus smooth, others finely toothed, outer ramus reaching as far as peduncle-inner ramus, the latter distally rounded

HYPOTYPE. Slides L.34.

LOCALITY. Station 83/51.

DISTRIBUTION. Mediterranean; Atlantic about 53° N.. 47° N., and tropics; Pacific, 39° S., 140° E ; New Zealand

DISCUSSION

Although its appearance is very distinctive, no figure of the entire animal appears to have been given previously. And although the appendages have not received very great attention as far as figures go, I am reasonably sure that this specimen is *Paralycaea gracilis* Variations in the uropod are quite marked in this species; nearly every description differs from the next one, particularly as to whether the inner ramus of the 2nd uropods is longer or shorter than the outer, and whether or not it is coalesced with the peduncle—a degree of variation sufficient to account for the uropod differences between my specimen and, say, that figured by Barnard (1930).

One feature of my specimen, however, has not been noted by previous authors; that is the small, thumb-like boss on the 1st and 2nd gnathopods Claus defines the genus as having " both pairs of gnathopods simple and elongate " (" beide Gnathopodenpaare enden klauenförmig und sind lang gestreckt "). At the same time, I think that the tendency of the gnathopods to twist in mounting so that the propod and dactylos are at right angles to the basos and the process thereby hidden by the propod beneath is probably responsible for the discrepancy. The fifth peraeopod is almost completely reduced to basos alone. Apart from the gnathopod boss, I have found no serious differences from any of the published figures.

Family LYCAEOPSIDAE
Chevreux and Fage, 1925: 417.
Stephensen, 1925· 153.
Pirlot, 1929: 140-142.
Barnard, 1930: 425

" Head globular; eyes occupying the greatest part of the head; antenna 1 short and curved, fixed to the anterior margin of the head, 1st segment of flagellum dilated in the male, conical in the female, the other segments subterminal; antenna 2 rudimentary (male) or absent (female); mandible with (male) or without (female) palp; maxilliped outer lobes rounded externally, pointed at the tip which barely extends past the fused inner lobes; coxal plates distinct; gnathopods simple; peraeopod 3 extremely slender and elongated in the male; peraeopod 4 robust, not operculiform; peraeopod 5 reduced; gills vesicular and small on segments 5 and 6; uropods biramous."

(Translated from Chevreux & Fage.)

Barnard records one species, *Lycaeopsis themistoides.*

Genus LYCAEOPSIS Claus, 1879.
Claus, 1879· 188 (42).
Chevreux and Fage, 1925: 417.
Pirlot, 1929: 142.
Barnard, 1930: 425.

" With the characters of the family."

(Chevreux & Fage.)

Family LYCAEIDAE
Tryphanidae Boeck, 1870· 9
Stebbing, 1888:

Lycaeidae Claus, 1879: 177 (31).
Chevreux & Fage, 1925: 426.
Stephensen, 1925a: 167.
Spandl, 1927: 211.
Pirlot, 1929: 134.
Barnard, 1930: 428.

" Same characters as for Pronoidae except: antenna 2 rudimentary or absent in female; mandible without palp in female; peraeopod 5 reduced, but all segments present; gills vesicular and lobed; rami of uropods fused or articulated with peduncle." (Translated from Chevreux and Fage.)

Barnard records 2 genera and 4 species of this family from the New Zealand region.

KEY TO NEW ZEALAND GENERA OF LYCAEIDAE

1. Gnathopods 1 and 2 feeble; propod of all appendages prolonged under dactylos by rounded process . . *Tryphana* Boeck, 1870.
   Gnathopods 1 and 2 subchelate with dilated carpus margin forming cutting edge against which propod rests .. *Lycaea* Dana, 1852.

Genus LYCAEA Dana, 1852.

Chevreux and Fage, 1925: 429.
Stephensen, 1925a: 167.
Spandl, 1924: 30.
1927: 212.
Pirlot, 1929: 136.
1939: 44.

"Body thick; antenna 1 hidden in a frontal cavity; end segment of flagellum of antenna 2 very short; carpus of gnathopods 1 and 2 strongly dilated and with cutting margin; peraeopod 5 the longest; peduncle of uropod 1 much longer than the rami; inner ramus of uropod 3 fused with peduncle, outer ramus narrow." (Translated from Chevreux and Fage.)

KEY TO NEW SPECIES OF LYCAEA
(After Barnard, 1930.)

1. Inner ramus of uropod 2 fused with peduncle . .. *L. nasuta* Claus, 1887.
   Inner ramus of uropod 2 not fused with peduncle 2
2. Second segment of peraeopod 4 oval; dactylos of peraeopods 1-4 short .. .. *L. pauli* Stebbing, 1885
   Second segment of peraeopod 4 bulging; dactylos of peraeopods 1-4 long . . . . .. *L. pulex* Marion, 1874.

This key separates out the specimens described by Barnard (1930) under the names *L. pauli, L. nasuta* and *L. bajensis* If the synonymy given by Shoemaker (1945) is correct, then this key is not applicable in general terms since he unites specimens listed under almost all of Barnard's main dichotomies. The key is included here since comprehensive and definite diagnoses of the three species concerned are not available to construct a more accurate key. It is a guide only, for the sake of convenience, and should be used only in conjunction with the relevant literature.

Genus TRYPHANA Boeck, 1870.

Boeck, 1870: 9.
Pirlot, 1929: 135.
Barnard, 1930: 428.

" Gnathopods 1 and 2 feeble; propod of all the appendages produced below the dactylos in a rounded process." (Translated from Pirlot.)

Barnard records one species, *Tryphana malmi*.

Family BRACHYSCELIDAE

Euthamneidae Bovellius, 1890: 18.
Brachyscelidae Stephensen, 1923: 37.
1925: 171.

The only family diagnosis which I can find is one implied by its use in a key in Bovallius' paper. It is probably best phrased as "Telson free, not coalesced with the last urosome segments; otherwise like Lycaeidae." I am by no means satisfied that this is a satisfactory diagnosis, but I am not in a position to reformulate it.

Barnard records 2 species from New Zealand, both belonging to the genus *Brachyscelus*.

Genus BRACHYSCELUS Sp. Bate, 1861.

Sp. Bate, 1861: 7.
Stephensen, 1923: 37 (lit. and synonymy).
1925a: 172.
Chevreux and Fage, 1925: 427.

"Antenna 2, male, with end segment of the flagellum short; carpus of gnathopods 1 and 2 strongly dilated, and forming with the propod a strong chela with dentate margin; peduncles of uropods 1 and 2 subequal; rami of uropod 3 enlarged and natatory, articulated with the peduncle."
(Translated from Chevreux and Fage.)

KEY TO NEW ZEALAND SPECIES OF BRACHYSCELUS

1. Antenna 2, male, last segment nearly half length preceding segment; rami of uropod 3 not strongly broadened	*B. crusculum* Bate, 1861.
Antenna 2, male, last segment much shorter than half preceding segment; rami of uropod 3 strongly broadened	*B. rapacoides* Stephensen, 1925.

Family OXYCEPHALIDAE

Bovallius, 1890: 1–141, Pl. 1–7 (key to genera).
Stephensen, 1925a: 182.
Chevreux & Fage, 1925: 431.
Spandl, 1927: 178 (key to genera).
Pirlot, 1929: 160.

"Head prolonged by a more or less elongate rostrum; eyes large but not occupying the whole of the head; antenna 1 has 1st segment of flagellum very large and tumid; antenna 2 long, folded, absent in the female; mouthparts reduced: mandible with (male) or without (female) palp; coxal plates reduced; all peraeopods of the ambulatory type; peraeopod 5 reduced but complete; gills on segments 2–6; uropods biramous; telson and segments 2 and 3 of urosome fused." (Translated from Chevreux and Fage.)

Although the Lachlan collection contains no representatives of this genus, Barnard recorded 5 genera and 6 species from the region.

KEY TO NEW ZEALAND GENERA OF OXYCEPHALIDAE
(Adapted from Bovallius, 1890.)

1. Inner rami of uropods 2 and 3 coalesced with corresponding peduncle 2	
Inner ramus of uropod 3 coalesced with peduncle	*Calamorhynchus* Streets, 1878.
Inner rami of all uropods free, not coalesced with peduncles 3	

2. Gnathopod 1 with folding hand; gnathopod 2 with subchelate hand. The hand is only a little produced; rostrum broadly obtuse	*Simorhynchotus* Stebbing, 1888.
Gnathopods 1 and 2, hand chelate; head produced into more or less sharp-pointed rostrum . .	*Oxycephalus* M.-Edw., 1830.
3. Last urosome segment not twice as long as 1st	*Streetsia* Stebbing, 1888.
Last urosome segment more than twice as long as 1st	*Leptocotis* Streets, 1877.

Genus CALAMORHYNCHUS Streets, 1878.
Pirlot, 1929: 163.
Barnard, 1930: 434.

"Anterolateral parts of the head dilated in the form of a spoon."
(Translated from Pirlot.)

Barnard records only *Calamorhynchus pellucidus.*

Genus SIMORHYNCHOTIS Stebbing, 1888.
Stebbing, 1888: 1572.
Pirlot, 1929: 161.
Barnard, 1930: 433.

"Inner rami of 2nd and 3rd pairs of uropods fused with the peduncles. Gnathopod 1 simple, carpus only a little dilated. Gnathopod 2 subchelate. Head only a little prolonged, without true rostrum." (Translated from Pirlot.)

Barnard records one species, *Simorhynchotis antennarius.*

Genus OXYCEPHALUS M.-Edw., 1830.
Milne-Edwards, 1830: 396
Pirlot, 1929: 162.
Barnard, 1930: 433.

"Uropods 2 and 3 having their inner rami fused with the peduncle. Gnathopods 1 and 2 chelate. Rostrum sharp." (Translated from Pirlot.)

Barnard records one species, *Oxycephalus piscator.*

Genus LEPTOCOTIS Streets, 1877.
Streets, 1877: 137.
Pirlot, 1929: 168.
Barnard, 1930: 434.

"Last segment of urosome more than twice as long as telson."
(Translated from Pirlot.)

Barnard recognises only one species, *Leptocotis tenuirostris.*

Genus STREETSIA Stebbing, 1888.
Stebbing, 1888: 1603.
Bovallius, 1890: 80 (key to species).
Spandl, 1927: 184 (key to species).
Pirlot, 1927: 164.

"The head is very long, narrow, produced into a long, evenly tapering sharp-pointed rostrum which is open on the underside. The hinder part of the head is more or less constricted, but does not form a neck. The second pair of antennae are hidden under the head when folded. The first pair of peraeopoda are subcheliform; the second are more or less cheliform. The carpus and metacarpus of the fifth pair are not dilated. The last coalesced ural segment is not twice as long as the first, and more or less elongated. The inner rami of all three pairs of uropods are free, not coalesced with the corresponding peduncles. The telson is triangular, sharp-pointed, and more or less elongated." (Bovallius, 1890.)

KEY TO NEW ZEALAND SPECIES OF STREETSIA
(Adapted from Spandl.)

1. Gnathopod 2 basos posterodistal angle produced to acute process . . . . . *S. challengeri* Stebbing, 1888.
Gnathopod 2 basos without process . *S porcella* (Claus), 1879.

To the literature of these two species listed by Barnard (1930), add Pirlot, 1929: 164–167; 1938· 368–369 and 1939: 54. Pirlot considers *S. challengeri* a synonym of *S. pronoides* Bovallius, 1887.

Family SCELIDAE

Scelidae Claus, 1879: 149 (3), 162 (16).
Stebbing, 1888: 1491.
Chevreux and Fage, 1925: 423.
Parascelidae Bovallius, 1887: 42.
Stephensen, 1925, 207.
Spandl, 1927: 250-251.
Thyropidae Barnard, 1930: 436.

" Same characteristics as Platyscelidae except: mouthparts produced in the form of a beak; mandibles narrow, in the shape of a stylet; basos of peraeopod 3 ovoid, that of peraeopod 4 much longer and much more developed; peraeopod 5 reduced but with full number of segments."

(Translated from Chevreux and Fage.)

Barnard proposed the new name "Thyropidae" for this family on the grounds that the family name should be derived from that of the oldest genus. This was before two relevant opinions of the International Commission on Zoological Nomenclature stating that the oldest generic name in a family need not be taken as nomenclatorial type. Barnard's suggested substitution is therefore not necessary (Opinions 133 and 141, vide Schenk and McMasters, 1950).

A single specimen of this family taken by the Lachlan is the only record from New Zealand.

Genus PARASCELUS Claus, 1879.

Claus, 1879: 164 (18).
Stephensen, 1925: 208.
Chevreux & Fage, 1925: 423.
Spandl, 1927: 262

"Body middlingly thick and rounded, ventrally closed in; end segment of antenna 1 in male about ½ smaller than preceding segment; peraeopods slender, with basal segment elongated; gnathopods simple; basos of peraeopod 4 proximally enlarged, distally attenuated, without groove on lower part; uropod rami lanceolate." (Translated from Chevreux and Fage.)

Parascelus typhoides ? Claus, 1879. (Figs. 252–271.)

Claus, 1879· 165 (19). 1887· 46, Pl. 9, Figs. 12–16; Pl. 10, Figs. 12–13 (*fide* Spandl).
Chevreux and Fage, 1925· 424, Fig. 416.
Spandl, 1927: 262–264, Fig 55a-h
Shoemaker, 1945: 260

Description of Male

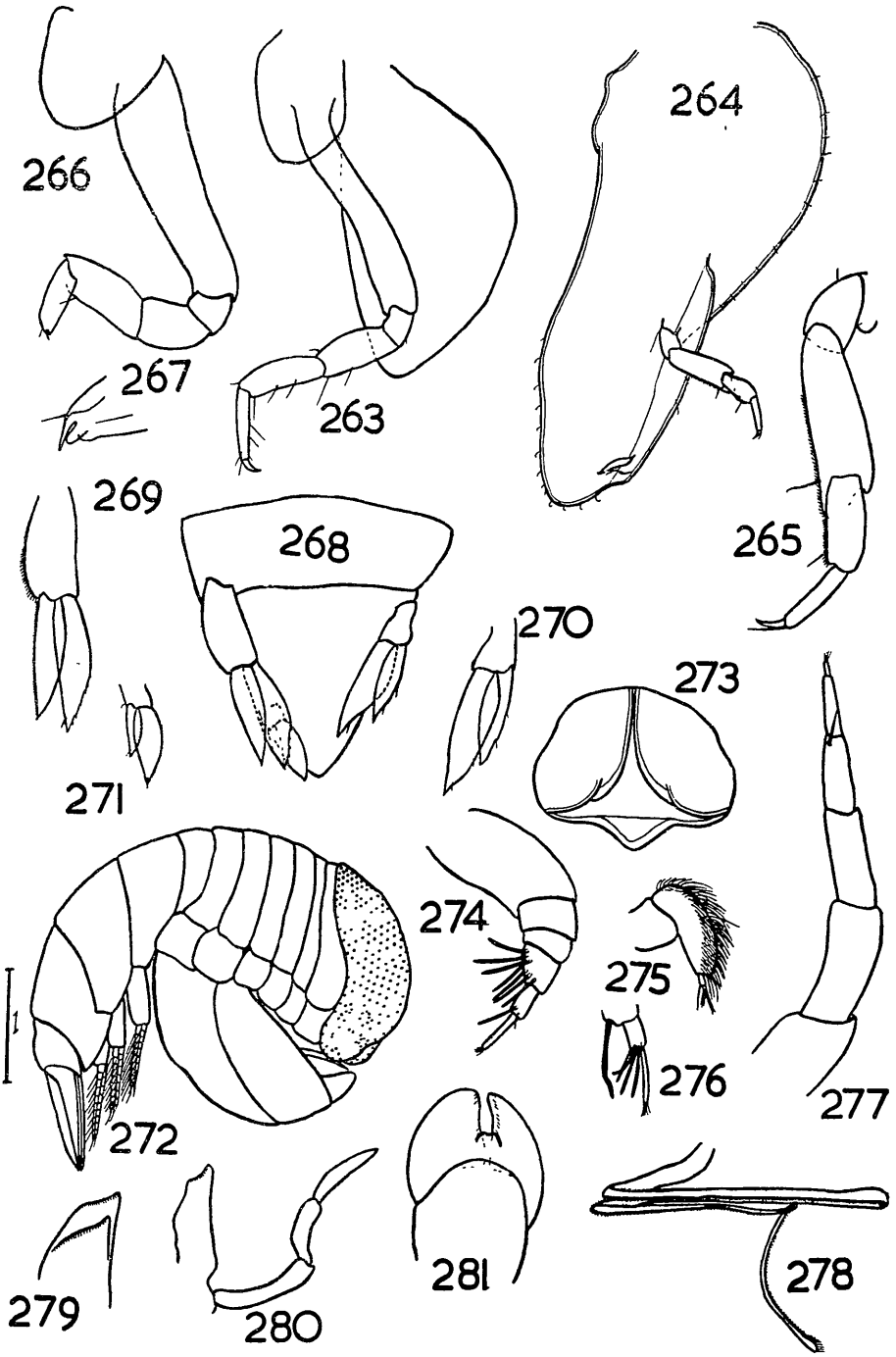
Length 5½ mm Head wider than 1st 2 body segments, comparatively narrower than in *Platyscelus ovoides,* not markedly different in general body shape. Eyes covering head, body segments marked off by shallow suture.

ANTENNAE. *First*: Peduncle as long as flagellum, 1st segment stout, about 5 times longer than 2nd and 3rd Flagellum, 1st segment stout but narrowing distally, a pair of long, flaccid sensory setae distally; 2nd segment barely shorter

than 3rd, the 2 together little more than ½ length 1st, 2nd has 3 or so long, fine setae distally, 3rd has long, fine setae terminally. *Second*: Slender, cylindrical, of 4 segments which are bent back on one another concertina-fashion; 1st a little more than ½ length 2nd; 2nd and 3rd subequal; 4th slightly longer than 3rd, narrowing, terminally rounded with 2 small bristles; otherwise naked.

GNATHOPODS. *First*: Sideplate trapezoid Basos widening a little distally, greatest width slightly more than ⅔ length. Ischium subsquare, between ⅓ and ½ basos length, a seta posterodistally. Merus width ⅔ length, length ½ basos, anterior margin slightly convex, single seta distally; posterior margin has 2 single setae. Carpus greatest width ¾ length, convex anterior margin length ⅔ basos: 2 setae on each distal angle; posterodistal angle produced very slightly in rounded process. Propod greatest width ⅓ length, narrowing to short dactylos, as long as carpus anterior margin convex. Dactylos has 1 or 2 minute setae on posterior margin, length about ¼ propod *Second*: Sideplate small, subrectangular Basos long, slightly concave, greatest width about ⅓ length Ischium subsquare, ½ basos length, single long slender seta posterodistally. Merus margins slightly convex, width ⅓ length, length not ½ basos; single seta anterodistally, 3 or 4 on posterior margin. Carpus margins slightly convex, greatest width about ⅔ length; length ½ basos, 3 long fine setae on posterior margin, a single seta anterodistally Propod narrowing to small dactylos, anterior margin convex, as long as carpus, greatest width about ⅖ length, single fine seta anterodistally. Dactylos as before, not ½ propod length.

PERAEOPODS *First*: Sideplate small, basically subrectangular, with rounded angles. Gills very large, ovate, longer than basos, greatest width about ⅔ length. Basos width not ½ length. Ischium length about ½ basos, seta on posterior margin. Merus width ½ length; length ½ basos, convex anterior margin has single seta distally; posterior has 2 long single setae. Carpus as long as merus, width ½ length; a single fine seta anterodistally, 3 setae on posterior margin. Propod barely shorter than carpus, width about ½ length, narrowing to dactylos, 2 fine setae anterodistally, 2 on posterior margin. Short dactylos nearly ⅓ propod length. *Third*: Sideplate has small posteriorly directed triangular process, lobes ovate, anterior slightly smaller than posterior. Basos medallion-shaped, greatly expanded, margins convex, greatest width about ¾ length; distally notched, ischium arising slightly anterior to, and partially masking, notch. Basos margin fringed with several short single setae anterodistally; total length slightly greater than remaining segments Ischium subrectangular, about ⅛ basos length, single seta anterodistally. Merus ¼ basos length, width more than ⅓ length, posterior margin slightly convex, single seta on posterodistal angle, 1 or 2 on anterior margin. Carpus nearly ½ basos, width ¼ length, single seta posterodistally, 2 anteriorly. Propod barely shorter than carpus, narrowing to dactylos, greatest width ⅕ length, 2 setae posterodistally, 3 on anterior margin distally. Dactylos about ¼ propod length. *Fourth*: Basos extremely large, inversely piriform, anterior margin slightly concave medially, 2 very shallow prominences proximally, convex distally and rounded ventrally; posterior margin strongly convex proximally, narrowing to ischium base distally, an almost straight flange along most of remaining margin; length nearly twice that of Pr. 3 basos; greatest width nearly ½ length; a comparatively small incision near margin posterodistally, incision slightly longer than ischium; basos has short single setae variously around margin Flange along posterior margin arising anterior to ischium, length



TEXT-FIG. 16.—*Parascelus typhoides* ? Claus. Male. 263—Peraeopod 1. 264—Peraeopod 4. 265—Peraeopod 4, end segments 266—Peraeopod 5 267—Peraeopod 5, end segments. 268—Uropods and telson. 269—Uropod 1. 270—Uropod 2. 271—Uropod 3 *Platyscelus ovoides* (Claus). 272—Adult female. 273—Rostrum and head. 274—Antenna 1, ♀. 275—Antenna 1, ♂. 276—Antenna 1, ♂, end segments 277—Antenna 2, ♀. 278—Antenna 2, ♂. 279—Left mandible, ♀. 280—Left mandible and palp, ♂. 281—Maxilliped.

nearly $\frac{1}{2}$ basos. Ischium approximately 1/17 basos, arising about $\frac{3}{5}$ along posterior margin. Merus total length between $\frac{1}{6}$ and $\frac{1}{7}$ basos length, anterior margin produced distally nearly $\frac{1}{2}$ along carpus, distal $\frac{1}{2}$ of margin finely toothed, with single strong seta. width $\frac{1}{3}$ length. Carpus as long as propod and nearly $\frac{1}{2}$ merus, width $\frac{1}{2}$ length, anterior margin finely toothed with strong single seta distally. Propod width $\frac{1}{4}$ length, with extremely minute teeth anteriorly. Dactylos $\frac{2}{5}$ propod length with an accompanying and slightly longer seta arising posterodistally from propod. *Fifth*: Sideplate ovate, tending to subrectangular. Basos greatest width $\frac{2}{7}$ length, narrowing distally. Ischium not $\frac{1}{5}$ basos length; merus width $\frac{2}{3}$ length, length nearly $\frac{1}{3}$ basos; carpus width $\frac{1}{2}$ length, length $\frac{2}{7}$ basos, single seta posterodistally; propod as long as merus, width more than $\frac{1}{3}$ length, distally rounded to minute, nail-like dactylos, an accompanying small seta.

Epimeral Plates. More or less ovate, ventrally rounded, deeper than wide.

Pleopods. Peduncle slightly longer than rami, rami have 8 or 9 segments.

Uropods First reaching as far as outer ramus of 3rd; inner ramus of 2nd little shorter; rami lanceolate. *First*: Peduncle barely shorter than outer ramus, which is barely shorter than inner; peduncle outer margin convex, finely toothed; outer ramus outer margin finely toothed. inner margin negligibly toothed; inner margin of inner ramus sparsely toothed distally. single seta distally on outer margin. *Second*: Peduncle proximally constricted, inner distal angle minutely toothed; rami margins very minutely toothed, outer margins of both rami each have 2 fine single setae Peduncle, inner ramus, outer ramus in ratio 2 5:4. *Third*: Reaching just past end of telson; peduncle small, seta at outer distal angle; outer ramus $\frac{1}{2}$ width of inner, inner margin minutely toothed, single seta distally; inner margin of inner ramus minutely toothed, single seta distally; other margins very minutely toothed Peduncle, inner ramus, outer ramus in approximate ratio 3·8 6 *Telson*· Subtriangular, distally rounded, length $\frac{3}{5}$ basal width.

Hypotype: Slides L.33.

Locality. Station 189/51, 1 male.

Distribution. North and South Atlantic; Mediterranean; Red Sea; New Zealand.

Discussion

The generic status of *Parascelus* is in some doubt, and there is considerable evidence to support the view that it is synonymous with *Thyropus* However, in view of the reluctance of more experienced workers to take this step, I am recording the above specimen as *Parascelus.* Classification of the family is hindered by the same factors which obtain in the previous family—a considerable number of species have been described. but very few specimens of each have been taken.

The specimen concerned is quite different from *Thyropus sphaeroma* It differs from *Parascelus parvus* in the 5th segment of the second gnathopod, which is not serrated; from *P. similis* in the outer ramus of uropod 3, which is not reduced to anything like the extent found in *P. similis;* from *P. edwardsii* in the shape of the antennae and in the basos of peraeopod 5, which is not broadened. It comes closest to *P typhoides,* but even here there are discrepancies It differs from *P typhoides* as figured by Spandl in having the rami of uropod 1 subequal, whereas Spandl figures the inner ramus considerably larger than the outer. There is some difference in the antennae; the 5th peraeopod segments show different proportions; and the basos of the 4th peraeopod is longer and narrower than Spandl shows. However, it is much closer to *P. typhoides* as figured by

Chevreux and Fage (1925). It differs from this also in some respects, in particular the shape of the antennae.

The differences in the uropods could possibly be attributed to age or sex differences; the antennal differences likewise can be glossed over in view of the paucity of material and our general lack of knowledge about variation within the genus; but the differences in the basos of peraeopod 4 are more important. The shape of the basos is regarded in this and the previous family as of family significance, and so any variation would seem to be of considerable significance. Whether Spandl's or Chevreux and Fage's specimens agree with Claus's originals, I do not know—my copy of Claus's paper unfortunately lacks the figures. But I suggest that Chevreux and Fage's specimen is not the same as Spandl's, and that mine comes closer to Chevreux and Fage's. Possibly the latter's specimens are specifically distinct, in which case the New Zealand specimen will probably fall into their species. It is, in fact, only because of the lack of further material, the obvious chariness of others to erect new species within the family, and the general lack of knowledge regarding variation within it, that I have not described the New Zealand specimen as a new species conspecific with Chevreux and Fage's specimens.

Family PLATYSCELIDAE

Platyscelidae Spandl, 1924· 34.
Stephensen, 1925: 212.
Spandl, 1927. 227 (key to genera).
Typhidae Chevreux and Fage, 1925: 419.

" Body very wide; head large, wider than body; eyes occupying the greater part of the head; antenna 1 short and curved; 1st flagellar segment dilated, the others subterminal; antenna 2 slender, folded in a zig-zag in male, a little inwardly curved in the female; mandibles with (male) or without (female) palp; maxilliped outer plates lobes externally convex, inner margin concave; ending in a frayed crown distally which reaches considerably past the fused inner plates, coxal plates distinct; basos of peraeopods 3, 4 and 5 transformed into opercular plates; gills on segments 2–6; last two segments of urosome and telson fused; uropods have both rami fused or articulated with peduncle."

(Translated from Chevreux and Fage.)

Five genera and eight species of this family have been recorded from New Zealand. Of these, 7 are recorded by Barnard in the Terra Nova Report, and one was taken by the Lachlan. This last is identical with *Platyscelus intermedius*, described from New Zealand by G. M. Thomson (1879).

KEY TO NEW ZEALAND GENERA OF PLATYSCELIDAE

(Adapted slightly from Spandl, 1927.)

1. Gnathopods 1 and 2 both chelate 2
   Gnathopods 1 and 2 simple or minutely subchelate . . 3
   Gnathopods 1 and 2, 5th and 6th segments with sharp processes . .. . *Amphithyrus* Claus, 1879.
2. Antenna 2, male, last 2 segments many times smaller than the preceding one .. .. . . *Platyscelus* Sp. Bate, 1861.
   Antenna 2, male, last 2 segments never longer than half the third . .. . *Hemityphis* Claus, 1879
3. Peraeopods 1 and 2, 6th segment has small process *Tetrathyrus* Claus, 1879.
   Peraeopods 1 and 2, 6th segment smooth . *Paratyphis* Claus, 1879.

Genus AMPHITHYRUS Claus, 1879.

Claus, 1879: 161 (15).
Pirlot, 1929: 158.
Barnard, 1930: 438.

"Gnathopods 1 and 2 subchelate. Last 2 segments of 2nd antennae of male as long as or almost as long as preceding segment. Uropod 3 peduncle glandular."
(Translated from Pirlot.)

Barnard records one species from New Zealand, *Amphithyrus bispinosus.*

Genus HEMITYPHIS Claus, 1879.

Claus, 1879: 158 (12).
Pirlot, 1929: 159.
Barnard, 1930: 437.

" Gnathopods 1 and 2 chelate. Last 2 segments of 2nd antennae of male much shorter than in *Amphithyrus,* but longer than in *Eutyphis.* Inner margin of maxilliped profoundly concave." (Translated from Pirlot.)

Barnard records one species, *Hemityphis rapax.*

Genus PARATYPHIS Claus, 1879.

Claus, 1879: 159 (13).
Stebbing, 1888: 491 and 1476.
Stephensen, 1925: 220-221.
Spandl, 1927: 243 (literature).
Pirlot, 1929: 157.

"The first pair of gnathopods simple, the second simple or with a rudimentary chela. The 2 last segments of antenna 2 of the male moderately long."
(Translated from Pirlot.)

KEY TO NEW ZEALAND SPECIES OF PARATYPHIS
(After Spandl, 1927.)

1. Groove of 2nd segment of peraeopod 4 short . . *P. parvus* Claus, 1887.
   Groove of 2nd segment of peraeopod 4 elongated . . *P. spinosus* Spandl, 1924.

Shoemaker (1945: 259–260) lists *P. parvus* as a doubtful synonym of *P. maculatus.* It is noteworthy that very few specimens of this genus have so far been taken. Stephensen remarks that up to his 1925 report "hardly more than 10 specimens in all are mentioned". With the exception of the "Thor" catch of *P. clausii,* the "Terra Nova" of *P. parvus* and the "Armauer Hansen" of *P. promontorii,* the number of specimens of each species is extremely small. Consequently, there is little knowledge of the degree of variation within each species.

Genus TETRATHYRUS Claus, 1879.

Claus, 1879: 150 and 160 (4, 14).
Stebbing, 1888: 491, 1480.
Stephensen, 1925: 224.
Chevreux and Fage, 1925: 422.
Spandl, 1927: 240 (literature).

Generic diagnosis much as suggested in key to genera.

KEY TO NEW ZEALAND SPECIES OF TETRATHYRUS

1. Peraeopod 4 ischium and other segments arising between ½ and ⅔ along basos; 4th segment has both margins straight, evenly widening; Pr 5 has 2nd segment comparatively wide, ending in acute point .. .. *T. forcipatus*
   Peraeopod 4 ischium and other segments arising near distal end of basos; 4th segment very broad at its middle, tapering

distally, anterior margin straight, posterior convex; Pr. 5, 2nd segment narrow, curved distally, crinkled appendage distally .. . . *T. pulchellus*

Genus PLATYSCELUS Sp. Bate, 1861.

Chevreux and Fage, 1925: 419.
Spandl, 1927: 227–228 (literature and synonymy)

"Carpus of gnathopods greatly prolonged under the propod; basos of peraeopods 3 and 4 forming a very long and wide opercular plate; peraeopod 5 reduced to basos, much shorter and narrower than the 2 preceding peraeopods."
(Chevreux and Fage, in translation.)

KEY TO NEW ZEALAND SPECIES OF PLATYSCELUS
(After Chevreux and Fage, 1925.)

1. Gnathopods 1 and 2, dorsal margin of propod serrulated all along its length, inferior carpal process has numerous lateral spines, carpus of peraeopod 4 little smaller than merus; length, 14–20 mm. .. . . . . *P. ovoides*
   Gnathopods 1 and 2, dorsal margin of propod smooth, inferior carpal process without lateral spines (rarely 1 or 2); carpus of peraeopod 4 about ½ merus; length 4–6 mm. . *P. serratulus*

Platyscelus ovoides (Claus), 1879. (Figs. 272–290.)

Eutyphis ovoides Claus, 1879: 155 (9).
Platyscelus intermedius Thomson, 1879. 244, Pl. X, D, 4a–i. Thomson and Chilton, 1886: 151.
Platyscelus ovoides Shoemaker, 1945. 256–258, Text-figs. 47–48 Spandl, 1927: 228–229, Fig. 44a-d. Chevreux and Fage, 1925: 420–422, Fig. 413.

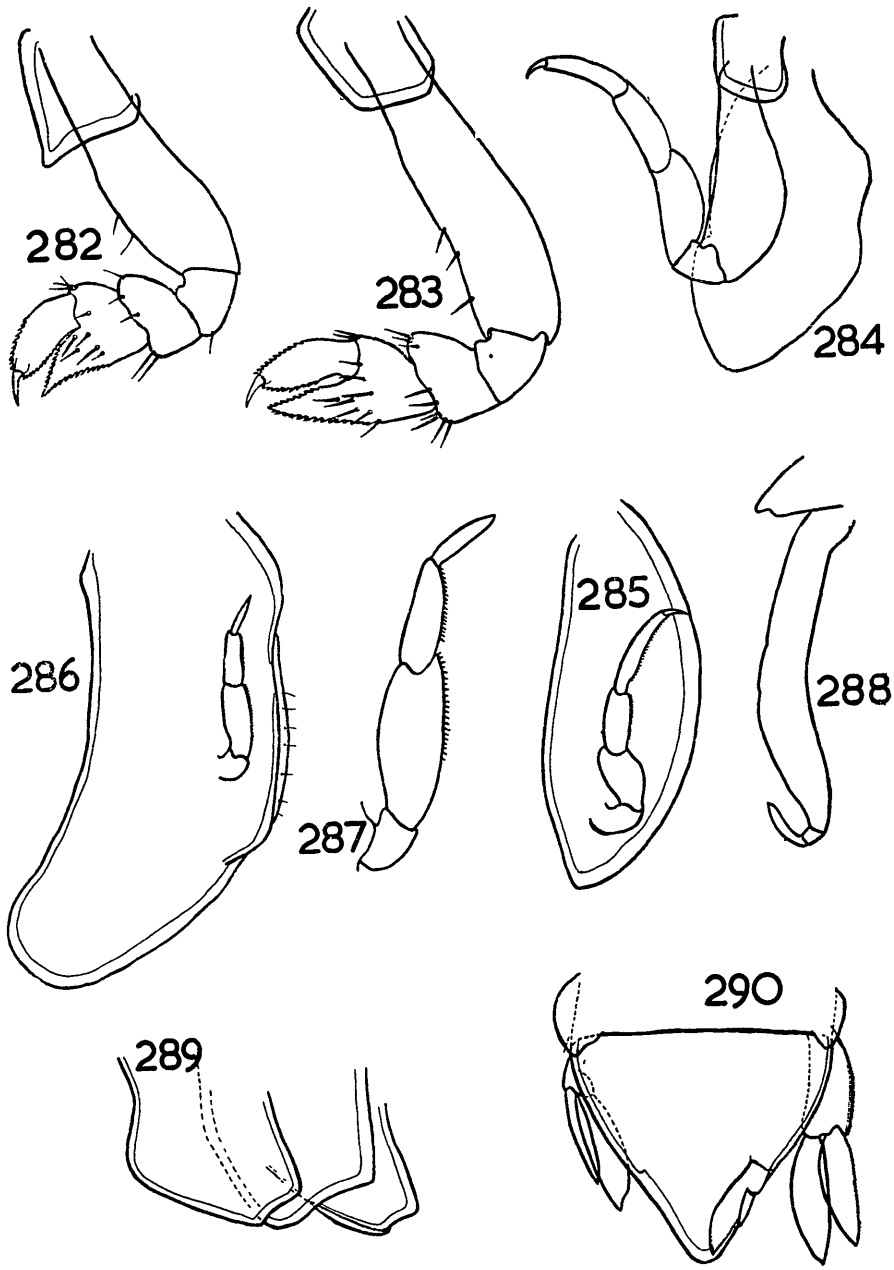
Description of Female

Length, 6½ mm. Body in shape somewhat ovoid; basos in peraeopods 3 and 4 greatly expanded, forming pouch under body which conceals all abdominal appendages. Eyes large, covering head. Rostrum subtriangular, short and broad.

ANTENNAE. *First*: Small, of 6 segments; 1st large, as long as next 4; 2nd and 3rd wide and short; 4th as long as 5th, 5th much the narrower; 4th has several long flaccid sensory setae interiorly, 5th has one; 6th segment slender, slightly longer than 5th, has terminal tuft of fine setae. *Second*. Of 6 segments, becoming succeedingly more slender; 1st ¾ length 2nd, as long as 3rd; 4th ¾ length 3rd, as long as 5th and 6th combined, has single strong seta; 6th has terminal tuft of bristles.

MOUTHPARTS. Very much reduced. *Mandible*: Without palp; cutting edge oblique, of 2 finely incised plates; molar process and spine row absent. *Maxilliped*: Outer plates ovate, outer margin convex; inner slightly concave, distally rounded. Inner plate vestigial.

GNATHOPODS. *First*: Sideplate small, subtriangular. Basos greatest width ⅓ length, 2 or so spines on anterior margin. Ischium subrectangular, greatest length ¼ basos, a spine on posterodistal angle. Merus length ⅔ width; ⅕ basos length; anterior margin convex, distal angles rounded, a few setae on end margin. Carpus subtriangular, anterior margin short, as long as merus; posterodistal angle produced in triangular process to dactylos base; margins of process strongly serrated; carpus posterior margin ⅖ basos length; long fine setae on anterodistal angle, several across process base. Propod margins convex and strongly serrated; ⅓ basos length; width ½ length. Slender dactylos about ⅖ propod length. *Second*: Longer than 1st, sideplate small and subrectangular, otherwise similar.



TEXT-FIG. 17.—*Platyscelus ovoides* (Claus). 282—Gnathopod 1, ♀. 283—Gnathopod 2, ♀. 284—Peraeopod 1, ♀. 285—Peraeopod 3, ♀. 286—Peraeopod 4, ♀. 287—Peraeopod 4, ♀, ischium to dactylos. 288—Peraeopod 5, ♀. 289—Epimeral plates. 290—Uropods and telson.

PERAEOPODS. *First* Gills large, ovate. Sideplate small, subsquare. Basos posterior margin distally convex, greatest width ⅓ length. Ischium subrectangular, ¼ basos length. Merus anterior margin convex width ½ length; length nearly ½ basos Carpus width ⅔ length, length ⅔ basos Propod narrower, as long as carpus Short dactylos not ⅓ propod length *Second* Similar *Third* Basos greatly expanded to shield-like plate; anterior margin slightly convex, posterior strongly and evenly convex; distally bluntly pointed, greatest width ⅔ length; remaining segments arising near distal end, only about ⅓ basos length and turned back along basos long axis. Ischium about ⅙ basos length Merus as long as ischium, width about ¾ length; margins distally convex. Carpus barely shorter, width ½ length, linear. Propod linear, width not ⅓ length, length nearly ½ basos. Anterior margins of carpus and propod have strong fine teeth most of length. Slender dactylos nearly ⅓ propod length. *Fourth* Basos greatly expanded in concave-lens shape; ⅓ as long again as basos of Pr 3, greatest width ⅔ length, distally broadly rounded; posterior margin has several setae medially Remaining segments little more than ⅓ basos length, arising ½ down and slightly in from posterior margin Ischium perhaps 1/15 basos length; merus about ⅙ basos, margins slightly convex, width ⅔ length Carpus ⅔ length merus, width ⅓ length, margins slightly convex. Propod length ⅔ carpus, width not ¼ length, distally acute. Dactylos absent. Merus and carpus posterior margins have strong fine teeth most of length *Fifth*. Greatly reduced, gill-like Basos width about ⅓ length, anterior margin slightly convex, posterior concave, 3rd segment very small and narrow, 4th linear, about ⅓ basos length.

EPIMERAL PLATES *First*· Anterior margin convex, posterior concave, narrowing to truncate and slightly concave distal margin *Second*· Somewhat similar, not narrowing so markedly, distally concave *Third* Anterior margin strongly convex so small concave distal margin appears as a cutting off the posterodistal angle

PLEOPODS Biramous, normal peduncles slightly shorter than the rami, almost as wide as long

UROPODS *First*· Reaching end of telson, biramous, peduncle proximally constricted, rami lanceolate; inner slightly longer than outer, both slightly longer than peduncle; outer margin of peduncle and of outer ramus finely serrate *Second* Peduncle small, almost subtriangular, length about ½ narrow outer ramus, which is somewhat shorter than broad inner ramus, inner extending slightly past base of 3rd uropods *Third* Arising from telson slightly past halfway, outer ramus arising from outer margin of inner ramus about ⅓ along its length, slender, about ⅔ length of broad inner ramus, which almost reaches end of telson, outer margin and distal portion of inner margin of fused peduncle and inner ramus finely serrate, tip of outer ramus has single fine seta *Telson* Subtriangular, distally rounded, length ⅔ basal width

Description of Male

ANTENNAE *First*· Peduncle, 3rd segment as wide as long, flagellum of 3 segments. 1st as wide and twice as long as last peduncle segment, superior margin strongly convex, has strong brush of setae, 2nd and 3rd together about ⅔ as long very slender, 3rd twice length 2nd, a few fine setae on each distally. *Second*. Very long, not showing obvious signs of segmentation, folded in about 5 distinct zig-zigs; the end a blunt knob, margin has short, fine bristles right along

MANDIBLES Palp, 2nd segment ⅔ and 3rd segment ⅘ length of 1st

HYPOTYPES. Slides L.31, female. L.32, male.

LOCALITY. Station 75/51, 2 ♀♀, 1 ♂

DISTRIBUTION. North and South Atlantic, Mediterranean; North Pacific; South Pacific; Indian Ocean.

DISCUSSION

Shoemaker (1945) says of Thomson's *P. intermedius* that it is "probably the same as *P. ovoides* but the species was not figured and the description is not sufficient for the determination of the species". In actual fact, the species was figured in the paper, but the figures were reduced so much by the lithographer that they are practically useless. Stebbing (1888: 1464) also suggests that Thomson's *P. intermedius* is "scarcely, if at all, distinguishable from *Platyscelus ovoides*" Thomson's original drawings which I was fortunate enough to see leave no doubt that his specimens were juvenile *P. ovoides*.

My own specimens from the Lachlan collections were also juvenile *P. ovoides*, agreeing very closely with Shoemaker's figures of a 5 mm. specimen (Shoemaker, 1945, Text-fig. 48). Adults of this species reach 14–20 mm. in length according to Chevreux and Fage, and show some differences from the juveniles as illustrated by Shoemaker.

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