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THE CRUSTACEA AMPHIPODA OF SIGNY ISLAND, SOUTH ORKNEY ISLANDS

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ABSTRACT

A REPORT is given on a collection of 34,700 amphipods obtained at Signy Island, South Orkney Islands, in 1964–65.

An account is given of previous collections in the west Antarctic, emphasizing those expeditions which have contributed to the South Orkney Islands fauna. A brief outline of the geology, geography and meteorology of Signy Island is related to the biological conditions found in littoral and shallow sub-littoral habitats. Collecting methods are briefly described and notes on substrate types are included in a detailed station list.

The systematic account, which forms the main part of this report, deals with 60 species collected at Signy Island of which 26 are recorded for the first time at the South Orkney Islands and nine are described as new. A number of species not represented in the collection are also discussed. The genus *Oradarea* is revised, all existing species being diagnosed and illustrated. Four new species are described, two from the west Antarctic and two from the Ross Sea. *Schraderia* and *Pontogeneia* are discussed in some detail, and a key to the species of *Pontogeneia* is provided. A new name is proposed for *Megamphopus longicornis* Chevreux.

An ecological analysis indicates the habitat preferences of some of the common species. The species composition of the collection is compared with that of previous collections. Probable reasons for the observed differences are noted.

A breeding cycle of egg laying in autumn, over-winter brooding and liberation of hatchlings in spring is found to be common among Signy Island species. The significance of this cycle and of breeding synchrony is discussed. Egg production in 12 species is compared and shown to be proportional to the volume of the female. Eggs of Antarctic species are shown to be larger than those of temperate species. Females outnumber males in most of the species examined. Causes and effects of the greater number of females in the breeding population are considered.

The geographical distributions of the 77 species of amphipod recorded from the South Orkney Islands are discussed and the fauna is shown to be Antarctic in affinity. The fauna is characterized and the high proportion of benthic algicolous species noted. An attempt is made to quantify the similarity of the South Orkney Islands fauna with neighbouring areas, and it is found to be most closely related to that of South Georgia. Theoretical considerations suggesting that the South Orkney Islands fauna may be more closely related to that of the South Shetland Islands and the Antarctic Peninsula are discussed. Mathematical treatment suggests that further collecting in other areas of the South Orkney Islands will be necessary to delineate fully the fauna of the group, but that nearly all of the species in the area sampled have been obtained. Bipolarity is briefly discussed. At most three species of Antarctic amphipod are thought to occur in Arctic regions, and two of these are bathypelagic.

CONTENTS

I. INTRODUCTION

THE South Orkney Islands are on the southern limb of the chain of islands known collectively as the Scotia arc which connects South America with Antarctica (Figs. 1 and 2). They lie in the Southern Ocean between lat. 60° and 61°S. and long. 44° and 47°W., 380 km. east of Clarence Island in the South Shetland Islands group, and 820 km. south-west of South Georgia. A British Antarctic Survey station is situated on Signy Island (lat. 60°43′S., long. 45°38′W.), the fourth largest of the South Orkney Islands (Fig. 3). It was from the vicinity of this station that the collections which form the basis of this report were made.

Laboratory facilities were established at Signy Island in 1961 and one of the first programmes was a survey of the marine sub-littoral, carried out by P. Redfearn using free-diving techniques and conventional collecting gear worked from small boats. Large general collections were taken from all types of substrates from the littoral down to 20 m., while some material was collected at greater depths. Amphipods formed a very important part of the benthic community and about 34,700 specimens were available from that survey for study in the present investigation. The extent and excellent condition of the collections is a tribute to the energy of those involved in the work.

A. HISTORICAL

The amphipod fauna of the Atlantic sector of Antarctica is better known than that of any other part of the continent with the possible exception of the south-west part of the Ross Sea. Collections of the German International Polar Year Expedition (Pfeffer, 1888), First French Antarctic Expedition (Chevreux, 1906), Scottish National Antarctic Expedition (Chilton, 1912), Second French Antarctic Expedition (Chevreux, 1913), Belgian Antarctic Expedition (Monod, 1926; Ruffo, 1949), Swedish Antarctic Expedition (Schellenberg, 1931), Discovery Committee (Barnard, 1932), United States Antarctic Services Expedition (Shoemaker, 1945), Norwegian Antarctic Expedition (Stephensen, 1947) and the British Antarctic Survey (this paper) have all contributed to a total of 224 species of gammaridean amphipods known from the region.

Previous information on the amphipod fauna of the South Orkney Islands comes from four sources (Appendix A). Collections made from *La Zelée*, one of the ships of the French Expedition under d'Urville in 1838 yielded three species of hyperiid which were described by Bate (1861, 1862).

During the winter of 1903 collections of benthic marine organisms were made in shallow water at Scotia Bay, Laurie Island, by the Scottish National Antarctic Expedition and the amphipods were subsequently studied by Chilton (1912). Chilton's premature insistence of "variability" and "wide distribution" which has clouded studies of the taxonomy and distribution of Antarctic amphipods has required a re-examination of much of this collection which is now considered to contain 36 species from the South Orkney Islands. Small collections made by the staff of the Argentine meteorological station at Uruguay Cove, Laurie Island, were also examined by Chilton (1925). He found seven species present, all of which had been recorded in the *Scotia* collections.

In February 1927, several stations were worked by the R.R.S. *Discovery* in the vicinity of Signy Island (Fig. 3). Of the five stations which yielded amphipods, two were in much deeper water (244–344 m.) than had been sampled by previous expeditions. These five stations provided 20 species of amphipod, of which 11 were new records for the South Orkney Islands (Barnard, 1932).

The present collection, taken mainly in water of less than 20 m. depth contains 60 species of which 26 had not previously been recorded from the area. The total number of species so far recorded is 77. Investigation of the plankton and further collecting of the benthos seem likely to raise this number considerably.

B. GEOGRAPHICAL

Signy Island, together with most of the islands of the Scotia arc, is the remains of an early Mesozoic cordillera breached during the late Cretaceous (Allen, 1966). The rocks of the island, quartz-mica-schists, amphibolites and marbles, are either Precambrian or early Cambrian in age (Adie, 1964; Matthews and Maling, 1967), and are sufficiently hard to provide a stable substrate for sessile organisms and to prevent colonization by boring animals.

Signy Island lies immediately south of Coronation Island, the largest in the South Orkney Islands group,

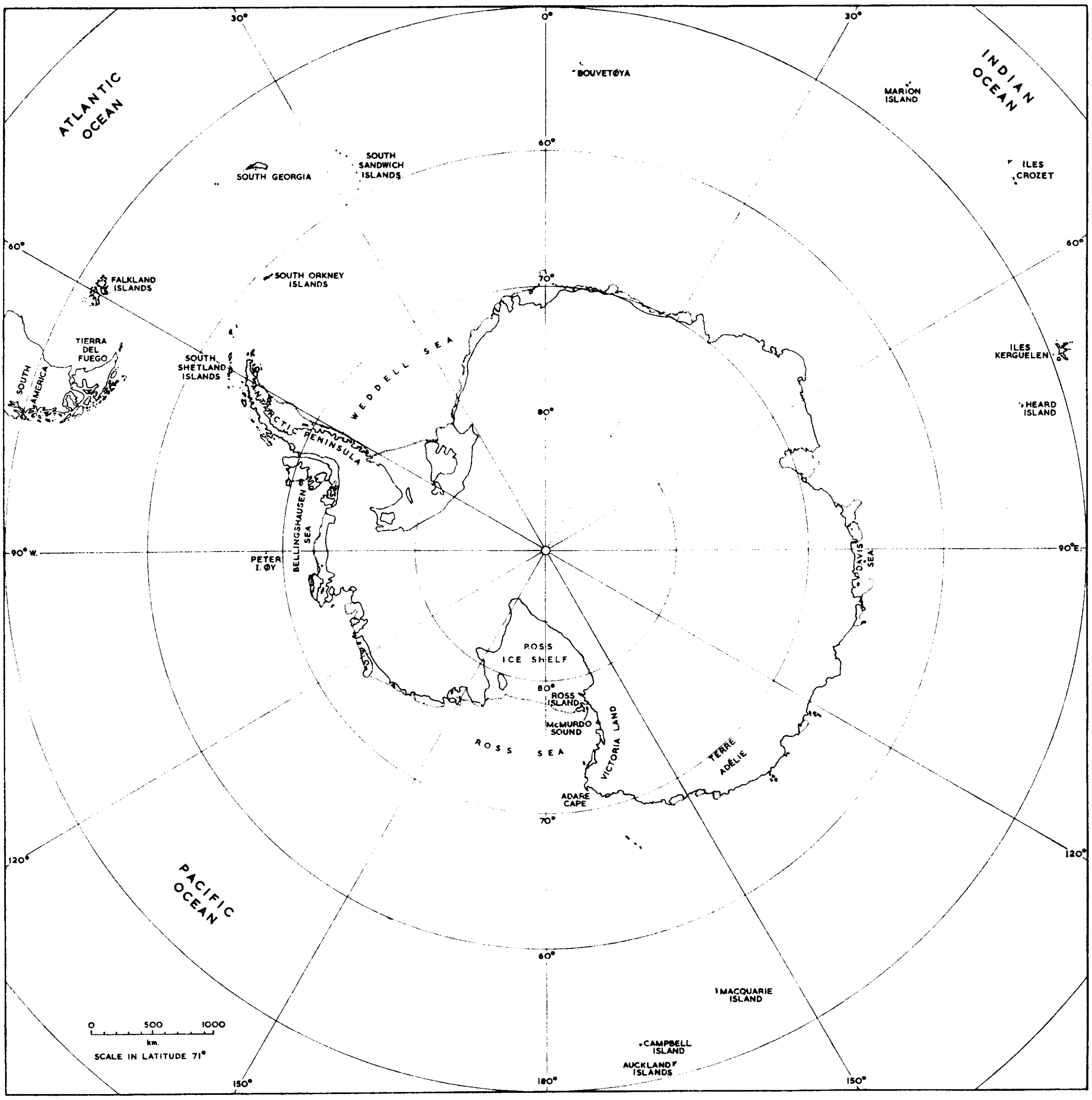

FIGURE 1
Antarctica and the Southern Ocean.

and is separated from it by the 1·6 km. wide Normanna Strait (Fig. 3). The island is triangular in shape, being 7 km. from north to south and 5 km. from east to west.

The central part of Signy Island is formed by a plateau 213–244 m. a.s.l. with several peaks rising to a maximum of 276 m. The edge of the plateau is sharply defined and characterized by many small cirques most of which terminate 30–61 m. a.s.l. Some of the cirques extend below sea-level, for depths in Paal Harbour, a drowned cirque, exceed 20 m. Areas of lowland which occur mainly on the east coast are covered with glacial drift (Matthews and Maling, 1967).

A wide variety of littoral conditions are found in the Borge Bay–Paal Harbour area (Fig. 4). Rocky shores may be steeply inclined or nearly flat, and the rock is either smooth or heavily dissected. Pools of

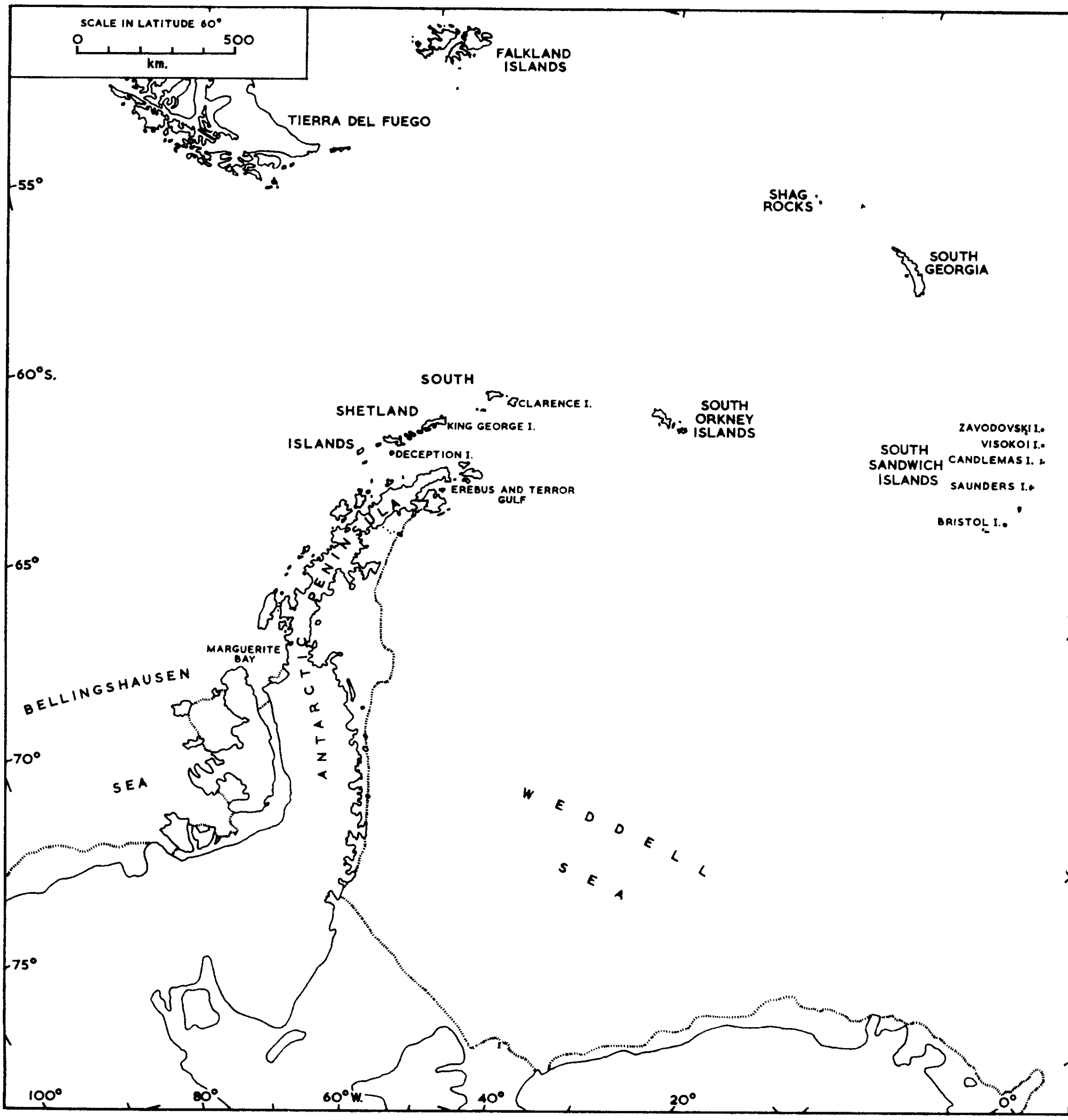

FIGURE 2

The Antarctic Peninsula and Scotia arc.

various sizes occur during the summer months. The very irregular local topography results in widely differing degrees of insolation and wave action on various shores. Boulder beaches occur in a number of areas and there are some littoral accumulations of shingle, e.g. Factory Cove. Areas of fine sand and mud with scattered boulders occur in some sheltered conditions, particularly at Elephant Flats where a shallow lagoon is protected from wave action by an old terminal moraine of Orwell Glacier.

The submarine topography is very irregular. Rock and boulder slopes occur under most shores and extend to a depth of 5–20 m. before being replaced by areas of sand and mud which slope down gradually to the east (Fig. 5). In inshore areas, these plains of sand and mud are interrupted by rock outcrops, boulders and morainic deposits. Although bottom deposits are of a mixed nature, there is a tendency for gravels and sands to occur in shallow water close to the shore, and muds and silts in deeper water farther offshore (Fig. 5).

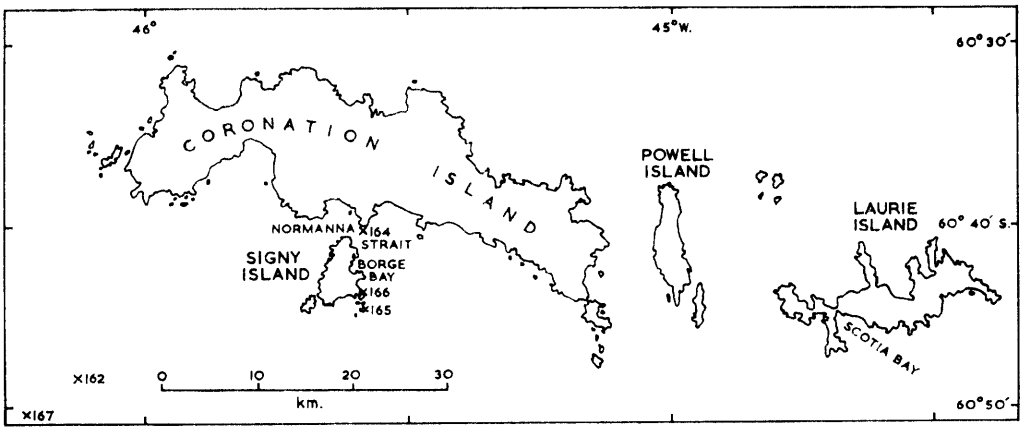

FIGURE 3

The South Orkney Islands. Positions of *Discovery* stations 162 and 164–167 are indicated.

C. METEOROLOGICAL

The passage from west to east of depressions to the south of Signy Island produces a prevalence of west and north-west winds. The British Antarctic Survey station is situated on the east side of the island and is thus sheltered from the main force of the prevailing winds both by the plateau of the island itself and by the mountains of Coronation Island. Winds from the east and south-east are fairly frequent, so that wave action in the littoral and immediate sub-littoral may occasionally be quite severe.

The annual temperature regime is typical of Antarctic maritime areas. During the summer months (December–April) the mean temperature is at or a little above freezing point, while during the coldest part of the year (July–September) values of −10° to −12° C are normal. Extreme temperatures during the year may range from +10° to below −30° C. Water temperatures rarely exceed 2·0° C during the summer, and fall to −1·9° C during the winter.

The formation of fast ice and the presence of pack ice around Signy Island are very variable. Fast ice usually persists for about 5 months in the year, often from May–June to October–November, but both this and the incidence of pack ice are influenced by climatic conditions in the Weddell Sea. The presence of an ice foot, on-shore freezing and the scouring effect of sea ice all combine to have a profound effect on the littoral flora and fauna.

The tidal range is about 2 m.

D. BIOLOGICAL

The following brief account of the fauna and flora of the littoral and sub-littoral is based on a published summary (Price and Redfearn, 1968) and on additional information supplied by J. H. Price, P. Redfearn and M. G. White, and on personal observations during two brief visits to Signy Island.

On rocky shores the algae *Porphyra*, *Ulothrix* and *Urospora* form zonal bands where they are sufficiently numerous to do so. Unless rock pools are present, or the substrate is dissected with cracks and crevices, the fauna is poor both in numbers and species, although the limpet *Patinigera polaris* colonizes the shore and may be common during the ice-free periods of the year. Shingle beaches are usually sterile, but sand and mud flats support a limited fauna of burrowing organisms.

At L.W.S. the algae *Leptosomia*, *Lithothamnia* and *Iridaea* occur on rocky substrates and in the immediate sub-littoral *Curdiea* is also found. *Patinigera* occurs at this level and in suitable areas stands of encrusting organisms (particularly Bryozoa, Porifera and hydroids) provide shelter for annelids, amphipods and nemertines. At 1–1·5 m. below L.W.S. the algae *Desmarestia menziesii* and *Ascoseira mirabilis* are frequently co-dominants, forming a narrow zone above the stands of *Desmarestia anceps* which extend to depths of about 9 m. The large bush-like form of *D. anceps* provides many micro-habitats for other organisms. Small epiphytic algae are common. Several species of mollusc (*Patinigera*, *Margarella*, etc.) crawl on the fronds which provide shelter for large numbers of amphipods such as *Atyloella magellanica*, *Pontogeneia antarctica*, *Bovallia gigantea* and *Paradexamine fissicada*. The holdfasts of these algae, and to a

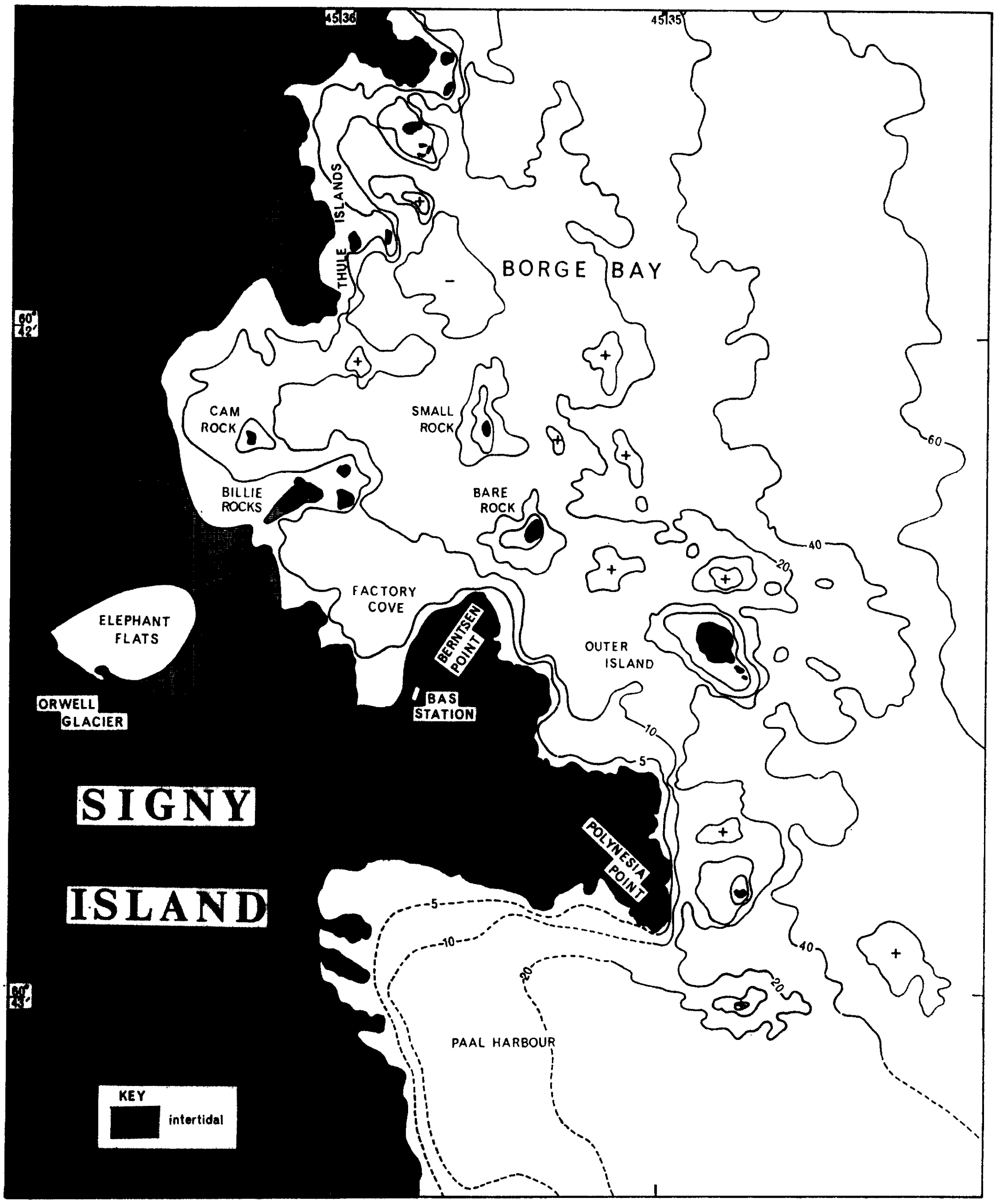

FIGURE 4

Submarine contours (in m.) in Borge Bay, Signy Island. (Reproduced from Admiralty chart No. 1775 with the sanction of the Controller, H.M.S.O., and of the Hydrographer of the Navy.)

lesser extent their stipes, support dense growths of sessile organisms (particularly small algae, Bryozoa, Porifera, spirorbid Annelida and hydroids). The epiphytes in their turn provide shelter for many small organisms, particularly annelids and the amphipods *Probolisca ovata*, *Jassa falcata* and *Parajassa georgiana*. Sponges of the genus *Iophon* frequently occur in rock crevices in this zone, and it is probable that the amphipod *Polycheria antarctica* is associated with these sponges in the same way that small dexaminids associate with sponges in European waters. Below the level of *D. anceps* and extending to at least 20 m. is a zone dominated by the alga *Phyllogigas grandifolius*. The epiphytes in this zone are generally rather more sparse than in the *D. anceps* zone but they may still be quite extensive. In both of these zones several

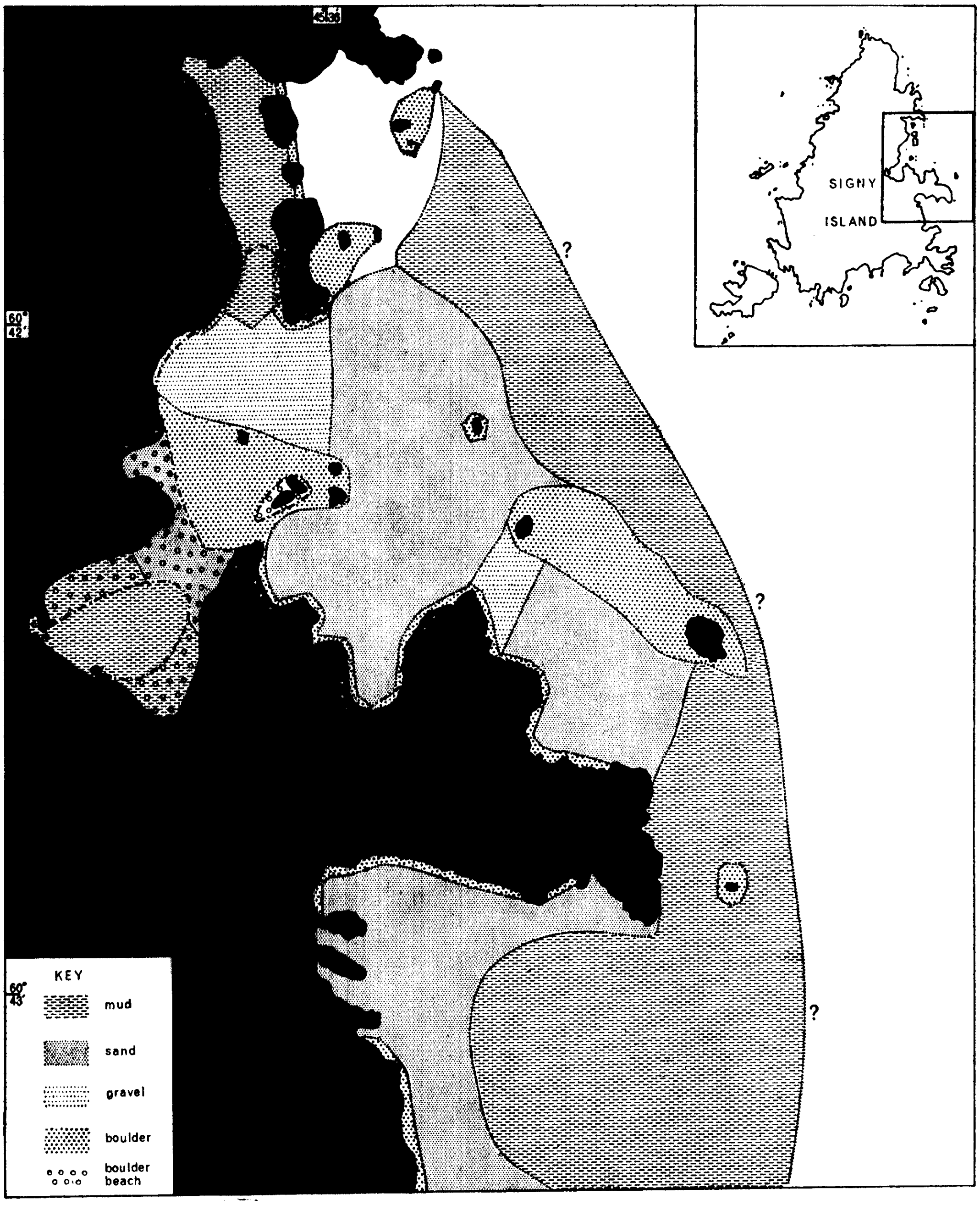

FIGURE 5

Substrate types in Borge Bay, Signy Island. (Based on data supplied by P. Redfearn and J. H. Price.)

species of asteroid and the isopod *Glyptonotus antarcticus* may be abundant. Several species of nototheniid fish also occur among the algae.

Sediment substrates support infaunas consisting mainly of molluscs and annelids. Also occurring in the sediments are Cumacea and a number of species of amphipod. Of the latter, *Cheirimedon femoratus*, *Lepidepecreum cingulatum*, *Tryphosella kergueleni* and *Parharpinia rotundifrons* occur mainly in sand while *Pseudeurystheus sublitoralis* and *Kuphocheira setimanus* are found in mud. Trawls over sediment bottoms frequently bring up large amounts of detached algae. The epifauna on these bottoms consists mainly of molluscs, echinoderms, serolid isopods and fish. There is some evidence that on sediments in water deeper than 20 m. echinoderms such as *Odontaster validus*, *Cryptasterias turqueti*, *Sterechinus neumayeri* and holothurians are important constituents of the fauna.

II. COLLECTING METHODS

COLLECTIONS in the littoral and sub-littoral were made during the period February 1964 to March 1965.

Material from the sub-littoral was obtained by free-diving techniques and by the use of conventional bottom-sampling equipment. During the summer months, work was carried out from a 4·88 m. open boat equipped with an outboard motor and small powered winch, and during the winter through holes in the fast ice.

The transect sections at Billie Rocks and Berntsen Point were worked by divers. Intensive collections were made at Billie Rocks from low water to a depth of 10 m. at which depth the rock and boulder bottom was replaced by a sand plain. The Berntsen Point site, which was more exposed to wave action, was less intensively collected. Large close-woven sacking bags with draw-strings at the neck were used to contain samples collected from transect stations. Spot dives were also made at various localities in Borge Bay and Paal Harbour.

Three types of bottom sampling equipment were used. A 0·91 m. Agassiz trawl was convenient to use from a small boat and good samples were obtained with it. In areas with dense stands of large algae the trawl tended to become fouled rather easily. Some samples were biased in that a single plant of *Desmarestia anceps*, which might be 6 m. long and have a holdfast 30 cm. across, completely filled the trawl. This problem was less evident with the 1·83 m. beam trawl. The beam trawl was less handy to use than the Agassiz trawl and imposed a greater drag on the boat. A 0·33 m. anchor dredge was used successfully, although it failed to sample adequately some of the deeper elements of the infauna in firm sandy substrates.

III. STATION LIST

Station number	*Locality*	*Date*	*Depth (m.)*	*Method of collection*	*Notes*
1	Berntsen Point	18.xii.64	Littoral	By hand	Boulder beach. Scattered Rhodophyceae
2	Elephant Flats	19.xii.64	Littoral	By hand	Boulder beach. Scattered Rhodophyceae
3	Elephant Flats	17.i.65	Littoral	By hand	Boulder beach. Scattered Rhodophyceae
4	Elephant Flats	3.ii.65	Littoral	By hand	Boulder beach. Scattered Rhodophyceae
5	Billie Rocks	12.ii.65	LW	By hand	Creviced rock with *Lithothamnia*, *Iridaea* sp., *Leptosomia simplex* (A. et E. S. Gepp) Kylin, *Desmarestia menziesii* J. Ag. (all algae)
6	Billie Rocks	12.ii.65	0·15–0·5	By diver	Creviced rock with *Lithothamnia*, *Iridaea* sp., *Leptosomia simplex* (A. et E. S. Gepp) Kylin, *Desmarestia menziesii* J. Ag. (all algae)
7	Billie Rocks	12.ii.65	0·5–0·8	By diver	Creviced rock with *Lithothamnia*, *Iridaea* sp., *L. simplex*, *D. menziesii*, *Desmarestia anceps* Montague, *Ascoseira mirabilis* Skottsberg, Porifera, Polyzoa
8	Billie Rocks	15.iii.65	1·4–1·7	By diver	Creviced rock with *Lithothamnia*, *D. anceps*, *Iophon/Phyllophora* association (sponge/alga), Porifera, Polyzoa
9	Billie Rocks	5.iii.65	1·6–1·9	By diver	Vertical creviced rock with *Lithothamnia*, *D. anceps*, *A. mirabilis*, *Iophon/Phyllophora*, Porifera, Polyzoa
10	Billie Rocks	5.iii.65	1·9–2·2	By diver	Vertical creviced rock with *Lithothamnia*, *D. anceps*, *A. mirabilis*, *Iophon/Phyllophora*, Porifera, Polyzoa
11	Billie Rocks	5.iii.65	2·2–2·5	By diver	Vertical creviced rock with *Lithothamnia*, *D. anceps*, *A. mirabilis*, *Iophon/Phyllophora*, Porifera, Polyzoa
12	Billie Rocks	4.iii.65	2·8–3·1	By diver	Solid rock inclined at 65° with *Lithothamnia*, *D. anceps*, *Desmarestia chordalis* J. D. Hooker et Harvey, *A. mirabilis*, Rhodophyceae, Porifera, Polyzoa
13	Billie Rocks	4.iii.65	3·1–3·4	By diver	Solid rock inclined at 65° with *Lithothamnia*, *D. anceps*, *Desmarestia chordalis* J. D. Hooker et Harvey, *A. mirabilis*, Rhodophyceae, Porifera, Polyzoa
14	Billie Rocks	5.iii.65	3·7–4·0	By diver	Rock inclined at 60° with *Lithothamnia*, *D. anceps*, Rhodophyceae, *Iophon/Phyllophora*
15	Billie Rocks	1.iii.65	4·0–4·3	By diver	Rock inclined to 60°, and some boulders with *Lithothamnia*, *D. anceps*, *Iophon/Phyllophora*, Porifera, Polyzoa
16	Billie Rocks	1.iii.65	4·3–4·6	By diver	Rock inclined to 60°, and some boulders with *Lithothamnia*, *D. anceps*, *Iophon/Phyllophora*, Porifera, Polyzoa
17	Billie Rocks	1.iii.65	4·6–4·9	By diver	Rock inclined to 60°, and some boulders with *Lithothamnia*, *D. anceps*, *Iophon/Phyllophora*, Porifera, Polyzoa

Station number	*Locality*	*Date*	*Depth* (m.)	*Method of collection*	*Notes*
18	Billie Rocks	27.ii.65	6·8–7·1	By diver	Rock inclined at 45–50° with overlying boulders and sand in crevices. *Lithothamnia*, *D. anceps*, Rhodophyceae, Polyzoa
19	Billie Rocks	23.ii.65 27.ii.65	7·1–7·4	By diver	Rock inclined at 45–50° with overlying boulders and sand in crevices. *Lithothamnia*, *D. anceps*, Rhodophyceae, Polyzoa
20	Billie Rocks	27.ii.65	7·4–7·7	By diver	Rock inclined at 45–50° with overlying boulders and sand in crevices. *Lithothamnia*, *D. anceps*, Rhodophyceae, Polyzoa
21	Billie Rocks	26.ii.65	7·7–8·0	By diver	Boulder slope inclined at 45–50° with *D. anceps*, *Phyllogigas grandifolius* (A. et E. S. Gepp)
22	Billie Rocks	26.ii.65	8·0–8·3	By diver	Boulder slope inclined at 45–50° with *D. anceps*, *Phyllogigas grandifolius* (A. et E. S. Gepp)
23	Billie Rocks	26.ii.65	8·3–8·6	By diver	Boulder slope inclined at 45–50° with *D. anceps*, *Phyllogigas grandifolius* (A. et E. S. Gepp)
24	Billie Rocks	1.iii.65	8·6–8·9	By diver	Boulder and sand slope inclined at 5–10° with *Lithothamnia*, *P. grandifolius*, *D. anceps*, Rhodophyceae, Polyzoa
25	Billie Rocks	1.iii.65	8·9–9·2	By diver	Boulder and sand slope inclined at 5–10° with *Lithothamnia*, *P. grandifolius*, *D. anceps*, Rhodophyceae, Polyzoa
26	Billie Rocks	1.iii.65	9·2–9·5	By diver	Boulder and sand slope inclined at 5–10° with *Lithothamnia*, *P. grandifolius*, *D. anceps*, Rhodophyceae, Polyzoa
27	Billie Rocks	4.iii.65	9·5–9·8	By diver	Loose boulders on sand substrate, bottom almost level with *Lithothamnia*, *P. grandifolius* and dense loose lying mass of *Desmarestia*
28	Berntsen Point	10.ii.65	1	By diver	Solid rock
29	Berntsen Point	10.ii.65	2	By diver	Solid rock
30	Berntsen Point	10.ii.65	2·7	By diver	Solid rock
31	Berntsen Point	9.ii.65	3·4–3·7	By diver	Solid rock
32	Berntsen Point	10.xii.64	3–4·5	By diver	Solid rock
33	Berntsen Point	21.iv.64	8–10	By diver	Vertical rock with boulder slope below
34	Berntsen Point	21.x.64	1–10	By diver	Solid rock and boulders with *Desmarestia* and *Phyllogigas*
35	Berntsen Point	9.ii.65	10	By diver	Gentle boulder slope running into sand
36	Observation Point	20.i.65	20	By diver	Solid rock
37	Near Billie Rocks	14.xi.64	9·8–10·5	Anchor dredge	Nearly flat sand and rock outcrops with algae

Station number	*Locality*	*Date*	*Depth* (m.)	*Method of collection*	*Notes*
38	Mirounga Flats	1.xi.64	5–10	Anchor dredge	Gravel and sand
39	Berntsen Point–Billie Rocks	16.iv.64	10–15	Anchor dredge	Sand
40	Between Berntsen Point and Bare Rock	19.vii.64	10+	Anchor dredge	Sand
41	Between Berntsen Point and Bare Rock	29.v.64	10–12	Anchor dredge	Sand
42	Between Bernsten Point and Bare Rock	29.v.64	10–12	Anchor dredge	Sand
43	Between Berntsen Point and Bare Rock	29.v.64	10–12	Anchor dredge	Sand
44	Paal Harbour	5.ii.65	20–25	Anchor dredge	Mud
45	Paal Harbour	13.iii.65	20–25	Anchor dredge	Mud and sand
46	Factory Cove–Berntsen Point	15.iv.64	6–14	Agassiz trawl	Close inshore over boulder slopes. *D. anceps*, *P. grandifolius* and Rhodophyceae dominant
47	Berntsen Point–Observation Bluff	15.iv.64	10–15	Agassiz trawl	Rocks, gravel and sand with *D. anceps* and Rhodophyceae
48	Bare Rock–Outer Islet	15.iv.64	5–10	Agassiz trawl	Boulders with *D. anceps*, *P. grandifolius* and Rhodophyceae
49	From Berntsen Point to north-east	29.vi.64	10–20	Agassiz trawl	Gravel and sand off Berntsen Point, sand and isolated rocks beyond. Some algae
50	Berntsen Point–Bare Rock	16.x.64	5–10	Agassiz trawl	Gravel and sand, some rocks with *D. anceps* and *P. grandifolius*
51	Billie Rocks–Bare Rock	10.xii.64	5–15	Agassiz trawl	Sand. Isolated boulders with algae
52	Outer Islet–Observation Bluff	14.ix.64	20	Agassiz trawl	Gravel and sand, sand with some rock. Algae on rocks
53	Outer Islet–Observation Bluff	20.ix.64	20	Agassiz trawl	Gravel and sand, sand with some rock
54	Paal Harbour	19.iv.64	5–15	Agassiz trawl	Boulder, gravel and sand with *D. anceps*
55	Paal Harbour	8.x.64	49	Agassiz trawl	Mud and rock, *D. anceps* and *P. grandifolius*
56	Borge Bay	3.ii.64	10–15	Beam trawl	Sand
57	Bare Rock–Small Rock	27.v.64	10–15	Beam trawl	Sand and gravel, some rock
58	Off Bare Rock	22.vii.64	15	Beam trawl	Boulders and sand
59	Elephant Flats–Billie Rocks	1.vii.64	5–6	Agassiz trawl	Boulders
60	Normanna Strait off Balin Point	9.iii.65	37–55	Long line	Mud

IV. SYSTEMATIC ACCOUNT

In the following account, 60 species from Signy Island are described. Several species not occurring in the collection are also discussed; these are included in square brackets. The occurrences and numbers of all species collected by Redfearn in 1964–65 are listed in Appendix B.

Peraeon appendages are numbered relative to the respective peraeon segments, i.e. gnathopods 1 and 2, and peraeopods 3–7. Lengths of specimens were measured from the tip of the rostrum to the tip of the telson. Sex determinations have been based on the presence of genital papillae in the male and oostegites in the female; specimens possessing neither have been assumed to be juveniles unless size considerations indicated maturity. If the number of individuals of any species at a single station exceeded 100 (rarely 50), the proportions given for males, ovigerous females, non-ovigerous females and juveniles were based on the analysis of 100 specimens.

A few specimens of most species have been deposited at the British Antarctic Survey station at Signy Island, at the British Antarctic Survey Zoology Section and at the National Institute of Oceanography. The rest of the material is housed at the British Museum (Nat. Hist.).

Localities mentioned under "geographical distribution" are given either in Figs. 1–3 or in Appendix D.

SUB-ORDER GAMMARIDEA

Family Lysianassidae

Stebbing, 1906, p. 8.
Hurley, 1963, p. 1–5.
Barnard, 1969, p. 294–317 (key to genera).

Genus *Cheirimedon* Stebbing

Stebbing, 1888, p. 638, 1906, p. 66–67.
Schellenberg, 1926, p. 262–63.
Barnard, 1969, p. 333–35.

Cheirimedon femoratus (Pfeffer)
Fig. 6a–c

Anonyx femoratus Pfeffer, 1888, p. 93, taf. 2, fig. 2; Stebbing, 1906, p. 84.
Cheirimedon femoratus Chilton, 1912, p. 467, 1913, p. 57; Schellenberg, 1931, p. 30; Barnard, 1932, p. 48; Nicholls, 1938, p. 23, fig. 8; Stephensen, 1938*a*, p. 236, 1947, p. 34.
Cheirimedon dentimanus Chevreux, 1905, p. 159, fig. 1, 1906*e*, p. 2, figs. 1–4; Stebbing, 1906, p. 720; Chevreux, 1913, p. 92.

Occurrence. (12 stations, 83 specimens; ♂♂ 7·5–12 mm., ♀♀ 9–14 mm., juvs. 3–7 mm.).

1. Sta. 8 1 ♀; 2. Sta. 16 1 juv.; 3. Sta. 17 1 ♂, 1 juv.; 4. Sta. 20 1 ♀; 5. Sta. 25 1 ♀; 6. Sta. 37 1 ♂, 2 ♀♀, 8 juv.; 7. Sta. 38 12 ♂♂, 6 ♀♀, 2 juv.; 8. Sta. 41 7 ♂♂; 9. Sta. 42 1 ♂; 10. Sta. 43 1 ♂; 11. Sta. 45 4 juv.; 12. Sta. 54 8 ♂♂, 25 ♀♀ (2 ovig.).

Remarks. The present material is in close agreement with the descriptions and figures of Pfeffer and Chevreux (1906*e*).

The epistome of this species is variable. Chevreux (1906*e*, fig. 2A) showed the typical form in which the epistome, although convex, does not project beyond the upper lip. In some of the *Discovery* material and in some of the present collection, however, the epistome is more convex (Fig. 6b and c), although in none of the specimens examined does the condition reach that shown by Nicholls.

Chevreux (1906*e*, fig. 4) illustrated the concave palm of gnathopod 1 of the male. This character is not developed until full sexual maturity has been attained. The concave palm, and calceoli on both antennae are found only in specimens of 9–10 mm. or more. The small male (7·5 mm.) from sta. 37 has convex palms indistinguishable from those of the female and no calceoli on the antennae. The sex of this specimen can be determined only by the presence of small genital papillae. Some of the smaller specimens from sta. 38 and 54 have calceoli on the antennae, but the condition of the palm is intermediate between the female and the adult male form.

The dorsal profile of pleon segment 3 is somewhat variable. Both Pfeffer and Chevreux show it as being just convex and hardly raised into a boss. Some of the specimens from Signy Island are similar to this, but others, particularly the male from sta. 43, show a noticeably greater development of the dorsal profile (Fig. 6a).

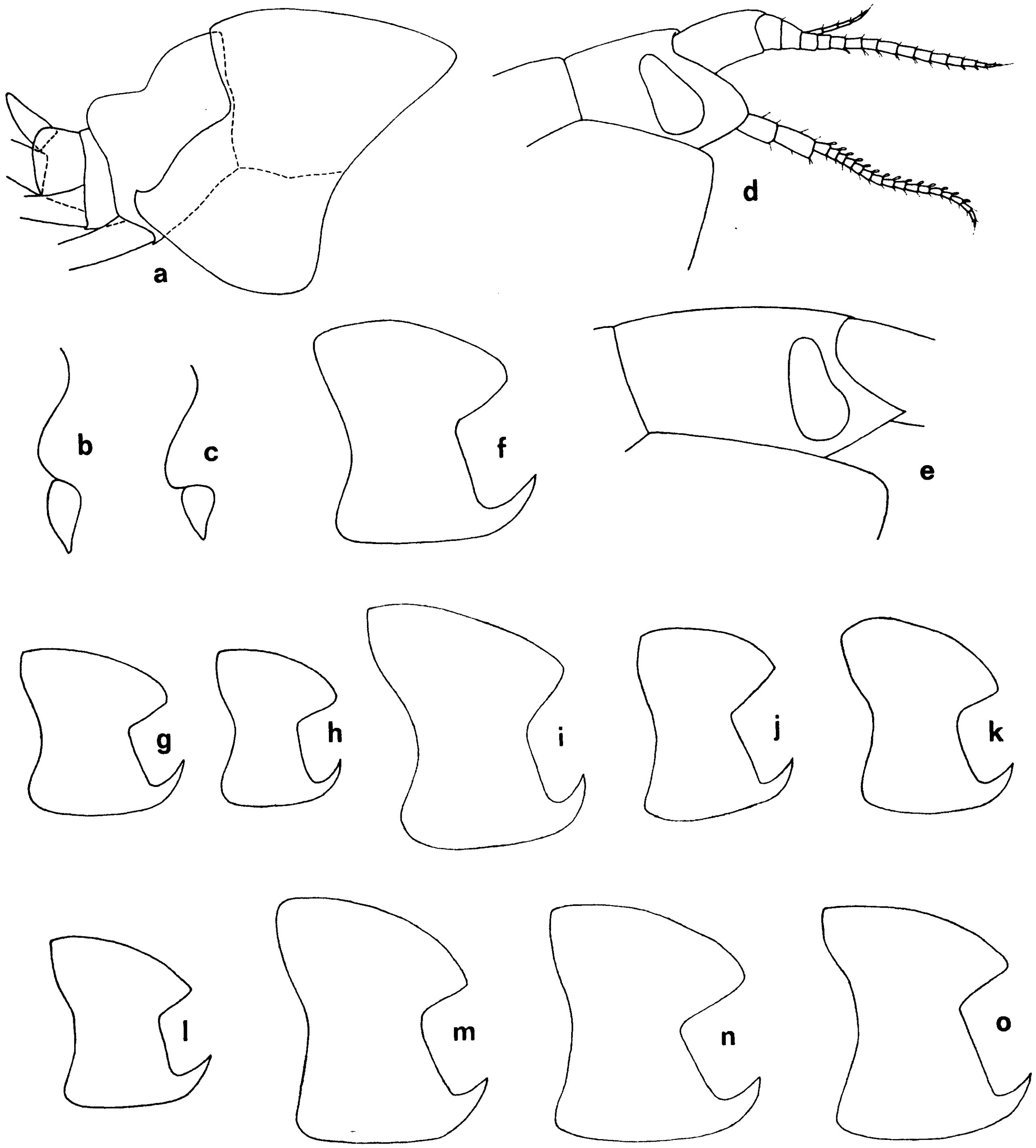

FIGURE 6

Cheirimedon femoratus Pfeffer. *a*, epimeron 3 and urosome, 10 mm. ♂, sta. 43; *b*, epistome and upper lip, 13 mm. ♀, sta. 54; *c*, epistome and upper lip, 14 mm. ♀, *Discovery* sta. 145. *Lepidepecreum cingulatum* Barnard. *d*, head and antennae, 7 mm. ♂, sta. 48. *Tryphosella kergueleni* (Miers). *e*, head, 15 mm. ♀, sta. 49; *f*, pleon segment 3, syntype, 13 mm. ovig. ♀, Iles Kerguelen; *g*, 11 mm. ♀, sta. 40; *h*, 10 mm. ♀, *Challenger* sta. 149H; *i*, 14 mm. ♀, Duke of York Island; *j*, 12 mm. ♀, sta. 40; *k*, 14 mm. ♀, *Discovery* sta. 144; *l*, 11 mm. ♀, *Discovery* sta. 144; *m*, 14 mm. ♂, *Gauss* winter quarters, 9 November 1902; *n*, 14 mm. ♂, *Gauss* winter quarters, 9 November 1902; *o*, 14 mm. ovig. ♀, *Discovery* sta. 174.

Pfeffer's figure of the telson bears little resemblance to the telson of specimens in this collection, but both Chilton and Barnard have attributed this to the fact that Pfeffer did not dissect his specimens.

Habitat. Usually associated with sediment substrates, with or without associated weed, but also on stony and rocky bottoms, February to May and during November, 1·5–25 m.

Breeding. Ovigerous females in April; recorded by Schellenberg in May and by Barnard in January, February and March.

Distribution. Graham Land (Booth Island, Port Charcot, Hugo Island, Port Lockroy, Wiencke Island, Melchior Islands, Seymour Island) 4–126 m.; South Shetland Islands (Deception Island) littoral–75 m.; South Orkney Islands (Signy Island, Laurie Island) 7–18 m.; South Sandwich Islands (Visokoi Island, Zavodovski Island) 10–15 m.; South Georgia (Cumberland Bay, Stromness Bay, Coal Harbour) 5–310 m.; Terre Adélie (Commonwealth Bay) 5–46 m.

Genus *Lepidepecreum* Bate and Westwood

Bate and Westwood, 1868, p. 509.
Stebbing, 1906, p. 78.
Gurjanova, 1951, p. 274–75, 1962, p. 323–25.
Barnard, 1969, p. 348.

Lepidepecreum cingulatum Barnard
Fig. 6d

Lepidepecreum cingulatum Barnard, 1932, p. 60, fig. 22.

Occurrence. (5 stations, 133 specimens; ♂♂ 4–7 mm., ♀♀ 4–8·5 mm., juvs. 2–3·5 mm.).
1. Sta. 18 1 ♀; 2. Sta. 38 15 ♂♂, 47 ♀♀ (5 ovig.), 24 juv.; 3. Sta. 48 1 ♂; 4. Sta. 54 5 ♂♂, 39 ♀♀ (19 ovig.); 5. Sta. 56 1 ♂.

Remarks. Barnard assigned his new species to the genus *Lepidepecreum* on the grounds of the resemblance of the mouth parts and gnathopod 1 to those of *Lepidepecreum umbo* (Goës). *L. cingulatum* can be distinguished from all other species of the genus by the lack of dorsal processes, particularly on pleon segment 4, and by the feebly indurated integument. Barnard also noted that the first article of the peduncle of antenna 1 is not produced as is the case in *L. umbo* and other species described at that time. Gurjanova (1962) has described several new species of *Lepidepecreum* including *L. alectum* and *L. kasatka*, in which the first article of the peduncle of antenna 1 is hardly produced, thus agreeing with *L. cingulatum* (Fig. 6d). The male of *L. cingulatum* is similar to Gurjanova's species in that there is no sexual dimorphism in uropod 3, nor is there any great disparity in length between the second antennae of male and female. The second antennae of an 8 mm. female have 13–14 articles, while those of a 7 mm. male have 17–18 articles of which all but the distal two or three bear calceoli antero-distally.

Habitat. Clean sand, or sand and gravel in February, April and November, 5–15 m. Is fed on by *Notothenia* sp.

Breeding. Ovigerous females with stage i eggs in April and stages ii–iv in November. Barnard (1932) recorded breeding in February. Females carry 9–13 eggs at one time. Stage i eggs average 0·49 mm. long (0·47–0·53 mm.) by 0·38 mm. wide (0·36–0·41 mm.).

Distribution. South Orkney Islands (Signy Island) 10 m.

Genus *Tryphosella* Bonnier

Sars, 1891, p. 75–76 (*Tryphosa*, not *sensu* Boeck) (part), 91–92 (*Hoplonyx*) (part).
Bonnier, 1893, p. 170.
Stebbing, 1906, p. 68–69 (*Tryphosa*, not *sensu* Boeck), 73–74 (*Tmetonyx*) (part).
Stephensen, 1925, p. 101–02 (*Tryphosa*).
Barnard, 1962*d*, p. 28–30 (*Tryphosa*) (part).
Hurley, 1963, p. 131–32 (*Tryphosa*).
Barnard, 1969, p. 365–66.

Barnard (1962*d*) has discussed the genera *Tryphosa* Boeck and *Tmetonyx* Stebbing, and shown that there is no valid reason for maintaining the two as distinct. The unequal plates of maxilla 2 of *Tmetonyx*, a character used by Stebbing to distinguish the two genera, show a complete intergradation with the condition of maxilla 2 seen in *Tryphosa*. *Tryphosa* and *Tmetonyx* should therefore be considered as synonymous.

More recently, Barnard (1969) has considered this synonymy in a wider context and is of the opinion that *Tmetonyx* should be retained for the type species only (*Oniscus cicada* Fabricius) and that the remaining species should be included in *Tryphosa* (*sensu* Sars). Barnard (1969) has also shown that the concepts of *Tryphosa* as understood by Boeck and Sars were not the same. Boeck (1876) selected *Anonyx nanus* Krøyer as the type species of *Tryphosa*, and Sars nominated *Anonyx minutus* as the type species of *Orchomenella*. As these two species are now considered congeneric, *Orchomenella* must be dropped in favour of *Tryphosa*. Barnard (1964*a*) has, however, shown the necessity of combining *Orchomenella* with *Orchomene*. As *Orchomene* Boeck has page preference over *Tryphosa*, the former name must stand, and the "*Tryphosa*" concept of Sars be re-named. Barnard (1969) has shown that the next available name is *Tryphosella* Bonnier 1893, which was intended to replace *Tryphosa*, as used by Sars, for a group of species distinct from *Orchomenella* Sars (= *Orchomene* Boeck). Thus *Tryphosella* contains all the species assigned to *Tryphosa* and *Tmetonyx* since the completion of Sars' (1895) monograph except the type species of each (Barnard, 1969).

Tryphosella kergueleni (Miers)
Figs. 6e–o and 7a–u

Lysianassa kergueleni Miers, 1875, p. 74.
Anonyx kergueleni Miers, 1879, p. 207, pl. 11, fig. 4.
Hippomedon kergueleni Stebbing, 1888, p. 625, pl. 8.
Hoplonyx kergueleni Walker, 1903, p. 51 (part).
Tryphosa kergueleni Stebbing, 1906, p. 69; Walker, 1907, p. 16 (part, part = *Tryphosa carinata*); Strauss, 1909, p. 47 (not ♂, = *Tryphosa carinata*); Chilton, 1909*a*, p. 617; Shoemaker, 1914, p. 74; Schellenberg, 1926, p. 266, fig. 15 (part), 1931, p. 34; Barnard, 1932, p. 49, fig. 13; Stephensen, 1938*a*, p. 237, 1947, p. 34; ? Nicholls, 1938, p. 25, fig. 10; not Barnard, 1930, p. 327 (= *Tryphosa major*); not Barnard, 1962*d*, p. 31, fig. 15.

Occurrence. (11 stations, ca. 455 specimens; ♂♂ 8–13 mm., ♀♀ 7·5–15 mm., juvs. 3–8 mm.).

1. Sta. 25 1 juv.; 2. Sta. 37 ca. 180 specimens (8% ♂♂, 5% ovig. ♀♀, 7% ♀♀, 80% juv.); 3. Sta. 38 5 ♂♂, 17 ♀♀ (6 ovig.), 5 juv.; 4. Sta. 39 1 ♂, 1 ♀, 14 juv.; 5. Sta. 40 45 ♂♂, 31 ♀♀ (8 ovig.), 39 juv.; 6. Sta. 41 2 ♀♀ (1 ovig.), 9 juv.; 7. Sta. 42 16 ♂♂, 23 ♀♀ (14 ovig.), 20 juv.; 8. Sta. 43 13 juv.; 9. Sta. 45 1 ♀, 9 juv.; 10. Sta. 49 2 ♀♀ (1 ovig.); 11. Sta. 50 6 ♂♂, 15 ♀♀ (10 ovig.).

Remarks. The above specimens agree, with a few minor differences, with the descriptions and figures of Miers (1879) and Stebbing (1888).

Miers stated that there are only three to four spines at the apex of the outer plate of maxilla 1. At first sight this appears true but on closer examination 11 spines can be made out: four large and two smaller ones in a row at the apex and five others set just below the apical row.

Stebbing's (1888, pl. 8) figure of gnathopod 2 is an oblique view. The appendage is much closer in form to that typical of the Lysianassidae (Fig. 7u).

Eyes have not previously been reported in this species. Some specimens from station 50, which had been preserved in very weak formalin were found to have large reniform eyes (Fig. 6e), the colour of which was bright crimson. This colour was lost in alcohol and in 4% formalin, very rapidly in the case of the former and after 1 week in the latter. No macroscopic trace of the eye remains.

In view of Barnard's (1932) distinction of "typical" and "hypsolophic" forms of this species, specimens described by Miers (1875), Stebbing (1888), Walker (1903, 1907) and Barnard (1930, 1932), and material from the present collection were examined (Figs. 6 and 7). The separation of the *Discovery* material into two forms is by no means as clear-cut as might be expected from Barnard's (1932, fig. 13) figure. A comparison of "typical" forms from *Discovery* sta. 174 with "hypsolophic" forms from *Discovery* sta. 144 shows that, while the bosses on pleon segment 4 differ both in shape and height, the differences in the degree of projection of the upper lip are insignificant. Specimens from other localities differ only slightly in the condition of the upper lip. Variation in the dorsal profile of pleon segment 4 is more marked. In most cases, specimens from any one locality were found to be very similar in the form of the upper lip and the dorsal profile of pleon segment 4. Exceptions to this are *Discovery* specimens from sta. 144 and material from several stations collected by Redfearn (stations 37, 40, 42 and 50). In all these samples gradations between extremes were found to exist (see Fig. 7a–t). Schellenberg (1926) and Stephensen (1938*a*) recorded specimens corresponding to both of Barnard's forms in single samples. Also shown in Fig. 6f–o are the third pleon segments from various specimens, illustrating the differences in length and curvature of the

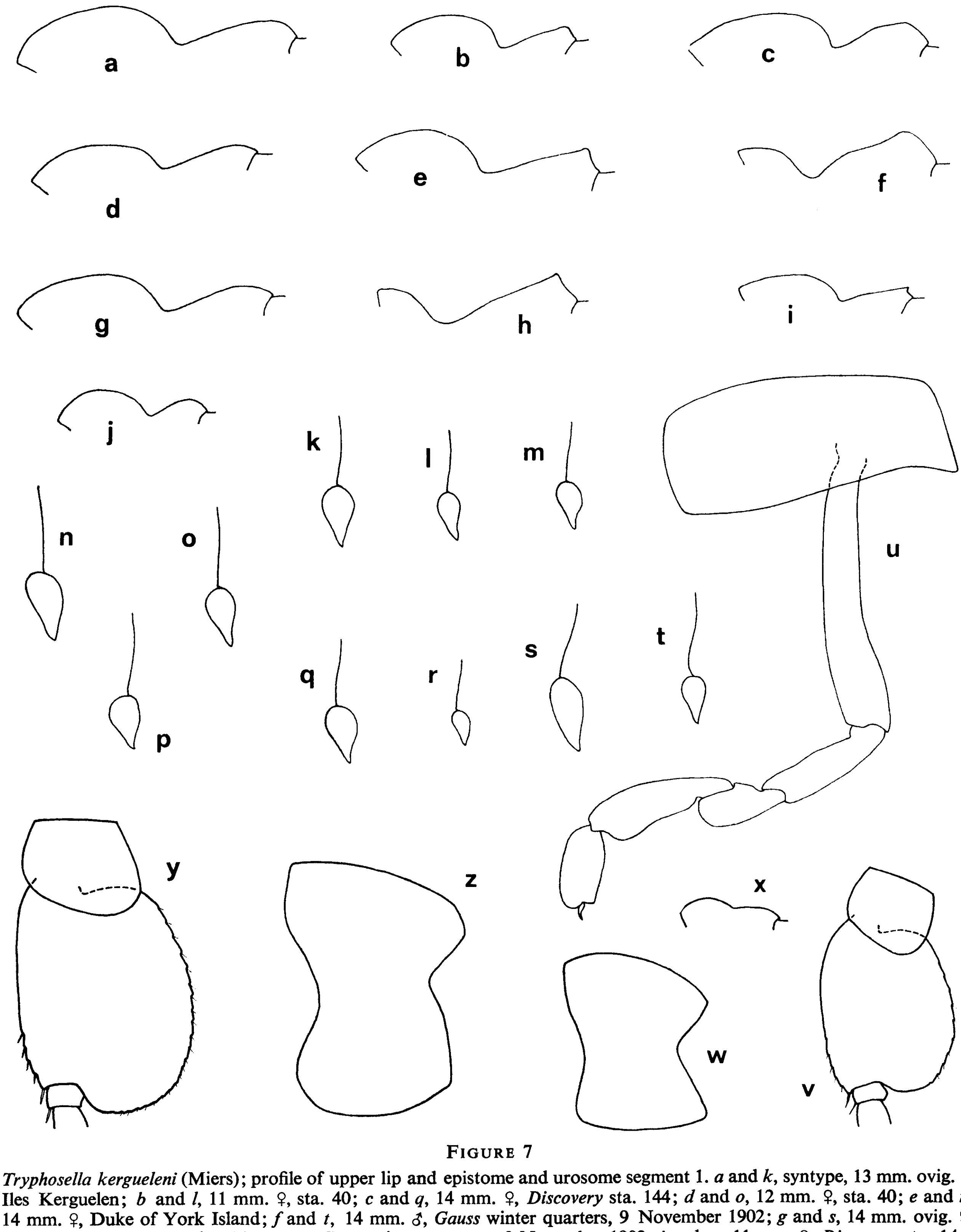

FIGURE 7

Tryphosella kergueleni (Miers); profile of upper lip and epistome and urosome segment 1. *a* and *k*, syntype, 13 mm. ovig. ♀, Iles Kerguelen; *b* and *l*, 11 mm. ♀, sta. 40; *c* and *q*, 14 mm. ♀, *Discovery* sta. 144; *d* and *o*, 12 mm. ♀, sta. 40; *e* and *n*, 14 mm. ♀, Duke of York Island; *f* and *t*, 14 mm. ♂, *Gauss* winter quarters, 9 November 1902; *g* and *s*, 14 mm. ovig. ♀, *Discovery* sta. 174; *h* and *p*, 14 mm. ♂, *Gauss* winter quarters, 9 November 1902; *i* and *m*, 11 mm. ♀, *Discovery* sta. 144; *j* and *r*, 10 mm. ♀, *Challenger* sta. 149H; *u*, gnathopod 2, 12 mm. ♂, sta. 40 (setae omitted). *Tryphosella* cf. *triangularis*, 6 mm. juv., sta. 11. *v*, basal article, peraeopod 7; *w*, pleon segment 3; *x*, urosome segment 1. *Tryphosella triangularis* (Barnard), syntype, 7 mm. juv., *Discovery* sta. 144; *y*, basal article, peraeopod 7. *Orchomene rotundifrons* (Barnard), syntype, 11 mm. ♀, *Discovery* sta. 174. *z*, pleon segment 3.

produced posterior-distal angle. Intergradation shows that the separation of the two forms described by Barnard (1932) is not justified.

The single specimen of *T. kergueleni* (*sensu* Barnard, 1930) has been re-determined as *Tryphosella major* Barnard. All reported material of *T. kergueleni*, with the exception of that of Nicholls, has only two setae on the inner plate of maxilla 1. It seems probable, therefore, that the specimens collected by the *Aurora* do not belong to this species.

The normal maximum size of *T. kergueleni* is 15–17 mm. Walker (1903) included under *T. kergueleni* specimens later described by Hurley (1965) as *Tryphosites capadarei.** The two species bear a strong superficial resemblance to each other, particularly in the strongly produced and upcurved posterior ventral angle of pleon segment 3. The two large specimens obtained by *Gauss* (Schellenberg, 1926) on 26 February 1902 are not *T. kergueleni*; indeed it is doubtful whether they belong to the genus.

The single specimen assigned to *T. kergueleni* by Barnard (1962*d*) is not conspecific with *T. kergueleni* (*sensu* Miers). It differs from the type material in the less acute eye lobes, the stouter, shorter peduncle of antenna 1, the length of the dactyl of gnathopod 1, the shorter extension of the posterior ventral angle of pleon segment 3, the narrower rami of uropod 3 and the absence of spines on the dorsal surface of the telson.

Habitat. Mostly on sandy bottoms, also on gravel or mud during March–July, October and November, 5–25 m.

Breeding. Females with eggs have been obtained in May, June, July, October and November. There is no evidence for a restricted breeding season as occurs in *Bovallia gigantea.* Barnard's (1932) records of ovigerous females in the period December–March indicate that breeding occurs throughout the year.

Distribution. Graham Land (Paulet Island) 100–150 m.; South Shetland Islands (Deception Island, Bridgeman Island) 5–750 m.; South Orkney Islands (Signy Island) 10 m.; South Sandwich Islands (Visokoi Island) 10–15 m.; South Georgia (Cumberland Bay, Stromness Bay, Bay of Isles, Coal Harbour) 12–310 m.; Iles Kerguelen 37–232 m.; Davis Sea (*Gauss* winter quarters) 0–385 m.; South Victoria Land (Duke of York Island, Cape Adare, Cape Wadworth, McMurdo Sound) 11–48 m.; New Zealand (Snares Island, Lyttleton Harbour) 91 m.

Tryphosella cf. *triangularis* Barnard

Fig. 7v–x

Tryphosa triangularis Barnard, 1932, p. 51–52, fig. 16.

Occurrence. (1 station, 1 specimen).

1. Sta. 11 1 juv.

Remarks. This specimen is damaged but is doubtfully referred to *T. triangularis* as it agrees with the type material in the condition of the head lobes, epistome, gnathopods and uropod 3. It differs in the less prominent boss on pleon segment 4, the stouter peduncle of antenna 1, the less produced posterior-ventral margin of the basal of peraeopod 7 and the more produced posterior distal margin of epimera 3. The minute notch and seta shown on the left side of this segment are absent from the right. The boss on pleon segment 4 of this specimen is a little less prominent than that of the smallest (5 mm.) of Barnard's material. Peraeopod 7 article 2 of a 7 mm. juvenile from *Discovery* sta. 144 is figured for comparison (Fig. 7y).

Habitat. The specimen was taken among epizoic growths on rock under an algal cover at a depth of 2–2·5 m.

Breeding. Barnard recorded ovigerous females in December and January.

Distribution. South Georgia (Cumberland Bay, Stromness Bay, Undine Harbour, lat. 53°52′S., long. 36°08′W.) 17–178 m.

* It was noted during examination of these specimens and of the type that the tooth-like projection, which led Hurley to place the species in the genus *Tryphosites*, is formed by the upper lip and not the epistome. The generic position is therefore incorrect, and the species is, in fact, identical with *Tryphosa carinata* Schellenberg. *T. carinata* was referred to *Tmetonyx* by K. H. Barnard (1932). J. L. Barnard (1962*d*) has fused *Tmetonyx* with *Tryphosa*, but excluded Schellenberg's species on the grounds of the produced upper lip. It seems probable that *T. carinata* will require a new genus in Hurley's (1963) sub-family Uristidinae.

Genus *Orchomene* Boeck

Boeck, 1871, p. 114–15.
Boeck, 1871, p. 117 (*Tryphosa*).
Sars, 1890, p. 59–60 (*Orchomene*), 66 (*Orchomenella*), 1891, p. 73–74 (*Orchomenopsis*).
Stebbing, 1906, p. 44 (*Orchomene*), 81 (*Orchomenella*), 83–84 (*Orchomenopsis*).
Schellenberg, 1926, p. 245–46 (*Allogaussia*).
Barnard, 1932, p. 64–65 (*Allogaussia*), 68 (*Orchomenella*).
Hurley, 1963, p. 118 (*Orchomenella*), 133–34 (*Allogaussia*).
Barnard, 1964*a*, p. 82–89 (key to species).
Barnard, 1969, p. 353–54.

Barnard (1964*a*) has discussed the genera *Orchomene*, *Orchomenella*, *Orchomenopsis* and *Allogaussia*, and examined those characters which have been used to separate them. The intergradations shown by the epistome (flat to strongly produced), third epimeron (smooth to coarsely serrate), fifth coxa (unproduced to strongly produced posterior lobe) and telson (apically rounded to deeply cleft) suggest that the separation of the four genera is arbitrary. The combinations of characters shown (Barnard, 1964*a*) by various species demonstrates that such a separation is difficult to maintain.

Hurley (1963) has retained *Allogaussia* as a distinct genus containing five species: *A. paradoxa* Schellenberg, *A. galeata* Schellenberg, *A. litoralis* Schellenberg, *A. navicula* Barnard and *A. recondita* Stasek. *Orchomenella franklini*, *O. pinguides* and *Allogaussia lobata* (= *O. pinguides*, see Hurley 1965) are excluded by their partially cleft telsons. Hurley separated the five species assigned to *Allogaussia* from *Orchomene* and *Orchomenella* by their uncleft telsons and strongly expanded peraeopod 5 basal articles. As these characters are extremes of morphological trends within the *Orchomene–Orchomenella* complex and are overlapped by species in that complex, I accept Barnard's (1964*a*) fusion of *Orchomene* Boeck, *Orchomenella* Sars, *Orchomenopsis* Sars and *Allogaussia* Schellenberg under Boeck's name. Barnard (1969) has shown that *Orchomenella* is a junior synonym of *Tryphosa* (*sensu* Boeck) and that as *Orchomenella* is a synonym of *Orchomene*, *Tryphosa* must also be included in *Orchomene*.

Orchomene nodimanus (Walker)

Orchomenopsis nodimanus Walker, 1903, p. 44, pl. 7, figs. 13–17; Chilton, 1912, p. 473, 1925, p. 176.
Orchomenopsis nodimana Stebbing, 1906, p. 721.
Orchomenella nodimanus Barnard, 1932, p. 68, pl. 27; Nicholls, 1938, p. 36, fig. 16.
Orchomene nodimanus Barnard, 1964*a*, p. 89.

Occurrence. (2 stations, 3 specimens; ♀♀ 7·5–11 mm.).

1. Sta. 45 2 ♀♀; 2. Sta. 50 1 ♀.

Remarks. These specimens have been compared in detail with Walker's syntypes from which they differ only in their smaller size.

Habitat. Mud and muddy gravel between boulders, 5–25 m.

Distribution. South Orkney Islands (Laurie Island) 16–18 m.; Victoria Land (Cape Adare) 48 m. (The locality of Nicholls' specimen is unknown.)

Orchomene rotundifrons (Barnard)
Fig. 7z

Orchomenella rotundifrons Barnard, 1932, p. 72, figs. 27c and 30.
Orchomene rotundifrons Barnard, 1964*a*, p. 87.

Occurrence. (6 stations, 85 specimens; ♂♂ 5–8 mm., ♀♀ 5–11 mm., juvs. 2–4·5 mm.).

1. Sta. 25 2 juv.; 2. Sta. 26 1 juv.; 3. Sta. 50 23 ♂♂, 30 ♀♀ (1 ovig.), 2 juv.; 4. Sta. 54 1 ♂, 2 ♀♀; 5. Sta. 57 1 ♂, 1 juv.; 6. Sta. 58 1 ♂, 2 ♀♀, 19 juv.

Remarks. The dorsal profile of pleon segment 4 is quite characteristic even in very small animals. Pleon segment 3 is illustrated (Fig. 7z) as Barnard's (1932, fig. 27c) drawing is rather misleading.

None of the males in the present collection shows any increase in length of antenna 2 indicating, possibly that none are fully mature.

Habitat. Occurs on mixed grounds, usually with algae, 5–15 m, *Breeding.* A single female with 15 stage i eggs was taken in October. Barnard recorded an ovigerous female in March.

Distribution. South Shetland Islands (Deception Island) 5–10 m.

FAMILY PHOXOCEPHALIDAE

Stebbing, 1906, p. 133–34.
Barnard, 1960, p. 179–81.
Barnard, 1969, p. 412–15 (key to genera).

Genus *Parharpinia* Stebbing

Stebbing, 1899*c*, p. 207, 1906, p. 147.
Tattersall, 1922, p. 4–6.
Pirlot, 1932, p. 59–62 (as *Pontharpinia*, part).
Gurjanova, 1938, p. 274, 1951, p. 387–88.
Barnard, 1960, p. 182 (as *Paraphoxus*, part).

Parharpinia rotundifrons Barnard
Fig. 8a and b

Parharpinia rotundifrons Barnard, 1932, p. 104, fig. 53.
Pontharpinia rotundifrons Stephensen, 1947, p. 44, fig. 17.
Paraphoxus rotundifrons Barnard, 1960, p. 278.

Occurrence. (15 stations, ca. 1,063 specimens; ♂♂ 5·5–7·5 mm., ♀♀ 5–8 mm., juvs. 2–6 mm.).

1. Sta. 4 1 ovig. ♀, 3 juv.; 2. Sta. 17 1 juv.; 3. Sta. 18 1 ovig. ♀; 4. Sta. 37 ca. 450 specimens (8% ♂♂, 4% ovig. ♀♀, 24% ♀♀, 64% juv.); 5. Sta. 38 11 ♂♂, 39 ♀♀ (13 ovig.), 54 juv.; 6. Sta. 39 3 ♂♂, 9 ♀♀ (8 ovig.), 37 juv.; 7. Sta. 40 5 ♂♂, 35 ♀♀ (17 ovig.), 39 juv.; 8. Sta. 41 ca. 200 specimens (12% ♂♂, 14% ovig. ♀♀, 7% ♀♀, 67% juv.); 9. Sta. 42 22 ♂♂, 42 ♀♀ (26 ovig.), 41 juv.; 10. Sta. 43 3 ♂♂, 7 ♀♀ (4 ovig.), 33 juv.; 11. Sta. 44 2 juv.; 12. Sta. 45 3 ♂♂, 19 juv.; 13. Sta. 49 1 juv.; 14. Sta. 50 1 ♀; 15. Sta. 58 1 juv.

Remarks. This material has been compared with the type and is in complete agreement with it. Barnard (1960), in his notes for the revision of the Phoxocephalidae, synonymized a number of genera, including *Parharpinia*, with *Paraphoxus*. The resultant heterogenous group of species obscures some of the more subtle adaptations to the burrowing habit which must be understood before the phylogeny of the family can be fully elucidated. For this reason, I prefer to retain the genus *Parharpinia* until a complete revision of the family is available.

Males differ from females in that they have larger eyes, elongate second antennae and setose rami of the third uropods.

Habitat. Confined to mud substrates in the shallow sub-littoral, littoral–25 m. Absence from mud samples collected at 40–50 m. in Normanna Strait and relative scarcity in the mud at 20–25 m. at the bottom of Paal Harbour may indicate that it is predominantly a shallow-water species.

Breeding. Taken during the periods February–July, and October and November, with ovigerous females present in February, April, May, July and November. The average length and breadth of 16 eggs was 0·62 mm. (0·58–0·67) and 0·47 mm. (0·43–0·50), respectively.

Distribution. South Shetland Islands (Deception Island) 30 m.; South Sandwich Islands (Visokoi Island) 10–15 m.; South Georgia (Cumberland Bay, Undine Harbour) 17–255 m.

Genus *Heterophoxus* Shoemaker

Shoemaker, 1925, p. 22.
Barnard, 1960, p. 318.
Barnard, 1969, p. 417.

Heterophoxus videns Barnard

Heterophoxus videns Barnard, 1930, p. 334, 449, fig. 11; Schellenberg, 1931, p. 74, figs. 37b and 38; Barnard, 1932, p. 100; Schellenberg, 1935, p. 232; Nicholls, 1938, p. 46, fig. 24; Barnard, 1960, p. 319.
Harpinia obtusifrons (not Stebbing) Walker, 1907, p. 17; Chilton, 1912, p. 477.

Occurrence. (3 stations, 4 specimens; ♂ 7 mm., ♀♀ 5–6 mm., juv. 2·5 mm.).

1. Sta. 19 1♀; 2. Sta. 21 1 ♂, 1 ♀; 3. Sta. 23 1 juv.

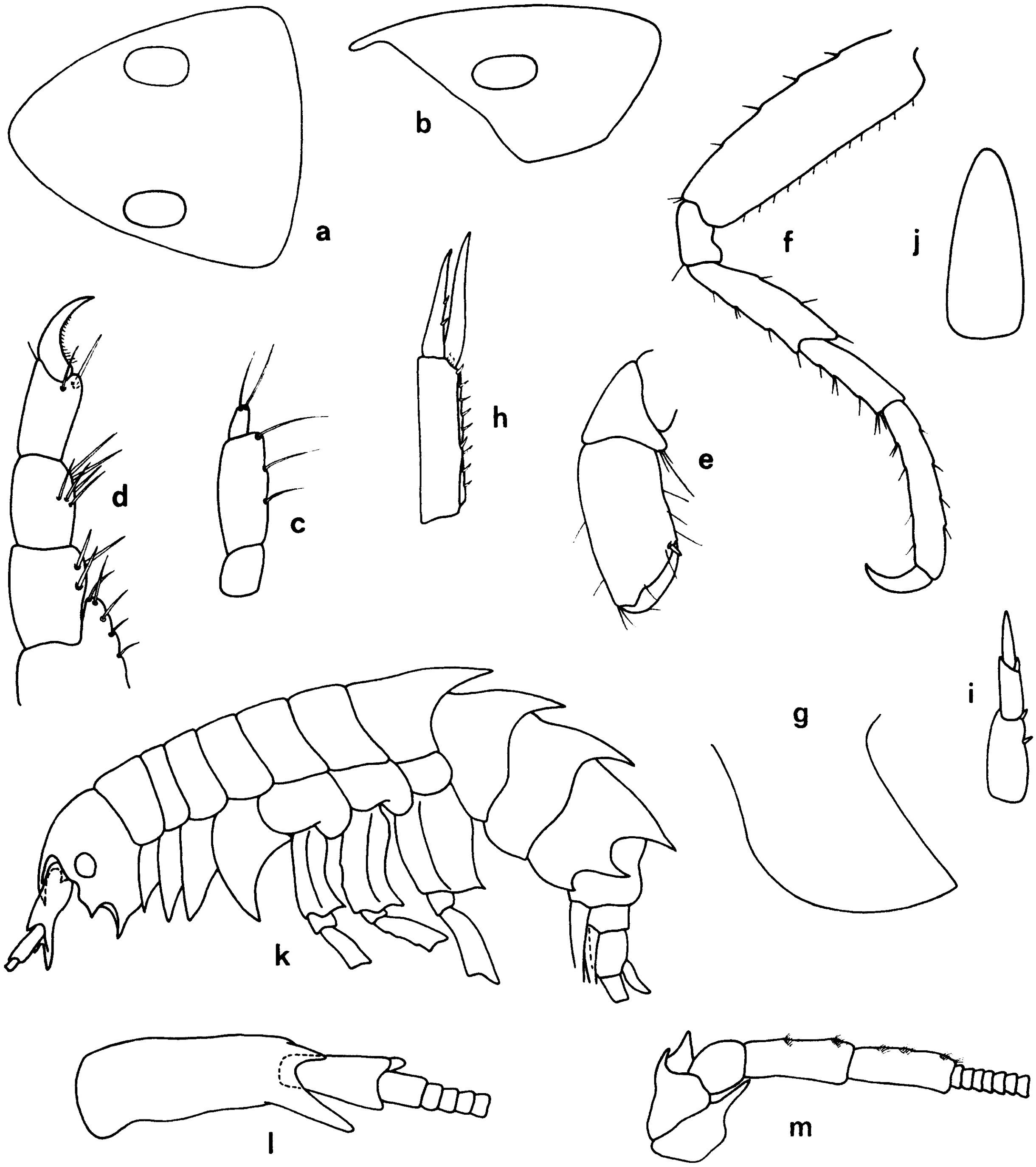

FIGURE 8

Parharpinia rotundifrons Barnard, 8 mm. ♀, sta. 41. *a* and *b*, head. *Probolisca ovata* (Stebbing), 3 mm. ovig. ♀, sta. 46. *c*, mandibular palp; *d*, maxilliped; *e*, gnathopod 1; *f*, peraeopod 7; *g*, epimeron 3; *h*, uropod 2; *i*, uropod 3; *j*, telson. *Gnathiphimedia fuchsi* sp. nov., holotype, 19 mm. ovig. ♀, sta. 51. *k*, habitus; *l*, antenna 1; *m*, antenna 2.

Remarks. The degree to which the teeth on the basal articles of peraeopod 7 are rounded varies somewhat. Some of the type material corresponds to Barnard's figure (1930, fig. 11) but other specimens from *Terra Nova* sta. 220, and sta. 331, have teeth which are distinctly asymmetric and which are produced to a sharp point.

Examinations of material collected by the *Nimrod* Expedition in McMurdo Sound (Barnard, 1930, p. 449) and the *Discovery* Expedition (Walker, 1907) confirm that these specimens are *H. videns*. Material described as *H. obtusifrons* by Chilton also belongs here.

Habitat. Occurs in small pockets of muddy sand between boulders and in fissures in rock. Literature records suggest that the usual habitat is mud or muddy sand. Depth range 7–9 m.

Breeding. Ovigerous females in May (Schellenberg, 1931).

Distribution. South Shetland Islands (Admiralty Bay) 391 m.; South Orkney Islands (Laurie Island) 16–18 m.; South Georgia (Cumberland Bay, Undine Harbour, lat. 53°31′S., long. 36°21′W.) 18–236 m.; Terre Adélie (Commonwealth Bay) 5–46 m.; Victoria Land (Cape Adare, McMurdo Sound) 13–457 m.; South America (numerous localities in Tierra del Fuego, Magellan Straits and as far north as Valparaiso) L.W.–46 m.; Falkland Islands.

Family Amphilochidae

Stebbing, 1906, p. 148–49.
Barnard, 1962*b*, p. 116–18.
Barnard, 1969, p. 132–35 (key to genera).

Genus *Gitanopsis* Sars

Sars, 1892, p. 223–24.
Stebbing, 1906, p. 153.
Schellenberg, 1926, p. 301.
Stephensen, 1949, p. 6.
Hurley, 1955*b*, p. 213.
Barnard, 1962*b*, p. 130–31.
Barnard, 1969, p. 138.

Gitanopsis squamosa (G. M. Thomson)

Amphilocus squamosa Thomson, 1880, p. 4, pl. 1, fig. 4; 1881, p. 214–15, fig. 5a–b; Della Valle, 1893, p. 597; Stebbing, 1906, p. 161; Chilton, 1912, p. 479 (part), 1923*a*, p. 84–85, 1923*b*, p. 240 (part), (?) Stephensen, 1927, p. 308.
Gitanopsis antarctica Chevreux, 1912, p. 211–12, 1913, p. 104–08, figs. 13–15; Barnard, 1932, p. 104–05; Stephensen, 1947, p. 45, 1949, p. 6–8.
Gitanopsis squamosa Schellenberg, 1926, p. 301–02, 1931. p. 95; Hurley, 1955*b*, p. 213–16, figs. 7–8.

Occurrence. (22 stations, 56 specimens; ♂♂ 2·25–2·5 mm., ♀♀ 2·5–4·25 mm., juvs. 1·25–2·25 mm.).

1. Sta. 4 1 ♀; 2. Sta. 10 2 ♂♂, 1 ovig. ♀, 1 juv.; 3. Sta. 11 1 juv.; 4. Sta. 13 1 ♂, 3 ♀♀ (1 ovig.), 1 juv.; 5. Sta. 14 2 ♀♀; 6. Sta. 16 1 ♂, 1 ovig. ♀, 2 juv.; 7. Sta. 17 1 ♂, 1 ovig. ♀; 8. Sta. 18 2 ♀♀ (1 ovig.); 9. Sta. 23 1 ♂; 10. Sta. 26 1 ovig. ♀; 11. Sta. 32 1 ♀; 12. Sta. 33 1 ovig. ♀; 13. Sta. 38 1 ovig. ♀; 14. Sta. 40 1 ♀; 15. Sta. 46 1 ovig. ♀; 16. Sta. 47 1 juv.; 17. Sta. 48 1 ♂, 1 ovig. ♀, 1 juv.; 18. Sta. 49 1 ♂, 4 ♀♀ (3 ovig.), 2 juv.; 19. Sta. 51 2 ♀♀, 1 juv.; 20. Sta. 54 3 ovig. ♀♀; 21. Sta. 57 2 ♀♀, 4 juv.; 22. Sta. 58 2 ♂♂, 2 ♀♀ (1 ovig.), 1 juv.

Remarks. There is very close agreement between these specimens and that figured by Hurley from New Zealand. Differences of a very minor nature are the narrower apex of the telson, the accessory flagellum of antenna 1 which is shorter than the first article of the main flagellum, and the presence of two spines on the terminal article of the mandibular palp in the present material. Hurley noted in his list of localities that a specimen collected at the South Orkney Islands by the *Scotia* Expedition "shows 1 or 2 minor differences, e.g. mandibular palp has 2 spines". Chevreux showed one terminal and three sub-terminal spines on this article.

The comprehensive illustrations of New Zealand material supplied by Hurley clearly show that *G. antarctica* Chevreux is synonymous with *G. squamosa* (Thomson).

Traces of pigment remain in some of the specimens. Thickly clustered chromatophores containing a rich orange-brown pigment are present on the head, the peraeon, the coxae, and the basal articles of peraeopods 5–7.

Habitat. Associated with algae on rock, boulder, sand and gravel bottoms, littoral–20 m. It has been collected from February to July and during November and December. Literature records confirm the association with algae.

Breeding. Females with ova or embryos have been recorded during February, March, April, June, July and November, but no clear pattern of breeding activity emerges. There is the usual tendency for larger females to carry a greater number of eggs. 19 eggs, from five females averaged 0·42 mm. long (0·37–0·46) by 0·34 mm. wide (0·29–0·38).

Distribution. Graham Land (Petermann Island, Port Lockroy) 3–30 m.; South Shetland Islands (Deception

Island) 75 m.; South Orkney Islands (Laurie Island); South Georgia (Cumberland Bay) 30–38 m.; Iles Kerguelen; Magellan region; Auckland Islands, L.W.; New Zealand, 7–9 m.; Tristan da Cunha.

FAMILY LEUCOTHOIDAE

Stebbing, 1906, p. 161–62 (part).
Barnard, 1969, p. 289 (key to genera).

Genus *Leucothoe* Leach

Leach, 1814, p. 403, 432.
Sars, 1892, p. 282–83.
Stebbing, 1906, p. 163–64.
Barnard, 1969, p. 289–90.

Leucothoe spinicarpa (Abildgaard)

Leucothoe antarctica Pfeffer, 1888, p. 128–31, pl. 2, fig. 4.
Leucothoe spinicarpa Sars, 1892, p. 283–84, pl. 100 and 101 (1) (as *L. articulosa* on plates); Della Valle, 1893, p. 652–54, pl. 6, fig. 4, pl. 19, figs. 1–20 (part); Stebbing, 1906, p. 165–66; Walker, 1907, p. 18; Chilton, 1912, p. 478–79, 1913, p. 60; Chevreux, 1913, p. 108–09; Barnard, 1916, p. 149–50; Chilton, 1923*a*, p. 88; Schellenberg, 1926, p. 308–09; Monod, 1926, p. 53, fig. 51; Barnard, 1930, p. 338–39; Schellenberg, 1931, p. 92; Barnard, 1932, p. 106; Nicholls, 1938, p. 47–48; Stephensen, 1947, p. 45–46.
(The above synonymy is complete only for Antarctic records.)

Occurrence. (12 stations, 44 specimens; ♂♂ 7–15 mm., ♀♀ 7–11 mm., juvs. 2–4 mm.).

1. Sta. 8 1 ♀; 2. Sta. 9 4 ♂♂, 2 ♀♀ (1 ovig.); 3. Sta. 11 6 ♂♂, 7 ♀♀ (1 ovig.); 4. Sta. 12 2 ♀♀; 5. Sta. 13 2 ♂♂, 2 ♀♀; 6. Sta. 19 1 ♂; 7. Sta. 25 1 juv.; 8. Sta. 33 3 ♂♂, 4 ♀♀ (2 ovig.); 9. Sta. 34 2 ♂♂, 1 ♀; 10. Sta. 53 1 ♀; 11. Sta. 54 1 ♀, 3 juv.; 12. Sta. 55 1 ovig. ♀.

Remarks. These specimens have been compared with material from Great Britain, but no differences of any significance have been found.

Habitat. Probably associated with sponges of the genus *Iophon*, which are common in shallow and deep water off Signy Island (personal communication from P. Redfearn), 1·5–49 m.

Breeding. Ovigerous females taken in March, April and October. Mean size of eggs is 0·71 mm. (0·66–0·74) by 0·61 mm. (0·59–0·64).

Distribution. Antarctic localities. Graham Land (Marguerite Bay, Bismarck Strait, Port Lockroy, north of Tower Island) 60–200 m.; South ShetlandIs lands (Clarence Island) 342 m.; South Orkney Islands (Laurie Island) 16–18 m.; South Sandwich Islands (Visokoi Island) 18–27 m.; South Georgia (Cumberland Bay lat. 53°55′S., long. 38°01′W.) 25–310 m.; Davis Sea (*Gauss* winter quarters, Drygalski Island) 110–385 m.; Iles Kerguelen (Observatory Bay); Terre Adélie (Commonwealth Bay) 46–549 m.; Victoria Land (McMurdo Sound) 457 m.; Bellingshausen Sea 400 m.

FAMILY THAUMATELSONIDAE

Gurjanova, 1938, p. 275–76, 386–87.
Barnard, 1969, p. 473 (key to genera).

Genus *Thaumatelson* Walker

Walker, 1906*a*, p. 15.
Gurjanova, 1938, p. 275–76.
Barnard, 1969, p. 476.

Thaumatelson walkeri Chilton

Thaumatelson walkeri Chilton, 1912, p. 481, pl. 1, figs. 11–15; Schellenberg, 1931, p. 113.

Occurrence. (23 stations, 171 specimens; ♂♂ 1·75–2·25 mm., ♀♀ 1·5–3·25 mm., juvs. 1–1·5 mm.).

1. Sta. 10 1 ♂, 4 ♀♀; 2. Sta. 11 1 ♀; 3. Sta. 12 1 ♂, 4 ♀♀, 3 juv.; 4. Sta. 13 2 ♂♂, 10 ♀♀, 5 juv.; 5. Sta. 14 4 ♂♂, 5 ♀♀; 6. Sta. 15 3 ♀♀; 7. Sta. 16 2 ♀♀; 8. Sta. 17 1 ovig. ♀; 9. Sta. 18 7 ♀♀, 2 juv.; 10. Sta. 19 2 ♂♂, 1 ovig. ♀; 11. Sta. 20 1 ♀, 7 juv.; 12. Sta. 21 2 ♀♀; 13. Sta. 22 2 ♂♂, 5 ♀♀; 14. Sta. 23 2 ♂♂, 16 ♀♀, 3 juv.; 15. Sta. 24 4 ♂♂, 15 ♀♀ (1 ovig.), 8 juv.; 16. Sta. 25 3 ♂♂, 18 ♀♀ (2 ovig.), 12 juv.; 17. Sta. 26 3 ♀♀; 18. Sta. 33 3 ♀♀; 19. Sta. 35 1 ♂, 1 juv.; 20. Sta. 46 1 ♂; 21. Sta. 48 1 ♀; 22. Sta. 49 2 ♀♀, 1 juv.; 23. Sta. 54 1 ♀, 1 juv.

Remarks. Specimens examined agree precisely with Chilton's description.

The fourth peraeon segment is much larger than any of the segments lying anterior or posterior to it. It is longer than the first three peraeon segments combined and is only just shorter than segments 5–7 combined. It is strongly arched and in the female is as wide as the massive fourth coxa is high.

The outer surfaces of the coxae of gnathopod 2 and peraeopods 3 and 4 are marked with a series of minute, regularly spaced, hexagonal pits.

The form of the pleon, urosome and telson is the same in both sexes and is as figured by Chilton. *Thaumatelson cultricauda* Barnard, although very similar, is distinct from *T. walkeri*.

Habitat. This species is closely associated with those areas in which there is a dense growth of large algae (*Desmarestia, Phyllogigas*, etc.), 2–20 m. It seems probable that a species so poorly adapted for swimming might live among the dense epizoic growths attached to the holdfasts of these algae. Several of the stations recorded by Schellenberg also yielded algae.

Breeding. Ovigerous females have been taken in February and March.

Distribution. Graham Land (north-east of Astrolabe Island, Seymour Island) 95–200 m.; South Orkney Islands (Laurie Island); South Georgia (Cumberland Bay) 20–75 m.; Shag Rocks Bank 160 m.

Thaumatelson herdmani Walker

Thaumatelson herdmani Walker, 1906*a*, p. 15; 1907, p. 21, pl. 7, fig. 11; Chilton, 1912, p. 484; Schellenberg, 1926, p. 324; 1931, p. 112.

Occurrence. (7 stations, 12 specimens; ♂♂ 1·5–1·75 mm., ♀♀ 1·75–2·5 mm., juvs. 1–1·25 mm.).

1. Sta. 12 1 ♂, 1 juv.; 2. Sta. 13 1 ♀; 3. Sta. 19 1 ♂, 2 ♀♀ (1 ovig.); 4. Sta. 24 1 ♂, 1 ♀, 1 juv.; 5. Sta. 36 1 ♀; 6. Sta. 49 1 ovig. ♀; 7. Sta. 56 1 ♀.

Remarks. A comparison of specimens in this collection with one of Walker's types shows no significant differences.

A minute accessory flagellum on antenna 1 was found both in Signy Island material and on the type specimen. The third article of the palp of the maxilliped is a little longer and less expanded than was shown by Walker.

This species is a much more slender animal than *T. walkeri* and the integument is less indurated.

Habitat. Probably similar to *T. walkeri*, 3–20 m.

Breeding. Ovigerous females in February and June. Schellenberg (1926) recorded an embryo-carrying female in December and the same author (1931) ovigerous females in May.

Distribution. Graham Land (Snow Hill Island) 125 m.; South Orkney Islands (Laurie Island); South Georgia (Cumberland Bay) 12–75 m.; Davis Sea (*Gauss* winter quarters) 385 m.; Victoria Land (McMurdo Sound); Burdwood Bank 140–150 m.

Genus *Prothaumatelson* Schellenberg

Schellenberg, 1931, p. 113.
Gurjanova, 1938, p. 275–76.
Barnard, 1969, p. 475.

Prothaumatelson nasutum (Chevreux)

Thaumatelson nasutum Chevreux, 1912, p. 212, 1913, p. 109, figs. 16–18; Barnard, 1932, p. 112.
Thaumatelson inermis Chilton, 1912, p. 483, pl. 1, figs. 16–17.
Prothaumatelson nasutum Schellenberg, 1931, p. 113.

Occurrence. (9 stations, 22 specimens; ♀♀ 1·25–2·5 mm., juvs. 1–1·25 mm.).

1. Sta. 19 1 ovig. ♀; 2. Sta. 21 1 ♀; 3 Sta. 22 1 ovig. ♀; 4. Sta. 23 2 ♀♀ (1 ovig.); 5. Sta. 24 5 ♀♀ (2 ovig.), 3 juv.; 6. Sta. 48 3 ♀♀ (1 ovig.); 7. Sta. 51 2 juv.; 8. Sta. 54 2 ♀♀; 9. Sta. 57 2 ♀♀.

Remarks. The condition of the mandibular palp in the present specimens is variable and is intermediate between that reported by Chevreux and by Chilton. Chevreux figured the palp as a single article, but notches at the level at which the division between a first and second article might be expected suggest either that an incipient joint or a real joint partly recognized is present. Chilton stated that the palp consists of three articles.

Material examined from this collection has two-articled palps, but the joints between first and second articles may be obscure or very distinct. A possible incipient joint between a second and third article was noted in one case. The mandible of a specimen from Chilton's type series of *T. inermis* showed a very clear division between the first two articles, but no trace of any other division.

The integument of the peraeon segments and the coxae of gnathopod 2 and peraeopods 3 and 4 is covered with minute, closely spaced, circular pits.

Habitat. Records suggest an association with large algae, probably in the epizoic growths on the holdfasts, 5–15 m.

Breeding. Ovigerous females recorded in February, March and April. The *Scotia* material (Chilton, 1912) contains ovigerous females taken in April and May, and the *Pourquoi Pas?* collections material taken in October.

Distribution. Graham Land (Petermann Island) 3 m.; South Orkney Islands (Laurie Island) 16–18 m.; South Georgia (Cumberland Bay) 1–40 m.

Family Stenothoidae

Stebbing, 1906, p. 171–72 (part, Metopidae), p. 192–93 (part, Stenothoidae).
Stephensen, 1931, p. 179.
Gurjanova, 1938, p. 275–82, 1951, p. 405–06.
Barnard, 1962*b*, p. 132–35.
Barnard. 1969, p. 444–48 (key to genera).

Genus *Probolisca* Gurjanova

Gurjanova, 1938, p. 279, 388.
Barnard, 1969, p. 450.

Probolisca ovata (Stebbing)
Fig. 8c–j

Metopa ovata Stebbing, 1888, p. 764, pl. 44; Della Valle, 1893, p. 645.
Metopoides ovata Della Valle, 1893, p. 907, 938.
Metopella ovata Stebbing, 1906, p. 183, figs. 47–48; Chilton, 1912, p. 481, 1923, p. 241; Schellenberg, 1926, p. 313 (part); Stephensen, 1927, p. 309; Schellenberg, 1931, p. 108; Barnard, 1932, p. 108; Nicholls, 1938, p. 48; Stephensen, 1938*a*, p. 237, 1947, p. 46.
Metopella ovatus Stebbing, 1914, p. 358.
Probolisca ovata Gurjanova, 1938, p. 279, 388.

Occurrence. (38 stations, ca. 1,553 specimens; ovig. ♀♀ 2–3·75 mm.; others 1–3·75 mm.).
1. Sta. 4 4 ovig. ♀♀, 8 others; 2. Sta. 9 1 specimen; 3. Sta. 10 25 ovig. ♀♀, 68 others; 4. Sta. 11 3 ovig. ♀♀, 5 others; 5. Sta. 12 6 ovig. ♀♀, 38 others; 6. Sta. 13 15 ovig. ♀♀, 47 others; 7. Sta. 14 16 ovig. ♀♀, 21 others; 8. Sta. 15 5 ovig. ♀♀, 6 others; 9. Sta. 16 13 ovig. ♀♀, 104 others; 10. Sta. 17 9 ovig. ♀♀, 76 others; 11. Sta. 18 6 ovig. ♀♀, 23 others; 12. Sta. 19 4 ovig. ♀♀, 11 others; 13. Sta. 20 3 ovig. ♀♀, 8 others; 14. Sta. 21 7 ovig. ♀♀, 2 others; 15. Sta. 22 13 ovig. ♀♀, 9 others; 16. Sta. 23 13 ovig. ♀♀, 55 others; 17. Sta. 24 4 ovig. ♀♀, 21 others; 18. Sta. 25 8 ovig. ♀♀, 14 others; 19. Sta. 26 9 ovig. ♀♀, 24 others; 20. Sta. 28 1 ovig. ♀; 21. Sta. 30 18 ovig. ♀♀, 23 others; 22. Sta. 32 5 ovig. ♀♀, 24 others; 23. Sta. 33 17 ovig. ♀♀, 10 others; 24. Sta. 35 1 ovig. ♀, 1 other; 25. Sta. 36 1 ovig. ♀, 1 other; 26. Sta. 44 1 ovig. ♀, 1 other; 27. Sta. 46 14 ovig. ♀♀, 12 others; 28. Sta. 47 6 ovig. ♀♀, 31 others; 29. Sta. 48 44 ovig. ♀♀, 105 others; 30. Sta. 49 34 ovig ♀♀, 39 others; 31. Sta 50 7 ovig. ♀♀, 24 others; 32. Sta. 51 7 ovig. ♀♀, 23 others; 33. Sta. 52 5 specimens; 34. Sta. 53 1 ovig. ♀; 35. Sta. 54 10 ovig. ♀♀, 39 others; 36. Sta. 56 2 ovig. ♀♀, 5 others; 37. Sta. 57 16 ovig. ♀♀, ca. 160 others; 38. Sta. 58 21 ovig. ♀♀, ca. 140 others.

Remarks. These specimens are identified with Stebbing's species despite several small differences.

In adult females of about the same size as the holotype, the antennae are longer. This is due to an increased number of articles in the flagella. Specimens 3 mm. long from Signy Island have about 15 articles in the flagella of each pair of antennae as opposed to 10–11 in Stebbing's specimen.

Stebbing suspected the presence of a third article on the mandibular palp but he was unable to make out the division between it and the second article. Specimens from this collection have palps very distinctly divided into three articles. The first article is short, hardly longer than wide, the second three times the length of the first and a little wider, and the third shorter than the first and much narrower. The second article has three or four stout setae on the inner margin and the third article has one or two terminal setae (Fig. 8c).

The propod of gnathopod 1 is a little less stout and the palm is more oblique in the present specimens (Fig. 8e). The palm of gnathopod 2 is also a little more oblique.

The dactyls of peraeopods 3–7 are all appreciably less than half the length of the corresponding propods (Fig. 8f), not more as Stebbing described for the type specimen. Uropods 1 and 2 have spinose peduncles, one or two spines on the outer rami, and the pectination shown by Stebbing very obscure.

Discovery material from South Georgia tends to be intermediate in character between the *Challenger* specimen and animals from Signy Island but has the mandibular palp clearly divided into three articles, a more oblique palm of gnathopod 1 and the third uropod in which the ramus is twice as long as the peduncle.

Habitat. Abundant throughout the year on most bottoms, except mud and sand, littoral–25 m.

Breeding. There is no evidence of seasonal breeding, females carrying eggs have been taken in all months of the year except August and November. Ovigerous females usually carry four or five eggs, but extremes of one and 11 have been recorded.

Distribution. South Shetland Islands (Deception Island) 25–75 m.; South Orkney Islands (Normanna Strait, Laurie Island) 4–36 m.; South Georgia (Cumberland Bay) 1–235 m.; Iles Kerguelen; various localities in South America from Tierra del Fuego to northern Argentina; Falkland Islands; Macquarie Island; Campbell Islands; New Zealand.

Genus *Proboloides* Della Valle

Della Valle, 1893, p. 907.
Stebbing, 1906, p. 187.
Barnard, 1932, p. 108–09.
Gurjanova, 1938, p. 277–78, 377–78, 1951, p. 406–07.
Barnard, 1969, p. 450.

Proboloides sarsi (Pfeffer)

Metopa sarsii Pfeffer, 1888, p. 84–86, taf. 2, figs, 3 and 8, taf. 3, fig. 2; Della Valle, 1893, p. 645.
Proboloides sarsii Stebbing, 1906, p. 190.
Metopoides walkeri Chevreux, 1906*a*, p. 37–39, fig. 1, 1906*e*. p. 28–33, figs. 15–17.
Metopoides sarsii Chilton, 1912, p. 479–80, pl. 1, fig. 10; Schellenberg, 1931, p. 96.
Metopoides sarsi Chilton, 1913, p. 55–56; Stephensen, 1947, p. 46 (not p. 47–49, fig. 18).

Occurrence. (13 stations, 46 specimens; ♂♂ 4·5–5 mm., ♀♀ 5–8·5 mm., juvs. 2·5–5 mm.).
1. Sta. 4 1 ♂, 13 ♀♀, 2 juv.; 2. Sta. 9 1 ♀; 3. Sta. 10 1 ♂, 4 ♀♀, 2 juv.; 4. Sta. 11 3 ♀♀, 2 juv.; 5. Sta. 13 1 ♂; 6. Sta. 17 1 ♀; 7. Sta. 19 1 juv.; 8. Sta. 30 2 juv.; 9 Sta. 33 1 ♀, 5 juv.; 10. Sta. 38 1 juv.; 11. Sta. 49 2 juv.; 12. Sta. 50 1 ♀, 1 juv.; 13. Sta. 51 1 juv.

Remarks. Gurjanova (1938) has reduced *Metopoides* Della Valle to a sub-genus of *Proboloides* as the two genera differed only in the presence of a minute accessory flagellum in *Metopoides.*

The submergence of *Metopoides walkeri* Chevreux in *Proboloides sarsi* is accepted, with reservations, on the authority of Chilton (1912). Chilton, who had access to one of Pfeffer's type specimens, found that the two species "agreed precisely" but, despite this, there appear to be significant differences in the shape of the basal article of peraeopod 7 when comparing the figures of Pfeffer (1888) and Chevreux (1906*e*). An attempt to check on this point has been frustrated by the disappearance of the specimen which Pfeffer dissected and that which Chilton mounted and examined. The third specimen which Pfeffer had has been re-identified as *Probolisca ovata* (Stebbing).

Dissected specimens agree well with the description given by Chevreux, differing only in the presence of a minute third article on the mandibular palp and the slightly sinuous posterior margin of epimera 3.

Male specimens are recorded for the first time. The genital papillae are rather flattened and quite transparent, making their observation difficult. There appear to be no sexual differences between the sexes except in size, the male being appreciably smaller than the female.

It thus seems unlikely that the large (13 mm.) male specimen taken at Iles Crozet and described by Stephensen (1947, p. 47–49) belongs to this species.

Habitat. Found among algae intertidally and in shallow water, littoral–20 m.

Breeding. Chevreux (1906) recorded a female with embryos in November.

Distribution. Graham Land (Petermann Island, Booth Island, Port Lockroy) littoral–30 m.; South Orkney Islands (Laurie Island) littoral; South Georgia (Royal Bay, Cumberland Bay) littoral–15 m.

Family Eophliantidae

Sheard. 1936, p. 457 (Eophliantinae) (part).
Nicholls, 1939, p. 312 (Prophliantidae) (part).
Gurjanova, 1958, p. 55–56.
Barnard, 1964*b*, p. 55–56 (key to genera).
Barnard, 1969, p. 209–11 (key to genera).

Genus *Wandelia* Chevreux

Chevreux, 1906*e*, p. 44.
Chilton, 1909*b*, p. 60–61 (*Bircenna*).
Nicholls, 1939, p. 310.
Barnard, 1969, p. 213.

The re-establishment of the genus *Wandelia* Chevreux, as distinct from *Bircenna* Chilton, by Nicholls, is based on the absence in the former of a conspicuous transverse flange on the sternite of the first peraeon segment which is present in three Australasian species of *Bircenna*.

Wandelia crassipes Chevreux
Fig. 10h

Wandelia crassipes Chevreux, 1906*d*, p. 87–89, figs. 1 and 2. 1906*e*, p. 45–49, figs. 24–26; Nicholls, 1939, p. 324–25.
Bircenna crassipes Chilton, 1909*b*, p. 60, 62, 1912, p. 484; Stephensen, 1947, p. 49.
? Stephensen, 1949, p. 14–15, fig. 4.

Occurrence. (6 stations, 52 specimens; ♂♂ 3·5–7·5 mm., ♀♀ 3·5–6 mm., juvs. 2–3 mm.).

1. Sta. 10 1 juv.; 2. Sta. 19 1 ovig. ♀, 2 juv.; 3. Sta. 30 1 ♂, 1 juv.; 4. Sta. 32 11 ♂♂, 31♀♀ (24 ovig.), 2 juv.; 5. Sta. 48 1 juv.; 6. Sta. 50 1 ovig. ♀.

Remarks. Specimens dissected closely resemble the description and figures of Chevreux (1906*d*, *e*), differing only in the absence of the setose spine on the mandibles.

In the largest specimens, particularly the large males from sta. 32, peraeopod 7 becomes relatively longer with increasing size. In a male 7·5 mm. long, peraeopod 7 is nearly twice the length of peraeopod 6. This lengthening occurs over the whole limb, and is not restricted to any one article.

No trace of a division between segments 2 and 3 of the urosome can be seen even in cleared specimens.

Very little attention has been paid to the sculpture of the integument in the Amphipoda, except for the large and obvious spines, teeth and carinae which are prevalent in some families and genera. Barnard (1932, p. 196–97) drew attention to the great variation shown by closely related forms in the pontogeneiid sequence of the Eusiridae, but no work has been done on the function of the holes, pits, grooves, etc. which are present in a great many, if not all, species.

A very distinctive form of sculpturing has been noted in this species. The peraeon, pleon, coxae and the basal articles of peraeopods 5–7 are marked with a series of circular pits, each of which has a single upstanding seta set on a minute papilla close to one side of the pit (Fig. 10h). They appear to be mechanoreceptors. These pits, which also occur on the edges of the basal articles of peraeopods 5–7 and the coxae are responsible for the crenelate appearance of these articles.

Habitat. The six samples containing this species all included large algae, but its morphology suggests that it and related species may be spongicolous. Barnard (personal communication) has evidence suggesting that some eophliantids bore in the woody stipes of large algae. The cylindrical body, small coxae, short peraeopods, and strongly hooked dactyls support this view. Depth range, 1·5–10 m.

Breeding. Ovigerous females taken in February and October carried stage i eggs, while all stages of development were present in the December material. The ovigerous specimen figured by Chevreux (1906*e*) was obtained in March–April. Several of the ovigerous females from sta. 32 had 5–11 immediate post-hatchlings clinging to the oostegites and inner surfaces of the posterior peraeopods.

Distribution. Graham Land (Petermann Island, Booth Island) 3–40 m.; South Shetland Islands (Deception Island) 25 m.; South Orkney Islands (Laurie Island) 16–18 m.

FAMILY ACANTHONOTOZOMATIDAE STEBBING

Stebbing, 1906, p. 210.
Hurley, 1954, p. 763–65.
Barnard, 1964*b*, p. 51.
Barnard, 1969, p. 117–20 (key to genera).

Genus *Pariphimedia* Chevreux

Chevreux, 1906*e*, p. 39–40, 1906*e*, p. 38–39.
Stebbing, 1914, p. 358–59.
Barnard, 1932, p. 126.
Barnard, 1969, p. 127.

Pariphimedia integricauda Chevreux

Pariphimedia integricauda Chevreux, 1906*a*, p. 39, fig. 25, 1906*e*, p. 39–44, figs. 21–23; Chilton, 1912, p. 487, 1925, p. 176; Barnard, 1932, p. 127, fig. 70; Stephensen, 1947, p. 50; Castellanos and Perez, 1963, tab. 5, fig. 17c.

Occurrence. (25 stations, ca. 659 specimens; ♂♂ 8–14 mm., ♀♀ 7–21 mm., juvs. 3–7 mm.).

1. Sta. 9 1 ♂, 2 ♀♀; 2. Sta. 10 1 juv.; 3. Sta. 12 1 juv.; 4. Sta. 13 1 juv. ; 5. Sta. 16 2 juv.; 6. Sta. 17 1 juv.; 7. Sta. 19 1 juv.; 8. Sta. 20 1 juv.; 9. Sta. 24 1 ♀, 4 juv.; 10. Sta. 26 2 juv.; 11. Sta. 27 1 juv.; 12. Sta. 32 1 juv.; 13. Sta. 33 3 juv.; 14. Sta. 38 1 juv.; 15. Sta. 46 2 ♀♀; 16. Sta. 48 1 ♀, 2 juv.; 17. Sta. 49 27 ♀♀ (20 ovig.), 1 juv.; 18. Sta. 50 ca. 450 specimens (7% ♂♂, 77% ovig. ♀♀, 15% ♀♀, 1% juv.); 19. Sta. 51 1 ♂, 1 ♀, 3 juv.; 20. Sta. 52 2 ♂♂, 33 ♀♀ (31 ovig.); 21. Sta. 53 12 ovig. ♀♀; 22. Sta. 54 1 ♂, 2 ♀♀; 23. Sta. 55 1 ♀; 24. Sta. 56 3 ♀♀; 25. Sta. 59 7 ♂♂, 74 ♀♀ (64 ovig.), 2 juv.

Remarks. The specimens agree with Chevreux's description as amended by Barnard. Accessory lamellae are absent from the mandibles. The appearance of this appendage in Chevreux's figures (1906*a*, fig. 25, 1906*e*, fig. 23) is due to shrinkage of tissue within the body of the mandible, a condition seen in some of the present material.

Habitat. Among algae in all months of the year except January, May and August, 1·5–49 m.

Breeding. Ovigerous females have been taken in June, July, September and October. During the early part of this period most of the eggs are at developmental stage i, whereas in October all stages are present suggesting that the breeding season is prolonged. It is probable that eggs are laid from June to October and that during the winter development requires about 4 months, while eggs laid in September and October would develop more rapidly and that the breeding season as a whole would produce the 3–6 mm. long juveniles found in transect samples in the late summer and early autumn (February–April). The mean number of eggs carried is higher in larger females.

Distribution. Graham Land (Booth Island, Flandres Bay, Port Lockroy, Melchior Islands) littoral–30 m.; South Shetland Islands (Deception Island) 25–75 m.; South Orkney Islands (Signy Island, Laurie Island) 7 m.; South Sandwich Islands (Visokoi Island) 10–15 m.

Genus *Gnathiphimedia* Barnard

Barnard, 1930, p. 352.
Barnard, 1969, p. 124.

Gnathiphimedia fuchsi sp. nov.

Figs. 8k–m, 9a–i and 10a–g

Type material is in the collection of the British Museum (Nat. Hist.) under the following registration numbers: holotype, 1969:225; allotype, 1969:226; paratype, 1969:227.

Type locality. Borge Bay, Signy Island, South Orkney Islands. Sta. 51, Agassiz trawl over sand and isolated boulders with algae, 5–15 m., 10 December 1964.

Material examined. (3 stations, 3 specimens).

1. Sta. 47 1 ♂ 16 mm. **allotype**; 2. Sta. 50 1 fragmentary specimen; 3. Sta. 51 1 ♀ with embryos 19 mm. **holotype**.

Diagnosis. Body moderately stout, paired dorsal processes on peraeon segment 7 and pleon segments 1–3. *Integument* indurated. *Head*, lateral margin produced into two acute processes separated by a moderately wide, rounded notch. *Rostrum* rather short, strongly down-curved. *Eyes* small, oval, protruding from sides of head. *Epistome*, very broad and short.

Antennae sub-equal, multi-articulate, no accessory flagellum. *Antenna 1*, main spine on article 1 of peduncle not reaching to end of article 2. *Mouth parts* projecting downwards, but less so than in most genera in the family. *Upper lip*, broad, not incised. *Mandible*, very short and stout, apex broadly rounded, very heavily chitinized, spatulate accessory lamella on left mandible only, molar obscure, marked by a small area of stout spines; palp article 1 short. *Lower lip*, inner lobes rudimentary, outer lobes not incised. *Maxilla 1*, outer plate broad; palp with two articles, reaching end of outer plate. *Maxilliped*, outer plate broad, distally acute; palp slender, article two not expanded or produced, article 4 absent.

Gnathopod 1, weak, minutely chelate; coxa triangular, distally acute. *Gnathopod 2*, stronger than 1, chelate; coxa narrow, triangular, distally acute; propod setose; dactyl longer than palm. *Peraeopods 5–7*,

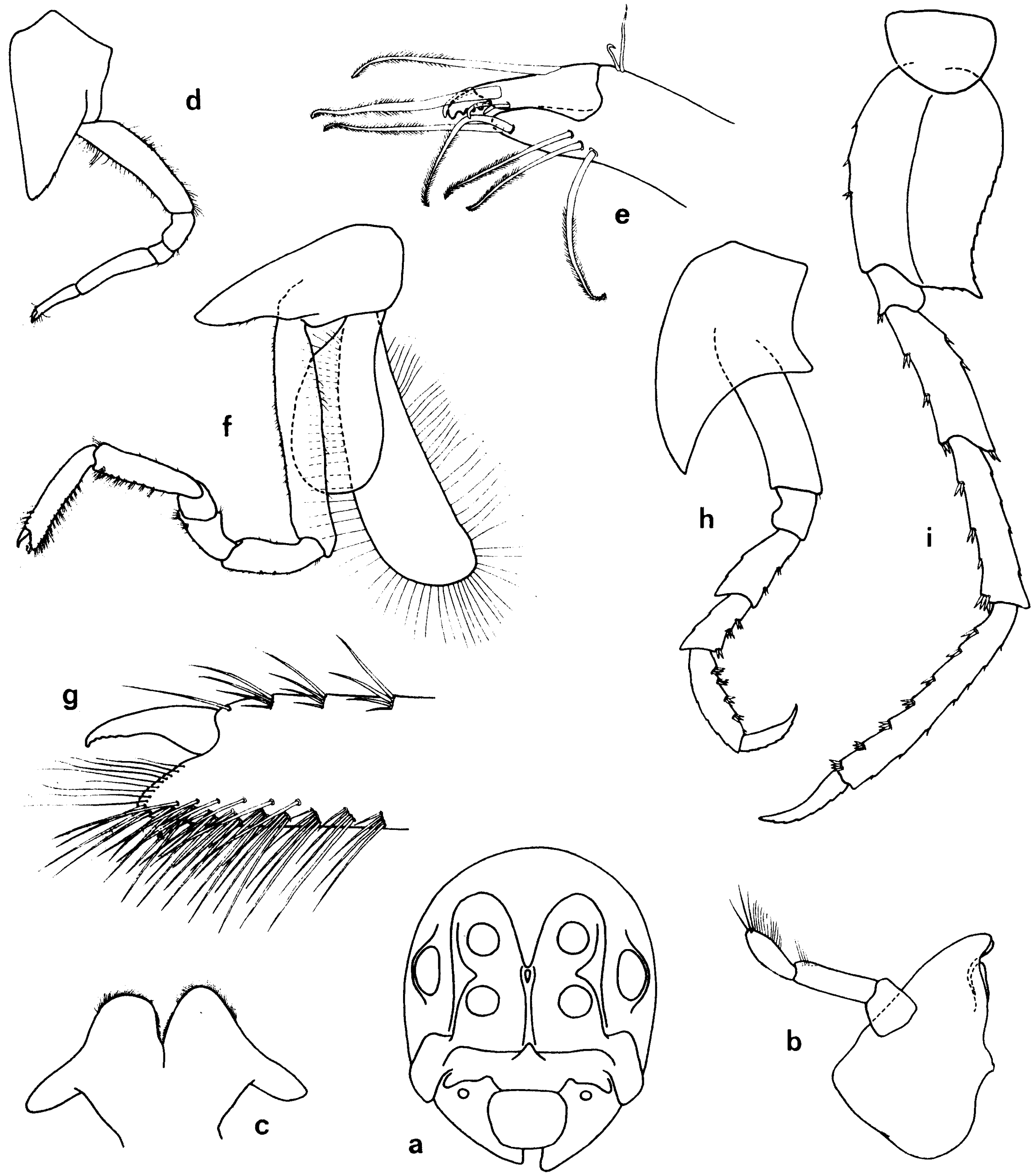

FIGURE 9

Gnathiphimedia fuchsi sp. nov., holotype, 19 mm. ovig. ♀. *a*, anterior face of head; *b*, left mandible; *c*, lower lip; *d* and *e*, gnathopod 1; *f* and *g*, gnathopod 2; *h*, peraeopod 4; *i*, peraeopod 7.

basal articles expanded, fifth the least so, seventh broadest; ventral and posterior margins concave, minutely serrate, posterior distal angle strongly produced; dactyls minutely serrate on convex margins. Peraeopod 5 shorter than, peraeopod 7 appreciably longer than, peraeopod 6.

Uropod 2, outer ramus much shorter than inner. *Uropod 3*, peduncle short, rami sub-equal, narrowly lanceolate. *Telson*, dorsally strongly concave, broadly notched distally.

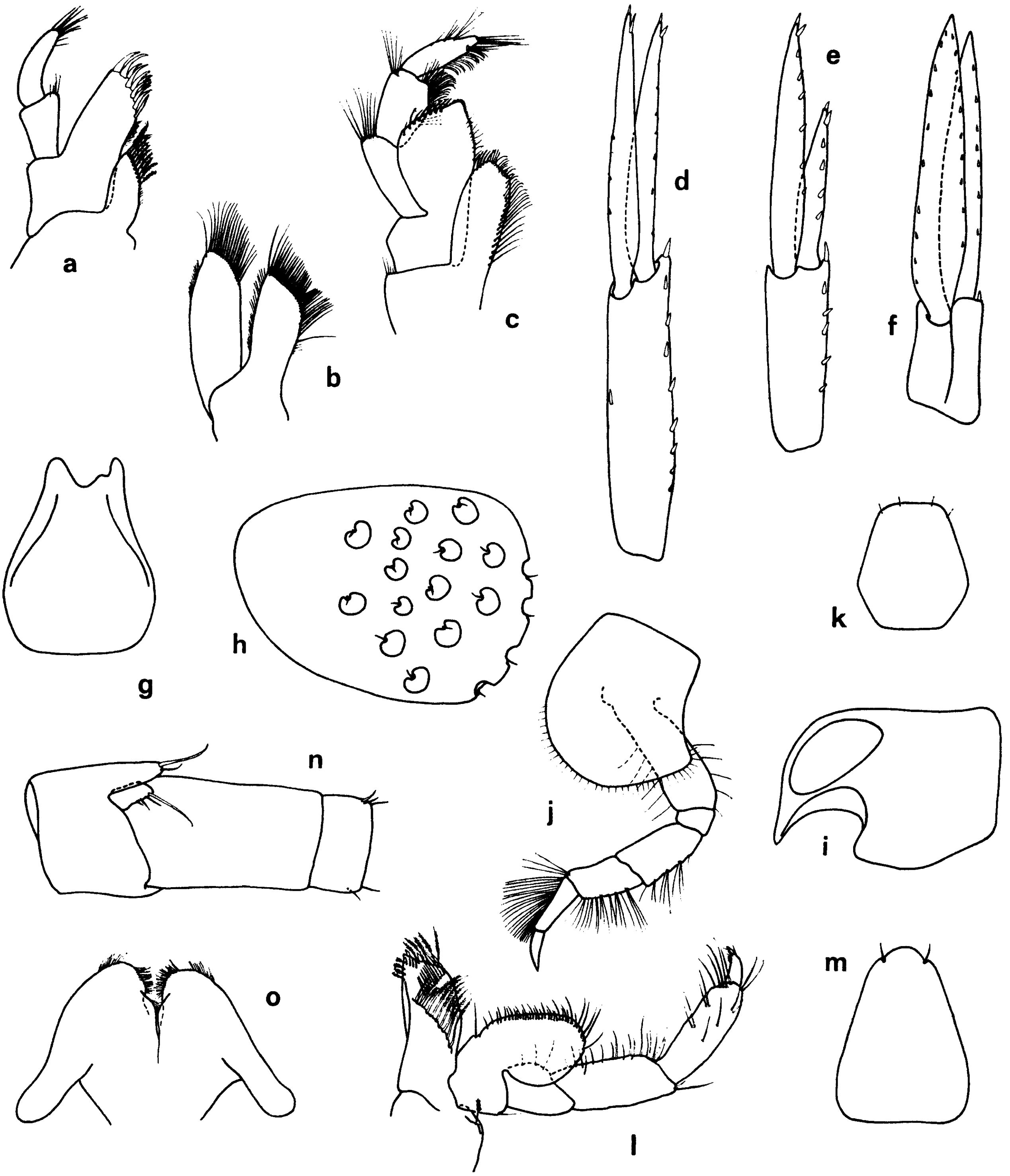

FIGURE 10

Gnathiphimedia fuchsi sp. nov., holotype, 19 mm. ovig. ♀. *a*, maxilla 1; *b*, maxilla 2; *c*, maxilliped; *d*, uropod 1; *e*, uropod 2; *f*, uropod 3; *g*, telson. *Wandelia crassipes* Chevreux, 5·5 mm. ♂, sta. 32. *h*, coxa 7. *Monoculodes scabriculosus* Barnard, 6·5 mm. ♀, sta. 44. *i*, head; *j*, peraeopod 4; *k*, telson. *Metaleptamphopus pectinatus* Chevreux, 6·5 mm. ♀, sta. 47. *l*, maxilliped; *m*, telson. *Oradarea novaezealandiae* (Thomson), 6 mm. ♀, Lyttelton Harbour, New Zealand. *n*, antenna 1 showing accessory flagellum; *o*, lower lip.

Remarks. The present species can be distinguished immediately from *G. macrops* Barnard and *G. sexdentata* (Schellenberg) as these species have only three pairs of dorsal processes. In a comparison with the type of the genus, *G. mandibularis* Barnard, *G. fuchsi* is characterized by the short major spine on the peduncle of antenna 1, the broad upper lip, the short first article of the mandibular palp, the broader and parallel-sided second article of the maxillary palp, the acuminate coxa of gnathopod 1, the forwardly produced coxae of gnathopod 2 and peraeopod 3, the rounded posterior distal angles of the coxae of peraeopods 5–7 and the narrow basal article with strongly produced posterior distal angle of peraeopod 5.

Named in honour of Sir Vivian Fuchs, Director of the British Antarctic Survey and Leader of the Trans-Antarctic Expedition.

Habitat. Sand or gravel with *Desmarestia* on isolated rocks and boulders at depths of 5–15 m.

Breeding. Female with embryos collected in December.

Family Oedicerotidae

Stebbing, 1906, p. 235–37.
Barnard, 1961, p. 81–82 (key to genera).
Barnard, 1969, p. 373–78 (key to genera).

Genus *Parhalimedon* Chevreux

Chevreux, 1906*b*, p. 76–79, 1906*e*, p. 33–34.
Schellenberg, 1931, p. 149.
Barnard, 1969, p. 385.

Parhalimedon turqueti Chevreux

Parhalimedon turqueti Chevreux, 1906*b*, p. 76–79, fig. 1, 1906*e*, p. 34–38, figs. 18–20; Schellenberg, 1931, p. 149, fig. 78.

Occurrence. (11 stations, 36 specimens; ♂♂ 3–3·5 mm., ♀♀ 3·5–5·5 mm., juvs. 2–3 mm.).

1. Sta. 17 1 ♀; 2. Sta. 18 1 ♀, 1 juv.; 3. Sta. 19 1 ♂, 2 ♀♀, 2 juv.; 4. Sta. 21 2 ♀♀; 5. Sta. 22 1 ♂, 1 ♀; 6. Sta. 23 2 ♀♀; 7. Sta. 24 1 juv.; 8. Sta. 25 3 ♂♂, 4 ♀♀, 2 juv.; 9. Sta. 26 2 ♂♂, 2 ♀♀, 2 juv.; 10. Sta. 49 1 ♂, 4 ovig. ♀♀, 1 juv.; 11. Sta. 54 1 ♀.

Remarks. These specimens agree well with Chevreux's description. The rami of uropod 3 tend to be more spinose, and the peduncle less so than in the type material. The lower margins of the coxae of the first four thoracic limbs are serrate or crenelate in addition to being strongly setose.

Habitat. Patches of fine sand and mud in rock crevices and between boulders in shallow water, 4·5–20 m.

Breeding. Ovigerous females have been obtained in June. Schellenberg recorded breeding females from South Georgia in May.

Distribution. Graham Land (Wiencke Island) 20–25 m.; South Georgia (Cumberland Bay) 22–50 m.

Genus *Methalimedon* Schellenberg

Schellenberg, 1931, p. 150.
Barnard, 1969, p. 383.

Methalimedon nordenskjoldi Schellenberg

Methalimedon nordenskjoldi Schellenberg, 1931, p. 150–52, fig. 79; Barnard, 1932, p. 141, fig. 80; Nicholls, 1938, p. 91–92.

Occurrence. (6 stations, 8 specimens; ♂♂ 3–4·5 mm., ♀♀ 5·5–7 mm.).

1. Sta. 37 1 ♀; 2. Sta. 39 3 ♀♀ (2 ovig.); 3. Sta. 43 1 ♀; 4. Sta. 44 1 ♂; 5. Sta 45 1 ♀; 6. Sta. 54 1 ♂.

Remarks. Barnard has remarked on the superficial resemblance of this species to *Parhalimedon turqueti*.

The present specimens differ from Schellenberg's material in having less produced second epimera, four instead of five spines in the mandibular spine row and plumose setae on the anterior margins of the coxae of peraeopods 5 and 6.

The setae on the inner plate of maxilla 1 are plumose.

Habitat. Sparingly on bottoms of mud and muddy sand, in February–May and November, 5–25 m. Most of the specimens reported in the literature were also obtained from muddy substrates.

Breeding. One of the females from sta. 39 (worked in April) has 24 stage ii eggs in the brood pouch. Ovigerous females are recorded in March and December (Barnard) and May and June (Schellenberg). The *Aurora* specimen (Nicholls, 1938) was carrying 12 embryos.

Distribution. South Georgia (off Drygalski Fjord, Cumberland Bay, Stromness Bay) 12–310 m.; Terre Adélie (Commonwealth Bay).

Genus *Oediceroides* Stebbing

Stebbing, 1888, p. 843–44, 1906. p. 267–68.
Pirlot, 1932, p. 87.
Barnard, 1961, p. 87–89, 1962*c*, p. 354–56.
Barnard, 1969, p. 384.

Oediceroides lahillei Chevreux

Oediceroides lahillei Chevreux, 1911*c*, p. 403–05, figs. 1 and 2; Schellenberg, 1931, p. 139; Stephensen, 1947, p. 51.
Gulbarentsia larseni Oldevig, 1961, p. 73–75.

Occurrence. (5 stations, 7 specimens; ♂ 15 mm., ♀♀ 15–20 mm.).

1. Sta. 48 1 ovig. ♀; 2. Sta. 49 1 ♀; 3. Sta. 50 2 ♀♀; 4. Sta. 52 1 ♂, 1 ♀; 5. Sta. 54 1 ovig. ♀.

Remarks. This species is considered distinct from *Oediceroides calmani* Walker from which it differs in the bulbous rostrum and convex dorsal surface of the head, the shorter and stouter mandibular palp, weakly produced coxa of gnathopod 1 and the convex posterior margin of the basal article of peraeopod 7.

There is evidence that the specimens described by Chevreux, Stephensen and Oldevig, as well as undescribed material in the British Museum (Nat. Hist.) came from a single sample collected by Captain C. A. Larsen off Visokoi Island in the South Sandwich Islands group. The collection made by Larsen appears to have been sorted and split up soon after it was made as Chevreux's material came to him via Dr. Lahille, correspondent of the Buenos Aires Museum, and the undescribed material in the British Museum (Nat. Hist.) via Government House in the Falkland Islands. Original labels with the latter specimens indicate that the sample was collected on 13 November 1908 (not 3 November 1908 as stated by Oldevig) at a depth 30–50 fathoms (not feet as Stephensen and Oldevig have assumed).

Habitat. Sand, 5–20 m.

Breeding. Ovigerous females in April with stage i eggs. Some of the Larsen specimens referred to above carried hatchlings. This suggests a prolonged development similar to that found in many of the species recorded from Signy Island.

Distribution. South Sandwich Islands (Bristol Island, Saunders Island, Candlemas Island, Visokoi Island, Zavodovski Island) 55–91 m.; Magellanic region (Beagle Channel),

Genus *Monoculodes* Stimpson

Stimpson, 1853, p. 54.
Stebbing, 1906, p. 258–59.
Barnard, 1932, p. 136.
Stephensen, 1938*b*, p. 222–23.
Gurjanova, 1951, p. 562–64.
Barnard, 1962*c*, p. 354–60 (key to species).
Barnard, 1969, p. 383.

Monoculodes scabriculosus Barnard
Fig. 10i–k

Monoculodes scabriculosus Barnard, 1932, p. 138–39, fig. 77; Stephensen, 1938*a*, p. 237–38.

Occurrence. (2 stations, 11 specimens; ♀♀ 4·5–6·5 mm., juvs. 3·5–4·5 mm.).

1. Sta. 39 1 ♀; 2. Sta. 44 4 ♀♀, 6 juv.

Remarks. These specimens, which were collected very close to the type locality, are in full agreement with the *Discovery* material. The head, peraeopod 4 and telson which are of diagnostic value within the genus are figured to supplement Barnard's description (Fig. 10i–k). Antenna 1, both in the present material and in the type series, is equal to, or only very slightly shorter than the peduncle of antenna 2. The pleon segment figured by Barnard (1932, fig. 77c) is the second and not the third, which is broadly and evenly rounded. The eyes are distinctly, but very narrowly, separated throughout their length.

Habitat. Mud or muddy sand, 10–25 m. *Discovery* collections indicate a similar habitat.

Breeding. Discovery material obtained during the period December to March contained ovigerous females.

Distribution. South Shetland Islands (Deception Island) 5–60 m.; South Orkney Islands (Normanna Strait) 24–36 m.; South Georgia (Cumberland Bay, Stromness Bay, Wilson Harbour) 20–136 m.

FAMILY PARAMPHITHOIDAE

Stebbing, 1906, p. 320–21.
Barnard, 1961, p. 102, 1964*b*, p. 49–51, 63–65 (key to genera).
Barnard, 1969, p. 389–93 (key to genera).

Genus *Epimeria* Costa

Costa, 1851, p. 46.
Stebbing, 1906, p. 321.
Barnard, 1961, p. 102–03.
Barnard, 1969, p. 394.

Epimeria monodon Stephensen

Epimeria monodon Stephensen, 1947, p. 53, fig. 19.

Occurrence. (10 stations, 42 specimens; ♂♂ 12–16 mm., ♀♀ 14–26 mm., juv. 6 mm.).

1. Sta. 13 1 ♀; 2. Sta. 19 1 ♂; 3. Sta. 46 1 ♂, 3 ♀♀ (1 ovig.), 1 juv.; 4. Sta. 47 3 ♀♀; 5. Sta. 48 4 ♀♀ (2 ovig.); 6. Sta. 50 8 ♀♀ (1 ovig.); 7. Sta. 51 2 ♀♀; 8. Sta. 54 8 ♀♀ (2 ovig.); 9. Sta. 56 2 ♀♀; 10. Sta. 59 8 ♀♀ (1 ovig.).

Remarks. These specimens undoubtedly belong to Stephensen's species. The relative lengths of the last three pairs of peraeopods vary somewhat. Peraeopod 6 is generally the longest and peraeopod 7 the shortest. Peraeopod 5 is usually intermediate in length but in extreme cases may be as long as either peraeopod 6 or 7.

Sexual differences are slight, the male has larger eyes and a slightly more prominent projection on pleon segment 3.

Formalin-preserved specimens had bright red eyes which faded to a pale straw yellow in alcohol.

Habitat. Apparently associated with algae growing on rock, boulder or gravel bottoms, 3–15 m.

Breeding. Ovigerous females carrying 50–60 large eggs in April, July and October. Eggs measure 1·42 mm. (1·26–1·54) by 1·12 mm. (1·05–1·16).

Distribution. Graham Land (Flandres Bay) 2–10 m.

FAMILY CALLIOPIIDAE

Stebbing, 1906, p. 285–86.
Barnard, 1964*b*, p. 49–54 (key to genera).
Barnard, 1969, p. 167–74 (key to genera).

Barnard (1964*b*) has recently discussed the Calliopiidae, commenting on the relationship of this family to the Eusiridae, Paramphithoidae and Pleustidae.

Genus *Oradarea* Walker

Walker, 1903, p. 56.
Shoemaker, 1930, p. 299–301.
Barnard, 1932, p. 162–63.
Barnard, 1969, p. 178.

Diagnosis. Calliopiid amphipods with compressed, moderately slender body, frequently with dentate pleon; antennae long, second rather longer than, or as long as first, accessory flagellum a single article, shorter than first article of primary flagellum; head with antennal angle prominent; article 3 of mandibular palp short, rather broad, transversely or obliquely truncate; lower lip without inner lobes; maxilla 1 and maxilliped normal; coxae not deep, fourth the deepest; gnathopods 1 and 2 without posterior lobes on carpus; gnathopod 2 sub-chelate, carpus and propod slender, very elongate; basal articles of peraeopods 3 and 4 without anterior process; dactyls of peraeopods not pectinate; telson generally rounded or sub-acute apically, but may be notched or emarginate. Integument with elongate scales.

Remarks. The history of the genus *Oradarea* has been complicated by several attempts to synonymize species of the genus with *Oradarea novaezealandiae* (Thomson) (see p. 53 for reasons necessitating the transfer of this species from *Leptamphopus*) and by the failure to recognize the subtle but constant differences which exist in this complex of closely related species.

Walker (1903) erected *Oradarea* for the species *O. longimana* obtained from Cape Adare. The new genus was defined as follows: "Body compressed. Third joint of mandibular palp rather shorter and narrower than the 2nd. Maxilla and maxillipeds as in *Amphithopsis* G. O. Sars. Upper antennae with a small secondary appendage. Lower antennae considerably longer than upper. Gnathopods very unequal, the 2nd much longer and proportionally narrower than the 1st. Telson entire."

Oradarea was compared with *Amphithopsis* Boeck (*sensu* Sars, 1893), from which it differed in having a more compressed body, and in the condition of mandibular palp, antennae and gnathopoda. It also differed from Boeck's definition in the presence of dorsal teeth on the pleon. Walker did not compare his genus with *Leptamphopus* Sars from which it differs in having an accessory flagellum, the relative proportions of the antennae, the well-developed eyes and the presence of an accessory plate on the right mandible.

Stebbing (1906) mentioned Walker's description and added "strangely like *Leptamphopus novaezealandiae*".

Chevreux (1906*e*) recorded *O. longimana* from several localities in Graham Land.

Walker (1907) pointed out the radical differences between his species and *Pherusa novaezealandiae* as described by Thomson (1879). Some of these differences were shown to be not valid by Chilton (1920) who, on examining Thomson's type material, found that the original description was based in part on fragments of a second species later described as *Panoploea spinosa* by Thomson.

Chilton (1909*a*) synonymized *Oradarea* with *Leptamphopus* and considered *O. longimana* identical with *L. novaezealandiae*, dismissing the objections of Walker (1907) as "variation". He noted the absence of an accessory flagellum in New Zealand specimens in contrast to Walker's material but considered this feature of insufficient significance to maintain the two species as distinct.

Chilton (1912) recorded specimens of *Oradarea* from the South Orkney Islands as *L. novaezealandiae*.

Chevreux (1913), under the name *L. novaezealandiae*, reported on specimens from the west coast of Graham Land. Included in the synonymy were references to *O. longimana*. Chevreux commented upon the considerable variation in number and form of the dorsal teeth, and the length of the antennae in his material.

Chilton (1920) re-examined the type specimens of *O. novaezealandiae* and continued to be of the opinion that *O. longimana* was synonymous with it.

Material from Iles Kerguelen and the Davis Sea collected by the German South Polar Expedition was referred to as *L. novaezealandiae* by Schellenberg (1926).

Shoemaker (1930) identified specimens obtained by the Cheticamp Expedition to the Gulf of St. Lawrence with *Amphithopsis longimana* Boeck. Shoemaker considered that Sars' definition of *Leptamphopus* should be accepted, thereby excluding from that genus *L. novaezealandiae* on the grounds of the dorsal teeth, and *L. longimana* (Boeck) (not *L. longimana* Sars = *L. sarsi* Vanhöffen) on the grounds of the accessory flagellum and the dorsal teeth. *L. longimana* (Boeck) was transferred to *Oradarea*, thereby reducing *O. longimana* Walker to a homonym for which Shoemaker proposed the name *O. walkeri*.

Barnard (1930) attributed specimens from New Zealand and from Oates Land to *L. novaezealandiae*.

The genus *Oradarea* was recognized by Schellenberg (1931), who assigned specimens from South Georgia to *O. walkeri* and gave a brief description.

Abundant material from the *Discovery* collections led Barnard (1932) to the independent recognition of the validity of Walker's genus. An examination of *O. novaezealandiae* material from New Zealand confirmed what Shoemaker had deduced from literature records, namely that *O. walkeri* and the five new species from the Scotia arc were distinct from *L. novaezealandiae*, and that the latter species should be removed from the genus *Leptamphopus* either to *Halirages*, or more suitably, a new genus. Barnard was able to assign tentative identifications to materal described by several previous authors as *L. novaezealandiae* and *O. longimana* Walker.

Pirlot (1934) described the strongly carinate species *O. shoemakeri* from two localities in the East Indies.

Among material collected at South Georgia, Stephensen (1938*a*) found specimens of *O. tridentata* and *O. bidentata*, both previously described by Barnard (1932) from that locality. Stephensen also recorded *L. novaezealandiae* from Campbell Island.

Material from the Australasian Antarctic Expedition (Nicholls, 1938) contained *O. walkeri*, *O. tricarinata* Barnard and a new species *Atylopsis megalops* subsequently transferred to *Oradarea* by Barnard (1964*b*).

Shoemaker (1945), having previously done much to elucidate the status of *Oradarea*, referred specimens from Graham Land to *L. novaezealandiae.*

Specimens from various localities in Graham Land and South Georgia obtained by the Norwegian Antarctic Expedition were examined by Stephensen (1947). Material was tentatively identified as *O. walkeri* (or *O. bidentata*) and *O. edentata*. Most of these specimens were described as being intermediate between *O. walkeri* and *O. bidentata*. Variations in eye colour, and in the shape of epimera 3 and the dorsal teeth gave rise to this uncertainty.

The absence of inner lobes of the lower lip is a character of generic value in the Calliopiidae (Stebbing, 1906; Barnard, 1964*b*). Both *O. longimana* (Boeck) and *Atylopsis megalops* Nicholls (transferred to *Oradarea* by Barnard (1964*b*)) are thus excluded from *Oradarea* and from *Leptamphopus*, the only other calliopiid genus characterized by elongate second gnathopods. *A. megalops* is retained in *Atylopsis* while a new genus would be appropriate for Boeck's species.

Oradarea as diagnosed above, thus contains eight recognized species; *O. novaezealandiae* (Thomson, 1879), *O. walkeri* Shoemaker (1930) (= *O. longimana* Walker 1903), *O. tridentata* Barnard 1932, *O. bidentata* Barnard 1932, *O. tricarinata* Barnard 1932, *O. impressicauda*, Barnard 1932, *O. edentata* Barnard 1932 and *O. shoemakeri* Pirlot 1934 together with the four new forms described here.

Leptamphopus is very close to *Oradarea*. The only constant differences between the two genera are the presence of a small one-articled accessory flagellum in *Oradarea* and the condition of the terminal article of the mandibular palp. In *Oradarea* this article is short, broad and obliquely truncate, while in *Leptamphopus* it tends to be narrow and falciform.

The elongate scales which are a prominent feature of the integument of all species of *Oradarea* except *O. novaezealandiae* and possibly *O. shoemakeri* are also found in the eusirid *Djerboa furcipes* Chevreux. Gnathopod 2 of this species is very similar in form to the elongate organ found in *Oradarea*. It is of interest to speculate whether this is convergence due to a particular mode of life, or an indication of the close relationship between the Calliopiidae and the Eusiridae as discussed by Barnard (1964*b*).

KEY TO THE SPECIES OF *Oradarea*

1. Peduncle of antenna 1 much longer than head, eyes oval or reniform, pleon segments 1–3 with strong lateral carinae, third epimera with two teeth . . . . ***shoemakeri*** Pirlot

   Peduncle of antenna 1 not much longer than head, eyes sub-circular, pleon segments 1–3 lacking strong lateral carinae, third epimera with not more than one tooth 2

2. Integument completely lacking elongate scale-like markings . . ***novaezealandiae*** (Thomson)

   Integument with elongate scale-like markings, at least on pleon 3

3. Telson very deeply channelled, apically notched . . . . ***impressicauda*** Barnard

   Telson not very deeply channelled, not apically notched 4

4. Telson apically acute or sub-acute 5

   Telson rounded or truncate 7

5. Dorsal margin of peraeon segment 7 produced into a rounded tooth, third epimera with large posterior-distal tooth . . . . ***tridentata*** Barnard

   Peraeon segment 7 not dentate, third epimera with small posterior-distal tooth . . 6

6. Gnathopod 2, propod slender, not distally expanded . . . . ***unidentata* sp. nov.**

   Gnathopod 2, propod relatively stout, expanded distally . . . ***walkeri*** Shoemaker

7. Peraeon and pleon segments lacking dorsal teeth 8
   Pleon segments 1 and 2 with dorsal teeth 9
8. Antennal lobe of head sub-rectangular, gnathopod 2 propod 1·25 times length of carpus, third epimera with distal tooth, telson narrow . . . . . . ***edentata*** Barnard
   Antennal lobe acute, gnathopod 2 propod 1·1 times length of carpus, third epimera without tooth, telson broad . . . . ***rossi*** **sp. nov.**
9. Peraeon segment 7 dorsally dentate 10
   Peraeon segment 7 not dentate 11
10. Gnathopod 2 palm convex, pleon segments 1 and 2 with dorso-lateral teeth, third epimera, posterior margin strongly convex . . . . ***tricarinata*** Barnard
    Gnathopod 2 palm concave, pleon segments 1 and 2 lacking dorso-lateral teeth, third epimera, posterior margin barely convex . . . . ***acuminata*** **sp. nov.**
11. Antennal lobe of head sub-rectangular, eyes, pale golden brown in alcohol, gnathopod 2, propod very slender, slightly tapered distally . . . . . ***bidentata*** Barnard
    Antennal lobe of head sub-acute, eyes small, dark brown in alcohol, gnathopod 2, propod slightly expanded distally . . . . ***ocellata*** **sp. nov.**

Oradarea walkeri Shoemaker
Figs. 11d and q, 12d and 13d

Oradarea longimana (Walker, not Boeck) Walker, 1903, p. 56–58, pl. 10, figs. 77–89 (part); Chevreux, 1906*e*, p. 54 (part); Walker, 1907, p. 32–33 (part).
Leptamphopus novaezealandiae (not Thomson) Chilton, 1912, p. 488–89 (part); Schellenberg, 1926, p. 351 (part).
Oradarea walkeri Shoemaker, 1930, p. 83; Schellenberg, 1931, p. 177–78 (part); Nicholls, 1938, p. 92–93; Stephensen, 1947, p. 52–53 (part).

Occurrence. (3 stations, 3 specimens; ♀♀ 9–11 mm.).

1. Sta. 45 1 ♀; 2. Sta. 50 1 ♀; 3. Sta. 53 1 ovig. ♀.

Diagnosis. A medium-sized species, up to 11 mm. in length. *Head*, antennal lobes acutely produced; eye lobes rounded, not prominent. *Peraeon*, segment 7, dorsal margin convex, free of succeeding segment, without tooth. *Pleon*, segment 1 with a low sub-carinate, sub-acute tooth; segment 2 with a low sub-carinate acute tooth; segment 3 sub-carinate. *Epimera 3*, ventral and posterior margins convex, posterior distal angle with acute, upturned tooth and small semi-circular notch. *Gnathopod 2*, propod longer than carpus, relatively stout, expanded distally; palm concave, palmar angle well defined. *Telson*, tapered gently then more abruptly, apex sub-rectangular, obscurely crenelate. *Integument*, large circular punctae scattered irregularly over peraeon and pleon, elongate scales rather obscure, particularly on pleon.

Habitat. One specimen from a mud substrate, the others from gravel, sand and rocks with algae, 5–25 m.

Breeding. Ovigerous female with 50 stage ii and iii eggs in September.

Distribution. Graham Land (Booth Island, Flandres Bay, Wiencke Island, Erebus and Terror Gulf) L.W.–200 m.; South Shetland Islands (Deception Island) 75 m.; South Orkney Islands (Laurie Island); Davis Sea (Drygalski Island, *Gauss* winter quarters) 110–385 m.; Terre Adélie (Commonwealth Bay) 5–91 m; Victoria Land (Cape Adare, Coulman Island) 13–183 m.

Oradarea bidentata Barnard
Figs. 11f and s, 12f and 13f

Leptamphopus novae-zealandiae (not Thomson) Chilton, 1912, p. 488–89 (part).
Leptamphopus Novae-Zealandiae (not Thomson) Chevreux, 1913, p. 143 (part).
Oradarea bidentata Barnard, 1932, p. 165, figs. 96b and 98; Stephensen, 1938*a*, p. 238, 1947, p. 52–53 (part).

Occurrence. (24 stations, ca. 1,117 specimens; ♂♂ 3–10 mm., ♀♀ 5·5–11 mm., juvs. 3–4 mm.).

1. Sta. 14 1 juv.; 2. Sta. 15 1 ♀, 1 juv.; 3. Sta. 16 2 ♂♂, 2 ♀♀; 4. Sta. 17 13 ♂♂, 4 ♀♀; 5. Sta. 18 1 juv.; 6. Sta. 19 5 ♀♀; 7. Sta. 23 1 ♂; 8. Sta. 24 2 ♂♂, 5 ♀♀; 9. Sta. 32 14 ♀♀; 10. Sta. 33 7 ♀♀; 11. Sta. 35 1 ♀, 1 juv.; 12. Sta. 36 1 ♂; 13. Sta. 39 1 ♂, 5 ♀♀, 1 juv.; 14. Sta. 46 42 ♂♂, 43 ♀♀, 7 juv.; 15. Sta. 47 30 ♂♂, 61 ♀♀; 16. Sta. 48 ca. 290 specimens (30% ♂♂, 64% ♀♀, 6% juv.); 17. Sta. 49 ca. 140 specimens (39% ♂♂, 2% ovig. ♀♀, 57% ♀♀, 2% juv.); 18. Sta. 50 2 ♂♂, 3 ♀♀ (1 ovig.); 19. Sta. 51 4 ♂♂, 3 ovig. ♀♀; 20. Sta. 52 1 ♂, 3 ovig. ♀♀; 21. Sta. 54 42 ♂♂, 56 ♀♀, 2 juv.; 22. Sta. 56 4 juv.; 23. Sta. 57 ca. 275 specimens (57% ♂♂, 1% ovig. ♀♀, 38% ♀♀, 4% juv.); 24. Sta. 58 5 ♂♂, 26 ♀♀ (3 ovig.), 4 juv.

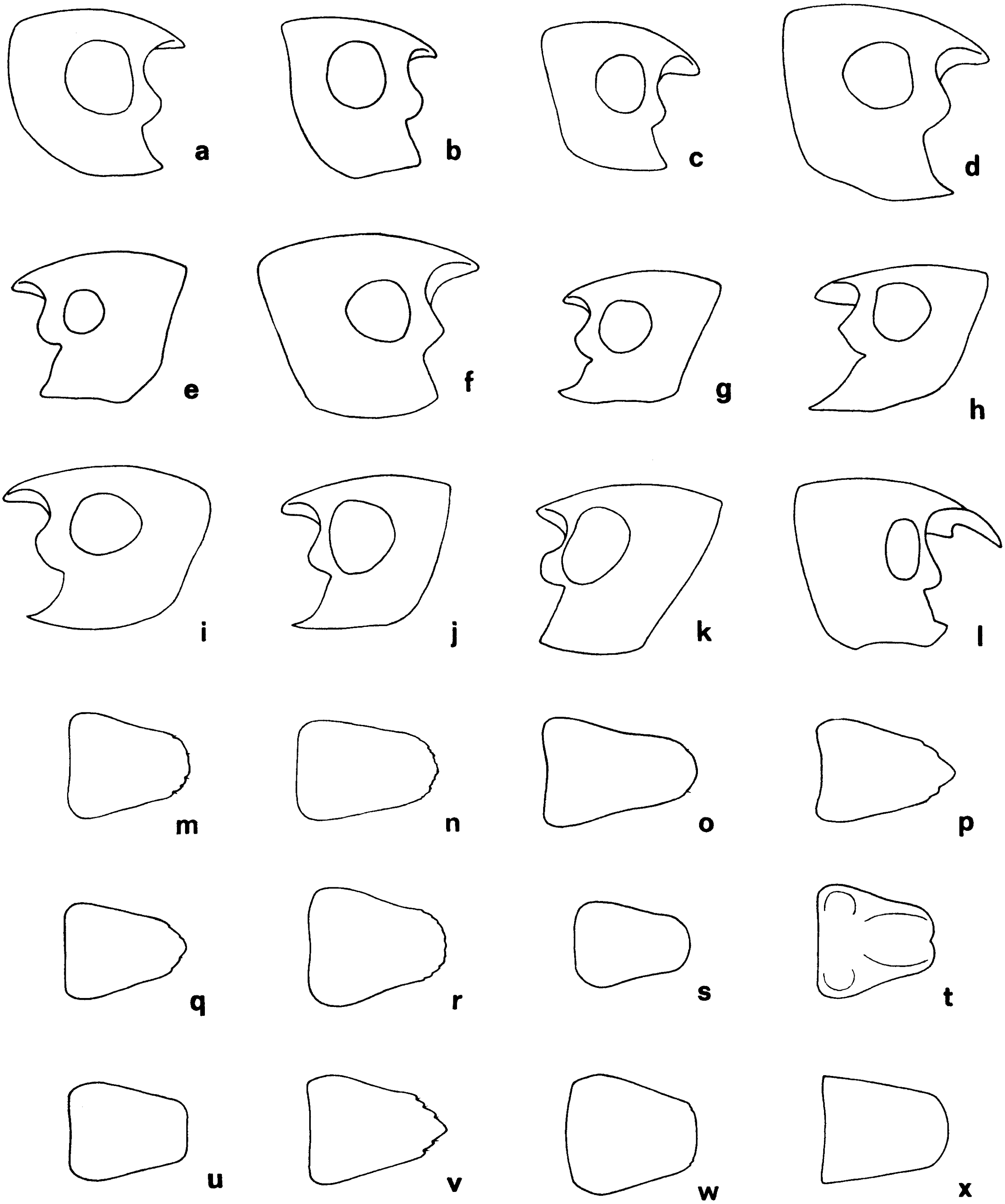

FIGURE 11

Oradarea species, head and telson. *a* and *m*, *O. rossi* sp. nov., holotype, 9 mm. ♀, lat. 78°35′S. *b* and *o*, *O. edentata* Barnard, syntype, 7 mm. ovig. ♀, *Discovery* sta. 173. *c* and *p*, *O. unidentata* sp. nov., holotype, 7 mm. ovig. ♀, sta. 51. *d* and *q* *O. walkeri* Shoemaker, syntype, 10 mm. ♀, Cape Adare, 1 November 1899. *e* and *r*, *O. ocellata* sp. nov., holotype, 17 mm. ovig. ♀, sta. 50. *f* and *s*, *O. bidentata* Barnard, syntype, 10 mm. ♀, *Discovery* sta. MS67. *g* and *t*, *O. impressicauda* Barnard, holotype, 15 mm. ♀, *Discovery* sta. 170. *h* and *u*, *O. acuminata* sp. nov., holotype, 15 mm. ♂, McMurdo Sound, 30 September 1903. *i* and *v*, *O. tridentata* Barnard, syntype, 12 mm. ovig. ♀, *Discovery* sta. 145. *j* and *w*, *O. tricarinata* Barnard, syntype, 13 mm. ♀, *Discovery* sta. 175. *k* and *n*, *O. novaezealandiae* (Thomson), 7 mm. ovig. ♀, Lyttelton Harbour, New Zealand. *l* and *x*, *O. shoemakeri* Pirlot (Pirlot, 1934, fig. 79).

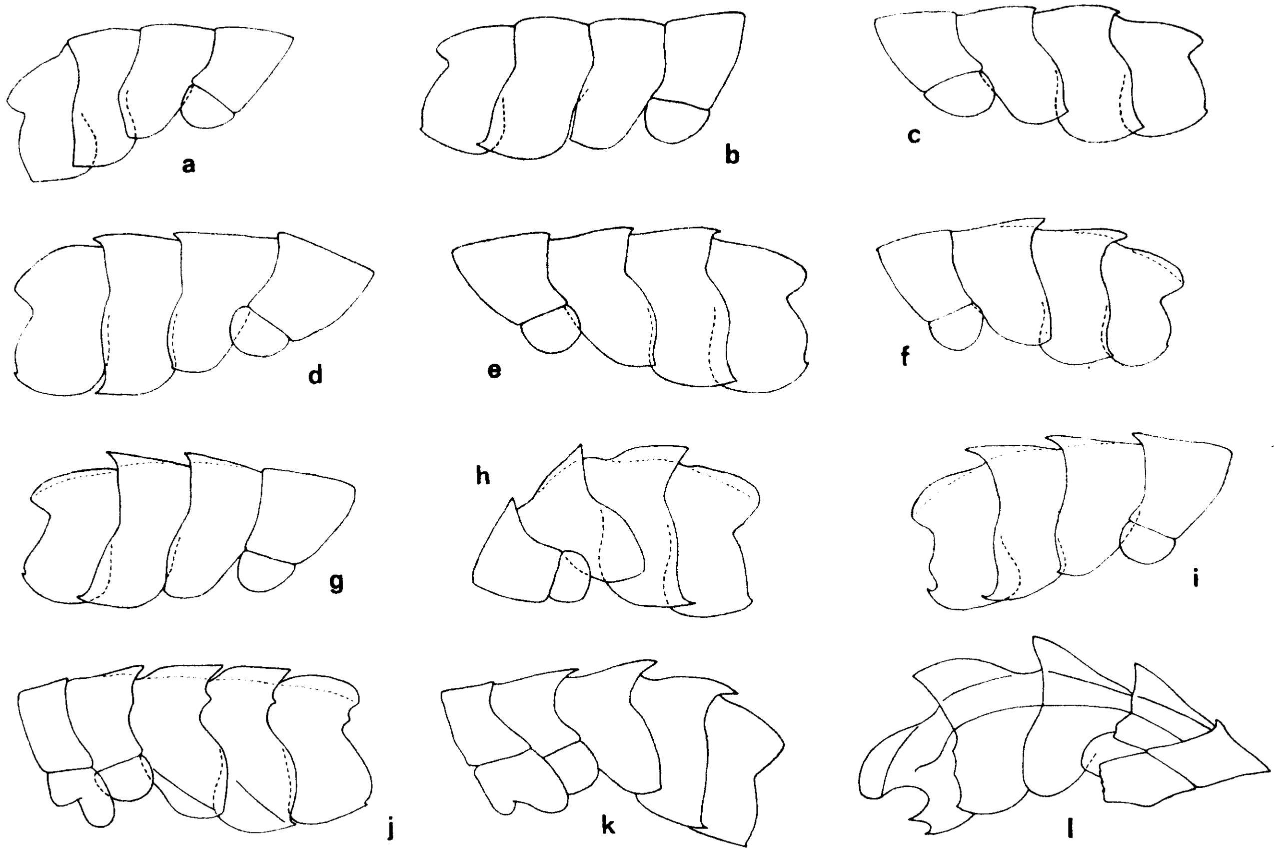

FIGURE 12

Oradarea species, pleon. *a, O. rossi* sp. nov., holotype, 9 mm. ♀, lat. 78°35′S. *b. O. edentata* Barnard, syntype, 7 mm. ovig. ♀, *Discovery* sta. 173. *c, O. unidentata*, holotype, 7 mm. ovig. ♀, sta. 51. *d, O. walkeri* Shoemaker, syntype, 10 mm. ♀, Cape Adare, 1 November 1899. *e, O. ocellata* sp. nov., holotype, 17 mm. ovig. ♀, sta. 50. *f, O. bidentata* Barnard, syntype, 10 mm. ♀, *Discovery* sta. MS67. *g, O. impressicauda* Barnard, holotype, 15 mm. ♀, *Discovery* sta. 170. *h, O. acuminata* sp. nov., holotype, 15 mm. ♂, McMurdo Sound, 30 September 1903. *i, O. tridentata* Barnard, syntype, 12 mm. ovig. ♀, *Discovery* sta. 145. *j, O. tricarinata* Barnard, syntype, 13 mm. ♀, *Discovery* sta. 175. *k, O. novaezealandiae* (Thomson), 7 mm. ovig. ♀, Lyttelton Harbour, New Zealand. *l, O. shoemakeri* Pirlot (Pirlot, 1934, fig. 79).

Diagnosis. A medium-sized species up to 11 mm. in length. *Head,* antennal lobes hardly produced, sub-rectangular; eye lobes rather small, somewhat pointed, rostrum deep. *Peraeon,* segment 7 without tooth. *Pleon,* segments 1 and 2 each with a dorsal, posterior, carinate tooth; segment 3 carinate. *Epimera 3* broadly rounded with small tooth on posterior margin. *Antennae* sub-equal, as long as head, peraeon and the first two or three pleon segments combined. *Gnathopod 2,* propod long, slender, slightly curved, longer than carpus; palm convex. *Peraeopods* relatively long, seventh longer than sixth. *Telson* rather narrow, length 1·4 times breadth, dorsally channelled, apex broadly rounded. *Integument* of peraeon and pleon marked with elongate scales.

Remarks. The dorsal teeth on the pleon of type material from South Georgia are large and carinate. The teeth, and the carina on pleon segment 3, are less well developed in material from the South Orkney Islands as shown by the *Scotia* collection (Chilton, 1912) and the present specimens, and from Graham Land (Chevreux, 1913).

Habitat. Frequently on mixed grounds with rocks, boulders and large algae, 3–20 m., but mostly from below 10 m.

Breeding. Ovigerous females have been recorded in May, June, July, September, October and December. Incubation occurs throughout the winter months.

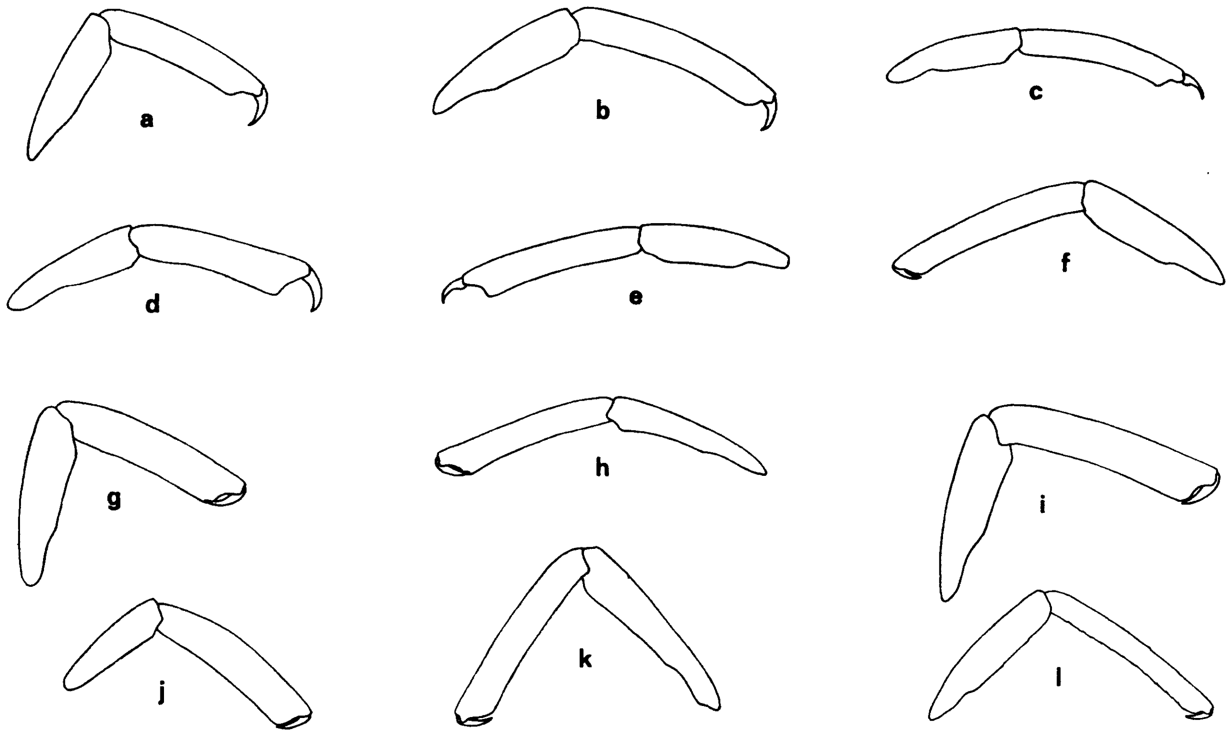

FIGURE 13

Oradarea species, gnathopod 2. *a*, *O. rossi* sp. nov., holotype, 9 mm. ♀, lat. 78°35′S. *b*, *O. edentata* Barnard, syntype, 7 mm. ovig. ♀, *Discovery* sta. 173. *c*, *O. unidentata*, holotype, 7 mm. ovig. ♀, sta. 51. *d*, *O. walkeri* Shoemaker, syntype, 10 mm. ♀, Cape Adare, 1 November 1899. *e*, *O. ocellata* sp. nov., holotype 17 mm. ovig. ♀, sta. 50. *f*, *O. bidentata* Barnard, syntype. 10 mm. ♀, *Discovery* sta. MS67. *g*, *O. impressicauda* Barnard, holotype, 15 mm. ♀, *Discovery* sta. 170. *h*, *O. acuminata* sp, nov., holotype, 15 mm. ♂, McMurdo Sound, 30 September 1903. *i*, *O. tridentata* Barnard, syntype, 12 mm. ovig. ♀, *Discovery* sta. 145. *j*, *O. shoemakeri* Pirlot (Pirlot, 1934, fig. 79). *k*, *O. tricarinata* Barnard, syntype, 13 mm. ♀, *Discovery* sta. 175. *l*, *O. novaezealandiae* (Thomson), 7 mm. ovig. ♀, Lyttelton Harbour, New Zealand.

Distribution. Graham Land (Petermann Island, Lemaire Channel, Flandres Bay, Port Lockroy) 2–60 m.; South Shetland Islands (Deception Island) 75 m.; South Orkney Islands (Laurie Island); South Georgia (Godthul, Cumberland Bay, Coal Harbour) 12–247 m.

Oradarea ocellata sp. nov.
Figs. 11e and r, 12e, 13e, 14a–p and 15a–g

Oradarea longimana (not Walker) Chevreux, 1906*e*, p. 54 (part).
Leptamphopus Novae-Zealandiae (not Thomson) Chevreux, 1913, p. 143 (part).
Oradarea walkeri (not Shoemaker) Stephensen, 1947, p. 52–53 (part).

Type material is in the collection of the British Museum (Nat. Hist.) under the following numbers: holotype (17 mm. ovigerous female), 1969:275; paratypes 1969:276–286, with the exception of nine specimens from sta. 50 which are deposited at the British Antarctic Survey station at Signy Island, three specimens from sta. 52 which are in the reference collection of the British Antarctic Survey Zoology Section and three specimens from sta. 59 which are held at the National Institute of Oceanography.

Type locality. Signy Island, South Orkney Islands. Sta. 50, Borge Bay, 16 October 1964. Agassiz trawl from Berntsen Point to Bare Rock, 5–10 m., gravel and sand, some rocks with *Desmarestia anceps* and *Phyllogigas grandifolius*.

Occurrence. (13 stations, ca. 243 specimens; ♂♂ 5·5–14 mm., ♀♀ 6–17 mm., juvs. 3–6 mm.).

1. Sta. 16 1 ♀; 2. Sta. 19 1 ♀; 3. Sta. 39 1 ♀; 4. Sta. 46 3 ♀♀ (damaged); 5. Sta. 48 1 ♂, 9 ♀♀ (1 ovig.); 6. Sta. 49 8 ♂♂, 3 ♀♀, 6 juv.; 7. Sta. 50 2 ♂♂, 14 ♀♀ (7 ovig.), including **holotype**; 8. Sta. 51 ca. 180 specimens (25% ♂♂ 22% ovig. ♀♀, 50% ♀♀, 3% juv.); 9. Sta. 52 3 ovig. ♀♀; 10. Sta. 55 1 ovig. ♀; 11. Sta. 57 6 damaged specimens; 12. Sta. 58 1 ♀; 13. Sta. 59 3 ♀♀.

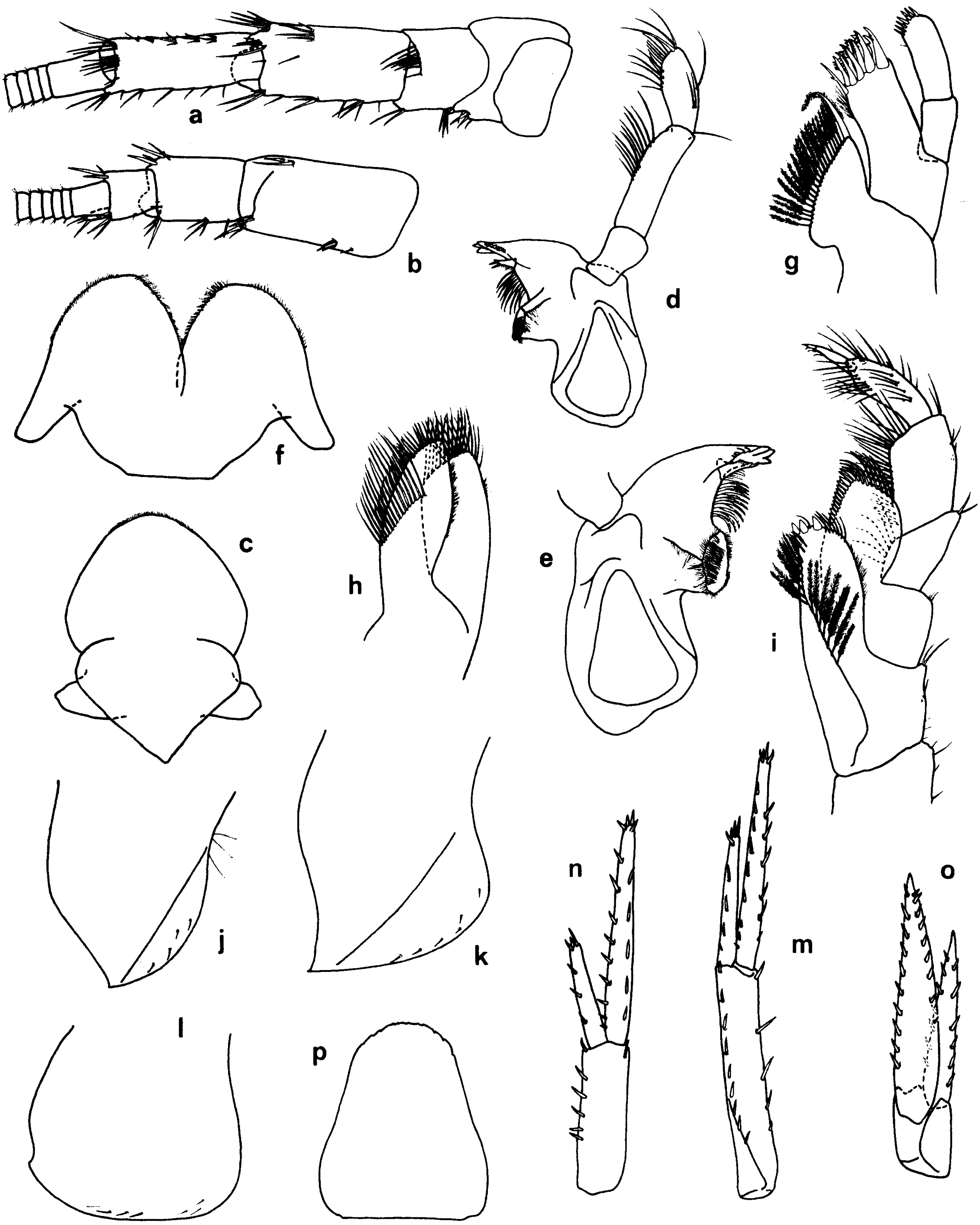

FIGURE 14

Oradarea ocellata sp. nov., holotype, 17 mm. ovig. ♀. *a* and *b*, antennae 2 and 1; *c*, upper lip; *d*, right mandible; *e*, left mandible; *f*, lower lip; *g* and *h*, maxillae 1 and 2; *i*, maxilliped; *j–l*, epimera 1–3; *m–o*, uropods 1–3; *p*, telson.

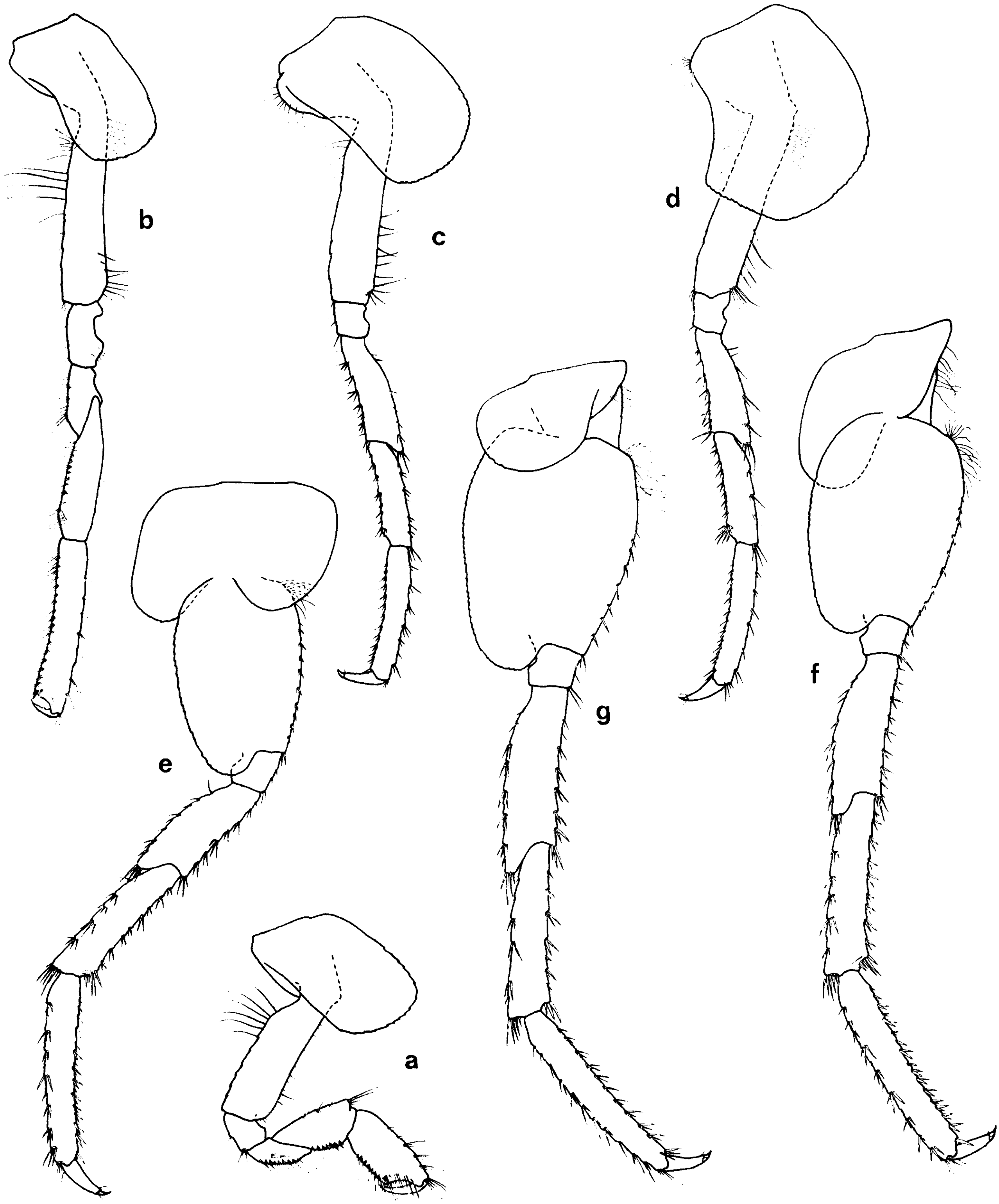

FIGURE 15
Oradarea ocellata sp. nov., holotype, 17 mm. ovig. ♀. *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7.

Other material examined

1. 1♂ Port Charcot, Booth Island, Graham Land, 20 m., 15 March 1904 (Chevreux, 1906); 2. 2 ♀♀ Petermann Island, Graham Land, 3 October 1909 (Chevreux, 1913); 3. 6 specimens Deception Island, South Shetland Islands, 75 m., 13 January 1928 (Stephensen, 1947).

Diagnosis. A large species, up to 17 mm. in length. *Head*, antennal lobes produced, sub-acute; eye lobes rounded, notch between, rather deep. *Eyes*, small, major diameter less than one-third of the depth of the head; colour in alcohol dark brown. *Peraeon*, segment 7, dorsal edge free from succeeding segment, convex, with incipient obtuse tooth. *Pleon*, segments 1 and 2 each produced dorsally into a small sub-acute tooth; segment 3 sub-carinate in the largest specimens. *Epimera 3*, ventral margin strongly convex, posterior margin sinuous, posterior distal angle with small acute tooth. *Antennae*, sub-equal, in female as long as body, in male rather longer. *Gnathopod 2*, propod rather slender, longer than carpus, slightly expanded distally; palm markedly concave. *Peraeopods*, rather stout, relatively short; seventh little if at all longer than sixth. *Telson*, rather broad, length 1·15 times breadth; apex broadly rounded, irregularly crenelate. *Integument*, elongate scales prominent on peraeon and pleon.

The name *O. ocellata* refers to the small eyes which characterize this species.

Remarks. This species resembles the Signy Island form of *O. bidentata* but can be distinguished by the produced antennal lobes, smaller eyes, stouter propod of gnathopod 2, subequal posterior peraeopods, and broader telson.

Habitat. Similar to *O. bidentata.* Confined almost exclusively to the open stands of large algae present on mixed bottoms, 4·5–49 m., most commonly 10–20 m.

Breeding. Ovigerous females in April, September, October and December. Available data do not give a clear picture of a seasonal pattern of breeding. The presence of a female carrying hatchlings in September is anomalous and may indicate a breeding season in the autumn. Two females of 12 mm. and 13 mm. carried 32 and 37 eggs, respectively.

Distribution. Graham Land (Petermann Island, Port Charcot) 20 m.; South Shetland Islands (Deception Island) 75 m.

Oradarea unidentata sp. nov.
Figs. 11c and p, 12c, 13c, 16a–o and 17a–g

Leptamphopus novaezealandiae (not Thomson) Chilton, 1912, p. 488–89 (part).
Leptamphopus Novae-Zealandiae (not Thomson) Chevreux, 1913, p. 143 (part).
Oradarea walkeri (not Shoemaker) Stephensen, 1947, p. 52–53 (part).

Type material is registered in the collection of the British Museum (Nat. Hist.): holotype (7 mm. ovigerous female), 1969:287; paratypes, 1969:288–309, with the exception of five specimens from sta. 10 which are deposited at the British Antarctic Survey station at Signy Island, and material from sta. 57 and 58 which are in the reference collections of the British Antarctic Survey Zoology Section and National Institute of Oceanography, respectively.

Type locality. Signy Island, South Orkney Islands. Sta. 51, Borge Bay, 10 December 1964. Agassiz trawl from Billie Rocks to Bare Rock, 5–15 m., sand and isolated boulders with algae.

Occurrence. (24 stations, 184 specimens; ♂♂ 3–7 mm., ♀♀ 4–7·5 mm., juvs. 2·5–4·5 mm.).

1. Sta. 10 3 ♂♂, 4 ♀♀; 2. Sta. 11 4 ♂♂, 1 ♀, 1 juv.; 3. Sta. 16 3 ♀♀ (1 ovig.), 2 juv.; 4. Sta. 17 3 ♀♀; 5. Sta. 18 1 juv.; 6. Sta. 19 2 ♂♂; 7. Sta. 20 2 ♂♂; 8. Sta. 21 1 ♀; 9. Sta. 22 1 ♀; 10. Sta. 24 1 ♂; 11. Sta. 26 3 ♂♂, 2 ♀♀; 12. Sta. 33 2 ♂♂, 1 ♀; 13. Sta. 36 1 ♂, 4 ♀♀, 1 juv.; 14. Sta. 40 1 ♂, 1 juv.; 15. Sta. 46 1 ♂, 2 ♀♀; 16. Sta. 48 3 ♂♂, 1 ♀, 2 juv.; 17. Sta. 49 4 ♂♂, 9 ♀♀, 5 juv.; 18. Sta. 50 3 ♂♂, 1 ♀, 1 juv.; 19. Sta. 51 16 ♂♂, 29 ♀♀ (8 ovig.), 4 juv. including **holotype**; 20. Sta. 52 5 ovig. ♀♀; 21. Sta. 53 2 ♀♀; 22. Sta. 54 3 ♂♂, 9 ♀♀ (1 ovig.), 9 juv.; 23. Sta. 57 9 ♂♂, 4 ♀♀, 3 juv.; 24. Sta. 58 5 ♂♂, 6 ♀♀ (1 ovig.), 3 juv.

Other material examined

1. 4 ♀♀ Scotia Bay, Laurie Island, South Orkney Islands, 10 fm. (Chilton, 1912); 2. 1 ovig. ♀ Lemaire Channel, Graham Land, 40–60 m., 18 November 1909 (Chevreux, 1913); 3. 4 specimens Deception Island, South Shetland Islands, 75 m., 13 January 1928 (Stephensen, 1947).

Diagnosis. Rather small, length up to 8 mm. *Head*, antennal lobes somewhat produced, sub-acute; eye lobes not prominent; notch between lobes not incised. *Peraeon* segment 7 without tooth. *Pleon* segment 1,

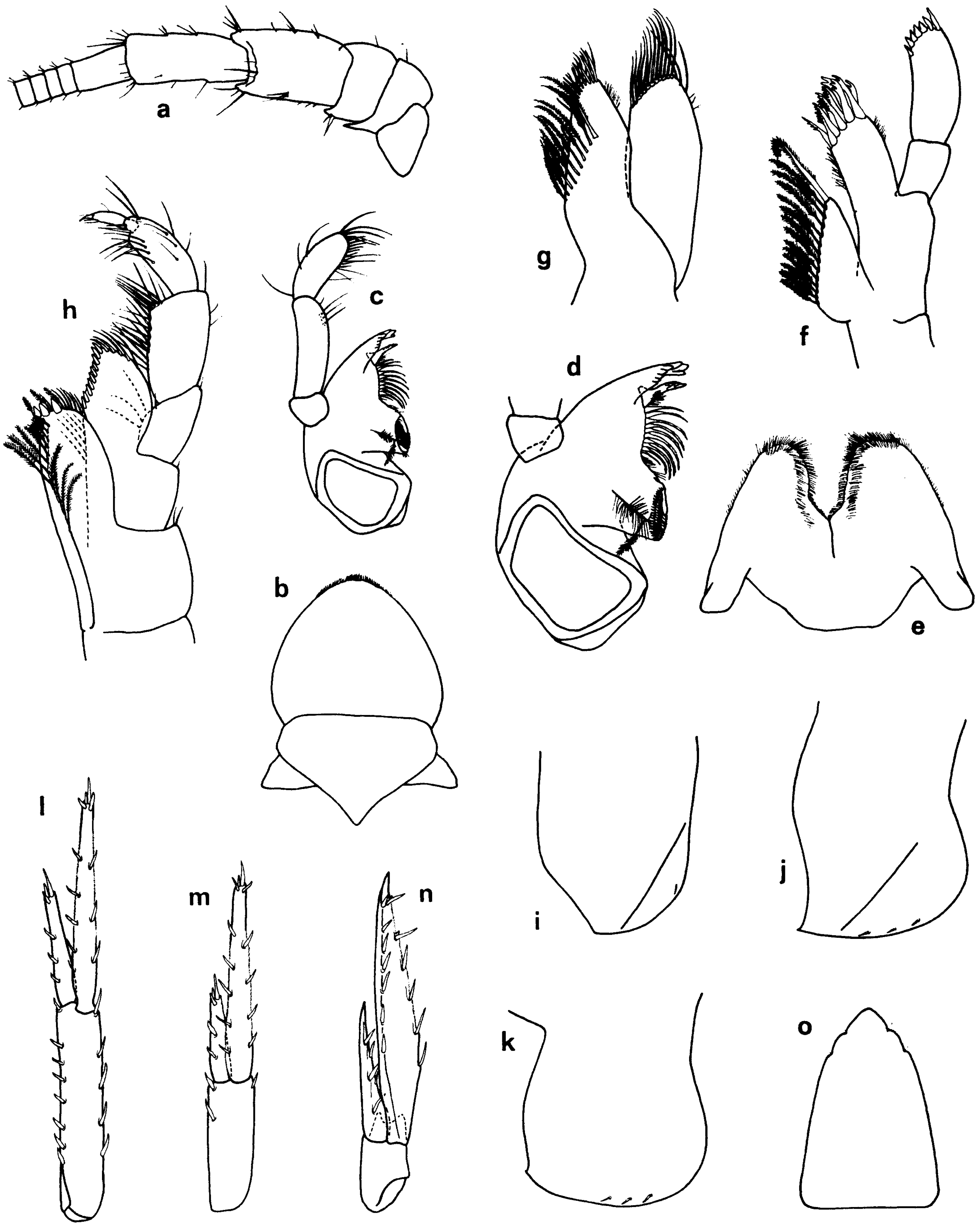

FIGURE 16

Oradarea unidentata sp. nov., holotype, 7 mm. ovig. ♀. *a*, antenna 2; *b*, upper lip; *c* and *d*, mandibles; *e*, lower lip; *f* and *g*, maxillae 1 and 2; *h*, maxilliped; *i–k*, epimera 1–3; *l–n*, uropods 1–3; *o*, telson.

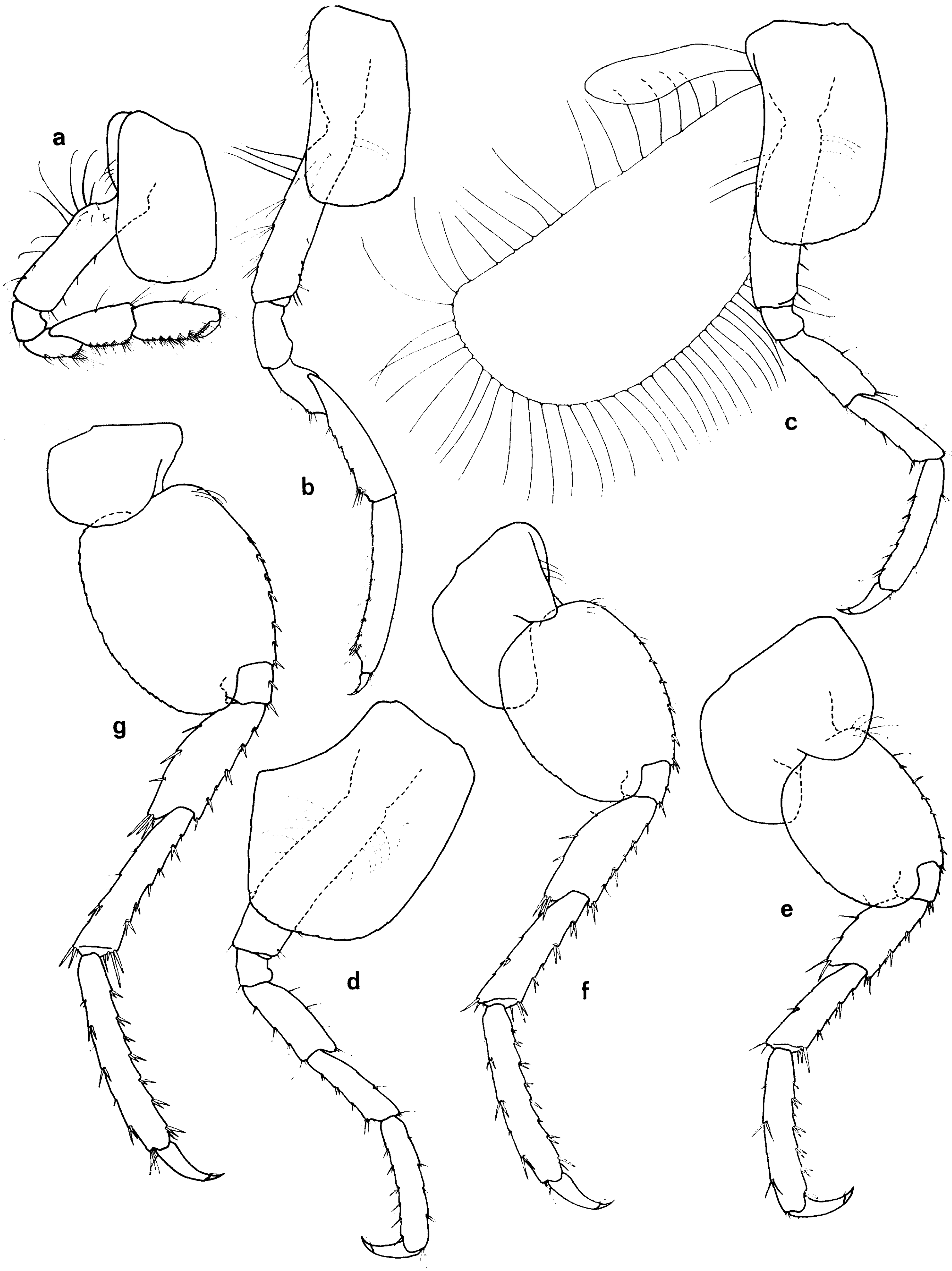

FIGURE 17

Oradarea unidentata sp. nov., holotype, 7 mm. ovig. ♀. *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7.

posterior dorsal margin convex, free of succeeding segment but without tooth; segment 2 with a small acute tooth; segment 3 not carinate. *Epimera 3*, ventral and posterior margins gently convex; posterior distal angle marked by small obtuse tooth. *Antennae* sub-equal, in male as long as body, in female as long as head, peraeon and pleon segments 1–3 combined. *Gnathopod 2*, propod slender, appreciably longer than carpus, curved, not expanded distally, palm oblique and straight. *Peraeopods* rather slender, quite long, seventh much longer than sixth. *Telson* longer than broad, tapering gently, then abruptly, apex sub-acute, irregularly crenelate. *Integument*, elongate scales present on peraeon but not pleon.

The name *O. unidentata* refers to the single tooth on pleon segment 2.

Remarks. Characters separating this species from others in the genus can be found in the key.

The tooth on pleon segment 2 is obsolete in animals of less than 4 mm. length, but the form of the telson separates this species from other edentate forms.

Habitat. Generally associated with large algae in shallow water, 2–20 m.

Breeding. Available data suggest both autumn and spring breeding.

Distribution. Graham Land (Lemaire Channel) 40–60 m.; South Shetland Islands (Deception Island) 75m.; South Orkney Islands (Laurie Island) 18 m.

Oradarea edentata Barnard
Figs. 11b and o, 12b and 13b

Oradarea edentata Barnard, 1932, p. 167–68, figs. 96d and 101; Stephensen, 1947, p. 53.
Leptamphopus novaezealandiae (not Thomson) Shoemaker, 1945, p. 290.
Oradarea walkeri (not Shoemaker) Stephensen, 1947, p. 52–53 (part).

Occurrence. (1 station, 2 specimens).

1. Sta. 46 2 ♀♀ 8 mm.

Diagnosis. A small species, up to 8 mm. in length. *Head*, antennal lobes hardly produced, sub-rectangular; eye lobes rounded. *Eyes* rather large. *Peraeon*, segment 7, posterior edge convex and free from succeeding segment but without tooth. *Pleon*, neither dentate nor carinate. *Epimera 3*, ventral margin nearly straight, posterior margin gently convex, posterior distal angle with small obtuse tooth. *Antennae*, short, as long as head and peraeon combined, a little longer in male. *Gnathopod 2*, propod longer than carpus, slender, curved, not expanded distally; palm convex, palmar angle poorly defined. *Peraeopods*, rather short, seventh longer than sixth. *Telson*, narrow, length 1·4 times breadth, lateral margins concave, apex rounded obscurely crenelate. *Integument*, elongate scales well defined anteriorly on peraeon but very obscure on pleon.

Habitat. Among algae on boulder bottom, 6–14 m.

Distribution. Graham Land (Melchior Harbour); South Shetland Islands (Deception Island) 5–75 m.; South Georgia (Godthul).

Oradarea tridentata Barnard
Figs. 11i and v, 12i and 13i

Leptamphopus novaezealandiae (not Thomson) Schellenberg, 1926, p. 351 (part).
Oradarea walkeri (not Shoemaker) Schellenberg, 1931, p. 177–78 (part); Stephensen, 1947, p. 52–53 (part).
Oradarea tridentata Barnard, 1932, p. 163–65, figs. 96a and 97.

Diagnosis. A medium-sized species, up to 12 mm. in length. *Head*, antennal lobes not very deep, produced, acute; eye lobes irregularly rounded. *Peraeon*, segment 7, produced posteriorly into obtuse, rounded tooth. *Pleon*, segments 1 and 2 each with an acute carinate tooth dorsally; segment 3 carinate. *Epimera 3*, ventral and posterior margins convex; posterior distal angle marked by a strong acute tooth with a semi-circular notch immediately above it. *Antennae*, rather short, not much longer than head and peraeon combined. *Gnathopod 2*, rather stout, propod somewhat longer than carpus, slightly expanded distally; palm nearly transverse, concave. *Peraeopods*, rather long, seventh longer than sixth. *Telson*, longer than broad, tapering gently then more abruptly; apex acute, serrate. *Integument* of peraeon and pleon with elongate scales.

Distribution. Graham Land (Port Lockroy) 20–30 m.; South Georgia (Cumberland Bay, Stromness Harbour, North Undine Harbour, Coal Harbour) 12–273 m.; Shag Rocks Bank 160 m.; Iles Kerguelen.

Oradarea impressicauda Barnard
Figs. 11g and t, 12g and 13g

Oradarea impressicauda Barnard, 1932, p. 166–67, figs. 96c and 100.

Diagnosis. A medium-large species, up to 15 mm. in length. *Head,* antennal lobes strongly produced, acute, eye lobes rounded; notch between antennal and eye lobes incised. *Peraeon,* segment 7, posterior margin free, convex, lacking tooth. *Pleon,* segments 1 and 2 dentate, carinate; segment 3 carinate. *Epimera 3,* somewhat produced posteriorly, broadly rounded, small tooth and incision on posterior margin. *Gnathopod 2,* rather stout, propod a little longer than carpus, not expanded distally; palm concave. *Peraeopods,* relatively long. *Telson,* short, length and breadth sub-equal, apex slightly incised; dorsally deeply channelled, lateral impressions shallow. *Integument,* elongate scales present but rather obscure.

Distribution. South Shetland Islands (Clarence Island) 342 m.

Oradarea tricarinata Barnard
Figs. 11j and w, 12j and 13k

Oradarea longimana (not Walker) Walker, 1907, p. 32–33 (part).
Oradarea tricarinata Barnard, 1932, p. 166, figs. 96a and 99; Nicholls, 1938, p. 93.

Diagnosis. A large species, up to 17 mm. in length. *Head,* antennal lobes strongly produced, acute; eye lobes rather small, rounded. *Eyes,* large, maximum diameter about half the height of head. *Peraeon,* segment 6, posterior margin free, produced into obtuse rounded tooth, segment 7 dorsally carinate, carina with subacute tooth posteriorly. *Pleon,* segments 1–3 strongly carinate dorsally; carinae on first two segments each produced into strong acute tooth; segment 3, carina high, not produced into tooth; dorso-lateral margins of first 3 pleon segment produced into acute or sub-acute teeth. *Epimera 3,* ventral margin nearly straight, posterior margin strongly convex; posterior distal angle marked by small acute tooth. *Antennae,* probably sub-equal, about as long as body. *Gnathopod 2,* rather slender, propod and carpus sub-equal, propod not expanded distally; palm convex. *Telson,* short, broad, length just greater than breadth; apex truncate, obscurely crenelate at lateral distal angles. *Integument,* with elongate scales on peraeon and pleon.

Remarks. The single female obtained in South Georgia by the *Discovery* expedition (Barnard, 1932, fig. 99) has peraeon segment 6 produced into a carinate tooth. The lateral carinae present in this specimen are represented in all the material from the South Shetland Islands by flat teeth on the dorso-lateral margins of peraeon segment 7 and pleon segments 1–3.

Distribution. Graham Land (north of Tower Island) 200 m.; South Shetland Islands (Deception Island) 525 m.; South Georgia (Stromness Harbour) 155–178 m.; Davis Sea (south-east of Drygalski Island) 110 m.); Victoria Land (Coulman Island) 183 m.

Oradarea acuminata sp. nov.
Figs. 11h and u, 12h, 13h, 18a–n and 19a–j

Oradarea longimana (not Walker) Walker, 1907, p. 32–33 (part).
Leptamphopus novaezealandiae (not Thomson) Barnard, 1930, p. 369 (part).

Type material is in the collection of the British Museum (Nat. Hist.) under the following registration numbers: holotype (15 mm. male), 1969:835; paratypes (from National Antarctic Expedition), 1969:836–840; paratypes (from British Antarctic Expedition), 1969:841.

Material examined

National Antarctic Expedition (Walker, 1907)
1. 2 ♂♂ 14 mm. Coulman Island, 100 fm., 13 January 1902; 2. 1 ♀ 20 mm. Hut Point, McMurdo Sound, 19 November 1902; 3. 1 ♀ 14 mm. hole No. 4, McMurdo Sound, 10 January 1903; 4. 1 ♀ 16 mm. hole No. 7, McMurdo Sound, 26 February 1903; 5. 1 ♂ 18 mm. hole No. 7, McMurdo Sound, 16 March 1903; 6. 1 ♂ 15 mm. McMurdo Sound, 30 September 1903, **holotype.**

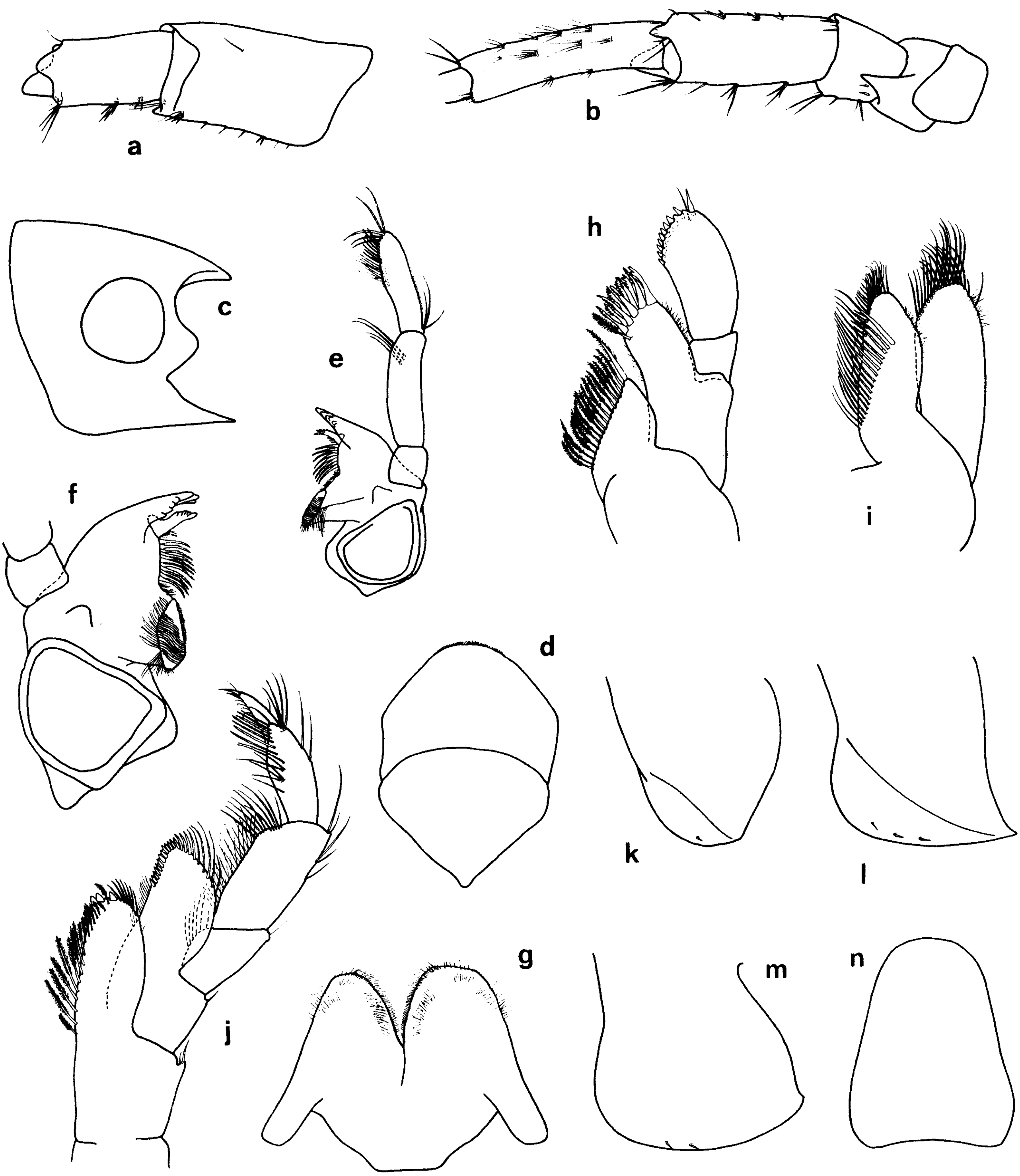

FIGURE 18

Oradarea acuminata **sp. nov., holotype, 15 mm. ♂. *a* and *b*, antennae 1 and 2; *c*, head; *d*, upper lip; *e*, right mandible; *f*, left mandible; *g*, lower lip; *h* and *i*, maxillae 1 and 2; *j*, maxilliped; *k–m*, epimera 1–3; *n*, telson.**

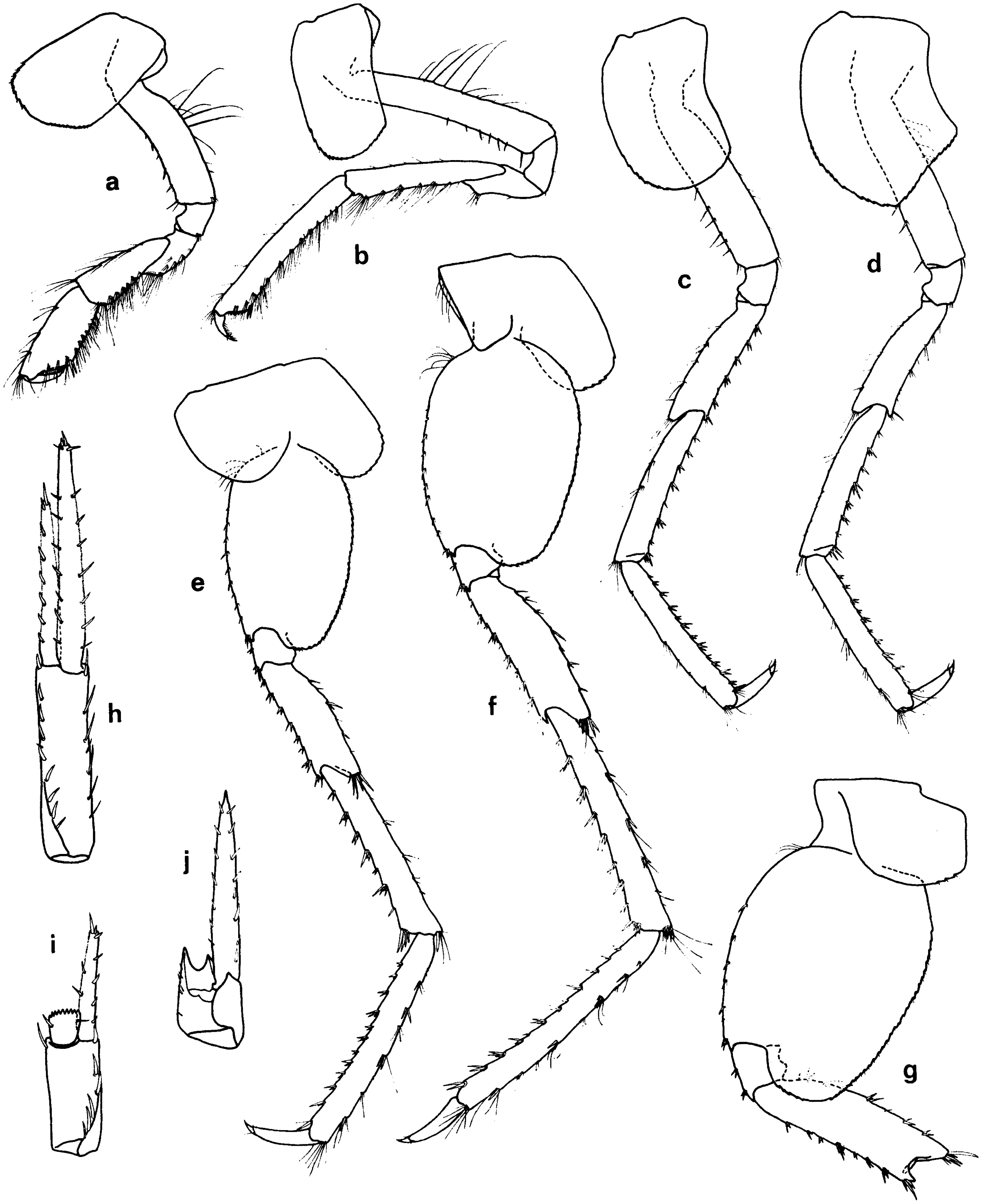

FIGURE 19

Oradarea acuminata sp. nov., holotype, 15 mm. ♂. *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7; *h*, uropod 1; *i*, uropod 2 (inner ramus broken); *j*, uropod 3 (inner ramus missing).

British Antarctic ("Terra Nova") Expedition (Barnard, 1930).
7. 1 ♂ 20 mm., 1 ♀ 20 mm. Sta. 194, Oates Land, 329–366 m., 22 February 1911.

Diagnosis. A large species, up to 20 mm. in length. *Head*, antennal lobes very strongly produced, acute; eye lobes rather prominent, apically angled; sinus between antennal and eye lobes rather deep, incised; rostrum rather deep. *Eyes*, rather large, diameter about two-fifths height of head. *Peraeon*, segment 7, dorsal margin free posteriorly, produced into a rounded, obtuse tooth. *Pleon*, segments 1 and 2 each produced into a strong carinate tooth; segment 3 strongly carinate. *Epimera 3*, rectangular, an obtuse tooth at the posterior distal angle. *Antennae* very long, subequal, considerably longer than body. *Gnathopod 2*, rather slender, propod only a little longer than carpus, expanded distally, palm concave. *Peraeopods*, long, slender, seventh nearly twice as long as sixth. *Telson*, broad, length only just greater than breadth, apex truncate, obscurely crenelate. *Integument* with elongate scales on peraeon and pleon.

The name *O. acuminata* alludes to the strongly produced, acute antennal lobes which are diagnostic.

Remarks. This species may be distinguished from other species in the genus by the shape of the antennal lobes, epimera 3 and telson. It is the largest species of *Oradarea* yet recognized.

Distribution. Oates Land 329–366 m.; Victoria Land (Coulman Island, McMurdo Sound) 64–183 m.

Oradarea rossi sp. nov.

Figs. 11a and m, 12a, 13a, 20a–n and 21a–g

Oradarea longimana (not Walker) Walker, 1903, p. 56–58 (part), 1907, p. 32–33 (part).

Type material is in the collection of the British Museum (Nat. Hist.) under the following registration numbers: holotype (9 mm. female), 1969:842; paratypes (from *Southern Cross* expedition), 1969:843; paratypes (from National Antarctic Expedition), 1969:844.

Type locality. Ross Sea, lat. 78°35′S., 18 February 1900, collected at the surface. (No longitude was given by Walker, but the noon position of *Southern Cross* on this date was about long. 165°W.)

Material examined

1. 12 ♂♂ 4–6·5 mm., 24 ♀♀ 4·5–9 mm. including **holotype** from type locality; 2. 1 ♀ 9 mm. Coulman Island, Victoria Land, 100 fm., 13 January 1902 (Walker, 1907).

Diagnosis. A small species, up to 9 mm. in length. *Head*, antennal lobe sub-acutely produced; eye lobes rounded, not prominent. *Eyes*, large, diameter greater than two-fifths of height of head. *Peraeon*, segment 7, dorsal margin free, without tooth. *Pleon*, no segments dentate or carinate. *Epimera 3*, ventral and posterior margins gently convex; posterior distal angle well defined, obtuse, without tooth. *Antennae*, rather short, probably not longer than head and peraeon combined. *Gnathopod 2*, propod a little longer than carpus, not expanded distally; palm concave. *Peraeopods*, slender, not very long, seventh 1·5 times length of sixth. *Telson*, rather broad, tapered, apex broadly rounded, irregularly crenelate. *Integument*, elongate scales prominent on peraeon, somewhat obscure on pleon.

The name *O. rossi* honours Sir James Clark Ross, who was the first man to explore the regions from which this species has been obtained.

Remarks. O. rossi is distinguished from all species in the genus except *O. edentata* and juvenile *O. unidentata* by the lack of dorsal teeth on peraeon and pleon segments. From *O. edentata* this species differs in the absence of teeth on epimera 3, broader telson and short, stout propod of gnathopod 2. The absence of teeth on epimera 3 and the broadly rounded telson separate *O. rossi* from juvenile *O. unidentata.*

Distribution. Ross Sea (Coulman Island, Ross Ice Shelf at lat. 78°35′S., long. 165°W.) surface–183 m.

Oradarea novaezealandiae (Thomson)

Figs. 10n and o, 11k and n, 12k and 13l

Pherusa novae-zealandiae Thomson, 1879, p. 239, pl. 10C, fig. 2.
Panoploea debilis Thomson, 1880, p. 3, pl. 1, fig. 3, 1881, p. 213–14; Thomson and Chilton, 1886, p. 150; Thomson, 1889, p. 262.
Phersau neo-zelanica Thomson and Chilton, 1886, p. 148.
Acanthozone longimana (not Boeck) Della Valle, 1893, p. 604, 620 (part).

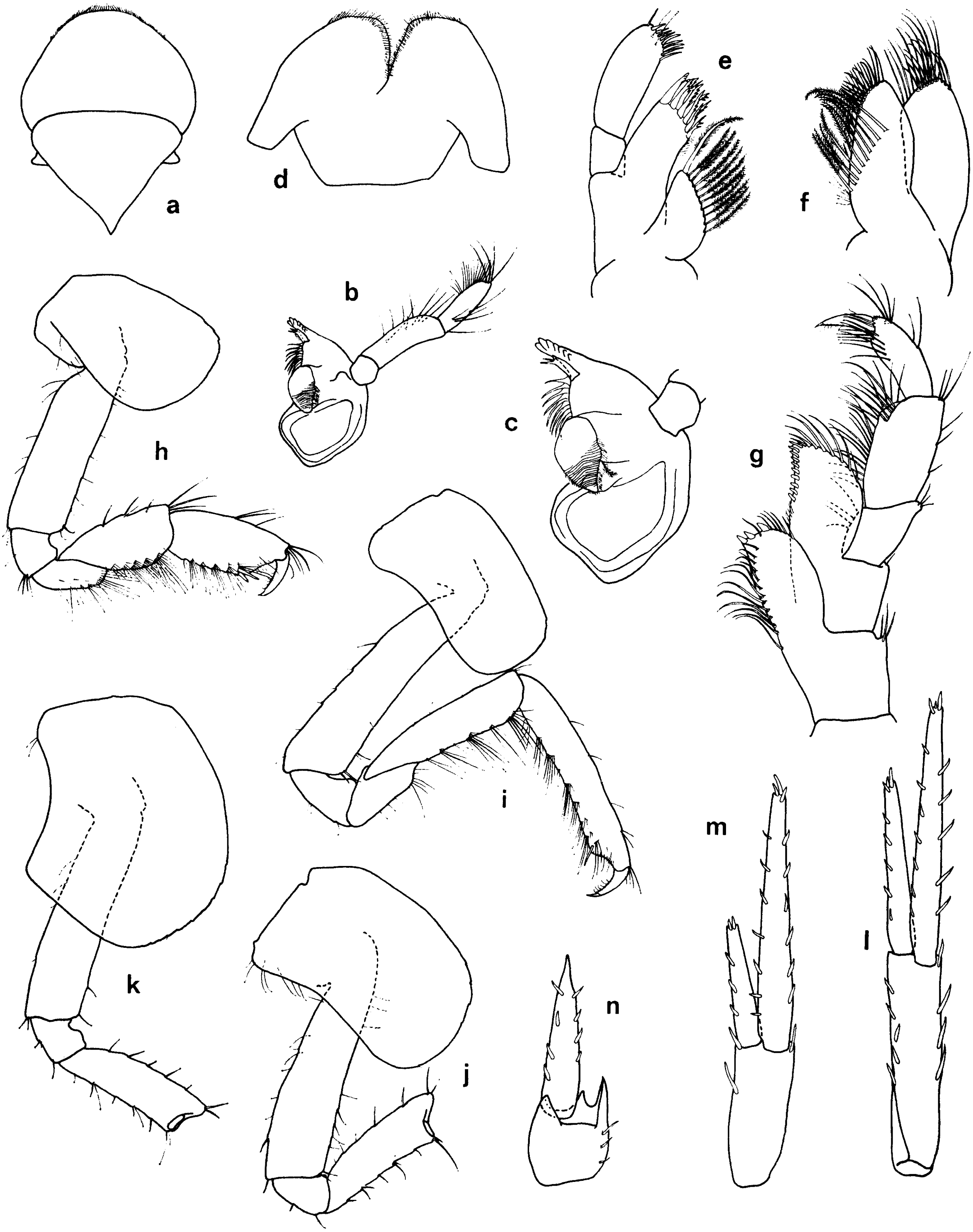

FIGURE 20

Oradarea rossi sp. nov., holotype, 9 mm. ♀. *a*, upper lip; *b* and *c*, mandibles; *d*, lower lip; *e* and *f*, maxillae 1 and 2; *g*, maxilliped; *h* and *i*, gnathopods 1 and 2; *j* and *k*, peraeopods 3 and 4; *l* and *m*, uropods 1 and 2; *n*, uropod 3 (inner ramus missing).

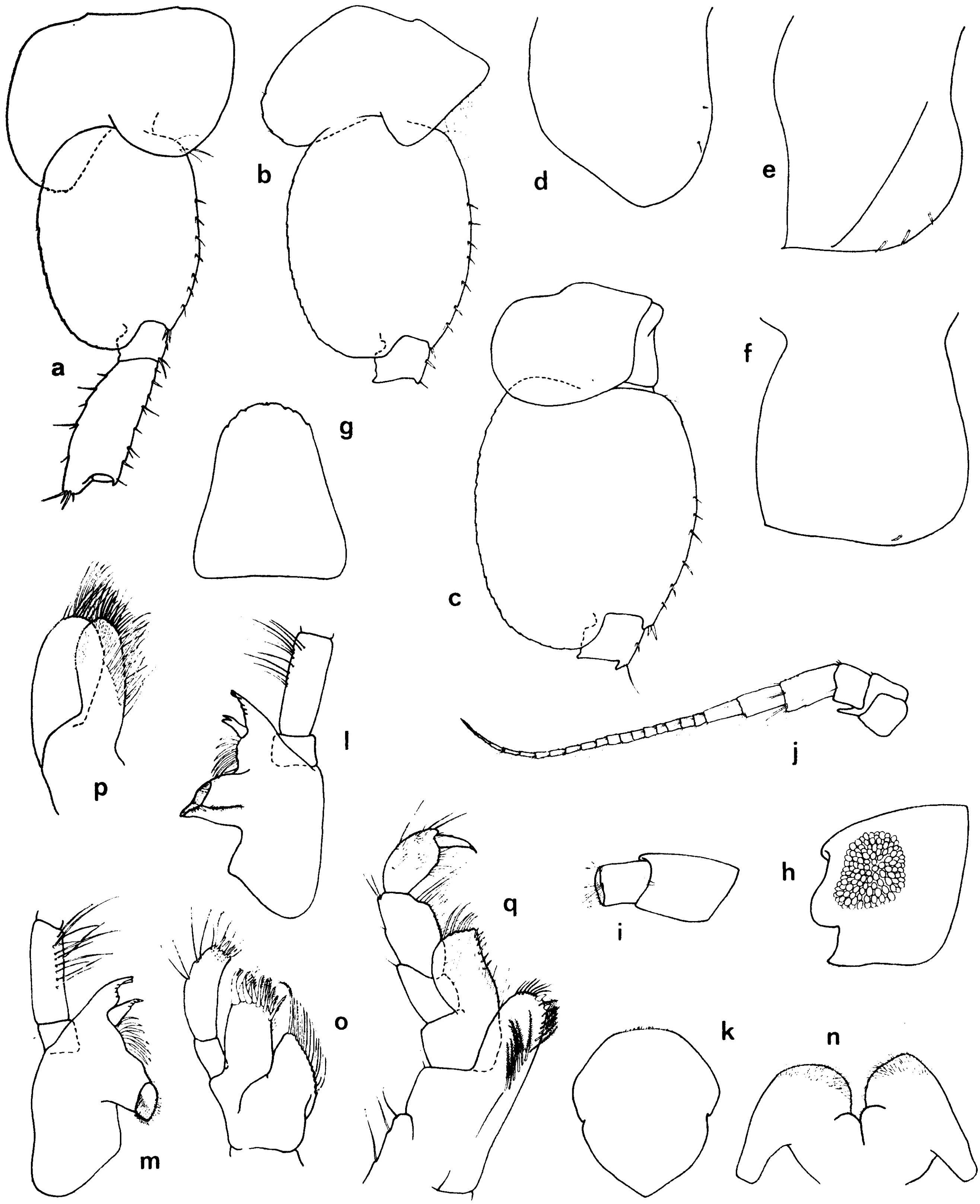

FIGURE 21

Oradarea rossi sp. nov., holotype, 9 mm. ♀. *a–c*, peraeopods 5–7; *d–f*, epimera 1–3; *g*, telson. *Atylopsis signiensis* sp. nov., holotype, 9 mm. ovig. ♀. *h*, head; *i* and *j*, antennae 1 and 2; *k*, upper lip; *l* and *m*, mandibles; *n*, lower lip; *o* and *p*, maxillae 1 and 2; *q*, maxilliped.

Leptamphopus novaezealandiae Stebbing, 1906, p. 294; Stephensen, 1927, p. 314–15; Barnard, 1930, p. 369 (part, part = *O. acuminata*); Stephensen, 1938*a*, p. 244–45; not Shoemaker, 1945, p. 290 (= *O. edentata*).
Leptamphopus novae-zealandiae Chilton, 1909*a*, p. 621–22; Thomson, 1913, p. 243; Chilton, 1920, p. 1–6, figs. 1–5; Barnard, 1932, p. 162–63; not Chilton, 1912, p. 488–89 (= *O. walkeri*, *O. bidentata* and *O. unidentata*).
Leptamphopus novae zealandiae Chilton, 1911, p. 308; not Schellenberg, 1926, p. 351 (= *O. walkeri*, *O. tridentata* and *Atylopsis megalops*).
Leptamphopus Novae-Zealandiae not Chevreux, 1913, p. 143 (= *O. bidentata*, *O. ocellata* and *O. unidentata*).

Diagnosis. Rather small, length up to 8 mm. *Head*, antennal lobes sub-rectangular; eye lobes rounded, not very prominent. *Peraeon*, segment 7 produced posteriorly into obtuse rounded tooth. *Pleon*, segments 1 and 2 each with an acute, rounded tooth dorsally; segment 3 not carinate. *Epimera 3*, ventral margin nearly straight; posterior margin sinuous; posterior ventral angle produced into a small, acute tooth which is not up-turned. *Gnathopod 2*, very slender, propod longer than carpus. *Peraeopods*, moderately long, seventh probably longer than sixth. Telson rather narrow; obscure, irregular crenellations on broadly rounded apex. *Integument*, completely lacking elongate scales.

Remarks. An examination of specimens kindly made available by Mr. G. A. Tunnicliffe of the Canterbury Museum shows that, although the lower lip lacks inner lobes, a small accessory flagellum is present on the first antenna. The species is therefore excluded from *Leptamphopus*, which includes only *L. sarsi* Vanhöffen and *L. paripes* Stephensen, and falls within the limits of *Oradarea*. The characteristic integumentary scales are absent in *O. novaezealandiae* but this feature is outweighed by the agreement of lower lip and accessory flagellum.

Distribution. Campbell Island (Perseverance Harbour); Auckland Islands (Carnley Harbour) 50 m.; New Zealand (Foveaux Strait, Dunedin, Otago, Akaroa, Lyttelton, Bay of Isles, North Cape) 7–50 m.

? *Oradarea shoemakeri* Pirlot
Figs. 11l and x, 12l and 13j

Oradarea shoemakeri Pirlot, 1934, p. 195–201, figs. 79–83.

Diagnosis. A medium-sized species, up to 15 mm. in length. *Head*, antennal lobes produced, a blunt tooth distally; eye lobes rounded; rostrum rather long, distally slender. *Eyes*, oval. *Peraeon*, segment 6 with a small dorsal tooth, segment 7, strongly carinate, carina ending in an acute tooth. *Pleon*, segments 1–3 very strongly carinate dorsally, carinae of segments 1 and 2 each ending in an acute tooth, segment 3 rounded, overhanging segment 4; lateral carinae on pleon segments 1–3. *Epimera 3*, ventral margin convex, posterior margin with large, triangular, acute tooth; posterior distal angle marked by smaller, acute tooth. *Antennae*, first probably longer than second. *Gnathopod 2*, moderately stout, propod much longer than rather short carpus; palm nearly transverse, convex. *Telson*, longer than broad, apically rounded.

Remarks. The position of *O. shoemakeri* is problematical. The description, based on a male specimen from the Celebes Sea and a female from the Timor Sea, agrees in general with the diagnosis given for the genus. However, the two specimens show considerable sexual dimorphism, a feature not found in other species of the genus. Differences in the anterior coxae, basals of peraeopods 5–7 and the shape of the head lobes give cause to doubt whether the two specimens are conspecific. Indeed the form of coxae 1–4 would tend to place them in different families—the female in the Calliopiidae and the male in the Paramphithoidae. If the female alone is considered, the long peduncles and the disparity in length of the flagella of the two pairs of antennae and the form of coxae 4–6 are atypical of the genus as a whole. The differences which separate *O. shoemakeri* from the homogeneous group of Antarctic species may warrant subgeneric or generic separation.

Distribution. Celebes Sea 1,165–1,264 m.; Timor Sea 525 m.

Genus *Atylopsis* Stebbing

Stebbing, 1888, p. 924–25 (part), 1906, p. 299.
Schellenberg, 1926, p. 351.
Barnard, 1969, p. 175.

Diagnosis. Calliopiid amphipods with *antenna 1* having accessory flagellum. *Mandible*, cutting edge not drawn out; palp article 3 not markedly shorter than article 2. *Lower lip* with inner lobes. *Maxilla 1*, palp article 2 longer than article 1. *Maxilliped*, inner plate not greater than outer, outer plate lacking spine teeth on inner margin; palp article 3 produced over article 4.

Gnathopods, sub-chelate; carpus equal to or less than propod; propod not tapering and bent, palm distinct. *Gnathopod 2*, not eusirid, carpus and propod not immensely long and slender. *Peraeopods*, coxa 4 the deepest; dactyls not pectinate. *Peraeopods 3–4*, basal without anterior process.

Telson, rather short, apically emarginate.

Relationships. Harpinioides differs from *Atylopsis* by the deep coxae and slender, curved propods of gnathopods 1–2.

Stenopleura is distinguished by very shallow coxae and pointed telson.

Atylopsis lacks the prominent carpal projections of *Calliopius* and has a notched telson.

Coxa 4 is deeper than the others in *Atylopsis*, whereas in *Haliragoides* coxa 1 is the deepest.

Cleippides has the carpus of gnathopod 1 much longer than the propod.

The pronounced rostrum and very shallow coxae distinguish *Regalia* from *Atylopsis*.

Apherusa is close to *Atylopsis* but may be separated by distinctly notched telson of the latter.

Remarks. Barnard (1958) accepted six species in the genus *Atylopsis* but later (Barnard, 1964*b*) rejected two of these, *A. latipalpus* Walker and Scott being transferred to *Pontogeneia* or *Accedomoera* and *A. megalops* Nicholls to *Oradarea*. The transference of *A. latipalpus* is here accepted but determination of its exact generic position is impossible as the type material is no longer extant. Nicholls' species is retained in *Atylopsis* as the presence of lobes on the lower lip preclude the species from *Oradarea*. Also, although the carpus and propod of gnathopod 2 are elongate they do not have the completely linear form seen in *Oradarea*.

The division of *Atylopsis* on the condition of the inner plate of maxilla 1 may ultimately warrant generic separation although similar divisions among the pontogeneiid sequence of the Eusiridae have broken down.

KEY TO THE SPECIES OF *Atylopsis*

1.	Pleon segments 1–2 dorsally dentate	2
	Pleon segments 1–2 dorsally smooth	3
2.	Gnathopod 2 propod elongate, length 4 times breadth . .	***megalops*** Nicholls 1938
	Gnathopod 2 propod short, length ca. 2 times breadth . .	***dentatus*** Stebbing 1888
3.	Maxilla 1 inner plate with 4–5 setae	***emarginatus*** Stebbing 1888
	Maxilla 1 inner plate with 12–13 setae	4
4.	Epimera 3 rounded posterior-distally; telson emargination small, apices truncate	***multisetosa*** Schellenberg 1926
5.	Epimera 3 with small blunt tooth at posterior distal angle; telson deeply notched, apices rounded	**sp. nov.** (see below)

Atylopsis signiensis sp. nov.
Figs. 21h–q and 22a–n

The holotype is in the collection of the British Museum (Nat. Hist.) under the registration number 1969:311.

Type locality. Borge Bay, Signy Island, South Orkney Islands. The specimen was taken at sta. 59 in an Agassiz trawl at a depth of 5–6 m. on a boulder bottom between Elephant Flats and Billie Rocks on 1 July 1964.

Occurrence. (1 station, 1 specimen).

1. Sta. 59 1 ovig. ♀ 9 mm.

Diagnosis. Body, dorsally smooth, no segments produced into teeth. *Head*, rostrum very short. *Eyes*, rather large, broadly reniform. *Epimera*, ventral margins spinose, posterior distal angles with a small rounded tooth; third, posterior margin convex.

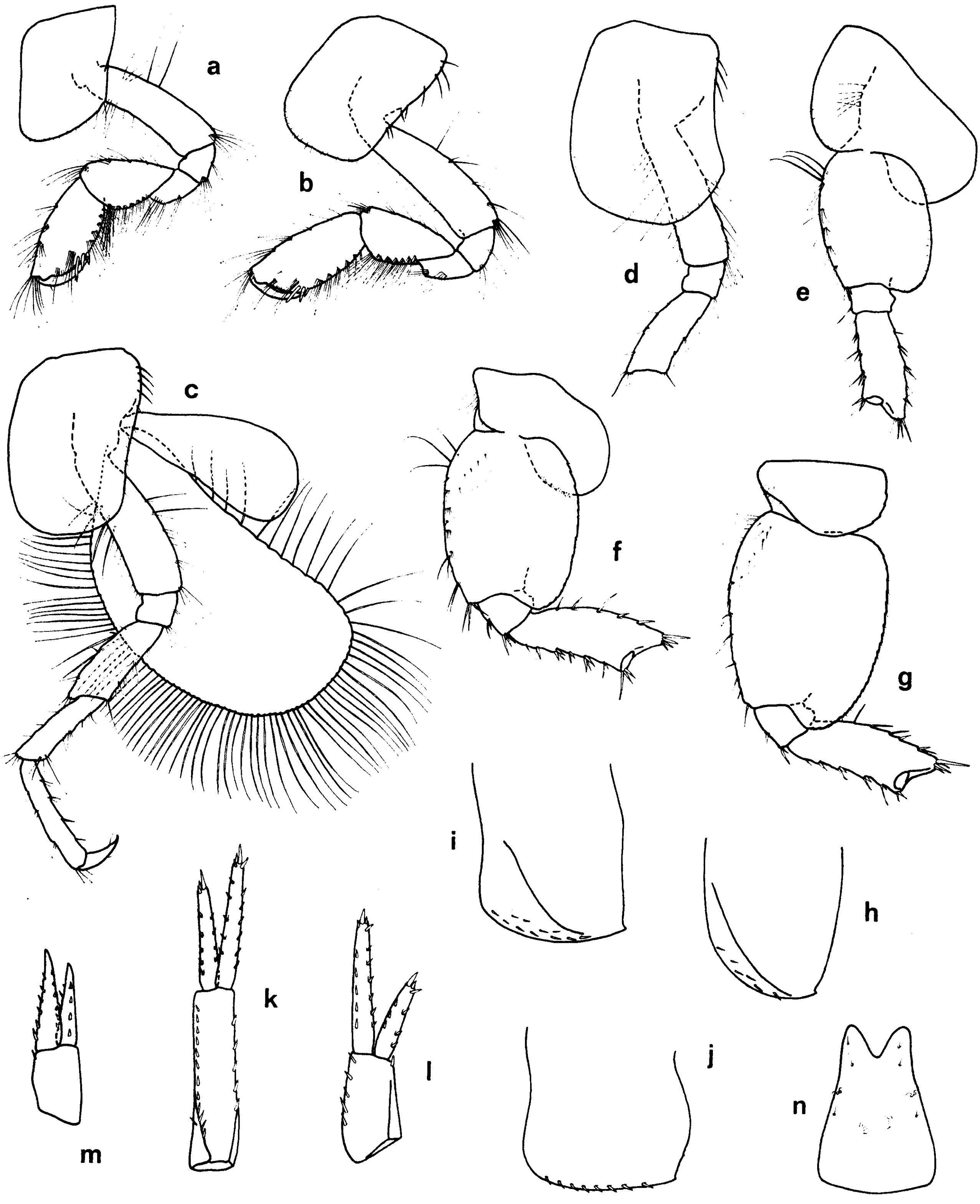

FIGURE 22

Atylopsis signiensis sp. nov., holotype, 9 mm. ovig. ♀. *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7; *h–j*, epimera 1–3; *k–m*, uropods 1–3; *n*, telson.

Antenna 1, article 1 short; article 2 shorter than first, hardly longer than wide. *Antenna 2*, as long as head and first four peraeon segments combined; peduncle articles short, fourth rather longer than fifth; flagellum nearly twice as long as peduncle, composed of 20 articles, the first equal in length to the next three combined. *Upper lip* rounded, apex somewhat truncate. *Left mandible*, incisor strong, six teeth; accessory lamella broad, five teeth; spine row, seven stout pectinate spines. *Right mandible*, similar to left mandible except for strongly bidentate accessory lamella. *Lower lip*, mandibular processes long. *Maxilla 1*, inner lobe obliquely truncate, bearing 13 setae; outer plate with 11 spines, some pectinate, others bluntly bifid. *Maxilla 2*, inner plate narrower but as long as outer, diagonal row of setae well developed.

Gnathopod 1, coxa longer than wide, sides parallel, anterior ventral angle rounded; carpus shorter than propod, weakly lobed posteriorly; propod oval, length twice width, palm convex. *Gnathopod 2*, similar to, but a little longer than gnathopod 1. *Peraeopod 3*, coxa deeper than wide; merus slightly expanded, decurrent anteriorly; propod longer than carpus; dactyl, one-third the length of propod; oostegite very long and broad. *Peraeopod 4*, coxa deeper than wide, shallowly emarginate posteriorly. *Peraeopod 5*, coxa bilobed, anterior lobe a little deeper than posterior; basal expanded, not tapering distally; merus somewhat expanded, decurrent. *Peraeopod 6*, coxa posterior lobe much deeper than anterior; basal similar to, but larger than in peraeopod 5. *Peraeopod 7*, coxa small; basal expanded, tapering a little distally.

Uropod 1, peduncle longer than rami, spinose; inner ramus four-fifths length of peduncle, longer than outer ramus. *Uropod 2*, peduncle rather stout, shorter than inner ramus, longer than outer. *Uropod 3*, short, not extending as far back as uropod 2; rami narrowly lanceolate, inner longer than outer, both just longer than peduncle. *Telson*, width two-thirds of length; lateral margins sinuous; distally notched for one-fifth of length; apices rounded, unarmed.

Remarks. Although the holotype lacks the distal portions of antenna 1, mandibular palp and peraeopods 4–7, its general agreement with other species in the genus, particularly *Atylopsis multisetosa*, indicates that it belongs in *Atylopsis*.

A. megalops and *A. dentata* differ from the present species by dentate pleon segments and few setae (three or less) on inner plate of maxilla 1. *A. megalops* is additionally distinguished by gnathopod 1 coxa and the elongate carpus and propod of gnathopod 2. The bilobed upper lip and form of telson in *A. dentata* further separate this species and *A. signiensis*. *A. emarginatus* has an emarginate upper lip, 4–5 setae on inner plate of maxilla 1, long dactyls on peraeopods and elongate rami of uropod 3 thus differing from *A. signiensis*. *A. multisetosa* is closest to *A. signiensis*, agreeing in the non-dentate pleon, upper lip and maxilla 1. Differences in epimera 3 and telson and deeper coxae 3–4 characterize the new species.

The name *A. signiensis* indicates the source of the material.

Habitat. Boulder bottom, 5–6 m.

Breeding. The holotype, collected in July, carried 31 stage ii eggs.

Genus *Metaleptamphopus* Chevreux

Chevreux, 1911*b*, p. 1167, 1913, p. 144.
Barnard, 1961, p. 104–06.
Barnard, 1969, p. 178.

Metaleptamphopus pectinatus Chevreux
Fig. 101

Metaleptamphopus pectinatus Chevreux, 1912, p. 215, 1913, p. 144–48, figs. 37–40; Schellenberg, 1931, p. 178.

Occurrence. (29 stations, ca. 6,161 specimens; ♂♂ 3–5·5 mm., ♀♀ 3–7 mm., juvs. 1·5–3·5 mm.).

1. Sta. 12 ca. 150 specimens (12% ♂♂, 33% ♀♀, 55% juv.); 2. Sta. 13 2 ♂♂, 5 ♀♀, 8 juv.; 3. Sta. 14 4 ♀♀, 5 juv.; 4. Sta. 15 1 ♀; 5. Sta. 16 ca. 200 specimens (22% ♂♂, 48% ♀♀, 30% juv.); 6. Sta. 17 20 ♂♂, 36 ♀♀, 30 juv.; 7. Sta. 18 2 ♂♂, 10 ♀♀, 6 juv.; 8. Sta. 19 2 ♂♂, 10 ♀♀, 4 juv.; 9. Sta. 20 3 juv.; 10. Sta. 22 1 juv.; 11. Sta. 23 1 ♀, 1 juv.; 12. Sta. 24 1 ♂, 4 ♀♀; 13. Sta. 25 1 ♂, 1 juv.; 14. Sta. 31 ca. 800 specimens (13% ♂♂, 55% ♀♀, 32% juv.); 15. Sta. 33 10 ♂♂, 18 ♀♀, 17 juv.; 16. Sta. 35 2 juv.; 17. Sta. 39 1 ♀; 18. Sta. 43 1 ♀; 19. Sta. 46 ca. 180 specimens (38% ♂♂, 44% ♀♀, 18% juv.); 20. Sta. 47 ca. 2,200 specimens (42% ♂♂, 34% ♀♀, 24% juv.); 21. Sta. 48 ca. 1,100 specimens (35% ♂♂, 39% ♀♀, 26% juv.); 22. Sta. 49 45 ♂♂ 35 ♀♀ (4 ovig.); 23. Sta. 50 3 ♂♂, 24 ♀♀ (9 ovig.), 1 juv.; 24. Sta. 51 9 ♂♂, 10 ♀♀ (1 ovig.); 25. Sta. 52 3 ♂♂, 3 ♀♀ (1 ovig.); 26. Sta. 54 40 ♂♂, 49 ♀♀, 10 juv.; 27. Sta. 57 ca. 950 specimens (39% ♂♂, 2% ovig. ♀♀, 49% ♀♀, 10% juv.); 28. Sta. 58 ca. 140 specimens (15% ♂♂, 14% ovig. ♀♀, 71% ♀♀); 29. Sta. 59 2 ♀♀.

Remarks. The specimens agree in most respects with the figures of Chevreux (1913). The mandibular palp is rather stout, with the second article longer than the third. The palp of maxilla 1 is very broad and spatulate. The inner plate of the maxilliped is transversely truncate with spines and setae on the distal margin, and an oblique row of setae on the dorsal surface (Fig. 10l).

Habitat. In samples with large algae, 3–20 m. This species probably inhabits the mat of epiphytes which occur on the holdfasts of *Desmarestia* and *Phyllogigas.* It has been recorded only from shallow water.

Breeding. The available data give no clear picture of the breeding cycle. Ovigerous females have been taken in May, June, July, September, October and December. In July (sta. 58) and October (sta. 50) eggs at all stages of development are present. Breeding occurs during the winter and spring months and probably more than one brood is reared in this time. Seven to 12 eggs are carried at any one time. In a sample of 16 eggs the mean length was 0·47 mm. (0·46–0·49 mm.) and the diameter 0·38 mm. (0·36–0·40 mm.).

Distribution. Graham Land (Petermann Island) 6 m.; South Georgia (Cumberland Bay) 1–2 m.

FAMILY EUSIRIDAE

Stebbing, 1888, p. 953–54, 1906, p. 338 (Eusiridae), p. 356 (Pontogeneiidae).
Schellenberg, 1929, p. 275–77 (Pontogeneiidae).
Barnard, 1964*b*, p. 57–62 (key to genera).
Barnard, 1969, p. 213–19 (key to genera).

The clarification and description of genera intermediate between the Eusiridae and Pontogeneiidae as diagnosed by Stebbing (1906) has led Barnard (1964*b*) to fuse the two families under the name Eusiridae.

Genus *Atyloella* Schellenberg

Schellenberg, 1929, p. 279.
Barnard, 1969, p. 222.

Atyloella magellanica (Stebbing)

Atylopsis magellanica Stebbing, 1888, p. 925–29, pl. 79.
Atylus magellanicus Della Valle, 1893, p. 701–02.
Pontogeneia magellanica Stebbing, 1906, p. 360; ? Castellanos and Perez, 1963, p. 10, tab. 5, fig. 17a; not Chevreux 1906*e*, p. 64–69, figs. 37–39 (= *Paramoera edouardi*); not Walker, 1907, p. 33–34, pl. 12, fig. 20.
Atyloides magellanica Schellenberg, 1926, p. 360–62, fig. 55; not Chilton, 1909, p. 627–28, 1912, p. 496–97, pl. 1, fig. 18 (= *Paramoera edouardi*); not Shoemaker, 1914, p. 75.
Atyloides magellanicus Stebbing, 1914, p. 365; not Chevreux, 1913, p. 178 (= *Paramoera edouardi*).
Atyloella magellanica Schellenberg, 1929, p. 279; Barnard, 1932, p. 201–02, fig. 118g; Nicholls, 1938, p. 110; Stephensen, 1947, p. 63.

Occurrence. (28 stations, 117 specimens; ♂♂ 6–13 mm., ♀♀ 7–21 mm., juvs. 5–7 mm.).

1. Sta. 9 1 ♀; 2. Sta. 10 1 ♂, 2 ♀♀, 1 juv.; 3. Sta. 11 3 ♂♂, 5 ♀♀, 3 juv.; 4. Sta. 12 2 specimens (damaged); 5. Sta. 13 1 ♂; 6. Sta. 14 2 juv.; 7. Sta. 16 5 ♂♂, 5 ♀♀, 5 juv.; 8. Sta. 17 3 ♂♂, 2 ♀♀, 9 juv.; 9. Sta. 18 5 ♂♂, 1 ♀; 10. Sta. 19 3 ♀♀, 4 juv.; 11. Sta. 21 3 ♂♂, 1 juv.; 12. Sta. 22 1 ♂, 1 juv.; 13. Sta. 24 1 ♀; 14. Sta. 25 1 ♀, 2 juv.; 15. Sta. 26 1 ♂, 1 juv.; 16. Sta. 27 1 juv.; 17. Sta. 30 1 juv.; 18. Sta. 33 3 specimens (damaged); 19. Sta. 34 1 ♀; 20. Sta. 36 2 ♂♂, 2 ♀♀; 21. Sta. 45 1 ♂; 22. Sta. 49 2 ovig. ♀♀; 23. Sta. 50 7 ♀♀ (1 ovig.); 24. Sta. 51 1 ♂, 2 ♀♀; 25. Sta. 52 1 ♂, 5 ovig. ♀♀; 26. Sta. 53 6 ovig. ♀♀; 27. Sta. 54 3 ♂♂, 1 ♀, 1 juv.; 28. Sta. 59 2 ♀♀ (1 ovig.).

Remarks. Several specimens of various sizes have been compared in detail with Stebbing's type material and description. A 7 mm. female from sta. 20 was found to agree in most respects with this material, differing only in the slightly stouter propods of gnathopods 1 and 2, and the coxa of peraeopod 4 which is taller than broad. The eyes are nearly round, as shown by Stebbing (pl. 79). A 17 mm. female from sta. 53 differs, in addition to the characters mentioned, in the increased number of spines and setae of mouthparts and peraeopods, more slender peraeopods 3–7, three sub-apical serrations on each lobe of the telson and the less prominent posterior distal tooth of epimera 3. Gradations between the extremes can be seen in specimens of intermediate size.

The integument of the present specimens is intermediate between the condition described by Barnard and that noted by Nicholls and Stephensen.

Habitat. Associated with algae, mainly in shallow water, 1·5–20 m.

Breeding. Ovigerous females taken in June, July, September and October indicate slow development of eggs through the winter months and hatching during the spring. Females of 19–20 mm. length carry 100–150 eggs in one brood. A sample of 20 eggs had a mean length of 0·72 mm. (0·69–0·74 mm.) and a mean diameter of 0·61 mm. (0·58–0·63 mm.).

Distribution. South Shetland Islands (Deception Island) 75 m.; Davis Sea (*Gauss* winter station) 385 m.; Terre Adélie (Commonwealth Bay) 46–549 m.; Tierra del Fuego 101 m.; Falkland Islands 1–16 m.

Genus *Schraderia* Pfeffer

Pfeffer, 1888, taf. 2, fig. 5.
Stebbing, 1888, p. 913 (*Atyloides*) (part).
Schellenberg, 1929, p. 280 (*Atyloides*).
Barnard, 1932, p. 203–04.
Nicholls, 1938, p. 110–13.
Barnard, 1969, p. 230.

Diagnosis. Body not carinate. *Head*, rostrum short; epistome lacking anterior process. *Antennae*, first longer than second; accessory flagellum a single article. *Upper lip* not incised. *Mandible* strong, with ridged molar and palp of three articles. *Lower lip* without inner lobes. *Maxilla 1*, palp, second article longer than first. *Gnathopod 2*, subchelate, carpus and propod greatly elongate, propod with spatulate spines on posterior margin. *Peraeopods* 5–7, articles 4–6 not longer than article 2. *Uropod 3*, rami lanceolate, rather short. *Telson* short, deeply cleft, with truncate, dentate apices.

Remarks. The genus *Schraderia*, based on the single habitus figure given by Pfeffer (1888), was overlooked by most of the earlier workers on Antarctic Amphipoda, and specimens with elongate second gnathopods were referred to *Atyloides serraticauda* Stebbing. The reference to *Schraderia* by Stebbing (1888, p. 1653) confirms the priority of Pfeffer's genus, while Barnard (1932) has shown that both of Pfeffer's names are valid and that *A. serraticauda* should be referred to *Schraderia*.

Dahl (1959) has listed characters by which *Schraderia* may be distinguished from the other two genera in the Eusiridae which possess elongate second gnathopods.

The *Schraderia* material in the present collection has been compared with most of the specimens previously recorded from Antarctic regions which have been made available to me by courtesy of the staffs of many museums and institutions throughout the world. As a result, I believe that the genus contains four species: *S. gracilis* Pfeffer (of which *S. calceolata* Chilton forms the opposite end of a morphological cline), *S. serraticauda* Stebbing, and two new species described here.

Schraderia gracilis Pfeffer
Figs. 23a–i, 24a–q and 25a–k

Schraderia gracilis Pfeffer, 1888, taf. 2, fig. 5; Stebbing, 1906, p. 308; Barnard, 1932, p. 204–05, figs. 118c and 123; Nicholls, 1938, p. 110–13, figs. 52d, 57 and 58n; Stephensen, 1938*a*, p. 240; Shoemaker, 1945, p. 290; Stephensen, 1947, p. 63–64.
Atyloides serraticauda (not Stebbing) Walker, 1903, p. 58; Chevreux, 1906*e*, p. 87–88; Walker, 1907, p. 33; Chilton, 1912, p. 497; Chevreux, 1913, p. 179; Chilton, 1921*b*, p. 224 (part).
Atyloides calceolata Chilton, 1912, p. 497–98, pl. 2, figs. 21–23.
Atyloides gracilis Schellenberg, 1929, p. 280, 1931, p. 193–94.
Paramoera serraticauda (not Stebbing) Monod, 1926, p. 57; Barnard, 1930, p. 388.

Occurrence. In view of the variation in this species, it will be convenient to list specimens in three separate groups, although morphologically these groups represent only parts of a morphological cline.

"*gracilis*" (21 stations, 115 specimens; ♂♂ 6–14 mm., ♀♀ 7·5–16 mm., juvs. 3–6 mm.).

1. Sta. 8 3 ♂♂, 1 ♀; 2. Sta. 10 6 ♀♀, 3 juv.; 3. Sta. 11 1 ♂, 4 ♀♀; 4. Sta. 12 1 ♂; 5. Sta. 13 9 ♂♂, 11 ♀♀, 10 juv.; 6. Sta. 14 1 ♂; 7. Sta. 15 2 ♂♂, 1 ♀, 2 juv.; 8. Sta. 16 2 ♂♂; 9. Sta. 17 1 ♂, 1 ♀; 10. Sta. 18 1 ♂, 1 ♀, 4 juv.; 11. Sta. 19 4 ♂♂, 5 ♀♀, 17 juv.; 12. Sta. 20 2 ♂♂, 1 juv.; 13. Sta. 21 2 ♂♂, 1 ♀; 14. Sta. 22 1 ♂, 1 juv.; 15. Sta. 23 1 ♂; 16. Sta. 24 1 ♂; 17. Sta. 26 1 juv.; 18. Sta. 33 1 juv.; 19. Sta. 48 1 juv.; 20. Sta. 49 3 ♀♀ (1 ovig.), 6 juv.; 21. Sta. 54 1 ♂, 1 juv.

Intermediates. (13 stations, 42 specimens; ♂♂ 5·5–10 mm., ♀♀ 7·5–12 mm., juvs. 3–6 mm.).

1. Sta. 11 1 ♂; 2. Sta. 13 2 ♀♀; 3. Sta. 17 1 ♂; 4. Sta. 19 1 ♀; 5. Sta. 22 2 ♂♂, 2 ♀♀, 1 juv.; 6. Sta. 23 2 ♂♂; 7. Sta. 24 1 ♂; 8. Sta. 35 1 juv.; 9. Sta. 48 4 ♀♀; 10. Sta. 49 1 ♂, 4 ♀♀, 13 juv.; 11. Sta. 50 1 ♂; 12. Sta. 51 2 ♀♀; 13. Sta. 54 1 ♂, 2 ♀♀.

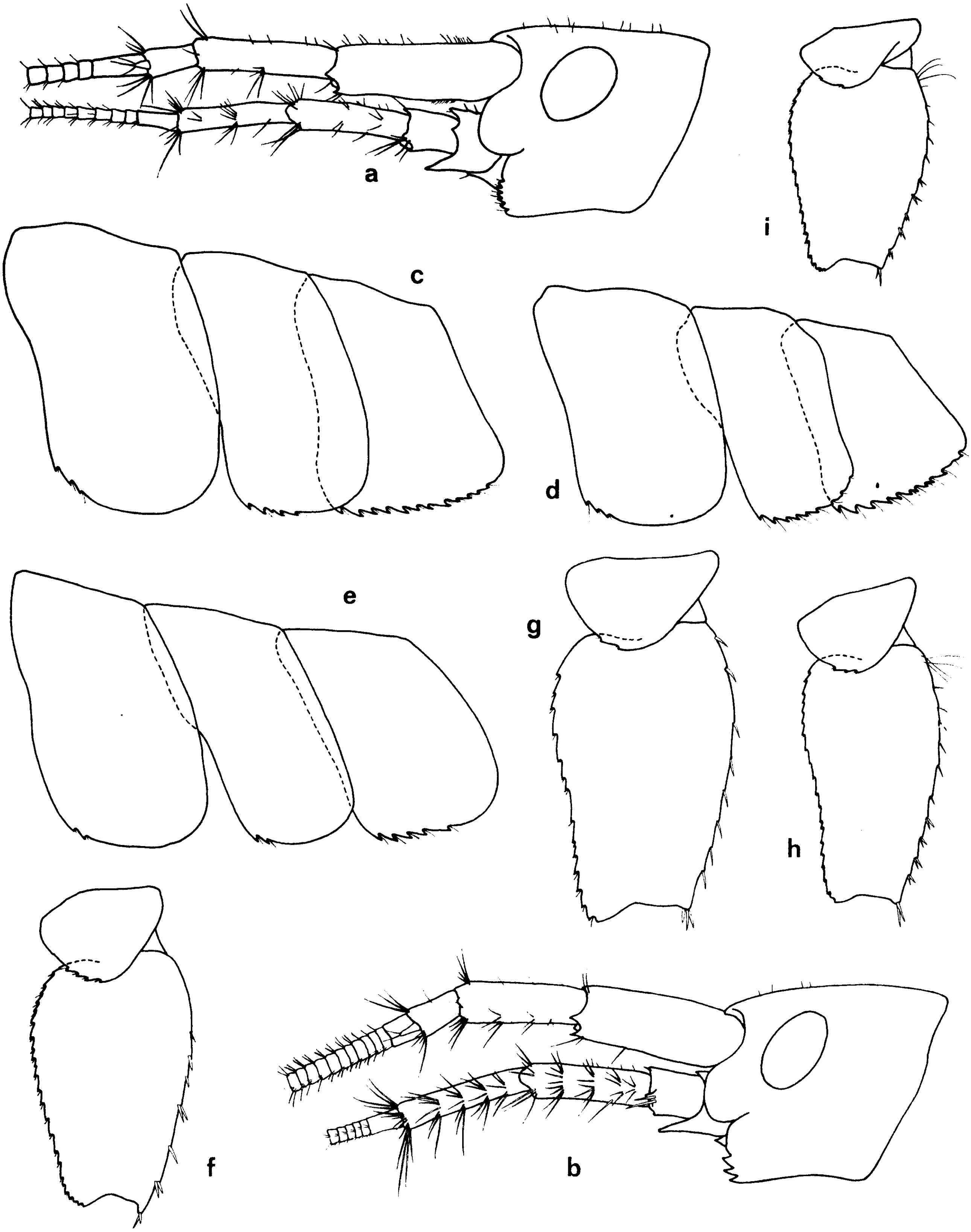

FIGURE 23

Schraderia gracilis Pfeffer "*gracilis*" form. *a*, head and antennae (left antennae removed), 10 mm. ♂, Cape Adare, 17 January 1900; *b*, head and antennae (left antennae removed), 11 mm. ♂, sta. 13; *c* and *f*, holotype, 12 mm. ovig. ♀, coxae 1–3 and peraeopod 7 basal article; *d* and *g*, 14 mm. ovig. ♀, Neumayer (Roosen) Channel, 129 m., 26 December 1908, coxae 1–3 and peraeopod 7 basal article; *e* and *h*, 12 mm. ovig. ♀, *Discovery* sta. 141 (South Georgia), coxae 1–3 and peraeopod 7 basal article; *i*, 14 mm. ♀, sta. 10, peraeopod 7 basal article.

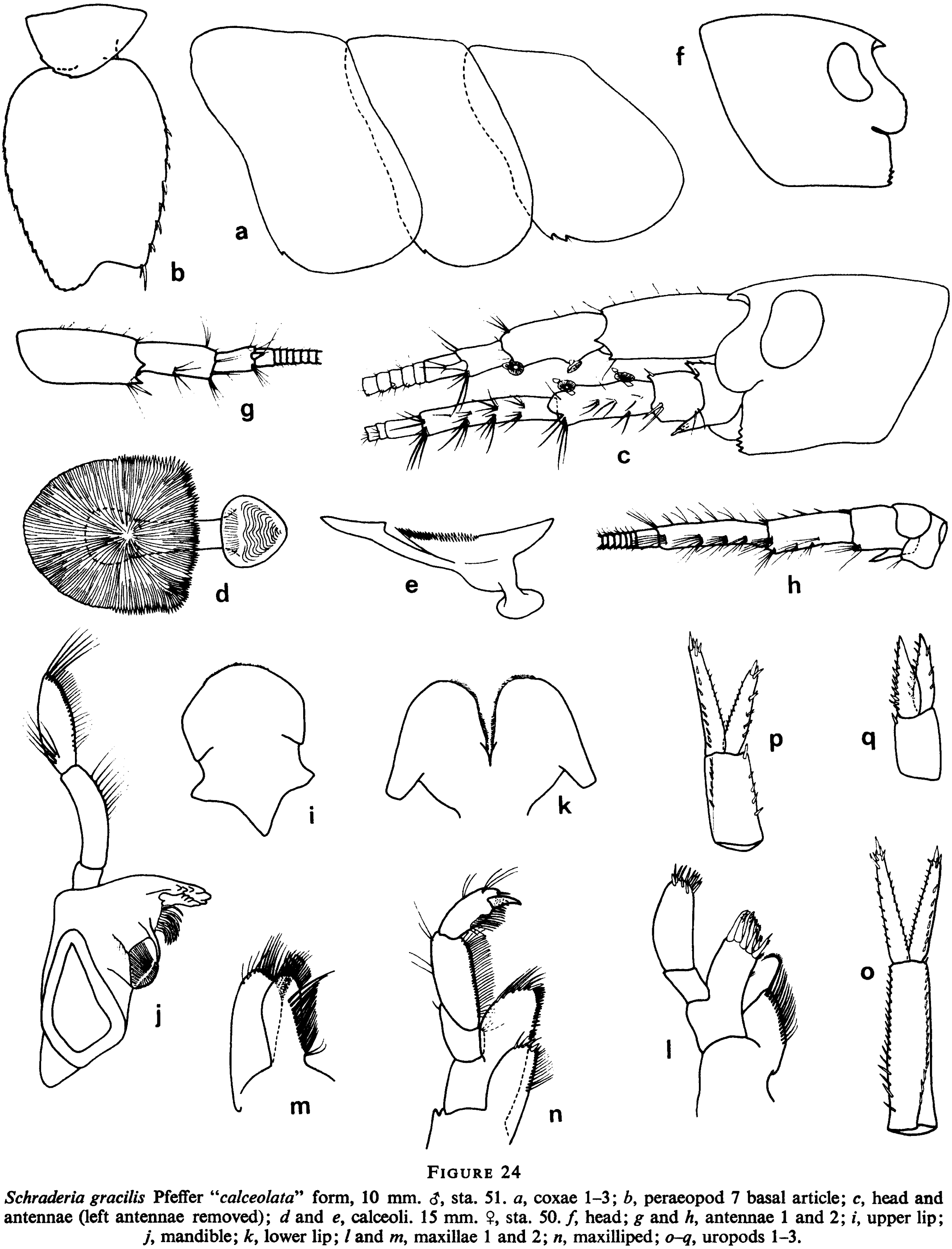

FIGURE 24

Schraderia gracilis Pfeffer "*calceolata*" form, 10 mm. ♂, sta. 51. *a*, coxae 1–3; *b*, peraeopod 7 basal article; *c*, head and antennae (left antennae removed); *d* and *e*, calceoli. 15 mm. ♀, sta. 50. *f*, head; *g* and *h*, antennae 1 and 2; *i*, upper lip; *j*, mandible; *k*, lower lip; *l* and *m*, maxillae 1 and 2; *n*, maxilliped; *o–q*, uropods 1–3.

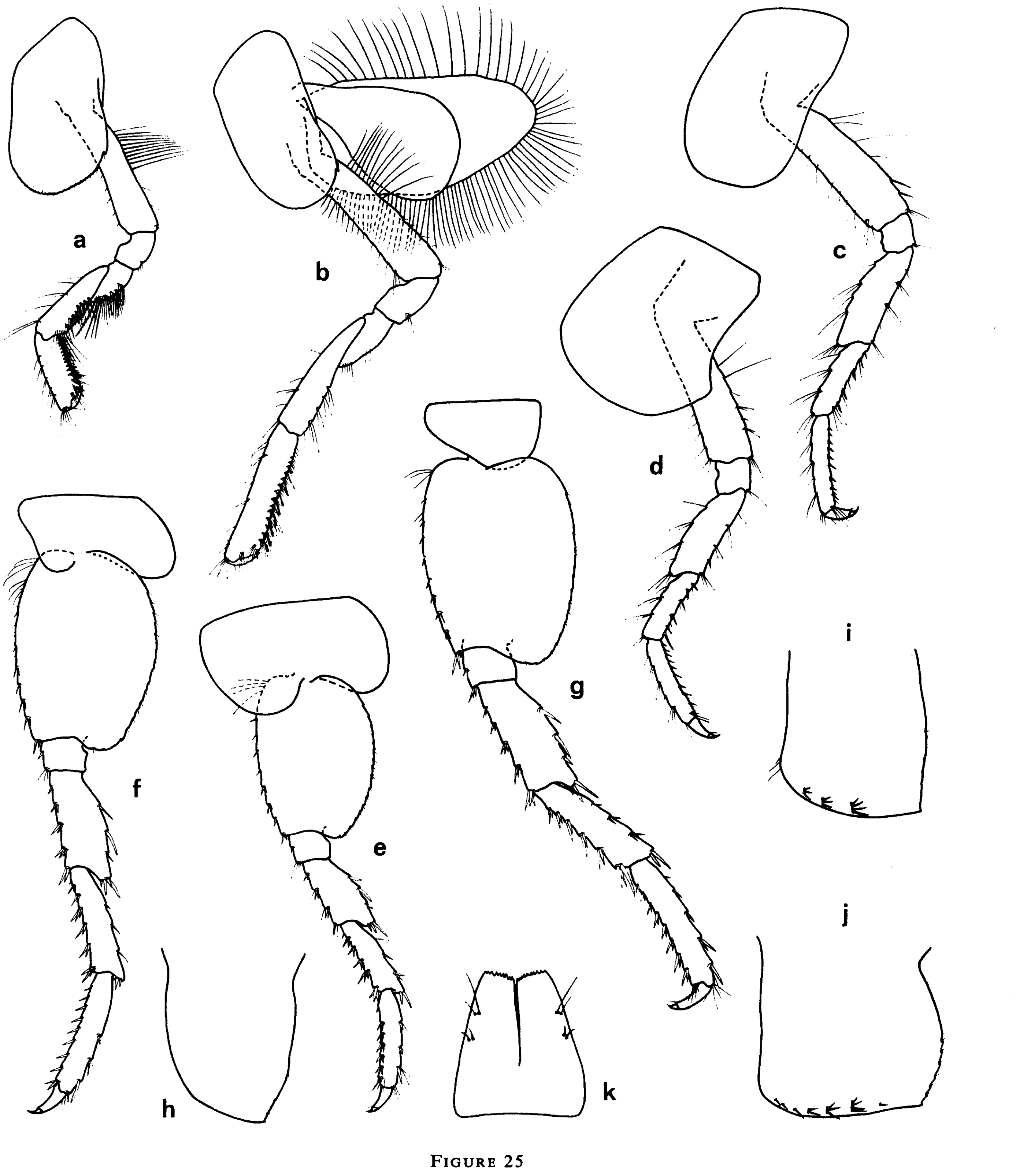

FIGURE 25

Schraderia gracilis Pfeffer "*calceolata*" form, 15 mm. ♀, sta. 50. *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7; *h–j*, epimera 1–3; *k*, telson.

"*calceolata*" (9 stations, 30 specimens; ♂♂ 6·5–10 mm., ♀♀ 9–15 mm., juvs. 4·5–6 mm.).

1. Sta. 11 1 ♀; 2. Sta. 22 1 ♂; 3. Sta. 25 3 ♂♂; 4. Sta. 38 1 ♂, 3 ovig. ♀♀; 5. Sta. 40 2 ♂♂; 6. Sta. 49 4 ♂♂, 3 ♀♀, 5 juv.; 7. Sta. 50 1 ♀; 8. Sta. 51 1 ♂, 1 ♀; 9. Sta. 54 1 ♂, 3 ♀♀ (2 ovig.).

Diagnosis. Large, up to 16 mm. *Head*, post-antennal angle deep, serrate. *Antenna 1*, length equal to or greater than head, peraeon and pleon segments 1–3 combined; peduncle slender to stout, if stout with calceoli in male. *Mandible*, palp obliquely truncate. *Maxilla 1*, inner plate with 13–18 plumose setae. *Gnathopod 1*, coxa with ventral margin weakly or strongly serrate. *Gnathopod 2*, coxa usually with at least one tooth ventrally. *Peraeopod 7*, basal moderately wide, posterior distal lobe angled or rounded. *Uropod 1*, inner ramus shorter than peduncle. *Uropod 3*, inner ramus not very short and broad, as long as peduncle. *Telson*, lobes broad, apices transversely truncate, multidentate.

Remarks. In the same year that Pfeffer illustrated *S. gracilis*, Stebbing (1888) described *Atyloides serraticauda*, obtained by the *Challenger* Expedition off Melbourne. In 1912, Chilton founded *Atyloides calceolata* on material from the South Orkney Islands, but later (Chilton, 1921*b*) reduced this species to a synonym of *A. serraticauda*. Schellenberg (1929) resurrected Pfeffer's name and placed *A. serraticauda* as a junior synonym. Barnard (1932) proved the validity of Pfeffer's species, synonymized Chilton's species with it, and transferred Stebbing's species to *Schraderia*. Barnard (1932) was also of the opinion that neither *S. gracilis* nor *S. serraticauda* showed the degree of variability ascribed to *S. serraticauda* by Chilton (1912) and Chevreux (1913). The inclusion of *S. calceolata* in the synonymy of *S. gracilis* by Barnard and his expressed opinion on the lack of variability in Pfeffer's species led Nicholls (1938) to query the specific identity of the Australasian Antarctic Expedition specimens, no males of which possessed calceoli. Nicholls accepted that Stebbing's species is distinct from Antarctic material but described some variation among the specimens obtained by the Australasian Antarctic Expedition.

Chilton (1912) indicated that Pfeffer had several specimens of *Schraderia gracilis* but that it was no longer possible to determine which of them had been used as a basis for the original illustration. By the courtesy of Dr. Hartmann of the Hamburg Museum, I have been able to examine two lots of material originating from the German International Polar Year Expedition, 1882–83. One jar, labelled "type", contains a single large specimen of *Schraderia*, while the second jar contains specimens of *Oradarea tridentata*, *Paramoera pfefferi* and *Jassa* sp. but no *Schraderia*.

The single specimen of *Schraderia* is a female, 12 mm. long, which carries several hatchlings. In so far as a comparison is possible, this specimen agrees well with the type figure (Pfeffer, 1888).

The post-antennal lobes of the type specimen are deep and strongly serrate, having four teeth on the right side and five on the left side of the head. The eyes are broadly reniform. The peduncles of the first antennae are long and relatively slender. The flagella of both pairs of antennae are detached and broken. The coxae of peraeon segments 1–3 are serrate ventrally, there being 12–13 teeth on each of the first coxae, five of the posterior part of the ventral margin of the second pair and 3 at the posterior ventral angle of the third (Fig. 23c). The basal article of peraeopod 5 is rather narrow and the posterior distal lobe is angular. The basal of peraeopod 7 is also rather narrow and has a strongly serrate posterior margin the distal half of which is concave (Fig. 23f). Epimera 3 are strongly serrate with nine teeth on the posterior margin. The telson lobes are broad, transversely truncate and bear seven teeth on each apex. The type specimen is thus in close agreement with the figures and description of Nicholls (1938). Gnathopod 2 conforms to Nicholls' fig. 57m. The eye of the type specimen is reniform rather than rounded oblong and the propod of gnathopod 1 is shorter and stouter than shown by Nicholls. The ration of length to breadth is 2·3 as opposed to 3·1.

S. gracilis is a morphologically variable species. The typical widespread form is exemplified by the type specimen while at the other end of the morphological cline is the form corresponding to Chilton's *S. calceolata*. Characters distinguishing specimens at the two extremes are:

	"*gracilis*" (Fig. 23a–i)	"*calceolata*" (Figs. 24a–q and 25a–k)
Antennal peduncles	Slender, lacking calceoli in both sexes	Stout, with discoidal calceoli in male
Antenna 1	As long as or longer than head and body combined	Not longer than head, peraeon and pleon segments 1–3 combined
Coxae 1–2	Strongly serrate with many teeth	Weakly serrate with few teeth

Peraeopod 7 basal article	Posterior margin strongly serrate, distal half concave; posterior distal lobe angular or narrowly rounded	Posterior margin weakly serrate, strongly convex; posterior distal lobe broadly rounded
Epimera 3	Posterior margin strongly serrate	Posterior margin not strongly serrate

These characters depend to some degree on size, but it is possible to distinguish the two extremes in individuals only 3–4 mm. long.

Schraderia gracilis has a wide geographical distribution, having been collected by most of the expeditions which have visited Antarctic and sub-Antarctic regions. A detailed examination of most of the reported material indicates that the "*calceolata*" form is less widely distributed than is the typical form (Table I). Populations of *S. gracilis* from the Davis Sea, Terre Adélie, and Victoria Land are composed entirely of the "*gracilis*" form. In these regions specimens are relatively small, males reaching a maximum length

TABLE I

RELATION BETWEEN GEOGRAPHICAL DISTRIBUTION AND MORPHOLOGICAL VARIATION IN *Schraderia gracilis*

Locality	*Source*	"*gracilis*"	*intermediate*	"*calceolata*"
Falkland Islands	Swedish Antarctic Expedition	1*	—	—
South Georgia	German International Polar Year Expedition	1	—	—
South Georgia	Swedish Antarctic Expedition	ca. 60*		4
South Georgia	Discovery Investigations	ca. 130*		—
South Orkney Islands	Scottish National Antarctic Expedition	2*		12
South Orkney Islands	British Antarctic Survey	157*		30
South Shetland Islands	Norwegian Antarctic Expedition	—	1	2
Graham Land, Seymour Island	Swedish Antarctic Expedition	1	—	—
Graham Land, Melchior Harbour	United States Antarctic Service Expedition	—	—	6
Graham Land, Neumeyer Channel	Second French Antarctic Expedition	7	—	—
Graham Land, Port Lockroy	Norwegian Antarctic Expedition	—	4	10
Graham Land, Flandres Bay	First French Antarctic Expedition	—	—	1
Graham Land, Neny Fjord	United States Antarctic Service Expedition	2	—	—
Iles Crozet	Ring Expedition (Stephensen, 1947)	1*	—	—
Davis Sea	Australasian Antarctic Expedition	2	—	—
Terre Adélie	Australasian Antarctic Expedition	1	—	—
Victoria Land, Cape Adare	Southern Cross Antarctic Expedition	ca. 30	—	—
Victoria Land, Cape Adare	National Antarctic Expedition	ca. 30	—	—
Victoria Land, Cape Adare	British Antarctic ("Terra Nova") Expedition	1	—	—
Victoria Land, Cape Wadworth	National Antarctic Expedition	1	—	—

* For exact status see text.

of 9 mm. and females 11 mm. The peduncle of antenna 1 is very slender and is considerably longer than the combined length of articles 1–4 of the peduncle of antenna 2. In 7–9 mm. males, coxae 1–3 have 5–8, 2–5 and 1–2 teeth, respectively. For 9–11 mm. females the corresponding figures are 5–8, 2–3 and 1–2.

Throughout Graham Land and the islands of the Scotia arc, collections may contain specimens characteristic of either or both ends of the morphological cline together with others which are of an intermediate nature. Intermediate specimens vary considerably but are basically of two sorts. There are those in which all of the variable characters are of an intermediate nature and those in which some of the variable characters correspond to one extreme of the cline and the remaining characters to the other extreme. However, this division is not absolute. The situation is further complicated by an apparent shift in one of the characters of the "*gracilis*" extreme, particularly in material from South Georgia and the South Orkney Islands.

A total of 31 specimens from Graham Land has been examined (Table I). Of these, ten belong to the "*gracilis*" extreme and 17 to the "*calceolata*" extreme. Six female "*gracilis*" 10–14 mm. long show very strongly serrate coxae, the tooth formula being 10–13, 4–10, 2–4 on coxae 1–3, respectively. A 10 mm. long male taken off Seymour Island has a formula of 10, 9, 5. "*calceolata*" specimens have very few teeth, 2, 1, 0 being a typical pattern for mature males and females while a few specimens are completely lacking in teeth.

Just over 200 specimens have been reported from South Georgia, of which ca. 195 have been examined in this study. The type specimen has been described previously and represents the "*gracilis*" extreme of the cline. About 20 of some 65 specimens obtained by the Swedish Antarctic Expedition (Schellenberg, 1931) and perhaps ten of ca. 130 specimens collected by *Discovery* (Barnard, 1932) lie at or near the "*gracilis*" extreme. There are four specimens which show the characters of the "*calceolata*" extreme, all from the Swedish Antarctic Expedition material. A few of the remaining specimens are intermediate but the bulk of them, a total of ca. 145 from the two collections, conform to the "*gracilis*" characters in all but the state of coxae 1–3. Females 10–13 mm. long have 4–7, 2–3, 1–2 teeth on the first three coxae, while the corresponding figures for 7–11 mm. males are 4–6, 1–3, 1–2.

200 specimens from the South Orkney Islands have been examined. The "*calceolata*" extreme of the cline is represented by 39 specimens, most of which have a coxal tooth formula of 1, 1, 0. 116 specimens are intermediate in that they agree with the "*gracilis*" facies in the condition of peraeopod 7 and epimera 3, but have very few teeth on coxae 1–3 and slightly shorter and stouter antenna 1 peduncles. In this latter group no males show the calceoliferous protuberances on the antennal peduncles which are characteristic of "*calceolata*". The numbers of coxal teeth in 9–13 mm. males and 11–16 mm. females are 3–4, 1–2, and 1. These specimens appear to be the manifestation of the "*gracilis*" facies in the South Orkney Islands as no typical "*gracilis*" specimens have been found in the collections examined. The remaining 40 odd specimens are intermediate between the "*gracilis*" form as found in the South Orkney Islands and the "*calceolata*" extreme.

Single specimens from the Falkland Islands and Iles Crozet belong basically to the "*gracilis*" end of the cline, but they have fewer coxal teeth than is typical, thus agreeing with much of the material from South Georgia and the South Orkney Islands.

In the present collection there appears to be a difference in the depth distributions of animals at the "*gracilis*" extreme, and the intermediate and "*calceolata*" forms, the last tending to occur at greater depths. This trend may be correlated with differences in habitat preference. The bathymetric data which are available for previously published collections of *S. gracilis* are insufficient to demonstrate a similar trend among these specimens.

There appear to be several possible explanations of the facts presented here. The process involved may be a straightforward speciation, in which case a new, poorly dentate calceoliferous species is evolving from an older, strongly dentate circum-polar species. The trends apparent in the population in South Georgia, where the earlier material (collected in 1902 by the Swedish Antarctic Expedition) is less homogeneous than more recently collected specimens (Discovery Investigations, 1926–27), are in conflict with this theory and support the idea of hybridization between two distinct species or a re-combination of two widely separated elements within the one species. Distributional factors also favour the hybridization or re-combination theory. A single original centre of interbreeding in the South Orkney Islands can be postulated with later extensions north to South Georgia and south to Graham Land. The present population of *S. gracilis* in the South Orkney Islands where the "*gracilis*" extreme of the morphological cline is represented by a very weakly dentate form may indicate evolutionary pressures more favourable to the "*calceolata*" extreme here than elsewhere or to a higher percentage of the "*calceolata*" form in the original population.

The population composition in *S. gracilis* may be due to a genetic balance within the species which is governed by environmental factors such as has been put forward by Ford (1937 *et seq.*) in discussions of melanistic forms of Lepidoptera in England. Hurley (1957) has suggested that this type of mechanism might account for the variation in population structure of the amphipod *Hyale grandicornis* Krøyer in New Zealand.

Two or more morphs are known to exist in a number of amphipod species. Kane (1966) has discussed the hyperiid *Parathemisto gaudichaudii* (Guérin) in which two forms, *compressa* and *bispinosa*, are known. She has referred to unpublished work by Nicholson (see Kane, 1966, p. 170), who obtained data suggesting that the forms in *P. gaudichaudii* might be the genetic expression of a single sex-linked factor. It is possible that the situation in *S. gracilis* may be similarly explained.

Breeding experiments and examinations of large samples from other localities in Graham Land and the Scotia arc are necessary to clarify this complex situation.

Habitat. This species occurs in shallow water in samples in which large algae were prominent. Depth range "*gracilis*", 1·5–20 m. (mean 5·8 m.), intermediates, 2·5–20 m. (mean 10·8 m.), and "*calceolata*" 2·5–20 m. (mean 11·2 m.).

Breeding. Six ovigerous females were collected in April, June and October but they show no distinct pattern of breeding.

Distribution. Graham Land (Neny Fjord, Stonington Island, Flandres Bay, Port Lockroy, Neumeyer Channel, Melchior Islands, off Seymour Island) L.W.–129 m.; South Shetland Islands (Deception Island) 50–75 m.; South Orkney Islands (Laurie Island) littoral–18 m.; South Georgia (Drygalski Fjord, Cumberland Bay, Stromness Bay, Undine Harbour, Coal Harbour, 40 km. 035° of Jason Island) L.W.–310 m.; Davis Sea (south-west of Drygalski Island) 110 m.; Terre Adélie (Commonwealth Bay) 6–110 m.; Victoria Land (Cape Adare, Cape Wadworth) 15–92 m.; Falkland Islands 16 m., Iles Crozet.

Schraderia dubia sp. nov.
Figs. 26a–p and 27a–g

Type material is in the collection of the British Museum (Nat. Hist.) under the following registration numbers: holotype (5·5 mm. ovigerous female) from sta. 16, 1969:404; paratypes 1969:405–422 with the exception of two specimens from sta. 9 which are deposited at the British Antarctic Survey Zoology Section, two specimens from sta. 10 which have been retained at the National Institute of Oceanography, and three specimens from sta. 16 which have been sent to Signy Island.

Type locality. Borge Bay, Signy Island, South Orkney Islands. Material was collected by diver at a depth of 4·3–4·6 m. on a transect at Billie Rocks on 1 March 1965. The substrate was of rock and boulders inclined to 60° and supporting *Lithothamnium*, *Desmarestia anceps*, *Phyllophora*, *Iophon* and various Porifera and Polyzoa.

Material examined. (18 stations, 75 specimens; ♂♂ 3·5–4·5 mm.; ♀♀ 3·5–6·5 mm.; juvs. 2–3·5 mm.).

1. Sta. 8 1 ♂, 6 ♀♀ (4 ovig.); 2. Sta. 9 1 ♂, 3 ovig. ♀♀; 3. Sta. 10 1 ♂, 5 ♀♀ (1 ovig.), 2 juv.; 4. Sta. 11 1 ovig. ♀; 5. Sta. 13 1 ♂, 4 ♀♀ (3 ovig.), 3 juv.; 6. Sta. 14 1 ovig. ♀; 7. Sta. 15 1 ♀; 8. Sta. 16 1 ♂, 9 ♀♀ (6 ovig.), 1 juv. including **holotype**; 9. Sta. 17 1 ♂, 1 ovig. ♀, 6 juv.; 10. Sta. 18 1 ♀; 11. Sta. 19 1 ♀, 2 juv.; 12. Sta. 21 2 ♀♀ (1 ovig.), 1 juv.; 13. Sta. 22 2 ♀♀; 14. Sta. 23 1 ovig. ♀; 15. Sta. 25 1 ♂, 2 ♀♀ (1 ovig.); 16. Sta. 26 1 ♂; 17. Sta. 33 2 ♀♀ (1 ovig.), 1 juv.; 18. Sta. 49 4 ♂♂, 5 ♀♀ (1 ovig.).

Diagnosis. Small, up to 6·5 mm. *Head*, post-antennal lobe deep, rectangular, anterior margin serrate. *Antenna 1*, shorter than body; peduncle stout, longer than head. *Mandible*, apex of palp obliquely truncate. *Maxilla 1*, inner plate with 10–11 plumose setae. *Gnathopod 1*, coxa with a single weak tooth at posterior distal angle. *Gnathopod 2*, coxa without teeth. *Peraeopod 5*, basal article very broad, posterior distal lobe strong, broadly rounded. *Peraeopod 7*, basal with posterior margin weakly serrate, distally strongly convex. *Uropod 1*, inner ramus shorter than peduncle. *Uropod 3*, inner ramus longer than peduncle. *Telson*, lobes narrow, tapering, each with a single apical notch.

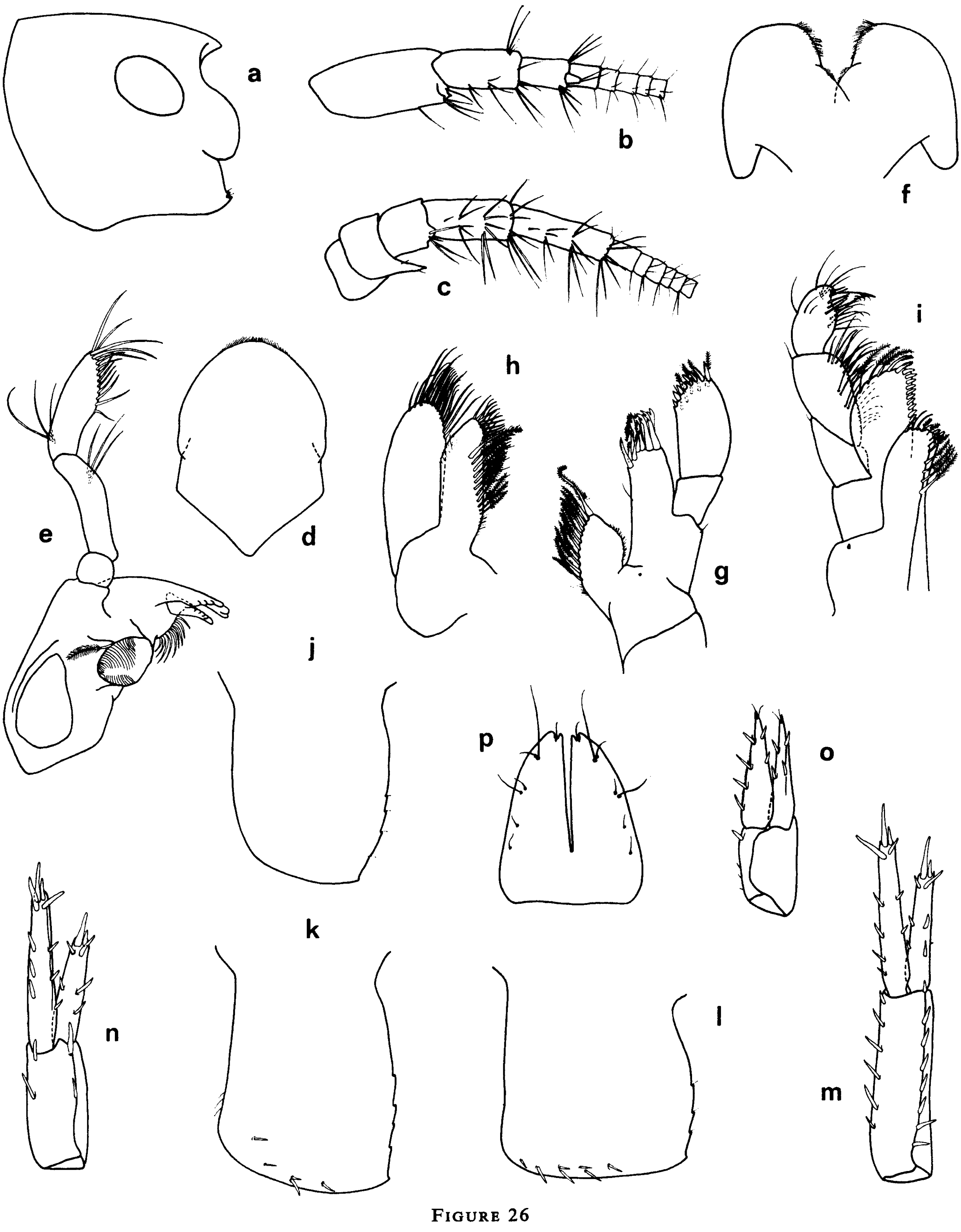

FIGURE 26
Schraderia dubia sp. nov., holotype, 5·5 mm. ovig. ♀, sta. 16. *a*, head; *b* and *c*, antennae 1 and 2; *d*, upper lip; *e*, mandible; *f*, lower lip; *g* and *h*, maxillae 1 and 2; *i*, maxilliped; *j–l*, epimera 1–3; *m–o*, uropods 1–3; *p*, telson.

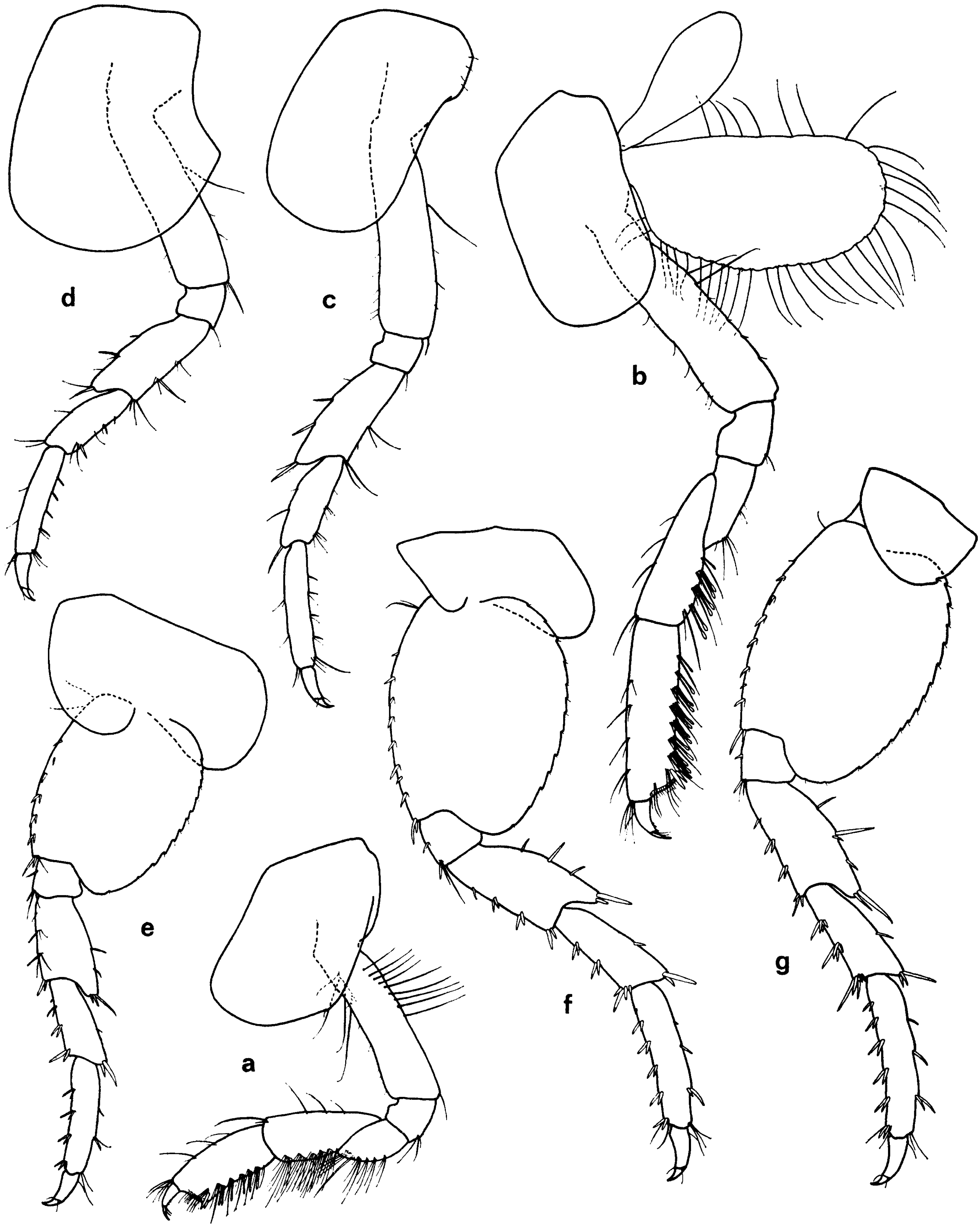

FIGURE 27

Schraderia dubia sp. nov., holotype, 5·5 mm. ovig. ♀, sta. 16. *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7.

Remarks. In view of the variation found in *S. gracilis*, the establishment of a new species which bears strong morphological resemblances to it requires some justification. Adult females of *S. dubia* and the "*calceolata*" extreme of *S. gracilis* are markedly different in size and in the form of the telson. *S. dubia* is also characterized by the relatively longer outer ramus of uropod 1 and the broader basal article of peraeopod 5. If an adult *S. dubia* and a juvenile "*calceolata*" form of *S. gracilis* are compared, neither size nor uropod 1 are distinctive. Although there are minor differences in the apices of the telson, they are not sufficient to form a diagnostic character. The broader basal article of peraeopod 5 is, however, still distinctive. There is little variation in the shape of this article in *S. dubia* in which the length : breadth ratio varies from 1·16 to 1·19. In juvenile *S. gracilis* the ratio is 1·30–1·35. *S. gracilis* juveniles of 5–6 mm. total length have only five setae on the inner plate of maxilla 1, whereas adult *S. dubia* of the same size have 11 setae.

These differences appear sufficient to justify the erection of *S. dubia*. However, *S. dubia* may be merely a precocious form of *S. gracilis* and this doubt is reflected in the specific name of the new species.

Habitat. A shallow-water species confined, to a large extent, to the rocky areas sampled on the Billie Rocks transect. Depth range 1·5–20 m.

Breeding. The pattern shown by the ovigerous females obtained is not clear but hints at the possibility of more than one breeding season per year.

Schraderia barnardi sp. nov.
Figs. 28a–r and 29a–e

Type material is in the collection of the British Museum (Nat. Hist.) under the following registration numbers: holotype (7 mm. ovigerous female), from sta. 49, 1969:423; paratypes, 1969:424–427 with the exception of specimens from sta. 17, 18 and 25, which have been deposited at the British Antarctic Survey Zoology Section, at Signy Island and at the National Institute of Oceanography, respectively.

Type locality. Borge Bay, Signy Island, South Orkney Islands. The material was obtained in an Agassiz trawl haul at 10–20 m. off Berntsen Point on 29 June 1964. The substrate was gravel and sand with isolated rocks and some algae.

Material examined. (7 stations, 33 specimens; ♂♂ 3–5·5 mm., ♀♀ 4–7·5 mm.; juvs. 2·5–4 mm.).
1. Sta. 17 1 ♀; 2. Sta. 18 1 ♀; 3. Sta. 19 6 ♂♂, 2 ♀♀; 4. Sta. 23 1 ♀; 5. Sta. 25 1 ♀; 6. Sta. 44 1 ♂; 7. Sta. 49 5 ♂♂, 9 ♀♀ (4 ovig.), 6 juv., including **holotype**.

Diagnosis. Small, up to 7·5 mm. *Head*, post-antennal lobe deep, rectangular, anterior margin serrate. *Eye* oval. *Antenna 1*, shorter than body; peduncle moderately stout, as long as head and peraeon segment 1 combined. *Mandible*, apex of palp obliquely truncate. *Maxilla 1* inner plate with 12–13 plumose setae. *Gnathopod 1*, coxa with two strong teeth at posterior distal angle. *Gnathopod 2*, coxa with one small tooth posterior distally. *Peraeopod 5*, basal narrow, posterior distal lobe absent. *Peraeopod 7*, basal, posterior margin serrate, concave distally. *Uropod 1*, inner ramus shorter than peduncle. *Uropod 3*, rami short and very broad, inner sub-equal in length to peduncle. *Telson*, lobes tapering, each with three apical teeth.

Remarks. The remarks made under *S. dubia* also apply here in that *S. barnardi* differs but little from *S. gracilis*. Diagnostic characters of *S. barnardi* are the lack of posterior distal lobes on the basal articles of peraeopods 5–7, the very short, broadly lanceolate rami of uropod 3 and the convex posterior margin of the second epimera.

The name *S. barnardi* recognizes the leading position in the study of amphipod systematics held by Dr. J. L. Barnard.

Habitat. Hard bottoms with algal cover in shallow water 4·5–25 m.

Breeding. Ovigerous females captured in June carried eggs at stages iii, iv and v.

Schraderia serraticauda (Stebbing)

Atyloides serraticauda Stebbing, 1888, p. 920–24, pl. 78, 1906, p. 362; Chilton, 1909*a*, p. 627, 1921*b*, p. 224 (part); not Walker, 1903, p. 58 (= *S. gracilis*); not Chevreux, 1906*e*, p. 87–88 (= *S. gracilis*); not Walker, 1907, p. 33; not Chilton, 1912, p. 497 (= *S. gracilis*), 1913, p. 61 (= *S. gracilis*); not Chevreux, 1913, p. 179 (= *S. gracilis*).
Atylus serraticauda Della Valle, 1893, p. 702.

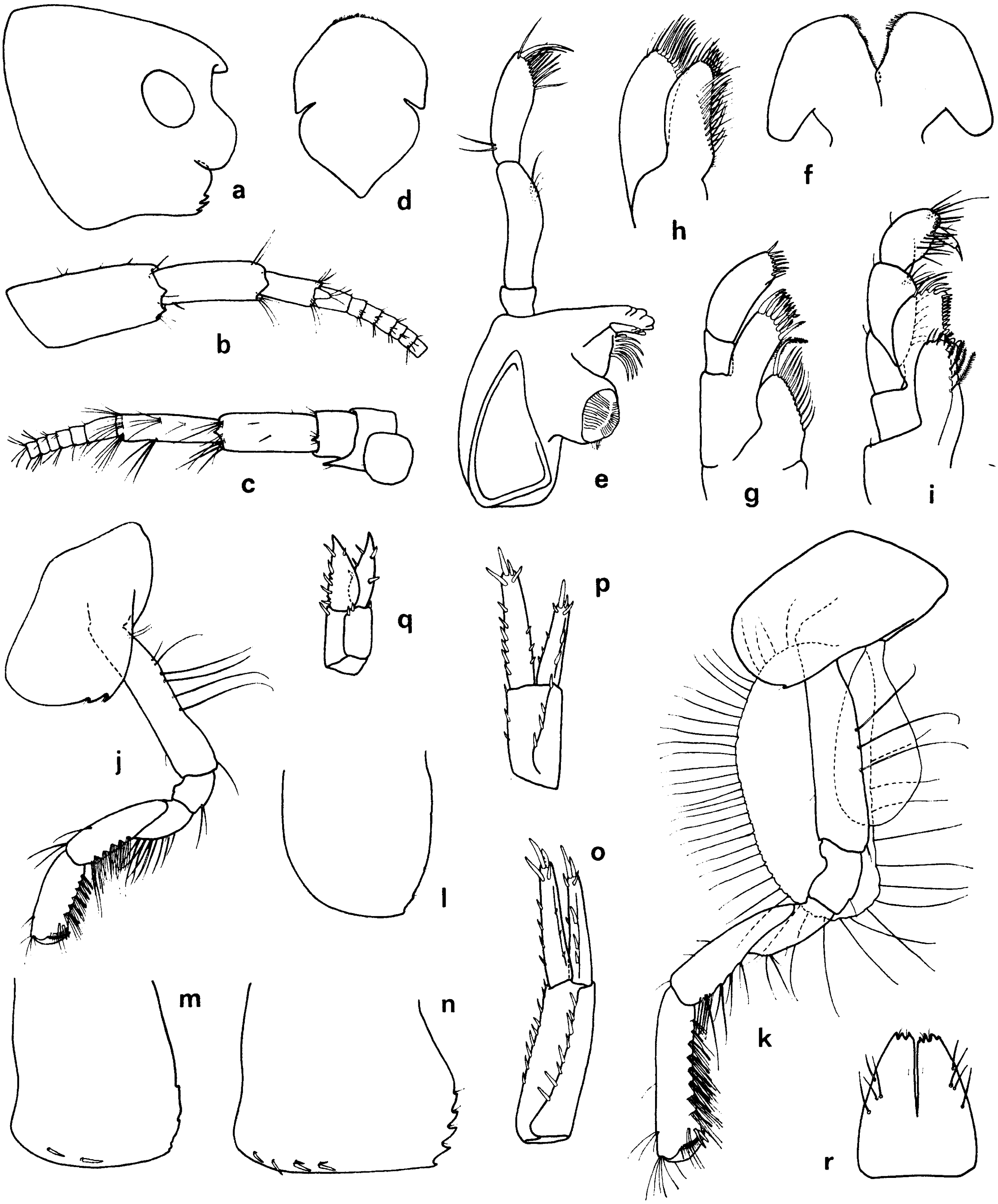

FIGURE 28

Schraderia barnardi sp. nov., holotype, 7 mm. ovig. ♀, sta. 49. *a*, head; *b* and *c*, antennae 1 and 2; *d*, upper lip; *e*, mandible; *f*, lower lip; *g* and *h*, maxillae 1 and 2; *i*, maxilliped; *j* and *k*, gnathopods 1 and 2; *l–n*, epimera 1–3; *o–q*, uropods 1–3; *r*, telson.

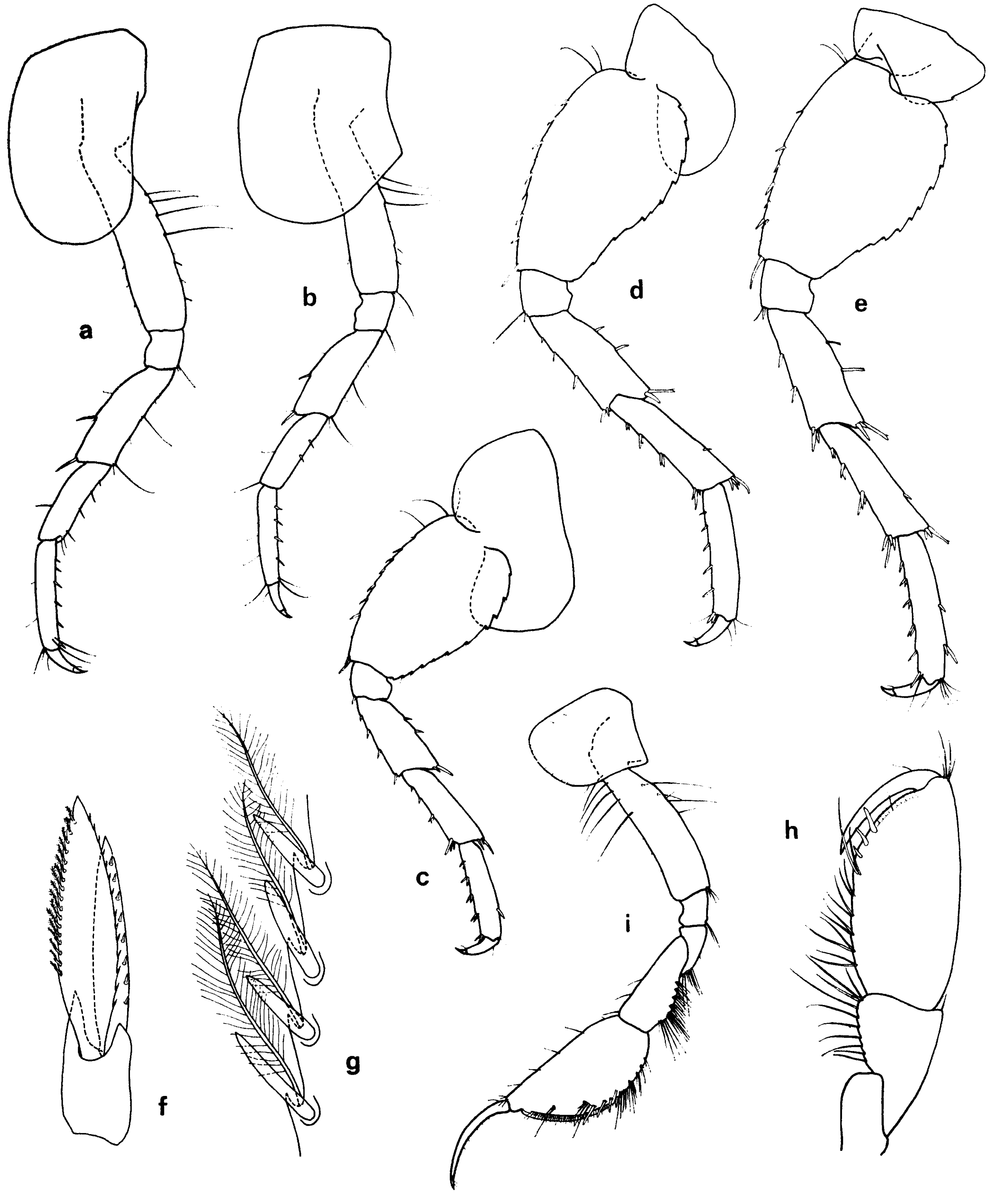

FIGURE 29

Schraderia barnardi sp. nov., holotype, 7 mm. ovig. ♀, sta. 49. *a–e*, peraeopods 3–7. *Liouvillea oculata* Chevreux, 18 mm. ovig. ♀, sta. 52. *f*, uropod 3; *g*, uropod 3, detail of inner margin of inner ramus. *Paramoera edouardi* Schellenberg, 7 mm. ♂, sta. 38. *h*, gnathopod 2. *Prostebbingia gracilis* (Chevreux), 7·5 mm. ♂, sta. 50. *i*, gnathopod 1.

Leptamphopus serraticauda Vanhöffen, 1907, p. 510.
Paramoera serraticauda Stephensen, 1927, p. 339; not Monod, 1926, p. 57 (= *S. gracilis*); not Barnard, 1930, p. 388 (= *S. gracilis*).
Schraderia serraticauda Barnard, 1932, p. 205; Nicholls, 1938, p. 114.

Diagnosis. Small, ca. 8 mm. *Head*, post-antennal lobes shallow, rounded. *Eye* oval. *Antenna 1* shorter than body; peduncle stout, as long as head. *Mandible*, apex of palp transversely truncate. *Maxilla 1*, inner plate with 16 plumose setae. *Gnathopod 1*, coxa with two or three weak teeth at posterior distal angle. *Peraeopod 5*, basal very broad, posterior distal lobe weak, broadly rounded. *Peraeopod 7*, basal, posterior margin serrate, distally convex. *Uropod 1*, peduncle and inner ramus sub-equal in length. *Uropod 3*, inner ramus longer than peduncle. *Telson*, lobes broad, truncate, with multidentate apices.

Remarks. This species is distinguished from others in the genus by the shallow rounded post-antennal lobe of the head and the long inner ramus of uropod 1.

Distribution. Macquarie Island; Melbourne, Australia 60 m.; Auckland Islands L.W.

Genus *Djerboa* Chevreux

Chevreux, 1906*e*, p. 74.
Schellenberg, 1929, p. 279–80.
Barnard, 1969, p. 223.

Djerboa furcipes Chevreux

Djerboa furcipes Chevreux, 1906*e*, p. 74–79, figs. 42–44; Chilton, 1909*a*, p. 622, 1912, p. 500; Chevreux, 1913, p. 179–80, fig. 60; Shoemaker, 1914, p. 75; Schellenberg, 1926, p. 363, 1929, p. 280, 1931, p. 193; Barnard, 1932, p. 203, fig. 118a; Stephensen, 1938*a*, p. 239–40, 1947, p. 62–63.

Occurrence. (17 stations, ca. 584 specimens; ♂♂ 6–16 mm., ♀♀ 7–20 mm., juvs. 3–7 mm.).

1. Sta. 16 1 ♂; 2. Sta. 18 1 ♂; 3. Sta. 39 5 ♂♂, 1 ♀; 4. Sta. 46 13 ♂♂, 1 ♀, 2 juv.; 5. Sta. 47 1 ♀; 6. Sta. 48 18 ♂♂, 20 ♀♀; 7. Sta. 49 20 ♂♂, 17 ♀♀ (1 ovig.); 8. Sta. 50 5 ♂♂, 17 ♀♀ (3 ovig.), 1 juv.; 9. Sta. 51 17 ♂♂, 31 ♀♀ (1 ovig.), 1 juv.; 10. Sta. 52 4 ♀♀ (3 ovig.); 11. Sta. 53 22 ♀♀ (19 ovig.); 12. Sta. 54 ca. 150 specimens (12% ♂♂, 87% ♀♀, 1% juv.); 13. Sta. 55 3 ♀♀ (1 ovig.); 14. Sta. 56 1 ♂, 3 juv.; 15. Sta. 57 45 ♂♂, 46 ♀♀ (11 ovig.); 16. Sta. 58 33 ♂♂, 67 ♀♀ (2 ovig.), 7 juv.; 17. Sta. 59 1 ♀.

Remarks. Several minor differences have been noticed between these specimens and the description given by Chevreux (1906*e*). The mandible is of the same form but rather more slender than is shown (Chevreux, 1906*e*, fig. 43D) and the outer plate of maxilla 1 bears 11 spines apically. The basal articles of peraeopods 5–7 are minutely crenellate. Each crenellation has a minute seta set in the inner angle.

Branchiae are attached to the coxae of the seventh pair of peraeopods of females, but they are absent in the males.

Many of the male specimens of 8 mm. and longer have sperm strands issuing from the genital papillae.

Habitat. Effectively confined to sediment bottoms in the presence of algae, 4·5–49 m.

Breeding. No clear breeding cycle emerges from the available data. The eggs of four measured ovigerous females were counted giving the following figures: 40 (16 mm.), 63 (19 mm.), 67 (19 mm.), 78 (20 mm.).

Distribution. Graham Land (Petermann Island, Booth Island, Melchior Islands 3–10 m.; South Orkney Islands (Laurie Island) 18–27 m.; South Georgia (Godthul, Cumberland Bay, Stromness Bay, Bay of Isles, Undine Harbour, Coal Bay, Wilson Harbour) 5–110 m.; Iles Crozet (Ile de la Possession); Iles Kerguelen (Observatory Bay).

Genus *Liouvillea* Chevreux

Chevreux, 1911, p. 1167, 1913, p. 138–39.
Barnard, 1964*b*, p. 71.
Barnard, 1969, p. 226–27.

Liouvillea oculata Chevreux
Fig. 29f and g

Liouvillea oculata Chevreux, 1912, p. 214, 1913, p. 139, figs. 34–36; Schellenberg, 1931, p. 160; Barnard, 1932, p. 152; Stephensen, 1947, p. 51.

Occurrence. (5 stations, ca. 179 specimens; ♂♂ 11–17 mm., ♀♀ 13–19 mm.).

1. Sta. 51 2 ♂♂, 9 ♀♀; 2. Sta. 52 ca. 140 specimens (6% ♂♂, 84% ovig. ♀♀, 10% ♀♀); 3. Sta. 53 23 ♀♀ (20 ovig.); 4. Sta. 54 2 ♂♂ 2 ♀♀; 5. Sta. 56 1 ♂.

Remarks. The internal lobes of both left and right maxilla 1 are armed with nine stout setae in all the specimens examined.

The inner ramus of uropod 3 is one-fifth longer than outer ramus, lanceolate and triangular in cross-section. The dorsal inner margin is strongly serrate. Plumose setae are set in the serrations and a row of stout spines is present on the dorsal surface close to the inner margin. The outer margin is armed with stout spines (Fig. 29f and g).

The grooves and indentations noted by Barnard are present in all specimens.

Habitat. Mostly among algae from sandy bottoms, 5–20 m.

Breeding. Ovigerous females were taken in September only. Chevreux recorded an ovigerous female in October and a female carrying embryos in November. All stages of developing embryos and ova were present in material from sta. 52. The mean number of eggs carried by a female increases with the size of the female, rising from 33 for a 14 mm. long female to 45 for a 17 mm. individual.

Distribution. Graham Land (Petermann Island, Port Lockroy, Paulet Island) 3–150 m.; Bransfield Strait (north of Tower Island) 200 m.; South Orkney Islands, Normanna Strait) 24–36 m.

Genus *Paramoera* Miers

Miers, 1875, p. 75.
Stebbing, 1906, p. 363.
Schellenberg, 1929, p. 280–81.
Barnard, 1969, p. 227.

Species identifications within the genus *Paramoera* are made difficult by the lack of adequate descriptions of many of the older species. Where possible, original material should be re-described in order to reduce the confusion among species from Australasia and South America. Schellenberg's (1931) synonymies under *Paramoera fissicauda* (Dana) appear too sweeping and, until a detail examination of more material can be made, the following six species are here recognized as occurring south of the Antarctic Convergence:

Paramoera australis Miers, 1875 (? = *P. austrina* Bate) (Kerguelen).
Paramoera brachyurus Schellenberg, 1931 (South Georgia).
Paramoera edouardi Schellenberg, 1929 (Graham Land, South Shetland Islands, South Orkney Islands, South Georgia).
Paramoera gregaria (Pfeffer, 1888) (South Georgia).
Paramoera pfefferi Schellenberg, 1931 (South Georgia).
Paramoera walkeri (Stebbing, 1906) (South Shetland Islands, South Georgia, Terre Adélie, south Victoria Land, McMurdo Sound).

Three of these species, *P. brachyurus*, *P. gregaria* and *P. pfefferi*, also occur around southern South America. A further four species have been recorded from this area, but not from south of the Antarctic Convergence. They are *P. fissicauda* (Dana), *P. hermitensis* Barnard, *P. obliquimana* Barnard and *P. parva* Ruffo.

Paramoera edouardi Schellenberg
Fig. 29h

Pontogeneia magellanica (not Stebbing) Chevreux, 1906*e*, p. 64–69, figs. 37–39; ? Castellanos and Perez, 1963, p. 10, tab. 5, fig. 17a.
Atyloides magellanica (not Stebbing) Chilton, 1912, p. 496–97 (part).
Atyloides magellanicus (not Stebbing) Chevreux, 1913, p. 178.
Paramoera edouardi Schellenberg, 1929, p. 281, 1931, p. 198; Barnard, 1932, p. 207, fig. 118 m.; Stephensen, 1947, p. 65.

Occurrence. (8 stations, 33 specimens; ♂♂ 6–9 mm., ♀♀ 6–11 mm., juvs. 3–5 mm.).

1. Sta. 4 2 ♂♂, 7 ♀♀, 4 juv.; 2. Sta. 8 1 ♂; 3. Sta. 9 1 ♀; 4. Sta. 38 3 ♂♂, 1 ♀, 3 juv.; 5. Sta. 46 2 juv.; 6. Sta. 49 3 ♂♂, 2 ♀♀, 1 juv.; 7. Sta. 50 1 ♂, 1 ovig. ♀; 8. Sta. 54 1 ♂.

Remarks. As Chevreux (1913) noted, an accessory flagellum of one article is present on antenna 1. The emargination of the upper lip is very slight; much less prominent than is shown by Chevreux (1906*e*, fig. 38). The meral articles of peraeopods 5–7 are expanded rather more than in the type material.

The propods of both pairs of gnathopods are distinctly stouter in the male than in the female and the carpal articles are rather shorter (Fig. 29h).

Most of the material assigned to *Atyloides magellanica* by Chilton (1912) belongs here.

Habitat. Not restricted to any particular type of habitat.

Breeding. An ovigerous female with stage i eggs in October.

Distribution. Graham Land (Flandres Bay) L.W.; South Shetland Islands (Deception Island, Admiralty Bay) L.W.–75 m.; South Orkney Islands (Laurie Island) littoral; South Georgia (Cumberland Bay) littoral–310 m.

Paramoera hurleyi sp. nov.
Figs. 30a–q and 31a–i

Type material is in the collection of the British Museum (Nat. Hist.) under the following registration numbers: holotype (5·5 mm. ovigerous female), from sta. 54, 1969:454; allotype (4·5 mm. male), 1969:455, and paratypes 1969:456–459 with the exception of two specimens from sta. 49, one of which is deposited with the British Antarctic Survey Zoology Section, the other in the collection of the National Institute of Oceanography, and one specimen from sta. 54 which has been sent to Signy Island.

Type locality. Paal Harbour, Signy Island, South Orkney Islands. The holotype and allotype were taken at sta. 54 in an Agassiz trawl at a depth of 5–15 m. on 19 April 1964. The substrate was boulders, gravel and sand with some attached *Desmarestia anceps.*

Occurrence. (4 stations, 19 specimens; ♂♂ 3·5–5 mm., ♀♀ 3·5–7 mm., juvs. 3–3·5 mm.).

1. Sta. 38 1 ♀; 2. Sta. 45 1 ♂; 3. Sta. 49 2 ♂♂, 3 ♀♀ (2 ovig.), 3 juv.; 4. Sta. 54 4 ♂♂, 5 ♀♀ (2 ovig.) including **holotype** and **allotype**.

Diagnosis. Body dorsally smooth, no segments produced into teeth. *Integument*, conspicuously scaly. *Head*, rostrum short, eye-lobe rather truncate, antennal lobe sub-acute. *Eyes* oval, rather small. *Epimera*, serrate posteriorly; third, posterior margin convex.

Antenna 1, as long as head and first five peraeon segments combined; peduncle about two-thirds length of flagellum; flagellum, with calceoli, 24 articles; accessory flagellum nearly half length of first article of primary flagellum. *Antenna 2*, three-quarters length of antenna 1, peduncle articles 4 and 5 sub-equal; flagellum with 20 rather short articles. *Mandible*, incisor process stout; accessory lamellae well developed, left with four blunt teeth, right acutely tridentate; molar well developed, ridged; palp rather short, stout, article 3 shorter than article 2. *Lower lip*, inner lobes absent. *Maxilla 1*, inner plate with six stout plumose setae; outer plate with 11 pectinate spines; palp with five stout teeth and two spines distally. *Maxilla 2*, inner plate with diagonal row of setae.

Gnathopod 1, coxa not distally expanded; propod just longer than carpus, rather narrow, not expanded distally, palm convex, nearly transverse. *Gnathopod 2*, similar to gnathopod 1, propod longer than carpus, length twice width. *Peraeopod 3*, coxa as deep as coxa 4; merus slightly expanded, longer than carpus and propod. *Peraeopod 4*, a little shorter than peraeopod 3, coxa deeper than wide, emargination shallow. *Peraeopod 5*, coxa with equal lobes. *Peraeopod 6*, rather stout, basal expanded, minutely serrate posteriorly. *Peraeopod 7*, basal rather broadly expanded, posterior margin strongly convex, serrate; merus stout, two strong spines on posterior margin.

Uropod 1, peduncle with numerous spines on lateral margin, longer than rami; inner ramus just longer than outer, both with strong terminal spines. *Uropod 2*, short, stout, peduncle as long as inner ramus; outer ramus three-quarters length of inner, terminal spines of both strong. *Uropod 3*, short, peduncle a little shorter than rami; rami lanceolate, inner longer than outer. *Telson*, width two-thirds of length, cleft for half of length; apices narrowly rounded, unarmed; two groups of setae on lateral margins.

Remarks. Paramoera hurleyi is close to *P. brachyurus*, but it differs in shape and proportion of carpus and propod of gnathopod 2, and longer inner ramus of uropod 2.

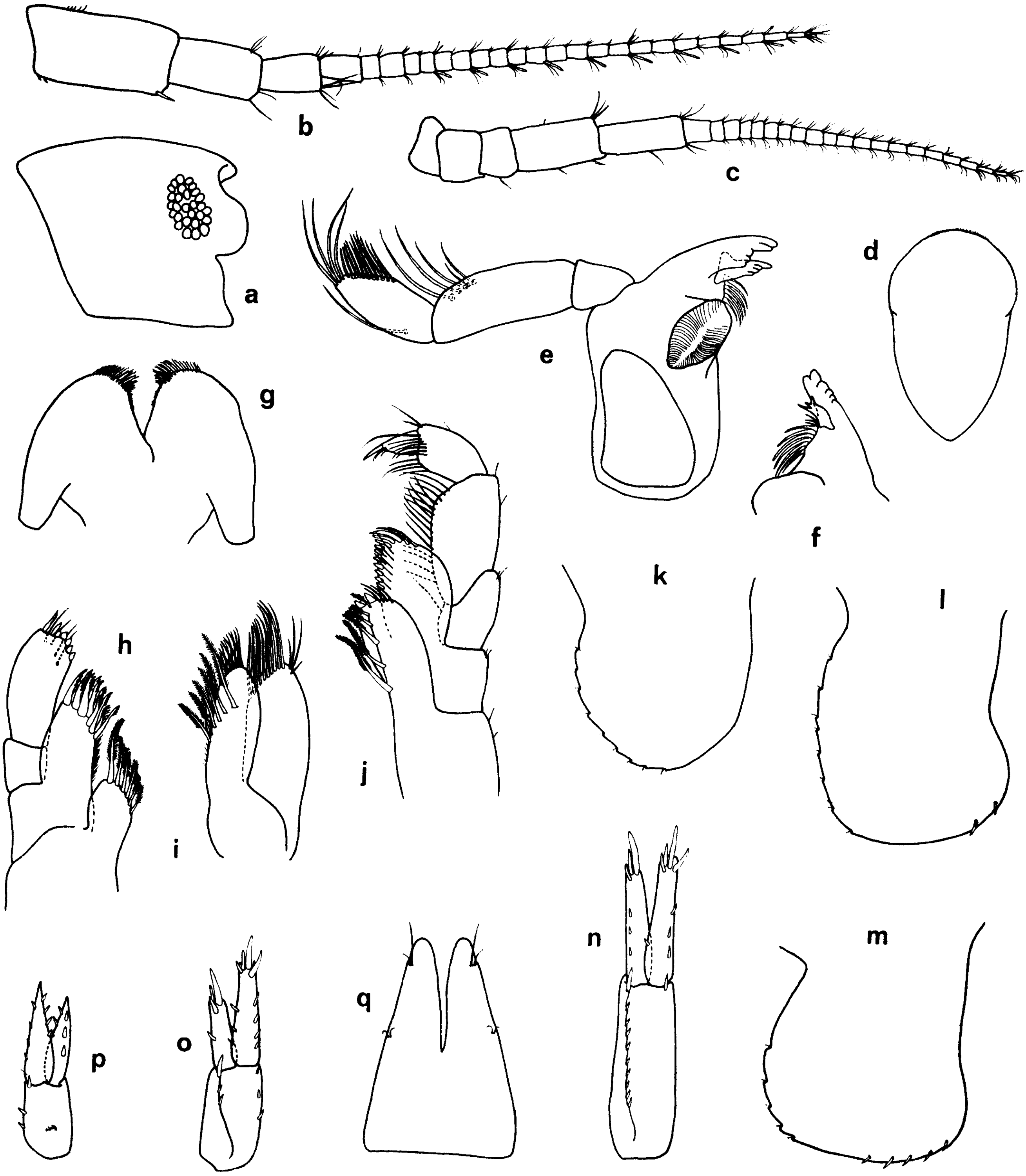

FIGURE 30

Paramoera hurleyi sp. nov., holotype, 5·5 mm. ovig. ♀, sta. 54. *a*, head; *b* and *c*, antennae 1 and 2; *d*, upper lip; *e*, left mandible; *f*, right mandible, incisor process; *g*, lower lip; *h* and *i*, maxillae 1 and 2; *j*, maxilliped; *k–m*, epimera 1–3; *n–p*, uropods 1–3; *q*, telson.

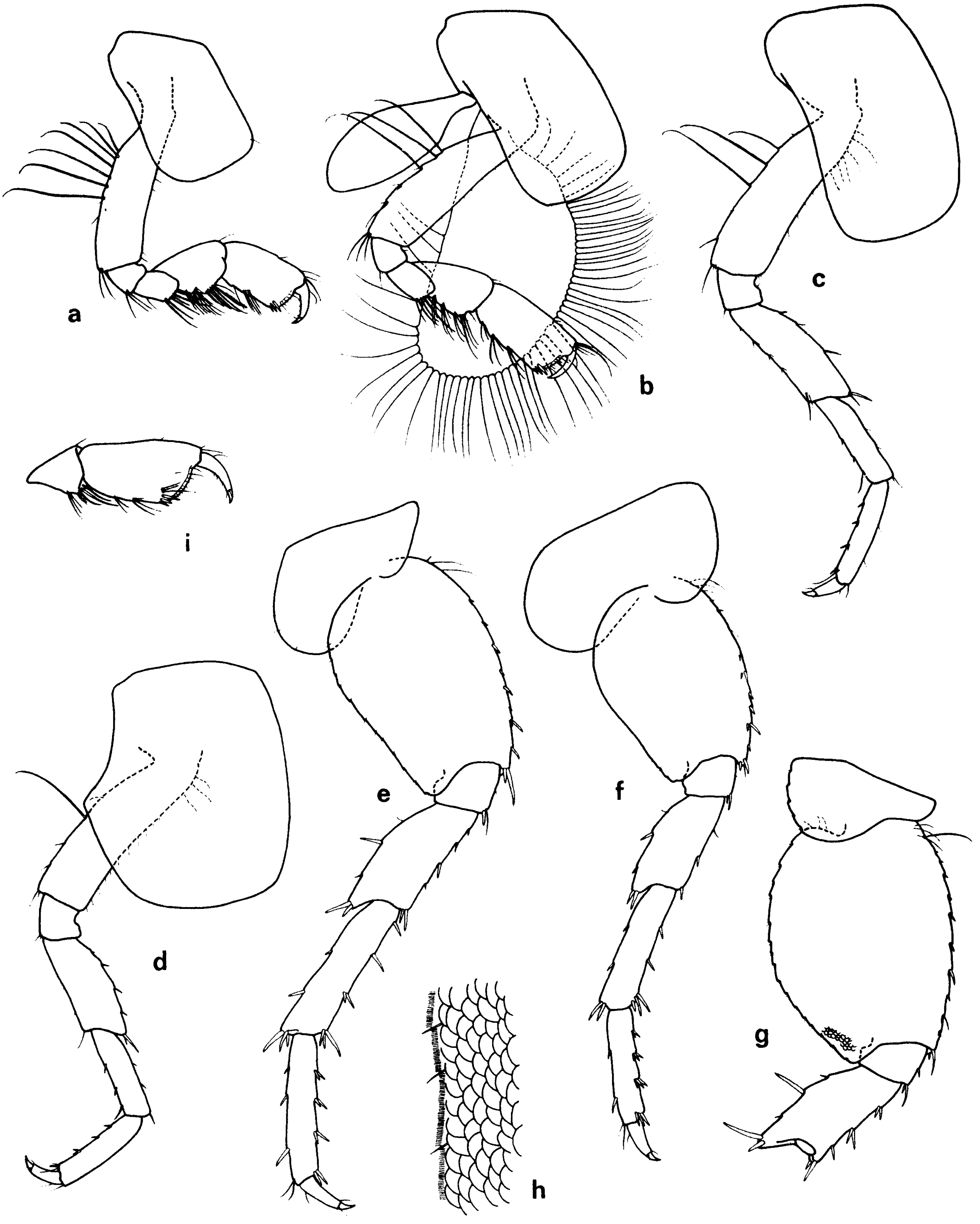

FIGURE 31

Paramoera hurleyi sp. nov., holotype, 5·5 mm. ovig. ♀, sta. 54. *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7; *h*, peraeopod 5, integumental scales. Allotype, 4·5 mm. ♂, sta. 54. *i*, gnathopod 2.

P. hurleyi and *P. australis* are also closely related. The former can be distinguished by its smaller size, unarmed apices of telson, stout mandibular palp and the form of coxae 4–5.

Differences in relative antennal length, telson and gnathopod 2 separate the present species from *P. pfefferi.*

P. gregaria is larger, has nine setae on maxilla 1 inner lobe compared with six in *P. hurleyi* and also differs in the condition of gnathopods and telson.

The elongate gnathopod 2 propod of *P. edouardi* is found in no other species in the genus.

P. walkeri is the only Antarctic species in the genus which is dorsally carinate and dentate.

The name *P. hurleyi* recognizes the significant contributions made to amphipod systematics and taxonomy by Dr. D. E. Hurley.

Habitat. Mixed bottoms, generally with some algal cover, 5–25 m.

Breeding. No pattern is apparent. Eggs of stages i and v were present in April and stages i and iii in June. The number of eggs carried is rather low; the 5·5 mm. holotype had eight eggs while the two ovigerous females from station 49 bore 11 and 13 eggs, respectively.

Genus *Pontogeneia* Boeck

Boeck, 1871, p. 193.
Stebbing, 1906, p. 359.
Schellenberg, 1929, p. 277–78, 1931, p. 181–82.
Barnard, 1969, p. 228.

Barnard (1958) listed 26 species in the genus *Pontogeneia*, and two other species, *P. litoralis* (Oldevig, 1959) and *P. quinsana* (Barnard, 1964*a*), have been described since that date.

The type species of *Pontogeneia* (*P. inermis* Krøyer) lacks an articulated accessory flagellum on antenna 1. Some species described since the erection of the genus have a distinctly articulated accessory flagellum of one article. Barnard (1964b), in his revision of the Eusiridae and Pontogeneiidae, erected a new genus, *Accedomoera*, for such species, and transferred to this genus *P. tricuspidata* Gurjanova, *P. mokyevskii* Gurjanova and *P. ushuaiae* Schellenberg. *P. brevirostrata* Bulycheva also has an articulated accessory flagellum and must be transferred to *Accedomoera*. The illustration of *P. brevirostrata* (Bulycheva, 1952) shows about eight setae on the inner plate of maxilla 1 which conflicts with Barnard's diagnosis of *Accedomoera*. However, Barnard, in the generic diagnosis gave 'less than four principal setae'. This presumably means stout plumose setae at the apex of the plate. Bulycheva gave no indication as to whether the apical setae are plumose or not. Should *Accedomoera brevirostrata* prove to have more than four plumose setae on the inner plate of maxilla 1, there is a case for altering the generic diagnosis, as several species of *Pontogeneia* have five or six setae on the inner plate (Table II) and the species described here (p. 81) has seven. This point should be borne in mind when using the familial key given by Barnard (1964*b*).

Schellenberg (1931) synonymized *P. danai* (Thomson) with *P. simplex* (Dana). The interval between produced flagellum articles of antenna 1 in *Pontogeneia* is constant from species to species, but differs in the specimens attributed to these two species (Table II), so this fusion cannot be accepted. Also included in the synonymy of *P. simplex* by Schellenberg is the species previously described by him (Schellenberg, 1926) as *Bovallia calliopioides*. The description of this species, and specimens collected by the Swedish Antarctic Expedition (Schellenberg, 1931) agree with Dana's description of *P. simplex* sufficiently well to be considered as members of the same species.

A total of 26 species may be accepted in the genus, although Barnard (1964*b*) has suggested that *Atylopsis latipalpus* Walker and Scott may also be a *Pontogeneia*. A key to the 26 accepted species is provided.

The primary division in the key separates 15 species in which the telson is cleft for one-half or more of its length from 11 species in which the telson is cleft for one-third or less. Of the first group, only one species (*P. danai*) occurs in the Southern Hemisphere, while only one of the second group (*P. quinsana*) occurs north of the Equator.

Key to the species of *Pontogeneia*

1. Telson cleft for half or more of its length 2
   Telson cleft for one-third or less of its length 16

TABLE II
CHECK LIST OF MORPHOLOGICAL CRITERIA IN THE GENUS *Pontogeneia*

(1)	*Cleft of telson as a percentage of length of telson* (2)	*Gnathopod 1, propod: carpus* (3)	*Gnathopod 2, propod: carpus* (4)	*Dorsal profile* (5)	*Post-antennal angle of head* (6)	*Antenna 1, interval of calceoliferous articles* (7)	*Epimera 3, posterior distal angle* (8)	*Uropod 3,* $\frac{\text{outer ramus}}{\text{inner ramus}} \times 100$ (9)	*Maxilla 1, number of plumose setae on inner plate* (10)	*Rostrum* (11)	*Length of rostrum relative to first peduncle article of antenna 1* (12)
bartschi	90	L	L	O	P	?1	A	95	3	Short	
intermedia	85	L	L	O	A	?2	T	85	5	Short	1/3
longleyi	70	L	L		P		A	80	3	Strong, decurved	
minuta	70	L	L	O	O	?2	A	95	3	Mod. long, slender	
arenaria	70	E	E	O	R		T	95	5	Long	
ivanovi	70	S	S	O	?P		A			Short	1/4
pacifica	65	L	L		P			?100	4	Long	
andrijaschevi	65	S	S	O			T	85		Short, deflexed	
makarovi	60	L	L	O			T			Very short	
kondakovi	60	E	S	O			A			Short, straight, not deflexed	
inermis	60	S	S	O	A	2	A	95	5–6	Deflexed	1/4
rostrata	55	E	L	O	P		A	75		Long	
*litoralis**	50	L	L	O	A	2	R	100	6	Minute	1/10
danai	50	L	L	P	?P	3–4	R	95		Short	
melanophthalma	50	L	L	P	A		T	100	3	Very short	
subantarctica	35	L	L	O	P	2	R	100	3	Small	
bidentata	30	L	L	P	P-A	2	R	100	5	Stout	1/3
quinsana	30	L	E	C	A	?3	T		?3	Strong, deflexed	
georgiana	25	L	L	O	P	2	R	100	3–4	Very short	1/5
antarctica	25	L	L	O	P	3	R	100	4–5	Short	1/4
tristanensis	25	L	L	O	R	4	R	100	3	Very short	
gracilicauda	25	L	L	O	P	4	R	100	4	Very short	1/8
simplex	20–25	L	L	P†	A	5–7	R	100	3–4	Short	1/5
redfearni	20	L	L	C†	A	3	R	95	7	Short, not deflexed	1/4
chosroides	20	L	L	O or C		6–7	R	100	5	Minute	
macrodon	15	L	L	C	A	4–5	T	100	6	Short, deflexed	1/4

Columns (3) and (4) L propod longer than carpus.
E propod equal to carpus
S propod shorter than carpus.

Column (5) P produced.
C carinate.
O smooth.

Column (6) O obtuse.
P right-angled.
A acute.
R round.

Column (8) R round.
A angled.
T toothed.

* The type material has been examined to provide these data.
† Only in large specimens.

2. Gnathopod 1, propod longer than carpus 3
   Gnathopod 1, propod equal to or shorter than carpus 11
3. Rostrum less than one-third the length of first peduncle article of antenna 1 4
   Rostrum more than half the length of first peduncle article of antenna 1 9
4. Gnathopods 1 and 2, carpus at least two-thirds the length of propod 5
   Gnathopods 1 and 2, carpus half the length of propod . . ***bartschi*** Shoemaker 1948
5. Epimera 3 with distinct tooth at posterior distal angle 6
   Epimera 3 rounded or with obtuse angle posterior distally 8
6. Telson cleft for less than two-thirds of length 7
   Telson cleft for five-sixths of length . . . . . . ***intermedia*** Gurjanova 1938
7. Epimera 3 posterior margin gently and evenly rounded, set with setae; eye broadly reniform ***makarovi*** Gurjanova 1951
   Epimera 3 posterior margin strongly convex, without setae; eye narrowly reniform ***melanophthalma*** Gurjanova 1938
8. Antenna 1 flagellum with every second article weakly produced posteriorly and bearing calceoli ***litoralis*** Oldevig 1959
   Antenna 1 flagellum with every third or fourth article strongly produced and bearing calceoli ***danai*** (Thomson) 1879
9. Coxa of gnathopod 2 broad, depth not more than one and a half times the width, distal margin not crenelate 10
   Coxa of gnathopod 2 narrow, depth nearly twice the width, distal margin crenelate ***pacifica*** Schellenberg 1938
10. Post-antennal angle of head obtuse; rami of uropod 3 sub-equal . ***minuta*** Chevreux 1908
    Post-antennal angle of head just acute; outer ramus of uropod 3 four-fifths the length of inner ramus . . . . ***longleyi*** Shoemaker 1933
11. Rostrum less than two-fifths the length of the first peduncle article of antenna 1 . . . 12
    Rostrum more than half the length of first peduncle article of antenna 1 15
12. Rostrum more or less deflexed 13
    Rostrum projecting straight forward, resulting in a concavity in the dorsal profile where rostrum and dorsal margin of head meet . . . . . . ***kondakovi*** Gurjanova 1951
13. Eye lobe and post-antennal angle separated by a sinus 14
    Eye lobe and post-antennal angle not separated by a sinus . . ***ivanovi*** Gurjanova 1951
14. Uropod 3, outer ramus five-sixths the length of inner ramus; eye lobe rounded ***andrijaschevi*** Gurjanova 1951
    Uropod 3, rami sub-equal; eye lobe somewhat truncate . . . ***inermis*** (Krøyer) 1838
15. Uropod 3, rami sub-equal; epimera 3 rounded . . . . ***arenaria*** Bulycheva 1952
    Uropod 3, outer ramus three-quarters the length of the inner ramus; epimera 3 angled posterior distally . . . . ***rostrata*** Gurjanova 1938
16. Epimera 3, posterior margin entire 17
    Epimera 3, posterior margin crenelate . . . . . ***quinsana*** Barnard 1964*a*
17. Antenna 1 flagellum with every second, third or fourth article produced and bearing calceoli . 18
    Antenna 1 with every sixth or seventh article produced and bearing calceoli 25
18. Epimera 3 rounded or angled, but without tooth; if dorsally dentate tooth on pleon segment 2 not noticeably larger than other teeth 19
    Epimera 3 with tooth at posterior ventral angle; large, sharp tooth dorsally on pleon segment 2 ***macrodon*** Schellenberg 1931
19. Antenna 1 flagellum with every second article produced and calceoliferous 20
    Antenna 1 flagellum with every third or fourth article produced and calceoliferous . . 22
20. Pleon segments 1 and 2 not dentate dorsally 21
    Pleon segments 1 and 2 dentate dorsally . . . . . ***bidentata*** Stephensen 1927
21. Coxa of peraeopod 4 emarginate posteriorly . . . . . ***georgiana*** (Pfeffer) 1888
    Coxa of peraeopod 4 not emarginate posteriorly . . . ***subantarctica*** Stephensen 1938
22. Antenna 1 flagellum with every third article produced and calceoliferous 23
    Antenna 1 flagellum with every fourth article produced and calceoliferous 24

23. Peraeopod 7 much longer than peraeopod 6; posterior margin of basal article nearly straight **sp. nov.** (p. 81)
    Peraeopod 6 and 7 sub-equal; posterior margin of basal article strongly convex ***antarctica*** Chevreux 1906*b*
24. Epimera 2 with tooth posterior ventrally . . . ***gracilicauda*** Schellenberg 1931
    Epimera 2 rounded posterior ventrally . . . . ***tristanensis*** Barnard 1932
25. Peraeopods 3–7, carpus distally expanded . . . . ***chosroides*** Nicholls 1938
    Peraeopods 3–7, carpus not distally expanded . . . . ***simplex*** (Dana) 1852

Pontogeneia antarctica Chevreux
Fig. 32a and b

Pontogeneia antarctica Chevreux, 1906*b*, p. 76, fig. 2; 1906*e*, p. 69–74, figs. 40 and 41; Chilton, 1912, p. 496; Chevreux, 1913, p. 177, fig. 59; Chilton, 1925, p. 178; Schellenberg, 1929, p. 278, 1931, p. 185; Barnard, 1932, p. 199, fig. 118h; Stephensen, 1947, p. 60; Ruffo, 1949, p. 47–49, figs. 14–16 (part); Castellanos and Perez, 1963, p. 10, tab. 5, fig. 17b; Bellisio, 1966, p. 52 (not pl. 26); not Chilton, 1909*a*, p. 624 (= *Pontogeneia subantarctica*); not Stebbing, 1914, p. 364; not Stephensen, 1927, p. 319, figs. 10–11 (= *P. subantarctica*).
Atyloides magellanica (not Stebbing) Chilton, 1912, p. 496–97 (part).

Occurrence. (40 stations, ca. 1,171 specimens; ♂♂ 7–15 mm., ♀♀ 7–21 mm., juvs. 3–9 mm.).

1. Sta. 1 94 ♀♀ (2 ovig.), 2 juv.; 2. Sta. 4 1 juv.; 3. Sta. 5 13 ♀♀, 1 juv.; 4. Sta. 6 24 ♀♀; 5. Sta. 7 5 ♀♀; 6. Sta. 8 28 ♂♂, 34 ♀♀, 11 juv.; 7. Sta. 9 4 ♂♂, 7 ♀♀, 3 juv.; 8. Sta. 10 6 ♂♂, 4 ♀♀; 9. Sta. 12 2 ♂♂; 10. Sta. 13 ca. 125 specimens (14% ♂♂, 76% ♀♀, 10% juv.); 11. Sta. 14 1 juv.; 12. Sta. 16 3 ♂♂; 13. Sta. 17 1 ♂; 14. Sta. 18 2 ♂♂; 15. Sta. 19 1 ♂, 1 ♀, 1 juv.; 16. Sta. 21 1 juv.; 17. Sta. 23 2 ♂♂; 18. Sta. 24 5 ♂♂; 19. Sta. 27 1 ♂, 1 ♀; 20. Sta. 29 10 ♀♀; 21. Sta. 30 14 ♂♂, 6 ♀♀, 23 juv.; 22. Sta. 32 6 ♂♂, 38 ♀♀ (13 ovig.), 38 juv.; 23. Sta. 33 10 ♂♂, 42 ♀♀, 49 juv.; 24. Sta. 35 1 ♀; 25. Sta. 37 1 juv.; 26. Sta. 38 1 ♂, 28 ♀♀ (3 ovig.), 3 juv.; 27. Sta. 41 1 ♂, 1 ♀; 28. Sta. 42 1 ♂; 29. Sta. 46 6 ♂♂, 5 ♀♀; 30. Sta. 47 1 ♂; 31. Sta. 48 8 ♂♂, 2 ♀♀ (1 ovig.); 32. Sta. 49 7 ♂♂, 14 ♀♀ (6 ovig.); 33. Sta. 50 ca. 450 specimens (3% ♂♂, 46% ovig. ♀♀, 51% ♀♀); 34. Sta. 51 1 ♂, 1 ♀; 35. Sta. 52 1 ovig. ♀; 36. Sta. 54 2 ♂♂, 1 ♀; 37. Sta. 56 1 juv.; 38. Sta. 57 1 ♀; 39. Sta. 58 3 ♂♂; 40. Sta. 59 3 ovig. ♀♀, 7 juv.

Remarks. The specimens from Signy Island differ in several respects from Chevreux's description (1906*e*, p. 69). The outer plate of maxilla 1 has 11 dentate spines distally and not nine, while the inner plate of maxilla 2 has two or three plumose setae. The first and second epimera have distinct posterior-ventral angles (Fig. 32b) and are not round as shown by Chevreux. Occasional specimens among the present material have a pair of small sub-terminal setae on the telson. A re-examination of syntypes from "Baie des Flandres, 6 fevrier 1904, maree basse" shows that they agree with those from Signy Island except for the inner plate of maxilla 2. Schellenberg (1926) noted the above discrepancies between specimens and description. His specimens agree completely with those from Signy Island.

In the adult, calceoli are present on every third article of the flagellum of antenna 1, except proximally where the typical arrangement has calceoli on articles 1, 2, 4, 6, 8, 11, etc. Occasional specimens show arrangements such as 1, 2, 4, 6, 8, 10, 13 . . ., 1, 2, 4, 6, 8, 10, 12, 15 and 1, 2, 3, 5, 7, 9, 12 . . .. Such deviations are frequently not symmetrical. The arrangement whereby every third article in the distal part of the flagellum bears calceoli is also not absolutely constant. Occasionally calceoliferous articles are separated by a single non-calceoliferous article, e.g. 23, 26, 28, 31, ... About 10 per cent of the specimens in the present collection show some variation from the typical pattern.

Material from the sub-Antarctic islands of New Zealand held at the Canterbury Museum and recorded as *P. antarctica* by Chilton (1909*a*) has been examined and found to be *Pontogeneia subantarctica* Stephensen.

The similarity between *P. antarctica* and *Pontogeneia georgiana* (Pfeffer) has been pointed out by Barnard (1932) and others. The two species may be distinguished by the stouter and more setose antenna 1, the arrangement of the calceoliferous articles of antenna 1, the prominent, angled head lobe and the rounded first and second epimera of *P. georgiana* (Fig. 32c and d).

The specimen identified as *Paramoera austrina* (Bate) var. by Walker (1908, p. 34) and included in the synonymy of *P. antarctica* by Schellenberg (1931) has been examined and re-identified as *P. subantarctica*.

A comparison of Ruffo's (1949) description of material from Harberton Harbour, Beagle Channel, Tierra del Fuego, with juvenile specimens from the present collection indicates that the South American material does not below to the species. Nor, apparently, does it belong to *P. subantarctica*.

Habitat. Common on rocky and mixed bottoms, usually where algae are present, littoral–20 m.

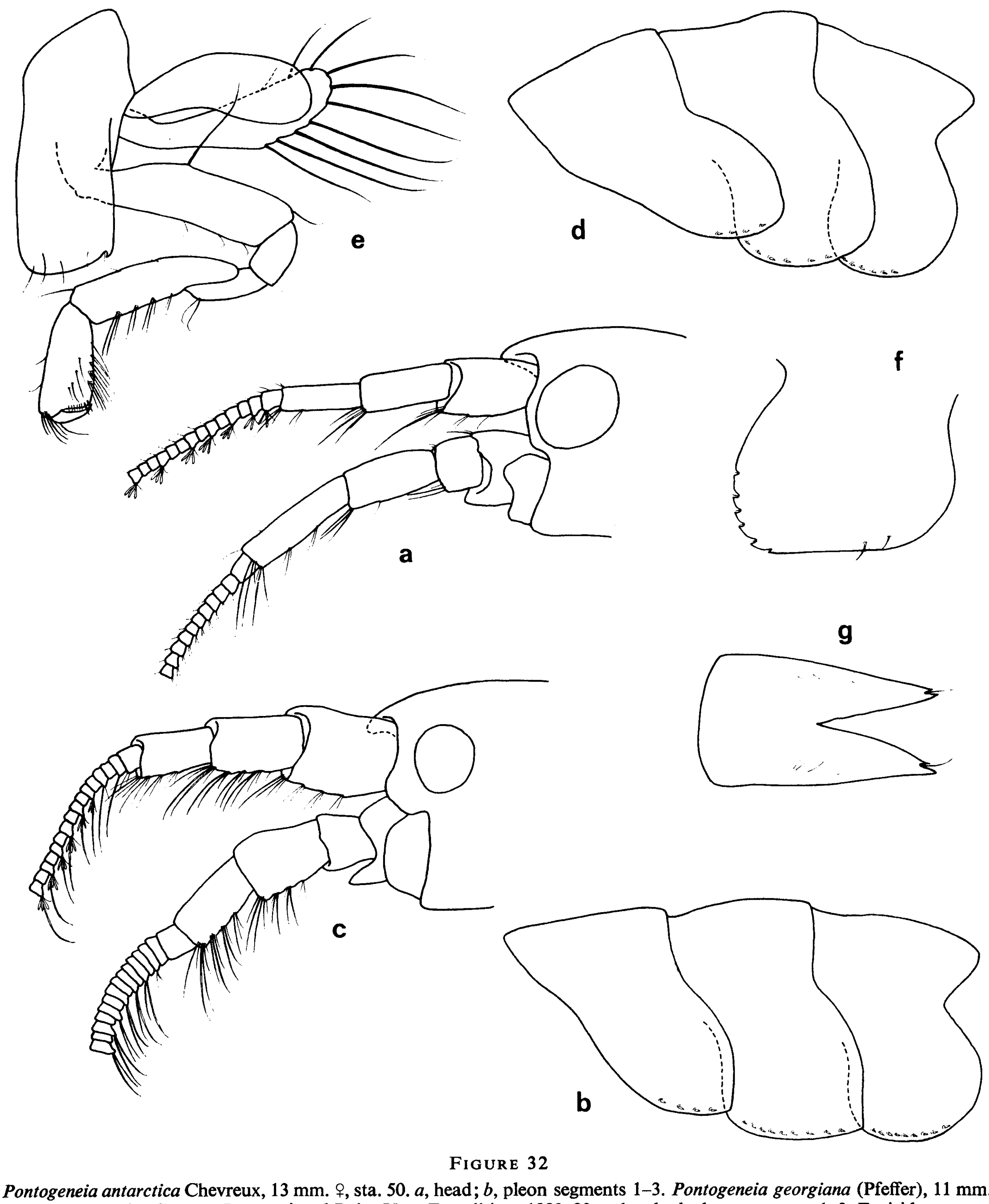

FIGURE 32

Pontogeneia antarctica Chevreux, 13 mm. ♀, sta. 50. *a*, head; *b*, pleon segments 1–3. *Pontogeneia georgiana* (Pfeffer), 11 mm. ♀, South Georgia, German International Polar Year Expedition, 1882–83. *c*, head; *d*, pleon segments 1–3. Eusiridae gen. et sp. indet., 4 mm. ♀, sta. 19. *e*, gnathopod 2; *f*, epimeron 3; *g*, telson.

Breeding. There are probably two breeding periods in a year, one during the winter months and the other during spring and summer.

The number of eggs carried varies from 34 by a 16 mm. female to 64 by a 19 mm. specimen. Stage i eggs have a mean length of 0·71 mm. (0·68–0·75) and a diameter of 0·58 mm. (0·55–0·61).

Distribution. Graham Land (Petermann Island, Booth Island, Flandres Bay, Port Lockroy; Melchior Islands, Spring Point, Two Hummock Island, Auguste Island, Cape Roquemaurel, Paulet Island, Seymour Island) littoral–40 m. (150 m.); South Shetland Islands (Deception Island, Admiralty Bay) littoral–25 m.; South Orkney Islands (Signy Island, Laurie Island) littoral–1 m.; Tierra del Fuego (Lennox Island, Isla Nueva) littoral–55 m.; Falkland Islands (Port Louis).

Pontogeneia redfearni sp. nov.
Figs. 33a–p and 34a–k

The type material is in the collection of the British Museum (Nat. Hist.) under the following registration numbers: holotype (18 mm. male) from sta. 48, 1969:499, allotype (22 mm. female) from sta. 48, 1969:500; and paratypes, 1969:501–512, with the exception of two specimens from sta. 16 deposited at the British Antarctic Survey Zoology Section, two specimens from sta. 48 exchanged with the Göteborgs Museum, Sweden, and the material from sta. 50 and 51 which are at Signy Island and the National Institute of Oceanography, respectively.

Type locality. Borge Bay, Signy Island, South Orkney Islands. Material was trawled in 5–10 m. between Bare Rock and Outer Islet on 15 April 1964. The substrate consisted of boulders with *Desmarestia anceps* and *Phyllogigas grandifolius.*

Material examined. (14 stations, 63 specimens; ♂♂ 7–18 mm., ♀♀ 10–23 mm., juvs. 8–10 mm.).

1. Sta. 11 1 juv.; 2. Sta. 12 1 ♂; 3. Sta. 13 2 ♂♂; 4. Sta. 16 9 ♂♂, 1 ♀, 6 juv.; 5. Sta. 17 6 ♂♂, 4 juv.; 6. Sta. 27 1 ♂; 7. Sta. 46 1 ♀, 1 juv.; 8. Sta. 47 3 ♂♂, 2 ♀♀, 1 juv.; 9. Sta. 48 2 ♂♂, 7 ♀♀ (including **holotype** and **allotype**); 10. Sta. 49 1 ♂, 1 ♀; 11. Sta. 50 1 ♂, 1 ovig. ♀; 12. Sta. 51 1 ♀; 13. Sta. 53 3 ovig. ♀♀; 14. Sta. 54 1 ♂, 7 ♀♀.

Diagnosis. Body slender. *Peraeon* just longer than pleon. *Pleon,* segments 1–3 with obscure dorsal carina (not apparent in small specimens). *Epimera,* second with posterior distal angle obtuse; third rounded. *Rostrum* short, about one-quarter the length of first article of peduncle of antenna 1, hardly deflexed. *Eye lobe* and post antennal angle separated by a sinus. *Post-antennal angle* sub-acute. *Epistome* not prominent. *Eyes* large, round.

Antennae long, slender, sub-equal. *Antenna 1,* accessory flagellum absent; article 3 of peduncle produced distally into a small, plate-like setiferous lobe; every third article of flagellum produced posteriorly and bearing calceoli. *Upper lip* rounded, not emarginate. *Mandible,* incisor process with seven teeth, accessory lamella with five teeth on left mandible and three teeth on right; palp long, slender, articles 2 and 3 equal in length. *Maxilla 1,* inner plate with seven stout plumose setae at apex, outer plate with 11 pectinate spines. *Maxilla 2,* lobes equal in length.

Gnathopod 1, coxa small, somewhat produced anteriorly; basal, anterior margin concave; propod large, much longer than carpus, oval, as long as basal, groups of spines on posterior margin, palmar angle obsolete; dactyl long and slender. *Gnathopod 2,* coxa of moderate size, wider than deep, emarginate posteriorly, remaining articles as in gnathopod 1. *Peraeopods 3–7,* carpus hardly expanded distally, dactyls with a single seta on concave margin. *Peraeopod 4,* coxa wider than deep, posteriorly slightly emarginate. *Peraeopod 6,* longer than peraeopod 5, coxa with posterior lobe wider and much deeper than anterior lobe. *Peraeopod 7,* much longer than peraeopod 6; coxa small; basal expanded, posterior margin straight, posterior distal angle produced, propod longer than carpus which is longer than slightly expanded merus.

Uropod 3, rami narrowly lanceolate, outer a little shorter than inner. *Telson* tapering distally, cleft for about one-fifth of its length, lobes rather narrowly rounded, unarmed.

P. redfearni may be distinguished from more than half of the species in this genus by its shallowly cleft telson (Table II). The interval between produced articles of the flagellum of antenna 1 and the number of plumose setae on the inner plate of maxilla 1 combined to distinguish this species from those which also have a shallowly cleft telson. The slender body and elongate seventh peraeopods are also distinctive.

The name *P. redfearni* is given in recognition of Peter Redfearn's work on the ecology of Signy Island.

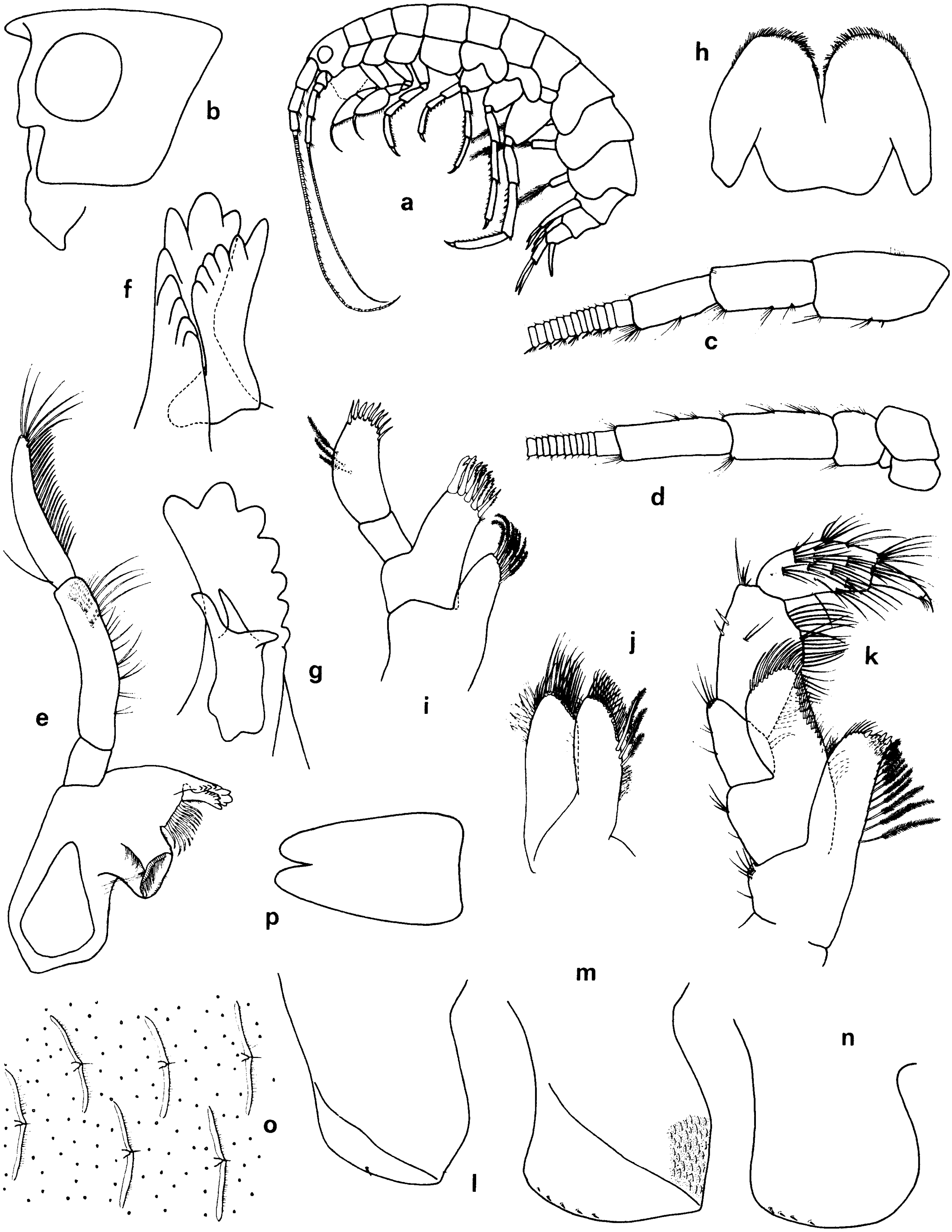

FIGURE 33

Pontogeneia redfearni sp. nov., holotype, 18 mm. ♂, sta. 48. *a*, habitus; *b*, head; *c* and *d*, antennae 1 and 2; *e* and *f*, left mandible; *g*, right mandible; *h*, lower lip; *i* and *j*, maxillae 1 and 2; *k*, maxilliped; *l–n*, epimera 1–3; *o*, epimeron 3, integumental scales; *p*, telson.

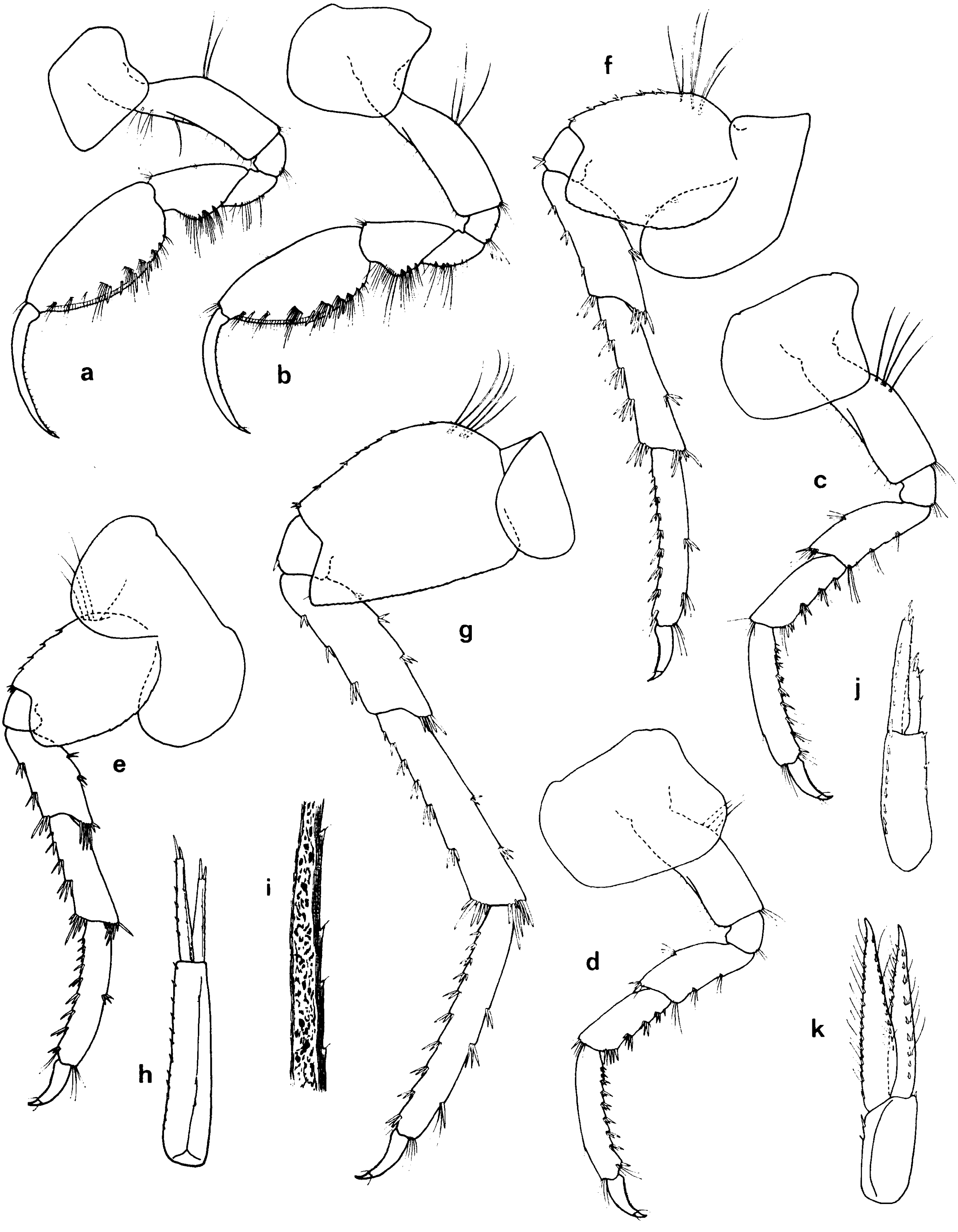

FIGURE 34

Pontogeneia redfearni sp. nov., holotype, 18 mm. ♂, sta. 48. *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7; *h*, uropod 1; *i*, uropod 1, outer margin of outer ramus; *j* and *k*, uropods 2 and 3.

Habitat. This species, like many of the pontogeneiid sequence of the Eusiridae, lives among algae in shallow water, 2·5–20 m. It may be noted that nearly all of the large specimens are from rather deeper water than are the majority of the smaller specimens.

Breeding. Ovigerous females taken in September (sta. 53) had stage iii and iv eggs, while the female taken in October (sta. 50) was carrying hatchlings (stage v). This species probably conforms with the pattern of autumn breeding and spring hatching.

Genus *Prostebbingia* Schellenberg

Schellenberg, 1926, p. 357–58, 1929, p. 278–79.
Barnard, 1969, p. 228–29.

Prostebbingia gracilis (Chevreux)
Fig. 29i

Stebbingia gracilis Chevreux, 1912, p. 218, 1913, p. 173, figs. 56–58.
Prostebbingia gracilis Schellenberg, 1926, p. 358, 1929, p. 279, 1931, p. 191; Barnard, 1932, p. 201, figs. 118d and 121; Stephensen, 1947, p. 62.

Occurrence. (39 stations, ca. 3,205 specimens; ♂♂ 4–10 mm., ♀♀ 5–13 mm., juvs. 1·5–7 mm.).

1. Sta. 5, 1 ♂; 2. Sta. 10 1 ♂, 2 ♀♀ (1 ovig.), 1 juv.; 3. Sta. 11 3 ♀♀; 4. Sta. 14 1 ♀; 5. Sta. 16 7 ♂♂, 13 ♀♀ (2 ovig.), 4 juv.; 6. Sta. 17 3 ♂♂, 7 ♀♀ (1 ovig.), 3 juv.; 7. Sta. 18 4 ♀♀ (1 ovig.), 12 juv.; 8. Sta. 19 2 ♂♂, 5 ♀♀, 8 juv.; 9. Sta. 20 1 ♂, 3 ♀♀, 1 juv.; 10. Sta. 22 3 ♂♂, 4 ♀♀ (1 ovig.), 2 juv.; 11. Sta. 23 5 ♂♂, 3 ♀♀, 6 juv.; 12. Sta. 24 7 ♂♂, 16 ♀♀, 6 juv.; 13. Sta. 25 1 ♂, 1 ♀; 14. Sta. 26 1 ♀; 15. Sta. 27 3 ♀♀ (1 ovig.); 16. Sta. 30 1 ovig. ♀; 17. Sta. 32 6 ♂♂, 37 ♀♀; 18. Sta. 33 2 ♂♂, 12 ♀♀ (4 ovig.), 6 juv.; 19. Sta. 35 2 ♀♀, 1 juv.; 20. Sta. 36 3 ♀♀, 1 juv.; 21. Sta. 38 2 ♂♂, 10 ♀♀ (1 ovig.); 22. Sta. 39 2 ♂♂, 2 ♀♀; 23. Sta. 40 1 ♂, 1 juv.; 24. Sta. 44 1 ♂, 1 juv.; 25. Sta. 45 3 juv.; 26. Sta. 46 ca. 140 specimens (38% ♂♂, 56% ♀♀, 6% juv.); 27. Sta. 47 29 ♂♂, 49 ♀♀, 12 juv.; 28. Sta. 48 ca. 700 specimens (24% ♂♂, 66% ♀♀, 10% juv.); 29. Sta. 49 ca. 300 specimens (46% ♂♂, 2% ovig. ♀♀, 49% ♀♀, 3% juv.); 30. Sta. 50 41 ♂♂, 16 ♀♀ (6 ovig.), 1 juv.; 31. Sta. 51 ca. 1,000 specimens (39% ♂♂, 61% ♀♀); 32. Sta. 52 17 ♂♂, 5 ♀♀ (4 ovig.); 33. Sta. 53 2 ♂♂, 4 ♀♀ (3 ovig.); 34. Sta. 54 12 ♂♂, 48 ♀♀, 7 juv.; 35. Sta. 56 19 ♂♂, 12 ♀♀, 43 juv.; 36. Sta. 57 ca. 370 specimens (66% ♂♂, 32% ♀♀, 2% juv.); 37. Sta. 58 ca. 140 specimens (34% ♂♂, 65% ♀♀, 1% juv.); 38. Sta. 59 3 ♀♀; 39. Sta. 60 1 ♂.

Remarks. These specimens agree in all respects with Chevreux's (1913) description.

Males differ from females in having a more slender body and larger propods and elongate dactyls of both pairs of gnathopods.

Specimens of both sexes preserved in weak formalin showed vermillion eyes and traces of pinkish or orange-red pigment on peraeon, mouth parts and uropods.

Habitat. Very common among algae in most habitats, L.W.–55 m. It has been captured during all months of the year except August.

Breeding. A remarkably low total of 32 (1 per cent) ovigerous females may indicate migratory movement, with breeding normally occurring in deeper water. Ovigerous females were captured in most months from February to November. The breeding pattern is not clear but suggests two peak periods of hatching; March–April and October. The number of eggs per brood varies from 10 in a 6 mm. female to 44 in an 11 mm. female. Recently laid eggs have a mean length of 0·48 mm. (0·46–0·50) and a diameter of 0·40 mm. (0·39–0·41).

Distribution. Graham Land (Marguerite Bay, Petermann Island, Lemaire Channel, Port Lockroy, Melchior Islands, north of Tower Island, Paulet Island) 4–254 m.; South Shetland Islands (Deception Island) 5–60 m.; South Georgia (Cumberland Bay) littoral–310 m.; Davis Sea (*Gauss* winter station, Gaussberg) 170–385 m.

Genus *Eurymera* Pfeffer

Pfeffer, 1888, p. 102–03.
Stebbing, 1906, p. 356.
Schellenberg, 1929, p. 277.
Barnard, 1969, p. 223–24.

Eurymera monticulosa Pfeffer

Eurymera monticulosa Pfeffer, 1888, p. 103, taf. 1, fig. 3; Stebbing, 1906, p. 357; Chevreux, 1906*e*, p. 59–64, figs. 34–36; Chilton, 1912, p. 493, 1913, p. 58; Chevreux, 1913, p. 167; Shoemaker, 1914, p. 74; Schellenberg, 1929, p. 277, 1931, p. 181; Barnard, 1932, p. 198, fig. 118b; Stephensen, 1938*a*, p. 239, 1947, p. 59; Castellanos and Perez, 1963, p. 10, tab. 5, fig. 16.

Occurrence. (16 stations, ca. 618 specimens; ♂♂ 12–21 mm., ♀♀ 13–27 mm., juvs. 6–7 mm.).

1. Sta. 3 1 ♀; 2. Sta. 4 3 ♂♂, 1 juv.; 3. Sta. 8 2 ♂♂; 4. Sta. 9 1 ♀; 5. Sta. 18 1 juv.; 6. Sta. 19 1 juv.; 7. Sta. 26 1 juv.; 8. Sta. 33 4 ♂♂, 1 ♀; 9. Sta. 38 2 ♂♂; 10. Sta. 46 2 ♂♂, 5 ♀♀; 11. Sta. 47 1 ♂; 12. Sta. 48 1 ♂; 13. Sta. 49 1 ♂, 5 ovig. ♀♀; 14. Sta. 50 1 ♂, 1 ovig. ♀; 15. Sta. 54 8 ♂♂, 5 ♀♀; 16. Sta. 59 ca. 575 specimens (12% ♂♂, 79% ovig. ♀♀, 9% ♀♀).

Remarks. This distinctive species has been described in detail by Pfeffer and Chevreux (1906*e*). In the present specimens, the palp of the left maxilla 1 is not longer but stouter than that of the right side (cf. Chevreux, 1906*e*, p. 62). The projection of article 1 of the peduncle of antenna 1 is only dentiform if viewed laterally. When seen from above it appears as a broad hood covering the base of article 2.

Habitat. Among large algae on rock and boulders, littoral–20 m. Since most of the specimens taken were present in one sample, swarming may occur. This species is confined to shallow water in west Antarctica and islands of the Scotia arc.

Breeding. Females with stage i and ii eggs in June and July, with hatchlings in October. Whether the considerable excess of females in this collection is due to segregation of the sexes or to a real difference in the proportions of males and females is not determinable.

The relation of size of female to number of eggs carried is less obvious than in most species; a small sample of ovigerous females had a mean length of 24·3 mm. (22–26) and carried an average 96·7 eggs (74–112). Stage i eggs have a mean length of 0·819 mm. (0·73–0·92) and a mean breadth of 0·675 mm. (0·62–0·72).

Distribution. Graham Land (Petermann Island, Booth Island, Port Lockroy, Melchior Islands, Spring Point) L.W.–40 m.; South Shetland Islands (Deception Island) 5–10 m.; South Orkney Islands (Laurie Island) 7 m.; South Georgia (St. Andrews Bay, Godthul, Cumberland Bay, Stromness Bay, Possession Bay, Bay of Isles, Coal Bay) littoral–16 m.

Genus *Pontogeneiella* Schellenberg

Schellenberg, 1929, p. 278.
Barnard, 1969, p. 228.

Pontogeneiella brevicornis (Chevreux)

Atyloides brevicornis Chevreux, 1906*c*, p. 84–86, fig. 3, 1906*e*, p. 79–84, figs. 45–47, 1911*c*, p. 403; Chilton, 1925, p. 178.
Paramoera austrina (not Bate) Chilton, 1912, p. 498–500 (part).
Pontogenieiella brevicornis Schellenberg, 1929, p. 278, 1931, p. 191; Barnard, 1932, p. 200, fig. 118f; Nicholls, 1938, p. 109, figs. 52c and 56; Stephensen, 1938*a*, p. 239, 1947, p. 61.

Occurrence. (18 stations, ca. 9,811 specimens; ♂♂ 9–17 mm., ♀♀ 11–22 mm., juvs. 5–10 mm.).

1. Sta. 25 1 ♀, 1 juv.; 2. Sta. 26 2 juv.; 3. Sta. 33 1 ovig. ♀; 4. Sta. 37 3 ♂♂, 10 ♀♀ (1 ovig.), 9 juv.; 5. Sta. 38 ca. 350 specimens (16% ♂♂, 20% ovig. ♀♀, 40% ♀♀, 24% juv.); 6. Sta. 39 2 ♀♀, 3 juv.; 7. Sta. 40 2 ♂♂, 2 ♀♀ (1 ovig.), 11 juv.; 8. Sta. 41 4 ♂♂, 1 juv.; 9. Sta. 42 4 ♀♀ (1 ovig.), 3 juv.; 10. Sta. 45 1 ♀, 2 juv.; 11. Sta. 46 3 ♂♂, 3 ♀♀, 1 juv.; 12. Sta. 47 1 ♀; 13. Sta. 49 ca. 850 specimens (1% ♂♂, 94% ovig. ♀♀, 5% ♀♀); 14. Sta. 50 9 ♂♂, ca. 8,000 ♀♀ (ca. 87% ovig.), many thousands of hatchlings 2·5–3 mm.; 15. Sta. 51 1 ♂, 6 ♀♀; 16. Sta. 52 1 ♂, 63 ♀♀ (58 ovig.); 17. Sta. 54 4 ♂♂, 6 ♀♀ (3 ovig.); 18. Sta. 59 ca. 450 specimens (1% ♂♂, 77% ovig. ♀♀, 22% ♀♀).

Remarks. These specimens agree in most respects with the description given by Chevreux (1906*e*) but several differences are worthy of note. The eyes are larger than is shown by Chevreux (1906*e*, fig. 45), particularly in male specimens. The antennae, which may be as short as Chevreux illustrated (1906*e*, fig. 45), are generally as long as the head and first four peraeon segments combined. This increase in length is due mainly to the longer flagellum which in both first and second antennae is about twice as long as the peduncle and consists of about 30 articles. The spines on the propods of the posterior peraeopods are strong, whereas those of the more proximal articles are much weaker. The crenelations at the distal ends of the lobes of the telson vary both in number and degree.

Diagnostic characters based on Chevreux's descriptions of this species and of *P. longicornis* have been listed by Schellenberg (1931). Schellenberg, basing his observations on material of both species collected by the Swedish Antarctic Expedition, considered that several of these characters cannot be regarded as significant. The characters discarded are those of the maxillipeds, posterior margins of the basal articles of peraeopods 5–7 and the telson. The present material confirms this and also casts some doubt on the size of the eyes as a diagnostic character.

The two species can be separated without much difficulty by the length of the posterior peraeopods, particularly the proportions of the carpus, and the peduncle of antenna 1 which is shorter than the head in *P. brevicornis* and longer in *P. longicornis*. In preserved material the eye colour appears diagnostic. The eyes of *P. brevicornis* are a very dark brown, while in *P. longicornis* the eyes are much lighter in colour.

One of the eight specimens assigned to *Paramoera austrina* by Chilton (1912) belongs to *P. brevicornis*, while the remaining seven are *Pontogeneiella longicornis*. None are referable to *Paramoera* spp. (cf. Schellenberg, 1931, p. 194, as *P. fissicauda*; Barnard, 1932, p. 209, as *P. capensis*).

Habitat. Associated with sandy bottoms, either with or without boulders and algae and frequently in shallow water, 5–25 m. Considerable numbers of specimens in a few of the samples may indicate swarming behaviour.

Breeding. Ovigerous females in all months between April and November except August. A sample of 21 eggs from one female was measured giving a mean length of 0·749 mm. (0·68–0·84) and a diameter of 0·580 mm. (0·54–0·64). Breeding occurs in April and is followed by slow development through the winter months resulting in hatching in October and November. The vast disproportion in numbers between the sexes is worthy of note.

Distribution. Graham Land (Booth Island, Port Lockroy) 6–40 m.; South Shetland Islands (Deception Island) 5–75 m.; South Orkney Islands (Normanna Strait, Laurie Island) 7–36 m.; South Sandwich Islands (Bristol Island, Candlemas Island, Visokoi Island, Zavodovski Island) 10–91 m.; South Georgia (Larsen Harbour, Godthul, Cumberland Bay, Coal Bay) 2–310 m.; Iles Crozet; Macquarie Island; Peter I Øy, 64 m.

Pontogeneiella longicornis (Chevreux)

Atyloides longicornis Chevreux, 1906*e*, p. 84–88, figs. 48–50, 1913, p. 179.
Paramoera austrina (not Bate) Chilton, 1912, p. 498–500 (part).
Pontogeneiella longicornis Schellenberg, 1929, p. 278, 1931, p. 190; Barnard, 1932, p. 200–01, fig. 118f; Stephensen, 1947, p. 62.

Occurrence. (13 stations, 57 specimens; ♂♂ 7–17 mm., ♀♀ 12–22 mm., juvs. 6–10 mm.).

1. Sta. 24 1 ♀; 2. Sta. 38 4 ♀♀; 3. Sta. 44 2 ♂♂, 1 juv.; 4. Sta. 46 1 ♂; 5. Sta. 48 1 ♂, 10 ♀♀; 6. Sta. 49 1 ♂, 2 ♀♀ (1 ovig.); 7. Sta. 51 3 ♂♂, 5 ♀♀, 3 juv.; 8. Sta. 52 3 ♀♀ (2 ovig.); 9. Sta. 53 1 ♂, 1 ♀, 1 juv.; 10. Sta. 54 1 ♂, 2 ♀♀, 1 juv.; 11. Sta. 55 2 ♂♂, 9 ♀♀ (8 ovig.); 12. Sta. 58 1 ♂; 13. Sta. 59 1 ovig. ♀.

Remarks. This species may be distinguished from *P. brevicornis* by the longer antennal peduncles, longer posterior peraeopods, and lighter-coloured eyes. There is some variation in the length of the antennae and peraeopods, but even those specimens in which these appendages are short are usually readily distinguishable from *P. brevicornis*.

Seven specimens from the South Orkney Islands assigned to *Paramoera austrina* by Chilton (1912) belong to *P. longicornis*.

Habitat. Similar to *P. brevicornis* but does not occur in nearly such large numbers, 5–49 m.

Breeding. Ovigerous females have been taken in June, July, September and October. The 21 mm. female taken in June (sta. 49) carried 83 eggs.

Distribution. Graham Land (Bismarck Strait, Lemaire Channel, Booth Island, Port Charcot, Wiencke Island, Port Lockroy, Neumayer Channel, Paulet Island) 6–315 m; South Shetland Islands (Deception Island) 75 m.; South Georgia (Godthul, Cumberland Bay, Undine Harbour) 12–310 m.

Genus *Bovallia* Pfeffer

Pfeffer, 1888, p. 95–96.
Stebbing, 1906, p. 357.
Schellenberg, 1929, p. 277.
Barnard, 1969, p. 222.

Bovallia gigantea Pfeffer

Bovallia gigantea Pfeffer, 1888, p. 96–102, taf. 1, fig. 5; Della Valle, 1893, p. 704; Stebbing, 1906, p. 357–58; Chevreux 1906*e*, p. 54–59, figs. 31–33, 1913, p. 168–69; Schellenberg, 1929, p. 277, 1931, p. 180–81, fig. 92; Barnard, 1932, p. 196–97, fig. 118a; Stephensen, 1938*a*, p. 238, 1947, p. 59–60; Castellanos and Perez, 1963, p. 10, tab. 5; Bellisio, 1966, p. 55, pl. 25; Thurston, 1968, p. 357–64, figs. 1–4, 1970, p. 269–78, figs. 1–5.
Bovallia monoculoides (not Haswell) Chilton, 1912, p. 494–95, 1913, p. 57–58; Shoemaker, 1914, p. 74 (part); Chilton, 1925, p. 177–78; not Chilton, 1909*a*, p. 622 (= ? *Eusiroides monoculoides* Haswell), 1921*a*, p. 66.

Occurrence. (36 stations, 589 specimens; ♂♂ 12–40 mm., 17–51 mm., juvs. 5–15 mm.).

1. Sta. 2 1 ♀; 2. Sta. 5 1 ♂; 3. Sta. 7 2 ♂♂, 2 ♀♀; 4. Sta. 11 1 ♂; 5. Sta. 12 3 ♂♂, 21 ♀♀ (2 ovig.); 6. Sta. 13 19 ♂♂, 53 ♀♀ (7 ovig.), 1 juv.; 7. Sta. 16 13 ♂♂, 18 ♀♀ (2 ovig.); 8. Sta. 17 7 ♂♂, 1 ♀, 1 juv.; 9. Sta. 18 2 ♂♂, 2 juv.; 10. Sta. 19 2 ♂♂, 1 ♀; 11. Sta. 20 1 ♂; 12. Sta. 21 3 ♂♂, 2 juv.; 13. Sta. 22 1 ovig. ♀, 3 juv.; 14. Sta. 23 13 ♂♂, 4 juv.; 15. Sta. 24 3 ♂♂, 5 ♀♀; 16. Sta. 26 1 ♀; 17. Sta. 27 2 ♂♂; 18. Sta. 30 1 ♀; 19. Sta. 31 1 ♀; 20. Sta. 32 1 ♂, 1 ♀; 21. Sta. 33 5 ♂♂; 22. Sta. 34 1 ♂, 2 ♀♀; 23. Sta. 36 4 ♂♂; 24. Sta. 46 17 ♂♂, 10 ♀♀ (3 ovig.), 2 juv.; 25. Sta. 47 8 ♂♂, 10 ♀♀ (1 ovig.); 26. Sta. 48 13 ♂♂, 3 ♀♀ (1 ovig.), 6 juv.; 27. Sta. 49 14 ♂♂, 20 ♀♀ (2 ovig.), 1 juv.; 28. Sta. 50 2 ♂♂, 6 ♀♀; 29. Sta. 51 6 ♂♂, 9 ♀♀, 21 juv.; 30. Sta. 52 3 ♂♂, 1 ovig. ♀; 31. Sta. 53 11 ♂♂, 5 ♀♀ (3 ovig.); 32. Sta. 54 19 ♂♂, 40 ♀♀ (2 ovig.), 11 juv. and 24 damaged or fragmentary specimens; 33. Sta. 55 1 ♀; 34. Sta. 56 1 juv.; 35. Sta. 57 23 ♂♂, 47 ♀♀, 13 juv.; 36. Sta. 59 18 ♂♂, 21 ♀♀ (4 ovig.).

Remarks. This large and handsome species is quite distinct. Chilton's attempts to synonymize it with *Eusiroides monoculoides* (Haswell) have been proved erroneous by Chevreux (1913), Schellenberg (1931) and Barnard (1932).

Habitat. Common among algae on rocky and stony bottoms, littoral–49 m. Widespread throughout the northern part of Graham Land and islands of the Scotia arc, where it is confined to shallow water.

Breeding. Data obtained from these specimens have been published previously (Thurston, 1968, 1970).

Distribution. Graham Land (Petermann Island, Flandres Bay, Port Lockroy, Melchior Islands, Spring Point) L.W.–30 m.; South Shetland Islands (Deception Island, Admiralty Bay) L.W.–10 m.; South Orkney Islands (Laurie Island) littoral–shallow sub-littoral; South Sandwich Islands (Candlemas Island, Visokoi Island) 10–15 m.; South Georgia (Drygalski Fjord, Royal Bay, Hound Bay, Cumberland Bay, Stromness Bay, Bay of Isles, Coal Bay) littoral–40 m.

Eusiridae gen. et sp. indet.
Fig. 32e–g

Occurrence. (9 stations, 20 specimens; ♂♂ 2–3 mm., ♀♀ 3–4 mm., juvs. 2 mm.).

1. Sta. 11 1 ovig. ♀; 2. Sta. 12 1 ♂; 3. Sta. 13 3 ♂♂, 2 ♀♀ (1 ovig.), 1 juv.; 4. Sta. 19 1 ♂, 4 ♀♀ (3 ovig.), 1 juv.; 5. Sta. 20 1 ♂, 1 ovig. ♀; 6. Sta. 22 1 ovig. ♀; 7. Sta. 23 1 juv.; 8. Sta. 25 1 ♂; 9. Sta. 33 1 ♀.

Remarks. All of the specimens of this fragile little species are damaged. The absence of antennae, distal articles of peraeopods 3–7, and uropod 3 prevent identification at the generic level.

This species differs from all others in the family by the following combination of characters. Head, antennal lobe rounded, very shallow; epistome somewhat produced; body smooth; epimera 3 produced posteriorly, rounded and serrate; mandible, article 3 of palp much shorter than article 2; lower lip with internal lobes; maxilla 1 with four apical setae; gnathopods 1–2, rather slender, carpus longer than propod; uropods 1–2, slender; telson, rather long, cleft for 60 per cent of its length, apices acute.

Use of the key to the Eusiridae (Barnard, 1964*b*) suggests that this species has affinities with *Atyloella*, *Accedomoera*, *Pontogeneia* and *Meteusiroides*.

Habitat. Confined to transect samples in shallow water, 2–10 m.

Breeding. Ovigerous females taken in February and March carried two to five stage i eggs.

Family Gammaridae

Stebbing, 1906, p. 364–67.
Barnard, 1961, p. 107–09.
Barnard, 1969, p. 231–36 (key to genera).

Genus *Paraceradocus* Stebbing

Stebbing, 1899*b*, p. 426, 1906, p. 429.
Barnard, 1969, p. 246.

Paraceradocus miersi (Pfeffer)

Megamoera miersii Pfeffer, 1888, p. 121–28, taf. 3, fig. 3.
Maera ? miersii Della Valle, 1893, p. 732.
Paraceradocus miersii Stebbing, 1899*b*, p. 426, 1906, p. 429–30; Chilton, 1912, p. 500, 1925, p. 179; Barnard, 1932, p. 215–16, fig. 132; Stephensen, 1947, p. 65–66; Bellisio, 1966, p. 52, pl. 26.
Paraceradocus miersi Chevreux, 1906*e*, p. 93–94, 1913, p. 180–81; Chilton, 1913, p. 59; Schellenberg, 1931, p. 202–03; Stephensen, 1938*a*, p. 240–41.

Occurrence. (2 stations, 2 specimens).
1. Sta. 3 1 ♂ 55 mm.; 2. Sta. 49 1 ovig. ♀ 52 mm.

Remarks. This large and handsome species is very distinctive. The two specimens agree with the description of Pfeffer as modified by Barnard except that the telson is as long as (in the male) or longer (in the female) than pleon segment 6, the eyes are dark, and the spine at the palmar angle of gnathopod 2 is much shorter. The first two of these characters agree with Pfeffer's original description. The basal article of peraeopod 7 is broad as appears typical, rather than narrow as in Barnard's specimens from the South Orkney Islands.

The position of the ventral spines on the peduncle of uropod 1 is variable. In the specimen from sta. 3, this spine, which is not set on a tooth, is one-third of the length from the proximal end. In the other specimen the main spine is 40 per cent of the length from the proximal end on the right side and 47 per cent on the left side. On the right side there is also a small spine at about the level shown by Pfeffer.

Habitat. Depth range, littoral–20 m.

Breeding. The female, taken in June, carries stage i eggs. Barnard reported ovigerous and embryo carrying females among his long-legged material from Signy Island.

Distribution. Graham Land (Petermann Island, Hovgaard Island, Booth Island, Port Charcot, Neumayer Channel, Paulet Island) littoral–150 m.; South Shetland Islands (Admiralty Bay) L.W.; South Orkney Islands (Signy Island, Laurie Island) 16–344 m.; South Sandwich Islands (Visokoi Island) 10–15 m.; South Georgia (Cumberland Bay, Coal Bay) littoral–310 m.

Family Dexaminidae

Stebbing, 1906, p. 514.
Sheard, 1938, p. 173–74.
Gurjanova, 1951, p. 788–89.
Barnard, 1969, p. 200–202 (key to genera).

Genus *Paradexamine* Stebbing

Stebbing, 1899*c*, p. 210, 1906, p. 518.
Sheard, 1938, p. 176.
Barnard, 1969, p. 206.

Paradexamine fissicauda Chevreux
Fig. 35a–i

Paradexamine fissicauda Chevreux, 1906*c*, p. 82–84, figs. 1 and 2, 1906*e*, p. 88–93, figs. 51–53, 1913, p. 181; Schellenberg, 1931, p. 210; Barnard, 1932, p. 217; Stephensen, 1938*a*, p. 241, 1947, p. 66; Bellisio, 1966, p. 52 (not pl. 26).
Paradexamine pacifica (not Thomson) Chilton, 1912, p. 501, 1925, p. 179.

Occurrence. (31 stations, 287 specimens; ♂♂ 9–18 mm., ♀♀ 13–33 mm., juvs. 3–12 mm.).
1. Sta. 8 1 juv.; 2. Sta. 10 6 juv.; 3. Sta. 12 1 ♀, 1 juv.; 4. Sta. 16 2 ♂♂, 4 juv.; 5. Sta. 17 2 ♀♀, 2 juv.; 6. Sta. 18 4 ♂♂, 1 ♀, 8 juv.; 7. Sta. 19 1 ♀; 8. Sta. 20 1 juv.; 9. Sta. 21 3 ♂♂, 3 ♀♀, 12 juv.; 10. Sta. 22 4 ♂♂, 3 ♀♀, 18 juv.; 11. Sta. 23 6 ♂♂, 15 juv.; 12. Sta. 24 2 juv.; 13. Sta. 25 5 juv.; 14. Sta. 26 1 ♀, 2 juv.; 15. Sta. 33 7 ♀♀, 2 juv.; 16. Sta.34 2 ♀♀; 17. Sta. 36 12 ♂♂, 11 ♀♀, 4 juv.; 18. Sta. 46 4 ♂♂, 12 ♀♀ (1 ovig.), 2 juv.; 19. Sta. 47 1 ♂; 20. Sta. 48 3 ♂♂, 2 ♀♀, 1 juv.; 21. Sta. 49 2 ♂♂, 5 ♀♀ (1 ovig.), 3 juv.; 22. Sta. 50 6 ♂♂, 20 ♀♀ (2 ovig.), 2 juv.; 23. Sta. 51 2 ♂♂, 1 ♀, 6 juv.; 24. Sta. 52 5 ♀♀, 1 juv.; 25. Sta. 53 2 ♂♂, 1 ovig. ♀, 1 juv.; 26. Sta. 54 9 ♂♂, 14 ♀♀ (2 ovig.), 5 juv.; 27. Sta. 55 4 ♂♂, 4 ♀♀ (1 ovig.), 1 juv.; 28. Sta. 56 1 ♀; 29. Sta. 57 7 ♂♂, 4 ♀♀ (2 ovig.); 30. Sta. 58 3 ♂♂, 1 ♀, 2 juv.; 31. Sta. 59 1 ♂, 3 ♀♀.

Remarks. The dorsal carinae on peraeon segments 6 and 7 are almost obsolete in these specimens (Fig. 35a) and even the largest males and females lack the posterior teeth described by Chevreux (1906*e*).

The carinae on pleon segments 1–4 are less prominent than in the type material.

Differences in antennal lengths should be treated with suspicion in discussions of specific and sub-specific differences, as this character is notoriously variable. There does, however, appear to be a genuine difference in this respect between material in this collection and the specimen figured by Chevreux. In adult animals with intact antennae most specimens have antenna 1 about two-thirds as long as the head and body combined, and antenna 2 a little shorter than the head and peraeon combined. In this respect, the Signy Island specimens agree with material reported from South Georgia by Schellenberg and with some of Stephensen's (1947) material from Graham Land.

Anterior to the grinding surface of the molar process of each mandible are two small tubercles, apparently functioning as accessory molars in large specimens. The ventral tubercle is bidentate and becomes worn apically before the simple dorsal one is abraded.

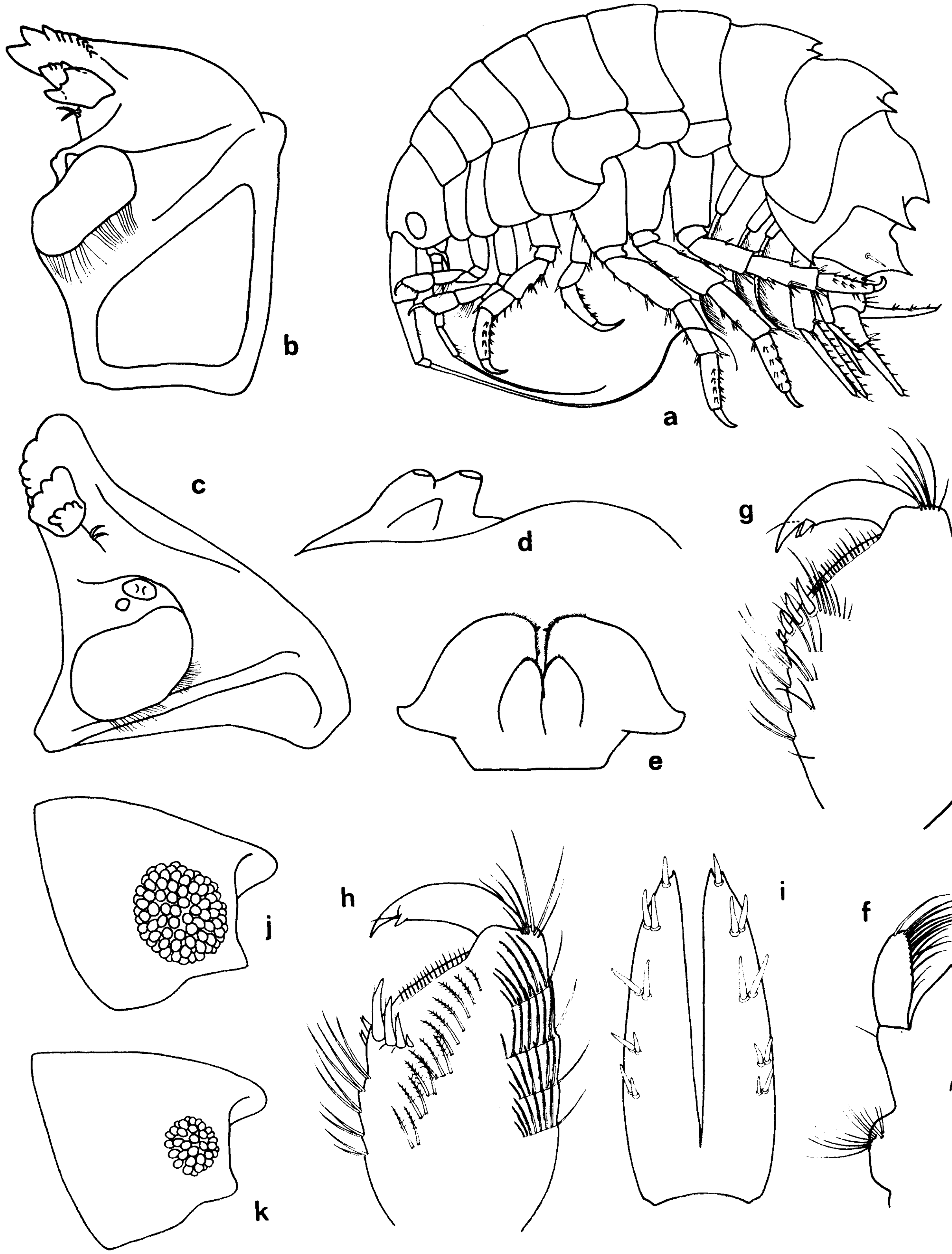

FIGURE 35

Paradexamine fissicauda Chevreux, 18 mm. ♀, sta. 36. *a*, habitus; *b*, right mandible; *c*, left mandible; *d*, left mandible, showing accessory molar; *e*, lower lip; *f*, maxilla 1; *g*, left gnathopod 1, outer face of propod; *h*, right gnathopod 1, inner face of propod; *i*, telson. *Polycheria antarctica* f. *gracilipes* Schellenberg. *j*, head, 6 mm. ovig. ♀, sta. 11; *k*, head, 3 mm. juv., sta. 54.

Apparent differences between Chevreux's illustrations and the present material in the mandibles, lower lip and first maxillae are attributable to oblique views of the appendages as figured by Chevreux (Fig. 35b–f).

The number of spines at the palmar angle of both gnathopods is at variance with Chevreux's description. In all specimens examined the arrangement of these spines is as shown in Fig. 35g and h. There are four, or exceptionally five, graded spines on the inner surface of the propod, three on the outer, and a single rather small spine in the mid-line.

Chevreux described the telson as being cleft to its base, and his illustration (fig. 52k) confirms this but suggests that this condition is artificial, perhaps caused by pressure of a cover-slip during mounting. If this is so, the telsons of the type material and the present specimens, in which the telson is cleft for 80–90 per cent of its total length, are in agreement (Fig. 35i).

The intermediate nature of specimens recorded by Stephensen (1947) indicates that a new varietal name is not required for the form with weak dorsal armature and short antennae.

Habitat. Abundant and widespread on bottoms with algal cover, 1·5–49 m. Literature records suggest that this is predominantly a shallow-water species.

Breeding. Ovigerous females from April to October, except in July and August. Inconclusive evidence suggests a breeding pattern similar to *Bovallia gigantea.*

Females of 19, 20 and 20 mm. length were carrying 53, 54 and 56 eggs respectively.

Distribution. Graham Land (Petermann Island, Lemaire Channel, Booth Island, Port Charcot, Neumayer Channel, Port Lockroy) 9–129 m.; South Georgia (Hound Bay, Godthul, Cumberland Bay) 2–70 m.

Genus *Polycheria* Haswell

Haswell, 1880*a*, p. 33, 1880*c*, p. 345.
Stebbing, 1906, p. 519.
Schellenberg, 1931, p. 212–13.
Barnard, 1969, p. 206.

Polycheria antarctica f. *gracilipes* Schellenberg
Fig. 35j and k

Polycheria antarctica f. *gracilipes* Schellenberg, 1931, p. 216–17, figs. 107b and 108.

Occurrence. (10 stations, ca. 369 specimens; ♂♂ 4–6·5 mm., ♀♀ 4–7 mm., juvs. 1·5–4 mm.).

1. Sta. 8 2 ♀♀ (1 ovig.), 2 juv.; 2. Sta. 9 5 ♀♀ (4 ovig.), 5 juv.; 3. Sta. 10 11 ♂♂, 5 ♀♀ (1 ovig.), 21 juv.; 4. Sta. 11 ca. 160 specimens (30% ♂♂, 26% ovig. ♀♀, 38% ♀♀, 6% juv.); 5. Sta. 12 13 ♂♂, 16 ♀♀ (2 ovig.), 39 juv.; 6. Sta. 13 4 ♂♂, 4 ♀♀ (2 ovig.), 2 juv.; 7. Sta. 14 15 ♂♂, 12 ♀♀, 23 juv.; 8. Sta. 17 2 ♂♂, 7 ♀♀ (3 ovig.); 9. Sta. 33 3 ♂♂, 3 ♀♀, 1 juv.; 10. Sta. 54 2 ♂♂, 3 ♀♀ (2 ovig.), 9 juv.

Remarks. Since *Polycheria antarctica* was described by Stebbing (1875), specimens from many localities have been ascribed to this species and a considerable number of forms and varieties has been attributed to it. It is difficult at present to assess the importance of the variation within *P. antarctica* as currently understood; a fact which emphasizes the need for more critical observations on new and old material.

The present specimens agree in all respects with Schellenberg's description of *P. antarctica* f. *gracilipes.* Their lack of variability suggests that f. *gracilipes* is a distinct entity and may be worthy of a higher rank.

The heads of an adult female and a juvenile are illustrated to show the form of the antennal lobe and also the allometric growth of the eye (Fig. 35j and k) which does not appear to reach a maximum size until sexual maturity is attained.

All of the *Discovery* Committee material (Barnard, 1932) from South Georgia belongs to *P. antarctica* f. *dentata* and none to the present form.

Habitat. Over 90 per cent of the material from shallow-water samples in which the *Iophon*/*Phyllophora* association (sponge/alga) and other sponges were dominant, 1·5–15 m. An association with sponges which has been suggested for this species (Stebbing, 1875; Schellenberg, 1926, 1931) and which certainly occurs in some other small dexaminids (e.g. *Tritaeta gibbosa*) therefore seems probable.

Breeding. Ovigerous females carrying stage i eggs in March and April.

Distribution. South Georgia (Cumberland Bay) 22–310 m.

Family Isaeidae

Stebbing, 1906, p. 603 (Photidae), 630.
Barnard, 1962*a*, p. 10–17 (Photidae).
Barnard, 1969, p. 264–69 (key to genera).

Barnard (1969) has found it necessary to combine the families Isaeidae and Photidae. It is unfortunate that the name Isaeidae has priority as it is relatively little used, whereas Photidae has covered a number of common widespread genera.

The familial diagnoses of the Isaeidae (= Photidae) and Corophiidae given by Stebbing (1906) overlap to such an extent that the only constant difference between the two families is the condition of the urosome, compressed in the Isaeidae and depressed in the Corophiidae. Since 1906 the description of new genera has further blurred this distinction so that the division between the families is now little more than arbitrary. Barnard (1962*a*) has drawn attention to the increasing difficulty of distinguishing the two families and suggested that the identification of genera within the families should be based on a consideration of both families. It would appear to be only a matter of time before their fusion under the name Corophiidae becomes necessary.

Barnard (1969) has pointed out that *Gammaropsis* Liljeborg has priority over *Eurystheus* Bate. Barnard (1962*a*) has rationalized the genera *Gammaropsis* (as *Eurystheus*), *Megamphopus* and *Podoceropsis*, and created a new genus *Kermystheus*, on the basis of a decreasing number of articles in the accessory flagellum. His diagnoses for these genera are as follows:

Gammaropsis. "Uropod 3 biramous, the rami biequal, usually longer than or subequal to peduncle; article 3 of antenna 1 as long as or longer than article 1, the accessory flagellum composed of 3 or more articles."

Megamphopus. "Like *Gammaropsis* but with accessory flagellum composed of one or two articles only; usually a long article tipped with a small one."

Kermystheus. "Similar to *Gammaropsis* but with accessory flagellum composed of a short, scale-like article."

Podoceropsis. "Similar to *Gammaropsis* but lacking an accessory flagellum."

Barnard reduced *Pseudeurystheus* Schellenberg to a sub-genus of *Gammaropsis*, and *Bonnierella* Chevreux to a sub-genus of *Megamphopus*. In *Megamphopus*, a new sub-genus *Segamphopus* was raised for *Megamphopus blaisus* Barnard. In later papers, *Audulla* Chevreux was submerged in *Gammaropsis* (Barnard, 1965) then resurrected as a sub-genus (Barnard, 1969).

This scheme, although artificial, provides a taxonomically convenient means for the identification of about half of the species currently recognized in the family Photidae.

The genus *Pseudeurystheus* was raised by Schellenberg (1931) for a species (*P. sublitoralis*) resembling *Gammaropsis* (= *Eurystheus*) but differing in the elongate carpus of the male gnathopod 2. The presence of an accessory flagellum of three articles led Barnard (1962*a*) to treat *Pseudeurystheus* as a sub-genus of *Eurystheus* thus emphasizing the similarity between the two genera but at the same time recognizing the atypical gnathopod of *Pseudeurystheus*. A similar type of gnathopod is found in *Megamphopus blaisus* Barnard (1932) which was described as having a two-articled accessory flagellum. As this type of gnathopod is not found in other species of *Megamphopus*, Barnard (1962*a*) erected for its reception the sub-genus *Segamphopus*. He thus recognized the similarity between *P. sublitoralis* and *M. blaisus* but segregated them as one had an accessory flagellum of three articles and the other of two.

The remarkable similarity of the two species prompted a re-examination of the type material of *Megamphopus blaisus*. The accessory flagellum was found to consist of three articles, the first and third short and the second rather long, in a ratio of 1·6 : 4·2 : 1. In this and in all other characters, *M. blaisus* agrees with *P. sublitoralis* and so the two must be fused under Schellenberg's name. Barnard's reason for erecting the two sub-genera, namely the attempt to maintain a distinct division between *Gammaropsis* and *Megamphopus*, no longer holds. *Pseudeurystheus* can stand as a distinct genus diagnosed as being similar to *Gammaropsis* but with the carpus of male second gnathopod 1·5 times as long as the propod. *Gammaropsis* is defined by Barnard's (1962*a*) diagnosis to which must be added "gnathopod 2 of male with carpus sub-equal to or shorter than propod".

Genus *Megamphopus* Norman

Norman, 1869, p. 282.
Chevreux, 1900, p. 97 (*Bonnierella*).
Stebbing, 1906, p. 621.
Barnard, 1932, p. 232.
Barnard, 1962*a*, p. 14–15.
Barnard, 1969, p. 273.

Barnard (1962*a*) rationalized the genera *Gammaropsis*, *Megamphopus* and *Podoceropsis* on the basis of a decreasing number of articles in the accessory flagellum. He defined *Megamphopus* as having an accessory flagellum with either one or two articles, and thus included species previously described under *Gammaropsis*, *Bonnierella* and *Podoceropsis*.

Megamphopus longicornis (Walker)

Gammaropsis longicornis Walker, 1906*b*, p. 153–54.
Eurystheus longicornis Walker, 1907, p. 35–37, pl. 12, fig. 21; Schellenberg, 1931, p. 245.
Eurystheus parvus Schellenberg, 1926, p. 376–77, fig. 61.
Eurystheus trigonurus Schellenberg, 1926, p. 381–82, fig. 64.
Megamphopus longicornis Barnard, 1962*a*, p. 15.

Occurrence. (13 stations, 21 specimens; ♂♂ 2–3·5 mm., ♀♀ 2·25–4 mm., juv. 2 mm.).

1. Sta. 10 1 ♀; 2. Sta. 12 1 ovig. ♀; 3. Sta. 13 1 ovig. ♀; 4. Sta. 14 3 ♀♀ (1 ovig.); 5. Sta. 15 1 ♀; 6. Sta. 16 1 ♂; 7. Sta. 18 1 ovig. ♀; 8. Sta. 19 2 ♀♀ (1 ovig.); 9. Sta. 20 2 ♀♀ (1 ovig.); 10. Sta. 22 1 ♂; 11. Sta. 23 1 ♂; 12. Sta. 24 1 ovig. ♀; 13. Sta. 25 1 ♂, 3 ♀♀ (2 ovig.), 1 juv.

Remarks. A comparison of these specimens with Walker's material reveals several minor differences.

Most of the material from both sources has lost both pairs of antennae, but it appears that Signy Island specimens have shorter antennae. The antennae of the female are sub-equal and as long as the cephalon and first five peraeon segments combined, whereas those of the types are as long as the cephalon and peraeon combined.

The ratio of lengths of propod to carpus for each pair of gnathopods differs in the two collections. For Ross Sea material the propod : carpus ratio is 1 : 1 for gnathopod 1 and 2·1 : 1 for gnathopod 2. The ratios for Signy Island material are 0·8 : 1 and 1·9 : 1, respectively.

The telson has several minute dorsal-apical setae similar to those shown by Schellenberg (1926, p. 381, fig. 64b).

As the two species described by Schellenberg (1926) (*Eurystheus parvus*, *E. trigonurus*) are intermediate between the Ross Sea material and specimens from Signy Island in some characters, and agree with one or other collection in other characters, there is little justification for separating them.

The removal of *Eurystheus longicornis* (Walker, 1906*b*) to *Megamphopus* by Barnard (1962*a*) reduces *Megamphopus longicornis* Chevreux (1911*a*) to a junior hononym, which, by the rules of the International Commission on Zoological Nomenclature, must be replaced. The name *Megamphopus chevreuxi* is therefore proposed for *M. longicornis* Chevreux.

Habitat. Present in small numbers in some transect samples, 2–9 m.

Breeding. Stage i and iii eggs in February and March. The number of eggs carried is small, being five to ten, depending on the size of the female.

Distribution. South Georgia (Cumberland Bay) 252–310 m.; Davis Sea (*Gauss* winter station) 385 m.; Iles Kerguelen, littoral; Victoria Land (McMurdo Sound) 18 m.; Falkland Islands, 197 m.

Genus *Pseudeurystheus* Schellenberg

Schellenberg, 1931, p. 234.

Pseudeurystheus sublitoralis Schellenberg

Pseudeurystheus sublitoralis Schellenberg, 1931, p. 234–36, fig. 119.
Megamphopus blaisus Barnard, 1932, p. 233–34, fig. 146; Barnard, 1962*a*, p. 15.

Occurrence. (1 station, 52 specimens).

1. Sta. 44 16 ♂♂ 3–4·5 mm., 34 ♀♀ 3·5–7 mm., 2 juv. 2–2·5 mm.

Remarks. None of the males and only two or three of the females appear fully mature. These larger specimens are closely comparable to Barnard's type material but differ in a few details. The flagella of the antennae are shorter, having only seven or eight articles instead of 12–14. The accessory flagellum is shorter than the first article of the primary flagellum, although consisting of three articles as in the type specimens. The epimera, particularly those of the third pair, are rather shallower in the present material than in Barnard's specimens.

Habitat. Mud, 20–25 m. The four *Discovery* stations in South Georgia at which *P. sublitoralis* was obtained were also on predominantly mud bottoms.

Distribution. South Georgia (Cumberland Bay, off Stromness Harbour) 17–310 m.; Shag Rocks Bank, 160 m.

Genus *Haplocheira* Haswell

Haswell, 1880*a*, p. 33, 1880*b*, p. 273.
Stebbing, 1906, p. 609.
Barnard, 1969, p. 272.

Haplocheira barbimanus (Thomson)
Fig. 36a–m

Gammarus barbimanus Thomson, 1879, p. 241–42, pl. 10D, fig. 1.
Haplocheira typica Haswell, 1880*b*, p. 273, pl. 11, fig. 2, 1882, p. 269–70, 1885, p. 106, pl. 16, figs. 4–8.
Corophium lendenfeldi Chilton, 1884, p. 262–63, pl. 20, fig. 1.
Corophium barbimanum Thomson and Chilton, 1886, p. 143.
Haplocheira plumosa Stebbing, 1888, p. 1172–77, pl. 126; Walker, 1903, p. 60.
Haplocheira barbimanus Stebbing, 1888, p. 1177; Schellenberg, 1926, p. 375; Barnard, 1930, p. 391; Schellenberg, 1931, p. 232; Barnard, 1932, p. 235; Nicholls, 1938, p. 126–27, fig. 65.
Leptocheirus barbimanus Della Valle, 1893, p. 433–34, tav. 57, figs. 4 and 5.
Haplocheira barbimana Stebbing, 1906, p. 609–10, figs. 104 and 105; Walker, 1907, p. 35; Chilton, 1912, p. 510; Stephensen, 1927, p. 352–53.

Occurrence. (8 stations, 24 specimens; ♂♂ 3·5–5 mm., ♀♀ 4–7·5 mm., juvs. 2–2·5 mm.).

1. Sta. 17 1 ♂, 1 ♀; 2. Sta. 19 3 juv.; 3. Sta. 22 1 ♂, 1 ♀; 4. Sta. 23 1 ♀, 2 juv.; 5. Sta. 25 4 ♂♂, 4 ♀♀ (2 ovig.), 3 juv.; 6. Sta. 26 1 ♂; 7. Sta. 49 1 juv.; 8. Sta. 54 1 juv.

Remarks. Gammarus barbimanus Thomson and *Corophium lendenfeldi* Chilton from New Zealand, and *Haplocheira typica* Haswell from Australia were combined under the name *Corophium barbimanus* by Thomson and Chilton (1886). Stebbing (1888) described *Haplocheira plumosa* from Iles Kerguelen but later (1906) relegated this name to the synonymy of *Haplocheira barbimana* (Thomson) without giving reasons for the change.

Specimens attributed to *H. barbimanus* have been obtained from many widely scattered localities in Antarctic and sub-Antarctic regions in the past 70 yr. Stephensen (1927) stated that specimens from the Auckland Islands are intermediate between those from New Zealand and from Iles Kerguelen. Barnard (1932) and Nicholls (1938) have expressed doubts regarding the identity of Antarctic specimens with those from temperate Australasia. Nicholls noted that a specimen from Macquarie Island "differs in numerous small details from the Antarctic species", but was unable to draw any definite conclusion due to the damaged state of the Macquarie Island material.

There is in the British Museum (Nat. Hist.) a single much damaged specimen, originally assigned to *Haplocheira typica* from Port Jackson, Australia. The specimen was received in the Museum not later than 1885 among a collection presented by the Australian Museum and may therefore be part of Haswell's type series. In so far as the material allows, a comparison of this specimen with one from Signy Island shows that the Australian specimen has a shorter stouter peraeopod 5, a broadly expanded basal article of peraeopod 7 and more nearly sub-rectangular epimera 3. There is some variation in the last two of these characters, and also in the degree of rounding of the eye lobes, among the Antarctic material examined (from Signy Island, South Georgia, McMurdo Sound and Cape Adare). Although the extremes seen among the Antarctic material do not overlap with the condition shown by the Australian specimen, suggesting that the two forms are distinct, it seems inadvisable to separate two species on the evidence of a single damaged specimen.

Various appendages of an ovigerous female from sta. 25 are figured in the hope that an Australian carcinologist with fresh material available will be able to resolve this problem.

Habitat. Probably builds tubes on algae or among encrusting organisms in shallow water, 4·5–20 m.

Breeding. Stage i and ii eggs in March. One female had 19 eggs in the brood pouch.

Distribution. South Orkney Islands (Laurie Island) 16–18 m.; South Georgia (off Drygalski Fjord, Cumberland Bay, Stromness Bay, Undine Harbour) 12–178 m.; Iles Kerguelen, littoral; Terre Adélie (Commonwealth Bay) 5–110 m.; Victoria Land (Cape Adare, Franklin Island, McMurdo Sound)

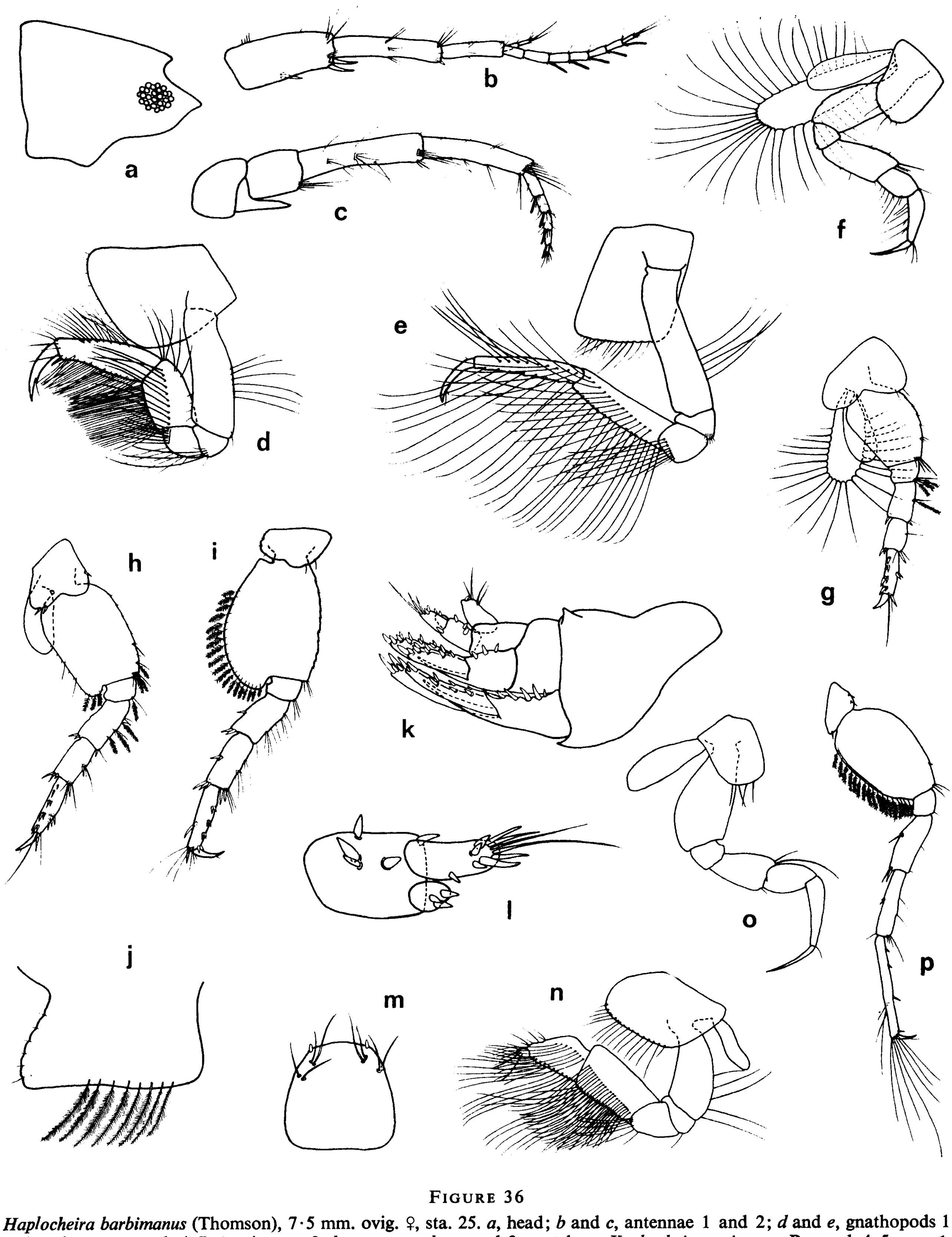

FIGURE 36

Haplocheira barbimanus (Thomson), 7·5 mm. ovig. ♀, sta. 25. *a*, head; *b* and *c*, antennae 1 and 2; *d* and *e*, gnathopods 1 and 2; *f–i*, peraeopods 4–7; *j*, epimeron 3; *k*, urosome; *l*, uropod 3; *m*, telson. *Kuphocheira setimanus* Barnard, 4·5 mm. ♂, sta. 44. *n*, gnathopod 2; *o* and *p*, peraeopods 4 and 7.

10–457 m.; Magellanic region, L.W.–55 m.; Falkland Islands, L.W.–40 m.; Australia, L.W.; Macquarie Island; Auckland Islands, 19 m; New Zealand.

Genus *Kuphocheira* Barnard

Barnard, 1931, p. 429, 1932, p. 237.
Barnard, 1969, p. 273.

Kuphocheira bears a close resemblance to *Haplocheira*, from which it differs in lacking an accessory flagellum, inner ramus of uropod 3 and hooks on the telson, and in having a reduced dactyl on gnathopod 2. *Kuphocheira* is also remarkably like the corophiid genus *Corophium*. The peraeon is broad and the urosome not compressed (height and width are sub-equal), antenna 2 of the male is stouter than that of the female, peraeopods 5–7 have dense plumose setae on the posterior margins of the basal articles, peraeopod 7 is slender and elongate, and the uropods are strongly spinose.

Kuphocheira setimanus Barnard
Fig. 36n–p

Kuphocheira setimanus Barnard, 1931, p. 429, 1932, p. 238–39, fig. 149.

Occurrence. (3 stations, ca. 232 specimens; ♂♂ 3–4 mm., ♀♀ 3–6 mm., juvs. 1–3 mm.).
1. Sta. 37 1 juv.; 2. Sta. 44 ca. 230 specimens (35% ♂♂, 15% ovig. ♀♀, 30% ♀♀, 20% juv.; 3. Sta. 45 1 ♂.

Remarks. The flagellum of antenna 1 has six or seven articles in the adult male and five to six in the female. The basal articles of peraeopods 3 and 4 have straight anterior margins and the terminal setae on the propods of peraeopods 5–7 are very long, particularly so in peraeopod 7, in which they are longer than the propod.

The long dense setae on the gnathopods from a net similar to that found in *Corophium* and other filter-feeding amphipods.

Habitat. Mud, 10–25 m. There is evidence that mud bottoms are normal in Normanna Strait so that Barnard's material from this locality (*Discovery* sta. 164) was probably also from a muddy bottom.

Breeding. Stage i eggs in February. The eggs are large, and few in number, about six to eight per female.

Distribution. South Orkney Islands (Normanna Strait, 24–36 m.

Family Ischyroceridae

Stebbing, 1906, p. 647–48 (as Jassidae).
Barnard, 1962*a*, p. 52–53.
Barnard, 1969, p. 275–76 (key to genera).

Genus *Ischyrocerus* Krøyer

Krøyer, 1838, p. 287.
Stebbing, 1906, p. 657.
Gurjanova, 1951, p. 913–15.
Barnard, 1969, p. 279.

Ischyrocerus camptonyx sp. nov.
Figs. 37a–m and 38a–k

Jassa falcata (not Montagu) Chilton, 1912, p. 511–13 (part); Barnard, 1932, p. 241–42 (part).
? *Ischyrocerus* sp. Stephensen, 1947, p. 75.

The type material is in the collection of the British Museum (Nat. Hist.) under the following registration numbers: holotype (5·5 mm. male from sta. 48), 1969:693; allotype (4·5 mm. ovigerous female from sta. 48), 1969:694; and paratypes 1969:695–702, with the exception of specimens from sta. 26 which are at Signy Island, from sta. 30 which has been retained by the author and sta. 35 which have been deposited at the British Antarctic Survey Zoology Section.

Type locality. Borge Bay, Signy Island, South Orkney Islands. Specimens were trawled at sta. 48 in 5–10 m. between Bare Rock and Outer Islet on 15 April 1964. The substrate was boulders with *Desmarestia anceps* and *Phyllogigas grandifolius*.

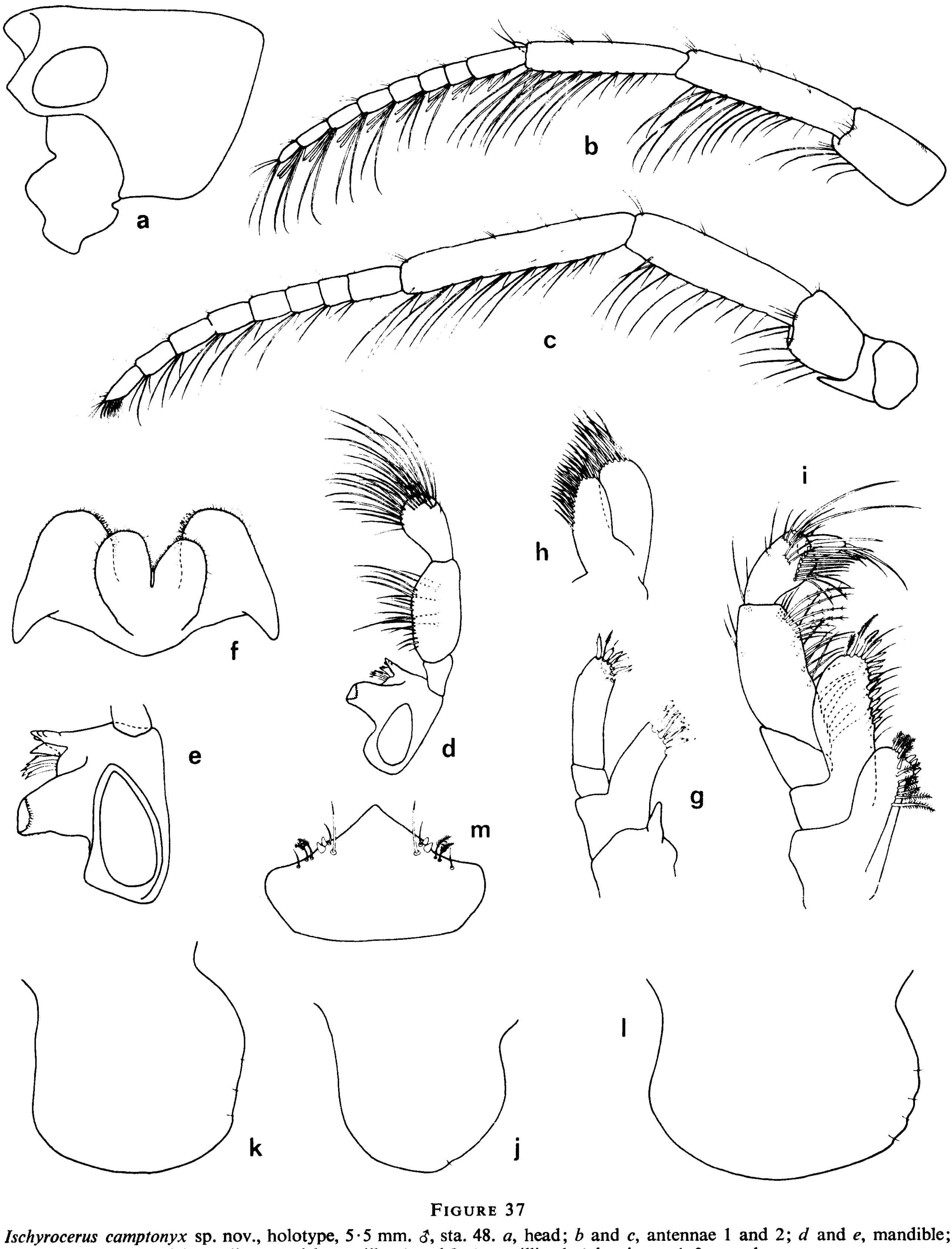

FIGURE 37
Ischyrocerus camptonyx sp. nov., holotype, 5·5 mm. ♂, sta. 48. *a*, head; *b* and *c*, antennae 1 and 2; *d* and *e*, mandible; *f*, lower lip; *g* and *h*, maxillae 1 and 2; *i*, maxilliped; *j–l*, epimera 1–3; *m*, telson.

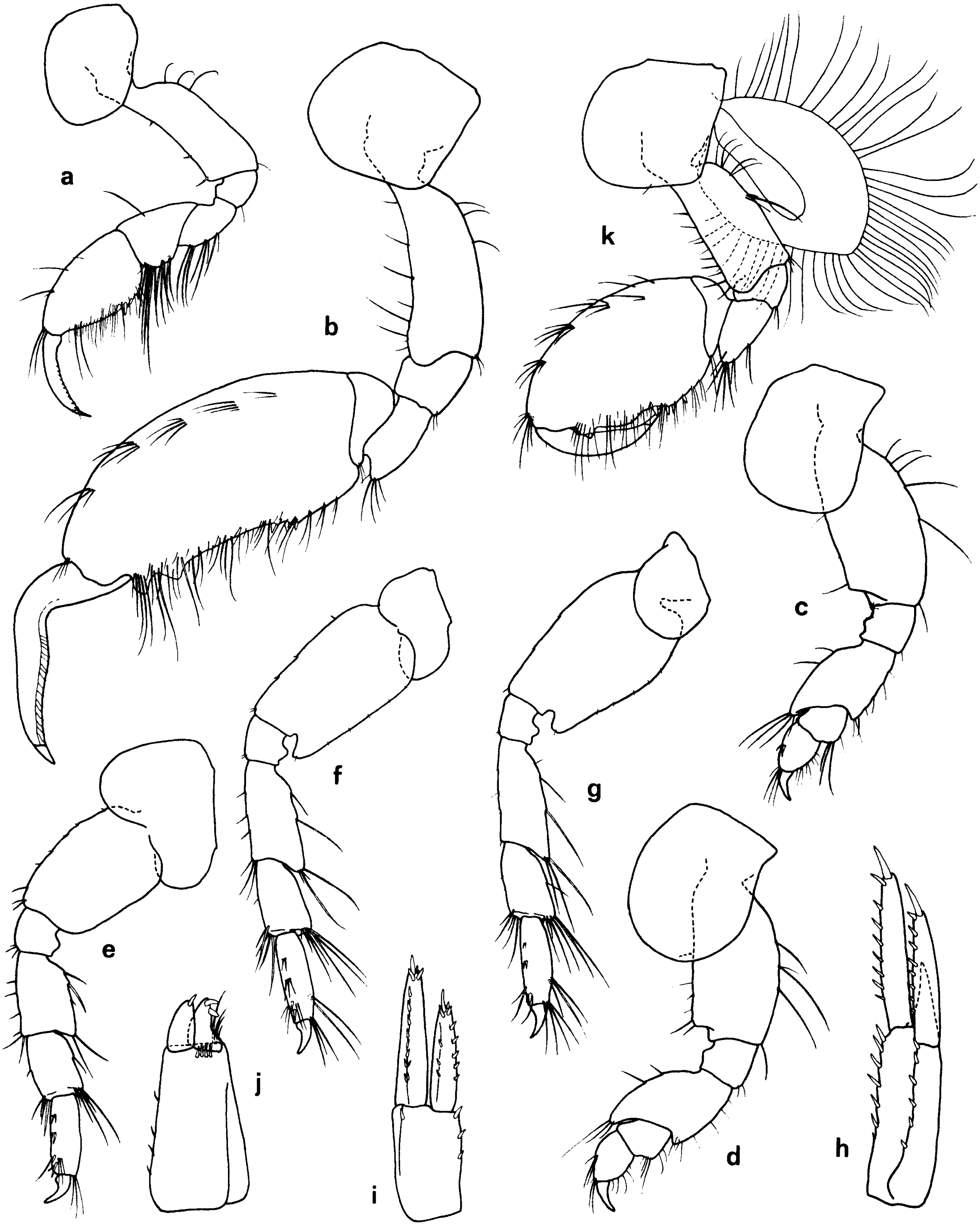

FIGURE 38

Ischyrocerus camptonyx sp. nov., holotype, 5·5 mm., ♂, sta. 48, *a* and *b*, gnathopods 1 and 2; *c–g*, peraeopods 3–7; *h–j*, uropods 1–3. Allotype, 4·5 mm. ovig. ♀, *k*, gnathopod 2.

Occurrence. (11 stations, 35 specimens; ♂♂ 3·5–5·5 mm., ♀♀ 3–5 mm., juvs. 1·5–3 mm.).

1. Sta. 25 3 ♂♂, 4 ♀♀ (1 ovig.), 2 juv.; 2. Sta. 26 1 ♂, 1 ovig. ♀; 3. Sta. 30 1 ovig. ♀; 4. Sta. 35 2 ♀♀ (1 ovig.); 5. Sta. 47 3 juv.; 6. Sta. 48 1 ♂, 5 ♀♀ (2 ovig.), 3 juv. (including holotype and allotype); 7. Sta. 51 1 ♀; 8. Sta. 52 1 ♂; 9. Sta. 54 1 ♂; 10. Sta. 57 1 ovig. ♀, 2 juv.; 11. Sta. 58 1 ♂, 2 juv.

Other material examined

1. 2 ♀♀ from Scotia Bay, Laurie Island, South Orkney Islands, April 1903 (Scottish National Antarctic Expedition; Chilton, 1912). 2. 10 ♂♂, 15 ovig. ♀♀, 8 ♀♀, 1 juv. from East Cumberland Bay, South Georgia (Discovery Committee; Barnard, 1932).

Diagnosis. Body moderately stout, no dorsal carination. *Epimera*, third broadly rounded, slightly crenelate posteriorly. *Eye lobes*, prominent, apically angled. *Eyes*, moderately large, occupying most of eyelobes, each composed of ca. 50 rather distinct ommatidia.

Antennae, long, slender, first shorter than second. *Antenna 1*, peduncle article 1 stout, shorter than head, article 3 just shorter than article 2; first article of flagellum longer than the two succeeding articles; accessory flagellum very short, with two articles, the second vestigial. *Antenna 2*, as long as the head and peraeon combined. *Mandible*, incisor process with six teeth, accessory lamella strong, molar well developed, palp, article 2 expanded, article 3 flattened distally. *Maxilla* 1, inner plate small without apical setae. *Maxillipeds*, article 4 of palp spatulate.

Coxae, 3 and 4 sub-equal, just higher than second, fourth higher than fifth. *Gnathopod 1*, article 6 pyriform, dactyl serrate on inner margin. *Gnathopod 2*, much larger than and structurally unlike gnathopod 1, coxa of same form as peraeopod 3, propod longer than basal article, length more than twice breadth; palm concave, with two teeth near hinge of dactyl, armed with setae except at palmar angle; dactyl strongly flexed proximally, sinuous distally. *Peraeopods 3–4*, basal stout, expanded anteriorly; merus expanded anteriorly, strongly decurrent; distal articles short. *Peraeopods 5–7*, stout, particularly peraeopod 5; basal articles expanded; dactyls short and strongly curved. *Peraeopods 6–7*, posterior-distal lobe of basal articles sub-acute.

Uropods 1–2, outer ramus longer than inner, sub-equal with peduncle. *Uropod 3*, peduncle stout, three times as long as rami, spine row on dorsal surface at distal margin; outer ramus with three stout hooked spines dorsally near apex and a minute comb with five–six teeth laterally. Telson, triangular, much wider than long, with a spine and several setae in a group on the distal lateral margins.

Gnathopod 2 of the female is smaller and less elongate than in the male. The palm is irregularly sinuous and the palmar angle is marked by a cluster of short spines. The dactyl is less strongly flexed than in the male.

The colour pattern (in alcohol) is characteristic. The head and peraeon segment 1 are unpigmented except for widely scattered dark chromatophores which may also occur on the peduncles of both antennae. Peraeon segments 3–7 and pleon segments 1–2 are a rather dark pinkish brown. This coloration is apparently subcuticular. Peraeon segment 2 and pleon segment 3 may or may not be pigmented.

Remarks. Ischyrocerus is predominantly a northern genus, 24 species being included in the key to species from Russian Seas given by Gurjanova (1951). A non-carinate dorsum, small eyes (maximum diameter not greater than one-quarter length of head) and very short rami of uropod 3 (much less than half the length of the peduncle) distinguish *I. camptonyx* from more than half of the 31 species currently recognized in the genus. Of the remainder, *I. anguipes* Krøyer, *I. chamissoi* Gurjanova, *I. ctenophorus* Schellenberg, *I. enigmaticus* Gurjanova, *I. hortator* Barnard, *I. latipes* Krøyer and *I. rhodomelae* Gurjanova have telsons in which the length is greater or sub-equal to the breadth. *I. elongatus* Gurjanova is distinguished by the sub-equal antennae and the unexpanded merus of peraeopods 3–4. *I. inexpectatus* Ruffo differs from *I. camptonyx* in having a projecting lobe at the proximal end of the posterior margin of the propod of gnathopod 2, and long dactyls on peraeopods 5–7. The form of the propod and length of the dactyl of gnathopod 2 distinguish *I. longimanus* (Haswell) from the present species.

The name *I. camptonyx* alludes to the strongly flexed dactyl of gnathopod 2.

Habitat. Sparse on mixed grounds with algae, 3–20 m.

Breeding. Ovigerous females from February to May. Stage i eggs in February and March, early stage ii eggs in April and stage iii eggs at the end of May; hatching probably in September. Females of 4·5 mm. with 5–9 relatively large eggs.

Distribution. South Georgia (Cumberland Bay); South Orkney Islands (Laurie Island).

Genus *Jassa* Leach

Leach, 1814, p. 433.
Stebbing, 1906, p. 652.
Barnard, 1969, p. 279.

Sexton and Reid (1951) discussed at length many species erected during the nineteenth and early twentieth centuries which they considered to be synonymous with *Jassa falcata* (Montagu). Included in this synonymy were three forms described from Antarctic regions: *Jassa ingens* Pfeffer, *Jassa goniamera* Walker and *Jassa wandeli* Chevreux.

Sexton and Reid considered *Jassa falcata* to be a multiform species having two main forms, the "broad" and the "narrow", each of which may show a number of minor variants. They argue from breeding experiments to show that these minor forms can occur among the progeny of apparently typical females of either of the major forms. Cross-breeding experiments between the two major forms resulted in extruded young which died before they were referable to either of these forms. On the basis of these last results, the broad and narrow forms were considered to belong to one and the same species. A third form, the "large polar form" was nominated, which combined some of the features of both broad and narrow forms.

The evidence presented by Sexton and Reid is not conclusive. Much more experimentation is required before the relation between the two major forms and the large polar form can be fully clarified. Until this is done, it is more profitable to list separately the various forms attributable to *Jassa falcata* (*sensu lato*).

Jassa ingens (Pfeffer)

Podocerus ingens Pfeffer, 1888, p. 131–37, taf. 3, fig. 1.
Podocerus falcatus Della Valle, 1893, p. 445–48 (part).
Jassa ingens Stebbing, 1906, p. 653–54; Schellenberg, 1931, p. 249, fig. 129; ? Stephensen, 1938*a*, p. 241; not Barnard, 1932, p. 242, fig. 151c (= *Jassa goniamera*).
Jassa falcata (not Montagu) Chilton, 1913, p. 60–61; Sexton and Reid, 1951, p. 46, 64–66, 82, 86 (not pl. 27–29).

Occurrence. (32 stations, 139 specimens; ♂♂ 5–22 mm., ♀♀ 6·5–24 mm., juvs. 3–8·5 mm.).

1. Sta. 8 3 ♂♂, 4 ♀♀; 2. Sta. 9 1 ♀; 3. Sta. 10 4 ♂♂, 6 ♀♀; 4. Sta. 11 2 ♂♂; 5. Sta. 12 1 ♂; 6. Sta. 13 1 ♀; 7. Sta. 15 2 ♂♂, 1 ♀, 2 juv.; 8. Sta. 16 2 ♂♂, 2 ♀♀; 9. Sta. 17 2 ♀♀; 10. Sta. 19 1 ♂, 6 ♀♀, 1 juv.; 11. Sta. 20 2 ♂♂, 2 ♀♀; 12. Sta. 21 1 ♂; 13. Sta. 22 1 ♂, 2 ♀♀; 14. Sta. 23 1 ♂; 15. Sta. 24 1 ♀; 16. Sta. 25 3 ♂♂, 1 ♀; 17. Sta. 26 1 ♂, 1 ♀; 18. Sta. 30 2 ♂♂, 1 ♀; 19. Sta. 33 1 ♂, 1 ♀, 4 juv.; 20. Sta. 35 3 ♂♂, 2 ♀♀; 21. Sta. 46 1 ♂, 2 ♀♀, 4 juv.; 22. Sta. 47 1 ♀; 23. Sta. 48 1 juv.; 24. Sta. 49 6 ♂♂, 8 ♀♀, 4 juv.; 25. Sta. 50 3 ♂♂; 26. Sta. 51 4 ♀♀, 1 juv.; 27. Sta. 52 3 ♂♂, 9 ♀♀ (4 ovig.); 28. Sta. 53 2 ♀♀ (1 ovig.); 29. Sta. 54 6 ♂♂, 1 ♀, 5 juv.; 30. Sta. 56 1 ♂; 31. Sta. 57 1 ♂; 32. Sta. 58 1 ♂, 2 ♀♀, 2 juv.

Remarks. An examination of Pfeffer's type specimen of *J. ingens* confirms that the present specimens and those described by Stephensen belong to this species. The remainder of Pfeffer's material is not *J. ingens* but is similar to the specimen figured by Sexton and Reid (1951, pl. 27–29). Specimens attributed to *J. ingens* by Barnard belong to *Jassa goniamera* Walker and not to *J. ingens*.

The specimens listed here agree completely with Pfeffer's type and with the description and figures of Stephensen. Schellenberg (1931), who examined Pfeffer's type specimen, described two features of diagnostic value. On the posterior margin of gnathopod 2 there is a strong transverse groove which accommodates the tip of the dactyl. Adjacent to this groove, and forming the proximal side of it, is a blunt tooth crowned with several stout spines, which is clearly figured by Pfeffer and Stephensen. The present material and the specimens described by Stephensen also agree with Pfeffer's type in the propod of peraeopods 5–7 which is considerably shorter than the merus and has a convex anterior margin with a row of stout close-set spines. This condition can be seen in specimens of as small as 4 mm. long, but is not apparent in hatchlings.

Chilton (1912), under *Jassa falcata*, stated that gnathopod 2 of Pfeffer's type, a 26 mm. male, has "a small secondary notch or tooth that does not appear to be present in the smaller specimens labelled *Podocerus ingens*". Chilton considered the possibility that there were two species present, but was inclined to believe that the differences between the type and the remaining specimens were "merely those that we might expect to meet in such a very large form".

Habitat. Jassa ingens occurs predominantly in shallow water among algae, etc. on rocky bottoms, 1·5–20 m. Although widespread in this type of habitat, it does not appear to be very numerous.

Breeding. Only five ovigerous females are present, all captured during September when carrying eggs of stages iii–v. Females 20 mm. long carry 160–170 eggs at one time. Juveniles are nearly 2 mm. long when they are liberated from the brood pouch.

Distribution. South Shetland Islands (Deception Island) 75 m.; South Sandwich Islands (Candlemas Island); South Georgia (Royal Bay).

Jassa goniamera Walker

Jassa goniamera Walker, 1903, p. 61–62, pl. 11, figs. 98–107 (part, specimens less than 5 mm. long are *Parajassa georgiana*); Stebbing, 1906, p. 739; Schellenberg, 1931, p. 253; Nicholls, 1938, p. 128; Stephensen, 1947, p. 73–74, fig. 24.
Hemijassa goniamera Walker, 1907, p. 38.
Jassa falcata (not Montagu) Chilton, 1912, p. 511–13 (part); Schellenberg, 1926, p. 383–84 (part); Sexton and Reid, 1951, p. 72, 75, 77–78, 81–83, 85, 86.
Jassa ingens (not Pfeffer) Barnard, 1932, p. 242 (part).

Remarks. The constancy of the form of gnathopod 2 in individuals from 5 mm. to over 20 mm. long suggests that this species should be retained and not synonymized with *J. falcata*. This view is supported by several minor but distinct differences which are apparent when types of *J. goniamera* are compared with those characters which were given as diagnostic of *J. falcata* by Sexton and Reid. *J. goniamera* differs in having head lobes acute in adults, nearly so in juveniles 5–6 mm. long; coxa 2, dorsal and ventral margins parallel, rounded anteriorly; epimera 3 rather broadly rounded; eyes relatively large; flagellum of antenna 2 without hooked spines; gnathopod 2 alike in males and females; peraeopods 3 and 4, merus long and only a little broadened, hardly decurrent; peraeopods 5–7, posterior distal angle of basal sub-acute.

Distribution. Graham Land (north of Tower Island, Erebus and Terror Gulf) 125–200 m.; South Shetland Islands (Clarence Island) 342 m.; South Sandwich Islands (Visokoi Island) 10–17 m.; Weddell Sea (lat. 71°02′S., long. 12°00′W.) 220 m.; Davis Sea (south-west of Drygalski Island) 110 m.; Terre Adélie (Commonwealth Bay) 101–110 m.; Victoria Land (Cape Adare, McMurdo Sound) 18–37 m.; Ross Sea (Coulman Island) 183 m.

Jassa falcata (Montagu)
Fig. 39a–h

Cancer (Gammarus) falcatus Montagu, 1808, p. 10, pl. 5, fig. 2.
Jassa pulchella Leach, 1814, p. 433.
Jassa falcata White, 1850, p. 54; Chilton, 1912, p. 511–13 (part), 1913, p. 60–61 (part); Schellenberg, 1926, p. 383–84, 1931, p. 250–51; Barnard, 1932, p. 241–42 (part); Nicholls, 1938, p. 127–28; Sexton and Reid, 1951, p. 29–91, pl. 4–30 (part). not Barnard, 1930, p. 392 (= *Parajassa georgiana*).
Podocerus falcata Stebbing, 1888, p. 1132–35, pl. 119.
Jassa wandeli Chevreux, 1906*e*, p. 94–99, figs. 54–56, 1913, p. 181–82, fig. 61; Stephensen, 1947, p. 74
(The above list of references is complete only for Antarctic records.)

Until the situation can be clarified by breeding experiments, it is convenient to include specimens of the following three forms under the name *J. falcata*. The morphological criteria separating these forms would, under most circumstances, be considered sufficient for specific distinction. In view of the apparent constancy of these forms, they may eventually be considered good species, distinct from *J. falcata*.

1. Specimens agreeing with *J. wandeli* (cf. Chevreux (1906, 1913) have been recognized. This form is characterized by "narrow form" gnathopod 2 (Sexton and Reid, 1951) which lacks setae on the anterior margin of the basal article, by "broad form" antenna 2 which has fused flagellar articles clothed with dense masses of setae and by the pigment pattern. The propods of peraeopods 5–7 are straight anteriorly and lack the conspicuous spines found in *J. ingens*.

The pigment which remains after prolonged immersion in alcohol is brown or purplish brown in colour, and is concentrated in closely packed chromatophores. The antennae and most of the dorsal and anterior regions of the head and all of the body segments are pigmented, the second segment occasionally being less so than the rest (cf. Sexton and Reid, 1951, p. 32). The chromatophores of each segment may be in a single group or separated into a large dorsal and two smaller lateral areas. The margin of each segment is commonly unpigmented. All of the coxae and the basal articles of peraeopods 5–7 are pigmented. An unpigmented marginal area may or may not be present. The anterodistal part of the propod of gnathopod 2 is generally pigmented. Occasional specimens show a reduction in the pigmented areas. This is frequently correlated with a reduction in pigment intensity. Other specimens show an increased pigment intensity and additional areas of chromatophores on the gnathopods, posterior peraeopods and pleopods.

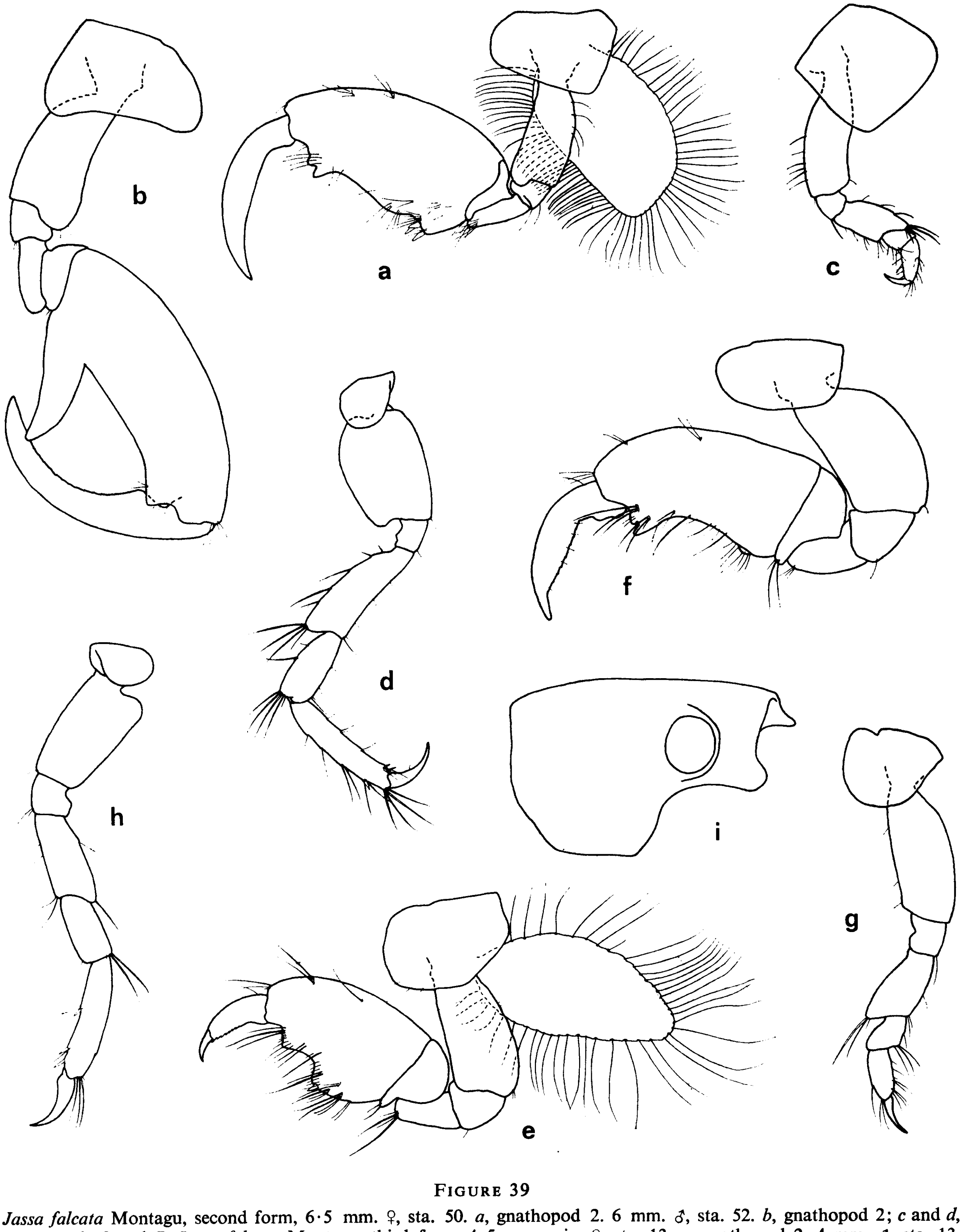

FIGURE 39

Jassa falcata Montagu, second form, 6·5 mm. ♀, sta. 50. *a*, gnathopod 2. 6 mm. ♂, sta. 52. *b*, gnathopod 2; *c* and *d*, peraeopods 3 and 7. *Jassa falcata* Montagu, third form, 4·5 mm. ovig. ♀, sta. 13. *e*, gnathopod 2. 4 mm. ♂, sta. 13. *f*, gnathopod 2; *g* and *h*, peraeopods 3 and 7. *Podocerus capillimanus* Nicholls, 7·5 mm. ♂, sta. 20. *i*, head.

Occurrence. (30 stations, ca. 572 specimens; ♂♂ 3·5–10 mm., ♀♀ 3–10 mm., juvs. 2–3·5 mm.).

1. Sta. 2 2 ♀♀; 2. Sta. 4 1 ♂, 1 ♀, 1 juv.; 3. Sta. 8 2 ♀♀ (1 ovig.); 4. Sta. 9 8 ♂♂, 3 ♀♀ (2 ovig.); 5. Sta. 10 18 ♂♂, 20 ♀♀ (11 ovig.), 1 juv.; 6. Sta. 11 9 ♂♂, 14 ♀♀ (5 ovig.); 7. Sta. 12 2 ♂♂, 8 ♀♀ (4 ovig.), 5 juv.; 8. Sta. 13 2 ♂♂, 1 ovig. ♀, 2 juv.; 9. Sta. 15 8 ♂♂, 12 ♀♀ (4 ovig.), 3 juv.; 10. Sta. 16 ca. 120 specimens (38% ♂♂, 7% ovig. ♀♀, 38% ♀♀, 17% juv.); 11. Sta. 17 ca. 180 specimens (28% ♂♂, 4% ovig. ♀♀, 36% ♀♀, 32% juv.); 12. Sta. 18 5 ♂♂, 2 ♀♀, 4 juv.; 13. Sta. 19 1 ♂, 2 ♀♀ (1 ovig.), 5 juv.; 14. Sta. 20 4 ♂♂; 15. Sta. 22 1 juv.; 16. Sta. 23 1 ♂, 3 ♀♀ (1 ovig.), 1 juv.; 17. Sta. 24 5 ♂♂, 2 ♀♀; 18. Sta. 25 2 ♂♂, 1 ♀, 2 juv.; 19. Sta. 26 7 ♂♂, 7 ♀♀ (3 ovig.); 20. Sta. 29 1 ovig. ♀; 21. Sta. 30 10 ♂♂, 14 ♀♀ (1 ovig.), 13 juv.; 22. Sta. 32 1 ♂, 2 juv.; 23. Sta. 33 7 ♂♂, 5 ♀♀, 3 juv.; 24. Sta. 35 2 juv.; 25. Sta. 46 8 juv.; 26. Sta. 49 1 ♂, 2 ♀♀, 1 juv.; 27. Sta. 51 6 ♂♂, 5 ♀♀; 28. Sta. 52 2 ♂♂, 2 ovig. ♀♀, 1 juv.; 29. Sta. 53 1 ♂, 2 ovig. ♀♀, 1 juv.; 30. Sta. 54 3 ♂♂, 1 juv.

Habitat. Mostly from shallow-water substrates with substantial algal cover, littoral–20 m.

Breeding. Most of the material was obtained during February and March, when ovigerous females were carrying eggs at an early stage of development.

2. A second, hitherto unrecognized form, is characterized by "narrow form" antenna 2 and gnathopod 2, by the very strongly produced coxa of gnathopod 1 which, in adult males, extends forward to the level of the rather large eye, and by large scattered chromatophores. The eye lobe is angular but not pointed. In male specimens, the anterior lobe of coxa 5 is as deep as coxa 4, whereas in the previously described form coxa 4 is markedly deeper than coxa 5. Maximum length attained is at least 6·5 mm.

Most of the South Orkney Islands specimens examined by Chilton (1912) belong to this form. As most of the *Scotia* material was collected from depths of 18–46 m., it is probable that this form inhabits rather greater depths than the previously described form. The difference may be correlated with a difference in habitat preference.

Occurrence. (4 stations, 7 specimens; ♂♂ 3–6 mm., ♀♀ 3·5–6·5 mm., juv. 3 mm.).

1. Sta. 32 1 ♂; 2. Sta. 44 1 ♂, 1 ♀; 3. Sta. 50 2 ♀♀ (1 ovig.), 1 juv.; 4. Sta. 52 1 ♂.

Habitat. Mixed bottoms and mud, 3–25 m.

3. Specimens of the third form are small, reaching a maximum length of 5 mm. Antenna 2 is of the "broad form" type, although there is little tendency to develop the usual thick masses of setae. Gnathopod 2 of the female is characteristic of the "broad form". The same is true for the male except that the "thumb" is absent and the palm limited by an obtuse spinous projection. In both sexes the basal article of gnathopod 2 lacks the characteristic setae on the anterior margin. Peraeopods 3–4 are relatively long and slender. The postero-distal lobes on the basals of peraeopods 5–7 are much reduced. Except for the eye, which is dark brown, no trace of pigment remains in any of these specimens.

Occurrence. (29 stations, ca. 2,912 specimens; ♂♂ 2·5–5 mm., ♀♀ 2·5–5·5 mm., juvs. 1–3 mm.).

1. Sta. 9 1 ♀; 2. Sta. 10 ca. 300 specimens (12% ♂♂, 18% ovig. ♀♀, 23% ♀♀, 47% juv.; 3. Sta. 11 ca. 140 specimens (25% ♂♂, 28% ovig. ♀♀, 21% ♀♀, 26% juv.); 4. Sta. 12 ca. 170 specimens (20% ♂♂, 12% ovig. ♀♀, 11% ♀♀, 57% juv.); 5. Sta. 13 ca. 430 specimens (14% ♂♂, 20% ovig. ♀♀, 19% ♀♀, 47% juv.); 6. Sta. 14 ca. 150 specimens (19% ♂♂, 19% ovig. ♀♀, 16% ♀♀, 46% juv.); 7. Sta. 15 19 ♂♂, 24 ♀♀ (7 ovig.), 61 juv.; 8. Sta. 16 ca. 260 specimens (24% ♂♂, 29% ovig. ♀♀, 12% ♀♀, 35% juv.); 9. Sta. 17 ca. 230 specimens (26% ♂♂, 26% ovig. ♀♀, 16% ♀♀, 32% juv.); 10. Sta. 18 8 ♂♂, 11 ♀♀ (7 ovig.), 40 juv.; 11. Sta. 19 ca. 210 specimens (18% ♂♂, 11% ovig. ♀♀, 20% ♀♀, 51% juv.); 12. Sta. 20 6 ♂♂, 9 ♀♀ (5 ovig.), 26 juv.; 13. Sta. 21 15 ♂♂, 26 ♀♀ (14 ovig.), 25 juv.; 14. Sta. 22 2 ♂♂, 3 ♀♀ (2 ovig.), 6 juv.; 15. Sta. 23 ca. 160 specimens (10% ♂♂, 26% ovig. ♀♀, 16% ♀♀, 48% juv.); 16. Sta. 24 ca. 170 specimens (22% ♂♂, 34% ovig. ♀♀, 10% ♀♀, 34% juv.); 17. Sta. 25 ca. 160 specimens (16% ♂♂, 16% ovig. ♀♀, 10% ♀♀, 58% juv.); 18. Sta. 26 7 ♂♂, 8 ♀♀ (5 ovig.), 32 juv.; 19. Sta. 30 3 ♂♂, 16 ♀♀ (8 ovig.), 17 juv.; 20. Sta. 32 1 ♀, 4 juv.; 21. Sta. 33 2 ♂♂, 10 ♀♀ (4 ovig.), 9 juv.; 22. Sta. 35 1 ♂, 1 ♀, 8 juv.; 23. Sta. 40 1 juv.; 24. Sta. 46 2 ♂♂, 3 ovig. ♀♀, 7 juv.; 25. Sta. 47 1 juv.; 26. Sta. 48 1 ♂, 1 ♀, 1 juv.; 27. Sta. 49 3 ♂♂, 2 ovig. ♀♀, 2 juv.; 28. Sta. 51 1 ♂, 1 ♀, 1 juv.; 29. Sta. 54 32 ♂♂, 19 ♀♀ (7 ovig.), 53 juv.

Habitat. Over 95 per cent among shallow-water organisms epiphytic on larger algae, 1·5–20 m.

Breeding. Most ovigerous females in February or March, with eggs at stages i or ii.

Distribution. Localities of *J. falcata* (all forms) are Graham Land (Petermann Island, Booth Island) L.W.–6 m.; South Orkney Islands (Signy Island, Laurie Island) 24–36 m.; South Sandwich Islands (Visokoi Island); South Georgia (Cumberland Bay); Shag Rocks Bank, 160 m.; Davis Sea (*Gauss* winter station) 385 m.; Iles Kerguelen; Macquarie Island; Magellanic region, 15 m.; Burdwood Bank, 137–150 m.; Falkland Islands, 18–40 m.

Genus *Parajassa* Stebbing

Stebbing, 1899*a*, p. 240, 1906, p. 649.
Barnard, 1969, p. 279–80.

Parajassa georgiana Schellenberg

Parajassa georgiana Schellenberg, 1931, p. 247–48, fig. 128; Barnard, 1932, p. 243–44, fig. 152.
Jassa falcata (not Montagu) Barnard, 1930, p. 392.
Jassa goniamera (not Walker) Walker, 1903, p. 61–62 (part).

Occurrence. (20 stations, ca. 809 specimens; ♂♂ 2·5–4·5 mm., ♀♀ 2·5–5 mm., juvs. 1·5–3 mm.).
1. Sta. 10 23 ♂♂, 40 ♀♀ (1 ovig.), 34 juvs.; 2. Sta. 11 10 ♂♂, 24 ♀♀ (1 ovig.), 14 juv.; 3. Sta. 12 14 ♂♂, 12 ♀♀ (1 ovig.), 14 juv.; 4. Sta. 13 ca. 140 specimens (16% ♂♂, 2% ovig. ♀♀, 42% ♀♀, 40% juv.); 5. Sta. 14 15 ♂♂, 35 ♀♀ (2 ovig.), 39 juv.; 6. Sta. 15 7 ♂♂, 29 ♀♀ (2 ovig.), 26 juv.; 7. Sta. 16 6 ♂♂, 6 ♀♀ (1 ovig.), 2 juv.; 8. Sta. 17 9 ♂♂, 22 ♀♀ (2 ovig.) 2 juv.; 9. Sta. 18 2 ♀♀, 1 juv.; 10. Sta. 19 ca. 120 specimens (26% ♂♂, 2% ovig. ♀♀, 30% ♀♀, 42% juv.); 11. Sta. 20 1 ♀, 1 juv.; 12. Sta. 21 2 ♂♂, 12 ♀♀, 10 juv.; 13. Sta. 22 1 ♀; 14. Sta. 23 14 ♂♂, 12 ♀♀ (1 ovig.), 9 juv.; 15. Sta. 24 20 ♂♂, 19 ♀♀ (1 ovig.), 16 juv.; 16. Sta. 25 8 ♂♂, 13 ♀♀ (1 ovig.), 1 juv.; 17. Sta. 26 2 ♀♀, 3 juv.; 18. Sta. 33 1 ♂, 1 juv.; 19. Sta. 35 2 ♀♀; 20. Sta. 54 4 ♂♂, 5 ♀♀, 6 juv.

Remarks. These specimens agree well with the descriptions and figures of Schellenberg and Barnard. The telson is nearly triangular (Barnard, 1932, fig. 152h). The carpus of gnathopod 2 of large male specimens is markedly inflated anteriorly.

The smallest specimens (ca. 3 mm.) among the types of *J. goniamera* Walker belong to *P. georgiana* so that the smallest specimens of *J. goniamera* present are 6 mm. long. The single specimen attributed to *J. falcata* by Barnard (1930) also belongs here. Both this specimen and Walker's *J. goniamera* were captured at Cape Adare.

Habitat. Common at Billie Rocks, invariably with *Jassa falcata.* Mostly among epiphytic organisms, 2–20 m.

Breeding. Mostly collected in February or March, when ovigerous females carry stage i eggs; about 10 in a 4 mm. specimen.

Distribution. South Georgia (Cumberland Bay) 1–26 m.; Tierra del Fuego (Ushuaia) L.W.; Victoria Land (Cape Adare) 48–92 m.

FAMILY PODOCERIDAE

Stebbing, 1906, p. 694–95.
Barnard, 1969, p. 426–27 (key to genera).

Genus *Podocerus* Leach

Leach, 1814, p. 433.
Stebbing, 1906, p. 700–01.
Barnard, 1962*a*, p. 64–67.
Barnard, 1969, p. 431.

Podocerus capillimanus
Figs. 39i and 40a–k

Podocerus capillimanus Nicholls, 1938, p. 129–30, fig. 67.

Occurrence. (4 stations, 11 specimens; ♂♂ 3·5–8·5 mm., ♀♀ 4–6 mm.).
1. Sta. 20 3 ♂♂, 1 ovig. ♀; 2. Sta. 30 5 ♂♂; 3. Sta. 33 1 ♂; 4. Sta. 49 1 ♀.

Remarks. In view of the considerable distance between the type locality (Macquarie Island) and Signy Island, the present specimens were compared most carefully with Nicholls' description. Differences noted were of a minor nature, concerning the degree of setation of the basal article of gnathopod 1 and the internal surface of the propod of gnathopod 2.

Anterior lobes of the head are nearly square and the rostrum is small.

Antenna 1 is about two-thirds of the length of antennae 2 in both sexes. Peduncle article 1 is two-thirds, and article 2, six-fifths of article 3. Article 3 and the flagellum are sub-equal. The relative lengths of the last three peduncle articles and the flagellar articles of antenna 2 (5 : 11 : 13 : 5 : 2 : 2) are closely similar to those of Nicholl's specimens (4 : 11 : 13 : 5 : 3 : 2). Gnathopod 1 with articles 2–6 strongly setose on inner surfaces.

Peraeopods 3 and 4 short, stout, propods strongly spinose on posterior margins. Peraeopods 5–7, rather short, stout, basal articles somewhat expanded, propods proximally strongly spinose on posterior margins. Uropods 1 and 2 not long; rami strongly spinose. Uropod 3 flat, oval and without rami; just longer than the telson. Telson semi-circular with tall dorsal papilla surmounted by two long stout spines.

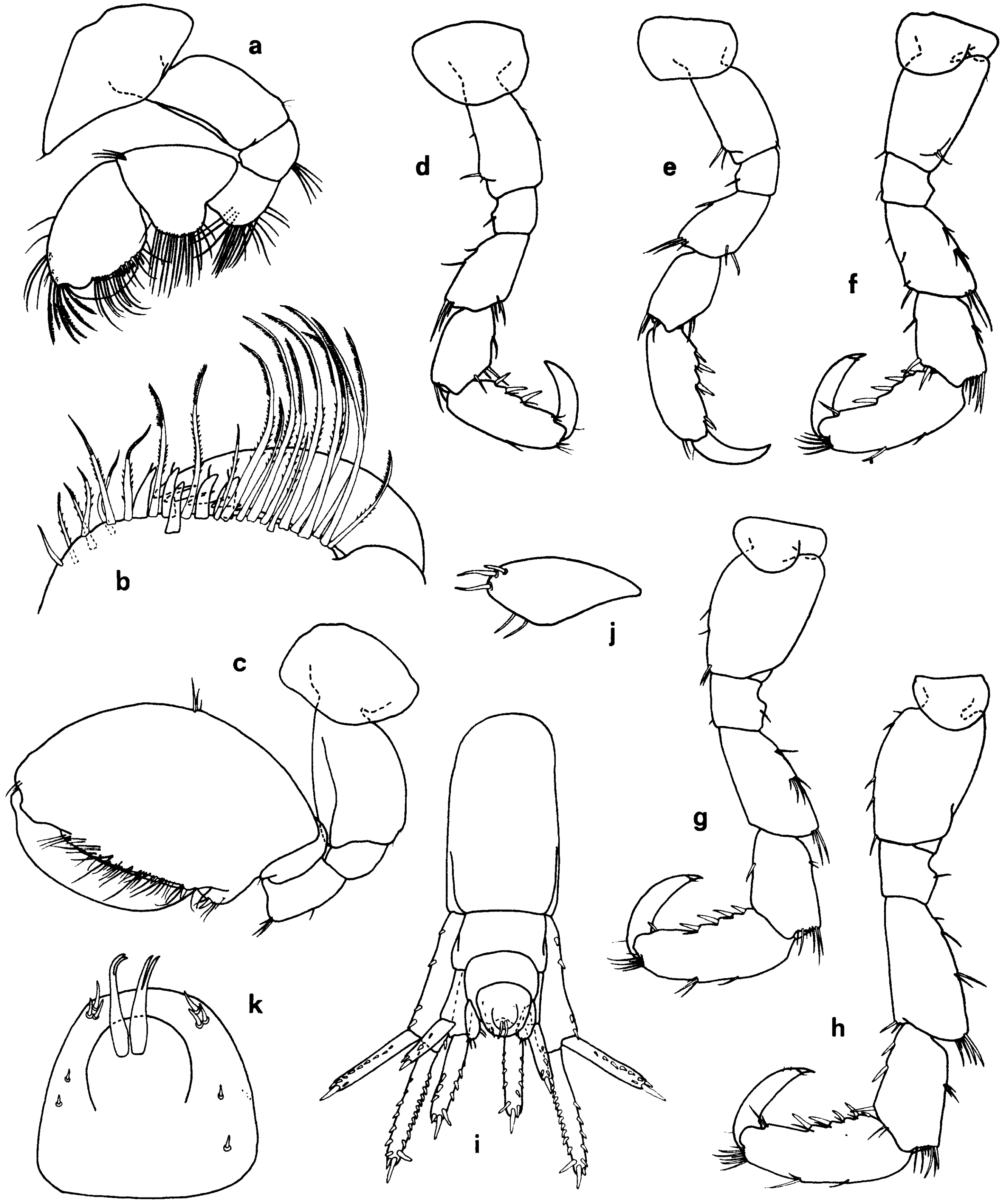

FIGURE 40

Podocerus capillimanus Nicholls, 7·5 mm. ♂, sta. 20. *a* and *b*, gnathopod 1; *c*, gnathopod 2; *d–h*, peraeopods 3–7; *i*, urosome; *j*, uropod 3; *k*, telson.

Habitat. Among algae, 2·5–20 m.

Breeding. The single ovigerous female taken in late February was carrying stage ii eggs.

Distribution. Macquarie Island, near low water.

SUB-ORDER HYPERIIDEA

FAMILY VIBILIIDAE

Barnard, 1930, p. 402–03 (key to genera).

Genus *Cyllopus* Dana

Dana, 1852, p. 990.
Bovallius, 1889, p. 4–5.
Barnard, 1930, p. 405–08.
Vinogradov, 1962, p. 20.

Cyllopus magellanicus Dana

Cyllopus magellanicus Dana, 1852, 1855, p. 990–91, pl. 68, fig. 1; Bate, 1862, p. 305–06, pl. 50, fig. 1; Bovallius, 1887*a*, p. 11, 1887*c*, p. 555–56, 1889, p. 5–6; Walker, 1907, p. 7; Behning, 1913, p. 214–15; Barnard, 1930, p. 408–09, 1932, p. 266, 1937*b*, p. 4; Stephensen, 1947, p. 78; Hurley, 1955*a*, p. 129–33, figs. 2 and 3 (44–50), 1960, p. 111, 1961, p. 598; Vinogradov, 1962, p. 21.
Cyllopus danae Bate, 1862, p. 308, pl. 50, fig. 3; Bovallius, 1887*a*, p. 12, 1887*c*, p. 556, 1889, p. 7–8.
Vibilia macropis Bovallius, 1887*a*, p. 7, 1887*b*, p. 51–52, pl. 8, figs. 1–8; Behning, 1925, p. 480–81, figs. 3–11.
Cyllopus batei Bovallius, 1887*a*, p. 11, 1889, p. 14–16.
Cyllopus armatus Bovallius, 1887*a*, p. 11, 1887*c*, p. 556–57, pl. 41, figs. 15–25, 1889, p. 10–14; Spandl, 1927, p. 174.
Cyllopus laevis Bovallius, 1887*a*, p. 16, 1889, p. 8–10, pl. 1, figs. 36–41.
Cyllopus hookeri Stebbing, 1888, p. 1296–1300, pl. 209A; Bovallius, 1889, p. 18–19.
Vibilia serrata Stewart, 1913, p. 248–50, pl. 4 and 5 (figs. 1–6).
Cyllopus macropis Hurley, 1955*a*, p. 133–36, figs. 3 (51–64) and 4; Vinogradov, 1962, p. 20–21.

Occurrence. (1 station, 1 specimen).

1. Sta. 46 1 ♀ 12 mm.

Remarks. The above synonymy is due largely to Barnard (1930), who discussed *Cyllopus* at some length. Hurley (1955*a*) accepted this synonymy with the exception of *Vibilia macropis* Bovallius, which he considered to be a distinct species in the genus *Cyllopus*. This is apparently confirmed by Hurley's (1955*a*) excellent figures, but an examination of the single specimen from Signy Island suggests that only one species is involved. This specimen agrees precisely with *C. magellanicus* as figured by Hurley in the condition of maxillipeds and peraeopods 1, 3 and 7, while the head, first antenna and first maxilla are of the form shown for *C. macropis*. Antenna 2 and peraeopod 5 agree with the illustrations of neither form, being shorter and stouter than the condition shown for *C. magellanicus* and longer and more slender than that shown for *C. macropis*. Vinogradov (1962) considered *C. magellanicus* and *C. macropis* to be distinct. Further large collections are necessary to settle this problem.

Distribution. Circum-polar. Widely distributed in all oceans between lat. 36° and 65°S.

SUB-ORDER CAPRELLIDEA

FAMILY CAPRELLIDAE

Mayer, 1890, p. 5–10 (key), 145–51, 1903, p. 153–55.
McCain, 1968, p. 2–6, 107–12.

Genus *Caprellinoides* Stebbing

Stebbing, 1888, p. 1237–38.
Mayer, 1890, p. 87–88, 1903, p. 57.
Barnard, 1930, p. 440, 1932, p. 301.

Caprellinoides mayeri (Pfeffer)

Caprellina mayeri Pfeffer, 1888, p. 137–42, taf. 3, fig. 4.
Caprellinoides mayeri Mayer, 1890, p. 88, taf. 5, figs. 57 and 58, taf. 6, figs. 15 and 26, taf. 7, fig. 48; Chilton, 1913, p. 61; Schellenberg, 1931, p. 265; Barnard, 1932, p. 302–03, fig. 167.
? *Piperella grata* Mayer, 1903, p. 59.

Occurrence. (18 stations, 254 specimens; ♂♂ 3·5–12 mm., ♀♀ 3·5–7·5 mm., juvs. 1·5–5 mm.).

1. Sta. 9 1 ♂; 2. Sta. 10 5 ♂♂, 7 ♀♀ (1 ovig.), 26 juv.; 3. Sta. 11 8 ♂♂, 7 ♀♀, 11 juv.; 4. Sta. 12 2 ♂♂, 5 ♀♀ (2 ovig.), 24 juv.; 5. Sta. 13 13 ♂♂, 8 ♀♀, 26 juv.; 6. Sta. 16 3 ♂♂, 5 ♀♀; 7. Sta. 17 4 ♂♂, 7 ♀♀, 2 juv.; 8. Sta. 19 1 ♂, 2 ♀♀; 9. Sta. 23 1 ♂, 2 ♀♀. 11 juv.; 10. Sta. 24 1 ♂, 2 ♀♀, 2 juv.; 11. Sta. 25 6 ♂♂, 9 ♀♀ (3 ovig.), 9 juv.; 12. Sta. 26 1 ♂, 2 ♀♀, 2 juv.; 13. Sta. 30 3 ♂♂, 4 ♀♀, 10 juv.; 14. Sta. 33 2 ♂♂, 3 ♀♀, 3 juv.; 15. Sta. 34 7 ♂♂, 3 ♀♀; 16. Sta. 40 1 ♂; 17. Sta. 49 2 ♀♀; 18. Sta. 54 1 juv.

Remarks. The slender body illustrated by Barnard (1932) contrasts with the stout appearance shown by Pfeffer (1888) but the present material supports Barnard's contention that his specimens are adults of Pfeffer's species. Variations in the Signy Island material are such that, for animals of a given length, the depth of any body segment in the stoutest specimen will be twice that of the slenderest animal.

None of the males in this collection appears fully mature. In no specimen is the palm of gnathopod 2 as concave as was shown by Barnard. The dorsal armature is tuberculate rather than spinous but is absent in some juvenile and sub-adult specimens.

Barnard's material was collected in much deeper water than were the rest of the extant specimens. Intraspecific morphological differences related to depth are apparent in the Discovery Committee material of *Paraceradocus miersi* (Pfeffer) (Barnard, 1932, p. 216).

Habitat. Mostly from shallow water, 1·5–20 m.

Breeding. Ovigerous females taken in March carry stage i eggs.

Distribution. South Georgia (off Drygalski Fjord, Royal Bay, Cumberland Bay) L.W.–235 m.

V. ECOLOGICAL ACCOUNT

PRIOR to the present material collected by Redfearn in 1964–65, knowledge of the fauna of the South Orkney Islands was based on investigations by the Scottish National Antarctic Expedition and was of a systematic nature. Present work besides aiming to revise the systematics of Antarctic amphipods was also intended to indicate suitable species for autecological studies (e.g. Thurston, 1968, 1970; White, 1970). Though the collections were of a general nature, some ecological generalizations can be made.

Synecological studies in the Antarctic Peninsula and the southern islands of the Scotia arc using diving techniques suggest that the fauna and flora of the rocky sub-littoral throughout this area is broadly similar to that found at Signy Island (Neushal, 1961; Price and Redfearn, 1968; McCain and Stout, 1969; Gruzov and Pushkin, 1970). The littoral zone and a variable but generally narrow zone in the sub-littoral suffer ice scour for part of the year and are consequently floristically and faunistically impoverished, except in cracks and crevices. Flora in the littoral zone is limited to filamentous green algae, a few red algae and diatoms. The limpet *Patinigera polaris* and a sparse fauna of annelids and amphipods form the sum total of animal invasion of this zone. The ice-scoured sub-littoral zone is characterized by the alga *Desmarestia* and the sea-urchin *Sterechinus neumayeri*. Price and Redfearn (1968) recorded red crustose algae of the Lithothanmia group as being an important feature of this zone at Signy Island. Hedgpeth (1969) recorded the red crustose alga *Hildenbrandia*, a member of this group, at Palmer station, lat. 64°45′S., long. 60°05′ W. Only in cracks and crevices does a varied fauna exist. Below the zone of ice-scour, algae are dominated by *Phyllogigas* which provides cover for a rich assemblage of large invertebrates. Echinoids, asteroids, molluscs poriferans and polyzoans are obvious inhabitants of this zone, but other organisms, particularly annelids and amphipods, are frequently very numerous. At depths below this zone where light intensity precludes the luxuriant growth of *Phyllogigas*, glass sponges, polyzoans, gorgonians and various echinoderms become the dominant organisms. The associated fauna of small invertebrates sometimes attains a greater biomass at these depths than in shallower water. Contrasts with more southerly areas on the continental margin are the absence there of large macrophytes (Propp, 1970) and the greater depth of ice-scouring (Dayton and others, 1969, 1970).

It is at once apparent from an examination of the data in Appendix B that some species are confined to particular stations or groups of stations. Reference to the station list suggests that in some cases a species is confined to a particular type of habitat. Nearly all of the specimens of *Parharpinia rotundifrons* occur in stations worked by dredge on sediment bottoms. The same is true of *Kuphocheira setimanus*, except that this species is confined to mud rather than to sand. *Parajassa georgiana* occurs chiefly at stations 10–26, all of which were worked on the Billie Rocks transect. An analysis of species distribution relative to the stations at which they occur will provide further examples of habitat preference.

58 of the 60 stations worked can be divided into five groups on the basis of location and methods of collection. This division is, within certain limits, also meaningful in an ecological sense, and an analysis of species distribution relative to these groups is likely to throw light on the habitat preferences of the species concerned. The station groupings are given in Table III. Stations 36 and 60 have been omitted from the groupings, the first as it was an isolated diver-worked station in Paal Harbour and the other as it was an adventitious catch associated with a long-line haul.

TABLE III

GROUPING OF STATIONS BY LOCATION AND METHODS OF COLLECTION

Group	*Station numbers*	*Number of stations*	*Number of specimens*	*Methods of collection*	*Remarks*
A	1–4	4	155	By hand	Littoral rocky substrates
B	5–27	23	7,302	Diver	Billie Rocks transect, mostly on rock and boulders
C	28–35	8	1,592	Diver	Berntsen Point transect, mostly on rock with some boulders
D	37–45	9	2,440	Anchor dredge	Mostly on sand (mud at one station)
E	46–59	14	23,179	Agassiz trawl and beam trawl	Mostly on sand and gravel substrates with isolated boulders and algae

Stations 36 and 60 not included.

The ecological significance of the five groups is limited by the considerable diversity of micro-habitats present at most of the individual stations. Obvious inter-group correlations of micro-habitat occur in a number of cases. The epibenthic fauna of sandy bottoms will be taken in both dredge and trawl samples. Organisms associated with the fronds of large algae will occur mainly in trawl samples, but will also be included in the material from stations worked on both transect lines. Those species, which occur in the dense growths of epiphytic organisms associated with the holdfasts of large algae, form a significant proportion of the total fauna obtained from transect stations, but will also figure in trawled material. There will also be micro-habitats in common between littoral stations and the shallowest stations on the transect lines, and between the two transect lines. Despite these inter-group associations, broad indications of habitat preference, of some species at least, will emerge.

The number of specimens in each of the five groups varies considerably (Table III) and the following method has been adopted in an attempt to overcome this disparity. The number of specimens of each species in any one habitat group has been divided by the total number of specimens of all species in that group. The proportion of a species in each of the five groups has been expressed as a percentage of the total proportional representation of that species:

i.e.

$$P_{xy} = \frac{100\, n_{xy}}{N_x \sum_A^E \frac{n_{xy}}{N_x}},$$

where P_{xy} = percentage representation of species y in group x,
n_{xy} = number of specimens of species y in group x,
N_x = total number of specimens of all species in group x,
and $\sum_A^E \frac{n_{xy}}{N_x}$ = sum of proportions of species y in each of groups A to E.

26 species (one in two forms) represented by 100 or more specimens have been analysed to determine their distribution among the five groups under consideration (Table IV). If an arbitrary limit of 90 per cent is used to define the level at which a species is effectively confined to one or other of the groups, then eight of the 27 taxa are so confined. More than 90 per cent of all *Polycheria antarctica* and *Parajassa georgiana* occurred in Billie Rocks transect samples (group B). The same level was exceeded by *Lepidepecreum cingulatum*, *Tryphosella kergueleni*, *Parharpinia rotundifrons* and *Kuphocheira setimanus* in dredged material (group D) and by *Oradarea ocellata* and *Liouvillea oculata* in trawled samples (group E). Although there are significant differences between the physical parameters of the Billie Rocks and Berntsen Point transects, there is evidence to suggest that the two areas are faunistically somewhat similar. If the specimen totals for these two groups (B and C) are combined, a further three species, *Thaumatelson walkeri*, *Jassa falcata* (form 3) and *Caprellinoides mayeri* are found to be confined to transect stations at the 90 per cent level. Similarly if dredge and trawl samples (groups D and E) are combined, more than 90 per cent of the specimens of *Djerboa furcipes* and *Pontogeneiella brevicornis* occur in these two station groups. Five species, *Probolisca ovata*, *Oradarea unidentata*, *Bovallia gigantea*, *Jassa ingens* and *Jassa falcata* (form 1) are distributed among three, four or five of the groups in such a way that no group contains more than 50 per cent of the specimens of any one species.

The interpretation of these data in an ecological sense is complicated by the diversity of the micro-habitats in the areas sampled. By analogy with related species from other parts of the world and observations of the morphology, tentative suggestions can be made regarding the ecology of most of the species mentioned above.

L. cingulatum, *T. kergueleni* and *P. rotundifrons* are important constituents of the infauna of sandy bottoms. The first two species are lysianassids and occupy a niche utilized by many other species of the family. They live in or at the surface of the sand and are probably necrophagous. The third species is a member of the Phoxocephalidae, a family typically associated with soft bottoms. None of these species forms permanent burrows. *K. setimanus* is confined almost exclusively to mud substrates. This isaeid is morphologically rather similar to the mud-burrowing corophiids (see Barnard (1962*a*) for a discussion of the inter-relationship of the Aoridae, Isaeidae, Ischyroceridae and Corophiidae), and probably resembles them in habit, in that it forms quasi-permanent burrows in the substrate and also filter feeds.

Polycheria antarctica, *P. georgiana*, *T. walkeri*, *J. falcata* (form 3) and *C. mayeri* are probably associated with all or some part of the dense epiphytic and epilithic fauna and flora, which grows on and around the holdfasts of large algae such as *Desmarestia* and *Phyllogigas*. *P. antarctica* bears a close morphological resemblance to *Tritaeta gibbosa* (Bate), a species known to be an ectocommensal of sponges. *P. antarctica* probably occupies a similar niche, as both Schellenberg (1931) and Barnard (1932) have recorded an association of this species with sponges. *C. mayeri* may be associated with one or more hydroid species which form a significant part of the epiphytic and epilithic community.

O. ocellata and *L. oculata* are typically associated with the fronds of *Desmarestia* and *Phyllogigas*. *P. brevicornis* is one of the commonest elements of the epifauna of sand and gravel bottoms in shallow water (personal communication from A. Losh), thus explaining its presence in both dredge and trawl samples. *D. furcipes* may also occur in a similar situation. *B. gigantea* appears to be associated with the larger algae (personal communication from M. G. White). The wide distribution of *J. falcata* (form 1) may be due to an association with small algae, a niche typical of the broad form of *J. falcata* in Britain.

An inspection of the distribution of species represented by less than 100 specimens among the stations worked by Redfearn (Appendix B) suggests that some of these species are also confined to particular habitats.

TABLE IV

NUMBERS AND DERIVED PROPORTIONAL REPRESENTATION OF 26 SPECIES OF AMPHIPODA AMONG FIVE HABITAT GROUPINGS

Species	*A*	*B*	*C*	*D*	*E**
Lepidepecreum cingulatum	0	1	0	86	46
	—	0·37	—	94·32	5·31†
Tryphosella kergueleni	0	1	0	431	23
	—	0·08	—	99·36	0·56
Pontharpinia rotundifrons	4	2	0	1,054	3
	5·63	0·06	—	94·28	0·03
Thaumatelson walkeri	0	159	5	0	7
	—	86·35	12·46	—	1·20
Probolisca ovata	12	692	100	2	745
	28·89	35·37	23·44	0·31	11·99
Pariphimedia integricauda	0	19	4	1	635
	—	7·90	7·63	1·25	83·22
Oradarea bidentata	0	38	23	7	1,048
	—	7·68	21·33	4·24	66·75
Oradarea ocellata	0	2	0	1	240
	—	2·48	—	3·71	93·80
Oradarea unidentata	0	34	3	2	139
	—	34·86	14·10	6·14	44·90
Metaleptamphopus pectinatus	0	508	847	2	4,804
	—	8·59	65·71	0·10	25·60
Atyloella magellanica	0	76	5	1	31
	—	68·04	20·53	2·68	8·74
Djerboa furcipes	0	2	0	6	546
	—	1·04	—	9·35	89·60
Liouvillea oculata	0	0	0	0	179
	—	—	—	—	100·00
Schraderia gracilis	0	120	2	6	59
	—	72·42	5·53	10·84	11·21
Pontogeneia antarctica	97	287	237	36	514
	73·55	4·62	17·50	1·73	2·61
Prostebbingia gracilis	0	140	67	23	2,970
	—	9·64	21·17	4·74	64·45
Eurymera monticulosa	5	6	5	2	600
	51·26	1·31	4·99	1·30	41·14
Pontogeneiella brevicornis	0	4	1	407	9,399
	—	0·10	0·11	29·09	70·71
Bovallia gigantea	1	187	12	0	385
	11·48	45·56	13·41	—	29·55
Paradexamine fissicauda	0	108	11	0	141
	—	53·23	24·87	—	21·89
Polycheria antarctica	0	348	7	0	14
	—	90·50	8·35	—	1·15
Kuphocheira setimanus	0	0	0	232	0
	—	—	—	100·00	—
Jassa ingens	0	57	14	0	68
	—	39·96	45·02	—	15·02
Jassa falcata (form 1)	5	473	58	0	36
	23·89	47·98	26·98	—	1·15
Jassa falcata (form 3)	0	2,709	72	1	130
	—	87·86	10·71	0·10	1·33
Parajassa georgiana	0	790	4	0	15
	—	97·16	2·26	—	0·58
Caprellinoides mayeri	0	215	35	1	3
	—	56·66	42·30	0·79	0·25

* See Table III.
† See text for method of derivation.

The lysianassid *Cheirimedon femoratus* occurs mostly in dredge and trawl samples suggesting that, like other members of the family, it normally lives on or in sandy bottoms. Relatively high proportions of *Proboloides sarsi* and *Paramoera edouardi* at littoral stations indicate that these species occupy the shore during ice-free periods. *Wandelia crassipes* may be lignivorous and inhabit the woody stipes of large algae (personal communication from J. L. Barnard). *Monoculodes scabriculosus* and *Pseudeurystheus sublitoralis* show an affinity for mud, occurring in large numbers only at the station which produced the bulk of the specimens of *Kuphocheira setimanus*. *Pontogeneiella longicornis* is closely related to *P. brevicornis* and probably leads a similar life, as part of the epibenthos. Both *Megamphopus longicornis* and *Podocerus capillimanus* are confined to transect samples. The morphology of these two species suggests that they are denizens of the epilithic and epiphytic community.

One of the most remarkable features of the present collection is the large number of eusirids and calliopiids, and the relatively few lysianassids that it contains. This was due to a considerable extent to the use of diving techniques to investigate the fauna of rock and boulder substrates, bottoms which are impossible to sample effectively with conventional gear. A further important factor governing the numerical composition of the collection was the absence of traps from the collecting gear used. Very large numbers of necrophagous lysianassids are attracted to bait in traps (Hodgson *in* Walker, 1907; Arnaud, 1970) but very few other amphipod species can be obtained in this way.

VI. BREEDING CYCLES AND REPRODUCTION

1. *Introduction*

The collection on which this paper reports was made primarily as the basis of a qualitative ecological survey. It is possible, however, to draw conclusions concerning the breeding habits of at least some of the species represented. The life cycle of *Bovallia gigantea*, based on specimens from this collection, has been discussed previously (Thurston, 1968, 1970).

In many species of amphipod the rate of development of ova has been shown to be dependent on temperature, higher temperatures resulting in more rapid development (see, for instance, Clemens, 1950; Kinne, 1953, 1960; Hynes, 1954, 1955; Vlasblom, 1969). Species such as *Gammarus duebeni* Lilljeborg and *Chaetogammarus marinus* (Leach) (formerly *Marinogammarus marinus*; see Stock, 1968, p. 17–18), which occur in temperate waters in Europe (*G. duebeni* also occurs in North America), produce broods through most or all of the year. These species show a very considerable variation in the time taken for development of ova. Hynes (1954) showed that the incubatory period of *G. duebeni* lasts 14 days at 18° C but 55 days at 5° C. These figures agree closely with data for the same species given by Kinne (1953) and Steele and Steele (1969). Vlasblom (1969) has calculated that the mean incubatory period of *C. marinus* is 9–10 days at 20° C and 43–44 days at 5° C.

An extended period of reproduction, sometimes limited to the warmer months, and with several broods produced in a year, is typical of amphipods of temperate regions (see references quoted above). This pattern contrasts strongly with the situation found in several of the polar amphipods so far studied, in which development is slow and prolonged, and hatching occurs in later winter or spring. This pattern is, in fact, common to many aquatic polar poikiliotherms, and is considered to be an adaptation ensuring that juveniles are liberated at a time of maximum food availability during the spring phytoplankton bloom (see, for instance, Thorson, 1936, 1950; MacGinitie, 1955). *Pontoporeia affinis* Lindstrom, a glacial relict in Eurasia and North America, lays eggs in the period November–December which hatch in March or April thus taking about 4 months to develop (Segerstråle, 1937; Mathisen, 1953). The large pelagic and under-ice amphipod, *Gammarus wilkitzkii* Birula, found throughout the Arctic Basin, also has a prolonged incubation period (Barnard, 1959). In this species, eggs are laid in December and hatch between April and June. An incubatory period of 5–6 months is suggested for this species as Barnard recorded some of the hatchlings obtained in June as having undergone the first post-natal moult while still in the brood pouch. At Signy Island, *B. gigantea* lays eggs in February or March. Development is even more prolonged than in *G. wilkitzkii*, taking about 7 months, and resulting in hatching in September or October (Thurston, 1968).

A simple arbitrary scale was used by Thurston (1968) to quantify the development of ova in *B. gigantea*. The following five stages were recognized:

i. Ovum with close-packed yolk cells but no trace (in the preserved material) of any embryo.
ii. Early embryo present in which yolk cells are partly or wholly surrounded by the embyronic membranes, but in which the embryo shows little or no macroscopic structure.
iii. Embryo in which the somites and limb buds can be made out.
iv. Late embryo in which development is almost complete and in which pigment has been laid down in the eyes.

v. Hatchling, at which stage some at least of the embryos have hatched and are free in the brood pouch. This scale is comparable with those used by Steele and Steele (1969) and Vlasblom (1969) in their studies.

2. *Breeding cycles*

The number of ovigerous females and their distribution in time vary considerably among the species present in this collection. There are sufficient ovigerous females to demonstrate a breeding pattern in 17 species of the 60 represented. The developmental scale set out above has been used to show the development in time of ova of these 17 species. These data are summarized in Table V and can be seen that at least eight, and probably ten, of these species have a strongly synchronized breeding cycle, resulting in a single period of incubation per year, with prolonged overwinter development and hatching in the spring months (September–November). Four species appear to have two periods of incubation in the annual cycle, one during the winter and the other during spring and summer. The remaining three species show no particular pattern, suggesting that breeding is not seasonally synchronized.

TABLE V

BREEDING PATTERNS OF 17 SPECIES OF AMPHIPODA FROM SIGNY ISLAND

Breeding synchronized; one period of incubation per year; eggs laid February–April, hatched September–November	
Parharpinia rotundifrons	*Bovallia gigantea*
Oradarea bidentata	*Paradexamine fissicauda*
Atyloella magellanica	*Ischyrocerus camptonyx*
Pontogeneiella brevicornis	*Jassa falcata*
? *Pariphimedia integricauda*	? *Pontogeneiella longicornis*
Breeding synchronized; two periods of incubation per year (or alternate generations); eggs laid February–April and October–December	
Pontogeneia antarctica	*Prostebbingia gracilis*
? *Tryphosella kergueleni*	? *Oradarea unidentata*
Breeding not obviously synchronized	
Gitanopsis squamosa	*Djerboa furcipes*
Metaleptamphopus pectinatus	

The population structure of those four species showing synchrony of breeding and two periods of incubation per year is uncertain. It is not clear whether the overwintering and summer broods are produced by the same generation of females, and if so whether an individual female breeds on both occasions. An examination of some specimens of *Pontogeneia antarctica* has shown that females which have liberated young in October are not in condition to breed again immediately. The complete regression of ovaries, degeneration of internal tissues and necrosis of gills and oostegites are typical of the signs of senescence which precedes death in female *P. affinis* which have liberated young (Segerstråle, 1937, 1959; Larkin, 1948; Mathisen, 1953). A similar condition has been recorded in *B. gigantea* (Thurston, 1970).

Developmental data for a further 28 species were obtained. In most cases these data are too fragmentary to show any significant pattern, but three species, *Epimeria monodon, Pontogeneia redfearni* and *Eurymera monticulosa*, appear to have prolonged overwinter development.

The developmental data have been deposited at the British Museum (Nat. Hist.).

3. *Synchrony of breeding cycles*

MacGinitie (1955) has demonstrated that many benthic amphipods at Point Barrow, Alaska, lay eggs in the autumn and that hatching takes place in the following spring after slow overwinter development. The same author suggested that, in species of benthic poikiliotherms from the same locality, individuals breed only once in a year even in those species which have more than one breeding period in the annual cycle. These features obtain at Signy Island so that the faunas from this locality and Point Barrow are closely comparable as regards the pattern of breeding cycles.

A marked seasonal synchronization of breeding cycles is thus a feature of the amphipod fauna in both North and South Polar regions. The most obvious correlation of the spring hatching is with the seasonal phytoplankton bloom which follows the break-up of fast ice after the winter. Thorson (1936, 1950) has argued that this is the primary cause of seasonal synchrony of breeding cycles among Arctic marine poikiliotherms. With the exception of *B. gigantea* which has been observed feeding on plankton or debris suspended in the water (personal communication from M. G. White), very little is known of the feeding habits and food preferences of Signy Island amphipods. Enequist (1949) has shown that many benthic amphipods are primarily detritus feeders. There are no data on the seasonal availability of detritus at Signy Island, nor of the bacteria which form an important food source for organisms living in and on soft bottoms (Enequist, 1949). Both factors are likely to be influenced, either directly or indirectly, by the sea-ice regime and the phytoplankton production.

That the marked synchrony of breeding cycles may be dependent on factors other than the vernal phytoplankton bloom is suggested by the work of Pearse (1963) on the lysianassid *Orchomene plebs* (Hurley) (Pearse, as *Orchomenella proxima*). This species, which is predatorial and necrophagous in habit (Hodgson *in* Walker, 1907; Arnaud, 1970), and thus, presumably, independent of the phytoplankton cycle, was shown to have a synchronized breeding season resulting in the liberation of young in the spring. The immense numbers of lysianassids attracted to bait in traps and to dead seals, etc. suggests that the necrophagous habit is common among the members of this family, and that synchrony of breeding cycles may not be dependent on the annual food cycle. No amphipod species from Signy Island can, on present evidence, be shown to have a breeding cycle unrelated to the seasonal cycle, but this has been demonstrated for the isopod *Glyptonotus antarcticus* (Eights), a predator and scavenger (White, 1970).

Although precopula, the pre-mating pairing found in many gammaridean species, is thought to be a normal adjunct to mating in amphipods, it is not universal. Segerstråle (1937, 1959, 1967) has stated that mating in *P. affinis* occurs in the water and without precopula. If precopula does not occur, then mating aggregations and a close synchrony of the breeding cycle becomes necessary.

There is thus some evidence to suggest that synchronized breeding cycles are dependent on food availability, and hence the spring phytoplankton bloom, in some species. In other species such cycles may result from the necessity for mating aggregations caused by the absence of precopula from the mating behaviour.

4. *Alternation of generations*

It has been shown that the growth rate of *Bovallia gigantea* is low and that sexual maturity is not reached until an age of 28–29 months for males and 40–41 months for females (Thurston, 1968, 1970). If a similar growth rate applies to other amphipods at Signy Island, some of the larger species such as *Epimeria monodon*, *Atyloella magellanica*, *Djerboa furcipes*, *Eurymera monticulosa* and *Pontogeneiella brevicornis* will require 18 months to attain sexual maturity. If, as seems probable, many polar amphipods breed only once before dying, an alternation of generations may occur such as has been demonstrated by Dunbar (1946, 1957) for *Parathemisto libellula* (Lichtenstein). If such a mechanism were to be maintained over sufficiently long periods with little or no exchange of genetic material, speciation could occur, leading to greater ecosystem stability in the sense of Dunbar (1968). An alternation of generations can only occur if both sexes reach sexual maturity at the same age. This is not so in *B. gigantea*, and the disparity in size between sexes in *E. monodon* and *A. magellanica* suggests that in these species, too, females require a year longer than males to reach sexual maturity. In *D. furcipes*, *E. monticulosa* and *P. brevicornis* an alternation of generations may occur. It is tempting to suggest that the sibling species pair *P. brevicornis* and *P. longicornis* might have arisen in this manner.

5. *Number and size of eggs*

Data relating number of eggs produced to size of female have been given for a number of amphipod species (e.g. Sexton, 1928; Cheng, 1942; Clemens, 1950; Kinne, 1952; Mathisen, 1953; Hynes, 1954, 1955).

A study of malacostracan species led Jensen (1958) to conclude that the relative number of eggs produced is related to the size of the female in such a way that the number of eggs is a linear function of the volume of the female. This general rule also holds good for Antarctic amphipods.

An attempt has been made to compare the reproductive output of 12 Antarctic amphipod species. Dimensions of eggs and lengths of females are shown in Table VI. The total volume of eggs produced per female for each of the 12 species has been plotted against a function of the average length of ovigerous females (Fig. 41, A). The relation between the size of the female (L^3) and the volume of eggs produced V_T) is given by the equation

$$\log (V_T) = 0{\cdot}9189 \log (L^3) + \bar{3}{\cdot}5581$$
$$\text{or} \quad V_T = 0{\cdot}003615 L^{2{\cdot}7567}.$$

This equation was obtained by a least-squares fit to the log-log transformation. It is unlikely that any of these 12 species (except possibly *P. antarctica*) breed more than once. If a species bred twice, the total

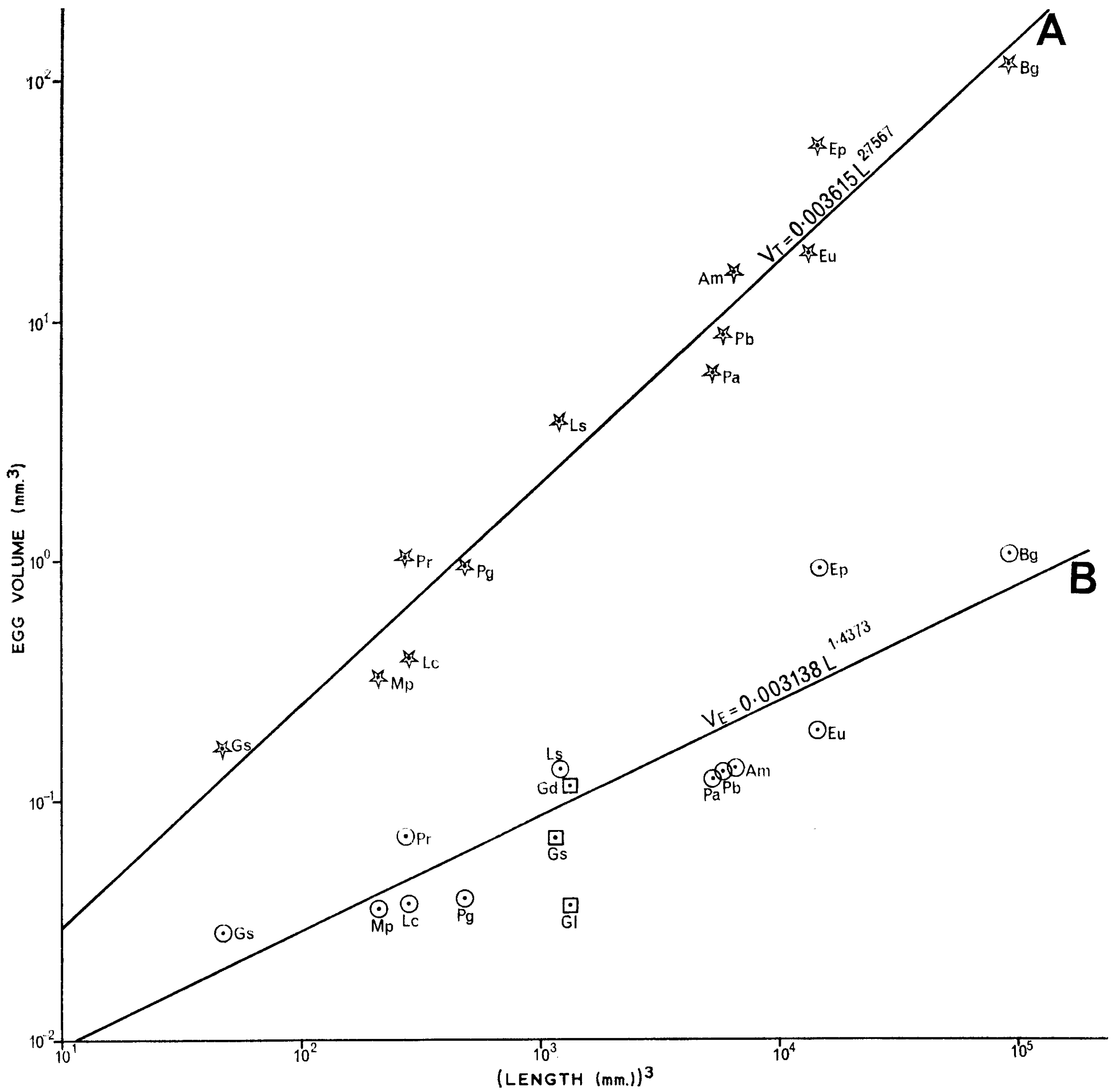

FIGURE 41

A. Relation between mean size of female and mean total volume of ova produced.
B. Relation between mean size of female and mean volume of ovum. (Antarctic species: Am *Atyloella magellanica*, Bg *Bovallia gigantea*, Ep *Epimeria monodon*, Eu *Eurymera monticulosa*, Gs *Gitanopsis squamosa*, Lc *Lepidepecreum cingulatum*, Mp *Metaleptamphopus pectinatus*, Pa *Pontogeneia antarctica*, Pb *Pontogeneiella brevicornis*, Pg *Prostebbingia gracilis*, Pr *Parharpinia rotundifrons*. Temperate species: Gd *Gammarus duebeni*, Gl *G. locusta*, Gs *G. salinus*.)

TABLE VI

LENGTH OF FEMALE AND NUMBER AND SIZE OF EGGS CARRIED IN 12 SPECIES OF AMPHIPOD FROM SIGNY ISLAND

Species	*Number of specimens*	*Female*		*Eggs*		
		Length (mm.)	*Number of eggs carried*	*Length* (mm.)	*Width* (mm.)	*Volume* ($mm.^3$)
Lepidepecreum cingulatum	8	6·58 (6–7)	10·75 (9–13)	0·49 (0·47–0·53)	0·38 (0·36–0·41)	0·0370 (0·0346–0·0420)
Parharpinia rotundifrons	51	6·50 (5·5–7·5)	14·31 (6–24)	0·61 (0·58–0·67)	0·47 (0·43–0·50)	0·0718 (0·0582–0·0800)
Gitanopsis squamosa	7	3·61 (3·25–4·25)	5·86 (5–7)	0·43 (0·41–0·46)	0·36 (0·34–0·38)	0·0288 (0·0260–0·0319)
Leucothoe spinicarpa	3	10·67 (10–11)	20·67 (19–22)	0·71 (0·66–0·74)	0·61 (0·59–0·64)	0·1357 (0·1273–0·1481)
Epimeria monodon	2	24·50 (24–25)	55·50 (54–57)	1·42 (1·26–1·54)	1·12 (1·05–1·16)	0·9378 (0·8210–1·0634)
Metaleptamphopus pectinatus	10	5·97 (5·75–6·5)	9·30 (7–12)	0·47 (0·46–0·49)	0·38 (0·36–0·40)	0·0356 (0·0322–0·0410)
Atyloella magellanica	4	18·75 (18–19)	114·25 (76–142)	0·72 (0·69–0·74)	0·61 (0·58–0·63)	0·1380 (0·1217–0·1490)
Pontogeneia antarctica	2	17·50 (16–19)	49·00 (34–64)	0·71 (0·68–0·75)	0·58 (0·55–0·61)	0·1240 (0·1119–0·1394)
Prostebbingia gracilis	7	7·86 (6–11)	24·86 (10–44)	0·48 (0·46–0·50)	0·40 (0·39–0·41)	0·0392 (0·0353–0·0437)
Eurymera monticulosa	10	24·30 (22–26)	96·70 (74–112)	0·82 (0·73–0·92)	0·68 (0·62–0·72)	0·1957 (0·1641–0·2307)
Pontogeniella brevicornis	25	18·08 (15–21)	65·80 (42–97)	0·75 (0·68–0·84)	0·58 (0·54–0·64)	0·1319 (0·1160–0·1630)
Bovallia gigantea	6	45·17 (41–49)	108·00 (80–139)	1·53 (1·33–1·73)	1·15 (1·04–1·23)	1·0679 (0·9079–1·2879)

production would be doubled, but in the case of *P. antarctica* in which the reproductive output is lower than predicted, the volume of eggs laid would still fall very close to the calculated line.

Many marine Arctic poikiliotherms produce larger eggs than do related species from temperate and tropical areas. This seems primarily to be an adaptation towards a reduction in free larval life (see, for example, Thorson, 1936; MacGinitie, 1955). Such an adaptation is necessitated by the requirements of slow and prolonged embryonic development found in most Arctic invertebrates. The disparity in egg sizes is most marked in groups such as molluscs and echinoderms which have free larval stages and less so in groups which have direct development.

The volume of individual eggs has been compared with a function of the length of ovigerous females for the same 12 species treated above (Fig. 41, B). A linear relation is again obtained and the relation between size of female (L^3) and volume of egg (V_e) is given by the equation

$$\log (V_e) = 0\cdot4791 \log (L^3)+\bar{3}\cdot4966$$
$$\text{or} \quad V_e = 0\cdot003138L^{1\cdot4373}$$

as obtained by a least-squares fit on the log-log transformation. Data for *Gammarus locusta* (L.), *Gammarus salinus* Spooner (Spooner, 1947, table I) and *G. duebeni* (Hynes, 1954) have been included on graph B (Fig. 41). All Antarctic species lie close to the regression line except *Epimeria monodon.* No reason for the large eggs of this species can be suggested.

MacGinitie (1955) has shown that some species of amphipod at Point Barrow, Alaska, produce large eggs. In so far as these data can be compared with the present figures, the Alaskan material falls within the range of variation of species from Signy Island. Hynes (1954) has shown that egg size in *G. duebeni* is influenced by salinity; on average, females from lower salinities produce larger eggs. This factor may explain the range in size of eggs in the three species of *Gammarus* shown in Fig. 41, graph B. The fully marine *G. locusta* has eggs which are little more than one-third the volume to be expected from the equation obtained from data on the Antarctic species. Polar amphipods produce larger eggs than do temperate species, and thus conform to the general pattern of production of large eggs by polar poikiliotherms.

6. *Sex ratios*

Of 43 species and two forms represented by 20 or more specimens, all but three species show a preponderance of females. In the collection as a whole, the ratio of males to females is 1 : 3·3. *Pontogeneiella brevicornis* is noteworthy in that females outnumber males in the ratio 108 : 1.

If, as seems probable, individuals of most species breed only once, the preponderance of females may be explained, in some cases at least, by the death of males after mating. In *Pontogeneia antarctica* the totals of all males and females captured during February, March and April, during or just after mating, were 104 and 193, respectively, giving a ratio of 1·86. Material obtained in September and October, when embryos were close to hatching, totalled 12 males and 442 females, a ratio of 36·8. Similar figures for *Djerboa furcipes* are 56 males and 158 females (ratio 2·82) taken during the period February–April and five males and 46 females (ratio 9·20) in September and October. Figures for *P. brevicornis* appear somewhat anomalous, the autum sex ratio being 11 : 877 (79·73), the spring ratio 10 : 8063 (806·3) and that for November 57 : 218 (3·82). The ratio of males to females for the period February–April is heavily biased by specimens from station 48 (four males, 862 females) collected on 15 April by which time post-mating male mortality would probably have taken place. If these specimens are discounted, the autumn sex ratio becomes 7 : 14, i.e. 2·00. Of the 218 females captured in November, 71 were ovigerous, all with late-stage embryos or hatchlings. These ovigerous females and some of the 147 non-ovigerous specimens represent the remains of the population which bred in the previous autumn, while the males and most of the non-ovigerous females form part of the breeding population for the following autumn.

Precopulation is not universal and does not take place in *Pontoporeia affinis*. In this species adult males become modified for a pelagic existence, actively seeking the females and mating in open water (Segerstråle, 1937, 1950). If precopula does not occur, the time during which a male will need to be associated with a single female for successful mating is much less. With the time factor thus reduced, it becomes possible that an individual male may be able to mate with more than one female. A high proportion of females in a species would be advantageous under conditions of slow reproductive turnover and heavy predation as the annual production would be high relative to the total population. Many of the large, algicolous species at Signy Island are efficient and active swimmers. Males would not need to undergo the modifications found in *P. affinis* in order to actively seek out females and mate without precopula. Such species would be at an advantage if females outnumbered males.

It is also possible, though unlikely, that the excess of females may be a result of parasitism. Bulnheim and Vavra (1968) have shown that in *G. duebeni* eggs infected with the microsporidian *Octosporea affeminans* produce only female individuals.

VII. BIOGEOGRAPHY

SCHELLENBERG (1931) has discussed fully the distribution of gammaridean amphipods in Antarctica and southern South America but additional comments are worthwhile in view of present results and the critical part that the Scotia arc plays in any such discussion (Dell, 1964). Several authors (e.g. Ekman, 1953; Knox, 1960; Hedgpeth, 1970) have discussed the biogeography of the Southern Hemisphere. The regional divisions proposed by these authors are basically similar, although geographical and terminological differences are apparent. The scheme proposed by Hedgpeth will be followed here as the amphipod data fit it at least as well as those of Ekman and Knox, and it has the additional merit of simplicity. The Antarctic region, covering the whole of the area south of the Antarctic Convergence, is divided into two sub-regions, the western Antarctic composed essentially of the Antarctic Peninsula and Scotia arc, and the continental Antarctic. South Georgia is regarded as at best a district within the west Antarctic sub-region (cf. Knox (1960), who gave the island provincial status). The sub-Antarctic region includes most of the area between the Antarctic Convergence and the Subtropical Convergence. New Zealand is excluded from the sub-Antarctic region, however, and the northern limits of the region in South America probably occur between lat. 40° and 45°S. Magellanic (including the Falkland Islands) and Kerguelen sub-regions are recognized within the sub-Antarctic region.

A. GEOGRAPHICAL DISTRIBUTION

Three species of hyperiid, 73 species of gammarid and one species of caprellid have been recorded from the South Orkney Islands (Appendix A). Disregarding the three species of hyperiid which are all planktonic, common and circum-polar in distribution, 74 species remain for discussion. Ten species (14 per cent) are currently considered endemic to the islands. *Haliragoides australis* was described by Chilton (1912) but has not been recorded since. *Lepidepecreum cingulatum* and *Kuphocheira setimanus* were described from *Discovery* material and are both represented in the present collection. The remaining seven species, *Gnathiphimedia fuchsi*, *Atylopsis signiensis*, *Schraderia dubia*, *S. barnardi*, *Paramoera hurleyi*, *Pontogeneia redfearni* and Eusiridae gen. and sp. nov., are described as new in this study. A further nine species, making a total of 19 (26 per cent) are confined to the islands of the Scotia arc (Table VII). 22 species (30 per cent) are not found outside the Scotia arc and Antarctic Peninsula, so that 55 per cent of the amphipod species recorded from the South Orkney Islands group are endemic to the west Antarctic sub-region. Of the remaining 33 species, 12 (16 per cent) are circum-Antarctic in distribution, 13 (18 per cent) are Antarctic and sub-Antarctic, 6 (8 per cent) extend into cold temperate regions and two (3 per cent), *Leucothoe spinicarpa* and *Jassa falcata*, are cosmopolitan.

The amphipod fauna of the South Orkney Islands is predominantly Antarctic in affinity; 53 species (72 per cent) are confined to the Antarctic region and 65 species (88 per cent) confined to the Antarctic and sub-Antarctic regions. The six non-cosmopolitan species extending into cold temperate regions show no particular affinity with South America, only one species occurring there and not in Australasia.

Although information is still building up on the faunas of the South Orkney Islands, Scotia arc and west Antarctic sub-region, for example in the present collection 26 species in a total of 60 were new records for the South Orkney Islands and nine were new species, it is possible to present some facts which help to characterize the fauna of the South Orkney Islands and the west Antarctic sub-region.

One of the most noticeable features of the present collection is the very high proportion, both of specimens and species, of Eusiridae and Calliopiidae (see Appendices A and B). Both of these families are ecologically diverse, but the pontogeneiid sequence of the Eusiridae and many of the Calliopiidae are benthic and are typically found associated with large algae in shallow water. The abundance of large algae such as *Phyllogigas* and *Desmarestia* spp. on rock substrates in shallow water throughout most of the sub-region

TABLE VII

GEOGRAPHICAL DISTRIBUTION OF GAMMARID AND CAPRELLID AMPHIPODS RECORDED AT SIGNY ISLAND

1. *Species confined to the western Antarctic sub-region*	
a. Species confined to the Scotia arc	
Lepidepecreum cingulatum	*Paramoera hurleyi*
Tryphosella triangularis	*Pontogeneia redfearni*
Orchomene rotundifrons	Eusiridae gen. et sp. nov.
Parharpinia rotundifrons	*Polycheria antarctica gracilipes*
Gnathiphimedia fuchsi	*Pseudeurystheus sublitoralis*
Monoculodes scabriculosus	*Kuphocheira setimanus*
Haliragoides australis	*Ischyrocerus camptonyx*
Atylopsis signiensis	*Jassa ingens*
Schraderia dubia	*Caprellinoides mayeri*
Schraderia barnardi	
b. Species present on the Antarctic Peninsula and Scotia arc	
Harpinia cariniceps	*Oradarea unidentata*
Thaumatelson walkeri	*Oradarea edentata*
Prothaumatelson nasutum	*Metaleptamphopus pectinatus*
Proboloides sarsi	*Liouvillea oculata*
Wandelia crassipes	*Paramoera edouardi*
Pariphimedia integricauda	*Eurymera monticulosa*
Parhalimedon turqueti	*Pontogeneiella longicornis*
Monoculodes antarcticus	*Bovallia gigantea*
Epimeria monodon	*Paraceradocus miersi*
Oradarea bidentata	*Paradexamine fissicauda*
Oradarea ocellata	*Eurystheus purpurescens*
2. *Circum-antarctic species*	
Cheirimedon femoratus	*Methalimedon nordenskjoldi*
Orchomene pinguides	*Oediceroides calmani*
Orchomene macronyx	*Epimeriella macronyx*
Orchomene nodimanus	*Oradarea walkeri*
Orchomene plebs	*Eusirus perdentatus*
Liljeborgia georgiana	*Prostebbingia gracilis*
3. *Circum-polar species occurring in Antarctic and sub-Antarctic regions*	
Thaumatelson herdmani	*Djerboa furcipes*
Cardenio paurodactylus	*Pontogeneia antarctica*
Colomastix fissilingua	*Pontogeneiella brevicornis*
Oediceroides lahillei	*Megamphopus longicornis*
Rhachotropis antarctica	*Parajassa georgiana*
Atyloella magellanica	*Podocerus capillimanus*
Schraderia gracilis	
4. *Circum-polar species occurring in the Antarctic, sub-Antarctic and cold temperate regions*	
a. Species extending into the South American temperate regions only	
Heterophoxus videns	
b. Species extending into the Australasian temperate regions only	
Tryphosella kergueleni	*Haplocheira barbimanus*
c. Species extending into both the South American and Australasian temperate regions	
Gitanopsis squamosa	*Eusirus antarcticus*
Probolisca ovata	
5. *Cosmopolitan species*	
Leucothoe spinicarpa	*Jassa falcata*

provides conditions ideal for many of the benthic eusirids and calliopiids. At least three species (*Epimeriella macronyx*, *Eusirus antarcticus* and *E. perdentatus*) of the 74 species of Gammaridea and Caprellidea recorded from the South Orkney Islands are wholly or largely planktonic in habit so that at most 71 species may be considered benthic. Of this total 24 species (34 per cent) are benthic eusirids and calliopiids. This compares with three species in 59 (5 per cent) in a recent study of Amphipoda associated with algae in the Adriatic (Krapp-Schickel, 1969), eight species in 293 (3 per cent) from the tropical Indo-Pacific (Barnard, 1965) and one species in 131 (< 1 per cent)* from California (Barnard, 1966). Even on the Antarctic

* Based on Barnard (1966, table 9), depth classes 9–18, 19–37, 38–55 m.

continent the Australasian Antarctic Expedition material (Nicholls, 1938) contains only eight species in a total of 70 (11 per cent).

The number of apparently endemic species in the west Antarctic sub-region fauna will undoubtedly drop when the faunas of surrounding areas are more fully investigated. It is improbable, however, that species such as *Pariphimedia integricauda*, *Oradarea bidentata*, *Metaleptamphopus pectinatus*, *Liouvillea oculata*, *Eurymera monticulosa*, *Bovallia gigantea*, *Paraceradocus miersi*, *Paradexamine fissicauda* and *Jassa ingens*, most of which are both large and common in the area under consideration, should have escaped notice elsewhere. These species are likely to prove endemic to the west Antarctic and form a very obvious and characteristic part of the amphipod fauna.

A survey of the literature revealed that 224 species of gammaridean amphipods have been recorded from west Antarctica (see Appendix E). Strictly speaking, this figure applies to the Scotia arc and British Antarctic Territory, since an arbitrary boundary of long. 80°W. was chosen to delimit the west Antarctic sub-region thereby excluding several species described by Ruffo (1949) from farther west in the Bellingshausen Sea. The number of species recorded at South Georgia, the South Orkney Islands, the South Shetland Islands and the Antarctic Peninsula are shown in Table VIII. The South Sandwich Islands and Shag Rocks Bank are omitted as their faunas are insufficiently known.

TABLE VIII

NUMBERS OF SPECIES OF GAMMARIDEAN AMPHIPODS IN FOUR AREAS WITHIN THE WEST ANTARCTIC SUB-REGION

South Georgia	144
South Orkney Islands	73
South Shetland Islands	84
Antarctic Peninsula	97
Total in the four areas combined	221*

* Excluding three species which have been recorded at Shag Rocks Bank but not elsewhere in the West Antarctic sub-region.

A number of methods for mathematically defining the similarity or dissimilarity of related areas, using data in this form, have been put forward, but Holloway and Jardine (1968) have stated that the Preston coefficient of faunal dissimilarity (Preston, 1962*a*, *b*) is the only such coefficient with a sound statistical basis. Preston's coefficient of faunal dissimilarity (z) compares two areas and is given by the "resemblance equation"

$$x^{1/z}+y^{1/z} = 1,$$

where x is the proportion of the joint fauna occurring in one area and y the proportion of the joint fauna occurring in the other area. Values of z lie between 0 and 1, those close to zero indicate that the compared faunas are almost identical, and those close to unity that the faunas have few, if any, species in common. The value $z = 0 \cdot 27$ is a critical level. Below this, the two areas are "samples" of some larger unit, while at higher levels the areas "show some degree of interaction, but it is incomplete, and there is, and long has been, some degree of genuine isolation".

Preston coefficients for all combinations of the areas under consideration are given in Table IX. As might be expected from the geological history and geographical separation (it must be remembered that the faunas dealt with here are shallow-water ones), of the four areas, values of the coefficient are considerably above 0·27, indicating some degree of faunal isolation. The closest faunal links are between Graham Land and the South Shetland Islands ($z = 0 \cdot 541$), and between the South Orkney Islands and South Georgia ($z = 0 \cdot 596$). The latter is somewhat unexpected in that the South Orkney Islands are closer, both in time and space, to the South Shetland Islands than to South Georgia. The relations between the four areas can be shown diagrammatically as in Fig. 42a.

TABLE IX

PRESTON COEFFICIENTS OF FAUNAL DISSIMILARITY FOR AREAS OF THE WEST ANTARCTIC SUB-REGION

Areas compared	*Species in common*	*Preston coefficient*
South Georgia (144 spp.)–South Orkney Islands (73 spp.)	47	0·596
South Georgia (144 spp.)–South Shetland Islands (84 spp.)	43	0·674
South Georgia (144 spp.)–Antarctic Peninsula (97 spp.)	51	0·641
South Orkney Islands (73 spp.)–South Shetland Islands (84 spp.)	32	0·669
South Orkney Islands (73 spp.)–Antarctic Peninsula (97 spp.)	39	0·614
South Shetland Islands (84 spp.)–Antarctic Peninsula (97 spp.)	49	0·541

Appendix E lists by areas the occurrence of 224 gammaridean amphipod species recorded from the west Antarctic sub-region. It can be seen that the known distribution of some species is "discontinuous", for examples 11 species have been recorded at South Georgia and the South Shetland Islands but not in the South Orkney Islands, and 15 species have been recorded from South Georgia and the Antarctic Peninsula, but not at the South Orkney Islands or at the South Shetland Islands. There are no known oceanographical or ecological barriers which can account for these discrepancies, so it is quite possible that they are attributable to an incomplete knowledge of the fauna of the sub-region. If it is assumed that all those species with "discontinuous" distributions do, in fact, occur in intermediate areas, another table (Table X) comparable with Table IX can be drawn up. These figures may be substituted in the "resemblance equation". The resultant Preston coefficients are considerably lower than the previous set and that relating to the South Shetland Islands and the Antarctic Peninsula approaches the value (0·27) set by Preston for two "isolates" in equilibrium with each other. The results can be shown diagrammatically (Fig. 42b). This theoretical situation is obviously a limiting one but it gives some idea of the picture which might emerge from the results of intensive, widespread collecting in the west Antarctic sub-region.

The theoretical results are more in keeping with the known geological and biogeographical history of the sub-region than are those obtained from known distributions. The lack of material from the deeper

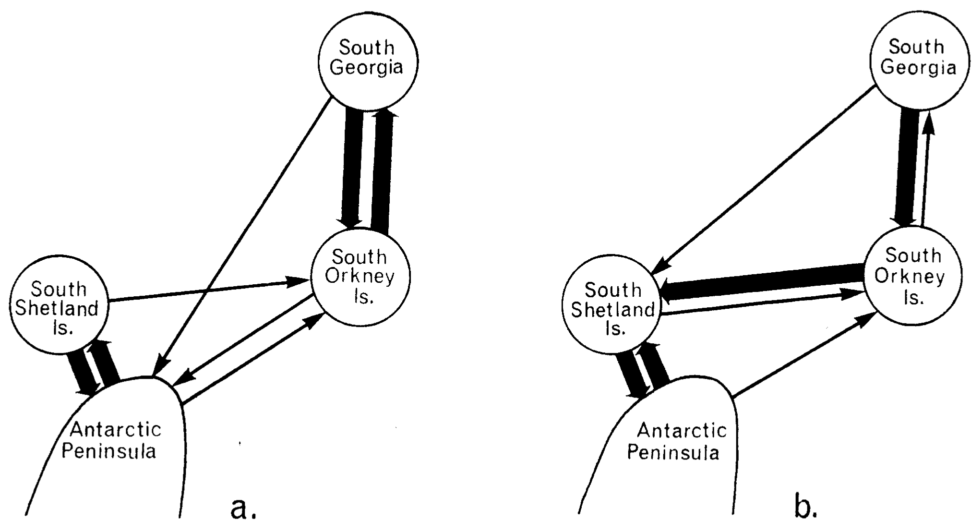

FIGURE 42

Schematic diagram of the faunal affinities in the west Antarctic sub-region. a. Based on data in Table XI. b. Based on theoretical data in Table XII. (Thick arrows join most closely related areas.)

TABLE X

THEORETICAL PRESTON COEFFICIENTS OF FAUNAL DISSIMILARITY FOR AREAS OF THE WEST ANTARCTIC SUB-REGION

Areas compared	*Species in common*	*Preston coefficient*
South Georgia (144 spp.)–South Orkney Islands (107 spp.)	81	0·416
South Georgia (144 spp.)–South Shetland Islands (114 spp.)	69	0·542
South Georgia (144 spp.)–Antarctic Peninsula (97 spp.)	51	0·641
South Orkney Islands (107 spp.)–South Shetland Islands (114 spp.)	81	0·340
South Orkney Islands (107 spp.)–Antarctic Peninsula (97 spp.)	62	0·475
South Shetland Islands (114 spp.)–Antarctic Peninsula (97 spp.)	79	0·313

areas of the continental shelf from around the South Orkney Islands is particularly evident. A similar lack affects the apparent pattern of the faunal components of the Antarctic Peninsula. Shallow-water collections from the South Shetland Islands are almost non-existent and those from South Georgia are rather sparse. If these gaps can be made good, the faunal relationships within the west Antarctic sub-region may parallel closely the theoretical results derived above.

The fauna of the South Orkney Islands consists of 74 species of gammaridean and caprellidean amphipods (Appendix A) of which 59 (80 per cent) are present in the collection under consideration. The distribution of benthic amphipods throughout the west Antarctic sub-region suggests, however, that the fauna of the islands may be as high as 107 species (Table X). Preston (1948) has discussed means whereby an estimate of the total population of a "universe" can be derived from the data contained in a large unbiased sample from that population. He showed that for a large number of individuals representing many species, the number of individuals tended to be distributed among the species according to a log-normal relation. If equal increments of the logarithm of the number of individuals per species were plotted against the number of species falling into each increment, the resultant graph tended to take the form of a normal or Gaussian curve. The area under such a curve would give an estimate of the total number of species in the population sampled.

The species totals (Appendix B) were ranked and plotted by "octaves", i.e. groups such that the upper limit was twice the lower limit (see Preston, 1948, p. 255–56). A theoretical curve was fitted to these data (Fig. 43) by the method of Hald (1949, 1952) and a value of 66·56 obtained as the total number of species in the population sampled. This figure is below that of the known fauna of the South Orkney Islands and is indicative that the "universe" being sampled is not the whole of the South Orkney Islands, but some much smaller area (cf. the analysis of moths captured at Rothamstead quoted by Preston (1948, p. 260)).

An exact definition of the area sampled is obviously not possible, but it is likely that the collection herein reported is representative of a "universe" limited to water less than 40–50 m. in depth, and possibly restricted to the east coast of Signy Island.

B. BIPOLARITY

Hedgpeth (1970) has discussed bipolarity, pointing out that ever-increasing systematic refinement is continually reducing the number of bipolar species. In many invertebrate groups (molluscs, bryozoans, pycnogonids, etc.) no bipolar species are known, while in others (e.g. sponges) a very small proportion of species are thought to have a completely discontinuous distribution.

Barnard (1930) and Birshtein and Vinogradov (1962) have referred to bipolarity in amphipods. Barnard dismissed the subject, concluding that there were no bipolar species, but Birshtein and Vinogradov quoted two species of *Ampelisca* given by Gurjanova (1951) and added to these three other species, all of them bathypelagic. Various authors (Chevreux, 1906; Stephensen, 1925; Barnard, 1932; Nicholls, 1938) have drawn attention to the differences between the southern forms attributed to *Ampelisca eschrichtii* Krøyer and *A. macrocephala* Lilljeborg and their northern counterparts. In view of the small morphological

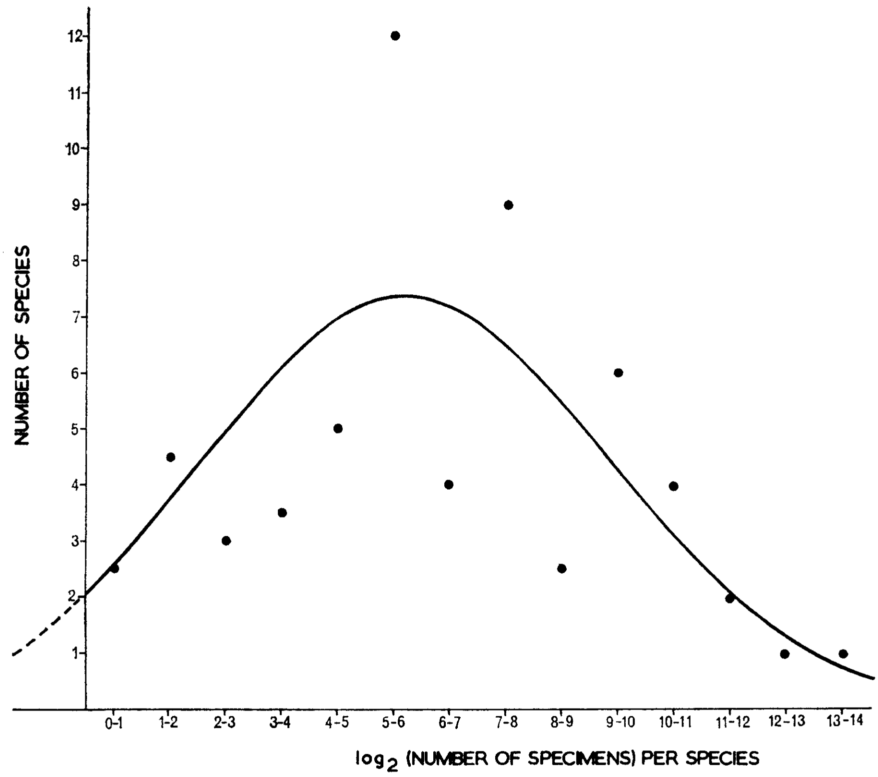

FIGURE 43

Distribution of 60 species (one in three forms) according to the number of specimens per species. (The numbers of specimens per species are ranked in "octaves" (Preston, 1948, p. 255–56) and the curve was fitted by the method of Hald (1949, 1952).)

differences used to separate species in this large and difficult genus, it is probable that the two southern forms should be considered as distinct species. Of the three bathypelagic species listed by Birshtein and Vinogradov, *Koroga megalops* can hardly be considered bipolar as it has been recorded from the Arabian Sea (Barnard, 1937*a*; Birshtein and Vinogradov, 1964), but not from farther south than the Kermadec Trench (Birshtein and Vinogradov, 1960). The remaining two bathypelagic species, *Paracallisoma alberti* and *Cleonardo macrocephala*, are absent from tropical and subtropical seas. Barnard (1932) has identified specimens of *Pachychelium* from South Georgia and the Falkland Islands with *P. davidis*, a species described from Davis Strait. It is possible, however, that Barnard's material may be identical with species described by Schellenberg from the Southern Hemisphere.

The total number of gammaridean amphipods known from the Antarctic region is about 315 and of these at most three species can be considered bipolar.

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APPENDICES

APPENDIX A

Amphipoda of the South Orkney Islands

Species	Source					Geographical distribution							
	Bate, 1861, 1862	Chilton, 1912	Chilton, 1925	Barnard, 1932	Thurston (this paper)	1 Antarctic Peninsula, west coast, south of lat 67°S.	2 Antarctic Peninsula, west coast north of lat. 67°S., west of long. 60°W.	3 Antarctic Peninsula, north and east coasts, east of long 60°W.	4 South Shetland Islands	5 South Sandwich Islands	6 South Georgia	7 Shag Rocks	Areas outside the west Antarctic sub-region
Cheirimedon femoratus (Pfeffer)		/		/	/		/	/	/	/	/		Terre Adélie
Lepidepecreum cingulatum Barnard				/	/								
Tryphosella kergueleni (Miers)				25	/			/	/	/	/		Iles Kerguelen, Davis Sea, Ross Sea, New Zealand
Tryphosella cf. *triangularis* (Barnard)					/						/		
Orchomene pinguides (Walker)		1							/	/	/		Davis Sea, Ross Sea
Orchomene macronyx (Chevreux)		2					/				/		Davis Sea
Orchomene nodimanus (Walker)		3	4		/								Ross Sea
Orchomene plebs (Hurley)		5				/	/		/				Weddell Sea, Davis Sea, Ross Sea
Orchomene rotundifrons (Barnard)					/				/				
Cardenio paurodactylus Stebbing				/						/	/		Bouvetøya, Iles Kerguelen
Harpinia cariniceps Barnard				/			/		/				
Parharpinia rotundifrons Barnard					/				/	/	/		
Heterophoxus videns Barnard		6			/				/		/		Terre Adélie, Ross Sea, South America, Falkland Islands
Gitanopsis squamosa (Thomson)		7			/		/		/		/		Iles Kerguelen, Auckland Islands, New Zealand, Magellanic region, Tristan da Cunha
Leucothoe spinicarpa (Abildgaard)		/			/	/	/	/	/	/	/		Iles Kerguelen, Davis Sea, Terre Adélie, Ross Sea, Bellingshausen Sea, cosmopolitan
Thaumatelson walkeri Chilton		/			/			/			/	/	
Thaumatelson herdmani Walker		/			/			/			/		Davis Sea, Ross Sea, Burdwood Bank
Prothaumatelson nasutum (Chevreux)		8			/		/				/		
Probolisca ovata (Stebbing)		9		/	/				/		/		Iles Kerguelen, Macquarie Island, Campbell Island, New Zealand, South America, Falkland Islands
Proboloides sarsi (Pfeffer)		10			/		/				/		
Wandelia crassipes Chevreux		11			/		/		/				
Colomastix fissilingua Schellenberg		12										/	Iles Kerguelen, Davis Sea, Ross Sea, Tierra del Fuego, Falkland Islands
Liljeborgia georgiana Schellenberg		13									/		Terre Adélie
Pariphimedia integricauda Chevreux		/	/		/		/		/	/			
Gnathiphimedia fuchsi sp. nov.					/								
Parhalimedon turqueti Chevreux					/		/				/		
Methalimedon nordenskjoldi Schellenberg					/						/		Terre Adélie
Oediceroides lahillei Chevreux					/					/	/		Tierra del Fuego
Oediceroides calmani Walker				/		/	/						Davis Sea, Terre Adélie, Ross Sea
Monoculodes antarcticus Barnard				/			/	/					
Monoculodes scabriculosus Barnard				/	/				/		/		
Epimeria monodon Stephensen					/		/						
Epimeriella macronyx Walker				/									Davis Sea, Ross Sea, Bellingshausen Sea
Oradarea walkeri Shoemaker		14			/		/				/		Davis Sea, Terre Adélie, Ross Sea
Oradarea bidentata Barnard		15			/		/		/		/		
Oradarea ocellata sp. nov.					/		/		/				
Oradarea unidentata sp. nov.		16			/		/		/				
Oradarea edentata Barnard					/		/		/		/		
Haliragoides australis Chilton		/											
Atylopsis signiensis sp. nov.					/								
Metaleptamphopus pectinatus Chevreux					/		/				/		
Eusirus antarcticus (Thomson)		/		/		/	/	/	/	/	/		Weddell Sea, Bouvetøya, Davis Sea, Terre Adélie, New Zealand, Ross Sea, South America, Falkland Islands
Eusirus perdentatus Chevreux		17		/			/	/	/				Davis Sea, Terre Adélie, Ross Sea, Bellingshausen Sea
Rhachotropis antarctica Barnard				/			/	/	/		/		Falkland Islands
Atyloella magellanica (Stebbing)					/				/				Davis Sea, Terre Adélie, Tierra del Feugo, Falkland Islands
Djerboa furcipes Chevreux		/			/		/				/		Iles Crozet, Iles Kerguelen
Schraderia gracilis Pfeffer		18			/	/	/	/	/		/		Iles Crozet, Davis Sea, Terre Adélie, Ross Sea, Falkland Islands
Schraderia dubia sp. nov.					/								
Schraderia barnardi sp. nov.					/								
Liouvillea oculata Chevreux				/	/		/	/					
Paramoera edouardi Schellenberg		19			/		/		/		/		
Paramoera hurleyi sp. nov.					/								
Pontogeneia antarctica Chevreux		/	/	/	/		/	/	/		/		Tierra del Fuego, Falkland Islands
Pontogeneia redfearni sp. nov.					/								
Prostebbingia gracilis (Chevreux)					/	/	/	/	/		/		Davis Sea
Eurymera monticulosa Pfeffer		/			/		/		/		/		
Pontogeneiella brevicornis (Chevreux)		20	21	/	/		/		/	/	/		Iles Crozet, Macquarie Island, Peter I Øy
Pontogeneiella longicornis (Chevreux)		22			/		/	/	/		/		
Bovallia gigantea Pfeffer		23	23		/		/		/	/	/		
Eusiridae gen. et sp. nov.					/								
Paraceradocus miersi (Pfeffer)		/	/	/	/		/	/	/	/	/		
Paradexamine fissicauda Chevreux		24	24		/		/				/		
Polycheria antarctica gracilipes Schellenberg		/			/						/		
Eurystheus purpurescens Barnard				/			/				/		
Megamphopus longicornis (Walker)					/						/		Iles Kerguelen, Davis Sea, Ross Sea, Falkland Islands
Pseudeurystheus sublitoralis Schellenberg					/						/	/	
Haplocheira barbimanus (Thomson)		/			/						/		Iles Kerguelen, Terre Adélie, Australia, Macquarie Island, Auckland Islands, New Zealand, Ross Sea, Magellanic region, Falkland Islands
Kuphocheira setimanus Barnard				/	/								
Ischyrocerus camptonyx sp. nov.					/						/		
Jassa ingens (Pfeffer)					/				/	/	/		
Jassa falcata (Montagu)		/		/	/		/			/	/	/	Iles Kerguelen, Davis Sea, cosmopolitan in temperate and tropical seas
Parajassa georgiana Schellenberg					/						/		Ross Sea, Tierra del Fuego
Podocerus capillimanus Nicholls					/								Macquarie Island
Cyllopus lucasi Bate	/												Circumpolar, Antarctic
Cyllopus magellanicus Dana	26				/								Circumpolar, sub-Antarctic and Antarctic
Vibilia edwardsi Bate	/												Circumpolar, sub-Antarctic and Antarctic
Caprellinoides mayeri (Pfeffer)					/						/		
TOTALS	3	36	7	20	60								

1. As *Orchomenella.*
2. As *Orchomenella.*
3. As *Orchomenopsis* and under *Orchomenopsis chilensis.*
4. As *Orchomenopsis* and under *Orchomenopsis chilensis.*
5. As *Orchomenopsis.*
6. As *Harpinia obtusifrons.*
7. As *Amphilochus.*
8. As *Thaumatelson nasutum.*
9. As *Metopella.*
10. As *Metopoides.*
11. As *Bircenna.*
12. As *C. brazieri.*
13. As *L. dubia.*
14. As *Leptamphopus novaezealandiae.*
15. As *Leptamphopus novaezealandiae.*
16. As *Leptamphopus novaezealandiae.*
17. As *E. splendidus.*
18. As *Atyloides serraticauda* and *A. calceolata.*
19. As *Atyloides magellanica.*
20. As *Paramoera austrina.*
21. As *Atyloides brevicornis.*
22. As *Paramoera austrina.*
23. As *Bovallia monoculoides.*
24. As *P. pacifica.*
25. As *Tryphosa.*
26. As *C. danae.*

APPENDIX C

GEOGRAPHICAL DIS UTION OF 224 SPECIES OF GAMMARIDEAN AMI PODS RECORDED FROM BRITISH ANTARCTIC TERRITORY AND THE SCOTIA ARC

Species	Graham Land, west coast south of lat. 67°S. (1)	Graham Land, west coast north of lat. 67°S. and west of long. 60°W. (2)	Graham Land, north and east coast east of long. 60°W. (3)	South Shetland Islands (4)	South Orkney Islands (5)	South Sandwich Islands (6)	South Georgia (7)	Shag Rocks (8)	Areas outside the west Antarctic sub-region
Acanthonotozomella oatesi Barnard		+					+		Davis Sea, Ross Sea
Alexandrella dentata Chevreux	+								
Allogaussia navicula Barnard			+	+					
Ambasiopsis georgiensis Barnard							+		
A. uncinata Barnard				+					
Ampelisca bouvieri Chevreux		+	+				+		
A. bransfieldi Barnard				+					
A. "eschrichti"	+	+					+		Ross Sea
A. hemicryptops Barnard		+	+	+					
A. "macrocephala"							+		Terre Adélie, Ross Sea
Anchiphimedia dorsalis Barnard		+							Ross Sea
Andaniotes ingens Chevreux		+							Terre Adélie
A. linearis Barnard		+	+				+		Terre Adélie
Aristias antarcticus Walker				+			+		Davis Sea, Terre Adélie, Ross Sea, Iles Kerguelen, Tierra del Fuego, Falkland Islands
A. collinus Barnard			+	+					
Atyloella magellanica (Stebbing)				+	+		+		Davis Sea, Terre Adélie, Tierra del Fuego, Falkland Islands
A. quadridens (Barnard)			+						Ross Sea
Atylopsis signiensis sp. nov.					+				
Austropleustes cuspidatus Barnard				+					
A. simplex Barnard							+		
Bovallia gigantea Pfeffer		+		+	+	+	+		
Byblis antarctica Schellenberg			+	+					
B. subantarctica Schellenberg							+		
Byblisoides juxtacornis Barnard		+							Ross Sea
Cardenio paurodactylus Stebbing					+	+	+		Bouvetøya, Iles Kerguelen
Cerapus oppositus Barnard		+					+		
Cheirimedon femoratus (Pfeffer)		+		+	+	+	+		Terre Adélie
Chosroes decoratus Barnard				+					
C. incisus Stebbing								+	Tierra del Fuego, Falkland Islands
Clarencia chelatus Barnard				+					
Colomastix fissilingua Schellenberg					+			+	Iles Kerguelen, Davis Sea, Ross Sea, Tierra del Fuego, Falkland Islands
Cyphocaris richardi Chevreux				+					East Weddell Sea, Bouvetøya, North and South Atlantic Ocean, South Indian Ocean, Pacific Ocean
Didymochelia spongicola Barnard							+		
Djerboa furcipes Chevreux		+			+		+		Iles Kerguelen, Iles Crozet
Echiniphimedia echinata (Walker)	+	+					+		Davis Sea, Terre Adélie, Ross Sea
E. hodgsoni (Walker)		+	+	+			+		Davis Sea, Terre Adélie, Ross Sea
Eclysis similis Barnard							+		
Epimeria excisipes Barnard		+	+	+			+		
E. georgiana Schellenberg							+		
E. inermis Walker			+	+					Davis Sea, Ross Sea, West of Falkland Islands
E. intermedia Schellenberg							+		
E. macrodonta Walker	+	+	+	+					East Weddell Sea, Davis Sea, Terre Adélie, Ross Sea
E. monodon Stephensen		+			+				
E. puncticulata Barnard							+		Ross Sea
Epimeriella macronyx Walker					+				Davis Sea, Ross Sea, Bellingshausen Sea west of long. 80°W.
E. walkeri Barnard		+		+					Davis Sea, Ross Sea
Eurymera monticulosa Pfeffer		+		+	+		+		
Eurystheus dimorphus Barnard							+		
E. georgianus Schellenberg							+		
E. purpurescens Barnard		+			+		+		
E. serricrus Barnard				+			+		
E. triodon Schellenberg			+				+	+	Davis Sea
Eusiridae gen. et sp. nov.					+				
Eusiroides crassi Stebbing				+			+		South Atlantic, South Pacific
E. georgianus Barnard			+	+			+		
Eusirus antarcticus (Thomson)	+	+	+	+	+	+	+		East Weddell Sea, Davis Sea, Terre Adélie, Ross Sea, north of Ross Sea, Bouvetøya, South America, Falkland Islands, New Zealand
E. laticarpus Chevreux	+	+							
E. microps Walker		+		+					Bouvetøya, Davis Sea, Ross Sea, north of Ross Sea, Bellingshausen Sea west of long. 80°W.
E. perdentatus Chevreux		+	+	+	+				Davis Sea, Terre Adélie, Ross Sea, Bellingshausen Sea west of long. 80°W.
Gainella chelata Chevreux	+								
Gitanopsis squamosa (Thomson)		+		+	+		+		Iles Kerguelen, Auckland Islands, New Zealand, Magellanic region, Tristan da Cunha
Gnathiphimedia fuchsi sp. nov.					+				
G. macrops Barnard							+		Terre Adélie
G. sexdentata (Schellenberg)		+	+	+					Davis Sea, Terre Adélie, Ross Sea
Halice profundi Barnard				+			+		
Haliragoides australis Chilton					+				
Haplocheira barbimanus (Thomson)					+		+		Iles Kerguelen, Terre Adélie, Ross Sea, Magellanic region, Falkland Islands, east Australia, New Zealand, Macquarie Island
Haploops securiger Barnard				+			+		
Harpinia cariniceps Barnard		+		+	+				
Heterophoxus trichosus Barnard			+	+					
H. videns Barnard				+	+		+		Terre Adélie, Ross Sea, Magellanic region, Falkland Islands
Hyale hirtipalma (Dana)							+		Iles Kerguelen, Macquarie Island, Magellanic region
Iphimedia sp.	+								
Iphimediella bransfieldi Barnard			+						Davis Sea
I. margueritei Chevreux	+		+			+	+	+	Terre Adélie, Ross Sea
Ischyrocerus camptonyx sp. nov.					+		+		
Jassa falcata (Montagu)		+			+		+	+	Cosmopolitan
J. goniamera Walker			+			+			East Weddell Sea, Davis Sea, Terre Adélie, Ross Sea
J. ingens (Pfeffer)		+	+	+	+	+	+		
J. multidentata Schellenberg							+		
Kerguelenia palpalis Barnard			+						Davis Sea
Kuphocheira setimanus Barnard					+				
Lepechinella cetrata Barnard				+					
Lepidepecreella ovalis Barnard							+		
Lepidepecreoides xenopus Barnard		+		+			+		
Lepidepecreum cingulatum Barnard					+				
Leucothoe spinicarpa (Abildgaard)	+	+	+	+	+		+		Iles Kerguelen, Davis Sea, Terre Adélie, Ross Sea, Bellingshausen Sea west of long. 80°W. Cosmopolitan
Liljeborgia chevreuxi Schellenberg	+								
L. georgiana Schellenberg					+		+		Terre Adélie
L. kinahani var. *georgiensis* Barnard							+		
L. longicornis (Schellenberg)				+			+	+	
L. quadridentata Schellenberg							+		
Liouvillea oculata Chevreux		+	+		+				
Maera pfefferi Barnard							+		
Megamphopus longicornis (Walker)					+		+		Iles Kerguelen, Davis Sea, Ross Sea
Melphidippa antarctica Schellenberg			+	+			+		Davis Sea, Ross Sea
Metaleptamphopus pectinatus Chevreux		+			+		+		
Methalimedon nordenskjoldi Schellenberg					+		+		Terre Adélie
Monoculodes antarcticus Barnard		+	+		+				
M. scabriculosus Barnard				+	+		+		
Nicippe unidentata Barnard		+							
Oediceroides brevirostris Schellenberg							+		
O. calmani Walker	+	+			+				Davis Sea, Terre Adélie, Ross Sea
O. lahillei Chevreux					+	+	+		Tierra del Fuego
O. lahillei f. *polita* Schellenberg							+		
O. macrodactylus Schellenberg				+			+		
O. newnesi (Walker)							+		Iles Kerguelen, Davis Sea, Ross Sea
Oradarea bidentata Barnard					+		+		
O. edentata Barnard				+	+		+		
O. impressicauda Barnard				+					
O. ocellata sp. nov.		+		+	+				
O. tricarinata Barnard			+	+			+		Davis Sea
O. tridentata Barnard							+		
O. unidentata sp. nov.		+		+	+				
O. walkeri Shoemaker		+	+	+	+		+		Davis Sea, Terre Adélie, Victoria Land
Orchestia scutigerula Dana							+		Magellanic region, Falkland Islands
Orchomene abyssorum Stebbing				+					Davis Sea, Terre Adélie, Ross Sea, South Atlantic
Orchomene acanthurus (Schellenberg)	+						+	+	
O. cavimanus Stebbing							+		Iles Kerguelen, Davis Sea, Terre Adélie, South Atlantic
O. charcoti (Chevreux)		+	+						
O. macronyx (Chevreux)		+			+		+		Davis Sea
O. nodimanus (Walker)					+				Ross Sea
O. pinguides (Walker)				+	+	+	+		Davis Sea, Ross Sea
O. plebs (Hurley)	+	+		+	+				East Weddell Sea, Davis Sea, Ross Sea
O. rossi (Walker)		+	+				+		East Weddell Sea, Davis Sea, Ross Sea
O. rotundifrons (Barnard)				+	+				
O. zschaui (Pfeffer)		+				+	+		
Pachychelium davidis Stephensen							+		West Greenland
P. oculatum Schellenberg							+		
Pagetina genarum Barnard							+		
Panoploea joubini Chevreux	+	+		+					Davis Sea, Terre Adélie
Paraceradocus miersi (Pfeffer)		+	+	+	+	+	+		
Paradexamine fissicauda Chevreux		+			+		+		
P. sexdentata Schellenberg							+		
Parajassa georgiana Schellenberg					+		+		Victoria Land, Ross Sea
Paralysianopsis odhneri Schellenberg							+		Terre Adélie, Falkland Islands
Paramoera brachyurus Schellenberg							+		Tierra del Fuego
P. edouardi Schellenberg		+		+	+		+		
P. fissicauda (Dana)							+		Iles Crozet, Iles Kerguelen, S. Chile, Tierra del Fuego, Argentina, Falkland Islands, Gough Island
P. gregaria (Pfeffer)							+		Cape Horn
P. hurleyi sp. nov.					+				
P. pfefferi Schellenberg							+		Magellanic region, Falkland Islands
P. walkeri (Stebbing)				+			+		Terre Adélie, Ross Sea
Parandania boecki (Stebbing)				+			+		Atlantic and Indian Oceans
Paraperioculodes brevimanus Barnard							+		
Pardalisca abyssoides Barnard		+							
Parepimeria bidentata Schellenberg							+	+	
P. crenulata Chevreux		+	+	+				+	Bouvetøya
P. major Barnard				+					
Parhalimedon turqueti Chevreux		+			+		+		
Parharpinia fuegensis Schellenberg							+		Magellanic region
P. obliqua Barnard			+				+		
P. rotundifrons Barnard				+	+	+	+		
P. sinuata Barnard							+		Cape Horn
Pariphimedia integricauda Chevreux		+		+	+	+			
Paroediceroides sinuata Schellenberg							+		
Phippsiella rostrata Barnard							+		
Phoxocephalopsis deceptionis Stephensen				+					
Phoxocephalus coxalis Barnard							+		
Podoceropsis elephantis Barnard				+					
Podocerus capillimanus Nicholls					+				Macquarie Island
P. cristatus (Thomson)								+	Falkland Islands, Argentina
P. septemcarinatus Schellenberg		+		+				+	Davis Sea, Bellingshausen Sea west of long. 80°W.
Polycheria antarctica (Stebbing)					+		+		South Africa, Iles Kerguelen, Indian Ocean, New Zealand, Argentina, Falkland Islands, South Atlantic
Pontharpinia maxima Stephensen				+					
P. uncinata Chevreux		+							
Pontogeneia antarctica Chevreux		+	+	+	+		+		
P. georgiana (Pfeffer)		+					+		
P. redfearni sp. nov.					+				
Pontogeneiella brevicornis (Chevreux)		+		+	+	+	+		Bouvetøya, Peter I Øy, Macquarie Island
P. longicornis (Chevreux)		+	+	+	+		+		
Probolisca elliptica (Schellenberg)							+		
P. ovata (Stebbing)				+	+		+		Iles Kerguelen, Macquarie Island, Campbell Island, New Zealand, Argentina, Falkland Islands
Proboloides antarcticus Walker				+					Ross Sea
P. carinata (Schellenberg)							+		
P. clavata (Schellenberg)							+	+	
P. compacta (Stebbing)							+		Tierra del Fuego
P. crenatipalmatus (Stebbing)							+		Magellanic region, Tristan da Cunha
P. elliptica (Schellenberg)							+		Magellanic region, Falkland Islands
P. magellanica (Stebbing)							+		Magellanic region
P. parallelocheir (Stebbing)							+		Magellanic region
P. sarsi (Pfeffer)		+			+		+		
P. typica (Walker)							+		Davis Sea, Ross Sea
Prostebbingia gracilis (Chevreux)	+	+	+	+	+		+		Davis Sea
Prothaumatelson nasutum (Chevreux)		+			+		+		
Pseudamphilochus shoemakeri Schellenberg							+		
Pseudepimeria grandirostris Chevreux	+								Terre Adélie
Pseuderichthonius gaussi Schellenberg			+	+					Davis Sea
Pseudeurystheus sublitoralis Schellenberg					+		+	+	
Pseudischyrocerus distichon (Barnard)							+	+	Bouvetøya, Terre Adélie, Ross Sea
Pseudorchomene coatsi (Chilton)							+		East Weddell Sea, Davis Sea
Rhachotropis antarctica Barnard		+	+	+	+		+		Falkland Islands
Schraderia barnardi sp. nov.					+				
S. dubia sp. nov.					+				
S. gracilis Pfeffer	+	+	+	+	+		+		Davis Sea, Terre Adélie, Victoria Land, Falkland Islands, Iles Crozet
Seba antarctica Walker							+		Terre Adélie, Ross Sea
S. georgiana (Schellenberg)							+		
S. subantarctica Schellenberg							+		Magellanic region, Falkland Islands
Shackletonia robusta Barnard				+			+		
Socarnoides kergueleni Stebbing						+	+		Iles Kerguelen
Stomacontion insigne Barnard								+	
Syrrhoe nodulosa Barnard		+		+					Bellingshausen Sea west of long. 80°W.
S. psychrophila Monod							+		Bellingshausen Sea west of long. 80°W.
Syrrhoites anaticauda Barnard			+	+					Ross Sea
Thaumatelson cultricauda Barnard							+		
T. herdmani Walker			+		+		+		Davis Sea, Ross Sea, Burdwood Bank
T. walkeri Chilton			+		+		+	+	
Tiron antarcticus Barnard			+				+		
"*Tmetonyx*" *carinata* (Schellenberg)				+			+		Davis Sea, Ross Sea, East Weddell Sea
Tryphosella adarei (Walker)			+	+					Davis Sea, Terre Adélie, Ross Sea
T. analogica (Barnard)							+		
T. bispinosa (Schellenberg)							+	+	Bellingshausen Sea west of long. 80°W., Falkland Islands
T. kergueleni (Miers)			+	+	+	+	+		Iles Kerguelen, Davis Sea, Terre Adélie, Ross Sea, New Zealand
T. longitelson (Barnard)							+		Bellingshausen Sea west of long. 80°W.
T. major (Barnard)			+	+			+		Ross Sea
T. murrayi (Walker)			+						East Weddell Sea, Davis Sea, Terre Adélie, Ross Sea
T. serrata (Schellenberg)							+		Magellanic region
T. triangularis (Barnard)					+		+		
Uristes albina (Barnard)				+					
U. georgiana (Schellenberg)							+		Davis Sea
U. gigas Dana			+				+		Iles Kerguelen, Davis Sea, Terre Adélie, Ross Sea
Urothoides oniscoides Barnard				+					
Waldeckia obesa (Chevreux)	+	+		+		+	+		East Weddell Sea, Davis Sea, Terre Adélie, Ross Sea
Wandelia crassipes Chevreux		+		+	+				Tristan da Cunha
	19	66	49	84	73	17	144	17	

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APPENDIX B

Occurrences and Numbers of Amphipod Species Collected from Borge Bay and Paal Harbour, Signy Island

Station	Cheirimedon femoratus	Lepidepecreum cingulatum	Tryphosella kergueleni	T. cf. triangularis	Orchomene nodimanus	O. rotundifrons	Parharpinia rotundifrons	Heterophoxus videns	Gitanopsis squamifera	Leucothoe spinicarpa	Thaumatelson walkeri	T. herdmani	Prothaumatelson nasutum	Probolisca ovata	Proboloides sarsi	Wandelia crassipes
1																
2																
3																
4							4		1					12	16	
5																
6																
7																
8	1									1						
9										6				1	1	
10									4		5			93	7	1
11				1					1	13	1			8	5	
12										2	8	2		44		
13									5	4	17	1		62	1	
14									2		9			37		
15											3			11		
16	1								4		2			117		
17	2						1		2		1			85	1	
18		1					1		2		9			29		
19								1		1	3	3	1	15	1	3
20	1										8			11		
21								2			2		1	9		
22											7		1	22		
23									1		21		2	68		
24								1			27	3	8	25		
25	1		1			2				1	33			22		
26						1			1		3			33		
27																
28														1		
29																
30														41	2	2
31																
32									1					29		44
33									1	7	3			27	6	
34										3						
35											2			2		
36												1		2		
37	11		180				450									
38	20	86	27				104		1						1	
39			16				49									
40			115				79		1							
41	7		11				200									
42	1		59				105									
43	1		13				43									
44							2							2		
45	4		10		2		22									
46									1		1			26		
47									1					37		
48		1							3		1		3	149		1
49			2				1		7		3	1		73	2	
50			21		1	55	1							31	2	1
51									3				2	30	1	
52														5		
53										1				1		
54	33	44				3			3	4	2		2	49		
55										1						
56		1										1		7		
57						2			6				2	176		
58						22	1		5					161		
59																
60																
Total	83	133	455	1	3	85	1,063	4	56	44	171	12	22	1,553	46	52

Station	Pariphimedia integricauda	Gnathiphimedia fuchsi	Parhalimedon turqueti	Methalimedon nordenskjoldi	Oediceroides lahillei	Monoculodes scabriculosus	Epimeria monodon	Oradarea walkeri	O. bidentata	O. ocellata	O. unidentata	O. edentata	Atylopsis signiensis	Metaleptamphopus pectinatus	Atyloella magellanica	Djerboa furcipes
1																
2																
3																
4																
5																
6																
7																
8																
9	3														1	
10	1										7				4	
11											6				11	
12	1													150	2	
13	1						1							15	1	
14									1					9	2	
15									2					1		
16	2								4	1	5			200	15	1
17	1		1						17		3			86	14	
18			2						1		1			18	6	1
19	1		5				1		5	1	2			16	7	
20	1										2			3		
21			2								1				4	
22			2								1			1	2	
23			2						1					2		
24	5		1						7		1			5	1	
25			9											2	3	
26	2		6								5				2	
27	1														1	
28															1	
29																
30																
31																
32	1								14					800		
33	3								7		3			45	3	
34															1	
35									2					2		
36									1		6				4	
37				1												
38	1															
39				3		1			7	1				1		6
40											2					
41																
42																
43				1										1		
44				1		10										
45				1				1							1	
46	2						5		92	3	3	2		180		16
47		1					3		91					2,200		1
48	3				1		4		290	10	6			1,100		38
49	28		5		1				140	17	18			80	2	37
50	460	1			2		8	1	5	16	5			28	7	23
51	5	1					2		7	180	49			19	3	49
52	35				2				4	3	5			6	6	4
53	12							1			2				6	22
54	3		1	1	1		8		100		21			99	5	150
55	1									1						3
56	3						2		4							4
57									280	6	16			950		91
58									35	1	14			140		107
59	83						8			3			1	2	2	1
60																
Total	659	3	36	8	7	11	42	3	1,117	243	184	2	1	6,161	117	554

Station	Liouvillea oculata	Paramoera edouardi	P. hurleyi	Schraderia gracilis	S. dubia	S. barnardi	Pontogeneia antarctica	P. redfearni	Prostebbingia gracilis	Eurymera monticulosa	Pontogeneiella brevicornis	P. longicornis	Bovallia gigantea	Eusiridae gen. et sp. nov.	Paraceradocus miersi	Paradexamine fissicauda
1							96									
2													1			
3										1					1	
4		13					1			4						
5							14		1				1			
6							24									
7							5						4			
8		1		4	7		73			2						1
9		1			4		14			1						
10				9	8		10		4							6
11				7	1			1	3				1	1		
12				1			2	1					24	1		2
13				32	8		125	2					73	6		
14				1	1		1		1							
15				5	1											
16				2	11		3	16	24				31			6
17				3	8	1	1	10	13				9			4
18				6	1	1	2		16	1			4			13
19				27	3	8	3		15	1			3	6		1
20				3					5				1	2		1
21				3	3		1						5			18
22				8	2				9				4	1		25
23				3	1	1	2		14				16	1		21
24				2			5		29			1	8			2
25				3	3	1			2		2			1		5
26				1	1				1	1	2		1			3
27							2	1	3				2			
28																
29							10									
30							43		1				1			
31													1			
32							82		43				2			
33				1	3		101		20	5	1		5	1		9
34													3			2
35				1			1		3							
36									4				4			27
37							1				22					
38		7	1	4			32		12	2	350	4				
39									4		5					
40				2					2		15					
41							2				5					
42							1				7					
43																
44						1			2			3				
45			1						3		3					
46		2					11	2	140	7	7	1	29			18
47							1	6	90	1	1		18			1
48				5			10	9	700	1	850	11	22			6
49		6	8	39	9	20	21	1	300	6		3	35		1	10
50		2		2			450	2	58	2	8,000		8			28
51	11			4			2	1	1,000		7	11	36			9
52	140						1		22		64	3	4			6
53	23							3	6			3	16			4
54	4	1	9	9			3	8	67	13	10	4	94			28
55												11	1			9
56	1						1		74				1			1
57							1		370				82			11
58							3		140			1				6
59							10		3	570	460	1	39			4
60									1							
Total	179	33	19	187	75	33	1,171	63	3,205	618	9,811	57	589	20	2	287

Station	Polycheria antarctica	Megamphopus longicornis	Pseudeurystheus sublitoralis	Haplocheira barbimanus	Kuphocheira setimanus	Ischyrocerus camptonyx	Jassa ingens	Jassa falcata (form 1)	J. falcata (form 2)	J. falcata (form 3)	Parajassa georgiana	Podocerus capillimanus	Cyllopus magellanicus	Caprellinoides mayeri	Number of species	Number of specimens
1								2							2	98
2															1	1
3															2	2
4								3							8	54
5															3	16
6															1	24
7															2	9
8	4						7	2							11	103
9	10						1	11		1				1	14	56
10	37	1					10	39		300	97			38	20	681
11	160						2	23		140	48			26	20	459
12	68	1					1	15		170	40			31	20	566
13	10	1					1	5		430	140			47	23	988
14	50	3								150	89				14	356
15		1					5	23		104	62				11	218
16		1					4	120		260	14			8	24	852
17	9			2			2	180		230	33			13	27	732
18		1						11		59	3				23	189
19		2		3			8	8		210	120			3	32	487
20		2					4	4		41	2	4			17	95
21							1			66	24				15	142
22		1		2			3	1		11	1				19	104
23		1		3			1	5		160	35			14	22	375
24		1					1	7		170	55			5	23	370
25		5		11		9	4	5		160	22			24	24	331
26				1		2	2	14		47	5			5	22	139
27															6	10
28															2	2
29								1							2	11
30						1	3	37		36		5		17	12	189
31															1	1
32								3	1	5					12	1,025
33	7						6	15		21	2	1		8	26	311
34														10	5	19
35						2	5	2		10	2				12	34
36															8	49
37					1										7	666
38															15	652
39															10	93
40										1				1	9	218
41															5	225
42															5	173
43															5	59
44			52		230				2						10	305
45					1										11	49
46						3	7	8		12			1		25	579
47						9	1			1					17	2,463
48							1			3					25	3,228
49				1			18	4		7		1		2	35	909
50							3		3						29	9,226
51						1	5	11		3					26	1,452
52						1	12	5	1						20	329
53							2	4							15	106
54	14			1		1	12	4		104	15			1	38	931
55															7	27
56							1								13	101
57						3	1								15	1,997
58						3	5								15	644
59															14	1,187
60															1	1
Total	369	21	52	24	232	35	139	572	7	2,912	809	11	1	254		34,718

APPENDIX D

Geographical Coordinates of Antarctic Localities Mentioned in the Text*

	Latitude	Longitude		Latitude	Longitude
Adare, Cape	71°17′S.,	170°14′E.	Laurie Island	60°44′S.,	44°37′W.
Admiralty Bay	62°07′S.,	58°27′W.	Lemaire Channel	64°49′S.,	62°57′W.
Astrolabe Island	63°19′S.,	58°42′W.	Lockroy, Port	64°49′S.,	63°30′W.
Auguste Island	64°03′S.,	61°36′W.	McMurdo Sound	77°30′S.,	165°00′E.
Bismarck Strait	64°51′S.,	64°00′W.	Marguerite Bay	68°30′S.,	69°00′W.
Booth Island	65°05′S.,	64°00′W.	Melchior Harbour	64°19′S.,	62°59′W.
Bridgeman Island	62°04′S.,	56°40′W.	Melchior Islands	64°19′S.,	62°57′W.
Bristol Island	59°02′S.,	26°31′W.	Neny Fjord	68°16′S.,	66°50′W.
Burdwood Bank	54°20′S.,	59°00′W.	Neumeyer Channel	64°47′S.,	63°30′W.
Candlemas Island	57°03′S.,	26°40′W.	Normanna Strait	60°41′S.,	45°38′W.
Charcot, Port	65°03′S.,	64°00′W.	Paulet Island	63°35′S.,	55°47′W.
Clarence Island	61°08′S.,	54°06′W.	Peter I Øy	68°47′S.,	90°35′W.
Coal Harbour	54°02′S.,	37°58′W.	Petermann Island	65°11′S.,	64°11′W.
Commonwealth Bay	66°54′S.,	142°40′E.	Possession Bay	54°06′S.,	37°06′W.
Coulman Island	73°28′S.,	169°45′E.	Roquemaurel, Cape	63°33′S.,	58°56′W.
Cumberland Bay	54°17′S.,	36°30′W.	Royal Bay	54°32′S.,	36°00′W.
Davis Sea	66°00′S.,	92°00′E.	St. Andrews Bay	54°26′S.,	36°11′W.
Deception Island	62°57′S.,	60°38′W.	Saunders Island	57°47′S.,	26°27′W.
Drygalski Fjord	54°49′S.,	36°00′W.	Scotia Bay	60°46′S.,	44°40′W.
Drygalski Island	65°45′S.,	92°30′E.	Seymour Island	64°16′S.,	56°45′W.
Duke of York Island	71°37′S.,	170°04′E.	Signy Island	60°43′S.,	45°38′W.
Erebus and Terror Gulf	63°55′S.,	56°40′W.	Snow Hill Island	64°27′S.,	57°13′W.
Flandres Bay	65°02′S.,	63°20′W.	Stonington Island	68°11′S.,	67°00′W.
Franklin Island	76°05′S.,	168°11′E.	Stromness Bay	54°09′S.,	36°38′W.
(Gauss winter station)	66°02′S.,	89°38′E.	Tower Island	63°33′S.,	59°51′W.
Godthul	54°17′S.,	36°18′W.	Two Hummock Island	64°08′S.,	61°40′W.
Hound Bay	54°22′S.,	36°14′W.	Undine Harbour	54°02′S.,	37°59′W.
Hovgaard Island	65°08′S.,	64°07′W.	Visokoi Island	56°42′S.,	27°12′W.
Hugo Island	64°59′S.,	65°46′W.	Wadworth, Cape	73°19′S.,	169°47′E.
Isles, Bay of	54°02′S.,	37°20′W.	Wiencke Island	64°50′S.,	63°25′W.
Jason Island	54°10′S.,	36°30′W.	Wilson Harbour	54°07′S.,	37°45′W.
Larsen Harbour	54°50′S.,	36°01′W.	Zavodovski Island	56°20′S.,	27°35′W.

* Positions based on H.M.S.O. (1962) and United States Board on Geographic Names (1969).

APPENDIX E

Systematic Index of Scientific Names
(Synonyms are given in brackets)