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The Marine Fauna of New Zealand: Family Sphaeromatidae (Crustacea Isopoda: Flabellifera)

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D. E. HURLEY and K. P. JANSEN

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DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

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ABSTRACT

The taxonomy and distribution of sphaeromatid isopods in the New Zealand region and Subantarctic Islands are revised in the light of collections made in recent years and of re-examination of early New Zealand material. All species are diagnosed and figured, and a checklist and keys to genera and species are provided. Twenty-six new species in 12 genera are added, and one new genus has been erected.

CHECKLIST OF NEW ZEALAND AND SUBANTARCTIC SPHAEROMATIDAE

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INTRODUCTION

Sphaeromatidae* (Crustacea Isopoda: Tribe Flabellifera) or "marine pill-bugs" are perhaps the most commonly seen isopods of predominantly marine provenance. They are characterised by seven pereon segments and seven pereopods (except in the very young, which have only six pereopods), and by a pleon of two distinct segments. The anterior pleon segment has five pairs of pleopods ventrally, and the posterior pleon segment, or pleotelson, has one pair of biramous uropods anterolaterally. The inner ramus of this uropod is fixed to the peduncle, but the outer is movable.

Sphaeromatids occur in a wide range of habitats, from fresh water, through brackish water and high eulittoral levels, to depths as great as 1800 m (Stebbing 1893: 363). Individual species, however, occur in more or less defined habitat niches, being restricted there by their morphology, physiology, and breeding potential (Riegel 1959, Elkaim 1966, Lejuez 1966, Holdich 1968a, Jansen 1971). In the intertidal, they may be found on or burrowing in wood, sand or mud, beneath stones, and in or among weed, especially algal holdfasts, bryozoans, sponges, and tunicates. As a common and almost universally present–but varyingly composed–component of the littoral zone, they lend themselves particularly well to ecological studies. In their recent book "The New Zealand Sea Shore", Professor John Morton and Dr Michael Miller (1968) have shown how usefully these animals can be integrated into an ecological description of the littoral zone, and have pointed the way for more detailed work. It is our hope that the present revision will stimulate further ecological work in New Zealand, as well as assist in solving more mundane problems of identification.

The earliest records of sphaeromatids from New Zealand appear in "Histoire Naturelle des Crustacés" (Milne Edwards 1840). Then came J. D. Dana's (1853) report on "Crustacea" in the Reports of the United States Exploring Expedition. In succeeding years, new species and genera were recorded and described by several New Zealand workers, among whom G. M. Thomson and Charles Chilton were prominent.

Sexes and stages of maturity were often not distinguished, but sphaeromatids often vary greatly with growth and sexual differentiation. Consequently, conspecific males and females have often been referred to different species or even genera. For these and other reasons the Sphaeromatidae have vexed taxonomists for many years. Hansen (1905) made the first significant attempt to put the systematics on a sound basis when he divided the family into three groups of genera on the morphology of the fourth and fifth pleopods, and recognised that many species had been created unnecessarily owing to the males and females being described separately.

In the present account, it has been possible with a few exceptions to match males with females and juveniles so that a number of synonymies have been amended. At the same time, large samples from some localities have allowed the recognition of sympatric forms where small but consistent morphological differences have indicated hitherto unrecognised species previously lumped together. In this respect the situation in New Zealand resembles that described by Monod (1931a: 8) ". . . the opinion that all European *Sphaeroma* with non-toothed uropods are *rugicauda* belongs to that category of ancient but false affirmations which hinder those whom they influence from practising the examination of detail which would enlighten them; they prefer to continue calling *serratum* all *Sphaeroma* to which can be applied Fabricius's 1787 diagnosis; that is to say, to confuse under one name several perfectly distinct species".

Several genera and species are recognisable only from adult males, since females and juveniles lack the necessary diagnostic characters. For most of them, samples have been adequate to allow each form to be properly placed and figured. Unsubstantiated records in the literature have been omitted.

*It has been customary in the past to use the family name Sphaeromidae, but recent usage has turned to Sphaeromatidae (e.g., Monod 1931a, Grüner 1965, Kusakin 1969). Through Dr Isabella Gordon we obtained the opinion of Mrs E. N. Arnold, a Greek scholar, on the correct classical derivation. Mrs Arnold comments:

"The word *Sphaeroma* exists as a noun in Greek. Liddel and Scott's Greek Lexicon (7th edition, 1893, unabridged) gives the following translations; (i) anything round or globular; (ii) a steelyard weight; (iii) a star; (iv) in plural, buttocks. The Lexicon does not give the genitive singular stem of *Sphaeroma* but it is likely that it declines like other third declension neuter nouns ending in –oma; e.g. coma, comatose = sleep; diploma, diplomatos = a folded letter; carcinoma, carcinomatos = a cancer. The stem would thus be Sphaeromat- and the familial name derived from it, Sphaeromatidae. *Sphaeroma* is used in Aristotle and it is likely that an eighteenth century scientist would have known it.

"It is possible to argue that *Sphaeroma* in Bosc's sense is a compound of *Sphaera* = a sphere and (*h*)*omos* = like. If this were the derivation, the stem would be Sphaerom- and the familial name Sphaeromidae. However, it is a somewhat devious argument when *Sphaeroma* already exists as a word in classical Greek."

We have therefore accepted "*Sphaeromatidae*" as being the correct familial form.

GENERAL ACCOUNT OF SPHAEROMATIDAE

External Morphology (Fig. 1)

The body is divided into cephalon, pereon, and pleon. The anterior margin of the cephalon often projects in a small apex, below and either side of which the shorter first and longer second antennae are inserted. The eyes are well developed and set laterally on the cephalon, facing forward, outward, and upward. Between the bases of the antennae, the epistome faces anteroventrally and extends posteriorly to the labrum, which partly covers the anterior part of the mandibles and mouth opening. The mandibles are well developed, with palps, and asymmetrical, a state common in malacostracans. First and second maxillae and maxillipeds lie

ventral and posterior to the mouth opening and paragnath.

The pereon comprises seven segments contained by sclerotised tergites, laterally fused coxal plates, and unsclerotised sternites. A pair of pereopods corresponds to each pereonal segment. Each pereopod comprises six movable articles–the coxae being fused laterally with the tergites and sternites–and ends in a claw and a short stout spine.

The pleon comprises two segments and their appendages. The anterior segment appears to arise from fusion of five somites as it supports five pairs of biramous pleopods, although visible suture lines indicate only four segments originally. The first three pairs of pleopods, used in swimming, are lightly sclerotised and bordered with long, plumose setae; the last two pairs are respiratory, unsclerotised, and without plumose setae, but are sometimes bordered with short, fine setae. The rami of the last two pairs of pleopods occur with a few exceptions in two forms (Fig. 2); thin and membranous with flat surfaces, or thick and fleshy with pleated surfaces. In one New Zealand genus, *Pseudosphaeroma*, some of the rami are partly thin and membranous, partly thick and fleshy, but not pleated. The various combinations of these forms in pleopods 4 and 5 are the basis of the three groups of genera into which the (then) subfamily was divided by Hansen (1905: 94, 100–101): Eubranchiatae, Hemibranchiatae, and Platybranchiatae.

Sexual Differentiation

Sexual differences are not apparent in small specimens, but develop with growth. Males tend to be larger than females, and in several genera to be more prominently sculptured.

Males are first distinguishable externally by the penes, which appears as tiny rudiments at the posterior margin of the seventh pereon sternite and grow with succeeding moults. At the same time, the appendices masculinae appear at the inner distal ends of the inner rami of the second pleopods as small projections, which separate towards the bases of the rami with succeeding moults. Adult males are distinguished by the complete separation of the appendix masculina above the point of origin on the inner ramus of pleopod 2 (Fig. 16F), and this is extremely important taxonomically. Concurrently, the body changes towards the distinctive male form, and differences from the female form increase with each moult.

Females are first distinguishable externally by the oöstegites, or brood plates, which appear as minute projections from the sternites just inside the fused coxae of the second, third, and fourth pairs of pereopods (Fig. 1); at this stage the ovaries are full of yolky eggs. After

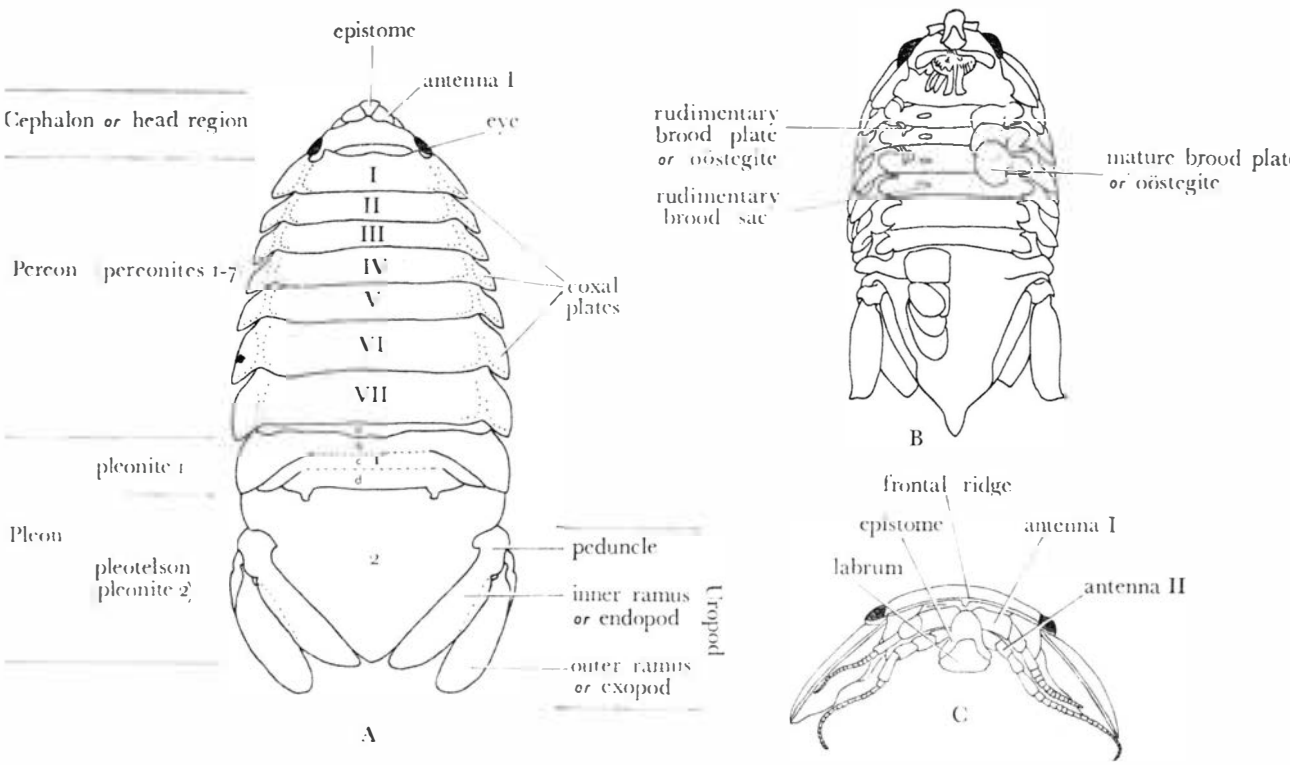


FIG. 1. External morphological features of sphaeromatids: A, dorsal view of generalised sphaeromatid; B, ventral view of female *Isocladus armatus* (legs omitted); C, ventral view of head of *Exosphaeroma gigas*.

the next moult, the eggs remain in the ovaries but rudimentary brood sacs appear; the oöstegites are either unchanged or now fully developed. According to Jensen (1955) this depends on whether copulation has occurred in *Sphaeroma hookeri*, but Holdich (1968a) has observed otherwise in *Dynamene bidentata*. After a further moult, following copulation, the oöstegites are fully developed and the eggs have been transferred from the ovaries to the internal brood sacs, or to the marsupium in several genera, e.g., *Cymodocella, Cassidina* (Hansen 1905: 79, 81), presumably fertilised as they pass down the oviducts. The brood sacs are then distended by the eggs so that they occupy nearly all of the body cavity, packed around the gut and extending into the cephalon and pleon. The eggs or embryos are usually visible through the ventral body integument and oöstegites, so that gravid females are readily recognised.

Post-embryonic Development

After embryonic development in the brood sacs the young squeeze out from the openings under the oöstegites and cling to the female for varying periods before finally swimming free. They are then fully formed except that the seventh pereonal segment is very small and overlapped by the sixth, and the seventh pereopods have not appeared (*see also* Kinne 1954; Holdich 1968a). The seventh pereopods appear as rudiments after the first moult and, together with the seventh segment, are fully developed after about the fourth moult.

ACKNOWLEDGMENTS

This paper forms part of a proposed revision of the Crustacea Isopoda of New Zealand.

During a visit to the United Kingdom in 1962–63 on a Nuffield Fellowship, D. E. Hurley was able to examine all the New Zealand isopod types in the British Museum (Natural History) and, equally important, all of the early New Zealand collections held there including especially the material described by Miers. Although some of this had long been dried and treated as insect material, it was possible to identify all of it, establish its systematic position, and figure the material where appropriate. Through the good offices of Dr Isabella Gordon of the British Museum and the appropriate curators in the Paris Museum, it was also possible to see relevant Filhol specimens. Subsequently, New Zealand type and early material was borrowed from Canterbury Museum, and the basis was laid for examination and figuring of material in New Zealand collections.

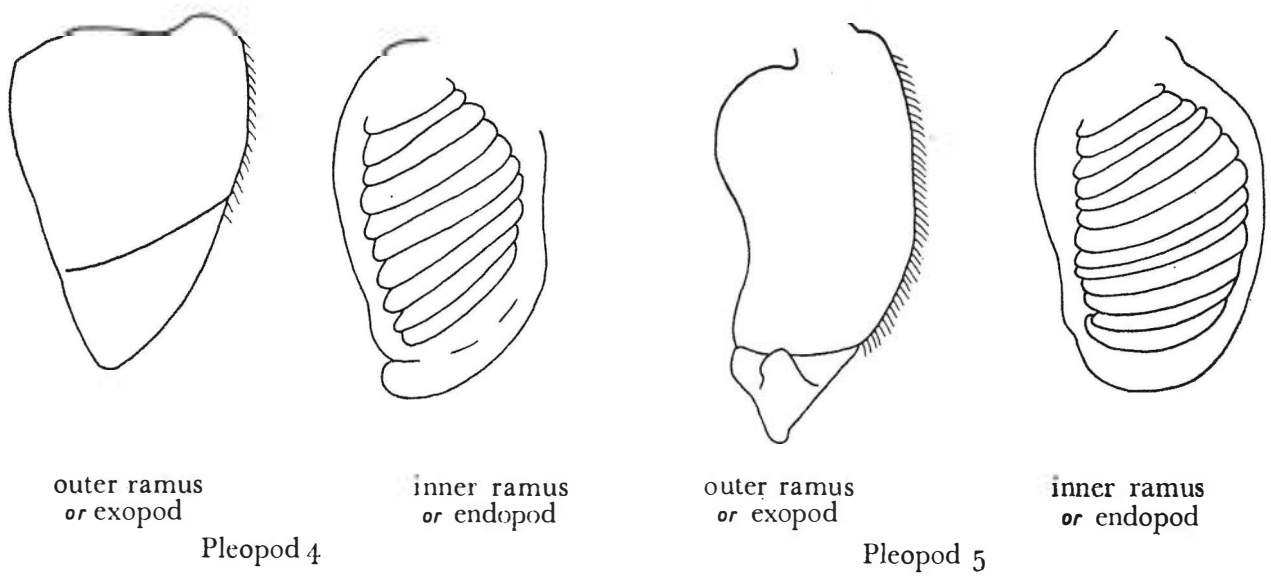


FIG. 2. Pleopods 4 and 5 of the hemibranchiatine sphaeromatid *Sphaeroma quoyanum*, showing segmentation of outer rami and pleating of inner rami.

Much remained to be done when K. P. Jansen, having completed his doctoral thesis on the ecology of sphaeromatid isopods at Kaikoura, New Zealand, offered his collaboration. This has permitted completion of the work much sooner than was anticipated, and has brought a new perspective to it. Jansen's approach has been the pragmatic one of first examining all the material brought together from diverse sources, recognising species and, equally important, various life-forms which had sometimes been considered valid species in the past. As well as illustrating these and marrying the two sets of data, he prepared the first draft. Throughout, there has been constant discussion and collaboration, but his has been the larger share of the draft manuscript. The views expressed are, however, those of both authors.

The authors express their thanks to all who have helped in any way with this project and, in particular, to Dr Isabella Gordon and Dr R. M. Ingle of the British Museum (Natural History), whose hospitality and help are in large part responsible for much clarification of the early New Zealand material; to the Curators of the Crustacea of the Museum National d'Histoire Naturelle of France for help with Filhol type material; and to Dr Richard Bott, Sektionär der Crustaceen-Sektion des Senckenberg-Museums, for assistance with Kohl-Larsen material.

In New Zealand, thanks are due to Dr R. K. Dell, Director of the National Museum, Wellington, and Mr J. M. Moreland of that institution for access to their crustacean collections; to the Director and Drs Marie Büchler and G. Tunnicliffe of the Canterbury Museum for assistance with and loan of Chilton Collection specimens; Professor R. L. C. Pilgrim of the Zoology Department, Canterbury University, for various and continued assistance over the years; the various collectors named in the station list; and Mrs Gillian Crook for assistance with drafting of figures.

STATION DATA AND ABBREVIATIONS

N.Z. Oceanographic Institute Station Lists are in abbreviated form, particularly in field notes where records of individual occurrences of animals noted in the field but not relevant to this paper have been omitted. To assist in referring to material from other institutions, where station numbers are not available, a running sample number is given, distinguishable from station numbers by the absence of a letter prefix.

"Z" numbers used within the N.Z. Oceanographic Institute denote material from other sources or material collected by staff members before their association with the Institute but subsequently donated to the Institute.

Chatham Islands Expedition material is deposited at Canterbury Museum, Christchurch; Victoria University Zoology Department collections at the National Museum, Wellington; Edward Percival Marine Laboratory collections at that laboratory, Kaikoura.

Type material is deposited at the museum or institution owning the material. Canterbury University and Chatham Islands Expedition material is held at Canterbury Museum.

ABBREVIATIONS FOR EQUIPMENT

DC–cone dredge;
DCMB–cone dredge with cylindrical steel wire mesh bag with canvas bag as inner lining;
DD–Devonport dredge (modified naturalist's dredge, rectangular with steel wire mesh bag);
GHO–Hayward orange-peel grab (with metal plates added);
GLP–large Petersen grab;
GP–Petersen grab;
GOP–orange-peel grab;
TAL–Agassiz trawl with 6′ netting bag;
TAM—Agassiz trawl with 4′ netting bag;
TAS–Agassiz trawl with 3′ netting bag;
TM–modified Menzies trawl ('isopod dredge').

LIST OF STATIONS

New Zealand Oceanographic Institute (NZOI)

A444e 41°18.7′S, 174°30.2′E. Recovery of ironsand by special dredge (A444 × 5). Depth 256 m.
Cymodoce australis

B176 (9 Oct. 1959) 50°29′S, 166°30.5′E. TAS.
Broken shell, bryozoan, much sponge. Depth 84 m.
Cymodoce allegra, Exosphaeroma gigas

B177 (9 Oct. 1959) 50°30.8′S, 166°20.5′E. DC.
Brown and red seaweed, little else, tiny rock fragment. Depth 38 m.
Cymodoce australis

B190 (14 Oct. 1959) Campbell I. Shore collection.
Algal holdfast with sandhoppers, some limpets. Near old house remains.
Exosphaeroma obtusum

B191 (15 Oct. 1959) Campbell I. Shore collection. Between old and new camps in bay.
Exosphaeroma obtusum

B247 (26 May 1960) 46°30′S, 168°02.5′E. GLO.
Shelly with gravel and pebbles. Depth 36 m.
Cilicaea caniculata

B260 (27 May 1960) 46°45.4′S, 168°39′E. DIS.
Algae, sponge, bryozoa, isopods, *Pentagonaster*, serpulids. Depth 25 m.
Cymodoce allegra, Exosphaeroma gigas

B262 (27 May 1960) 46°52′S, 168°31.3′E. DIS.
Dead shell, polychaete, bryozoa.
GLO. Shelly golden and darker sands. Bryozoa. Depth 70 m.
Cassidina typa

B578 (11 Oct. 1962) 47°20′S, 169°08′E. DCM.
Finer broken shell and polyzoa. Crinoids, worm tubes, sponge. Depth 143 m.
Cilicaea caniculata

B582 (11 Oct. 1962) 48°00′S, 167°38′E. DCM.
Bryozoa, brachiopods, *Panope*, isopod, etc. Depth 143 m.
Cymodoce allegra, Exosphaeroma gigas

B660 (24 Oct. 1962) 38°40′S, 174°12′E. TAL.
No sediment sample. Hermit crabs, sponge, etc. Depth 71 m.
Cymodoce iocosa

B664 (25 Oct. 1962) 38°01.8′S, 174°25.3′E. TAL.
Sponge, etc. Depth 75 m.
Cymodoce hodgsoni

B669 (25 Oct. 1962) 37°18.7′S, 174°06.2′E. TAL.
Mud, *Lyreidus*, prawn killers, etc. Depth 130 m.
Cymodoce iocosa

B686 (28 Oct. 1962) 40°16′S, 172°32.3′E. TAL.
Shell, worm tubes, solitary corals, etc.; much old shell. Depth 126 m.
Cilicaea tasmanensis, Cymodoce iocosa

C171 (4 Sep. 1959) 39°40′S, 172°52.5′E. TAS.
Depth 163 m.
Cymodoce iocosa

C186 (7 Sep. 1959) 40°40′S, 173°03′E. TAS.
Depth 37 m.
Cymodoce iocosa

C291 (23 Oct. 1959) 38°01.2′S, 174°25.2′E. GP.
Small sample: some mud, sand, ironsand, ground-up shell. Isopod (white). Depth 68 m.
Cassidina typa

C344 (26 Oct. 1959) 37°58.6′S, 174°34.4′E. DD.
Half mile SE Gannet I. Hermit crabs, few worms, starfish, shrimps, grey isopods, quill worms. Depth 55 m.
Cassidina typa

C395 (2 May 1960) 40°43′S, 174°16′E. N70 (light).
Cumaceans, amphipods, giant ostracods. Depth 11 m.
Scutuloidea maculata

C672 (16 Jun. 1961) 42°43.6′S, 173°30.6′E Rock dredge. S end Bushett Rocks. Angular to subangular bored boulders of sandstone coated with dead bryozoa. Depth 64 m.
Cymodoce iocosa

C752 (17 Feb. 1962) 35°19′S, 172°57.5′E. GLO.
Grey shelly medium muddy sand. Depth 131 m.
Cilicaea tasmanensis

C758 (17 Feb. 1962) 34°40′S, 172°14.5′E. TAL.
Medium grey muddy sand. *Flabellum*, sponge, 3 pebbles. Depth 205 m.
Pseudosphaeroma callidum

C814 (25 Feb. 1962) 37°40′S, 178°56.4′E. Off East Cape. GLO.
Soft grey mud.
TAL. Chiefly fossil concretions, mainly elongated and rounded in section with a hole through middle. Isopod. Depth 194 m.
Cilicaea tasmanensis

C921 (10 Feb. 1963) 41°04.9′S, 173°57.3′E. Tawero Pt., Pelorus Sound; tide race. GHO.
Mud with many shells. Live horse mussels, brachiopods, *Chlamys*, *Amphidesma*, oyster, barnacles, hydroids, bryozoa, hermit crabs, sponges, starfish, polychaetes
Cassidina typa

D2 (15 Apr. 1963) 52°33.8′S, 160°09′E. Shore collection, Campbell I.
Collections of *Paphirus*, etc. at Camp Cove.
Exosphaeroma obtusum

D15 (22 Apr. 1963) 54°29.5′S, 158°58′E. Shore collection, Buckle Bay, Macquarie I.
Exosphaeroma gigas

D39 (7 May 1963) 50°58′S, 165°45′E. DCMB.
Coral, rocks, alcyonaria with small ophiuroids and pycnogonids entwined, many small molluscs. Depth 549 m.
Cymodopsis torminosa

D45 (8 May 1963) 50°49.9′S, 166°05.0′E to 50°49.35′S, 166°05.2′E. DCMB.
Muddy shelly fine sand with *Nectocarcinus* and odd *Tawera* valves. Depth 22 m.
50°48.7′S, 166°05.35′E to 50°49.3′S, 166°05.38′ E. TAM.
Mass of seaweed around the wire and shackle. Tubular sponges. Depth 22 m.
Cymodoce australis

D52 (9 May 1963) 50°40.09′S, 166°13.4′E. DCMB.
Muddy medium fine sand, much dead shell. Depth 68 m.
50°41.85′S, 166°14.75′E. TAM.
Broken and encrusted shell, sponges, hydroids, red algae, ascidians, alcyonarians, etc. Depth 73 m.
Cymodoce allegra, Exosphaeroma gigas

D53 (9 May 1963) 50°41.6′S, 166°24′E. DCMB.
Mass of sponges with encrusted flat rocks, shell fragments, bryozoa. Depth 81 m.
Cymodoce allegra, Exosphaeroma gigas

D54 (9 May 1963) 50°43.8′S, 166°15.1′E. DCMB.
Muddy shelly fine grey sand with molluscan valves and fragments. Depth 99 m.
50°43.8′S, 166°15.1′E to 50°43.9′S, 166°17.1′E. TAM.
Nectocarcinus, galatheids, brown algae, amphipods, sponges. Depth 97 m.
Cymodoce perversa, Exosphaeroma gigas

D57 (9 May 1963) 50°36.7′S, 166°15.7′E. to 50°36.5′S, 166°15.9′E. DCMB.
Broken shell and red algae, spider crabs, etc. Depth 44 m.
Cymodoce australis

D60 (9 May 1963) 50°36.1′S, 166°15.3′E. TAM.
Mass of dead encrusted shell and small sponges, etc. Depth 49 m.
Cymodoce allegra, Exosphaeroma gigas

D65 (10 May 1963) 50°32.6′S, 166°13.3′E. TAS.
Great mass of red algae and fine sand, etc. Depth 20 m.
DCMB. Fine sand with fine shell fragments. Depth 20 m.
Cymodoce allegra, C. australis, Exosphaeroma gigas

D71 (11 May 1963) 50°30.8′S, 166°21.1–5′E. DCMB.
Boulders heavily encrusted with red algae etc. Depth 46 m.
50°31.1′S, 166°21.6′E to 50°30.8′S, 166°21.8′E. TAM.
Net torn on rough bottom, mass of red algae and some sponge. Depth 44 m.
Cymodoce allegra, Exosphaeroma gigas

D83 (13 May 1963) 49°53′S, 167°09′E. DCMB.
Brachiopods, sponges, bryozoans, bright yellow 'tentacled' sponges, fragmentary dead shell and echinoids. Depth 150 m.
TAM. Mass of many spp. of sponges (including yellow 'tentacled'), etc. Depth 150 m.
Cymodoce perversa

D127 (7 Jan. 1964) 46°42′S, 168°17.3′E. DCMB.
Dead shell, brittle stars, many dead oysters, some live. Depth 29 m.
TAM. Shell sand with echinoderms, sponges, etc. Small live oysters common. Depth 29 m.
Cilicaea caniculata

D132 (12 Jan. 1964) 48°06.0′S, 167°36.5′E. DCMB.
Bryozoan sand with echinoderm, mollusc, and brachiopod fragments. Depth 134 m.
TAM. Bryozoan slabs and cobbles with sponges and hydroids. Anemones and coarse broken shell, etc. Depth 134 m.
Cilicaea caniculata, Cymodoce allegra, Exosphaeroma gigas

D134 (12 Jan. 1964) 48°16′S, 168°45.3′E. DCMB.
A few small rocks, barnacles, echinoids. Depth 677 m.
DCMB. Fine sand, pebbles, molluscs, fossils. Depth 677 m.
TAM. Rat-tail fish, gastropods, hermit crabs, cidarids, asteroids, holothurian. Depth 677 m.
Cymodopsis impudica

D144 (14 Jan. 1964) 48°31′S, 167°17′E. DCMB.
Bryozoan sand with shells. Depth 132 m.
TAM. Bryozoan sand with starfish. Depth 132 m.
Cilicaea caniculata

D148 (14 Jan. 1964) 49°48′S, 167°02.5′E. DCMB.
Coarse shell sand, some brachiopods, small molluscs. Depth 146 m.
TAM. Mass of flat-lying gelatinous sponge. Depth 145 m.
Cymodoce australis

D176 (21 Jan. 1964) 51°06.′S, 167°48.5′E. DCMB.
Medium shelly sand with cobbles and pebbles, worms, molluscs, brachiopods. Depth 582 m.
TAM. Rocks, etc. Depth 582 m.
Cymodoce australis

D179 (22 Jan. 1964) 51°25.5′S, 167°21′E. DCMB.
Globigerina ooze. Depth 611 m.
TAM. Mainly *Pyrosoma*, etc. Depth 629 m.
Cymodoce australis

D182 (22 Jan. 1964) Auckland Is, Carnley Harbour. DCMB.
Dark brown mud. Depth 64 m.
TAM. Trawl full of cockles and mussels. *Munida* and *Nectocarcinus* in vast numbers. Depth 64 m.
Cymodoce australis

D185 (22 Jan. 1964) Auckland Is, Carnley Harbour. DCMB.
Sponge, etc., no mud. Depth 64 m.
TAM. Sponge. Depth 64 m.
Cymodoce australis

D186 (22 Jan. 1964) Auckland Is, Camp Cove, Carnley Harbour. Shore collection. Intertidal.
Exosphaeroma obtusum

D188 (22 Jan. 1964) Auckland Is, Figure of Eight I., Carnley Harbour. Shore collection. Intertidal.
Exosphaeroma obtusum

D190 (22 Jan. 1964) Auckland Is, Masked I., Carnley Harbour. Shore collection. Intertidal, habitat ranging from rocky to stones bedded in fine gravel.
Exosphaeroma obtusum, Pseudosphaeroma campbellensis

D191 (22 Jan. 1964) Auckland Is., Adams I., Carnley Harbour. Shore collection.
From rocks at water's edge to NW of boat shed. Intertidal.
Exosphaeroma obtusum

D194 (22 Jan. 1964) 50°44′S, 166°21′E. DCMB.
Coarse shell and bryozoan debris. Depth 95 m.
TAM. Mass of shell and bryozoans, sponge, brachiopods, etc. Depth 75 m.
Cymodoce australis

D211 (26 Jan. 1964) 48°53′S, 172°17.5′E. DCMB.
Globigerina ooze and salps. Depth 519 m.
TAM. Rich haul, many species. Depth 519 m.
Cymodoce australis

D595 (29 Jan. 1967) Chatham Is. Shore collection from between Durham Pt and Waitangi Wharf between high and low tide marks.
Exosphaeroma chilensis

E105 (11 Oct. 1964) 43°58.6′S, 176°37′W. Shore collections.
Intertidal rock platforms south of Cape Wishart, near Heaphy Shoal, Chatham Is.
Amphoroidea media, Dynamenopsis varicolor

E132 (16 Oct. 1964) 44°16.2′S, 176°14.2′W. Waihere Bay, Pitt I. Shore collections.
Isocladus armatus

E161 (19 Oct. 1964) 43°57.1′S, 176°33.2′W. Waitangi, Chatham Is. Shore collections from intertidal rocks to south of Waitangi Wharf.
Exosphaeroma chilensis, Isocladus armatus

E181 (19 Jan. 1965) 72°18.17′S, 179°16.52′E. Moubray Bay. DCMB. Rough stony bottom. Depth 44 m.
Cymodocella tubicauda

E182 (19 Jan. 1965) 72°18.17′S, 170°16.15′E. DCMB. Depth 37 m.
Cymodocella tubicauda

E186 (20 Jan. 1965) 72°17.07′S, 170°13.01′E. DCMB. Rock bottom with small pebbles. Depth 245–218 m.
Cymodocella tubicauda

E230 (24 Feb. 1965) 54°33.2′S, 158°56.7′E. Macquarie I., Sandy Bay. Shore collection.
On tidal flats and reef at N end of bay.
Exosphaeroma gigas

E231 (25 Feb. 1965) 54°32.4′S, 158°54.1′E. Macquarie I., Bauer Bay. Shore collection.
Rocky reef with sandy patches.
Exosphaeroma gigas

E232 (26 Feb. 1965) 54°29′S, 158°58.2′E. Macquarie I., Garden Cove. Shore collections.
Exosphaeroma gigas

E262 (6 Apr. 1965) 34°35′S, 172°20′E. DD.
Grey-green muddy fine sand. Depth 123 m.
Cymodocella egregia

E312 (10 Apr. 1965) 34°00′S, 171°47.5′E. DC.
No sample in main dredge, bryozoan debris (coarse sand grade) in pipe attachment. Depth 119 m.
DCMB. Bryozoan debris (very few molluscs), sponges, and corals with rock fragments. Depth 119 m.
Cilicaea dolorosa

E401 (7 Oct. 1965) 46°00′S, 171°12′E. TAM.
Globigerina ooze and sand. Gastropods, octopus, pycnogonids, rat-tail. Depth 914–823 m.
Cymodopsis impudica

E416 (13 Oct. 1965) 45°21′S, 171°57′E. TM.
Sandy globigerina ooze. Depth 1 225 m.
Cymodopsis impudica, C. torminosa

E417 (13 Oct. 1965) 45°12′S, 171°49′E. TM.
Shelly sandy mud with forams. Depth 860 m.
Cymodopsis impudica

E422 (15 Oct. 1965) 44°15′S, 175°00′E. TAM.
Fine sandy mud. Depth 615 m.
Cymodoce allegra, Exosphaeroma gigas

E433 (18 Oct. 1965) 43°43′S, 174°30′E. TAM.
Muddy sand. Depth 571 m.
Cymodoce australis

E820 (23 Oct. 1967) 46°35′S, 165°58′E. TAM.
Bryozoa, worm tubes, live and dead shell. Depth 270 m.
Cymodoce allegra, Exosphaeroma gigas

E834 (26 Oct. 1967) 46°54′S, 168°07.7′E. Stewart I., Halfmoon Bay. Shore collection.
Exosphaeroma obtusum

E948 (20 Oct. 1968) Whale Bay, Raglan. Shore collection. Intertidal.
Exposed boulder shore—rock, stones, gravel, scrubby *Corallina officinalis*. Coll. K. P. Jansen.
Dynamenella condita, Pseudosphaeroma campbellensis

E949 (21 Oct. 1968) Bethell's Beach, N of Manukau Harbour. Shore collection.
Intertidal. Exposed rocky shore, very steep. *Durvillea antarctica, Corallina,* dense mussel beds. Coll. K. P. Jansen.
Dynamenella cordiforaminalis, D. huttoni, Dynamenella spp.

E950 (21 Oct. 1968) Bethell's Beach. Shore collection.
Intertidal. Sheltered sandy shore with pools. Coll. K. P. Jansen.
Isocladus armatus, Exosphaeroma obtusum

E951 (21 Oct. 1968) Bethell's Beach. Shore collection.
Intertidal. Freshwater stream, rock to about mid-tide. *Ulva,* etc. Coll. K. P. Jansen.
Pseudosphaeroma campbellensis

E952 (22 Oct. 1968) Maunganui Bluff, N of Dargaville. Shore collection.
Intertidal. Exposed boulder shore, sandy, dense mussel beds. Coll. K. P. Jansen.
Dynamenella huttoni, Dynamenoides decima, Isocladus reconditus

E953 (23 Oct. 1968) Ocean Beach, outside Whangarei Heads. Shore collection.
Intertidal. Exposed rocky shore, thick mixed algal cover. Coll. K. P. Jansen.
Amphoroidea longipes, A. media, Dynamenella huttoni, Dynamenella sp., *Dynamenopsis varicolor, Isocladus reconditus, Scutuloidea maculata*

E954 (23 Oct. 1968) Urquhart's Beach, inside Whangarei Heads. Shore collection.
Intertidal. Sheltered stony shore. Coll. K. P. Jansen.
Exosphaeroma obtusum

E955 (23 Oct. 1968) Inside Whangarei Heads. Shore collection.
Intertidal. Extensive silt flats, scattered stones, fair fresh water runoff. Coll. K. P. Jansen.
Exosphaeroma planulum

E956 (24 Oct. 1968) Leigh. Shore collection.
Intertidal. Moderately exposed, rock platform about mid-tide level falling to below low water level, weed sparse above, more abundant below. Coll. K. P. Jansen.
Amphoroidea longipes, A. media, Cassidinopsis admirabilis, Cilicaea dolorosa, Dynamenoides decima, D. vulcanata, Isocladus dulciculus

E957 (23 Oct. 1968) Leigh. Shore collection.
Intertidal. Sand, stones, pools, upper littoral. Coll. K. P. Jansen.
Amphoroidea media, Cilicaea dolorosa, Dynamenella huttoni, Dynamenopsis varicolor, Isocladus armatus, I. dulciculus

E958 (25 Oct. 1968) Mount Maunganui. Shore collection.
Intertidal. Moderately sheltered, stones, boulders in sandy pools. Coll. K. P. Jansen.
Isocladus armatus, I. reconditus

E959 (25 Oct. 1968) Mount Maunganui. Shore collection.
Intertidal. Fairly exposed rocky shore, good mixed algal cover. Coll. K. P. Jansen.
Amphoroidea media, Cilicaea dolorosa, Cymodopsis montis, Dynamenella huttoni, Dynamenoides decima, Exosphaeroma obtusum, Isocladus reconditus, I. dulciculus, Scutuloidea maculata

E960 (25 Oct. 1968) Mount Maunganui. Shore collection.
Intertidal. Inside harbour, sheltered stony-sandy beach, about mid-tide level. Coll. K. P. Jansen.
Isocladus armatus, I. dulciculus

E961 (26 Oct. 1968) Mahia Beach, Mahia Peninsula. Shore collection.
Intertidal. Sandy shore, flat sandstone outcropping, very exposed. Coll. K. P. Jansen.
Isocladus armatus

E962 (26 Oct. 1968) Mahia Beach, Mahia Peninsula. Shore collection.
Intertidal. Rocky shore, flat, sparse algae, exposed. Coll. K. P. Jansen.
Isocladus armatus

E966 (5 Nov. 1967) Eve Bay, Wellington. Intertidal wash of algae and their rhizomes. Coll. J. L. Barnard (JLB NZ–1).
Amphoroidea media, Cilicaea dolorosa, Dynamenella huttoni, Dynamenoides decima

E967 (5 Nov. 1967) Eve Bay, Wellington. Wash of numerous rocks and gravel covered with algae. Coll. J. L. Barnard (JLB NZ–2)
Cassidinopsis admirabilis, Cilicaea dolorosa, Cymodocella egregia, Dynamenella condita, D. cordiforaminalis, D. huttoni, Dynamenoides decima, Dynamenopsis varicolor

E969 (22 Jan. 1968) Kaikoura. Intertidal wash of kelp holdfasts (*Lessonia, Macrocystis, Laminaria, Cystophora*), heavy turf of *Gelidium* and *Bostrychia*, alga *Hormosira* and halopterins and echinothamnions. Coll. J. L. Barnard (JLB NZ–4).
Amphoroidea media, Dynamenella cordiforaminalis, D. huttoni, Dynamenopsis varicolor, Dynamenoides vulcanata, Scutuloidea maculata

E971 (23 Jan. 1968) Kaikoura. Wash of rocks in broad shallow channel in mid-intertidal sparse corallines, *Hormosira* and halopterin algae. Coll. J. L. Barnard (JLB NZ–6).
Cilicaea dolorosa, Dynamenella condita, D. huttoni, D. insulsa, Dynamenoides decima, D. vulcanata, Dynamenopsis varicolor, Scutuloidea maculata

E972 (23 Jan. 1968) Kaikoura. Washings of rocks covered with corallines, some *Hormosira*, other algae (?*Haliopteris* especially), or bare rocks in middle intertidal above low water in shallow drain channels. Coll. J. L. Barnard (JLB NZ–7).
Exosphaeroma obtusum, Isocladus armatus

E973 (25 Jan. 1968) St Clair, Dunedin. Intertidal algae, especially pterocladians or strebocladians, heavy turf of *Gelidium, Bostrychia,* and several specimens of *Pyura* sp. Coll. J. L. Barnard (JLB NZ–8).
Dynamenella condita, D. huttoni, Scutuloidea maculata

E974 (25 Jan. 1968) St Clair, Dunedin. Three holdfasts of *Durvillea antarctica,* one compound tunicate in middle. Coll. J. L. Barnard (JLB NZ–9).
Dynamenella huttoni, Isocladus calcareus, Scutuloidea maculata

E975 (15 Feb. 1968) Leigh (Marine Stn). Generalised wash of algae, especially *Carpophyllum, Cystophora,* halopterins in tide pool. Coll. J. L. Barnard (JLB NZ–10).
Amphoroidea media, Cassidinopsis admirabilis, Cilicaea dolorosa, Cymodocella egregia, Dynamenoides decima, Dynamenopsis varicolor, Isocladus dulciculus, Scutuloidea maculata

E976 (15 Feb. 1968) Leigh (Marine Stn). Wash of intertidal algae, especially *Carpophyllum, Cystophora, Hormosira,* halopterins in tide pool. Coll. J. L. Barnard (JLB NZ–11).
Isocladus dulciculus

E977 (15 Feb. 1968) Leigh (Marine Stn). Huaroa Pt, Whangaparaoa Pensinsula. Small high rock pools in surf splash zone, lined with filamentous brown algae.
Wash of *Liagora harveyana* on upper rock platform. Coll. J. L. Barnard (JLB NZ–12).
Cilicaea dolorosa, Cymodocella capra, C. egregia, Dynamenoides vulcanata, Dynamenopsis varicolor, Isocladus dulciculus

E978 (16 Feb. 1968) Huaroa Pt. Whangaparaoa Peninsula. Small high rock pools in surf splash zone, lined with filamentous brown algae. Coll. J. L. Barnard (JLB NZ–13).
Dynamenoides decima, D. vulcanata

E979 (16 Feb. 1968) Huaroa Pt, Whangaparaoa Peninsula. Heavy stand of algae at low water including *Cystophora torulosa* and bases of dying *Codium* sp. Coll. J. L. Barnard (JLB NZ–14).
Amphoroidea media, Cassidinopsis admirabilis, Cilicaea dolorosa, Dynamenoides decima, D. vulcanata, Dynamenopsis varicolor

E980 (16 Feb. 1968) Huaroa Pt, Whangaparaoa Peninsula. Wash of rocks in shallow channels 25 m from low water. Coll. J. L. Barnard (JLB NZ–15).
Isocladus dulciculus

E981 (17 Feb. 1968) Tapeka Pt, near Russell. Intertidal wash of sparse algae, mostly *Hormosira,* plus short cropped *Carpophyllum* and *Cystophora* and others. Coll. J. L. Barnard (JLB NZ–16).
Amphoroidea media, Dynamenella huttoni, Dynamenoides decima

E982 (20 Feb. 1968) Makorori Beach, 13.4 km on road NE of Gisborne town cenotaph. Shore collection. Wash of dense stands of *Cystophora, Carpophyllum* and marine grasses (?*Zostera*) on broad open sea platform, plus sphaeromid-bored siltstone, surf grass occurring on small mesas about 1.5 m in extent, many filamentous brown epiphytes on kelps. Coll. J. L. Barnard (JLB NZ–17).
Cassidinopsis admirabilis, Cilicaea dolorosa, Cymodocella egregia, Dynamenoides vulcanata, Dynamenopsis varicolor, Isocladus dulciculus, Sphaeroma laurensi

E983 (Jan. 1965) Castlepoint. Shore collection. Intertidal. Rock pools. Coll. D. E. Hurley.
Amphoroidea media, Cilicaea dolorosa, Dynamenella cordiforaminalis, Dynamenoides decima, D. vulcanata, Dynamenopsis varicolor, Isocladus calcareus, I. dulciculus, Scutuloidea maculata

E984 (Jan. 1965) Castlepoint. Shore collection. Intertidal. Rock pools. Coll. D. E. Hurley.
Isocladus calcareus

E985 (4 Nov. 1964) Island Bay. Shore collection. Under stones, low tide. Coll. D. E. Hurley.
Amphoroidea media, Exosphaeroma obtusum, Dynamenoides decima

E986 (4 Nov. 1964) Lyall Bay. Seaweed washings. Coll. D. E. Hurley.
Dynamenopsis varicolor

F82 (14 Jan. 1965) 50°01′S, 166°54′E. DCMB. Bryozoan shell grit. Depth 133 m.
TAM. Sponges, hermit crab, brachiopod shells, asteroids. Depth 133 m.
Cymodoce perversa

F94 (17 Jan. 1965) 49°13′S, 168°01′E. DCMB. Small amount of foraminiferal sand, gastropods, etc. Depth 604 m.
TAM. Echinoid fragments, gastropods, hermit crabs, barnacles, etc. Depth 576 m.
Cymodoce australis

F97 (17 Jan. 1965) 48°00′S, 168°32′E. TAM. *Nectocarcinus,* anemones, holothurians, echinoids, asteroids, dead bivalves and gastropods, brachiopods, sponges, etc. Depth 134 m.
Cymodoce allegra, Exosphaeroma gigas

F104 (20 Jan. 1965) 48°40′S, 170°45.5′E. TAM. Off-white sand and mud. Large soft purple echinoid, asteroids, ophiuroids, holothurians, gastropod, hermit crabs, isopods, rat-tails. Depth 814–788 m.
Cymodopsis impudica

F136 (30 Jan. 1965) 51°20′S, 172°42′E. TAM. Globigerina ooze. Sponge, asteroids, holothurians, ophiuroids, live and dead gastropods, coral, etc. Depth 547 m.
Cymodoce australis

F145 (1 Feb. 1965) 53°14′S, 171°48′E. TAM. Globigerina ooze. Holothurians, echinoids, gastropods, hermit crabs, ophiuroids, white spider crabs, bryozoan fragments, empty worm tubes. Depth 435 m.
Cymodoce australis

F147 (1 Feb. 1965) 52°21′S, 173°09′E. TAM. Globigerina ooze. Echinoids, *Hyalinoecia,* corals, gastropods, hermit crabs, bivalves, shrimps, isopods. Depth 611 m.
Cymodoce australis, Cymodopsis sphyracephalata

F753 (18 Aug. 1966) 44°45′S, 174°30′E. TAM. Globigerina ooze. Holothurians, gastropods, *Hyalinoecia, Lithosoma.* Depth 763–854 m.
TM. Mollusca, ophiuroids, isopods, amphipods, cumaceans, polychaetes. Most sediment washed out. Depth 854–788 m.
Cymodopsis impudica

Z1795 (14 Sep. 1962) Cape Hallett. Weed. Dredged. Sta. A.
Cymodocella tubicauda

Z1799 (Sep. 1962) Cape Hallett. Dredged. Sta. B.
Cymodocella tubicauda

Z1801 (22 Sep. 1962) Cape Hallett. Trap. Sta. A.
Cymodocella tubicauda

Z1804 (29 Sep. 1962) Cape Hallett. Dredged. Sta. A.
Cymodocella tubicauda

Z1819 (17 Nov. 1962) Campbell I. Beeman Cove jetty, low spring tide. Intertidal. Coll. A. W. Wright.
Exosphaeroma obtusum

Z1824 (16 Dec. 1962) Campbell I. Lookout Bay. Intertidal. Coll. A. W. Wright.
Cymodocella tubicauda, Exosphaeroma obtusum

Z1829 (28 Dec. 1962) Campbell I. Beeman Cove jetty. Intertidal. Coll. A. W. Wright.
Exosphaeroma obtusum

Z1852 (4 May 1963) Campbell I. Lookout Bay. Intertidal, under rocks, outgoing tide. Coll. A. W. Wright.
Exosphaeroma obtusum

Z1854 (19 May 1963) Campbell I. Camp Cove. Intertidal, low tide, under rocks, sand and mud. Coll. A. W. Wright.
Exosphaeroma obtusum

Z2280 (13 Jan. 1963) Coromandel. In sandy pools (in *Pterocladia, Jania*). Coll. M. J. Gordon.
Isocladus dulciculus

Z2281 Leigh. Algae in pools (*Carpophyllum plumosum*)
Cilicaea dolorosa, Scutuloidea maculata

Z2282 (28 Mar. 1963) Narrow Neck. Coll. M. J. Gordon.
Amphoroidea media

Z2283 (24 Mar. 1963) Piha. Lion Rock. Coll. M. J. Gordon.
Dynamenella huttoni, Scutuloidea maculata

Z2284 (Jan. 1960) New Plymouth. Fitzroy Beach. Tidal pools in sandy beach. Coll. D. E. Hurley.
Isocladus armatus

Z2285 (1 Oct. 1952) Otago. Blueskin Bay. Trawled, fishing vessel *Grace*. Depth 20 m. Coll. D. E. Hurley.
Cassidina typa, Cilicaea caniculata, Cymodoce australis, C. penserosa

Z2286 (1952) Portobello. Coll. D. E. Hurley.
Cilicaea caniculata

Z2287 Castlepoint. Coll. R. B. Pike.
Cilicaea dolorosa

Z2288 (28 Nov. 1949) Campbell I. Perseverance Harbour. Under stones, met. station jetty. Coll. M. Laird.
Exosphaeroma obtusum

Z2289 (8 Sep. 1952) Otago Harbour. Quarantine I. Under stones. Coll. D. E. Hurley.
Exosphaeroma obtusum

Z2290 (8 Apr. 1952) Portobello. Jetty reef, Marine Station. Coll. D. E. Hurley.
Cilicaea caniculata, Isocladus calcareus

Z2291 (20 Jan. 1953) Portobello. Wharfblocks, Marine Station jetty. Coll. D. E. Hurley.
Cilicaea caniculata

Z2292 (10 Nov. 1952) Portobello. Light, Marine Station jetty. Coll. D. E. Hurley.
Cilicaea caniculata, Isocladus armatus

Z2293 (1952–1954) Portobello. Wharfblocks, Marine Station jetty. Coll. D. E. Hurley.
Cilicaea caniculata, Isocladus spiculatus

Z2294 (2 Oct. 1952) Portobello. Marine Station; off bryozoan. Coll. D. E. Hurley.
Cilicaea caniculata

Z2295 (20 Jul. 1952) Portobello. Off sponge-covered *Pyura* stalk cast on beach at Marine Station. Coll. D. E. Hurley.
Cilicaea caniculata

Z2296 (22 Apr. 1953) Portobello. Off wharf-piles. Coll. D. E. Hurley.
Cilicaea caniculata

Z2296a (Apr. 1953) Portobello. Middle sandbank near Port Chalmers. On *Macrocystis* holdfast. Coll. D. E. Hurley.
Cilicaea caniculata

Z2297 Tangoio. Coll. D. E. Hurley.
Amphoroidea media, Dynamenoides decima, Scutuloidea maculata

Z2298 (19 Feb. 1949) Island Bay. Seaweed, rock pool. Coll. D. E. Hurley (Coll. No. 61).
Dynamenella huttoni, Dynamenoides decima, Dynamenopsis varicolor

Z2299 (21 Nov. 1964) Castlepoint. LWST. Coll. R. B. Pike.
Cilicaea dolorosa, Dynamenopsis varicolor, Exosphaeroma obtusum, Isocladus calcareus

Z2300 (2 Dec. 1949) Macquarie I. Buckle Bay. Tidepool under stones. Coll. M. Laird.
Exosphaeroma gigas

Z2301 (2 Dec. 1949) Macquarie I. Aerial Cove. Tidepool under stones. Coll. M. Laird.
Exosphaeroma gigas

Z2302 (May 1967) Portobello. Under stones. LMTL. Coll. K. P. Jansen.
Exosphaeroma planulum

Z2303 (8 Mar. 1957) Westport. Ironbank pile 1.6 km up Buller River from sea.
Sphaeroma quoyanum

Z2304 (1 Aug. 1950) Island Bay. Off *Lessonia.* Coll. Dr J. G. Gibbs.
Amphoroidea longipes, Dynamenopsis varicolor, Scutuloidea maculata

Z2305 (4 Nov. 1964) Pt. Jerningham. From sea wall gutter UHTL. Coll. D. E. Hurley.
Exosphaeroma obtusum

Z2306 (14 Aug. 1950) Pt. Jerningham. Coll. D. E. Hurley.
Amphoroidea media

Z2307 (May 1950) Moa Point. Off *Laminaria.* Coll. J. G. Gibbs.
Amphoroidea media

Z2308 (13 Apr. 1963) Coromandel. Minifies Beach. In *Pterocladia.* Coll. M. J. Gordon.
Amphoroidea media, Dynamenella huttoni, Isocladus dulciculus, Scutuloidea maculata

Z2309 (6 Jun. 1952) Otago Harbour. Portobello Marine Station, sieved from sandbank. Coll. D. E. Hurley.
Isocladus spiculatus

Z2310 (3 Jun. 1952) Otago Harbour. Portobello Marine Station, small jetty, light. Coll. D. E. Hurley.
Isocladus spiculatus

Z2312 Te Wainui. Coll. D. E. Hurley.
Cilicaea dolorosa

Z2313 (May 1951) Brothers Is. Off seaweed. Coll. C. A. Bradstock.
Dynamenella huttoni, Scutuloidea maculata

Z2314 (3 Nov. 1957) Warrington-Karitane. 18–22 m.
Cassidina typa

Z2315 (Dec. 1949) Macquarie I. Garden Cove. Under stones. Coll. M. Laird.
Exosphaeroma gigas

National Museum Collections

CAPE EXPEDITION

[1] Cape Expedition 10. Station 3, No. 2. Campbell I.
Exosphaeroma obtusum

[2] WHD 278 (20 Jul. 1943) No. 1 Sta. Port Ross, Auckland Is. In rock pools. Coll. W. H. Dawbin.
Exosphaeroma obtusum, Dynamenella huttoni, Pseudosphaeroma campbellensis

[3] WHD 332 (7 Aug. 1943) Crozier Point, Auckland Is. Under boulders, low tide. Coll. W. H. Dawbin.
Exosphaeroma obtusum

[4] WHD 332 (11 Aug. 1943) Ewing I., Port Ross, Auckland Is. Coll. W. H. Dawbin.
Amphoroidea falcifer, Dynamenella huttoni

[5] WHD 370 (21 Aug. 1943) Laurie Harbour, Auckland Is. In mud flat, head of harbour, among old shells. Coll. W. H. Dawbin.
Exosphaeroma obtusum

[6] WHD 474 (6 Oct. 1943) North Arm, Carnley Harbour, Auckland Is. Among stones at high tide, mud flat. Coll. E. M. & W. D.
Exosphaeroma obtusum, Pseudosphaeroma campbellensis

[7] (19 May 1944) Ranui Cove, Auckland Is. Coll. E. G. Turbott.
Exosphaeroma obtusum

[8] RO 79 (4 Nov. 1944) Perseverance Harbour, Campbell Is. Off Shoal Point, 16 fm (30 m). Coll. R. Oliver.
Cymodoce australis

AUCKLAND ISLANDS

[9] (29 Mar. 1927) Hanfield Inlet, Auckland Is. Coll. W. R. B. Oliver.
Exosphaeroma gigas

[10] (Feb. 1950) Long Bay, Auckland Is. Coll. R. K. Dell.
Exosphaeroma obtusum

[11] (18 Mar. 1954) Sandy Bay, Enderby I., Auckland Is. Seaweed washings. Coll. R. K. Dell.
Dynamenella huttoni

[12] (8 Nov. 1954) Ranui Cove, Auckland Is. Intertidal. Coll. E. S. Gourlay.
Exosphaeroma obtusum, Pseudosphaeroma campbellensis

[13] (12 Nov. 1958) Laurie Harbour, Port Ross, Auckland Is. At foot of Hobson Hills, under stones of small creek above HT level. Coll. E. S. Gourlay.
Exosphaeroma obtusum

[14] (Dec. 1962) Ranui Cove, Auckland Is. Intertidal, under stones. Coll. J. C. Yaldwyn.
Exosphaeroma obtusum

[15] (Dec. 1962) Crozier Point, Port Ross, Auckland Is. From nest of red-billed gull. Coll. J. C. Yaldwyn.
Amphoroidea falcifer

[16] (Jan. 1963) Tucker Point, Auckland Is. Intertidal stones just inside Tucker Point. Coll. J. C. Yaldwyn.
Exosphaeroma obtusum

[17] (Jan. 1963) Ranui Cove, Auckland Is. Under intertidal stones. Coll. J. C. Yaldwyn.
Exosphaeroma obtusum

[18] (Jan. 1963) Between Deas Head and Tucker Point, Auckland Is. 12–15 fm (22–27 m). Coll. J. C. Yaldwyn.
Cymodoce australis

CAMPBELL ISLAND

[19] (Nov. 1952) Perseverance Harbour, Campbell I. Coll. J. Moreland.
Exosphaeroma obtusum

[20] (23 Jan. 1958) NW Campbell Is. Rock pools. Coll. R. J. Street, Marine Department.
Pseudosphaeroma campbellensis

[21] (1958) Coll. P. G. Poppleton.
Exosphaeroma obtusum

NEW ZEALAND

[22] (1 May 1913) Off Petane, Napier. Dredged.
Cassidina typa

[23] (25 Sep. 1922) Lyall Bay, under base of *Durvillea*.
Dynamenella hirsuta, D. huttoni, Dynamenopsis varicolor

[24] (Nov. 1934) Tasman Bay. Dredged. Coll. M. Young.
Cassidina typa

[25] (8 Feb. 1946) Facile Harbour, Dusky Sound. Coll. W. H. Dawbin, Pres. L. R. Richardson. Cr 1522.
Cilicaea caniculata

[26] (18 Feb. 1946) Smith Sound, Dusky Inlet. 30 fm (55 m). Coll. W. H. Dawbin, Pres. L. R. Richardson. Cr 1521.
Cilicaea dolorosa

[27] (21 Dec. 1947) Lyall Bay, under stones, mid-tide. Coll. R. K. Dell.
Cilicaea dolorosa, Dynamenella huttoni, Dynamenoides vulcanata, Exosphaeroma obtusum, Isocladus armatus, I. dulciculus

[28] (13 Sep. 1948) Stephens I., Cook Strait. Intertidal. Coll. R. K. Dell.
Dynamenella condita

[29] (8 Nov. 1948) Sealers Bay, Codfish I. Stewart I. Coll. R. K. Dell.
Exosphaeroma obtusum

[30] (27 Feb. 1949) Lyall Bay. Coll. R. K. Dell.
Cilicaea dolorosa, Exosphaeroma obtusum

[31] (1 Aug. 1950) Island Bay. Off *Lessonia*.
Amphoroidea longipes

[32] (14 Aug. 1950) Port Hutt, Chatham Is. Surface, under floodlight. Coll. P. Abernathy.
Amphoroidea longipes

[33] (5 Nov. 1950) Ringdove Bay, Antipodes I. Over 15 fm (27 m). *Macrocystis* cover. 2300 h. Coll. R. K. Dell.
Amphoroidea falcifer

[34] (10 Nov. 1952) Portobello Marine Biological Station, Otago Harbour. Coll. J. Moreland. Surface.
Cilicaea caniculata, Isocladus armatus

[35] (May 1953) Off Cape Campbell. 40 fm (73 m). Coll. P. Abernathy.
Cassidina typa

[36] (14 Sep. 1954) Hutt River, Wellington. 1.6 km up from mouth. Coll. E. M. Sladden. Cr 620.
Sphaeroma quoyanum

[37] (24 Jan. 1955) Murderers Cove, South Cape I., SW Stewart I. Coll. R. K. Dell & B. A. Holloway.
Dynamenella huttoni

[38] (14 Aug. 1955) Off Portobello Marine Station wharf, Otago Harbour. 2–4 fm (4–7 m). Coll. R. K. Dell & J. Moreland.
Cilicaea caniculata

[39] (8 Sep. 1955) Off Cape Campbell. 40 fm (73 m). Coll. P. Abernathy.
Cilicaea tasmanensis

[40] (20 May 1956) Solander I., Foveaux Strait. Coll. R. K. Dell. Cr 629.
Amphoroidea falcifer

[41] (3 Jan. 1957) BS 195. West of Trio I., entrance to Admiralty Bay. 40°50′S, 173°58′E. 16 fm (30 m). m.v. *Alert*.
Cymodoce hodgsoni

[42] (Jan. 1957) Manukau Harbour. Dredged. Coll. J. C. Yaldwyn.
Sphaeroma quoyanum

[43] (21 Jan. 1957) Dunedin wharves. By nightlight. Coll. R. K. Dell & J. Moreland.
Isocladus spiculatus

[44] (1 Jan. 1963) Ngiare Beach, Whangaroa. Under stones, low tide.
Isocladus armatus

[45] (11 Nov. 1963) Tauranga Bay, Whangaroa Harbour. Coll. R. K. Dell.
Amphoroidea falcifer, A. media, Dynamenella huttoni

[46] (12 Nov. 1963) Tauranga Bay, Whangaroa Harbour. Around mouth of *Centrostephanus*. Coll. R. K. Dell.
Exosphaeroma echinensis

[47] (20 Nov. 1963) Katherine Bay, Gt. Barrier I. Coll. R. D. Ordish.
Isocladus armatus

Canterbury University Collections

AUCKLAND ISLAND

[48] (27 Dec. 1962) Sta. 1. Ranui Cove, *Xiphophora* zone, under rocks. Coll. G. A. Knox.
Dynamenella huttoni, Exosphaeroma obtusum

[49] (27 Dec. 1962) Sta. 2. Ewing I. Drift algae. Coll. G. A. Knox.
Pseudosphaeroma campbellensis

[50] (28 Dec. 1962) Sta. 3. Ocean I. Platform, lower midlittoral. Coll. G. A. Knox.
Dynamenella huttoni

[51] (28 Dec. 1962) Crozier Pt. *Durvillea antarctica* holdfast.
Amphoroidea falcifer, Dynamenella huttoni

[52] (29 Dec. 1962) Sta. 4. Ocean I. Pool, rocky platform, midlittoral. Coll. G. A. Knox.
Amphoroidea falcifer, Dynamenella huttoni, Isocladus calcareus

[53] (30 Dec. 1962) Lindley Pt. Under boulders, *Durvillea* zone. Coll. G. A. Knox.
Dynamenella huttoni, Exosphaeroma obtusum, Pseudosphaeroma campbellensis

[54] (8 Jan. 1963) Ranui Cove, 2–3 fm (4–6 m). Coll. G. A. Knox.
Amphoroidea falcifer, A. longipes

[55] (9 Jan. 1963) Ranui Cove. Lower midlittoral. Algae. Coll. G. A. Knox.
Dynamenella huttoni

[56] (13 Jan. 1963) French I. *Durvillea antarctica*. Coll. G. A. Knox.
Amphoroidea falcifer, Dynamenella huttoni

[57] (14 Jan. 1963) Ranui Cove.
Amphoroidea falcifer, Isocladus calcareus

[58] (15 Jan. 1963) Ranui Cove. *Macrocystis* holdfast.
Isocladus calcareus

[59] (16 Jan. 1963) Enderby I. Midlittoral shelf. Coll. G. A. Knox.
Dynamenella huttoni, Exosphaeroma gigas, E. obtusum

[60] (17 Jan. 1963) Derry Castle Reef, Enderby I. Under rocks, upper littoral. Coll. G. A. Knox.
Exosphaeroma gigas, Isocladus calcareus, Pseudosphaeroma campbellensis

[61] (18 Jan. 1963) Lindley Pt. Littoral mussel community. Coll. G. A. Knox.
Cilicaea caniculata

[62] (18 Jan. 1963) Port Ross. 12–14 fm (22–26 m). Coll. J. Moreland.
Cymodoce australis

SNARES ISLAND

[63] (4 Jan. 1961) With sponges, pool, *Durvillea* zone.
Amphoroidea falcifer, Cymodoce allegra, C. australis, Dynamenella condita, D. huttoni

[64] (5 Jan. 1961) Pool. *Durvillea* zone.
Cymodoce australis, Dynamenella condita, Isocladus calcareus

[65] (20 Jan. 1961)
Dynamenella condita, D. huttoni

[66] (26 Jan. 1961) *Durvillea* holdfast. Coll. G. A. Knox.
Dynamenella condita, D. huttoni

[67] (29 Jan. 1961) Under rocks, lower littoral. Coll. G. A. Knox.
Dynamenella condita, Exosphaeroma obtusum

[68] (2 Feb. 1961) Upper sublittoral, below *Durvillea*.
Dynamenella condita, D. huttoni, Scutuloidea maculata

[69] (3 Feb. 1961)
Dynamenella condita, D. huttoni, Scutuloidea maculata

[70] (4 Feb. 1961) Upper sublittoral. Boat harbour.
Dynamenella condita, Scutuloidea maculata

[71] (4 Feb. 1961) In algae under *Durvillea*.
Dynamenella condita, D. huttoni, Scutuloidea maculata

[72] (6 Feb. 1961) *Lessonia* holdfasts.
Dynamenella condita, D. huttoni, Exosphaeroma obtusum, Isocladus calcareus, Pseudosphaeroma campbellensis

[74] Coll. G. A. Knox.
Dynamenella condita, D. hirsuta, D. huttoni, Scutuloidea maculata

STEWART ISLAND

[75] (9 Jan. 1964) Port Pegasus, Pegasus Passage. Upper littoral in *Elminius* shells, *Bostrychia* zone. Coll. K. P. Jansen.
Pseudosphaeroma campbellensis

[76] (12 Jan. 1964) Port Pegasus, entrance to Smallcraft. *Apophloea* zone, under rocks. Coll. K. P. Jansen.
Dynamenella huttoni, Exosphaeroma obtusum, Pseudosphaeroma campbellensis

[77] (18 Jan. 1964) Mason's Bay, N end. Rock pool, lower midlittoral. Coll. K. P. Jansen.
Dynamenella huttoni, Exosphaeroma obtusum, Scutuloidea maculata

[78] (18 Jan. 1964) Mason's Bay, north end. *Durvillea* holdfast. Coll. K. P. Jansen.
Dynamenella huttoni, Exosphaeroma obtusum

[79] (19 Jan. 1964) Little Hellfire. In and under *Durvillea* holdfasts. Coll. K. P. Jansen.
Dynamenella huttoni, Exosphaeroma obtusum

[80] (19 Jan. 1964) Little Hellfire, midlittoral rock pool. Coll. G. A. Knox.
Dynamenella huttoni, Scutuloidea maculata

[81] (20 Jan. 1964) Bay south of Richards Point. Littoral rocks and pools. Coll. K. P. Jansen.
Dynamenella huttoni, Pseudosphaeroma campbellensis

[82] (22 Jan. 1964) Hellfire. Rockpools *Durvillea* zone. Coll. G. A. Knox.
Dynamenella huttoni, Scutuloidea maculata

[83] (22 Jan. 1964) Hellfire. Lower littoral. *Porphyra* to *Ulva*. Coll. K. P. Jansen.
Dynamenella huttoni

Edward Percival Marine Laboratory (EPML)
Kaikoura

[84] (6 May 1962) K020.Y. Kaikoura Peninsula, South Bay NE of slipway. Limestone. Lower *Hormosira* zone, open faces.
Cilicaea dolorosa, Isocladus calcareus

[85] (20 May 1962) K091.C. Kaikoura Peninsula.
Amphoroidea falcifer

[86] (27 Aug. 1962) K149.B. Kaikoura Peninsula, South Bay. Rocks, low tide.
Isocladus calcareus

[87] (30 Aug. 1962) K150.D. Goose Bay, *Durvillea* holdfasts.
Amphoroidea falcifer

[88] (31 Aug. 1962) K344.A. Kaikoura Peninsula. Old wharf. Dip netting, 2130 h, low tide, strong chop from NE after NE wind of short duration, bright moon largely obscured by cloud [Note: K149.A, K396.F have been added to K344A].
Exosphaeroma obtusum, Isocladus calcareus

[89] (3 Sep. 1963) K350.A. Kaikoura Peninsula, Sugar Loaf Pt. Midlittoral under rocks.
Isocladus armatus

[90] (1 Sep. 1964) K396.G. Kaikoura Peninsula, Old Wharf. 2100–2200 h. Dark night, southerly wind. about 2 h after wind change.
Dynamenella huttoni

[91] (1 Sep. 1964) K396.Z. As [90].
Scutuloidea maculata

[92] (3 Sep. 1964) K405.B. Kaikoura Peninsula, Seal Reef, SE side. LWST, from *Caulerpa brownii*.
Cilicaea dolorosa

[93] (3 Sep. 1964) K406.U. Kaikoura Peninsula, Seal Reef, NE corner under *Durvillea antarctica* holdfasts.
Dynamenella hirsuta, D. huttoni

[94] (3 Sep. 1964) K408.Z. Kaikoura Peninsula, Seal Reef, E side LWST, from *Carpophyllum maschalocarpum*.
Dynamenopsis varicolor

[95] (3 Sep. 1964) K414.E. Kaikoura Peninsula, Seal Reef, E side. LWST, from holdfasts of *Lessonia*.
Dynamenella huttoni

[96] (3 Sep. 1964) K420.B. As [93].
Dynamenella hirsuta, D. huttoni

[97] (3 Sep. 1964) K422.L. As [95].
Dynamenella hirsuta, D. huttoni

[98] (3 Sep. 1964) K424.R. As [95] but from stipe.
Amphoroidea media, A. longipes

[99] (3 Sep. 1964) K425.A. As [95] but from frond.
Amphoroidea longipes, Dynamenella cordiforaminalis

[100] (3 Sep. 1964) K425.C. As [95] but from frond.
Scutuloidea maculata

[101] (11 May 1965) K514.H. Kaikoura Peninsula, Wairepo Flat, opposite Sime farm, pool in *Zostera*. LWNT. Pool 3.0 × 2.4 × 0.3 m, pebbly bottom. Rotenone poisoning.
Isocladus armatus

[102] (3 Sep. 1964) K555.A. Continuation of [93].
Dynamenella cordiforaminalis

[103] (3 Sep. 1964) K556.A. Continuation of [94].
Dynamenella cordiforaminalis, D. insulsa

[104] (1967) Ex Kaikoura. Coll. K. P. Jansen.
Amphoroidea media, Cassidina typa, Cilicaea caniculata, Cymodocella egregia, Dynamenella condita, D. cordiforaminalis, D. huttoni, D. insulsa, Dynamenoides vulcanata, Dynamenopsis varicolor, Exosphaeroma echinensis, E. obtusum, Isocladus armatus, I. calcareus, Scutuloidea maculata.

[105] (1967) Kaikoura. Coll. K. P. Jansen.
Dynamenella cordiforaminalis

[106] (13 Nov. 1966) Kaikoura. Coll. K. P. Jansen.
Dynamenella cordiforaminalis

[107] (1967) Kaikoura. Coll. K. P. Jansen.
Dynamenella hirsuta, Isocladus armatus

[108] (1967) Kaikoura. Coll. K. P. Jansen.
Isocladus calcareus

[109] (1967) Kaikoura. Coll. K. P. Jansen.
Dynamenella condita

[110] (1 May 1967) Sugarloaf, Whalers Bay, LWNS. Under stones. Coll. K. P. Jansen.
Dynamenopsis varicolor

[111] (5 May 1967) Sugarloaf. *Carpophyllum*, LWN.
Amphoroidea media, Dynamenella cordiforaminalis

[112] (Aug. 1961) Kaikoura. Coll. R. L. Pilgrim.
Cymodocella egregia, Dynamenella huttoni

[113] (6-7 Aug. 1967) Seal Reef. *Durvillea antarctica* holdfasts. LML–LWN.
Dynamenella hirsuta

[114] (5 Jul. 1968) St. Kilda Rocks, Kaikoura. 8 m. Under and among spines of *Evechinus*. Coll. T. Dix.
Exosphaeroma echinensis

[115] (27 May 1967) From about soft, sublittoral, off Seal Reef. Coll. T. Dix.
Exosphaeroma echinensis

[116] *Durvillea* holdfasts. Coll. K. P. Jansen.
Dynamenella hirsuta

[117] (15 Feb. 1968) 4 km ENE of Kaikoura, 90–110 m. Coll. L. D. Bowring.
Cassidina typa

[118] (24 Oct. 1964) C.039. Christchurch. Under Heathcote bridge. General collection from pilings, rocks and mud. Lowest 0.75 m of piling thickly slimed. Lowest part of shore of jelly-like mud, evil smelling. [C.039.M.—"speckled sphaeromid amongst *Elminius*".] Coll. J. F. C. Morgans.
Pseudosphaeroma campbellensis

[119] (24 Oct. 1964) C.042. Christchurch. McCormacks Bay outfall tower, from wood and iron within 0.3 m of tower base, i.e., about 0.5 m from LW (−15 cm predicted for Lyttelton). N.B. *Ulva*, *Modiolus*, and *Elminius* from a turf with silt. [C.042.N.—"speckled isopod"]. Coll. J. F. C. Morgans.
Pseudosphaeroma campbellensis

[120] (26 Oct. 1964) C.049. Christchurch. Pleasant Pt Domain jetty, Heathcote Estuary. General collection from all levels from wood and rocks of and at tip of jetty (at LW). Apparently no boring animals here in wood. [C.049.G.—"speckled isopod from ½–4½ft above LW".] Coll. J. F. C. Morgans.
Exosphaeroma planulum, Pseudosphaeroma campbellensis

[121] (28 Oct. 1964) C.061. Christchurch. Avon River at corner of Kebblewhite St from stones at LW and

up to 0.3 m above. [C.061.E.—"speckled sphaeromids".] Coll. J. F. C. Morgans.
Exosphaeroma planulum

[122] (11 Jul. 1965) Christchurch. Heathcote–Avon Estuary. Wooden post above MTL. Coll. K. P. Jansen.
Pseudosphaeroma campbellensis

[123] (9 Feb. 1967) Christchurch. Heathcote–Avon Estuary. Among mussels on jetty. Coll. K. P. Jansen.
Pseudosphaeroma campbellensis

[124] (3 Apr. 1967) As [123].
Pseudosphaeroma campbellensis

[125] (19 May 1966) Matheson's Bay, near Leigh, Auckland, east coast. From LMTL. Coll. K. P. Jansen.
Isocladus dulciculus

[126] (1967) Hatfields Beach, near Auckland, east coast. Coll. K. P. Jansen.
Exosphaeroma planulum, Isocladus armatus, Sphaeroma quoyanum

[127] Dargaville. From LMTL, exposed sandy beach. Coll. R. Murray.
Isocladus reconditus

John Graham Collection

[128] (Aug. 1960) On *Pectinura maculata*. 15 fm (27 m).
Cassidina typa

[129] (Jun. 1963) Z1. [="Intertidal rocks, exposed at low tide, north and south of the Kakanui River mouth and those around Cape Wanbrow, the intervening beaches and the Oamaru Harbour"—Graham 1962]
Exosphaeroma obtusum

[130] (Aug. 1963) Z1 A. Oamaru Harbour.
Cilicaea caniculata

[131] (Sep. 1963) Z1. Cape Wanbrow, Oamaru.
Cymodocella egregia, Dynamenella huttoni, Exosphaeroma obtusum, Isocladus calcareus

Portobello Marine Biological Station

[132] (2 Aug. 1953) Little Papanui. Coll. E. J. Batham.
Isocladus calcareus

[133] (2 Sep. 1953) Portobello Marine Station jetty, with light. Coll. E. J. Batham.
Cilicaea caniculata, Isocladus spiculatus

[134] (25 Jan. 1960) Sta.D. Doubtful Sound. Shaded shore, rock, lower intertidal. Coll. E. J. Batham.
Exosphaeroma obtusum

N.Z. Geological Survey

[135] (1 Aug. 1950) Island Bay. Dredged, considerable depth.
Cilicaea tasmanensis

National Museum of Victoria, Australia

[136] (Dec. 1959) Garden Cove, Macquarie Island.
Exosphaeroma gigas

Chilton Collection, Canterbury Museum

[137] (Nov. 1915) Cuvier I. Coll. P. W. Grenfell.
Amphoroidea falcifer, Scutuloidea maculata

[138] Takapuna, Auckland. Coll. R. M. Laing.
Dynamenella cordiforaminalis, Dynamenoides vulcanata

[139] Auckland. 'Juvenile' *I. armatus*. Suter Collection.
Exosphaeroma chilensis, E. obtusum, Isocladus armatus, I. dulciculus

[140] (Nov. 1907) Campbell I. Taken on shore at mouth of a small freshwater stream.
Pseudosphaeroma campbellensis

[141] Halfmoon Bay, Stewart I. Coll. W. R. B. Oliver. No. 105.
Pseudosphaeroma campbellensis

[142] Golden Bay, Stewart I. Coll. W. R. B. Oliver. No. 93.
Pseudosphaeroma campbellensis

[143] Lyttelton. H. Suter Collection. CM1.
Scutuloidea maculata

[144] Sumner, N.Z. Coll. H. Suter. CM2.
Scutuloidea maculata

[145] (Nov. 1918) Cape Maria van Diemen. Coll. T. B. Smith. CM3.
Scutuloidea maculata

[146] (16 Nov. 1906) Lyttelton, N.Z. Coll. C. Chilton. CM4.
Scutuloidea maculata

[147] Tauranga, N.Z. Coll. W. R. B. Oliver. No. 259. CM5.
Scutuloidea maculata

[148] (4 Apr. 1920) Tauranga. On *Pterocladia lucida*. Coll. W. R. B. Oliver. CM6.
Scutuloidea maculata

[149] Lyttelton, N.Z. CM7.
Dynamenella cordiforaminalis

[150] Lyttelton, N.Z. Jar 211. CM8.
Dynamenella cordiforaminalis

[151] (14 Jun. 1923) Lyttelton Harbour. Coll. E. W. Bennett. CM9.
Dynamenella cordiforaminalis

British Museum (BM) Collection

[152] Rendezvous Cove, Auckland Is. 43–70. Presented by Lt. Smith, *Erebus*, during Antarctic voyage. [Material seen by Miers (1876)]
Exosphaeroma gigas

[153] Auckland Is. S6.56.
Exosphaeroma obtusum

[154] Stewart I., N.Z. Presented by Miss A. Lysaght 1949. 1955. 10. 20. 8–10.
Exosphaeroma obtusum

[155] Takapuna Beach, Auckland. Suter Collection. 99. 7–18. 9–11.
Exosphaeroma chilensis

[156] "New Zealand". 52–43. ("Co-types").
Cymodoce convexa

[157] "New Zealand". 50–53. ("Type").
Cymodoce granulata

Terra Nova (TN) Collections

TN Sta.96 3 Aug. 1911 11.3 km E of North Cape, N.Z. Depth 128 m. Agassiz trawl.
Cymodoce hodgsoni

TN Sta.133 30 Aug. 1911 Spirits Bay, near North Cape. Depth 20 m. Plankton.
Exosphaeroma obtusum, E. falcatum

TN Sta.135 1 Sep. 1911 Spirits Bay, near North Cape. Depth 3 m. Plankton.
Exosphaeroma obtusum

TN Sta.136 2 Sep. 1911 Spirits Bay, near North Cape. Surface.
Exosphaeroma obtusum

Victoria University of Wellington Zoology Department (VUZ, VUC)

Collection No. 83 (Sta.JUG). 41°42.3′S, 175°9′E (7 Feb. 1957). Depth c.550 fm (c.1 000 m). Mud, shell, rock, gravel. Beam trawl fished on bottom.
Cymodopsis impudica

Collection No. 98 (Sta.COM/N) 41°33′S, 174°50′E (29 Aug. 1957). Depth c.150 fm (c.275 m). Shell, sand, stones. Beam trawl fished on bottom.
Cassidina typa

Collection No. 99 (Sta.DOJ) 41°34.30′S, 174°43.30′E (29 Aug. 1957). Depth c.150 fm (c.275 m). Shell, sand, stones. Beam trawl fished on bottom.
Cassidina typa

Collection No. 101 (Sta.GOP) 41°38′S, 174°53.30′E (29 Aug. 1957). Depth c.550 fm (c.1 000 m). Mud. Beam trawl fished on bottom.
Cassidina typa

Chatham Islands 1954 Expendition (CI.)

Sta.9 (25 Jan. 1954) Glory Bay, Pitt I. Shore collection.
Dynamenella huttoni, Isocladus armatus

Sta.11 (26 Jan. 1954) Owenga. Shore collection.
Dynamenella huttoni, Dynamenopsis varicolor, Exosphaeroma chilensis, E. obtusum, Isocladus armatus

Sta.12 (26 Jan. 1954). Owenga. Hand net.
Amphoroidea falcifer, A. longipes, A. media, Dynamenopsis varicolor, Exosphaeroma obtusum, Isocladus dulciculus, Scutuloidea maculata

Sta.16 (27 Jan. 1954) Kaingaroa. Shore collection.
Dynamenopsis varicolor, Exosphaeroma obtusum, Isocladus calcareus, I. inaccuratus

Sta.19 (28 Jan. 1954) 43°38.2′S, 176°38′E. Rocky bottom, large dredge. 46 m.
Amphoroidea media, Cilicaea caniculata

Sta.22 (29 Jan. 1954) The Sisters. Shore collection.
Dynamenella cordiforaminalis, Dynamenopsis varicolor, Isocladus inaccuratus

Sta.25 (29 Jan. 1954) Waitangi Wharf. Shore collection.
Amphoroidea falcifer

Sta.26 (30 Jan. 1954) Waitangi. Shore collection.
Dynamenella huttoni

Sta.47 (7 Feb. 1954) Kaingaroa. Hand net.
Amphoroidea falcifer, A. media, Dynamenopsis varicolor

Sta.48 (8 Feb. 1954) Port Hutt. Shore collection.
Amphoroidea falcifer, Dynamenella huttoni

Sta.49 (8 Feb. 1954) Port Hutt. Shore collection.
Amphoroidea longipes, Cilicaea caniculata

Sta.52 (10 Feb. 1954) 44°04′S, 178°04′W. Fine green sandy mud. Large dredge. 476 m.
Cilicaea caniculata

Sta.59 (11 Feb. 1954) 43°38′S, 177°19′E. Fine green sandy mud. Large dredge. 531 m.
Cilicaea caniculata

Copenhagen Museum Collections (COP.)

Cop. 1 Three Kings. Depth 119 m.
Cilicaea dolorosa

Cop. 2 Cape Maria van Diemen. 16.1 km NW.
Cilicaea caniculata

Cop. 3 Cape Maria van Diemen.
Amphoroidea longipes, Dynamenella huttoni, Scutuloidea maculata

Cop. 4 North Cape.
Cymodopsis montis, Dynamenopsis varicolor, Exosphaeroma obtusum, Isocladus dulciculus

Cop. 5 Cape Brett.
Dynamenella cordiforaminalis, D. hirsuta, D. huttoni, D. mortenseni, Dynamenopsis varicolor

Cop. 6 Bay of Islands.
Cilicaea caniculata, Cymodocella capra, Dynamenoides decima, Isocladus armatus

Cop. 7 (29 Nov 1914) Little Barrier I. Depth 55 m. Coll. Mortensen's Expedition.
Cilicaea angustispinata, Cymodoce hodgsoni, C. iocosa

Cop. 8 Colville Channel. Depth 55 m. Sand.
Cymodoce hodgsoni

Cop. 9 Hauraki Gulf, 18 m.
Cilicaea angustispinata

Cop.10 North Channel, Kawau Is, Hauraki Gulf. 18 m.
Cilicaea angustispinata

Cop.11 Auckland, Ponui I.
Isocladus dulciculus

Cop.12 Puhoi Rock, Hauraki Gulf.
Dynamenella huttoni

Cop.13 Cape Kidnappers.
Isocladus armatus

Cop.14 Mahia Peninsula.
Exosphaeroma obtusum

Cop.15 Plimmerton.
Exosphaeroma obtusum

Cop.16 Wellington Harbour. Depth 9–18 m.
Cassidina typa

Cop.17 Island Bay, Wellington.
Cilicaea caniculata

Cop.18 Akaroa.
Isocladus armatus

Cop.19 Lyttelton Harbour.
Cilicaea caniculata

Cop.20 Stewart I., Pegasus Bay.
Exosphaeroma obtusum

Cop.21 Stewart Is., Halfmoon Bay.
Cilicaea caniculata, Isocladus calcareus

Cop.22 Auckland I., Carnley Harbour.
Isocladus calcareus

Cop.23 (15 Aug. 1938) New Plymouth. Coll. P. Heegard.
Dynamenella condita

"Galathea" Stations (GAL.)

Gal.581 (30 Dec. 1951) Perseverance Harbour, Campbell I. 52°33′S, 169°08′E. Dip net, lantern light. Depth 30 m.
Exosphaeroma obtusum

Gal.594 (4 Jan. 1952) Off Perseverance Harbour, Campbell I. 52°33′S, 169°10′E. Oyster dredge. Mud with sand, shells, and stones. Surface temp. 8.6°c, bottom temp. 8.3°c. Depth 46 m.
Cymodoce australis

Gal.595 (4 Jan. 1952) Perseverance Harbour, Campbell I. 52°33′S, 169°09′E. Rectangular dredge, 100 × 30 cm. Mud with sand, shells, and stones. Surface temp. 8.6°c. Depth 43 m.
Cymodoce australis

Gal.597 (9 Jan. 1952) Portobello, Otago Harbour. 45°47′S, 169°30′E. Tidal zone, hand collecting. Rocks and stones.
Isocladus armatus

Gal.604 (16 Jan. 1952) Stony shore, Harrison Cove, Milford Sound. 44°37′S, 167°55′E. Tidal zone, hand collecting. Stones. pH = 5.2–5.5
Pseudosphaeroma campbellensis

Gal.644 (1 Feb. 1952) Horuhoru I. Hauraki Gulf. 36°43′S, 175°10′E. Hand collecting, rock pools.
Dynamenella cordiforaminalis, Dynamenopsis varicolor

Gal.667 (27 Feb. 1952) Takapuna Bay, near Auckland. 36°47′S, 174°47′E. Tidal zone, hand collecting. Sand and rocks.
Isocladus armatus

SYSTEMATICS

Since there is no one modern work which encompasses all of the Isopoda and evaluates the many and varied groupings used in the past–tribes, subtribes, sections, groups, series, and so on–we have tried in the series of which this work is part to develop a unified classification which retains as far as possible the acceptable groupings of past workers, but translated into modern units. For example, we have included such groupings as Hansen's section Monolistrini, which we have treated as a subtribe. While this particular example may appear superfluous in the present context, since only one genus and species is concerned, its value should be more evident in the wider context of a unified and uniform systematic ranking within the Isopoda as a whole.

ORDER ISOPODA

Never a distinct carapace. Body usually dorsoventrally flattened, divided into head, pereon, and pleon. First thoracic somite always completely fused with head, its appendages modified into maxillipeds. Pereon of seven free somites (pereonites 1–7), the first and sometimes the second of which may be immovably fused to the head. Pleon of six somites, some of which may be coalesced and not obvious. Telson usually fused with sixth pleon somite, so only five pleonites plus telson segment or "pleotelson" are apparent. Eyes, when present, never on movable stalks but sessile or elevated on immobile head processes. First antenna almost always lacks accessory flagellum; accessory flagellum sometimes present on second antenna.

Mandibles, two pairs of maxillae, and maxillipeds present, often modified in accordance with habits.

Pereonites 1–7 each have a pair of pereopods or legs, often all alike, ambulatory or subprehensile, or variously modified. The coxae are commonly expanded into plates which are generally fused with, and form a lateral expansion of, the pereonites; their junction with the body is often indicated by a suture on pereonites 2–7 but rarely on free pereonite 1.

The pleon has five pairs of pleopods; typically each pleopod has two broad, lamellate branchial rami. In the male, the second pair are commonly modified as sexual appendages, and in some groups the first pair is so modified also.

Monod (1922) proposed a classification of the Isopoda into two sub-divisions: Decempedes, with one group only, the Gnathiidea; and Quatuordecempedes, with seven groups—Anthuridea, Asellota, Valvifera, Flabellifera, Epicaridea, Oniscoidea, and Phreatoicoidea. This classification into eight groups or suborders was accepted by Wolff (1962). However, Laing (1961) put forward a case for similar status for the Microcerberidea, previously regarded as a subfamily of the Anthuridae (Chappuis & Delamare 1954: 130–1). Grüner (1965) has accepted this, and lists nine tribes (as suborders).

Menzies (1962a, b), however, treated the Anthuroidea as a subtribe of the Flabellifera, along with the Seroloidea and the Cirolanoidea, and—one may infer—regards the microcerberids as part of the Anthuroidea.

Kusakin (1969) includes a suborder Tyloidea, which is derived from the Oniscoidea, for the family Tylidae. (We have not distinguished Tyloidea in our key to the infraorder.)

In this work we intended to accept the Menzies scheme, treating Anthuroidea as a superfamily of Flabellifera and, for the reasons given by Lang, to accept the microcerberids as an equivalent superfamily. However, we found the difficulties of incorporating them into the Flabellifera sufficiently deterrent, and the differences sufficiently significant, to persuade us to follow Grüner in giving Anthuridea and Microcerberidea equal ranking with the Flabellifera as "far from a homogeneous group".

We have also accepted Monod's original terms Decempedes and Quatuordecempedes, since they are the names originally given and we saw no valid reason for rejecting or amending them. Some may, however, consider them unnecessary.

It has been customary to refer to the major subdivisions within the Isopoda as suborders, but Monod's 1922 classification pre-empts the term suborder for the higher categories, Decempedes and Quatuordecempedes. For this reason, Menzies (1962a, b) and Wolff (1962) both use the term "Tribe". Thus:

Suborder Quatuordecempedes
Tribe Flabellifera
Subtribe Cirolanoidea
Family Sphaeromatidae

However, the International Code of Zoological Nomenclature (1961, 1964) now specifically defines a tribe as a category of the family-group subordinate to subfamily. (Blackwelder (1967: 448) comments that "tribe has also been used above the family-group levels but such as is now prohibited by the Code".)

In recent publications on Decapoda, Holthuis (e.g., 1967) uses the structure:

Suborder
Supersection
Section
Superfamily

A possible hierarchy suggested to us for the Isopoda would be:

Suborder
Section
Superfamily
Family

KEY TO MAJOR DIVISIONS OF ISOPODA
(FIGS 3–15)

1. Adults with five free thoracic somites and five pairs (2nd–6th) of normal legs, the first modified and the seventh absent; juvenile ('praniza') parasitic on fish ..... Suborder DECEMPEDES: (Gnathiidea)

   Adults with seven free thoracic segments and normally seven pairs of legs ... (Suborder QUATUORDECEMPEDES) 2

2. Uropods lateral or ventral (hinged to sides to pleotelson or folding under it) 3

   Uropods terminal (attached to or near end of pleotelson), usually cylindrical ('styliform') or entirely absent 5

3. Uropods and pleotelson together forming a tail fan; pleopods for the most part of the swimming type 4

   Uropods not forming a tail fan with the pleotelson but modified as a pair of covers folding under the abdomen and enclosing the pleopods ..... Infraorder VALVIFERA

4. Body elongated and approximately cylindrical; telson and last pleonite not fused; uropod outer ramus generally arching medially over the pleotelson ..... Infraorder ANTHURIDEA

   Body dorsoventrally flattened or at most semi-cylindrical; telson fused with last pleonite; both rami of uropod lie horizontally ..... Infraorder FLABELLIFERA

5. Aquatic or interstitial species; pleopods not modified for air-breathing 6

   Terrestrial, leafmould, inland, or littoral species; pleopods modified for air-breathing ..... Infraorder ONISCOIDEA

6. Pleopods generally covered by a thin opercular plate (the modified first pair of pleopods) Infraorder ASELLOTA

   Pleopods never covered by an operculum 7

7. Free-living fresh water species, body more-or-less compressed, amphipod-like ..... Infraorder PHREATOICIDEA

   Parasitic or interstitial species; body depressed dorsoventrally or cylindrically, not amphipod-like 8

8. Parasitic species; body depressed (flattened from above as though trodden on); parasitic on other Crustacea but with free-swimming larval forms; legs, when present, subchelate, prehensile ..... Infraorder EPICARIDEA

   Interstitial species; body cylindrical; only pereopod 1 subchelate ..... Infraorder MICROCERBERIDEA

Fig. 3. GNATHIIDEA: Generalised male gnathiidean. (After Monod, 1926, fig. 114).

Fig. 4. VALVIFERA: *Paridotea ungulata* (Pallas), a 38 mm male idoteid from Dunedin.

Fig. 5. VALVIFERA: *Pseudarcturella chiltoni* Tattersall, an arcturid from off North Cape, redrawn from the 4.5 mm type by Hurley.

Fig. 6 ANTHURIDEA: an 8 mm specimen (probably *Paranthura punctata* (Stimpson)) from New Zealand showing the characteristic tail fan.

Fig. 7. FLABELLIFERA: *Serolis bromleyana* Sühm, a 26 mm specimen from the Chatham Rise.

Fig. 8. FLABELLIFERA: *Exosphaeroma obtusum* Dana, a 15.5 mm specimen from Auckland Island.

Fig. 9. ONISCOIDEA: *Actaecia euchroa* Dana, a 6.5 mm male from Raglan Harbour.

Fig. 10. ANTHURIDEA: *Cruregens fontanus* Chilton, an 11.5 mm specimen from a well at Eyreton, New Zealand.

Fig. 11. ASELLOTA: *Jaeropsis* sp. from Island Bay, a 3 mm specimen from under stones.

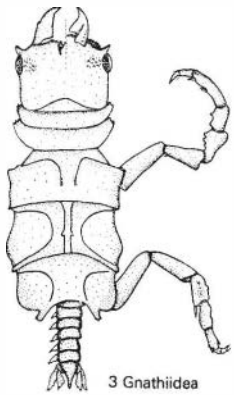
Fig. 12. ASELLOTA: *Antias hispidus* Vanhöffen, an 8 mm specimen from Auckland Island.

Fig. 13. PHREATOICIDEA: *Neophreatoicus assimilis* (Chilton), an 11 mm female from a well at Winchester, New Zealand.

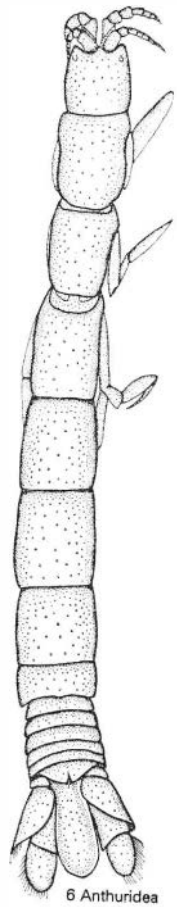
Fig. 14. EPICARIDEA: *Athelges lacertosi* Pike, a 16.4 mm female attached ventrally between pleopods to the hermit crab *Pagurus lacertosus* (Henderson). Specimen from Petre Bay, Chatham Islands.

Fig. 15. MICROCERBERIDEA: *Microcerberus stygius* Karaman, a Jugoslavian phreatic species of less than 2 mm total length.

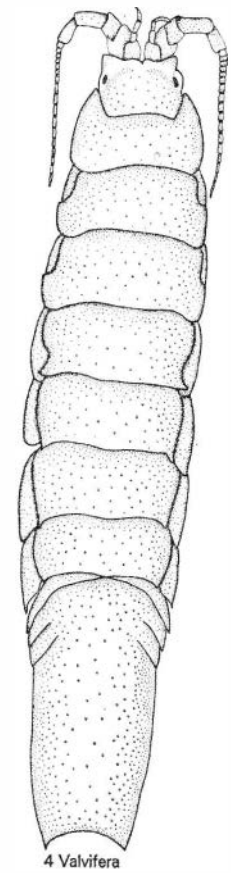
(Fig. 12 is entirely by D. E. Hurley. The remainder are by Mrs G. Crook from pencil originals by Hurley (Figs 4–11) and papers by Chilton, 1894 (Fig. 13); Pike, 1961 (Fig. 14) and Karaman, 1933 (Fig. 15)).



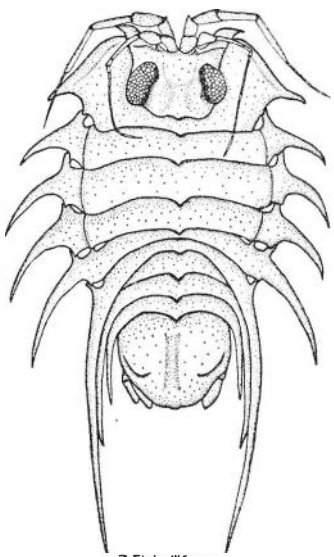
3 Gnathiidea



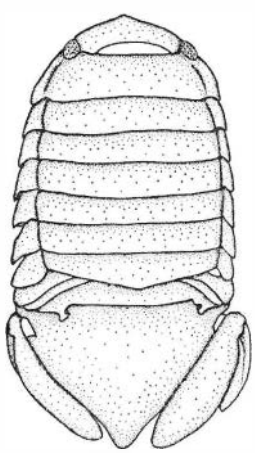
6 Anthuridea



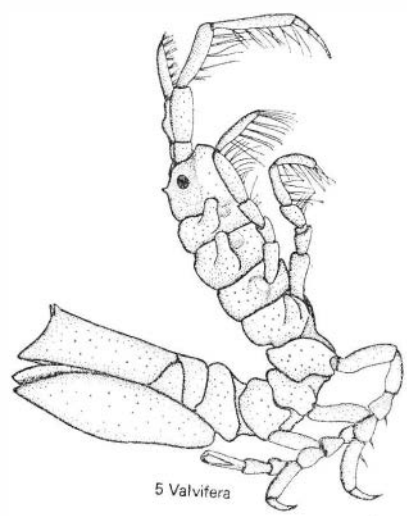
4 Valvifera



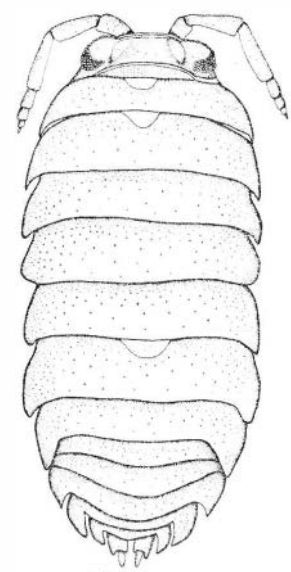
7 Flabellifera



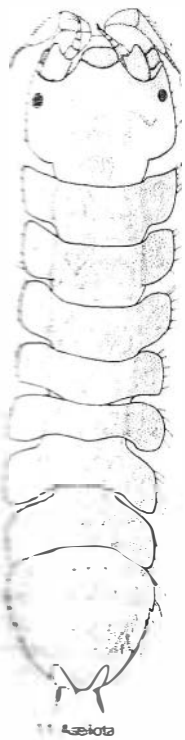
8 Flabellifera



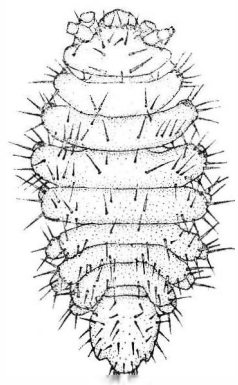
5 Valvifera



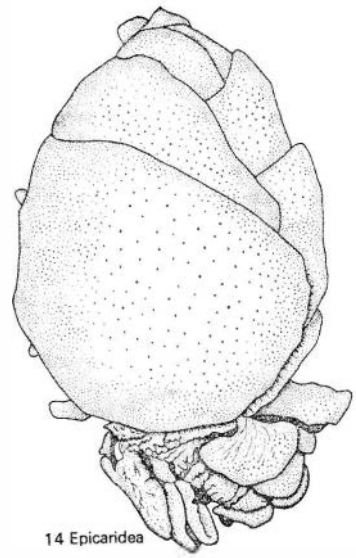
9 Oniscoidea



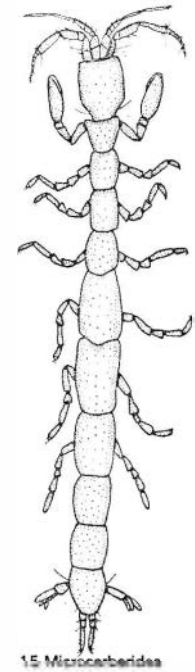
11 Asellota



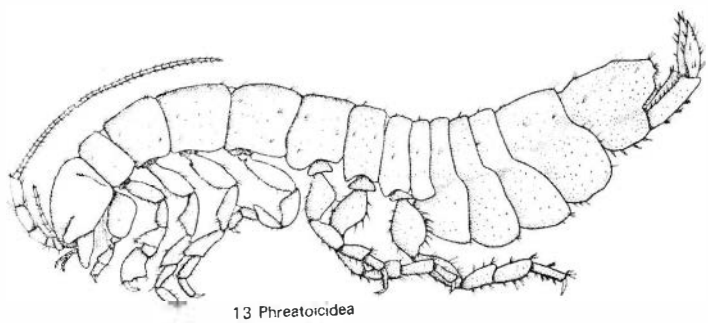
12 Asellota



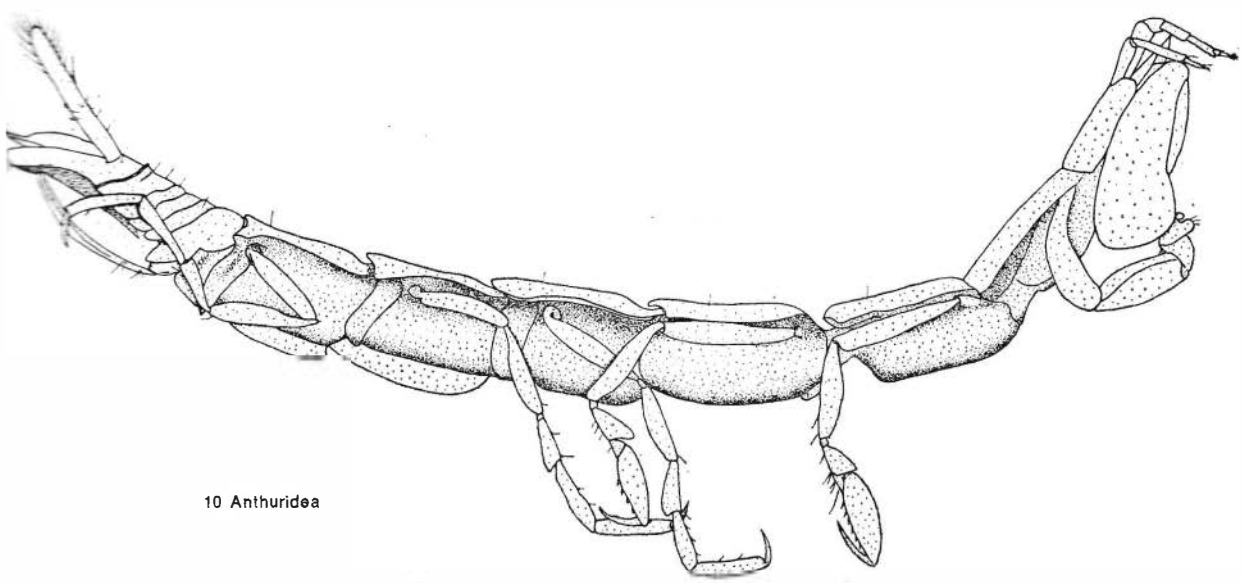
14 Epicaridea



15 Microcerberidea



13 Phreatoicidea



10 Anthuridea

We believe it is desirable to standardise the terms used here as much as possible with other groups. Since the International Code does not deal with names of higher rank than superfamily, guidance must be sought elsewhere. Blackwelder (1967: 435–6) suggests a basic heirarchy of taxa which impresses us as a successful distillation of past and current usage, while pointing out that there is no theoretical limit to the number of levels within the higher-category name. His order of categories is, in relevant part:

Suborder [e.g. Quatuordecempedes]
Infraorder [e.g., Flabellifera]
Superfamily [e.g., Cirolanoidea]
Family [e.g., Sphaeromatidae]

We are not aware of 'infraorder' having been used in this section of the Crustacea before. However, it has a definite self-evident place in the hierarchy of higher categories, and is commonly used in work on the Mammalia as a level below suborder (Blackwelder 1967: 220), whereas the term "section", although often used in the Crustacea, has not been given a universally accepted ranking. The International Code refers to "section" only in passing in an article (42d) on subdivision of genera. The only other reference we have found is in Mayr *et al.* (1953:36): "Terms like *section, series* and *division* are sometimes used for groups of higher categories. Their use is, however, not standardised, and they are sometimes used above and sometimes below the family, the order, the class. They are essentially still neutral terms, corresponding to the term *group*."

'Section' is more euphonious, and for that reason and its previous use in Crustacea is more acceptable to us than 'infraorder', but we feel there is much more to be gained from uniformity than from euphony and nostalgia. At the next level, the superfamily, the present endings can be retained without violence. "Names of superfamilies are not directly regulated as to the form of ending. For many years entomologists have standardised this ending as *-oidea* and have urged adoption of this form in the Code. In the 1961 Code there is no ruling, but it is recommended that *-oidea* be adopted for superfamily endings" (Blackwelder 1967:223). Most of the isopod groupings formerly accepted as subtribes and here designated superfamilies already end with *-oidea.*

INFRAORDER FLABELLIFERA

Pereon of seven somites; pleon of six, including pleotelson, which bears uropods. Five pairs of pleopods, seven pairs of pereopods. Mouthparts normal. Mandibles have well-developed molar processes, lacinia mobilis (left) setae row, and 3-segmented palp. Maxilla 1 has three plates, maxilla 2 has two. Maxilliped has epipod and palp with five segments. Eyes dorsal when present. Uropods lateral, flattened, not folding under pleon to cover pleopods.

Exceptions: no uropods in *Anuropus*; molar process absent in *Limnoria*; maxillae plates reduced or absent and number of maxilliped palp segments reduced in Cymothoidae. Sphaeromatidae have less than six free pleonites. Serolidae have less than 7 pereonites, but retain 7 pereopods and 5 pleopods. Uropods not flattened in *Limnoria* and many Sphaeromatidae.

(Derived from Menzies 1962a: 103–5)

KEY TO SUPERFAMILIES OF FLABELLIFERA

Pereon first somite fused medially to cephalon; 7th somite, when present, not reaching lateral contour of body; pleopods 1–3 smaller than 4 and 5, which are operculiform ..... SEROLOIDEA

Pereon has seven distinct separated somites, the first not fused with cephalon; pleopods generally similar, no one pair especially operculiform ..... CIROLANOIDEA

SUPERFAMILY CIROLANOIDEA

Menzies, 1962a: 112.

This group includes the more-or-less typical marine isopods. Pereon has seven distinctly separated somites, the first not fused with head. Pleopods generally similar; except occasionally for first pair, none are operculiform or larger than preceding pairs. Body somites individually wider than long. Uropods, when present, not arching over pleotelson.

KEY TO NEW ZEALAND FAMILIES OF SUPERFAMILY CIROLANOIDEA

1. Body flat and thin, oval and disc-like; peduncle articles of both antennae expanded into flattened plates to form, with coxal plates and uropod rami, a continuous ring of outer plates around body ..... PLAKARTHRIIDAE

   Body and antennae not as above 2

2. Pleon of five segments, uropods absent. Brackish or fresh water ..... Genus PARAVIREIA (*see* p. 26)

   Pleon usually of two or six segments, uropods present 3

3. Pleon of two segments ..... SPHAEROMATIDAE

   Pleon usually of six segments, including pleotelson 4

4. Uropod outer ramus rudimentary, more-or-less claw-like. Boring in wood or algae ..... LIMNORIIDAE

   Uropod with both rami well developed, usually flattened, fan-like 5

5. Maxilliped palp free, margins of last two segments more-or-less setose, never armed with hooks. ..... CIROLANIDAE

   Maxilliped palp embracing the cone formed by the mouthparts; apex armed with hooks, never setose 6

6. Body symmetrical; both antennae with well-defined peduncles and flagellae, pleopods setose; uropod rami large, more-or-less leaf-like ..... AEGIDAE

   Body often distorted; both antennae reduced, without clear distinction between peduncle and flagellum; pleopods not setose; uropod rami long or short but always narrow ..... CYMOTHOIDAE

FAMILY SPHAEROMATIDAE

Sphaeromidae Hansen, 1905: 69–135, pl. 7. Menzies, 1962a; 128–9.

TYPE-GENUS: *Sphaeroma* Latreille, 1802.

DIAGNOSIS

Cirolanoidea with pleon of two distinct free somites including telson; pleonite 1 has suture lines indicating fusion of other somites. Molar process well developed, lacinia mobilis present. Maxilliped palp of five segments. Uropod peduncle united firmly to inner ramus; outer ramus present or absent. Young of most species incubated in invaginated pouches of ventral body wall of female.

(After Menzies 1962a: 128)

REMARKS

The family Sphaeromidae [*sic*] as discussed by Hansen (1905) comprised the subfamilies Plakarthriinae, Limnoriinae, and Sphaerominae, which have since been raised to family rank (Hurley 1961: 269). The classification used in the present work is based on that established for the subfamily Sphaerominae by Hansen, who grouped the genera on the basis of the different forms and combinations of the rami of pleopods 4 and 5 into the Groups Platybranchiatae, Hemibranchiatae, and Eubranchiatae. Since the subfamily Sphaerominae and the family Sphaeromatidae are now identical through removal of the other subfamilies, there is no reason why the "Groups" should not be treated as subfamilies.

While Hansen's criteria–the pleating or otherwise of pleopods 4 and 5–basically separate most genera into one or other of the subfamilies, there are some borderline instances where the character of the pleopods is not clear-cut. Probably to assist in separation of such genera, Hale (1929) introduced into his key a subsidiary character, the presence or absence of segmentation of pleopods 4 and 5. In this he was followed by Hurley (1961). The Hemibranchiatae and Eubranchiatae with "the outer branch of at least the fifth pleopods two-jointed" were distinguished from the Platybranchiatae with "the outer branch of both pairs unjointed".

Because we found discrepancies between our generic and subfamily diagnoses in the segmentation of these pleopods, we have investigated more thoroughly the degree of segmentation in pleopods 3, 4, and 5 in the New Zealand species of Sphaeromatidae available to us (Table 1).

It is clear from this table that, for the New Zealand species, the situation is not quite as Hale's key suggests, but that there are possibilities for other guidelines; these we have incorporated in our key as a secondary element. Nevertheless there are exceptions, and it is clear that these characters cannot be relied on in isolation.

TABLE 1—Segmentation of the outer ramus of pleopods 3–5 in New Zealand Sphaeromatidae (S, segmented; P, partially segmented; U, unsegmented; ?, status unknown)

Species	Pleopod		
	3	4	5
EUBRANCHIATINAE			
Amphoroidea falcifer	U	U	P(¼)
Amphoroidea longipes	U	U	P(¼)
Amphoroidea media	U	U	P(¼)
Cymodocella capra	U	U	S
Cymodocella egregia	U	U	P(¼)[1]
Cymodocella tubicauda[2]	U	U	P(¼)
Dynamenella condita	U	U	S
Dynamenella cordiforaminalis	U	U	S
Dynamenella hirsuta	U	U	S
Dynamenella huttoni	U	U	S
Dynamenella insulsa	U	U	S
Dynamenella mortenseni	U	P(⅛)	S
Dynamenoides decima	U	U	U
Dynamenoides vulcanata	U	U	P(¼)
Dynamenopsis varicolor	S	U	P(¼)
Scutuloidea maculata	S	U	S
Cassidinopsis admirabilis[3]	U	S	U
Cassidinopsis emarginata	S	S	P(¼)[1]
HEMIBRANCHIATINAE			
Cymodocini			
Cilicaea angustispinata	S	S	S
Cilicaea caniculata	S	S	S
Cilicaea dolorosa	S	S	S
Cilicaea tasmanensis	S	S	S
Cymodoce allegra	S	S	S
Cymodoce australis	S	S	S
Cymodoce convexa	?	?	?
Cymodoce granulata	?	?	?
Cymodoce hodgsoni	S	S	S
Cymodoce iocosa	S	S	S
Cymodoce penserosa	S	S	S
Cymodoce perversa	S	S	S
Cymodopsis impudica	S	S	S
Cymodopsis montis	S	S	S
Cymodopsis sphyracephalata[4]	S	S	P(¼)
Cymodopsis torminosa	S	S	S
Sphaeromini			
Exosphaeroma chilensis[5]	S	S	P(¼)
Exosphaeroma echinensis	S	S	S
Exosphaeroma falcatum	?	?	?
Exosphaeroma gigas	S	S	S
Exosphaeroma obtusum	S	S	S
Exosphaeroma planulum	S	S	S
Isocladus armatus	S	S	S
Isocladus calcareus	S	S	S
Isocladus dulciculus	S	S	S
Isocladus inaccuratus	S	S	S
Isocladus reconditus	S	S	S
Isocladus spiculatus	S	S	S
Pseudosphaeroma callidum[6]	S	S	S
Pseudosphaeroma campbellensis[7]	S	P(¼)	S
Sphaeroma laurensi	U	S	S
Sphaeroma quoyanum	U	S	S
PLATYBRANCHIATINAE			
Cassidina typa[8]	U	U	P(2 × ¼)

NOTES TO TABLE 1

[1]It is difficult to distinguish pleating from segmentation—this is a best guess. Although *Cassidinopsis emarginata* is not a New Zealand species, material has been examined; it is included in this table because of its nonconformity.

[2]The only eubranchiatine species in which both rami of pleopods 4 and 5 are not undeniably pleated. The rami are distinctly thickened, but the pleating is obscure.

[3]This is an anomalous combination, but has been double-checked.

[4]The segmentation of pleopod 4 is faint, that of pleopod 5 extends only ¼ across.

[5]The segmentation is almost complete, but disappears near the thickened knobs.

[6]There is pleating on the inner ramus, whereas the outer is scarcely pleated but distinctly thickened.

[7]There is a slight pleating on the outer ramus as well as the inner in both pleopods 4 and 5.

[8]There is a slight segmentation beginning from each margin (not from one only, as in most instances of partial segmentation), but this still leaves about ½ unsegmented.

The outer ramus of pleopod 3 is two-segmented in the New Zealand Hemibranchiatinae (except *Sphaeroma laurensi** and *S. quoyanum**), but unsegmented in *Cassidina typa,* the only platybranchiatine, and generally unsegmented in the Eubranchiatinae.

Pleopod 4 outer ramus is segmented in New Zealand Hemibranchiatae (except *Pseudosphaeroma campbellensis,* in which it is partially segmented), but completely unsegmented in Eubranchiatinae (except *Cassidinopsis admirabilis*) and Platybranchiatinae.

Pleopod 5, however, varies from partially to completely segmented in all three subfamilies, to a degree which makes it useless for separation except possibly for Platybranchiatinae, in which its partial segmentation on *both* margins may be significant.

Key to subfamilies of Sphaeromatidae (with special reference to New Zealand species)

1. Pleopods 4 and 5, one or both rami of each with deep transverse pleats or wrinkles; pleopods 3 and 4, outer rami may be two-segmented; pleopod 5, outer rami invariably partially or completely two-segmented 2

   Pleopods 4 and 5, both rami of each without transverse pleats or wrinkles; pleopods 3 and 4, outer rami unsegmented; pleopod 5, outer rami with only rudimentary segmentation ..... Platybranchiatinae

2. Pleopods 4 and 5, inner ramus of each has transverse pleats or wrinkles, outer ramus of each is thin and membranous; pleopods 3–5, outer rami segmented, with few exceptions ..... Hemibranchiatinae

   Pleopods 4 and 5, both rami with transverse pleats or wrinkles (except *Cymodocella tubicauda*); pleopods 3 and 4, outer rami usually unsegmented; pleopod 5, outer rami usually partly or completely segmented ..... Eubranchiatinae

A number of genera (Monod 1931a: 67 *et seq.*) do not fit precisely into the groups established by Hansen (1905). *Pseudosphaeroma* Chilton, the only New Zealand genus in this category, has the outer rami of pleopods 4 and 5 transversely folded, but the whole inner part of the inner ramus of pleopod 4 and the proximal part of the inner part of pleopod 5, though thicker and fleshier than the remainder, are not folded. Originally placed in the Eubranchiatae by Chilton (1909: 653–4), *Pseudosphaeroma* was transferred to the Hemibranchiatae by Monod (1931a: 74), the arrangement followed here.

Paravireia Chilton (1925) has hitherto been regarded as belonging to the Sphaeromatidae. The type species of the genus, *Paravireia typica* Chilton, has been found only in a freshwater stream in the Chatham Islands. Morphologically it resembles terrestrial rather than free-living marine forms, particularly in the maxillipeds. More recently a second species, *P. pistus,* has been described from shallow water in Deep Bay, Stewart Island (Jansen 1973). Since the Sphaeromatidae are properly diagnosed by the characteristic pleon with only two free, separate segments, *Paravireia* cannot be included, and is omitted from this memoir. The apparent absence of uropods in *Paravireia* supports this separation. Limnoriidae and Plakarthriidae, at one time subfamilies of the Sphaeromatidae (Hansen 1905, Richardson 1913) have already been excluded (Hurley 1961).

Because in this work we break down a number of the commoner "species" or species complexes into several species (e.g., *Isocladus*), we have preferred not to integrate into the synonymy all of the references in Morton & Miller (1968). In a great deal of valuable ecological information, which we have freely drawn on, Morton & Miller (1968) list four species which do not appear in our material and should be looked for: *Cymodopsis* sp. (their fig. 71.8), *Cymodoce bidentata* (fig. 71.9), *Cilicaea curtispina* (fig. 71.6), and *Chitonopsis* sp. (fig. 149).

The figure illustrating *Cymodopsis* sp. in Morton & Miller appears to be taken from a drawing of *Cymodopsis crassa* Baker given in Hale (1929, fig. 279), and may not relate to the particular species found in Auckland. Our own material includes only one intertidal *Cymodopsis, C. montis* n.sp., which is not sufficiently like *C. crassa* to have been confused with it.

The figure given for *Cymodoce bidentata* may also be re-drawn from Hale (1929, fig. 283). *Cilicaea curtispina* of Morton & Miller may be based on Hale's figure (1929, fig. 280), although the proportions of the median spine are slightly different. These three illustrations appear to have been chosen to illustrate types of isopods found in New Zealand, not necessarily the actual species in hand, and we think the names are best omitted from the New Zealand fauna until specimens can be seen.

Chitonopsis sp., however, as figured by Morton & Miller (1968, fig. 149), is certainly distinct from the Australian species illustrated by Hale (1929, fig. 306), and deserves further attention when material comes to hand. (We understand the original material is no longer available). The authors appear to be quite correct in regarding as new to science this species which they describe so delightfully as "creeping about with its short walking legs like a minute clockwork mouse".

Subfamily Eubranchiatinae

Group Sphaerominae eubranchiatae Hansen, 1905: 101, 105–9.

Diagnosis

Pleopods 4 and 5, both rami subsimilar with deep, essentially transverse folds, often fleshy, without plumose marginal setae; pleopod 5, outer ramus generally distinctly or partially 2-segmented, subapical squamiferous protuberance very high; pleopod 3, both rami closely set with long, plumose setae, at least on distal margin; pleopod 1, inner ramus at least rather broad, scarcely ever half as long again as broad. (Pleotelson at least emarginate, generally with notch or slit terminating in foramen.)

*Monod (1931a: 16) found that pleopod 3 in a number of species of *Sphaeroma* was unsegmented, and concluded that in *Exosphaeroma* segmentation was complete to the extent of marginal indentations on both margins, whereas *Sphaeroma* "never possess complete articulation attaining and modifying the inner margin".

REMARKS

The New Zealand genera fall into two groups, those with pleopod 3 outer ramus unsegmented (*Amphoroidea, Cymodocella, Dynamenella,* and *Dynamenoides*), and those with the outer ramus of two segments (*Dynamenopsis* and *Scutuloidea*). *Cassidinopsis* is slightly anomalous: the type species is segmented but the New Zealand species appear to lack segmentation. Both species are, however, alike in being the only ones of all those examined in which pleopod 4 outer ramus was clearly 2-segmented.

KEY TO NEW ZEALAND AND SUBANTARCTIC GENERA OF SUBFAMILY EUBRANCHIATINAE

1. Antenna I, segment 1 expanded, protruding in front of head as large, free plate ..... AMPHOROIDEA

   Antenna I, segment 1 normal, not expanded in front of head as large, free plate 2

2. Uropod a large, single, broad, oval plate ..... SCUTULOIDEA

   Uropod not a large, single, broad plate 3

3. Uropod rami equally developed 4

   Uropod rami not equally developed 5

4. Pleotelson sides folded down and around to form nearly closed tube; pereonite 6 coxal plate produced posteriorly, overlapping pereonite 7 ..... DYNAMENOPSIS

   Pleotelson sides not forming tube, pleotelson has apical notch or foramen instead; pereonite 6 coxal plate not produced posteriorly to overlap pereonite 7 ..... DYNAMENELLA

5. Pleotelson sides bent downwards and inwards to form tube; pleopod 3 unsegmented ..... CYMODOCELLA

   Pleotelson sides not bent to form tube 6

6. Pleotelson has transverse foramen connected with posterior margin by narrow slit; pleopods 3 and 4 unsegmented ..... DYNAMENOIDES

   Pleotelson feebly emarginate, no slit; pleopod 3 may be segmented, pleopod 4 definitely segmented ..... CASSIDINOPSIS

Amphoroidea Milne Edwards, 1840

Amphoroidea Milne Edwards, 1840: 222–3. Hansen, 1905: 108, 126. Menzies, 1962a: 140.

TYPE-SPECIES: *Amphoroidea typa* Milne Edwards, 1840.

DIAGNOSIS

Eubranchiate Sphaeromatidae with pleopod 3 outer ramus unsegmented. Pleopods 4 and 5, rami unsegmented. Antenna I expanded into exceedingly large, horizontal plate in front of head. Body smooth, flattened, without processes. Mature males with well developed appendix masculina on pleopod 2 inner ramus. Female mouthparts not metamorphosed. Broodplates overlapping in midline. Males and females similar.

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF AMPHOROIDEA

1. Antenna I, anterior margin of first segment parallel to transverse axis of body; uropod rami subequal in length ..... FALCIFER

   Antenna I, anterior margin of first segment slanted posterolaterally; uropod outer ramus longer than inner 2

2. Antenna I, expanded segment has rounded angles, length and basal width subequal; uropod outer ramus about twice as long as inner ..... LONGIPES

   Antenna I, expanded segment has sharp angles, not as long as basal width; uropod outer ramus about half as long again as inner ..... MEDIA

Amphoroidea falcifer Thomson, 1879 (Fig. 16A–C)

Amphoroidea falcifer Thomson, 1879: 233–4, pl. 10, fig. A5. Filhol, 1885: 456. pl. 50, fig. 7. Thomson & Chilton, 1886: 153. Hurley, 1961: 271.
Amphoroidea falcifera. Nierstrasz, 1931: 214.

DIAGNOSIS

Amphoroidea with anterior margin of expanded first segment of antenna I parallel to transverse axis of body. Uropod rami of equal length, not produced past end of pleotelson. Pleotelson apex slightly produced with shallow, semicircular notch. Prominent longitudinal ridge formed where pereon tergites and coxal plates fuse. Coxal plates vertical.

TYPE LOCALITY: Kaikoura Harbour and Stewart Island.

MATERIAL EXAMINED

Whangaroa Harbour: [45] 1 juv. (15 mm), 2♀♀ (17–18 mm), 2♂♂ (17–19 mm).
Cuvier Is: [137] spp.
Kaikoura: [87] 1 juv. (2 mm), 2♀♀ (10–20 mm); [85] 1 sp.
Solander I: [40] 1♂ (13 mm).
Snares Is: [63] 1 juv. (12 mm), 1♂ (16 mm).
Antipodes Is: [33] 1 juv. (13 mm).
Auckland Is: [51, 52, 54, 56, 57] 2 juvs (8–10 mm), 2♀♀ (18–19 mm), 4♂♂ (18–21 mm); [15] 1♀ (18 mm). *Also*: [15] 4 spp.; [4] 1 sp.
Chatham Is Exped: [CIE 12, 25, 47, 48] 16 juvs (6–14 mm), 1♀ (19 mm), 1♂ (15 mm).
OTHER RECORDS: Lyttelton, Taylor's Mistake, Quail I., Godley Head (Chilton Coll.); Otago, Longbeach, Oamaru; Auckland I. (coll. W. H. Dawbin, Cape Exped., 1943).

HABITAT: Under stones, in and among algal holdfasts.
DEPTH RANGE: Intertidal and shallow subtidal.
REMARKS: As remarked by Hansen (1905), this species is distinct from *A. typa* of Milne Edwards and *A. australiensis* of Dana.

Amphoroidea longipes n.sp. (Fig. 16G–I)

DIAGNOSIS

Amphoroidea with anterior margin of first segment of antenna I slanting posterolaterally, expanded segment with rounded angles, length and basal width subequal. Uropod outer ramus about twice as long as inner, produced past end of pleotelson. Pleotelson apex slightly produced, with shallow, semicircular notch. Coxal plates continuing curve of pereon tergites, not forming longitudinal ridge.

TYPE MATERIAL
Holotype: NZOI Type No. 146 [Z2304, ♂, 13 mm].
Paratypes: NZOI Type No. P203 [Z2034, 5 juvs, 2–8 mm; 4♀♀, 9–12 mm; 6♂♂, 10–13 mm].
TYPE LOCALITY: Kaikoura.
MATERIAL EXAMINED
Cape Maria van Diemen: [Cop. 3] spp.
Whangarei: [E953] 10 juvs (2–7 mm), 2♀♀ (9–10 mm), 2♂♂ (7–9 mm).
Auckland: [E956] 1 juv. (5 mm), 1♂ (8 mm).
Wellington: [Z2304] 5 juvs (2–8 mm), 4♀♀ (9–12 mm), 7♂♂ (10–13 mm); [31] spp.
Kaikoura: [98, 99] 2 juvs (8–14 mm), 24♀♀ (11–15 mm), 1♂ (10 mm).
Auckland Is: [54] 1 juv. (5 mm).
Chatham Is Exped: [CIE 12] 7 juvs (4–8 mm), 2♀♀ (11–12 mm), 2♂♂ (11–13 mm); [CIE 49] 1♂ (13 mm); [32] 1 sp.
OTHER RECORDS: None.
HABITAT: Algal fronds, exposed rocks.
DEPTH RANGE: Intertidal.

Amphoroidea media Hurley & Jansen, 1974 (Fig. 16D–F)

Amphoroidea media Hurley & Jansen, 1971: 473. Jansen, 1971: 268–9, 275.
[Not] *Amphoroidea falcifer* Thompson. Morton & Miller, 1968; 219, fig. 73.7. (?)Hicks, 1971: 52, 56.

DIAGNOSIS
Amphoroidea with anterior margin of first segment of antenna I slanting posterolaterally, expanded segment with sharp angles, not as long as basal width. Uropod outer ramus about half as long again as inner, produced past end of pleotelson. Pleotelson apex not produced, has shallow, semicircular notch. Coxal plates continue lateral curve of pereon tergites, do not form longitudinal ridge.

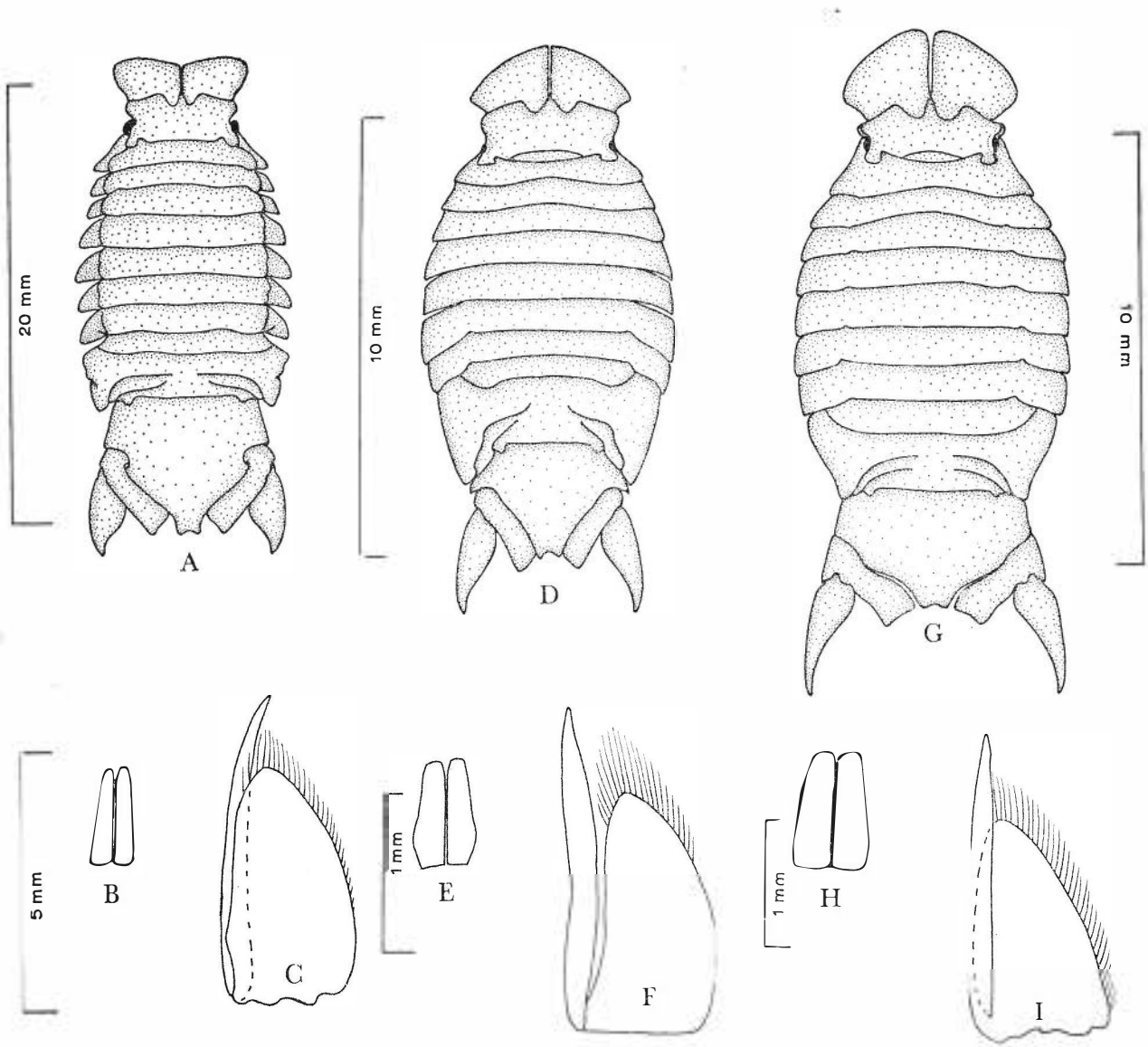


FIG. 16. *Amphoroidea* spp., mature ♂♂–whole animal, penes, and pleopod 2, inner ramus: A–C, *falcifer* Thomson; D–F, *media* Hurley & Jansen; G–I, *longipes* n.sp.

TYPE MATERIAL
Holotype: Canterbury Museum Type No. AQ3407 [104, ♂, 10 mm].
Paratypes: Canterbury Museum Type No. AQ3432 [104, 801 juvs, 2–9 mm; 299♀♀, 7–15 mm; 297♂♂, 6–12 mm].
TYPE LOCALITY: Kaikoura.
MATERIAL EXAMINED
Whangaroa Bay: [45] 1 juv (5 mm), 2♀♀ (9 mm), 1♂ (9 mm).
Russell: [E981] 3 juvs (2–5 mm).
Whangarei: [E953] 1♂ (8 mm).
Auckland: [E975, E979] 6 juvs (2–5 mm), 1♀ (9 mm), 1♂ (8 mm); [E956, E957] 1♀, 1♂ (9 mm); [Z2282] 1 sp.
Coromandel: [Z2308] 5 spp.
Mt Maunganui: [E959] 2 spp.
Napier: [Z2297] 3 spp.
Castlepoint: [E983] 4 juvs (3–7 mm), 5♂♂ (7–9 mm).
Wellington: [E966] 2 spp; [E985] 7 spp; [Z2306] about 20 spp; [Z2307] 7 spp.
Kaikoura: [104] 801 juvs (2–9 mm), 299♀♀ (7–15 mm), 297♂♂ (6–12 mm); [E969] about 20 spp; [98] many spp; [111] many spp.
Chatham Is: [CIE 12, 19, 47] 3 juvs (5–7 mm), 2♀♀ (12 mm), 1♂ (12 mm); [E105] 2 spp.
HABITAT: Algal fronds.
DEPTH RANGE: Intertidal and shallow subtidal.
REMARKS: The shape of the first segment of antenna I figured by Morton & Miller suggests that their species was *A. media.* They remark that it is kelp-brown in colour and fastens onto the blades of *Ecklonia,* "taking so firm a hold . . . as to make dislodgment difficult. The animal can, however, let itself go to swim in graceful arcs before re-attaching".

Hick's record from Island Bay is attributed here with a query because of *A. falcifer's* more southerly distribution. Hicks comments that his species is "commonly found on the large straps of surrounding brown algae" but "occasionally washed into the sublittoral corallines".

Cassidinopsis Hansen, 1905

Cassidinopsis Hansen, 1905: 108–9, 128. Menzies, 1962a: 142, 144.
TYPE SPECIES: *Cassidinopsis emarginata* (Guerin Meneville)

DIAGNOSIS
Eubranchiate Sphaeromatidae with pleopod 3 outer ramus of two segments. Pleopod 2 inner ramus has well developed appendix masculina. Antenna I, first segment of peduncle not expanded, posterodistal angle without process. Head small. Pleotelson apex feebly emarginate. Uropod inner ramus laterally expanded, outer ramus reduced. Female mouthparts not metamorphosed. Males and females similar, body segments without processes.

Cassidinopsis admirabilis n.sp. (Fig. 17)

DIAGNOSIS
Cassidinopsis with smooth body. Uropod outer ramus very small, attached anteriorly to inner ramus, and less than one-quarter its length. Inner ramus about twice as long as broad, with rounded apex.
TYPE MATERIAL
Holotype: NZOI Type No. 150 [E979, ♂, 3 mm].
Paratypes: NZOI Type No. P207 [E975, 979, 5 juvs, 1.5–2 mm; 7♀♀, 2–2.5 mm; 1♂, 3.5 mm].
TYPE LOCALITY: Leigh.
MATERIAL EXAMINED
Auckland: [E956] 1 juv. (1.5 mm); [E975, 979] 5 juvs (1.5–2 mm), 7♀♀ (2–2.5 mm), 2♂♂ (3–3.5 mm).
Gisborne: [E982] 4 juvs (1.5–2.4 mm).
Wellington: [E967] 24 juvs (1.5–2.5 mm).
OTHER RECORDS: None.
HABITAT: Rocks and algae.
DEPTH RANGE: Intertidal.
REMARKS: The type species, *Cassidinopsis emarginata,* appears to be of Antarctic and subantarctic distribution. *C. admirabilis* differs from *C. emarginata* in being smaller (mature males are about 3 mm long, whereas *C. emarginata* males reach 27 mm in length), and in the uropod rami. In *C. admirabilis,* the outer ramus is greatly reduced to less than one-quarter the length of the inner, which has a rounded apex. In *C. emarginata,* the outer ramus is reduced to only about half the length of the inner, and lies completely in the recessed outer margin of the broad, truncate inner ramus.

Cymodocella Pfeffer, 1887

Cymodocella Pfeffer, 1887: 109–10. Hansen, 1905; 107, 126. Menzies, 1962a: 138.
TYPE SPECIES: *Cymodocella tubicauda* Pfeffer, 1887.

DIAGNOSIS
Eubranchiate Sphaeromatidae with outer rami of pleopods 3, 4, and 5 unsegmented. Mature males with well developed appendix masculina on pleopod 2 inner ramus. Antenna I peduncle, first segment not expanded. Pleotelson produced posteriorly with sides bent down and around, forming tube open at both ends. Female mouthparts not metamorphosed. Broodplates overlapping in midline. Males and females similar, without processes. Uropods alike in both sexes, rami lamellar, outer ramus shorter than inner.

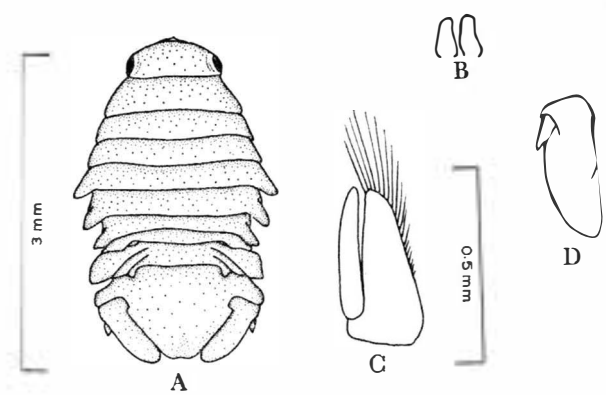


FIG. 17. *Cassidinopsis admirabilis* n.sp., mature ♂: A, whole animal; B, penes; C, pleopod 2, inner ramus; D, uropod, ventral view.

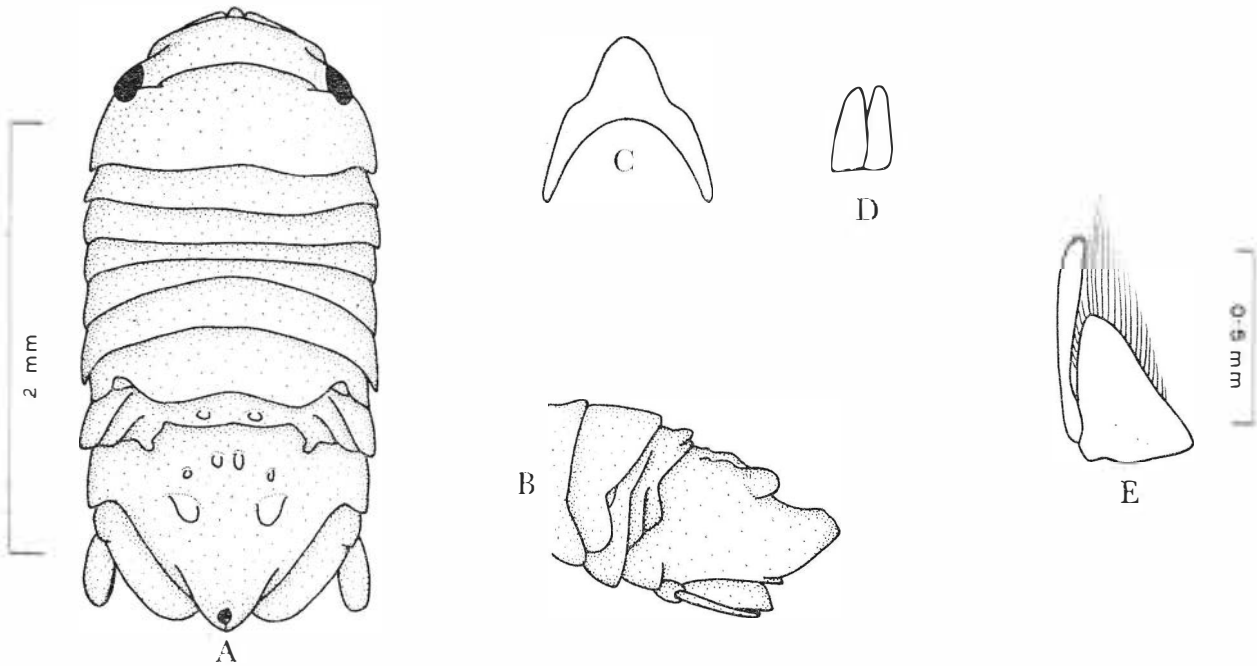


FIG. 18. *Cymodocella capra* n.sp., mature ♂: A, whole animal; B, pleon, side view; C, epistome; D, penes; E, pleopod 2, inner ramus.

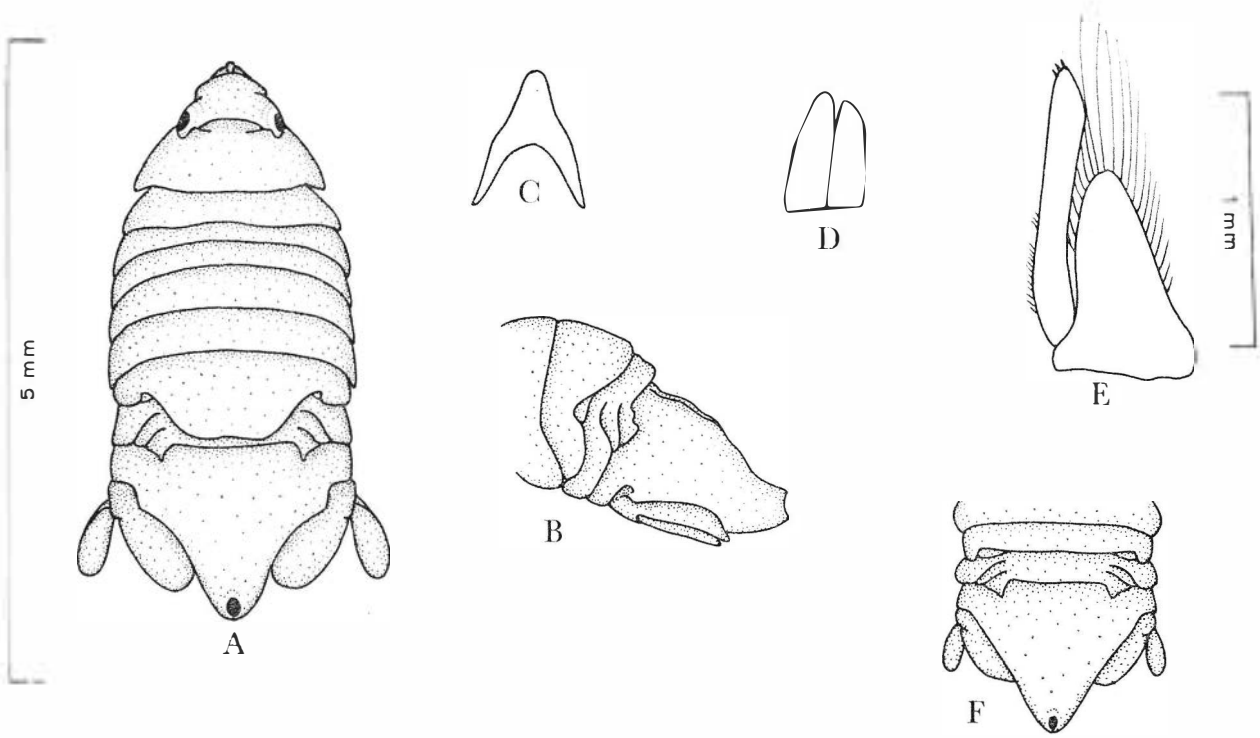


FIG. 19. *Cymodocella egregia* (Chilton), mature ♂ except F (♀): A, whole animal; B, pleon, side view; C, epistome; D, penes; E, pleopod 2, inner ramus; F, pleon, dorsal view.

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF CYMODOCELLA

1. Pleonite 1 and pleotelson smooth, without sculpturing or tubercles ..... EGREGIA

   Pleonite 1 and pleotelson sculptured or tuberculate 2

2. Pleonite 1 with small, rounded tubercle each side of midline; pleotelson with one large and two small tubercles each side of midline ..... CAPRA

   Pleonite 1 raised in a transverse ridge; pleotelson with strong, parallel, longitudinal ridge each side of midline, ridges and lateral margins tuberculate ..... TUBICAUDA

Cymodocella capra n.sp. (Fig. 18)

DIAGNOSIS

Cymodocella with a small tubercle on pleonite 1 each side of midline. Pleotelson with one large and two small tubercles each side of midline.

TYPE MATERIAL

Holotype: NZOI Type No. 147 [E977, ♂, 3 mm].
Paratypes: NZOI Type No. P204 [E977, ♂, 2.8 mm].
TYPE LOCALITY: Leigh, Auckland.
MATERIAL EXAMINED
Bay of Islands: [Cop. 6] spp.
Auckland: [E977] 2♂♂ (2.8–3 mm).
OTHER RECORDS: None.
HABITAT: Rock pools in splash zone with filamentous brown algae.
DEPTH RANGE: Intertidal.

Cymodocella egregia (Chilton, 1892) (Fig. 19)

Sphaeroma (?) *egregia* Chilton, 1892: 269
[Part] *Cymodocella tubicauda* Pfeffer. Hansen, 1905: 126. Hurley, 1961: 271.
Cymodocella egregia Hutton, 1904: 263. Jansen, 1971: 266, 272–3.
[Not] *Cymodocella tubicauda.* Morton & Miller, 1968: 215, fig. 71.2. (?) Hicks, 1970: 52, 56.

DIAGNOSIS

Cymodocella with pleotelson smooth and with shallow median dorsal groove.

TYPE LOCALITY: Island Bay, Wellington.
MATERIAL EXAMINED
Off North Cape: [E262] 6 spp.
Auckland: [E975, E977] 2 juvs (1.5–2 mm), 3♀♀ (3–5 mm), 1♂ (3.5 mm).
Gisborne: [E982] 5 juvs (1.5–2.5 mm), 2♀♀ (3 mm), 1♂ (3 mm).
Wellington: [E967] 1 juv. (2.5 mm).
Kaikoura: [104] 169 juvs (1.5–3 mm), 436 ♀♀ (2–4 mm), 173♂♂ (3–4.5 mm); [112] 4 spp.
Oamaru: [131] 1 sp.
OTHER RECORDS: None.
HABITAT: Among algae and under stones.
DEPTH RANGE: Intertidal.

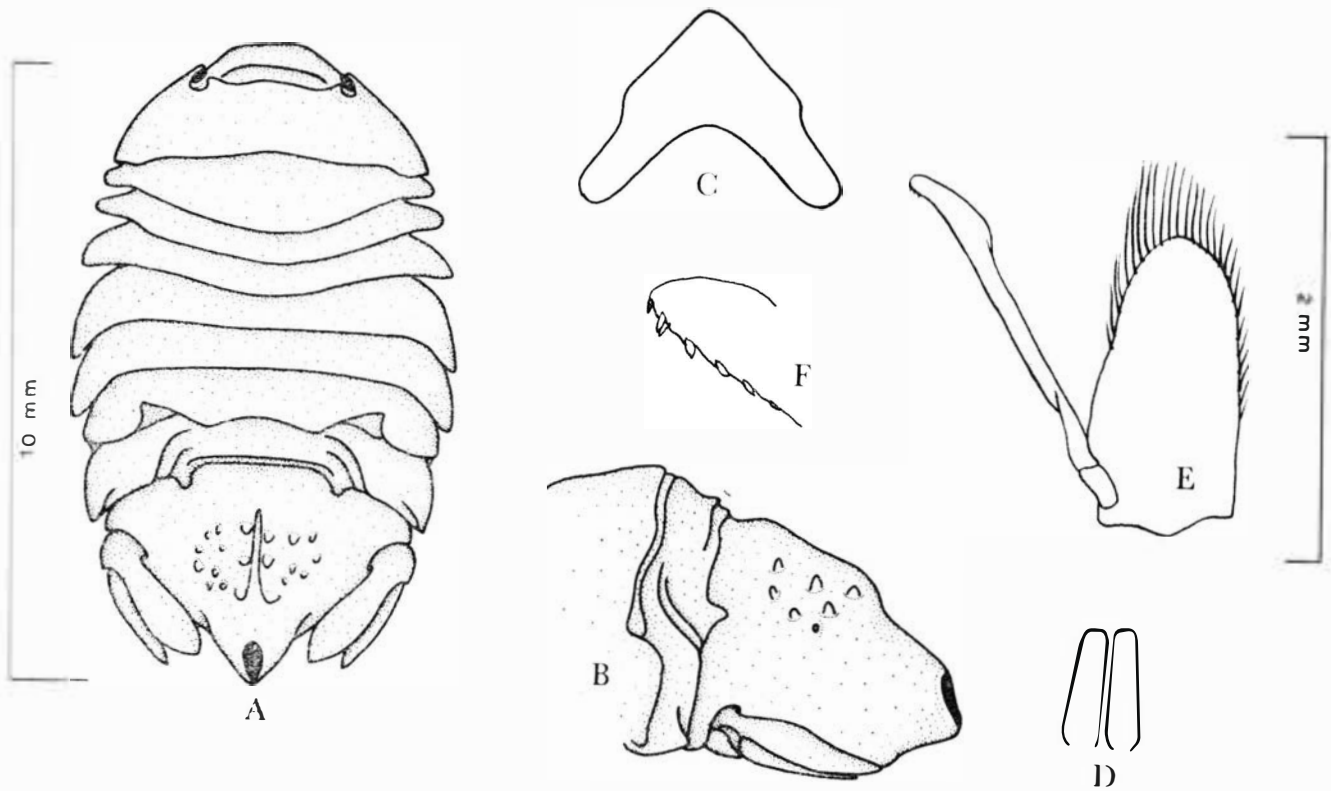


FIG. 20. *Cymodocella tubicauda* Pfeffer, mature ♂: A, whole animal; B, pleon, side view; C, epistome; D, penes; E, pleopod 2, inner ramus; F, tip of appendix masculina.

Cymodocella tubicauda Pfeffer, 1887 (Fig. 20)

Cymodocella tubicauda Pfeffer. 1887: 110–15, pl. 2 fig. 8, pl. 6 figs 11, 12. Hansen, 1905: 126. Richardson, 1908: 4–5, Chilton. 1909: 657. Hodgson, 1910: 31–4. Nierstrasz, 1931: 214. Richardson, 1913: 6–7.
Cymodocea antarctica Hodgson, 1902: 243–5, pl. 33, fig. 2.
[Not] *Cymodocella egregia* (Chilton). Richardson, 1960b: 7.

DIAGNOSIS
Cymodocella with pleonite 1 raised in a transverse ridge. Pleotelson strongly sculptured, with a longitudinal ridge each side of midline, tuberculate between ridges and lateral margins.

TYPE LOCALITY: South Georgia.

REMARKS: Hansen (1905: 126) and Richardson (1906b: 7) synonymised *Cymodocella tubicauda* Pfeffer (1887) from South Georgia and other Antarctic localities and *Sphaeroma (?) egregia* Chilton (1891). Hansen wrote, "The two species are identical, and the type must, therefore, be named *C. egregia* (Chilt.)". In fact, Pfeffer's description predated Chilton's by 4 years. Thus, *Cymodocella tubicauda* Pfeffer (1887) is the senior synonym, and must be retained as the type species of the genus. This was corrected by Richardson (1908: 4–5). However, the two species are apparently far from identical. Pfeffer's description, "Schwanzschild mit stark skulpiertem Mittelfelde" (Pleotelson with strongly sculptured middle section–1887: 109) is not the same as Chilton's "Body rather convex, smooth" (1892: 269). Pfeffer's largest specimen was 5.7 mm long, its greatest breadth 3.5 mm. During an ecological study of Sphaeromatidae (Jansen 1971) several hundred specimens of *C. egregia* from New Zealand were measured, including 173 mature males—no specimen was longer than 4.5 mm (breadth about 2.2 mm). There is no certainty that *C. egregia* is not a small geographic variant of *C. tubicauda*, but the regular form of the mature males of the former shows no tendency towards that of the latter, even disregarding the differences in size. Thus, the morphological and distributional differences indicate that the New Zealand material belongs to a distinct species.

The distribution rather suggests that *C. tubicauda* is an Antarctic form. Chilton's record of *C. tubicauda* from the Auckland Islands could equally well be referred to either species, in the absence of any record of distinguishing features. Hodgson (1902: pl. 33), however, distinctly shows a sculptured telson for his Auckland Islands material, even if not exactly identical with others from the Antarctic. We have therefore included *C. tubicauda* in the New Zealand region, and have taken the opportunity of figuring some NZOI material from new Antarctic collections.

MATERIAL EXAMINED
Antarctica–Moubray Bay: [E181, E182, E186] 3 juvs (6–8 mm), 1 ♀ (9 mm), 3 ♂♂ (9–10 mm). Cape Hallett: [Z1795] 7 spp; [Z1799] 1 sp; [Z1801] 3 spp; [Z1804] 1 sp; [Z1824] 3 spp.

OTHER RECORDS: Auckland Is: (Chilton 1909, Hodgson 1902). Antarctica: Sandwich Is, S. Georgia, Cape Adare, Booth-Wande I. Wincke I. Flanders Bay.

DEPTH RANGE: Intertidal to 245 m.

*According to Menzies & Glynn (1968), the type of *Dynamenella* has pleopod 3 outer ramus 2-segmented.

Dynamenella Hansen, 1905

Dynamenella Hansen, 1905: 107, 126. Menzies, 1962a: 135.
TYPE SPECIES: *Dynamenella perforata* (Moore)

DIAGNOSIS
Eubranchiate Sphaeromatidae with outer rami of pleopods 3 and 4 usually unsegmented*, pleopod 5 segmented. Antenna I, first segment not expanded in large plate. Both sexes without dorsal processes. Uropod rami subequal. In mature males, pleopod 2 inner ramus has well developed appendix masculina. Female mouthparts not metamorphosed. Broodplates overlapping in midline. Pleotelson has apical notch or foramen formed by closing of tips of notch.

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF DYNAMENELLA

1. Pleotelson with apical notch open, not constricted posteriorly, without median tooth 2
   Pleotelson with apical notch closed or constricted posteriorly, has median tooth in males 3
2. Pleotelson has shallow apical notch, body segments without lateral marginal setae ..... HUTTONI
   Pleotelson has deep apical notch, body segments have lateral marginal setae ..... HIRSUTA
3. Pleon surface tuberculate 4
   Pleon surface smooth or longitudinally ridged 5
4. Pleotelson apical notch, median process in adult males narrow-acute ..... CORDIFORAMINALIS
   Pleotelson apical notch, median process in adult males broad, obtuse ..... MORTENSENI
5. Pleotelson surface longitudinally ridged; apical notch in adult males has small, narrow median process ..... CONDITA
   Pleotelson surface smooth; apical notch in adult males has broad median process ..... INSULSA

Dynamenella condita n.sp. (Fig. 21)

DIAGNOSIS
Dynamenella with deep apical notch in pleotelson, notch constricted posteriorly in females, immature males, and juveniles, closed and with small median tooth in mature males. Sexes otherwise similar. Pleotelson dorsal surface deeply ridged longitudinally, tuberculate posterolaterally. Body segments with marginal lateral setae.

TYPE MATERIAL
Holotype: Canterbury Museum Type No. AQ3410 [104, ♂, 4 mm].
Paratypes: Canterbury Museum Type No. AQ3435 [104, 2 juvs, 2.5–2.8 mm; 7 ♀♀, 2.8–3.9 mm; 18 ♂♂, 3.2–4.2 mm].
TYPE LOCALITY: Kaikoura.

REMARKS: There appears to be variation in colour, from orange-red to grey-speckled (with prominent chromatophores), and in the degree of ridging. Two specimens from Stephens Island, which appear to be otherwise identical, have very pronounced ridging.

MATERIAL EXAMINED
Raglan: [E948] 1 juv. (2.5 mm).
New Plymouth: [Cop. 23] spp.
Wellington: [E967] 12 juvs (1–3 mm), 4♀♀ (3 mm), 2♂♂ (3 mm).
Stephens I: [28] 2 spp.
Kaikoura: [104] 2 juvs (2.5–2.8 mm), 7♀♀ (2.8–3.9 mm), 19♂♂ (3.2–4.2 mm); [E971] 69 juvs (1–4 mm), 6♀♀ (3 mm), 9♂♂ (3–4 mm); [109] about 40 spp.
Dunedin: [E973] 20 juvs (1–3 mm), 1♀ (3 mm), 6♂♂ (3–4 mm).
Snares Is: [63–74] 11 juvs (3 m), 1♀ (4 mm).

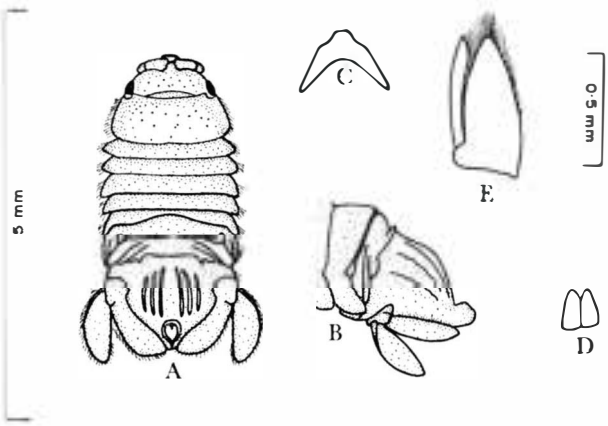


FIG. 21. *Dynamenella condita* n.sp., mature ♂: A, whole animal; B, pleon, side view; C, epistome; D, penes; E, pleopod 2, inner ramus.

OTHER RECORDS: None.
HABITAT: Under stones, among algae.
DEPTH RANGE: Intertidal.

Dynamenella cordiforaminalis (Chilton, 1883) (Fig. 22)

Cymodocea cordiforaminalis Chilton, 1883b: 188–9, pl. 22A, figs 1–1d. Thomson & Chilton, 1886: 152.
Cymodoce cordiforaminalis. Hurley, 1961: 270.
Dynamenella cordiforaminalis. Jansen, 1971: 267–8, 273.

DIAGNOSIS
Dynamenella with deep apical notch in pleotelson constricted posteriorly in females, immature males, and juveniles, closed and with a narrow median tooth in mature males. Sexes otherwise similar. Pleotelson dorsally tuberculate. Body segments with marginal lateral setae.
TYPE LOCALITY: Lyttelton Harbour.
MATERIAL EXAMINED
Cape Brett: [Cop. 5] spp.
Auckland: [E949] 15 juvs (3–5 mm), 18♀♀ (4–5 mm), 8♂♂ (5–6 mm); [138] spp; [Gal. 644] 1♂.
Castlepoint: [E983] 1 sp.
Wellington: [E967] 7 spp.
Kaikoura: [104] 740 juvs (1–4 mm), 220♀♀ (3–5 mm), 263♂♂ (3–7 mm); [E969] about 20 spp; [102] 1 sp; [103] 1 sp; [105] 20–30 spp; [106] 40–50 spp; [111] many small spp.
Lyttelton: [149] 24 spp. (3.5–4.5 mm); [150] 1 sp. (4.5 mm); [151] 6 spp. (3–5 mm).
Chatham Is: [CIE 22] about 14 spp.
HABITAT: Under stones, among algae, algal holdfasts.
REMARKS: The Lyttelton specimen [150] is from a jar (No. 211) labelled "*Cymodoce cordiforaminalis*" and "type".

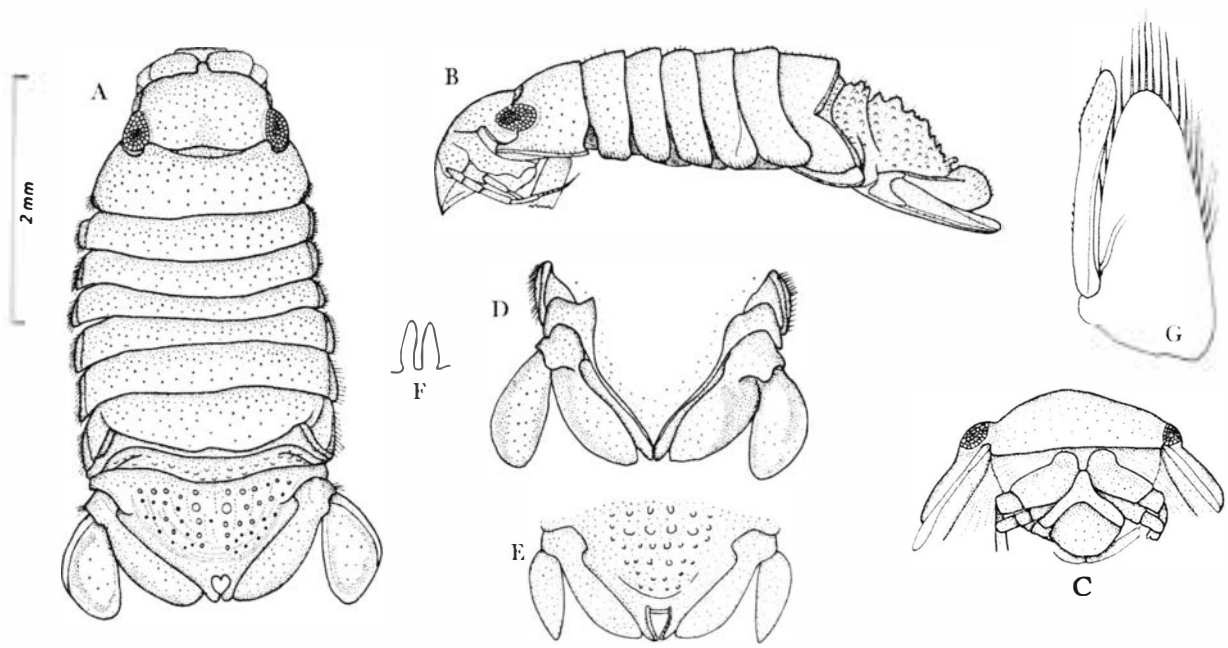


FIG. 22. *Dynamenella cordiforaminalis* (Chilton), mature ♂ except E (♀): A, whole animal; B, side view; C, frontal view of head, showing epistome and peduncles of antenna I; D, pleotelson, ventral view; E, pleotelson, dorsal view; F, penes; G, pleopod 2, inner ramus.

Dynamenella hirsuta Hurley & Jansen, 1971 (Fig. 23)

DIAGNOSIS

Dynamenella hirsuta Hurley & Jansen, 1971. Jansen, 1971: 268. *Dynamenella* with deep apical notch in pleotelson, notch lacking median tooth and posterior constriction. Body surface smooth, segments with marginal setae laterally. Uropod inner ramus with convex outer margin outer ramus broadly elliptical. Sexes similar.

TYPE MATERIAL

Holotype: Canterbury Museum Type No. AQ 3408 [107, ♂, 8 mm].

Paratypes: Canterbury Museum Type No. AQ 3433 [107, 137 juvs, 2–8 mm; 120 ♀♀, 5–8 mm; 73 ♂♂, 5–10 mm].

TYPE LOCALITY: Kaikoura.

MATERIAL EXAMINED

Cape Brett: [Cop. 5] spp.

Wellington: [23] 1 sp.

Kaikoura: [107] 137 juvs (2–8 mm), 120 ♀♀ (5–8 mm), 73 ♂♂ (5–10 mm); [116] 20–30 spp; [113] 20–30 spp; [93] spp; [96] spp; [97] spp.

Stewart I: [74] 1 sp.

HABITAT: Algal holdfasts.

DEPTH RANGE: Intertidal.

Dynamenella huttoni (Thomson, 1879) (Fig. 24)

Cymodocea (*Dynamena*) *huttoni* Thomson, 1879: 234, pl. 10, fig. A6.

Cymodoce huttoni. Hutton 1904: 263. Chilton, 1906: 272.

Dynamenella huttoni. Chilton, 1909: 657–8. Chilton, 1911a: 568. Stephenson, 1927: 368–9. Monod, 1931b: 25. Nierstrasz, 1931: 212. Hurley, 1961: 271. Holdich, 1968b: 407. Hicks, 1971: 52, 56. Jansen, 1971: 268, 273.

Dynamenella huttoni. Thomson & Anderson, 1921: 114. Naylor 1961: 11, figs 3a–g. Morton & Miller, 1968: 214, 215, 217, fig. 71.1.

DIAGNOSIS

Dynamenella with shallow apical notch in pleotelson, lacking both median tooth and posterior constriction. Body surface smooth, without setae. Uropod inner ramus with convex outer margin, outer ramus broadly elliptical. Sexes similar.

TYPE LOCALITY: Dunedin.

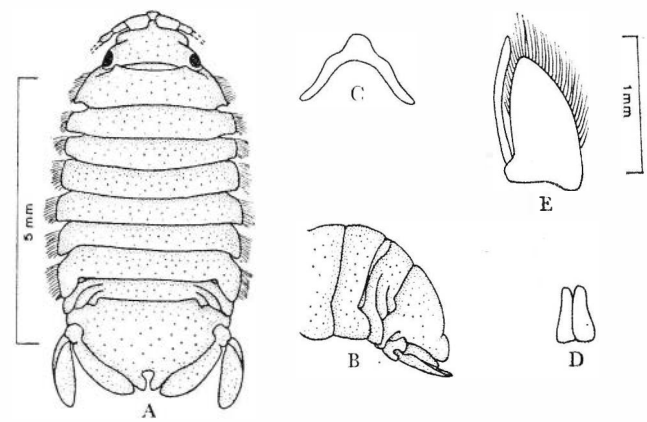


FIG. 23. *Dynamenella hirsuta* Hurley & Jansen, mature ♂: A, whole animal; B, pleon, side view; C, epistome; D, penes; E, pleopod 2, inner ramus.

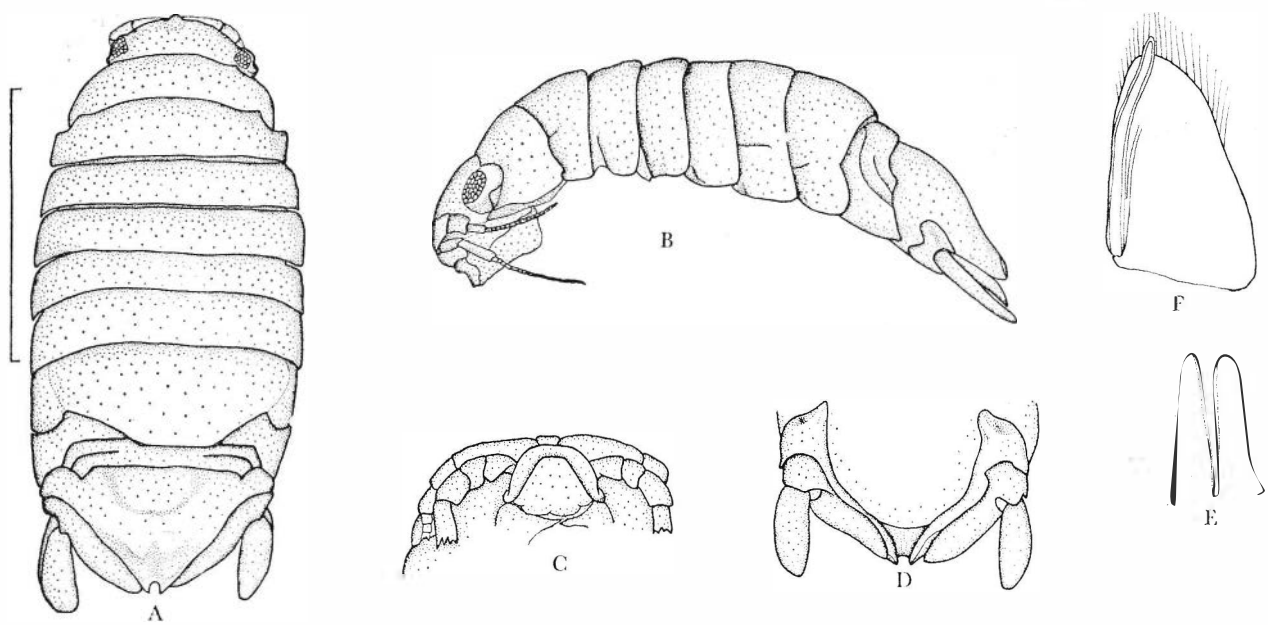


FIG. 24. *Dynamenella huttoni* (Thomson), mature ♂: A, whole animal; B, side view; C, ventral view of head showing epistome and peduncles of antennae; D, pleotelso n, ventral view; E, penes; F, pleopod 2, inner ramus.

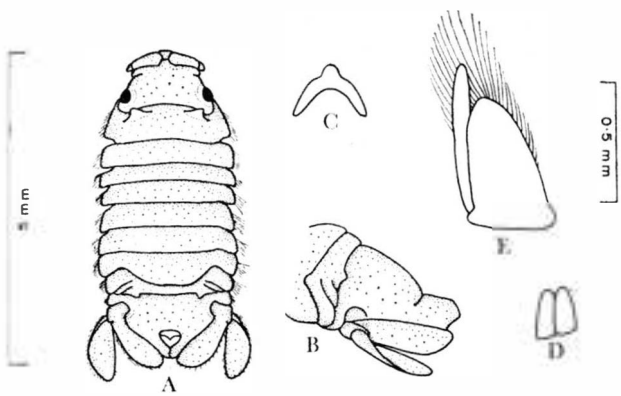


FIG. 25. *Dynamenella insulsa* n.sp., mature ♂: A, whole animal; B, pleon, side view; C, epistome; D, penes; E, pleopod 2, inner ramus.

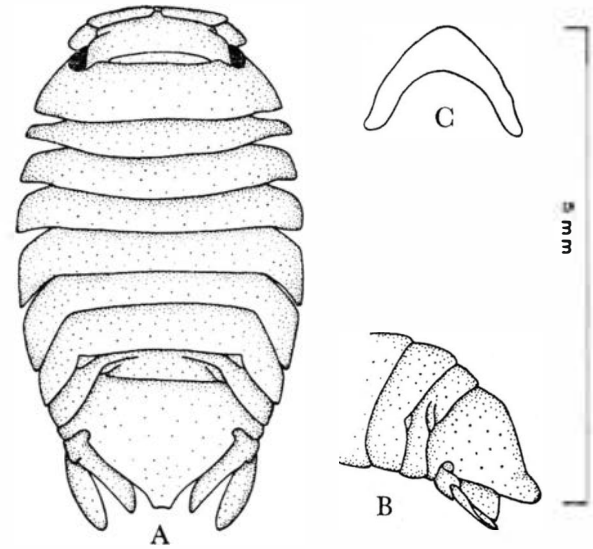


FIG. 27. *Dynamenella sp.*, juvenile: A, whole animal; B, pleon, side view; C, epistome.

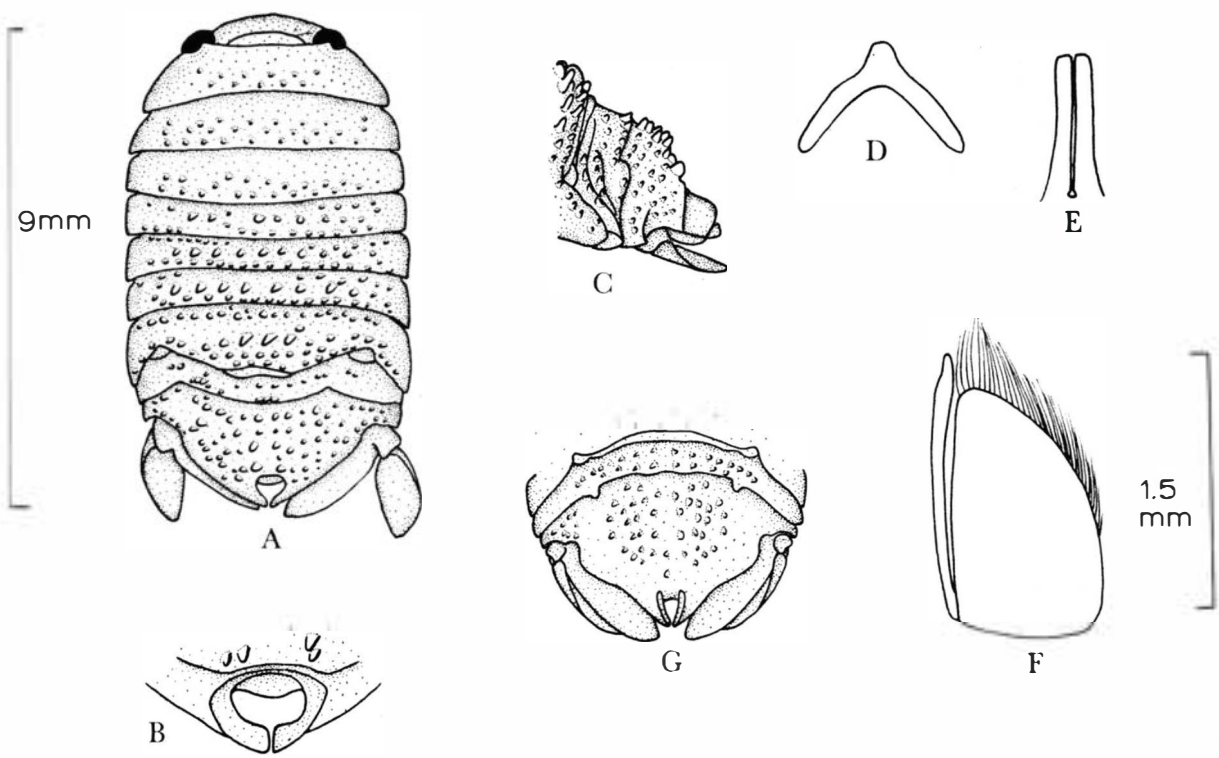


FIG. 26. *Dynamenella mortenseni* n.sp., mature ♂ except G (♀): A, whole animal; B, pleotelson sinus; C, pleon, side view; D, epistome; E, penes; F, pleopod 2, inner ramus; G, pleotelson, dorsal view.

MATERIAL EXAMINED
Cape Maria van Diemen: [Cop. 3] spp.
Whangaroa Harbour: [46] 1 sp.
Cape Brett: [Cop. 5] spp.
Piha: [Z2283] about 8 spp.
Russell: [E981] 10 spp.
Dargaville: [E952] 9 juvs (4–7 mm), 4♂♂ (8 mm).
Auckland: [E949] 15 juvs (2–7 mm), 4♀♀ (8–9 mm), 6♂♂ (8–11 mm); [E953] 3 juvs (3–7 mm), 3♀♀ (9–10 mm), 1♂ (10 mm); [E957] 1 juv. (6 mm); [Z2308] 1 sp; [Cop. 12] spp.
Mt. Maunganui: [E959] 11 juvs (3–7 mm), 1♀ (9 mm), 5♂♂ (8–10 mm).
Wellington: [E966] 6 spp; [E967] 2 spp; [23] 13 spp; [27] 4 spp; [Z2298] 4 spp.
Brothers Is: [Z2313] 7 spp.
Kaikoura: [104] 608 juvs (2–6 mm), 281♀♀ (7–11 mm), 175♂♂ (7–13 mm); [E969] 12 spp; [E971] 12 spp; [E973] 50–60 spp; [90] about 20 spp; [93] 6spp; [95] 2 spp; [96] 3 spp; [97] 1 sp; [112] 1 sp.
Oamaru: [131] 6 spp.
Dunedin: [E974] 18 spp.
Stewart I: [76–83] 85 juvs (3–10 mm), 5♀♀ (8–9 mm), 9♂♂ (12–13 mm); [37] 1sp.
Chatham I: [CIE 9, 11, 26, 48] 22 juvs (2–9 mm), 5♀♀ (7–10 mm), 2♂♂ (11 mm).
Snares Is: [63, 65, 66, 68, 69, 71, 72, 74] 60 juvs (2–7 mm), 8♀♀ (6–7 mm), 3♂♂ (7–10 mm).
Auckland Is: [48, 50, 51, 52, 53, 55, 56, 59] 15 juvs (3–9 mm), 23♀♀ (9–11 mm), 9♂♂ (10–16 mm); [2] 1 sp; [11] 6 spp; [4] spp.
OTHER RECORDS: Kermadec Is (coll. Capt. Bollons), Spirits Bay, Tauranga, Waitangi (coll. W. R. B. Oliver), Lyttelton (coll. J. S. Slyfield, 1925), Chatham Is (coll. H. B. Kirk), Stewart I. (coll. W. R. B. Oliver, H. B. Kirk), Antipodes I. (coll. L. Cockayne, 1903).
HABITAT: Under stones, among and under algal holdfasts (Jansen 1971).
DEPTH RANGE: Intertidal.
REMARKS: Morton & Miller (1968: 214) describe the species as the common isopod in the Auckland area on clean, exposed coast where "*Gigartina alveata* will mingle with the green *Ulva* and *Letterstedtia* as high as mid tide level . . . its normally orange body becoming blue-green to match the surroundings". They also speak of it as a common inhabitant of small red algae, and as being orange-brown. Morton & Miller's figure (71.1) appears to be *D. huttoni*.

Specimens from Lyall Bay [22] carried the commensal isopod *Iais californica*. Hicks (1971) records specimens of *D. huttoni* up to 5 mm long characterising mid-littoral samples of corallinacean algae at Island Bay.

Jansen (1971) found only juveniles in small red algae at higher intertidal levels, and mixed populations of adults and juveniles among brown algae at lower levels.

Dynamenella insulsa n.sp. (Fig. 25)

DIAGNOSIS
Dynamenella with deep apical notch in pleotelson, constricted posteriorly in females and immature males, closed with a large, broad, median tooth in mature males. Sexes otherwise similar. Pleotelson dorsal surface smooth. Body segments with marginal lateral setae.
TYPE MATERIAL
Holotype: Canterbury Museum Type No. AQ3409 [104, ♂, 5 mm].
Paratypes: Canterbury Museum Type No. AQ3434 [104, 6 juvs, 1.5–3.5 mm; 1♀, 3.5 mm; 6♂♂, 3.8–5 mm].
TYPE LOCALITY: Kaikoura.
MATERIAL EXAMINED
Kaikoura: [104] 6 juvs (1.5–3.5 mm), 1♀ (3.5 mm), 7♂♂ (3.8–5 mm); [103] 1 juv. (4 mm), 1♂ (5 mm); [E971] 1 juv. (3 mm).
OTHER RECORDS: None.
HABITAT: Among algae, under stones.
DEPTH RANGE: Intertidal.

Dynamenella mortenseni n.sp. (Fig. 26)

DIAGNOSIS
Dynamenella with deep apical notch in pleotelson, closed posteriorly in males and females, and with a broad, obtuse, median tooth in mature males. Sexes otherwise similar. Entire body dorsally tuberculate, more coarsely posteriorly.
TYPE MATERIAL
Holotype: NZOI Type No. 148 [Cop. 5, ♂, 9 mm].
Paratypes: NZOI Type No. P205 [Cop. 5, 3♂♂, 6–7 mm].
TYPE LOCALITY: Cape Brett.
MATERIAL EXAMINED
Cape Brett: [Cop. 5] 1♂ (9 mm), 3♀♀ (6–7 mm).
HABITAT: Among algae.
DEPTH RANGE: Intertidal.

Dynamenella sp. (Fig. 27)

Juveniles collected from Bethell's Beach, Auckland west coast, and Ocean Beach (Whangarei) appear not to fit any of the established New Zealand species, and without mature males, at least, cannot be properly identified. Figures are given so that matching adults may be looked for.
MATERIAL EXAMINED
Ocean Beach: [E953] 1 sp.
Bethell's Beach: [E949] 3 spp.

Dynamenoides n.gen.

TYPE SPECIES: *Dynamenoides vulcanata* n.sp.

DIAGNOSIS
Eubranchiate Sphaeromatidae with pleopod 3 outer ramus unsegmented. Antenna I peduncle, first segment not expanded in large plate. Pereonite 7 in mature males widened, with rear margin medially excavate, lateral ends produced posteriorly in acute process in males. Pleopod 2 inner ramus has reduced appendix masculina, not longer than inner ramus itself. Pleotelson has transverse foramen connected with apex by a narrow slit; in females and immature males the foramen is circular, and the slit may be narrow or closed. Dorsal processes absent in females and immature males.
REMARKS: *Dynamenoides* is separated from *Dynamenella* by the reduced appendix masculina in mature males and by the sexual differentiation in *Dynamenoides*. It is distinguished from *Dynamene* by the appendix masculina (lacking in *Dynamene*), and by the pereonite 7 processes in males – *Dynamene* has processes on pereonite 6 (Holdich 1968b: 401–7).

No gravid females of either species described here were seen, so it is not yet possible to diagnose mouthparts or broodplates.

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF DYNAMENOIDES

Uropod outer rami in mature males about twice length of inner; epistome not produced anteriorly, not protruding between bases of antennae I ..... VULCANATA

Uropod rami in mature males subequal; epistome produced anteriorly, protruding between bases of antennae I ..... DECIMA

Dynamenoides decima n.sp. (Fig. 28)

DIAGNOSIS

Dynamenoides with epistome produced anteriorly, protruding between bases of antennae I. Coxal plates broad, contiguous. Uropod rami subequal in mature males.

TYPE MATERIAL

Holotype: NZOI Type No. 149 [E983, ♂, 6 mm].

Paratypes: NZOI Type No. P206 [E983, 36 juvs, 3–6 mm; 3 immature ♂♂, 5.5 mm; 2 mature ♂♂, 5–6 mm].

TYPE LOCALITY: Castlepoint.

MATERIAL EXAMINED

Bay of Islands: [E981] about 20 spp; [Cop. 6] spp.

Dargaville: [E952] 1 sp.

Auckland: [E956] 1 juv. (3 mm), 2 immature ♂♂ (5.5–6 mm); [E975, 978, 979] 27 juvs (1.5–5.5 mm).

Mt Maunganui: [E959] 2 spp.

Napier: [Z2297] 4 spp.

Castlepoint: [E983] 36 juvs (3–6 mm), 3 immature ♂♂ (5.5 mm), 3 mature ♂♂ (5–6 mm).

Wellington: [E985] about 15 spp; [E966] 4 spp; [E967] 2 spp; [Z2298] 1 sp.

Kaikoura: [E971] 1 sp.

OTHER RECORDS: None.

HABITAT: Among algae, under stones.

DEPTH RANGE: Intertidal.

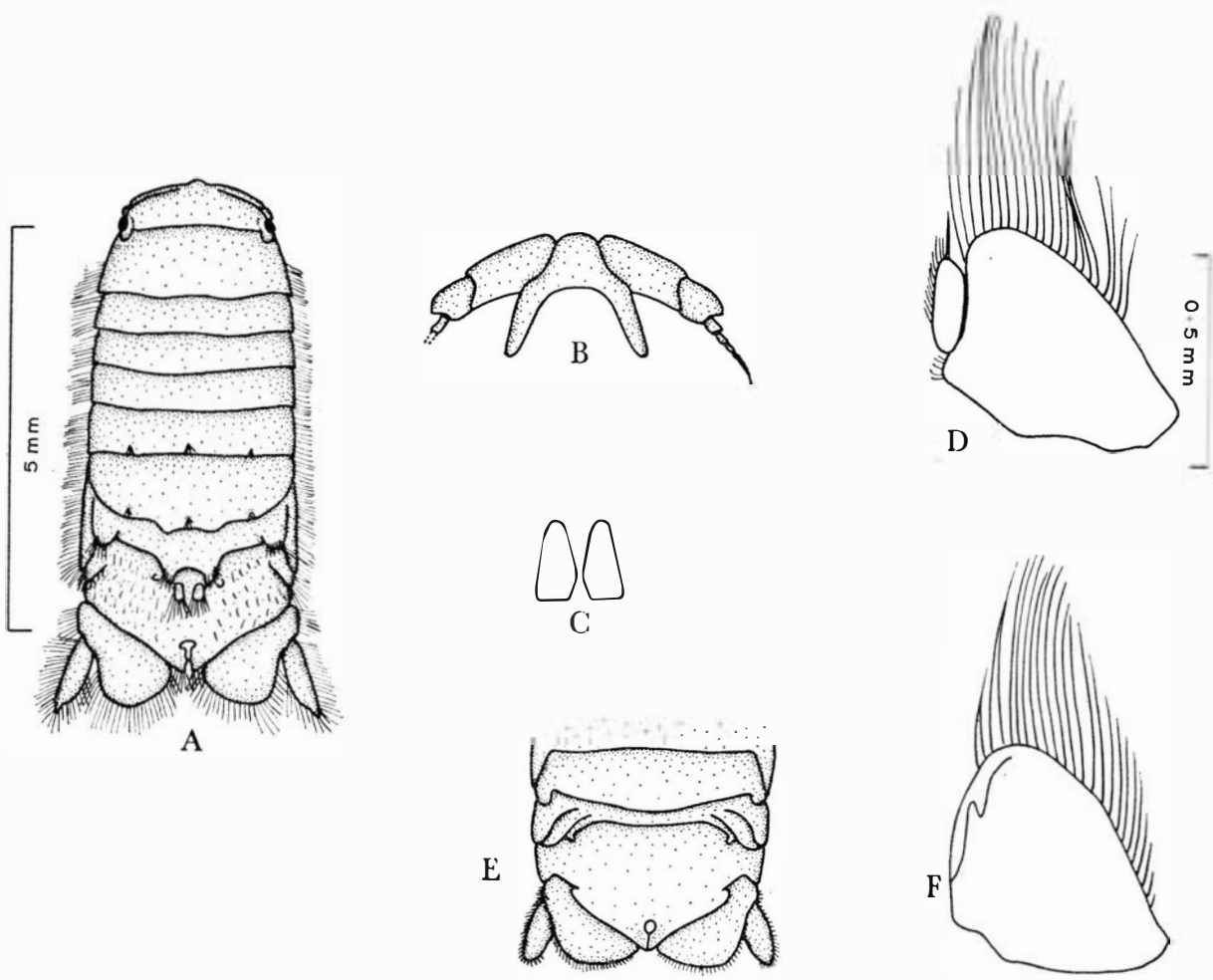


FIG. 28. *Dynamenoides decima* n.sp., mature ♂ except E, F (immature ♂): A, whole animal; B, epistome and antenna I; C, penes; D, pleopod 2, inner ramus; E, pleon; F, pleopod 2, inner ramus.

Dynamenoides vulcanata n.sp. (Fig. 29)

DIAGNOSIS

Dynamenoides with epistome broadly rounded, not produced anteriorly, not protruding between bases of antennae I. Coxal plates narrow, but widely separated. Uropod outer ramus in mature males about twice length of inner.

TYPE MATERIAL

Holotype: Canterbury Museum Type No. AQ3412 [104, ♂, 6 mm].

Paratypes: Canterbury Museum Type No. AQ3437 [104, 29 juvs, 3–6 mm; 4 immature ♂♂, 5.0–5.5 mm; 2 mature ♂♂, 6.0–6.5 mm].

TYPE LOCALITY: Kaikoura.

MATERIAL EXAMINED

Auckland: [E956] 2 juvs (4.5 mm), 2♂♂ (5.5–6 mm); [E977, 978, 979] 19 juvs (2–3 mm); [138] 1 immature ♂ (5 mm).
Gisborne: [E982] 6 juvs (2–3 mm).
Castlepoint: [E983] 2 juvs (3–5 mm).
Wellington: [27] 1 juv. (5.5 mm).
Kaikoura: [104] 29 juvs (3–6 mm), 4 immature ♂♂ (5–5.5 mm), 8 mature ♂♂ (6–6.5 mm); [E969, E971] 31 juvs 2–4.5 mm), 2♀♀ (5.5–6 mm), 1 immature ♂ (5 mm).

OTHER RECORDS: None.

HABITAT: Among algae, under stones.

DEPTH RANGE: Intertidal.

Dynamenopsis Baker, 1908

Dynamenopsis Baker, 1908: 152–3 (implicit in *Dynamenopsis obtusa*). Menzies, 1962a: 142.

TYPE SPECIES: *Dynamenopsis obtusa* Baker, 1908.

Eubranchiate Sphaeromatidae with pleopod 3 outer ramus 2-segmented. Pleopod 2 in mature males has well developed appendix masculina. Pereonite 6 coxal plates produced posteriorly, overlapping pereonite 7. Pleotelson strongly tuberculate, sides of apex folded down and around forming a nearly closed tube. Males and females similar. Female mouthparts not metamorphosed.

REMARKS: Menzies & Glynn (1968) consider that *Dynamenopsis* is a synonym of *Dynamenella* because of their discovery that the type of *Dynamenella* has a 2-segmented pleopod 3. However, we consider that the differences between *Dynamenopsis* and *Dynamenella* in pleotelson shape and development of pereonite 6 coxal plates are sufficiently distinctive to warrant the continued recognition of Baker's *Dynamenopsis obtusa* and our species as belonging to a valid genus. It is perhaps relevant to point out that Baker did not define the genus on the basis of pleopod 3, but merely described the species in detail and left the generic diagnosis to be

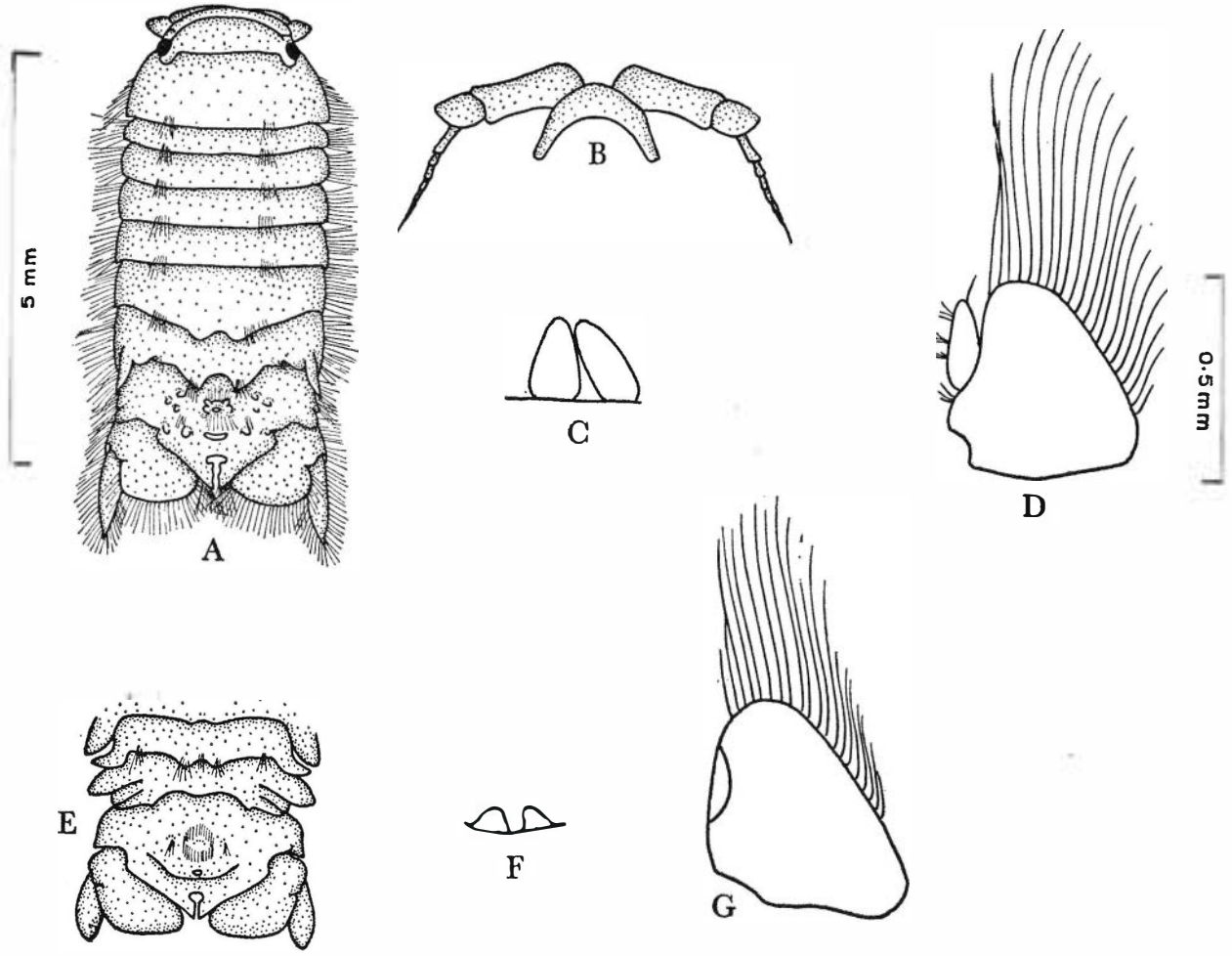


FIG. 29. *Dynamenoides vulcanata* n.sp., mature ♂ except E–G (immature ♂): A, whole animal; B, epistome and antenna I; C, penes; D, pleopod 2, inner ramus; E, pleon; F, penes; G, pleopod 2, inner ramus.

inferred from the specific description, and that *Dynamenopsis dianae* (Menzies, 1962b), which Menzies & Glynn (1968) transfer to *Dynamenella* is, by our standards. *Dynamenella* and not *Dynamenopsis*.

We were unable to find any trace of pleopod 3 segmentation in New Zealand species of *Dynamenella;* it may be that they warrant further distinction from *Dynamenella perforata,* the type of *Dynamenella,* but we would not place this much emphasis on pleopod 3 alone, and would want other criteria to confirm any such separation.

Dynamenopsis varicolor Hurley & Jansen, 1971 (Fig. 30)

Dynamenopsis varicolor Hurley & Jansen, 1971: 473. Jansen, 1971: 173.
Dynamenopsis sp. Hicks, 1971: 52, 56.

DIAGNOSIS
Dynamenopsis with a pair of prominent conical tubercles on pleotelson surrounded by a ring of smaller tubercles, a further prominent tubercle above the apical foramen. Uropod outer ramus broadly rounded and flat, inner ramus subrectangular, has concave outer margin, acute apex.

TYPE MATERIAL
Holotype: Canterbury Museum Type No. AQ3411 [104, ♂, 8 mm].
Paratypes: Canterbury Museum Type No. AQ3436 [104, 402 juvs, 2–7 mm; 213 ♀♀, 5–9 mm; 185 ♂♂, 5–12 mm].

TYPE LOCALITY: Kaikoura.
MATERIAL EXAMINED
North Cape: [Cop. 4] spp.
Cape Brett: [Cop. 5] spp.
Whangarei: [E953] 1♀ (6 mm).
Auckland: [E957] 1 juv. (3.5 mm); [E975, 977, 979] 7 juvs (2.6 mm); [Gal. 644] 1♂.
Gisborne: [E982] 4 juvs (3–4 mm).
Castlepoint: [E983] 2 juvs (3 mm), 1♀ (7 mm); [Z2298, Z2299] 4 juvs (2 mm), 2♀♀ (6–7 mm), 1♂ (7 mm).
Wellington: [E967] 3 juvs (3–4 mm); [E986] 1 sp; [Z2304] 1 sp; [23] 3♀♀ (6.5 mm).
Kaikoura: [104] 402 juvs (2–7 mm), 213♀♀ (5–9 mm), 186 ♂♂ (5–10 mm); [E969, 971] 9 juvs (2–5 mm), 2♀♀ (5–8 mm), 1♂ (6 mm); [110] 30+ spp; [94] 6 spp.
Chatham Is: [E105] 1♀ (8 mm); [CIE 11, 12, 16, 47] 1 juv. (5 mm), 3♀♀ (6–8 mm), 2♂♂ (6–7 mm); [CIE 22] 2 spp.
OTHER RECORDS: Tom Bowling Bay (coll. *Hinemoa*); Tauranga; Cook Strait, The Sisters; Lyttelton, Taylor's Mistake; Otago, Shag Point; Chatham I. Red Bluff (coll. W. R. B. Oliver) (material in Chilton Coll., labelled with MS. names "*Cilicaea rubra*" or "*Sphaeroma rubra*").
HABITAT: Under stones, among algae.
DEPTH RANGE: Intertidal.
REMARKS: *Dynamenopsis varicolor* is the only species of *Dynamenopsis* so far found in the New Zealand region. Surprisingly, because it is a very common littoral species, it has not previously been recorded.

Dynamenopsis varicolor has coxal plate 6 strongly overlapping pereonite 7, as in the Australian species *D. obtusa* Baker, but this character appears to be less strongly developed in *D. bakeri* Menzies (1962a. fig. 48), from Chile. The pleotelson tubercles differ in the

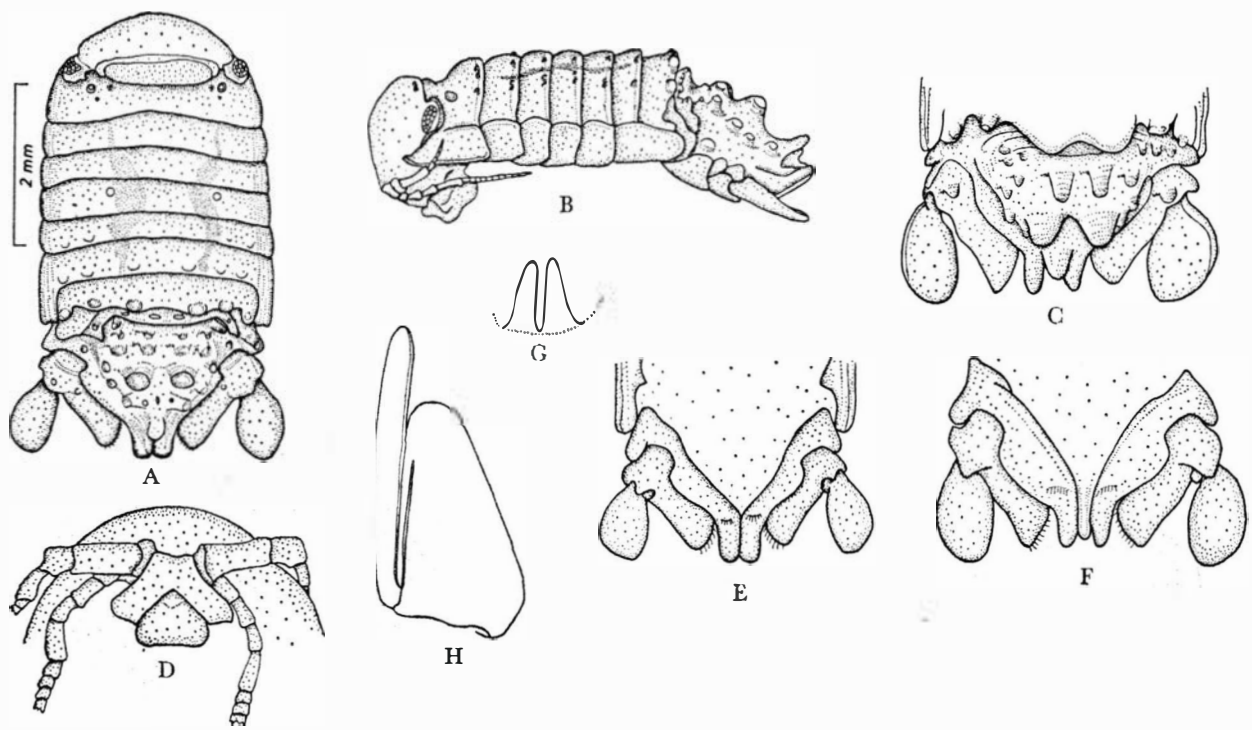


FIG. 30. *Dynamenopsis varicolor* Hurley & Jansen, mature ♂ except F (♀): A, whole animal; B, side view; C, pleotelson, dorsal view; D, ventral view of head, showing epistome and peduncles of antenna I; E, F, pleotelson, ventral view; G, penes; H, pleopod 2, inner ramus (without setae).

three species: they are most strongly developed in *varicolor*, least so in *obtusa*, and both *obtusa* and *bakeri* lack the large, paired tubercles of *varicolor*. Also, the uropods of *bakeri* are characteristically serrated.

Dynamenopsis varicolor is also distinguished by its strikingly variegated colour pattern in life, predominantly rosy pink or coral red, with specks of irridescent greenish-blue and black.

Scutuloidea Chilton, 1883

Scutuloidea Chilton, 1883a: 69–70. Hansen, 1905: 107, 126.
TYPE SPECIES: *Scutuloidea maculata* Chilton, 1883.

DIAGNOSIS
Eubranchiate Sphaeromatidae with pleopod 3 outer ramus of 2 segments. Mature males with well developed appendix masculina on pleopod 2 inner ramus. Female mouthparts not metamorphosed. Broodplates overlapping in midline. Uropod a large, single plate. Sexes similar.

Scutuloidea maculata Chilton, 1883 (Fig. 31)

Scutuloidea maculata Chilton, 1883a: 70–1, pl. 1 fig. 1. Nierstrasz, 1931: 214. Hurley, 1961: 271. Morton & Miller, 1968: 217, fig. 71.7. Hicks, 1971: 56. Jansen, 1971: 268, 273–4.

DIAGNOSIS
Scutuloidea with smooth body surface. Pleotelson large, triangular, with wide, shallow apical notch.
TYPE LOCALITY: Timaru, Lyttelton Harbour.

MATERIAL EXAMINED
Cape Maria van Diemen: [145] 50 spp. (2–5 mm); [Cop. 3] spp.
Whangarei: [E953] 20 juvs (2–3.5 mm), 20♀♀ (3–4 mm), 20♂♂ (3.5–5.5 mm).
Piha: [Z2283] about 20 spp.
Cuvier Is: [137] 2 spp.
Auckland: [E975] 6 juvs (1.5–2 mm); [Z2281] 1 sp.
Coromandel: [Z2308] about 14 spp.
Tauranga: [147] 5 spp. (5 mm); [148] many spp.
Mt. Maunganui: [E959] 1 juv. (3.5 mm), 2♀♀ (3.5–4 mm), 2♂♂ (3.5–5 mm).
Napier: [Z2297] 4 spp.
Castlepoint: [E983] 6 spp.
Wellington: [Z2304] 2 spp.
Cook Strait: [C395] 1 sp; [Z2313] 20–30 juvs.
Kaikoura: [104] 733 juvs (1.5–4.5 mm), 360♀♀ (3–5 mm), 332♂♂ (4–7 mm); [E969, 971] 141 juvs (1.5–4 mm), 8♀♀ (3–4 mm), 3♂♂ (5–5.5 mm); [100] 1 sp; [91] about 18 spp.
Lyttelton: [143] 104 spp. (1.5–4 mm); [146] 2 spp. (4–6 mm); [149] 8 spp. (3–5 mm).
Sumner: [144] 28 spp. (2–5 mm).
Otago: [E973, 974] 41 juvs (1.5–3.5 mm), 6♀♀ (3–3.5 mm), 6♂♂ (3.5–5 mm).
Stewart I: [77, 80, 82] 5 juvs (2.5–3 mm), 12♀♀ (2.5–4 mm), 21♂♂ (3.5–5 mm).
Snares Is: [68, 69, 70, 71, 74] 21 juvs (2.5–5 mm), 8♀♀ (3–4 mm), 11♂♂ (4.5–6 mm).
Chatham Is: [CIE 12] 1 juv. (4 mm), 1♀ (4 mm), 2♂♂ (5–6 mm).
OTHER RECORDS: Timaru (Chilton 1883: 70).
HABITAT: Algal fronds ("small red algae" – Morton & Miller 1968: "brown algae"—Jansen 1971).
DEPTH RANGE: Intertidal to 11 m.
REMARKS: The material from Lyttelton [143] included several males carrying females with their 3rd–5th legs. The females tend to be thicker in the body than the males, which are almost flat. The specimens have a circular, transparent area above the pleopod box which shows as a yellowish mass.

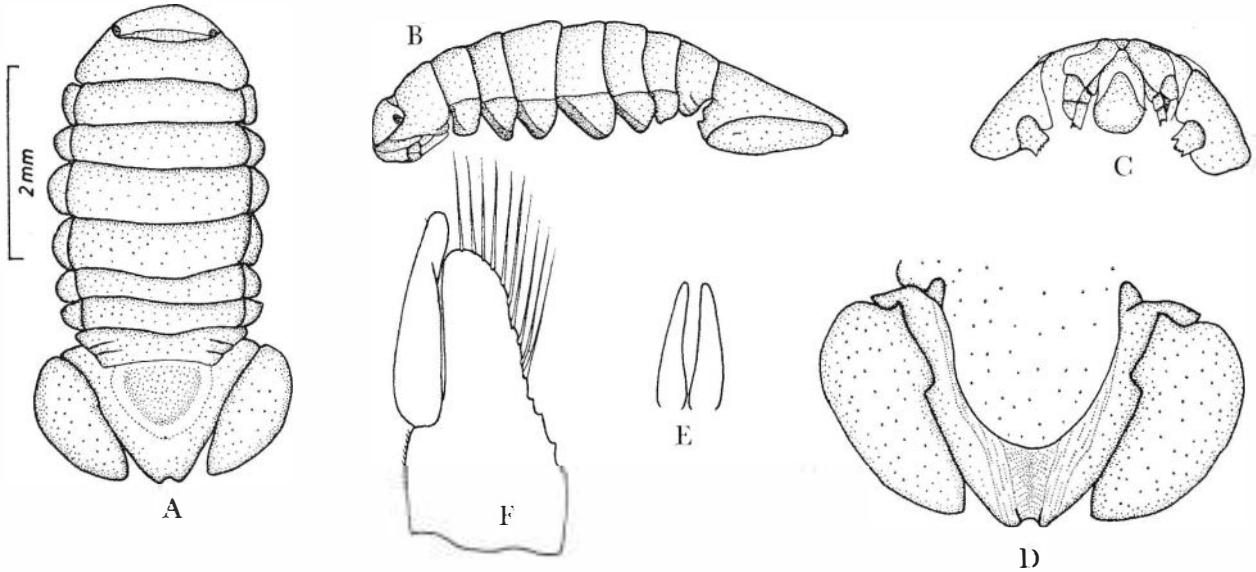


FIG. 31. *Scutuloidea maculata* Chilton, mature ♂: A, whole animal; B, side view; C, head, ventral view showing epistome and peduncles of antenna I; D, pleotelson, ventral view; E, penes; F, pleopod 2, inner ramus.

Subfamily Hemibranchiatinae

Group Sphaerominae hemibranchiatae Hansen, 1905: 100–5.

Diagnosis

Pleopods 4 and 5, inner rami thick and fleshy with deep, essentially transverse, folds; outer rami membranaceous* and rather pellucid, of two segments, both rami with plumose marginal setae; pleopod 5, outer ramus apical squamiferous protuberance very high; pleopod 3, both rami closely set with long, plumose setae, at least on distal margin; pleopod 1, inner ramus at least rather broad, scarcely ever half as long again as broad. (After Hansen 1905)

Remarks: Hansen (1905: 102) also adds these further comments (in précis): the proximal segments of the antennae fit into oblique excavations in front of the head—they never protrude with free expansions; the outer ramus of the uropods is always present, but may sometimes be exceedingly small; the brood develops in internal pouches; the body is never strongly depressed, and the animal has the faculty of rolling up excellently developed; the lateral margins of the pereon are not continuous.

Key to New Zealand and subantarctic genera of subfamily Hemibranchiatinae

1. Pleotelson apex notched in both males and females (tribe Cymodocini) 2

   Pleotelson apex without notch in males or females (tribe Sphaeromini) 4

2. Notch in pleotelson apex lacks median process in both sexes ..... Cymodopsis

   Notch in pleotelson apex has median process in males or females or both 3

3. Adult males, first pleonite produced posteriorly in large median process; uropod inner ramus much reduced ..... Cilicaea

   Adult males, first pleonite unarmed or produced in moderately large median process; uropod inner ramus well developed ..... Cymodoce

4. Pleopod 4 outer ramus has thick, opaque inner part, remainder thin and membranous; pleopod 5 outer ramus has thick, opaque proximal part, remainder thin and membranous ..... Pseudosphaeroma

   Pleopods 4 and 5, outer rami wholly thin and membranous 5

5. Maxilliped palp, last three segments have lobes poorly developed or absent; pereopods 1–3 have long, plumose setae; broodplates overlap in midline ..... Sphaeroma

   Maxilliped palp, last three segments have well developed lobes; pereopods are without long, plumose setae; broodplates do not reach midline 6

6. Pereonite 7 has backwardly directed median spine in males ..... Isocladus

   Pereonite 7 lacks median spine in both sexes ..... Exosphaeroma

Tribe **Cymodocini** Hansen, 1905

Section Cymodocini Hansen, 1905: 104.

Diagnosis

Pleotelson in both sexes notched, notch semicircular or bilobed often divided by a median process. Mouthparts strongly metamorphosed in gravid females (mandibles lack dark, strongly chitinised apices, other mouthparts blunted and non-setose). Maxilliped palp has long lobes on last three segments. Pleopod 3, outer ramus 2-segmented. Broodplates overlapping in midline.

Cilicaea Leach, 1818

Cilicaea Leach, 1818: 342. Hansen, 1905: 104, 122–3.
Type species: *Cilicaea latreillei* Leach, 1818

Diagnosis

Hemibranchiate Sphaeromatidae with pleotelson apex notched in males and females, the notch usually divided by a median lobe. Epistome without free process in front. Uropod outer ramus well developed, inner ramus vestigial in mature males, subequal in females and immature males. Pleonite 1 in adult males with large process which is reduced in immature males, absent in females. Pleopod 2 inner ramus has well developed appendix masculina in mature males.

Remarks: The inclusion of *Cilicaea latreillei* in the New Zealand fauna (Hurley 1961: 270) was based on a misreading by Nierstrasz (1931: 205) of a remark by Miers (1884: 329). It should be deleted.

Key to New Zealand and subantarctic species of Cilicaea

1. Adult males: pleotelson apex perforated each side of midline 2

   Adult males: pleotelson without perforations 3

2. Adult males: pleonite 1 process parallel-sided, truncated, with small, median, terminal emargination; uropod outer ramus completely covered with short, coarse setae; notch in pleotelson apex fully occupied by median lobe; pereonites with setal tufts laterally and each side of midline ..... canicULATA

   Adult males: pleonite 1 process with sides slightly divergent posteriorly, truncated, with small, median, terminal emargination; uropod outer ramus with short, coarse setae dorsally only; notch in pleotelson apex only partly occupied by median lobe; pereonites without setal tufts ..... dolorosa

3. Adult males: pleonite 1 process with posterior end expanded in two large, leaf-shaped lobes; uropod outer ramus without setae ..... tasmanensis

   Adult males: pleonite 1 process narrow and parallel-sided posteriorly, ending in two small lobes separated by a small, median emargination; uropod outer ramus completely covered with short setae ..... angustispinata

*In *Pseudosphaeroma*, pleopods 4 and 5 have the inner part of the outer ramus thick and opaque but the rest of the ramus thin and membranaceous.

Cilicaea angustispinata n.sp. (Fig. 32)

DIAGNOSIS

Cilicaea with pleonite 1 process in adult males narrow and with parallel sides posteriorly, terminating in two small lobes separated by a shallow, terminal, median emargination. Uropod outer ramus in adult males completely covered with short setae. Pleotelson apex in adult males without perforations.

TYPE MATERIAL

Holotype: NZOI Type No. 145 [Cop. 7, ♂, 7 mm].

Paratypes: NZOI Type No. P202 [Cop. 10, 4♂♂ 5–7 mm; 1♀, 6 mm; 1 juv., 3 mm].

TYPE LOCALITY: Hauraki Gulf (North Channel), Kawau Island.

MATERIAL EXAMINED

Little Barrier I: [Cop. 7] spp; 1♂ (7 mm, damaged).

Hauraki Gulf: [Cop. 9] 3♂♂, 1♀, 1 juv. [Cop. 10] 4♂♂ (5–7 mm, 2 damaged), 1♀ (6 mm), 1 juv. (3 mm).

HABITAT: Sublittoral, shallow shelf benthos.

DEPTH RANGE: 18–55 m.

Cilicaea caniculata (Thomson, 1879) (Fig. 33)

Nesea caniculata Thomson, 1879: 234–5, pl. 10 fig. A7. Filhol, 1885: 458.

Naesa canaliculata. Thomson & Chilton, 1886: 1953.

Cilicaea caniculata. Chilton, 1911a: 568. Chilton, 1911b: 311. Holdich, 1968b: 407. Morton & Miller 1968: 538.

Cilicaea caniculata. Hansen, 1905: 123. Nierstrasz, 1931: 206. Hurley, 1961: 270.

Cymodocea bituberculata. Filhol, 1885: 457, pl. 55 fig. 2.

Cymodoce bituberculata. Hutton, 1904: 263. Tattersall, 1921: 221–2, pl. 6. figs 9–15. Hurley, 1961: 270. Nierstrasz, 1931: 201. Morton & Miller, 1968: 538, fig. 71.9.

DIAGNOSIS

Cilicaea with pleonite 1 process in mature males broad, truncated, with a shallow, terminal, median cleft. Uropod outer ramus in adult males covered with setae except for the inner part of the ventral surface. Pleotelson apex in adult males perforated each side of midline, notch in apex fully occupied by median lobe. Females without pleonite process, pleotelson has instead two well marked, rounded bosses separated by a median groove.

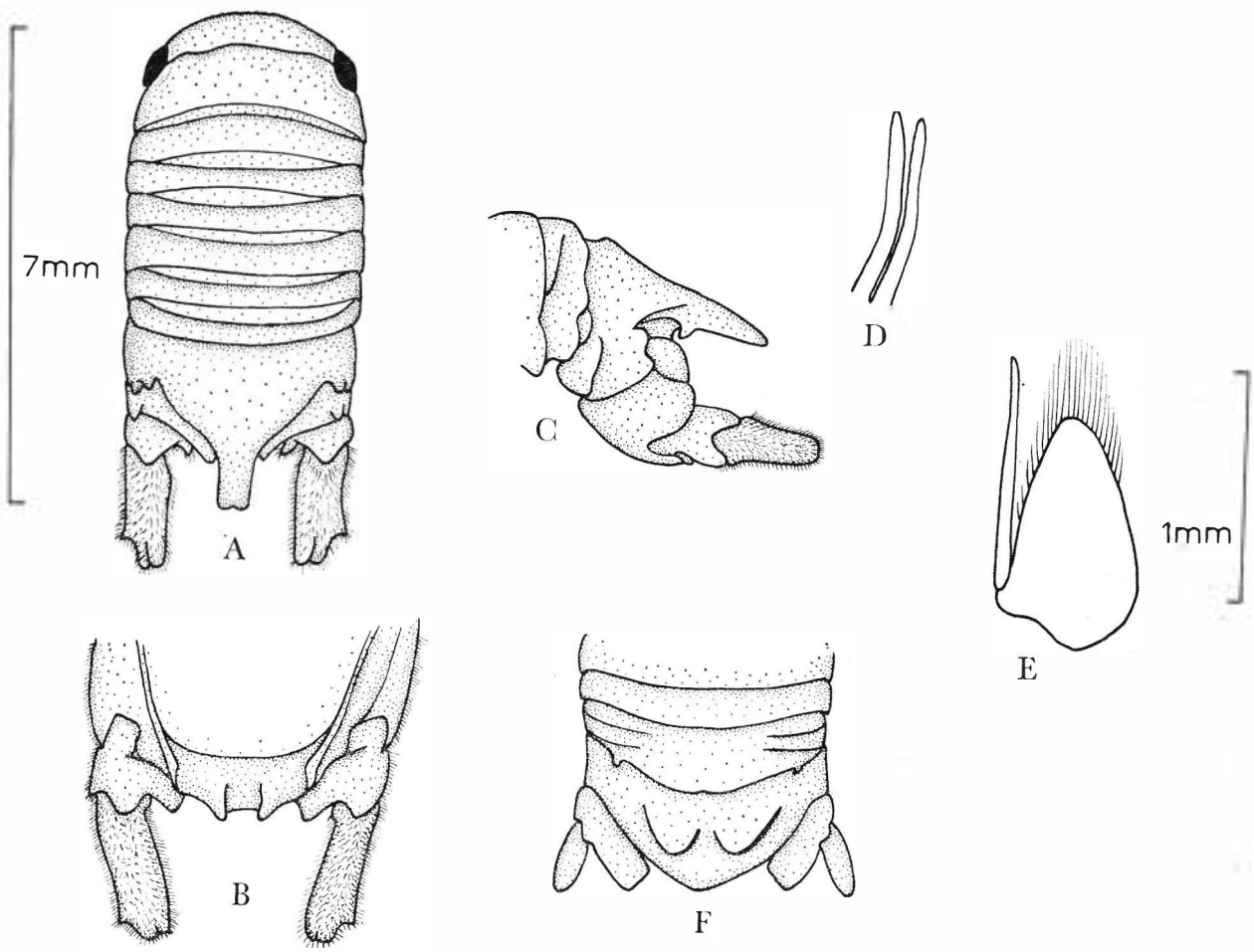


FIG. 32. *Cilicaea angustispinata* n.sp., mature ♂ except F (♀): A, whole animal; B, pleotelson, ventral view; C, pleon, side view; D, penes; E, pleopod 2, inner ramus; F, pleotelson, dorsal view.

TYPE LOCALITY: Dunedin.
MATERIAL EXAMINED
Off Cape Maria van Diemen: [Cop. 2].
Bay of Islands: [Cop. 6] spp.
Wellington: [Cop. 17] spp.
Kaikoura: [104] 6♂♂ (6–9 mm).
Lyttelton: [Cop. 19] spp.
Off Oamaru: [130] 3 spp; [133] 3 spp.
Otago Harbour: [Z2290] 2 juvs (6 mm), 2♂♂ (10–11 mm); [Z2292] 1♀, 1♂ (7 mm); [Z2294] 19 juvs (2–6 mm), 1♂ (11 mm); [Z2295] 4♀♀ (10–12 mm), 1♂ (14 mm); [Z2293]: [VUC1) 1♂ (10 mm); [VUC4] 6♀♀ (10–11 mm), 9♂♂ (10–12 mm); [Z2286] 65 juvs (2–7 mm), 1♀ (9 mm), 7♂♂ (7–8 mm). *Also*: [Z2291] 2 spp; [Z2296] 1 sp; [34] 1 sp; [38] 1 sp; [Z2296a] many specimens.
Off Otago: [Z2285] 2 spp.
Foveaux Strait: [B578] 1♀ (6 mm), 1♂ (7 mm); [D127] 1 juv. (6 mm). *Also*: [B247] 3 spp.
Stewart I: [Cop. 21] spp.
Off Snares Is: [D132] 1♂ (6 mm). *Also*: [D144] 1 sp; [61] 1 sp.
Dusky Inlet: [25] 1 juv. (6 mm), 1♂ (11 mm).
Chatham Is. Exped: [CIE 19] 1 juv. (5 mm), 1♂ (9 mm); [CIE 49] 2♂♂ (11–12 mm); [CIE 52] 1♂, 1♀ (10 mm); [CIE 59] 2♂♂ (9–11 mm).
OTHER RECORDS: None
HABITAT: Among algal holdfasts and in crevices.
DEPTH RANGE: Intertidal to 531 m, but the two Chatham Rise stations, CIE 52 and 59, may be wrongly identified as to species or station number, making the range then 0–143 m.
REMARKS: Unfortunate misspellings crept into both generic and specific names in Thomson & Chilton's checklist of 1886. The change of generic name removed the misspelling "*Naesa*", but "*canaliculata*" has persisted to the present day, although Chilton's subsequent reference used the correct original, "*caniculata*".

The most notable point about this species is the discovery that the females have long been considered a separate species in the genus *Cymodoce*. However, they are identical with the males in all details except the body processes, and are typically taken with the males.

Except where accompanied by adequate figures, the distribution records in earlier literature must be considered with suspicion, since it now appears that at least two species, *C. caniculata* and *C. dolorosa*, were confused.

Morton & Miller (1968: 538) refer to this species as one of the common isopods of river mouths, "burrowing in silty sand or mud". In the same habitat, they found "*Cymodoce bituberculata*", an association which adds weight to our belief that *C. bituberculata* is the female of *Cilicaea caniculata*.

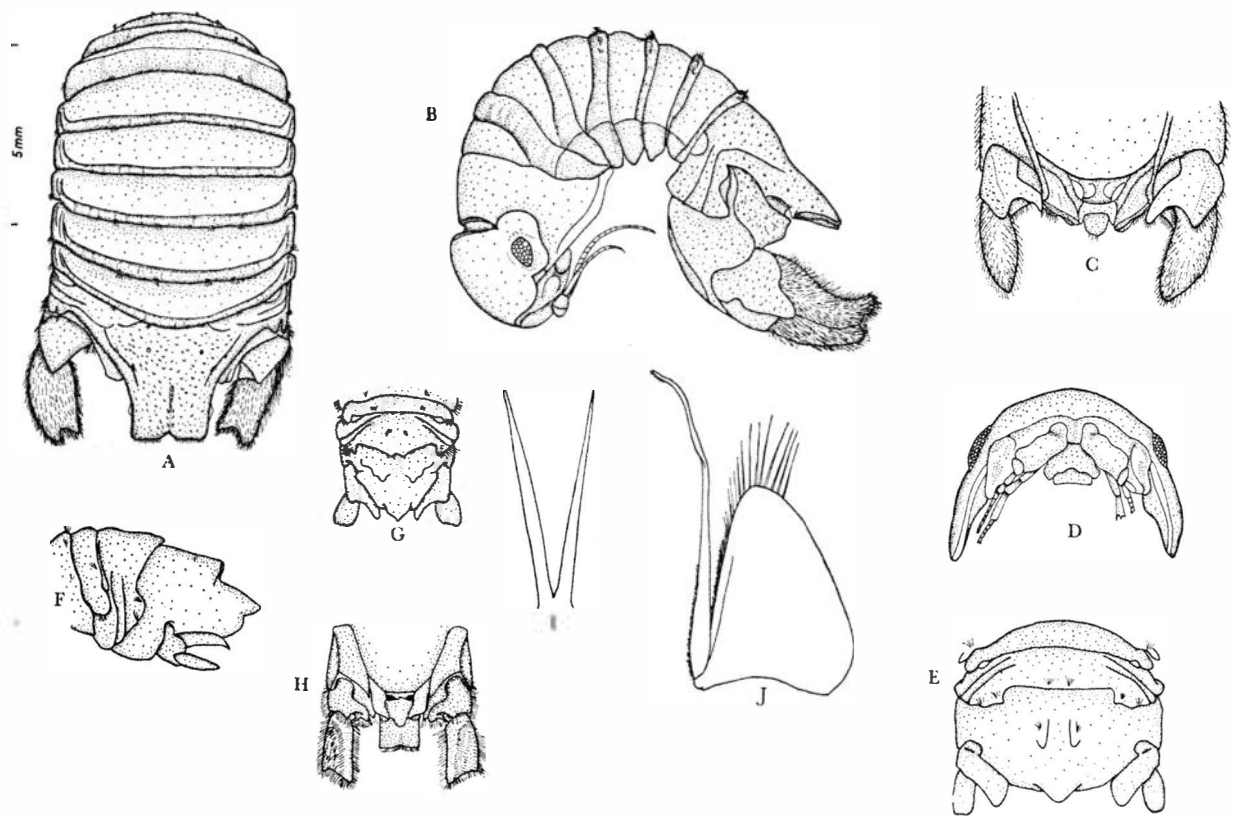


Fig. 33. *Cilicaea caniculata* (Thomson), mature ♂ except E, F (immature ♂) and G (♀): A, whole animal; B, side view; C, pleotelson, ventral view; D, head, frontal view showing epistome and peduncles of antenna I; E, pleon, dorsal view; F, pleon, side view; G, pleon, dorsal view; H, pleotelson, ventral view, different aspect from C.

Cilicaea dolorosa n.sp. (Fig. 34)

[? part] *Cymodocea bituberculata* Filhol, 1885: 457, pl. 55, fig. 2.

DIAGNOSIS

Cilicaea with pleonite 1 dorsal process in mature males truncate, slightly expanded at end, with a shallow median cleft. Uropod outer ramus in adult males covered with setae on dorsal surface only. Pleotelson apex in mature males perforated both sides of midline.

TYPE MATERIAL

Holotype: Canterbury Museum Type No. AQ3406 [104, ♂, 16 mm].

Paratypes: Canterbury Museum Type No. AQ3431 [104, 33 juvs, 2.5–9 mm; 22♀♀, 7–14 mm; 32♂♂, 9–14 mm].

TYPE LOCALITY: Kaikoura.

MATERIAL EXAMINED

Off Three Kings Is: [E312] 1 juv. (5 mm); [Cop. 1] spp.

Auckland (Leigh): [E956] 4 juvs (6–9 mm), 4♂♂ (8–14 mm); [E957] 3 juvs (3–7 mm); [Z2281] 1 juv (6 mm), 1♀ (8 mm), 1♂ (10 mm); [E975, 977, 979] 28 juvs (2–7 mm), 1♂ (10 mm).

Mt Maunganui: [E959] 5 juvs (5–7 mm), 2♂♂ (8–10 mm).

Gisborne: [E982] 4 juvs (3 mm); [Z2312] 2 spp.

Castlepoint: [Z2299] 1 juv. (2 mm); [Z2287] 1♀ (8 mm); [E983] 2♂♂ (8–9 mm). *Also*: [E983] 11 spp.

Wellington: [E966, 967] 51 juvs (2–4 mm), 1♀ (11 mm); [27] 1 juv. (7 mm); [30] 2 juvs (7–10 mm).

Kaikoura: [84] 1 juv. (7 mm); [92] 5 juvs (6–9 mm), 1♂ 11 mm); [E971] 4 juvs (3–4 mm); [104] 33 juvs (2.5–9 mm), 22♀♀ (7–14 mm), 33♂♂ (9–16 mm).

Dusky Inlet: [26] 1 sp.

OTHER RECORDS: None firm. It has possibly been confused with *C. caniculata.*

HABITAT: Under stones and among algae, in algal holdfasts on exposed shores.

DEPTH RANGE: Intertidal to 118 m.

REMARKS: The synonymy between *Cilicaea dolorosa* and part of Filhol's *Cymodoce bituberculata* has been introduced because of Filhol's record of *C. bituberculata* from Cook Strait. There are no other confirmed records of *Cilicaea caniculata,* of which *Cymodoce bituberculata* is considered the female, north of Kaikoura, making it likely that Filhol's records included females of both *Cilicaea caniculata* and *Cilicaea dolorosa.* Confusion with *Cilicaea tasmanensis* is unlikely since *C. tasmanensis* is a deeper, sublittoral species.

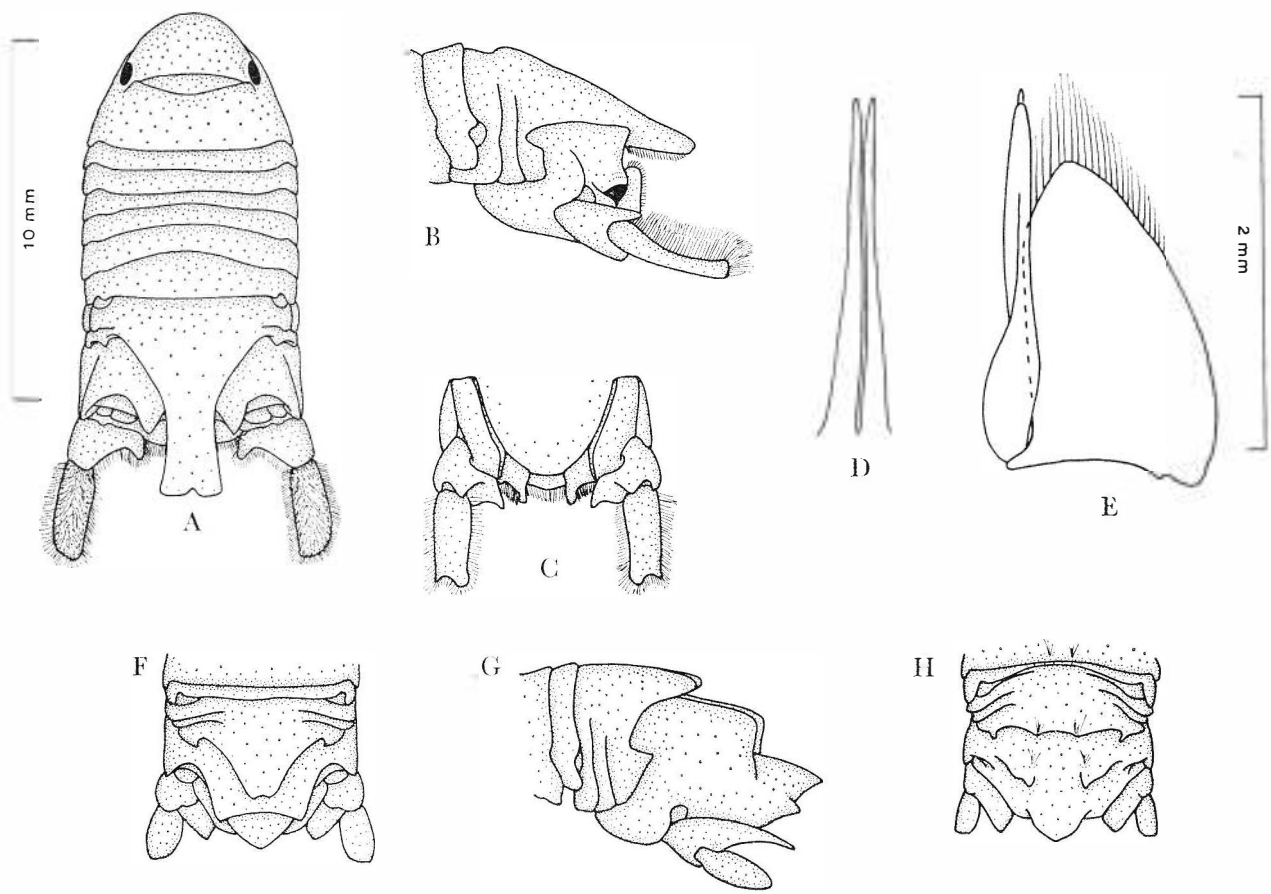


FIG. 34. *Cilicaea dolorosa* n.sp., mature ♂ except F, G (immature ♂) and H (♀): A, whole animal; B, pleon, side view; C, pleotelson, ventral view; D, penes; E, pleopod 2, inner ramus; F, pleon, dorsal view; G, pleon, side view; H, pleon, dorsal view.

Cilicaea tasmanensis n.sp. (Fig. 35)

DIAGNOSIS

Cilicaea with pleonite 1 process in adult males expanded posteriorly in two large, leaf-shaped lobes. Uropod outer ramus in mature males without setae. Pleotelson apex in mature males without perforations.

TYPE MATERIAL

Holotype: NZOI Type No. 144 [B686, TAM, ♂, 20 mm].
Paratypes: NZOI Type No. P201 [B686, 1♂, 9 mm; 6♀♀].

TYPE LOCALITY: Cook Strait.

MATERIAL EXAMINED

Off Hokianga: [C752] 1♂ (13 mm).
Off East Cape: [C814] 3♀♀ (10–11 mm), 1♂ (14 mm).
Cook Strait: [135] 1♂, 1♀ (12 mm); [39] 1♂ (8 mm).
Off Cape Farewell: [B686] 2♂♂ (9–20 mm), 6♀♀.

OTHER RECORDS: None.

HABITAT: Shelf benthos.

DEPTH RANGE: 73–194 m.

REMARKS: The female of the species is very like the female of *Cilicaea caniculata* (="*Cymodoce bituberculata*").

Cymodoce Leach, 1814

Cymodoce Leach, 1814: 533. Hansen, 1905: 104, 119–22.
TYPE-SPECIES: *Cymodoce truncata* Leach, 1814.

DIAGNOSIS

Hemibranchiate Sphaeromatidae with pleotelson notched in both sexes, the notch divided by a median lobe. Uropod rami both well developed. Epistome without free process in front. Sexes alike or dissimilar. Males with or without mesial process on pleonite 1. Mature males with well developed appendix masculina on pleopod 2 inner ramus.

REMARKS: The occasional use of the spelling *Cymodocea* has prompted us to check the correct usage. According to Sherborne's "Index Animalium", *Cymodoce* was used originally by Leach in 1814. *Cymodocea* was subsequently used by Leach in 1818, but in the meantime *Cymodocea* had been proposed by Lamouroux in 1816 for a genus of Coelenterata.

Present usage of *Cymodoce* would appear to be correct practice.

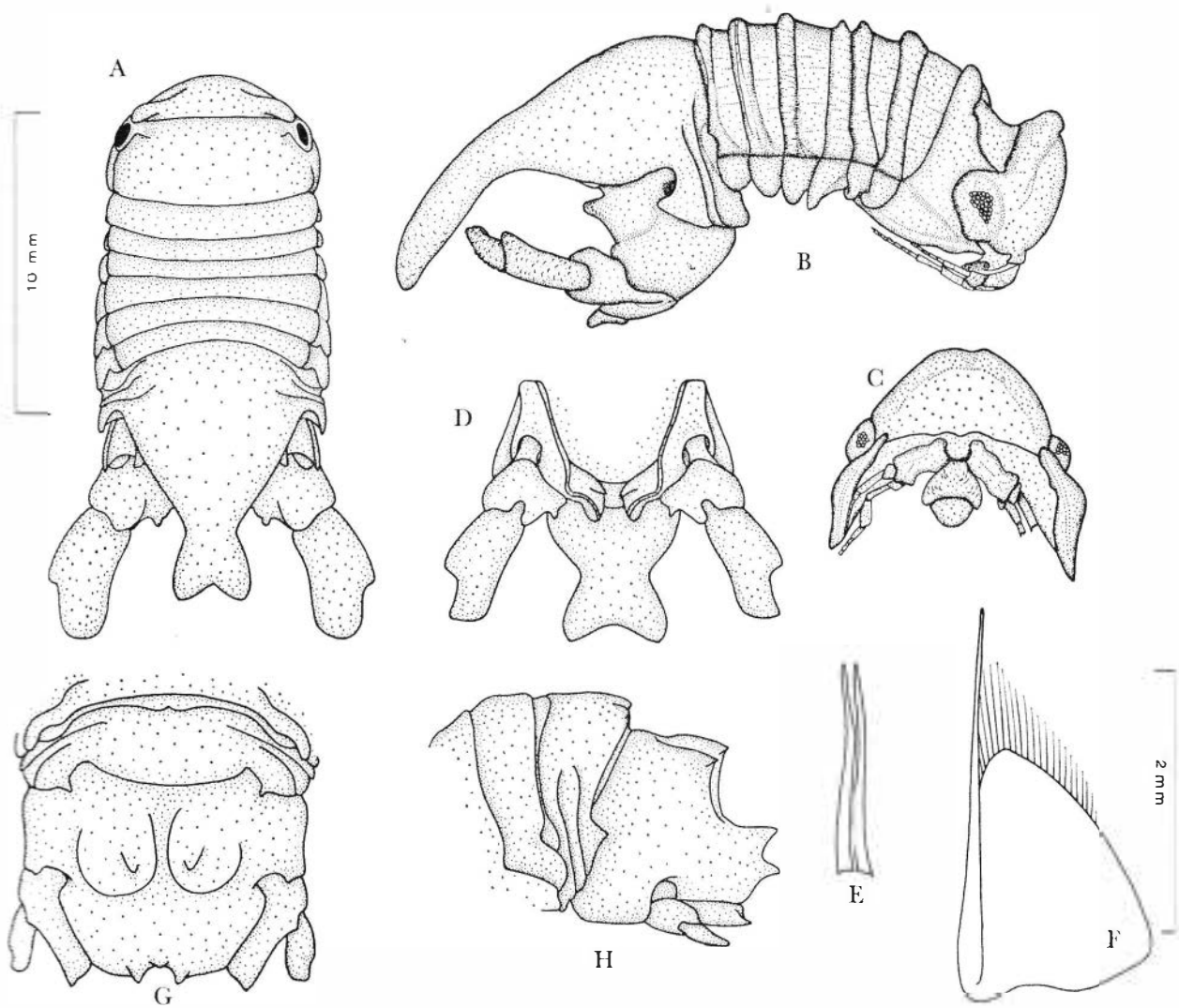


FIG. 35. *Cilicaea tasmanensis* n.sp., mature ♂ except G, H (♀): A, whole animal; B, side view; C, head, frontal view showing epistome and peduncles of antenna I; D, pleotelson, ventral view; E, penes; F, pleopod 2 inner ramus; G, pleon, ventral view; H, pleon, side view.

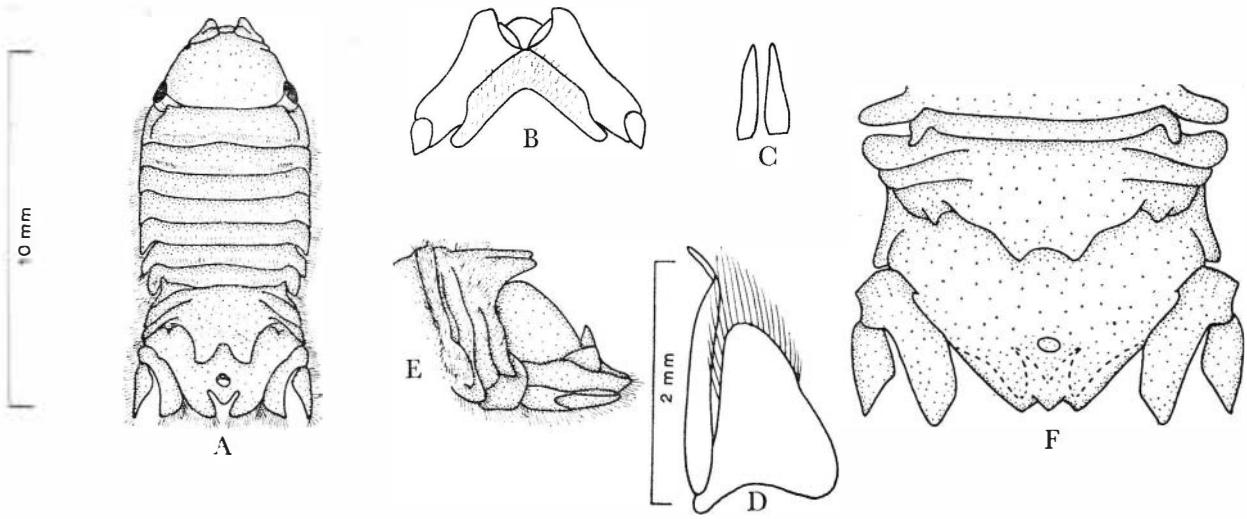


FIG. 36. *Cymodoce allegra* n.sp., mature ♂ except F (immature ♂): A, whole animal; B, epistome and peduncles of antenna I; C, penes; D, pleopod 2, inner ramus; E , pleon, side view; F, pleon, dorsal view.

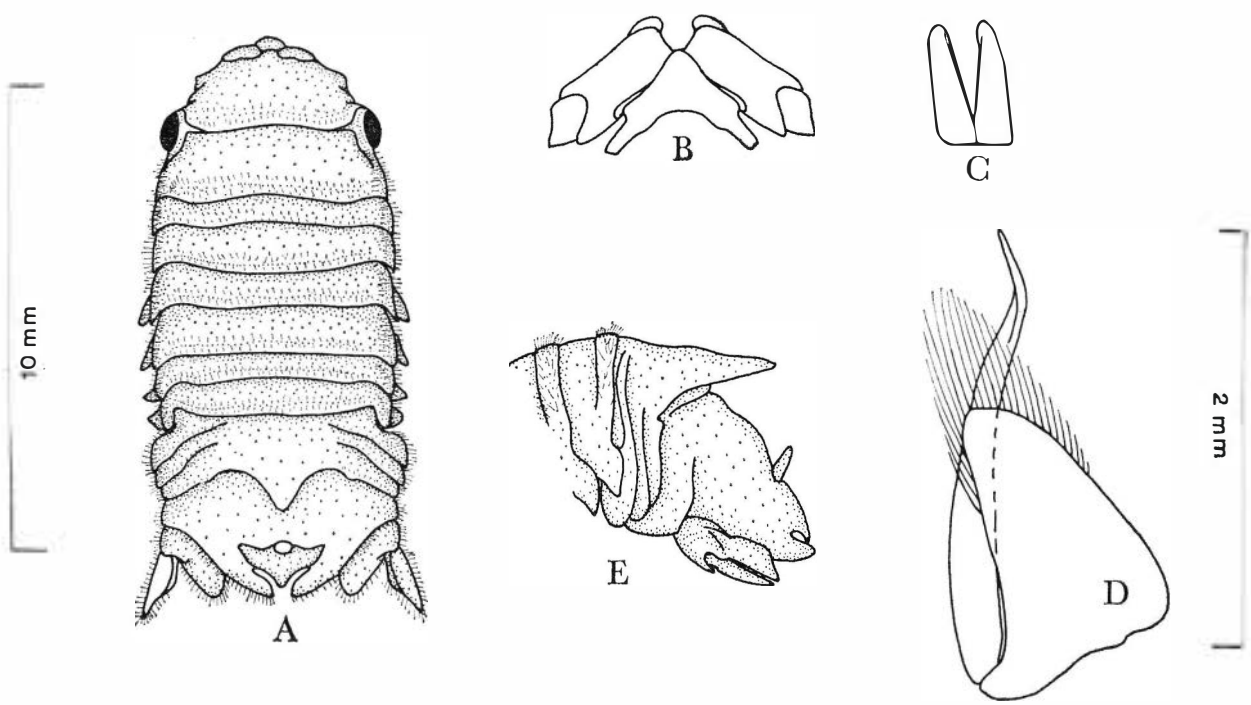


FIG. 37. *Cymodoce australis* Hodgson, mature ♂: A, whole animal; B, epistome and peduncles of antenna I; C, penes; D, pleopod 2, inner ramus; E, pleon, side view.

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF CYMODOCE

1 Males: pleonite 1 with single or bilobed median process; pleotelson with single median or transverse pair of small erect processes 2

Males: pleonite 1 and pleotelson without processes 7

2 Males: pleotelson with transverse pair of small, erect processes obscured by bifurcated process of pleonite 1; posterior margins of body segments strongly tuberculate ..... IOCOSA

Males: pleotelson with single, median, small, erect process 3

3 Males: pleotelson with small, erect process trilobed in dorsal view 4

Males: pleotelson with small, erect process rounded in dorsal view 5

4 Males: pleonite 1 with process broadly truncated in dorsal view, bilobed in posterior view ..... HODGSONI

Males: pleonite 1 with process ending in two rounded lobes in dorsal view ..... PENSEROSA

5 Males: pleonite 1 with process tapering to acute apex; pereonite 7 not longer than preceding segments; antenna 1 peduncle, segment 1 without prominent swellings or strong setae ..... AUSTRALIS

Males not as above 6

6 Males: pleonite 1 with process ending in two deeply separated lobes; antenna 1 peduncle, segment 1 with prominent swellings visible in dorsal view; pereonite 7 not longer than preceding segments ..... ALLEGRA

Males: pleonite 1 with process ending in two small, rounded lobes separated by a shallow cleft; antenna 1 peduncle, segment 1 with strong setae; pereonite 7 extends posteriorly, rounded rear margin partially covers pleonite 1 ..... PERVERSA

7 Pleotelson with four obscure tubercles in transverse series; uropod rami subequal ..... CONVEXA

Pleotelson with one obscure median tubercle; uropod outer ramus nearly twice length of inner ..... GRANULATA

Cymodoce allegra n.sp. (Figs. 36, 40I–J)

DIAGNOSIS

Cymodoce with small, erect, rounded spine on pleotelson; pleonite 1 with process ending in two well separated lobes in males. Antenna I has prominent swelling proximally on first segment of peduncle, visible in dorsal view. Body covered with short, fine hairs.

TYPE MATERIAL

Holotype: NZOI Type No. 137 [B176, ♂, 10 mm].

Paratypes: NZOI Type No. P194 [B176, 4 ♀ ♀, 7–9 mm; 2 ♂ ♂, 9–10 mm].

TYPE LOCALITY: North of Auckland Islands.

MATERIAL EXAMINED

Chatham Rise: [E422] 2 ♀ ♀ (9 mm).

Foveaux Strait: [B260] 1 ♂, 2 ♀ ♀ (10 mm); [E820] 1 ♂ (8 mm).

E of Snares Is: [B582] 1 ♂ (6 mm); [F97] 1 ♂ (9 mm). *Also*: [F97] 2 spp; [D132] 1 ♂ (8 mm).

Snares Is: [63] 1 ♂ (10 mm).

Off Auckland Is: [B176] 4 ♀ ♀ (7–9 mm), 3 ♂ ♂ (9–10 mm); [D71] 3 ♀ ♀ (7 mm); [D65] 1 juv. (7 mm); [D60] 2 ♀ ♀ (8 mm); [D52] 1 ♂ (9 mm); [D53] 1 sp.

HABITAT: Shelf and slope benthos.

DEPTH RANGE: Intertidal to 615 m.

DISTRIBUTION: Southern New Zealand, Chatham Rise, Subantarctic Islands.

Cymodoce australis Hodgson, 1902 (Figs 37, 40C–D)

Cymodocea australis Hodgson, 1902: 245–6, pl. 33 fig. 3, pl. 34 figs 3a–e.

Cymodoce australis. Hurley, 1961: 270.

Cymodoce multidens var. *australis* Nierstrasz, 1931: 200.

DIAGNOSIS

Cymodoce with single, tapering process on pleonite 1; pleotelson with single, rounded, erect process in males. Body covered with short, fine setae.

TYPE LOCALITY: Cape Adare, Antarctica.

MATERIAL EXAMINED

Cook Strait: [A444] 1 ♀ (10 mm).

Off Banks Peninsula: [E433] 1 ♂ (10 mm).

Otago: [Z2285] 25 juvs (3–10 mm).

Snares Is: [63] ♀ (10 mm); [64] 1 sp.

Off Snares Is: [F94] 1 ♂ (12 mm).

Campbell I.: [Gal. 594] 3 ♂ ♂, 4 ♀ ♀, 1 juv.; [Gal. 595] 1 juv., 3 ♀ ♀, 2 ♂ ♂ [8] 4 spp.

Off Auckland Is: [B177] 1 ♂ (7 mm); [D45] 1 ♂ (7 mm); [D65] 2 juvs (–6 mm); [D176] 1 ♀ (9 mm); [D179] 1 ♂ (12 mm); [D194] 1 ♀ (10 mm); [18] 1 juv. (7 mm). *Also*: [D57] 1 sp; [D65] 6 spp.

Auckland Is: [D182] 3 juvs (5–6 mm); [D185] 1 ♀ (10 mm). *Also*: [62] 1 sp.

Pukaki Rise: [D211] 1 ♂ (13 mm).

Off Antipodes I: [D148] 1 ♀ (6 mm).

Southern Campbell Plateau: [F136] 1 ♂ (8 mm); [F145] 1 ♂ (11 mm); [F147] 4 ♂ ♂ (7–9 mm).

OTHER RECORDS: Campbell I., Perseverance Harbour, 28 m (coll. R. Oliver Nov. 1944); Antarctica, Cape Adare, 14 m, 17 Jan. 1900 (Hodgson 1902).

HABITAT: Shelf and slope benthos.

DEPTH RANGE: Intertidal to 611 m.

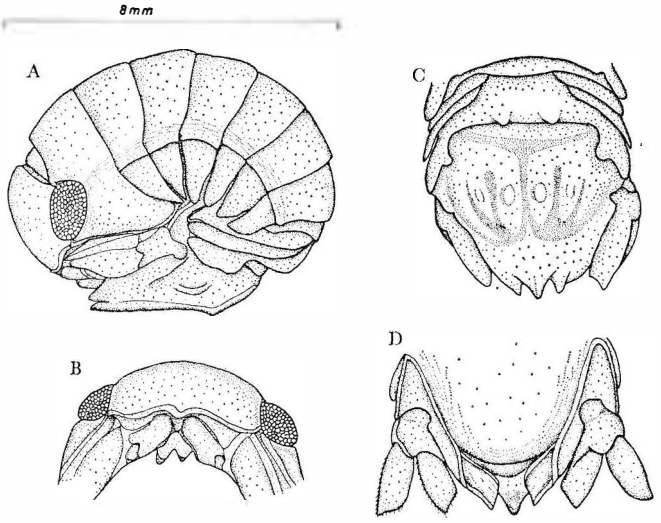


FIG. 38. *Cymodoce convexa* Miers: A, whole animal, side view; B, head, showing epistome and peduncles of antenna I; C, pleon, dorsal view; D, pleotelson, ventral view.

Cymodoce convexa Miers, 1876 (Fig. 38)

Cymodocea convexa Miers, 1876b: 114–15, pl. 3 fig. 6; 1876a: 229. Filhol, 1885: 457.
Cymodoce convexa. Nierstrasz, 1931 201. Hurley, 1961: 270.

DIAGNOSIS
Cymodoce without processes on pleonite 1 or pleotelson. Pleotelson has four obscure tubercles in transverse series. Uropods short, rami subequal.
TYPE LOCALITY: New Zealand.
MATERIAL EXAMINED
New Zealand: [156] 3 spp. (cotypes).
REMARKS: The dry specimens on which Miers based his original descriptions were examined, and an 8 mm female suitably restored forms the basis of the illustrations.

Since these are female specimens, it is possible that the male may have processes on pleonite 1 or pleotelson.

Cymodoce granulata (Fig. 39)

Cymodocea granulata Miers, 1876b: 114, pl. 3 fig. 5; 1876a: 229. Filhol, 1885: 457, pl. 55, fig. 4.
Cymodoce granulata. Nierstrasz, 1931: 201. Hurley, 1961: 270.

DIAGNOSIS
Cymodoce without processes on pleonite 1 or pleotelson. Pleotelson with one obscure median tubercle. Uropod outer ramus nearly twice length of inner.
TYPE LOCALITY: New Zealand.
MATERIAL EXAMINED
New Zealand: [157] 1 ♂ (12 mm).
REMARKS: The illustrations are of Miers' type in the British Museum (*Cymodoce granulata,* Type NZ 50–53).

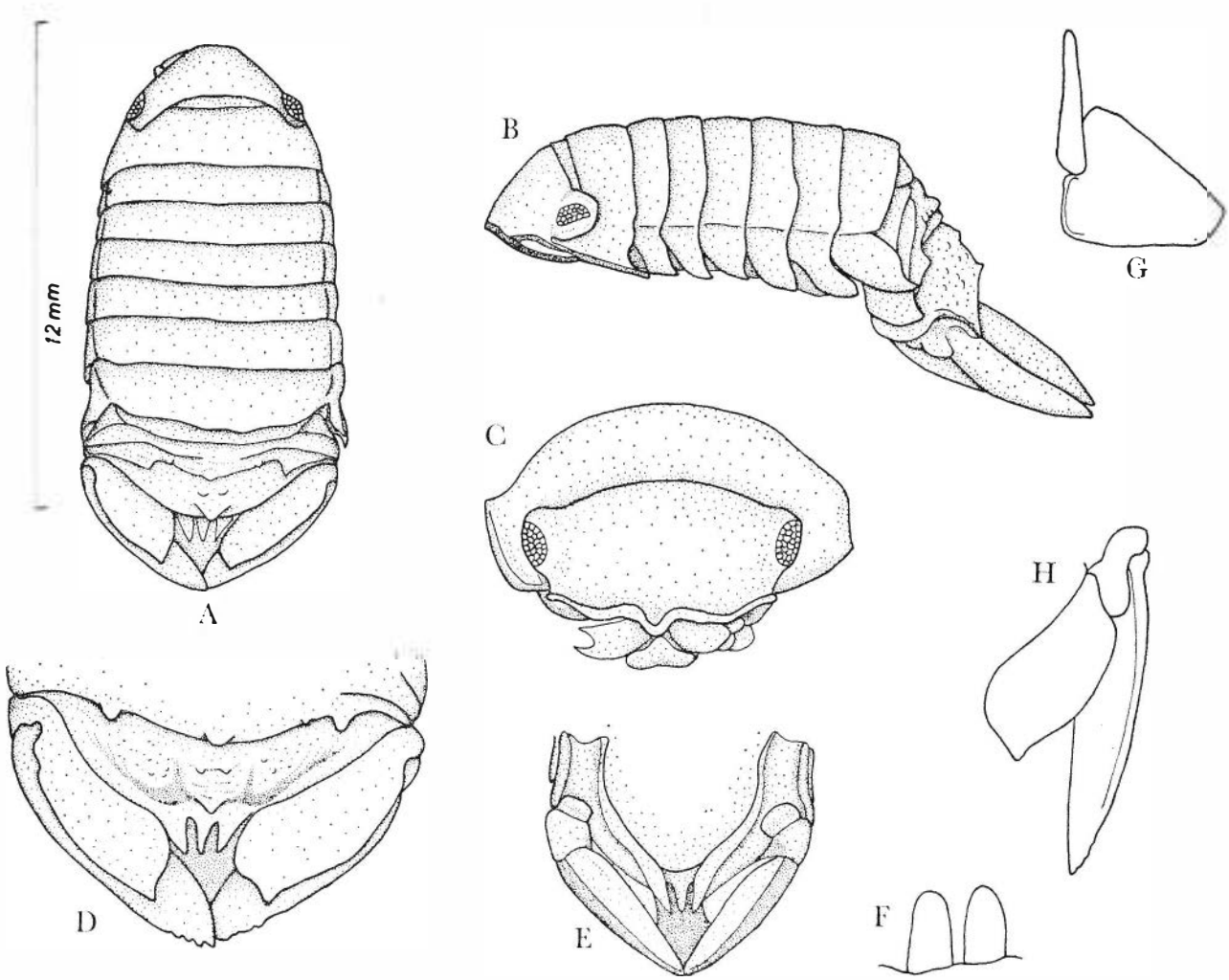


FIG. 39. *Cymodoce granulata* Miers, mature ♂: A, whole animal; B, side view; C, head, frontal view showing epistome and frontal margin; D, pleotelson, dorsal view; E, pleotelson, ventral view; F, penes; G, pleopod 2, inner ramus (without setae); H, uropod.

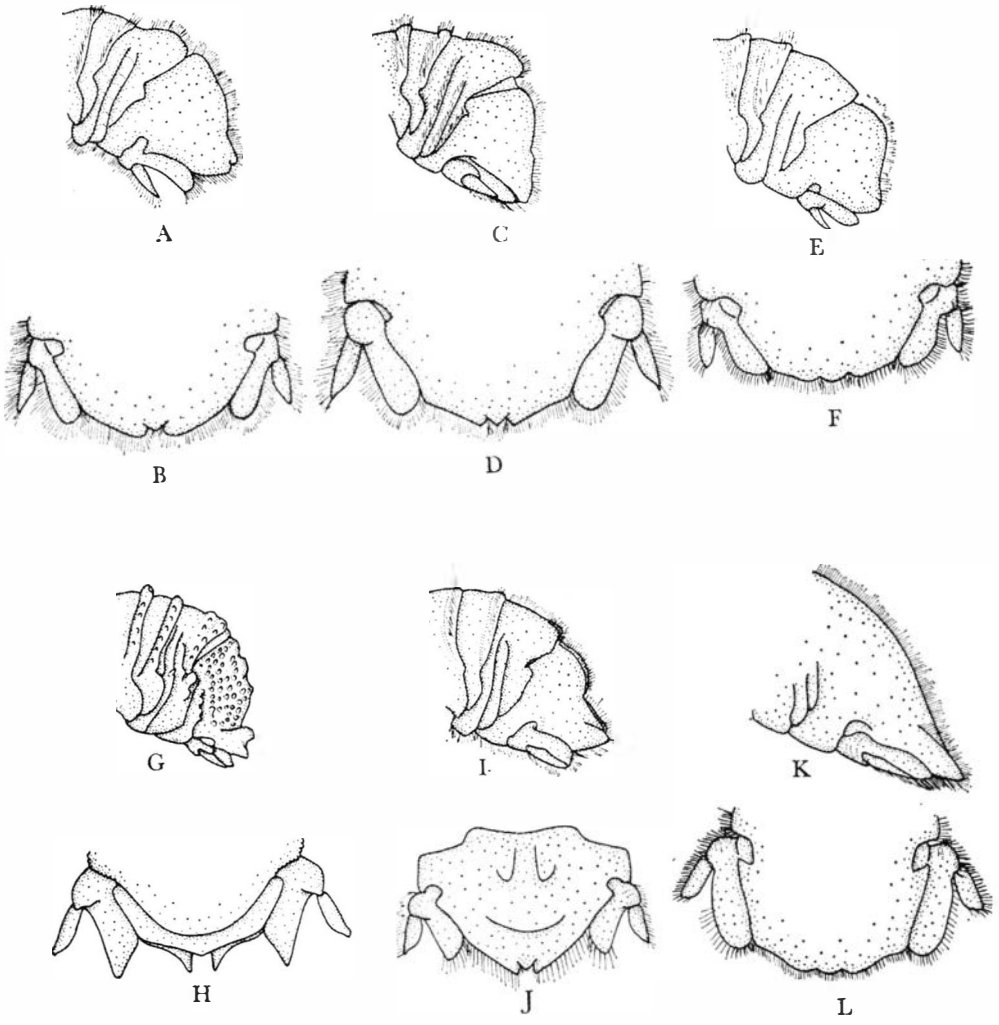


FIG. 40. *Cymodoce* spp. ♀ ♀, dorsal and side views of pleon: A, B, *perversa* n.n.; C, D, *australis* Hodgson; E, F, *hodgsoni* Tattersall; G, H, *iocosa* n.sp.; I, J, *allegra* n.sp.; K, L, *penserosa* n.sp. (reconstruction from damaged specimen).

Cymodoce hodgsoni Tattersall, 1921 (Figs 40E–F, 41)

Cymodoce hodgsoni Tattersall, 1921: 219–21, pl. 6, figs 1–8. Nierstrasz, 1931: 201. Hurley, 1961: 270.

DIAGNOSIS

Cymodoce with small, erect median process on pleotelson in males, process trilobed in dorsal view. Pleonite 1 in males has broad process, truncated in dorsal view, bilobed in posterior view. Body more or less covered with fine setae.

TYPE LOCALITY: Off North Cape.

MATERIAL EXAMINED

Off North Cape: [TN Sta. 96] 1 ♂ (9 mm).
Off Little Barrier I: [Cop. 7] spp.
Off Kawhia: [B664] 4 ♀ ♀ (5–6 mm), 2 ♂ ♂ (6 mm).
Hauraki Gulf: [Cop. 8] spp.
Off Marlborough Sounds: [41] 1 ♀ (10 mm), 4 ♂ ♂ (10–12 mm).

OTHER RECORDS: None.

HABITAT: Shelf benthos.

DEPTH RANGE: 30–126 m.

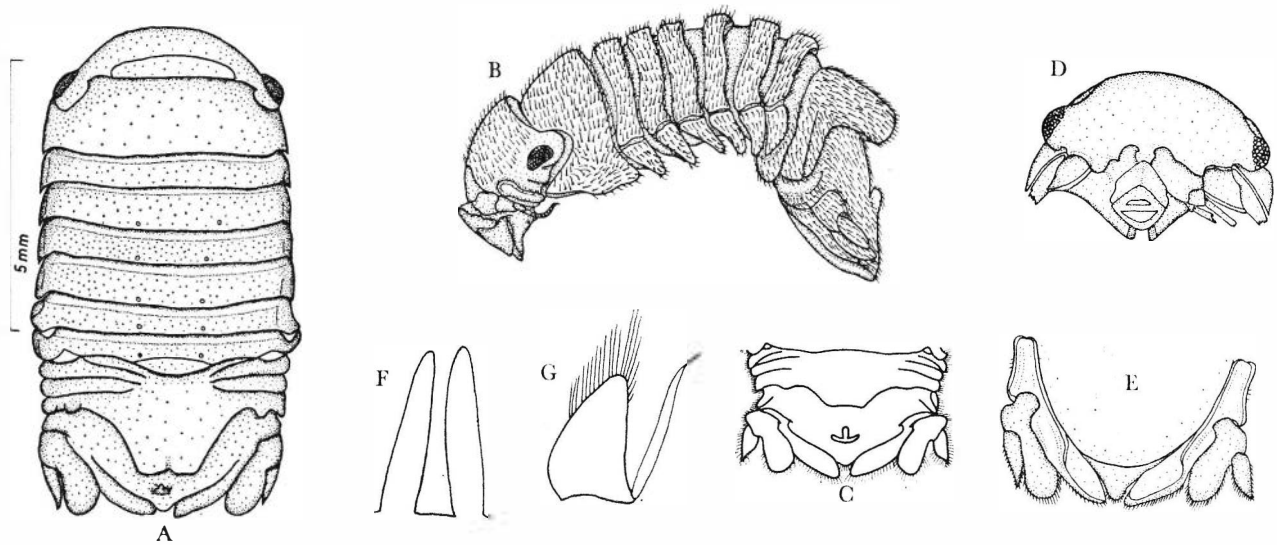


FIG. 41. *Cymodoce hodgsoni* Tattersall, mature ♂: A, whole animal (type); B, side view (N.Z. specimen); C, pleotelson, dorsal view, different aspect from A; D, head, showing epistome and peduncles of antenna I; E, pleotelson, ventral view; F, penes; G, pleopod 2, inner ramus.

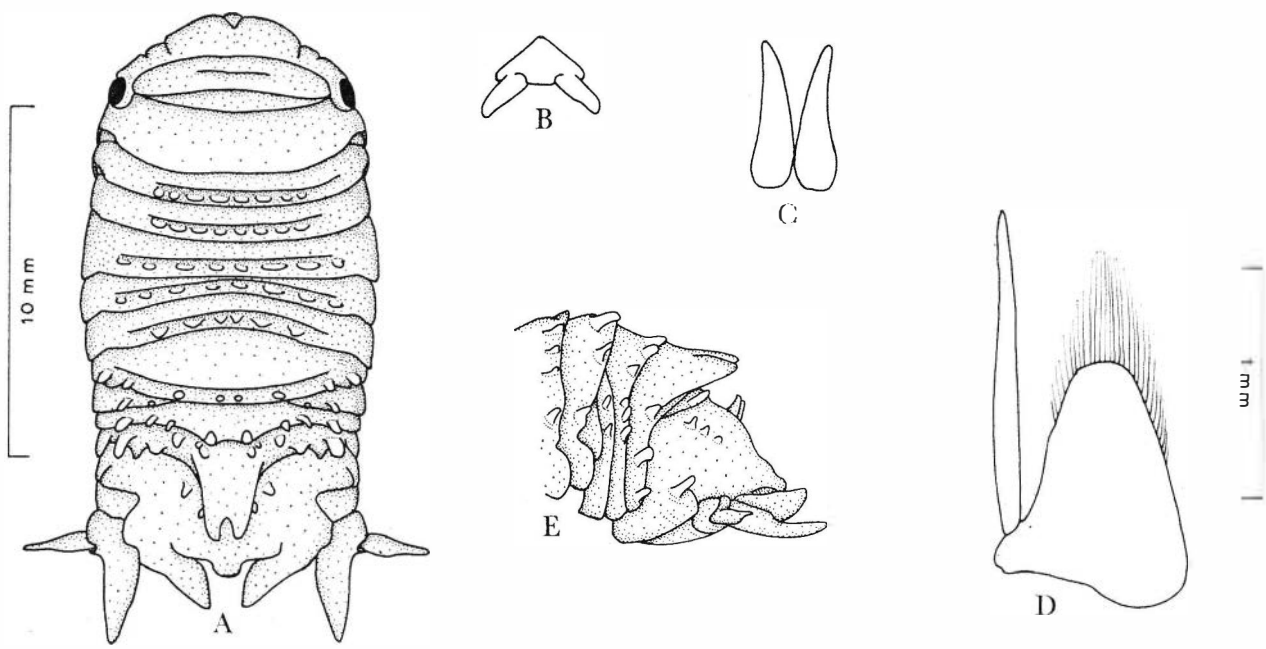


FIG. 42. *Cymodoce iocosa* n.sp., mature ♂: A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus; E, pleon, side view.

Cymodoce iocosa n.sp. (Figs 40G–H, 42)

DIAGNOSIS
Cymodoce with bifurcate process on pleonite 1; pleotelson with small, erect process each side of midline of pleotelson in males. Body segments strongly tuberculate in both males and females.

TYPE MATERIAL
Holotype: NZOI Type No. 139 [B660, ♂, 8 mm].
Paratypes: NZOI Type No. P196 [B660, 2 juvs, 7 mm; 2♀♀, 8 mm; 2♂♂, 8 mm].
TYPE LOCALITY: Off Cape Egmont.
MATERIAL EXAMINED
Off west coast North Island: [B669] 3♀♀ (7 mm); [B660] 2 juvs (7 mm), 2♀♀, 3♂♂ (8 mm); [B686] 2♂♂ (8 mm); [C171] 1 juv. (7 mm); [C186] 1♀ (7 mm).
Off Little Barrier I: [Cop. 7] spp.
Off east coast South Island: [C672] 1♀ (7 mm).
OTHER RECORDS: None.
HABITAT: Shelf benthos.
DEPTH RANGE: 37–163 m.

Cymodoce penserosa n.sp. (Figs 40K–L, 43)

DIAGNOSIS
Cymodoce with tapering, bilobed process on pleonite 1; pleotelson with small, erect process in males, trilobed in dorsal view.

TYPE MATERIAL
Holotype: NZOI Type No. 138 [Z2285, ♂, 10 mm].
Paratypes: NZOI Type No. P195 [Z2285, 1♀, 2♂♂, 10 mm].
TYPE LOCALITY: Blueskin Bay, Otago.
MATERIAL EXAMINED
Otago: [Z2285] 1♀, 3♂♂ (10 mm).
OTHER RECORDS: None.
HABITAT: Shallow shelf benthos.
DEPTH RANGE: 20 m (one record only).

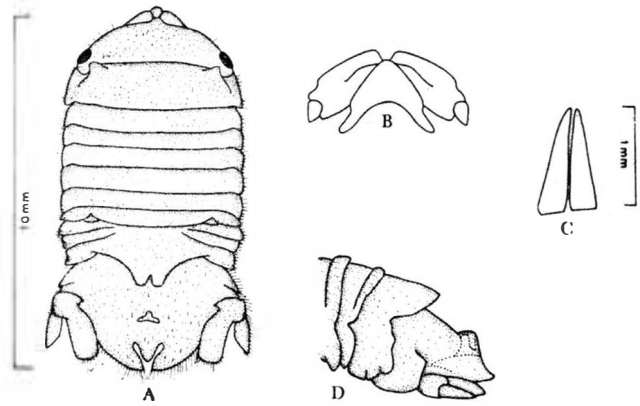


FIG. 43. *Cymodoce penserosa* n.sp., ♂: A, whole animal; B, epistome and peduncles of antenna I; C, penes; D, pleon, side view.

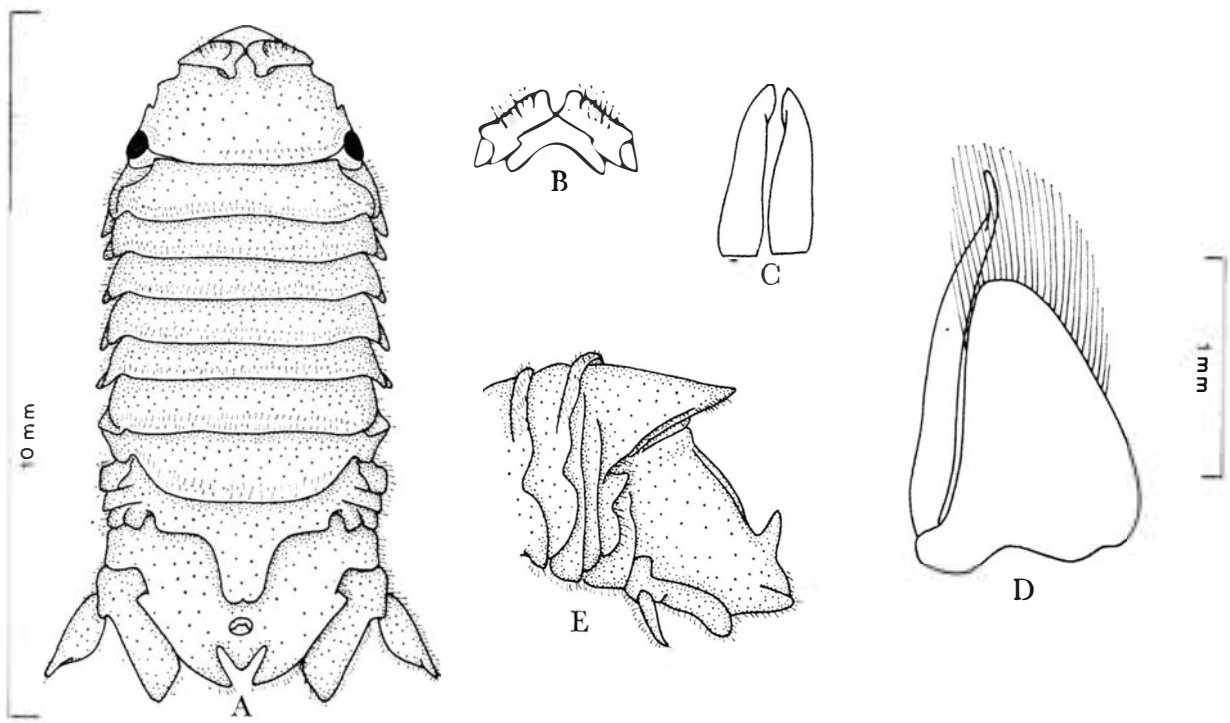


FIG. 44. *Cymodoce perversa* n.n., mature ♂: A, whole animal; B, epistome and peduncles of antenna I; C, penes; D, pleopod 2, inner ramus; E, pleon, side view.

Cymodoce perversa n.n. (Figs 40A–B, 44)

Cilicaea hamata Stephensen, 1927: 366–8, figs 27–28. Nierstrasz, 1931: 206.

DIAGNOSIS

Cymodoce with pleonite 1 process in males ending posteriorly in two small, rounded lobes separated by a shallow cleft. Pleotelson with small, single, rounded, erect process in males. Antenna 1 peduncle, segment 1 with strong setae. Pereonite 7 longer than preceding segments, margin rounded, extending posteriorly, partly covering pleonite 1.

TYPE LOCALITY: Carnley Harbour, Auckland Island.

MATERIAL EXAMINED

Off Auckland Is: [D54] 1 juv. (6 mm); [D83] 1 ♀, 3 ♂♂ (8–9 mm); [F82] 1 ♂ (6 mm).

OTHER RECORDS: Auckland I., Carnley Harbour, 81 m, sandy clay, 6 Dec. 1914, about 70 spp.; Campbell I., Perseverance Harbour, 18–36 m, sandy clay, 9 Dec. 1914, 1 juv ♂ (Stephensen 1927).

HABITAT: Sublittoral and shelf benthos.

DEPTH RANGE: 18–150 m.

REMARKS: This species was originally placed in *Cilicaea* by Stephensen (1927), but it is excluded from *Cilicaea* by the fully developed inner ramus of the uropod. Although synonymised with *Cymodoce australis* by later authors (e.g. Monod, 1931b: 24) it is here considered as a distinct species, very close to *C. australis*. Since Monod gives no description, it is difficult to be sure whether his specimens were *australis* or *perversa*, but it seems most likely that they were *perversa*.

Baker (1908: 141) described a new species, *Cymodoce hamata*, from Australia. Although Baker's species is at present placed in *Paracilicaea*, the possibility of confusion with Stephensen's *Cilicaea hamata*, now transferred to *Cymodoce*, is so great that a new name is required for Stephensen's species.

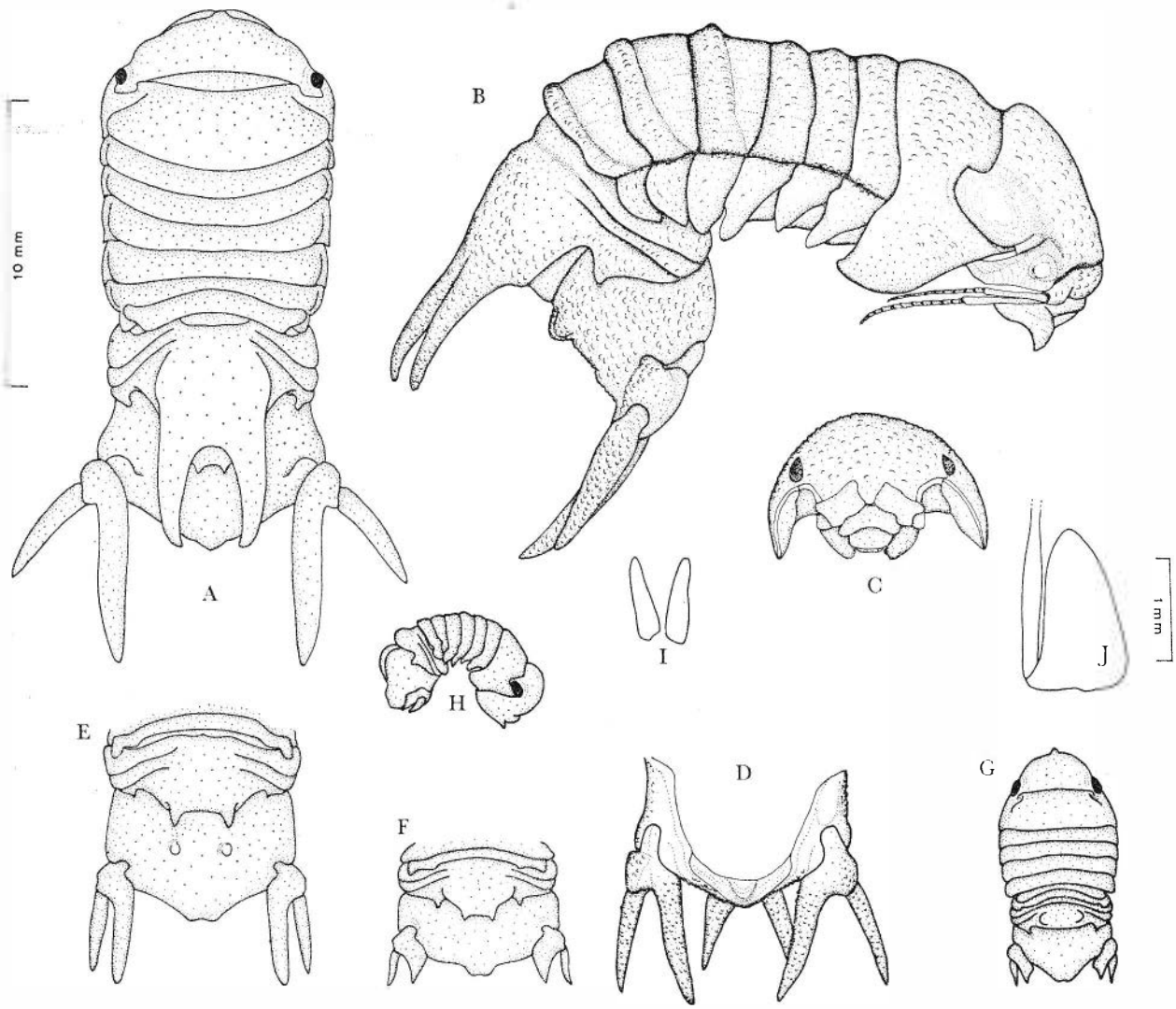


FIG. 45. *Cymodopsis impudica* n.sp., mature ♂ except E, F (immature ♂♂) and G, H (♀): A, whole animal; B, side view; C, head, frontal view showing epistome and peduncles of antenna I; D, pleotelson, ventral view; E, F, pleon, dorsal view; G, whole animal, dorsal view; H, side view; I, penes; J, pleopod 2, inner ramus.

Cymodopsis Baker, 1926

Cymodopsis Baker, 1926: 264.
TYPE-SPECIES: *Cymodopsis latifrons* (Whitelegge).

DIAGNOSIS
Hemibranchiate Sphaeromatidae with narrow or rounded notch before and beneath pleotelson apex, the notch undivided by a median process. Pleopod 3 outer ramus 2-segmented. Mature males, pleopod 2 inner ramus with well developed appendix masculina. Uropods variable, rami subequal or outer ramus reduced or modified.

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF CYMODOPSIS

1. Males: pleonite 1 with prominent, bifurcate process; pleotelson with small, acute, conical tubercle each side of midline; uropod rami rounded in cross-section, outer about half length of inner ..... IMPUDICA

   Males: pleonite 1 without bifurcate process; uropod rami flattened 2

2. Body flattened, smooth; pleotelson apex produced over circular foramen; pleonite 1 with small tubercle on rear margin each side of midline; pleotelson with low ridge each side of midline ..... MONTIS

   Body deep; pleotelson apex more or less produced over long, narrow notch; males, pleonite 1 produced medially into rounded process 3

3. Body strongly tuberculate, head and anterior pereonites with prominent, transverse ridges; epistome long, prominent; pleotelson apex extending beyond notch ..... SPHYRACEPHALATA

   Body, smooth; epistome short; pleotelson apex rising nearly vertically above notch ..... TORMINOSA

Cymodopsis impudica n.sp. (Fig. 45)

DIAGNOSIS
Cymodopsis with prominent bifurcated process on pleonite 1 in adult males. Pleotelson with small, acute, conical process each side of midline and shallow, vertical, apical notch. Uropod rami in adult males rounded in cross-section, flatter in females and young males.

TYPE MATERIAL
Holotype: NZOI Type No. 140 [E401, ♂, 9.5 mm].
Paratypes: NZOI Type No. P197 [E417, 2♂ ♂, 5.5 mm].
TYPE LOCALITY: Off Dunedin.
MATERIAL EXAMINED
Cook Strait: [VUZ 83] 1♀, 1♂ (8 mm).
Off Banks Peninsula: [F753] 4 juvs (5 mm).
Off Oamaru: [E416] 7 juvs (3–4 mm); [E417] 2♂ ♂ (5.5 mm).
Off Dunedin: [E401] 1♂ (9.5 mm).
Off Snares Is: [D134] 1 sp; [F104] 1 sp.
OTHER RECORDS: None.
HABITAT: Slope benthos.
DEPTH RANGE: 425–1 225 m.

Cymodopsis montis n.sp. (Fig. 46)

Cymodopsis with elongated epistome, rounded anterior part visible in dorsal view; small protuberance each side of forehead. Coxal plates vertical, the 6th produced posteriorly overlapping the reduced 7th. Pleotelson with two low, longitudinal ridges; apex rounded, extending posteriorly above a rounded, vertical notch. Uropod outer ramus ovate, as long as the arcuate inner ramus, neither reaching end of pleotelson. Males and females similar.

TYPE MATERIAL
Holotype: NZOI Type No. 141 [E959, ♂, 5 mm].
Paratypes: NZOI Type No. P198 [E959, 2♀ ♀, 5 mm].
TYPE LOCALITY: Mt. Maunganui.

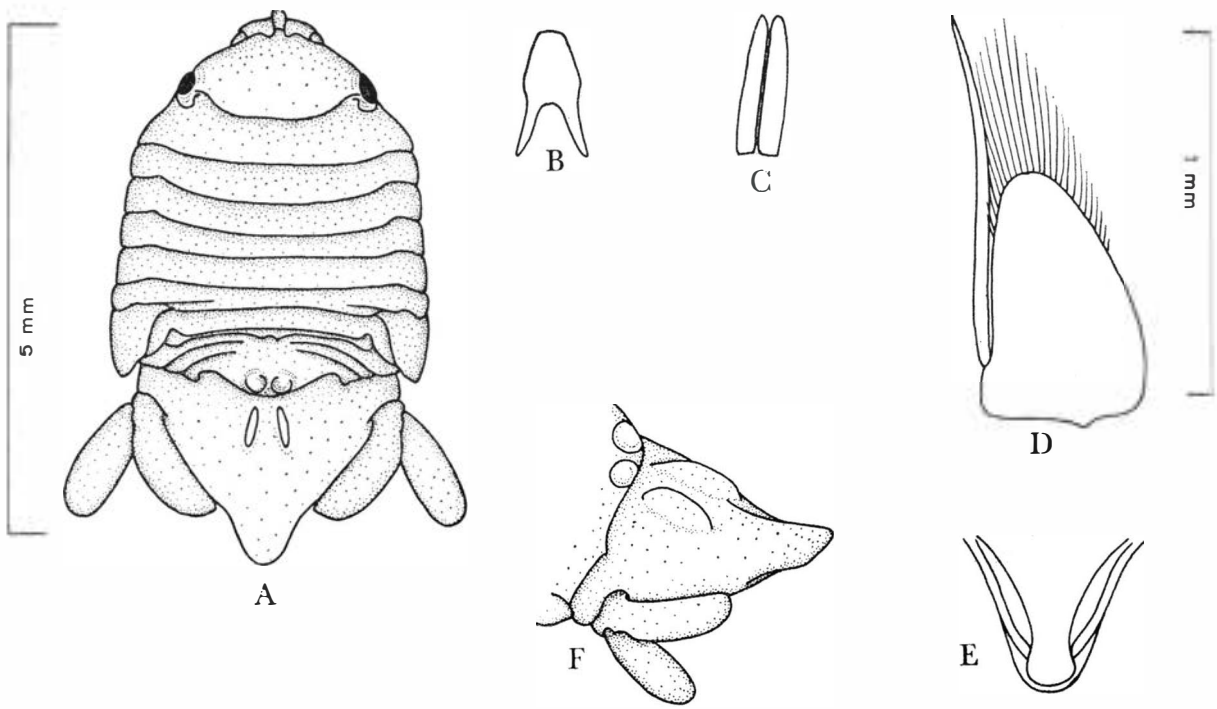


FIG. 46. *Cymodopsis montis* n.sp., mature ♂: A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus; E, pleotelson apex, ventral view; F, pleotelson, side view.

MATERIAL EXAMINED
North Cape: [Cop. 4] spp.
Mt. Maunganui: [E959] 1♂, 2♀♀ (5 mm).
OTHER RECORDS: None.
HABITAT: Moderately exposed shore, alga-covered rock.
DEPTH RANGE: Intertidal.

Cymodopsis sphyracephalata n.sp. (Fig. 47)

DIAGNOSIS
Cymodopsis with long, prominent epistome. Cephalon and anterior pereonites with prominent, transverse ridges. Body surface strongly tuberculate. Pleonite 1 in males raised in prominent, rounded process. Pleotelson apex extending behind long, narrow notch. Female unknown.

TYPE MATERIAL
Holotype: NZOI Type No. 143 [F147, TAM, ♂, 10 mm].
TYPE LOCALITY: Southern Campbell Plateau.
REMARKS: The integument, as in many deep-water isopods, is thick and chalky white. The eyes have black rings around the individual ocelli.
MATERIAL EXAMINED
Southern Campbell Plateau: [F147) 1♂ (10 mm).
OTHER RECORDS: None.
HABITAT: Slope benthos.
DEPTH RANGE: 611 m (one specimen only).

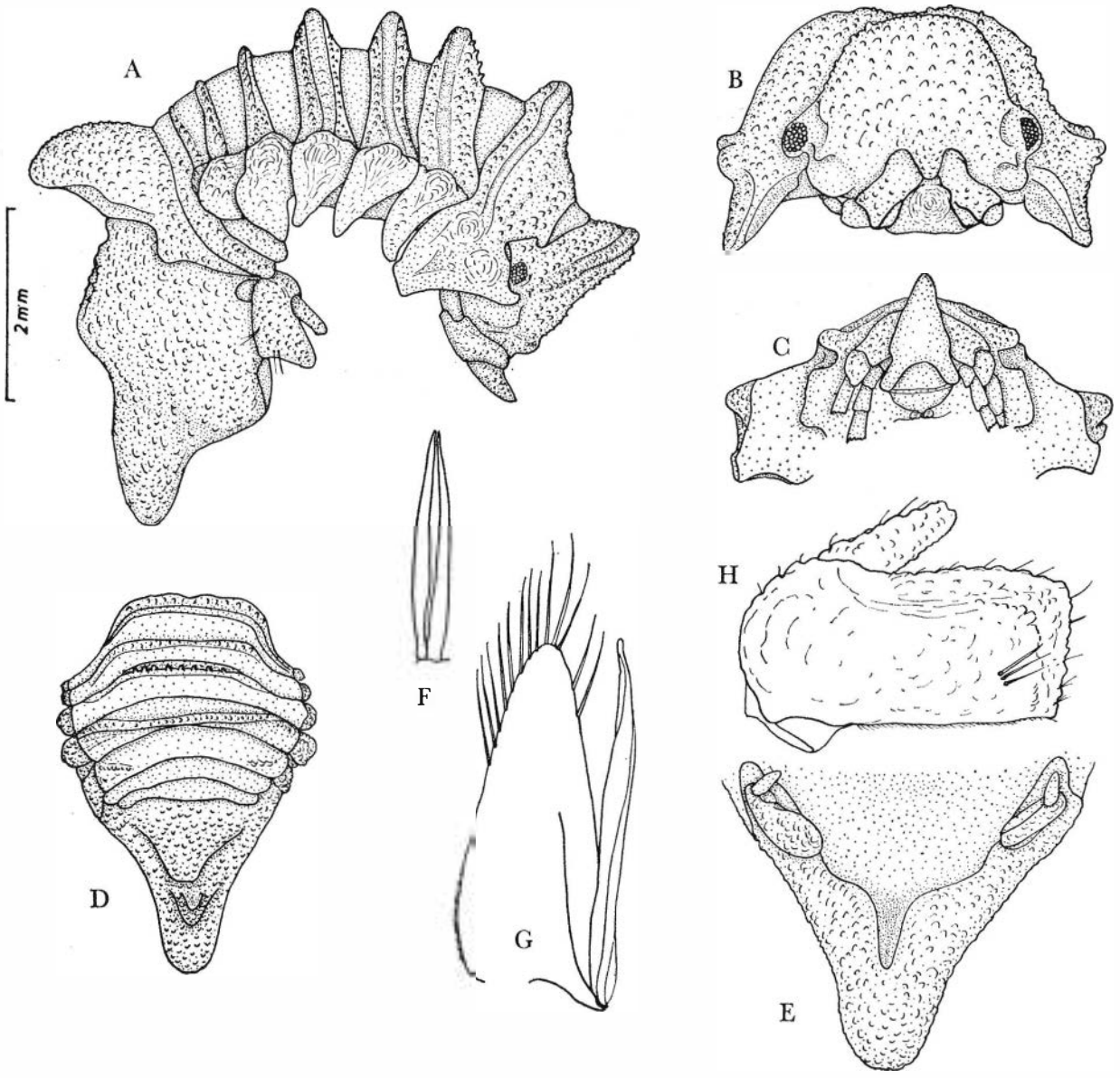


FIG. 47. *Cymodopsis sphyracephalata* n.sp., mature ♂: A, whole animal; B, head, frontal view showing epistome and peduncles of antenna I; C, head, ventral view showing epistome; D, pleon, dorsal view; E, pleotelson, ventral view; F, penes; G, pleopod 2, inner ramus; H, uropod.

Cymodopsis torminosa n.sp. (Fig. 48)

DIAGNOSIS
Cymodopsis with pleotelson apex rising sharply above narrow, vertical notch. Pleonite 1 in males with midpart swelling into rounded, conical process. Uropod outer ramus reduced, about half length and width of inner.

TYPE MATERIAL
Holotype: NZOI Type No. 142 [D39, ♂, 7 mm].
Paratypes: NZOI Type No. P199 [D39, 2 juvs, 5–6 mm].
TYPE LOCALITY: Off Auckland Islands.
MATERIAL EXAMINED
Off Auckland Is: [D39] 2 juvs (5–6 mm), 1♂ (7 mm).
Off Oamaru: [E416] 1 sp.
OTHER RECORDS: None.
HABITAT: Slope benthos.
DEPTH RANGE: 549–1 225 m

Tribe **Sphaeromini** Hansen, 1905

Section Sphaeromini Hansen, 1905: 102.

DIAGNOSIS
Female pleotelson rounded, or somewhat produced and more or less acute, but without notch. Male generally like female, but in some forms male pleotelson produced with pair of lateral notches, so median part appears as a process narrowed at its base, or with posterior margin of pereonite 7 forming backwardly directed spine. Mouthparts similar in both sexes.

Exosphaeroma Stebbing, 1900

Exosphaeroma Stebbing, 1900: 553. Hansen, 1905: 103, 118. Monod, 1931a: 9–20. Menzies, 1962a: 132.
TYPE-SPECIES: *Exosphaeroma gigas* (Leach, 1814).

DIAGNOSIS
Hemibranchiate Sphaeromatidae without notch in pleotelson apex. Maxilliped palp last three segments have well developed lobes. Sexes similar, without mesial processes. Pereopods without long, plumose setae. Pleopod 3 outer ramus of two segments. Pleopod 2 in mature males has well developed appendix masculina. Broodplates small, not reaching midline. Female mouthparts not metamorphosed.

(Hansen 1905, Monod 1931a)

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF EXOSPHAEROMA

1. Body wide and flattened; pereonite 6 coxal plate produced posteriorly, overlapping pereonite 7 and pleonite 1; uropod outer ramus about half length of inner ..... PLANULUM

   Body convex; pereonite 6 coxal plate not produced posteriorly; uropod rami of equal length 2

2. Epistome long and recurved dorsally, projecting well in front of antennae, giving snubnosed appearance in dorsal aspect; uropod inner ramus narrow, sharply pointed in males, strongly hooked in females ... FALCATUM

   Not as above 3

3. Pleotelson with two rounded anterior prominences, apex broadly rounded with margin folded downwards abruptly; uropods broad, not reaching telson apex ..... CHILENSIS

   Pleotelson smoothly convex anteriorly, margin not folded down abruptly at apex 4

4. Head with sharply raised and nearly straight frontal ridge; uropod rami narrowly ovate; pleotelson apex in large males without ventral transverse ridge ..... GIGAS

   Head without sharply raised frontal ridge; uropod rami broad; pleotelson apex in large males with ventral transverse ridge 5

5. Pleotelson apex narrow, acute; uropod rami broad ovate ..... OBTUSUM

   Pleotelson apex narrow, acute; uropod rami broad truncate ..... ECHINENSIS

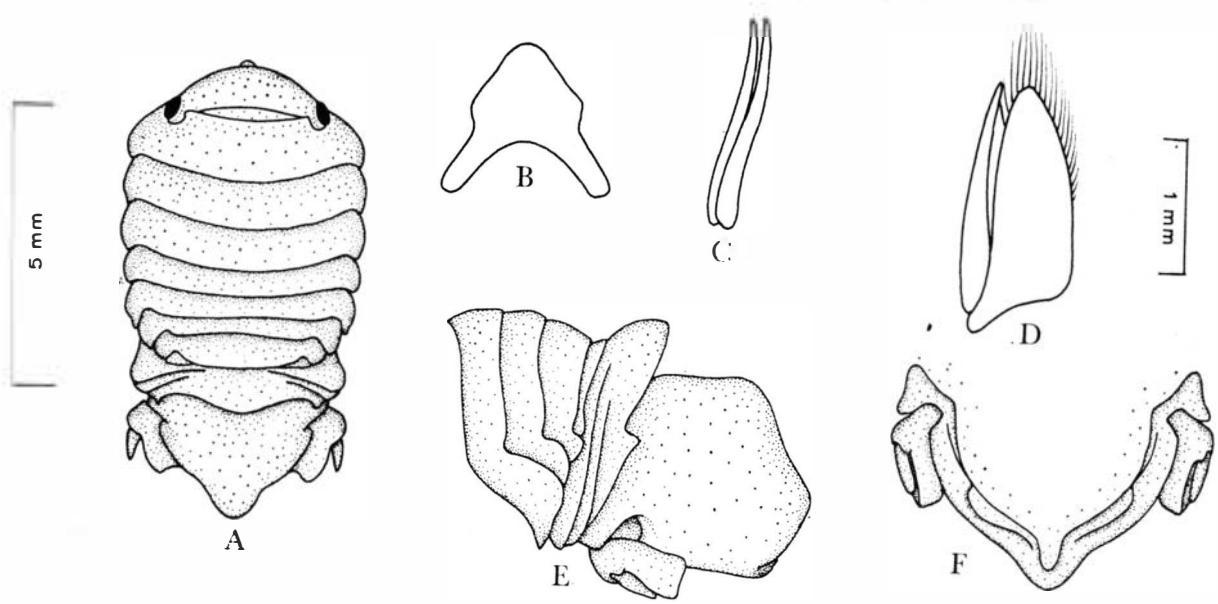


FIG. 48. *Cymodopsis torminosa* n.sp., mature ♂: A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus; E, pleotelson, side view; F, pleotelson, ventral view.

REMARKS: There is confusion in the literature regarding *Exosphaeroma gigas* (Leach, 1818), *Exosphaeroma lanceolatum* (White, 1847), and *Exosphaeroma obtusum* (Dana, 1853). *E. lanceolatum* has been removed from the New Zealand list, since there are no valid records of its occurrence. The only reference to this species in the New Zealand region is that of Monod (1931b: 23, figs 16f, g), who records *E. lanceolatum* from Campbell and Stewart Islands. Specimens of Monod's material were obtained from the Senckenberg Museum and, as suggested by his figures, proved to be *E. obtusum* (Dana), a species which has been consistently misidentified as *E. gigas* in the New Zealand region. However, the species are readily distinguishable: the shapes of the epistome and the pleotelson apex, and the transverse ridge behind the pleopods on the pleotelson ventral surface in *E. obtusum* and its absence in *E. gigas* are sufficient to separate the two. Further confirmation is provided by the difference in length ranges of the two species: in the present material, *E. obtusum* males range from 7 to 17 mm, with little if any variation over the species range (from Whangarei in the north to Campbell Island in the south), whereas *E. gigas* males range from 10 to 30 mm.

Since their distribution ranges overlap in the Subantarctic Islands *E. gigas* and *E. obtusum* are clearly not mere geographical variations. Since they are closely sympatric in numerous situations, and since they are completely separable with no intermediates, they are equally clearly distinct species with overlapping ranges.

The remaining species of *Exosphaeroma* are readily identifiable by their distinctive morphology.

Exosphaeroma chilensis (Dana, 1853) (Fig. 49)

Spheroma chilensis Dana, 1853: 777–8, pl. 52 figs 3a–c.
Exosphaeroma chilensis (or *chilense*). Chilton, 1911b: 310–11; 1912: 135. Nierstrasz, 1931: 194. Naylor, 1961: 8, fig. 1b. Hurley, 1961: 269.

DIAGNOSIS
Exosphaeroma with two rounded prominences on the anterior part of the pleotelson; apex of pleotelson broad and slightly concave, abruptly folded downwards terminally. Uropods broad, barely reaching end of pleotelson; inner ramus arcuate, has acute apex; outer ramus lanceolate, has rounded apex.

TYPE LOCALITY: Valparaiso, Chile.

MATERIAL EXAMINED
Auckland Is: [139] 1 ♂ (8 mm); [155] 3 spp.
Chatham Is: [CIE Sta. 11] 1 ♀ (10 mm); [D595] 4 juvs (8–11 mm), 4 ♀♀ (10–13 mm), 7 ♂♂ (10–18 mm); [E161] 1 juv. (6 mm), 3 ♀♀ (8–12 mm).

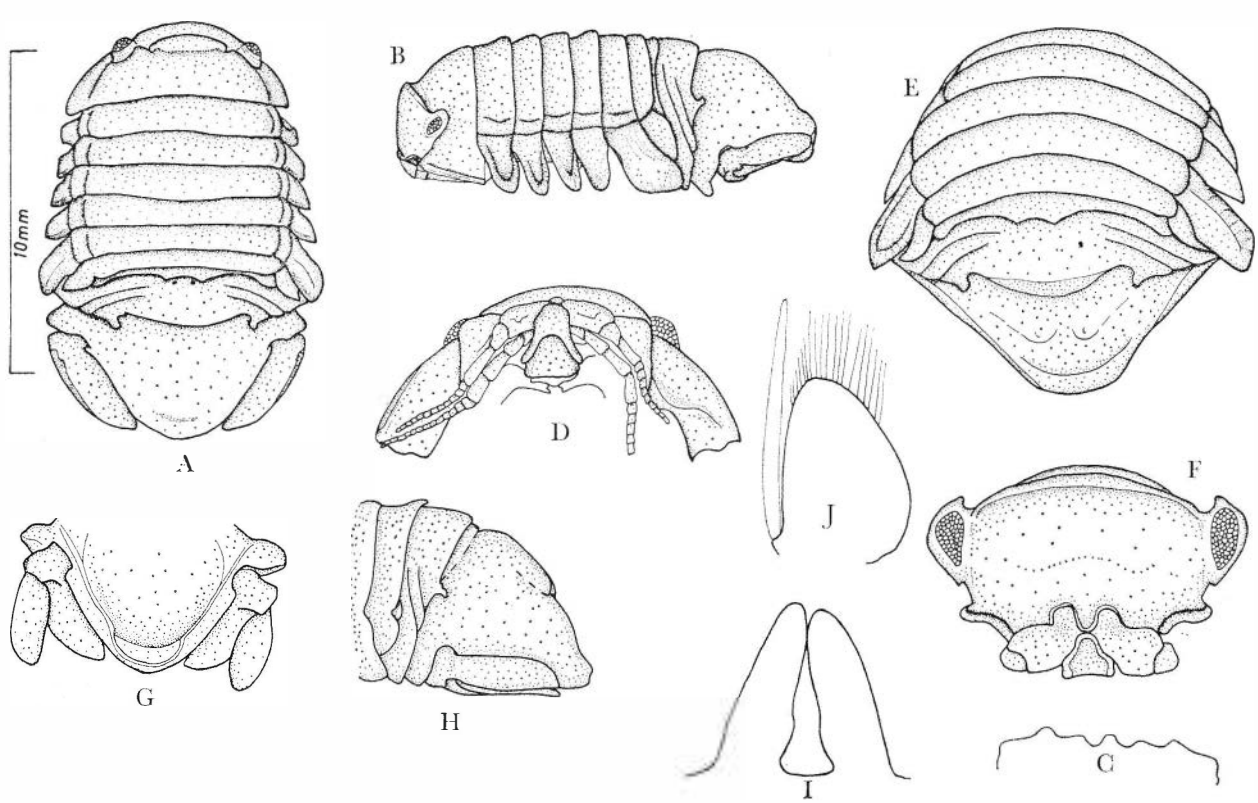


FIG. 49. *Exosphaeroma chilensis* (Dana), mature ♂ except H (♀): A, whole animal; B, side view; C, frontal margin of head, dorsal view; D, head, ventral view; E, posterior view of animal in natural rolled ("conglobated") position; F, head, frontal view; G, pleotelson, ventral view; H, pleon, side view; I, penes; J, pleopod 2, inner ramus.

DEPTH RANGE: Intertidal.
DISTRIBUTION: Auckland, Lyttelton, Chatham Islands (Chilton 1911b, 1912; Naylor 1961); South America, Valparaiso (Dana 1853).
REMARKS: A feature of this species is the way that the epimeral plates of pereonite 6 stick out like wings when the animal is rolled up.

Exosphaeroma echinensis n.sp. (Fig. 50)

DIAGNOSIS
Exosphaeroma with pleotelson smoothly rounded, apex produced and acute, has transverse ridge on ventral surface in large males. Uropod inner ramus broad, truncate; outer ramus with outer margin slightly excavate posteriorly. Sexes similar.
TYPE MATERIAL
Holotype: Canterbury Museum Type No. AQ3402 [115, ♂, 7 mm].
Paratypes: Canterbury Museum Type No. AQ3427 [104, 114, 115, 15 juvs, 13♀♀, 10♂♂].
TYPE LOCALITY: Kaikoura.
MATERIAL EXAMINED
Whangaroa: [45] 12♀♀ (5–8 mm), 4♂♂ (8–9 mm).
Kaikoura: [104, 114, 115] 15 juvs (2–6 mm), 13♀♀ (7–8 mm), 11♂♂ (6–9 mm).
OTHER RECORDS: Stewart I. (coll. W. Traill; Chilton Coll.).
HABITAT: The specimens collected by Dell [45] were taken from around the mouth of a sea urchin (*Centrostephanus*), and those collected by Dix (1970 [104, 114, 115]) on subtidal *Evechinus chloroticus*, amongst the spines. No information is available regarding Traill's specimens. *E. echinensis* thus appears to be associated with echinoids, perhaps as a facultative commensal.
DEPTH RANGE: Intertidal, subtidal.

Exosphaeroma falcatum Tattersall, 1921 (Fig. 51)

Exosphaeroma falcatum Tattersall, 1921: 216–17, pl. 5 figs 1–8. Nierstrasz, 1931: 194. Hurley, 1961: 269.

DIAGNOSIS
Exosphaeroma with smooth body and pleotelson. Long, dorsally recurved epistome, prominent in dorsal view, giving animal pug-nosed appearance. Uropod outer rami narrow, sharply pointed in males, strongly hooked in females.
TYPE LOCALITY: Spirits Bay, North Cape.
MATERIAL EXAMINED
Spirits Bay: [TN Sta. 133] BM syntypes No. 157–159, 2.5 mm.

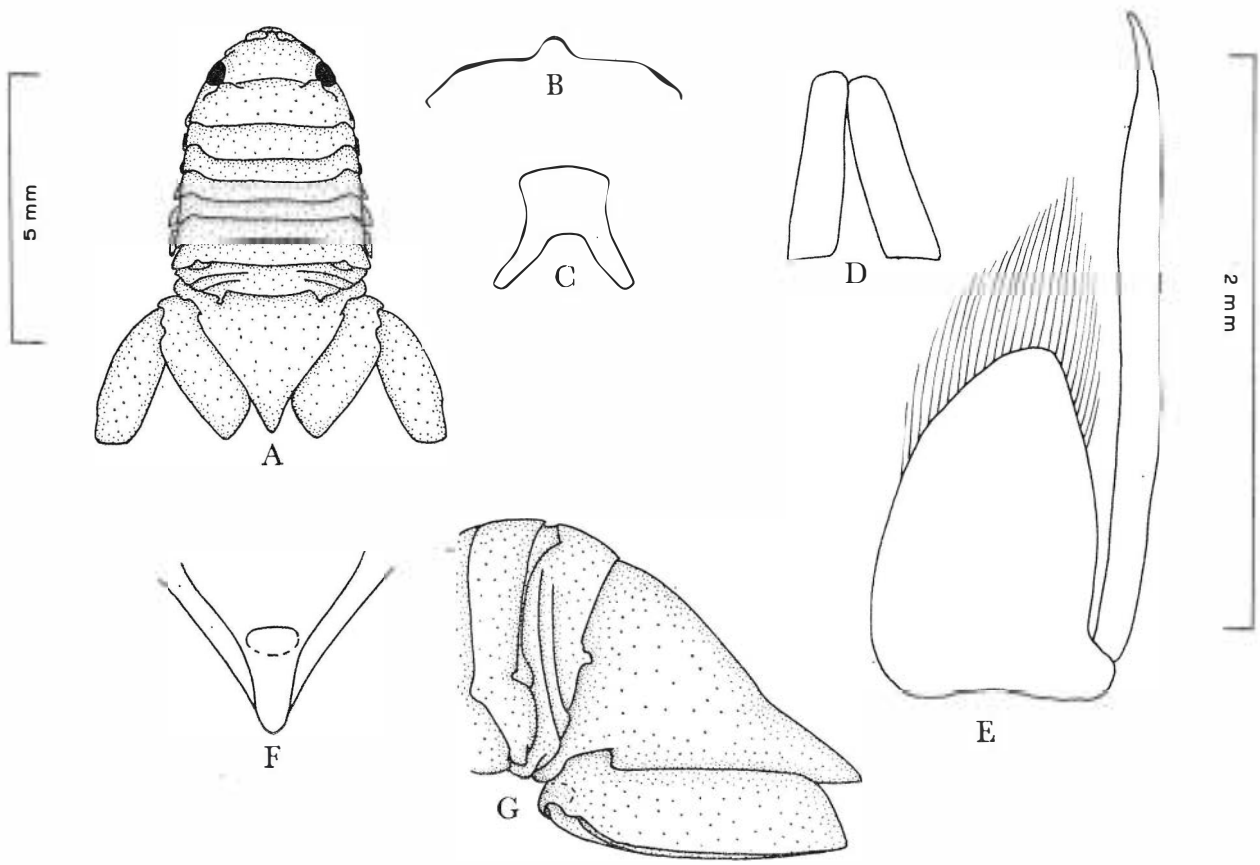


FIG. 50. *Exosphaeroma echinensis* n.sp., mature ♂: A, whole animal; B, frontal margin of head, dorsal view; C, epistome; D, penes; E, pleopod 2, inner ramus; F, pleotelson apex, ventral view; G, pleon, side view.

DISTRIBUTION: The only record is that of Tattersall (1921: 216) of two males and one female, all 2.5 mm long, from Terra Nova Sta. 133, Spirits Bay.

Note added in proof: 31 specimens of both sexes were recently collected intertidally by P. A. Luckens from a sandy beach at Marsden Point, Whangarei (N.Z.O.I. Stations J765, J770, J771, J772, J774, J839, J843, J844).

DEPTH RANGE: 20 m (one record only).

REMARKS: The figures are from the syntype material in the British Museum.

Exosphaeroma gigas (Leach, 1818) (Fig. 52)

Sphaeroma gigas Leach 1818: 346. Dana, 1853: 775, pl. 52, fig. 1. Miers, 1876b: 110–11. Thomson & Chilton, 1886: 155.

Exosphaeroma gigas. Stebbing, 1900: 553–8, pl. 39. Chilton, 1906: 271–2. Chilton, 1909: 652–3. Tattersall, 1921: 216. Stephensen, 1927: 362. Nierstrasz, 1931: 194. Barnard, 1940: 413, figs 13a–f. Hurley, 1961: 269. Menzies, 1962a: figs 43b, d.

[Not] *Exosphaeroma gigas* (Leach), Morton & Miller, 1968: 215, fig. 71.3.

DIAGNOSIS

Exosphaeroma with prominent, nearly straight, frontal ridge on head. Sexes similar. Uropods narrowly ovate. Pleotelson smoothly convex anteriorly, broadly rounded, without transverse ridge on apex ventrally in large males.

MATERIAL EXAMINED

Chatham Rise: [E422] 2 spp.

Foveaux Strait: [B260] 3 spp; [E820] 1 sp.

Near Snares I: [B582] 1 sp; [D132] 1 sp; [F97] 3 spp.

Auckland Is: [59] 8 juvs (4–11 mm), 8♀♀ (8–16 mm), 18♂♂ (11–23 mm); [9] 3 juvs (8–12 mm), 20♀♀ (9–20 mm), 32♂♂ (13–23 mm); [60] 1 juv. (9 mm), 1♀ (12 mm), 2♂♂ (20–22 mm); [152] 10 spp. (11–12 mm); [D54] 1♂ (28 mm). *Also*: [B176] about 10 spp; [D52] 1 sp; [D53] 1 sp; [D60] 2 spp; [D65] 1 sp; [D71] 3 spp.

Macquarie I: [Z2301] 1 juv. (6 mm); [Z2300] 5 juvs (6–9 mm), 2♂♂ (26–30 mm); [Z2315] 139 juvs (3–12 mm), 8♀♀ (11–14 mm), 1♂ (15 mm); [D15] 40 juvs (3–13 mm), 16♀♀ (8–14 mm), 11♂♂ (11–19 mm). *Also*: [136] about 60 spp, [E230] 11 juvs (7–11 mm), 7♀♀ (12–21 mm), 4♂♂ (13–27 mm), many others; [E231] 30 juvs (3–13 mm), 10♀♀ (11–14 mm), 10♂♂ (11–29 mm); [E232] 62 juvs (3–15 mm), 4♀♀ (12–18 mm), 35♂♂ (10–28 mm).

OTHER RECORDS: Naylor (1961: 8, fig. 1a) identified material from the Chatham Islands as *E. gigas*, but his figure indicates that it was *E. obtusum* (Dana); this is supported by the complete absence of other records of *E. gigas* for this locality, and the abundance of *E. obtusum* there.

Barnard (1940) gives a useful discussion, with figures of some Auckland Islands material.

E. gigas as figured by Morton & Miller (1968, fig. 71.3) is probably *E. obtusum*.

British Museum material from Stanley, Falkland Islands, closely resembles the Auckland Islands material.

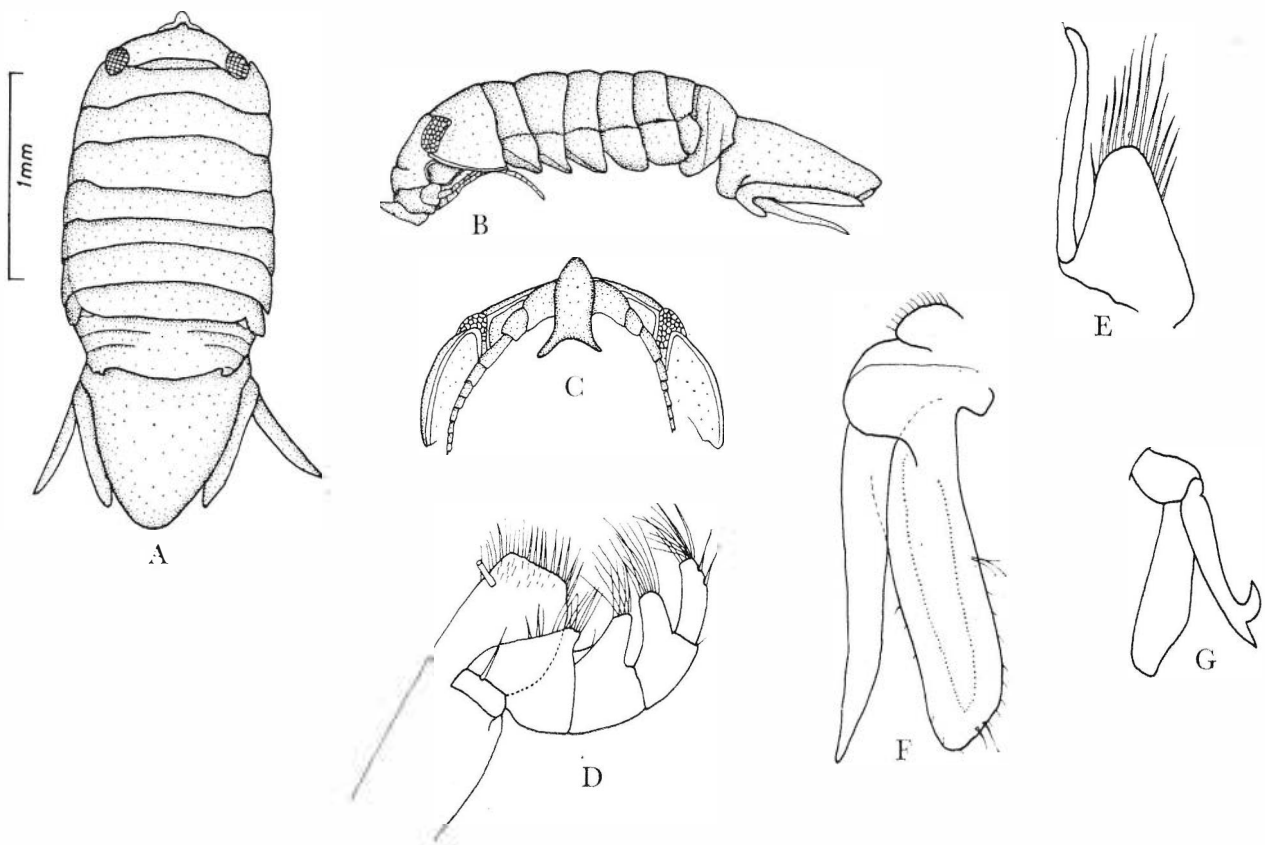


FIG. 51. *Exosphaeroma falcatum* Tattersall: A, whole animal, ♂; B, side view; C, head, ventral view; D, maxilliped; E, pleopod 2, inner ramus; F, uropod, ♂; G, uropod, ♀.

Exosphaeroma obtusum (Dana, 1853) (Fig. 53)

Sphaeroma obtusa Dana, 1853: 779, pl. 52, figs 5a–b.
Sphaeroma obtusum (or *obtusa*). Miers, 1876b: 112. Thomson & Chilton, 1886: 155. Nierstrasz, 1931: 192. Hurley, 1961: 269.
Exosphaeroma sp. Barnard, 1940: 416–17, figs 13g–k. Hurley, 1961: 270.
[Not] *Exosphaeroma lanceolatum* (White). Monod, 1931b: 23, figs 16f–g. Morton & Miller, 1968: 455, 457 fig. 168.
[Not] *Exosphaeroma gigas* (Leach). Naylor, 1961: 8, fig. 1a. Tattersall, 1921: 216. (?) Hicks, 1971: 56.
Exosphaeroma obtusum. Jansen, 1971: 266, 271.

DIAGNOSIS

Exosphaeroma without prominent frontal ridge on head. Uropod rami broad, inner arcuate, outer ovate. Pleotelson smoothly convex anteriorly, apex rounded, not produced, margin not folded downwards abruptly, has transverse ridge on ventral surface in large males.

TYPE LOCALITY: "Along shores of Parua [*sic*] Harbour, Bay of Islands".

MATERIAL EXAMINED

North Cape: [Cop. 4] spp.
Spirits Bay: [TN 133, 135, 136] 4 juvs (2.5–4 mm).
Whangarei: [E954] 20 juvs (2–8 mm), 35 ♀♀ (7–12 mm), 9 ♂♂ (8–13 mm).
Auckland: [E950] 1 juv. (5 mm); [10] 4 juvs (5–6 mm), 14 ♀♀ (6–8 mm), 7 ♂♂ (7–13 mm); [139] 2 ♀♀ (8–10 mm).
Mt. Maunganui: [E959] 1 juv. (5 mm).
Mahia Peninsula: [Cop. 14] spp.
Plimmerton: [Cop. 15] spp.
Wellington—Lyall Bay: [27] 1 juv. (7 mm); [30] 4 ♂♂ 10–14 mm). Island Bay: [E985] 3 juvs (4 mm). Pt. Jerningham: [Z2305] 5 juvs (6–12 mm), 1 ♀ (14 mm), 4 ♂♂ (10–17 mm).
Castlepoint: [Z2299] 1 ♀ (13 mm).
Kaikoura: [E972] 46 juvs (2–7 mm); [104] 1703 juvs (2–7 mm), 325 ♀♀ (7–12 mm), 282 ♂♂ (7–17 mm), [88] 8 juvs (4–7 mm), 1 ♀ (10 mm), 7 ♂♂ (10–13 mm).
Pegasus Bay: [Cop. 20] spp.
Oamaru: [129, 131] 1 juv. (5 mm), 1 ♀ (11 mm), 4 ♂♂ (11–12 mm).
Otago Harbour: [Z2289] 16 juvs (4–6 mm), 2 ♀♀ (7–8 mm), 11 ♂♂ (6–20 mm).
Doubtful Sound: [134] 8 juvs (5–6 mm), 3 ♂♂ (9–10 mm).
Stewart I: [76] 5 juvs (5–8 mm), 7 ♀♀ (7–10 mm), 5 ♂♂ (10–15 mm); [154] 5 ♂♂ (12–16 mm); [77–78] 5 juvs (5–8 mm), 4 ♀♀ (8–12 mm), 7 ♂♂ (11–15 mm); [29] 1 ♀ (8 mm), 10 ♂♂ (9–13 mm). *Also*: [79] about 11 spp; [E834] 7 spp.
Snares Is: [67] 4 juvs (6 mm), 3 ♀♀ (7–8 mm), 6 ♂♂ (7–12 mm). *Also*: [72] 4 spp.
Chatham Is: [CIE Sta. 11, 12, 16] 11 juvs (4–8 mm), 26 ♀♀ (7–12 mm), 23 ♂♂ (8–15 mm).
Auckland Is: [3] 9 juvs (6–9 mm), 14 ♀♀ (9–13 mm), 42 ♂♂ (9–16 mm); [10] 4 juvs (5–6 mm), 14 ♀♀ (6–8 mm), 7 ♂♂ (7–13 mm); [12] 14 ♀♀ (10–12 mm), 7 ♂♂ (10–15 mm); [153] 1 sp. (16 mm); [D186, D188, D191] 1 juv. (9 mm), 5 ♀♀ (9–13 mm), 5 ♂♂ (10–15 mm). *Also*: [D190] about 16 spp; [1, 5, 6, 7, 13, 14, 16, 17, 48, 53, 59] many spp.

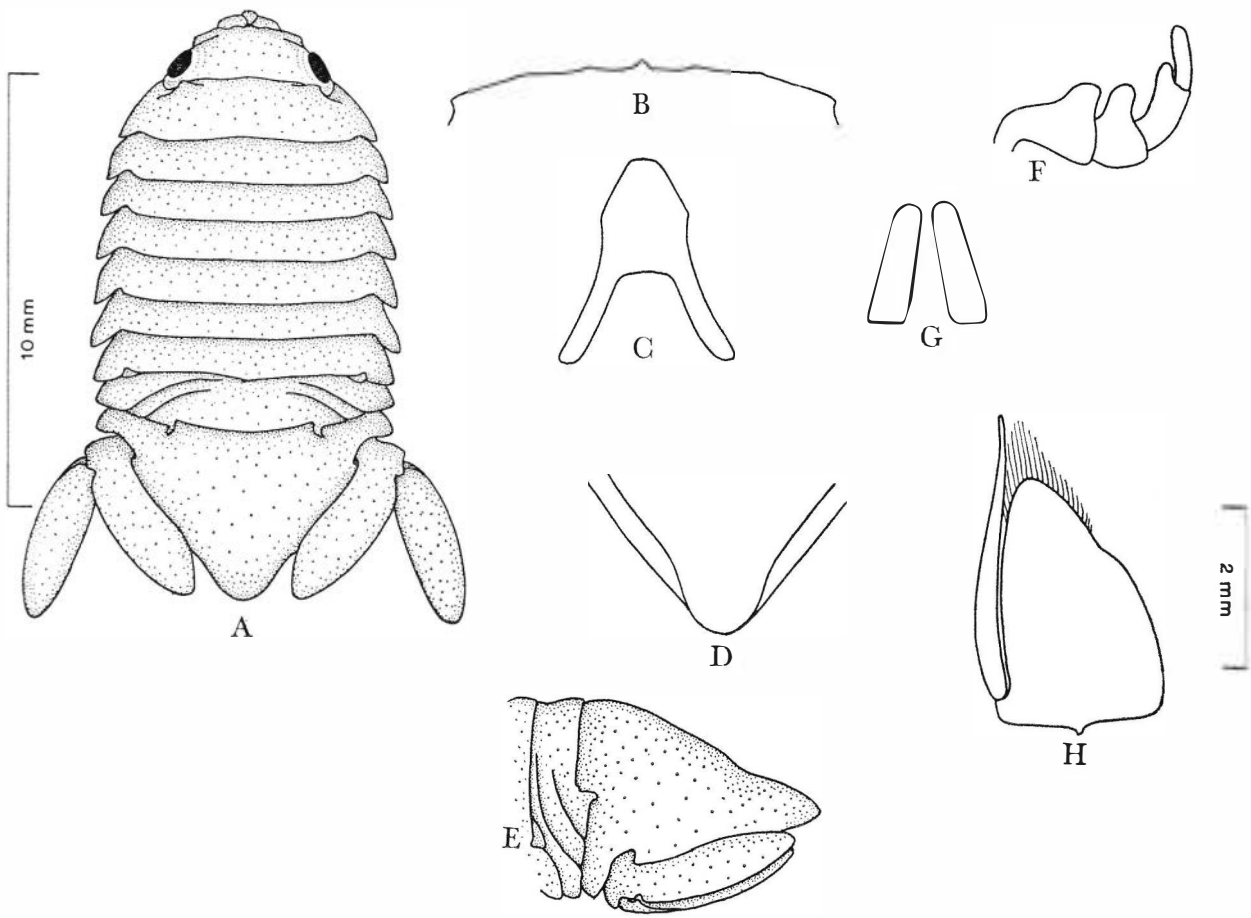


FIG. 52. *Exosphaeroma gigas* (Leach), mature ♂: A, whole animal; B, frontal margin (anterior outline) of head, dorsal view; C, epistome; D, pleotelson apex, ventral view; E, pleon, side view; F, maxilliped palp (without setae); G, penes; H, pleopod 2, inner ramus.

Campbell I: [21] 4♀♀ (8–11 mm), 6♂♂ (9–14 mm); [19] 5♀♀ (10–11 mm), 8♂♂ (10–15 mm); [Z2288] 6 juvs (6–8 mm), 4♀♀ (8–9 mm), 7♂♂ (8–12 mm); [Z1819, Z1824, Z1829, Z1854] 4 juvs (2–5 mm), 16♀♀ (9–13 mm), 13♂♂ (11–17 mm); [D2] 1 juv. (6mm), 1♂ (12 mm); [B190, B191] 3 juvs (6–7 mm), 5♀♀ (7–10 mm), 3♂♂ (9–12 mm). *Also*: [Gal. 581] 23 spp; [Z1852] 22 spp.

OTHER RECORDS: Chilton Coll: Tom Bowling Bay, North Cape ('Hinemoa', Jan. 1915); Moko Hinau, Great Barrier I. (coll. C. R. Gow, May 1915); Cuvier I. (coll. Grenfell, 1915); Wellington—Lyall Bay and Island Bay (coll. E. W. Bennett, May 1924); Sumner, Christchurch; Dunedin (coll. G. M. Thomson); Stewart I. (coll. A. Parrott); Chatham Is. (coll. S. D. Shand, June 1909); Auckland Is; Campbell I. (coll. G. M. Thomson). Muriwai Beach, Auckland (Morton & Miller 1968).

HABITAT: Under stones and in pools.

DEPTH RANGE: Intertidal.

DISTRIBUTION: Shores of New Zealand main islands, Chatham Islands, subantarctic islands of New Zealand region.

REMARKS: There is no material labelled "*Exosphaeroma lanceolatum*" from New Zealand in the British Museum collections; there is, however, some labelled *E. gigas*, which we refer to this species.

Monod (1931b) recorded and figured specimens of a sphaeromatid which he attributed to *Exosphaeroma lanceolatum* (White). We have been able to examine these through the courtesy of Dr Richard Bott of the Senckenberg Museum, and are satisfied that Monod's specimens belong to *Exosphaeroma obtusum* (Dana).

The *Exosphaeroma lanceolatum* of Morton & Miller (1968) is likely to belong to this species also. They describe their specimens as "short, oval-bodied . . . , sandy grey in colour and with no dorsal spine" and often to be found in northern New Zealand beaches "burrowing in sand of finer texture".

Barnard's *Exosphaeroma* sp. from Carnley Harbour and Dunedin (Barnard 1940) is clearly referable to this species.

Exosphaeroma planulum Hurley & Jansen, 1971 (Fig. 54)

Exosphaeroma planum Hurley & Jansen, 1971*: 472. Jansen, 1971: 270.

DIAGNOSIS

Exosphaeroma with wide, flattened body. Coxal plate of pereonite 6 produced posteriorly to overlap pereonite 7 and pleonite 1. Uropod outer ramus about half length of inner. Sexes similar.

*Although the date of this paper is nominally December 1970, it was not actually published until April 1971.

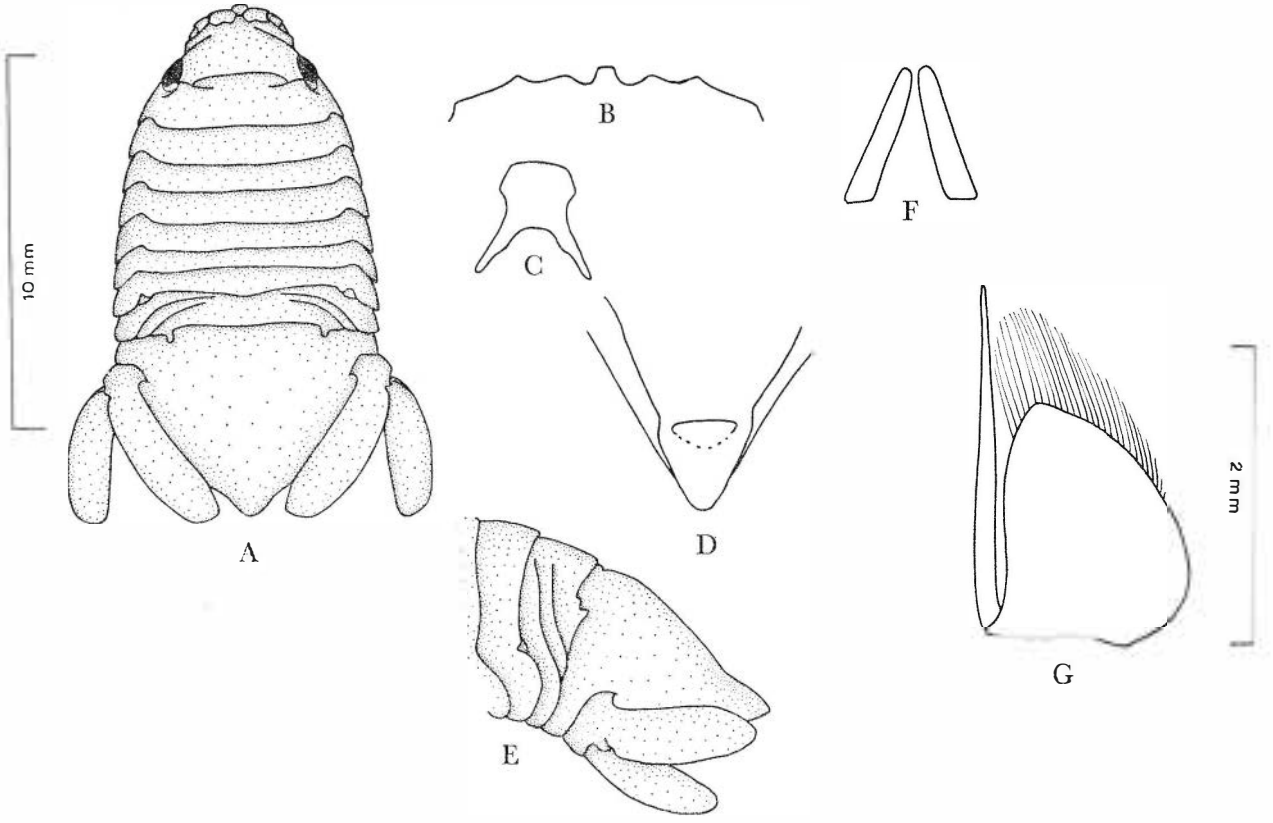


FIG. 53. *Exosphaeroma obtusum* (Dana), mature ♂: A, whole animal; B, frontal margin of head, dorsal view; C, epistome; D, pleotelson apex, ventral view; E, pleon, side view; F, penes; G, pleopod 2, inner ramus.

TYPE MATERIAL
Holotype: Canterbury Museum Type No. AQ3403 [121, ♂, 7 mm].
Paratypes: Canterbury Museum Type No. AQ3428 [121, 2♀♀, 6 mm].
TYPE LOCALITY: Heathcote–Avon Estuary, Christchurch.
MATERIAL EXAMINED
Whangarei: [E955] 7 juvs (3–6 mm), 31♀♀ (5–7 mm), 7♂♂ (5–8 mm).
Auckland: [126] spp.
Christchurch: [120] 1 juv. (2 mm); [121] 2♀♀ (6 mm), 1♂ (7 mm).
Portobello: [Z2302] 20 juvs (3–5 mm), 26♀♀ (4.5–6.5 mm), 30♂♂ (3.5–7 mm).
HABITAT: All recorded localities are strongly influenced by fresh water, particularly at low tide, the animals being found under stones in and about the direct freshwater inflow.
DEPTH RANGE: Intertidal.
REMARKS: In our preliminary diagnosis (Hurley & Jansen 1971) we inadvertently used a specific name, *planum*, already in use for a South African species. We have here amended the specific name of the New Zealand species to *planulum*. We would have emended it to a more distinctive name, but *planulum* allowed a paper in press on the biology of the New Zealand species (Jansen 1971) to go ahead with a minimum of alteration to figures and text.

Isocladus Miers, 1876

Isocladus Miers, 1876b: 112; 1876a: 228–9. Hansen, 1905: 103, 118–19. Menzies, 1962a: 129.

TYPE-SPECIES: *Isocladus armatus* (Milne Edwards).

DIAGNOSIS
Hemibranchiate Sphaeromatidae with slender, mesial, dorsal spine on pereonite 7 in males. Maxillipeds with well developed lobes on last three palp segments. Pleotelson apex considerably produced with a ventral groove in both males and females. Broodplates do not reach midline. Pleopod 3 outer ramus of two segments.
REMARKS: The species of *Isocladus* are rather similar in general appearance, but are clearly separated by a number of small morphological features, with no intermediate conditions in sympatric species-populations. For example, *Isocladus armatus* occurs in Otago Harbour with *I. spiculatus*. (Mature males of *I. armatus* are distinguished by a small tooth either side of the spine on pereonite 7–these teeth are absent in *I. spiculatus*–and by the shape of the spine and of the uropods.) Similarly, *I. armatus* occurs together with, and is distinguished from, *I. inaccuratus* in the Chatham Islands, and *I. reconditus* and *I. dulciculus* on the east coast of the North Island. Distinct differences in the morphology of mature males in sympatric species-populations have been taken to indicate that these are not merely individual variants within a variable species, and that the species are reproductively isolated, conforming with the species criteria of Mayr *et al.* (1953: 79–80). Moreover, in each situation, immature males, females, and juveniles have been available for comparison, as well as mature males, further removing the likelihood of the differences being due to individual variation.

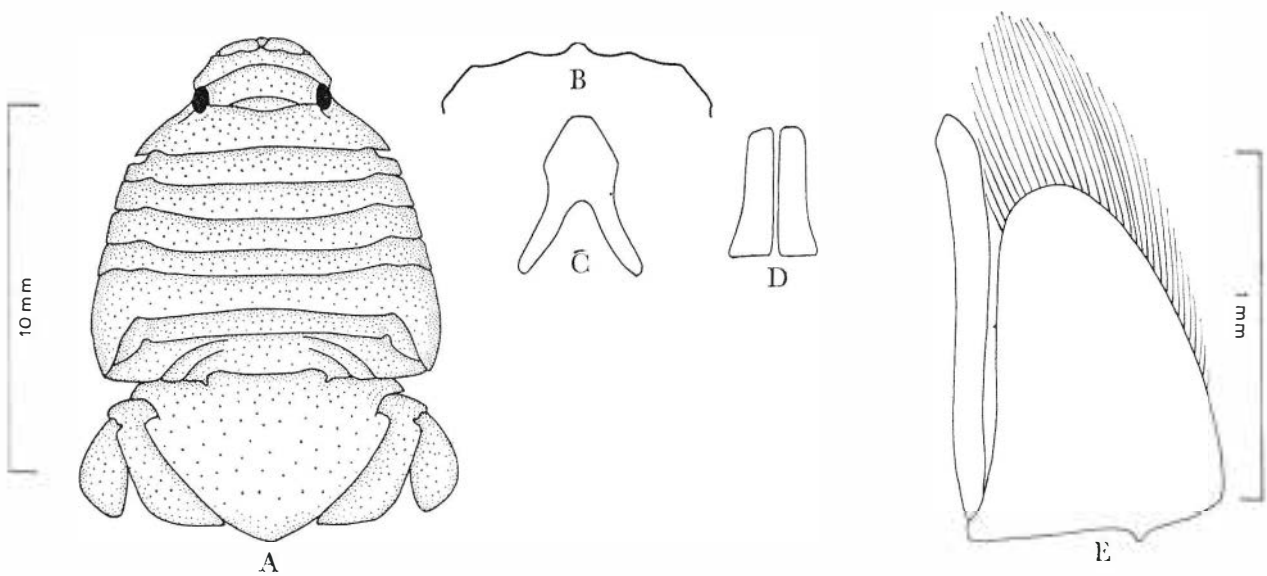


FIG. 54. *Exosphaeroma planulum* Hurley & Jansen, mature ♂: A, whole animal; B, frontal margin of head, dorsal view; C, epistome; D, penes; E, pleopod 2, inner ramus.

Key to New Zealand and subantarctic species of Isocladus

1. Adult males: with small tooth on pereonite 7 each side of base of spine 2

   Adult males: without small tooth on pereonite 7 each side of base of spine 4

2. Uropod outer ramus lanceolate, with strongly sigmoid outer margin, apex acute and turned outwards; pereonite 7 spine in mature males about three-quarters pleotelson length, apex acute; pleotelson apex also acute, strongly produced ..... ARMATUS

   Uropod outer ramus with broadly rounded apex 3

3. Uropod outer ramus with apex of outer margin recurved and excavate; pereonite 7 spine in mature males about half pleotelson length, tapering to acute apex; pleotelson apex obtuse ..... DULCICULUS

   Uropod outer ramus margin feebly emarginate posteriorly, apex obtuse; pereonite 7 spine in mature males about three-quarters pleotelson length, parallel-sided, apex rounded ..... RECONDITUS

4. Uropod outer ramus broad, apex rounded; pereonite 7 spine in mature males about half pleotelson length, tapering to rounded apex ..... CALCAREUS

   Uropod outer ramus narrow-lanceolate with sigmoid outer margins 5

5. Uropod outer ramus with strongly sigmoid outer margins, acute apex; pereonite 7 spine in mature males about three-quarters pleotelson length, expanded towards apex ..... INACCURATUS

   Uropod outer ramus with weakly sigmoid outer margin, less acute apex; pereonite 7 spine in males about half pleotelson length, tapering to acute apex ..... SPICULATUS

Isocladus armatus (Milne Edwards, 1840) (Fig. 55)

Sphaeroma armata Milne Edwards, 1840: 210–11.
Sphaeroma armata. Dana, 1853: 780, pl. 52 fig. 7.
Isocladus armatus. Miers, 1876b: 112–13; 1876a: 229. Nierstrasz, 1917: 108; 1931: 196. Tattersall, 1921: 217–19, pl. 5 figs 9–17. Monod, 1931b: 23–4, fig. 16c. Naylor, 1961: 9–11, figs 2e–g. Hurley, 1961: 270. Hicks, 1971: 52, 56. Jansen, 1971: 264–6, 270, fig. 6.
Sphaeroma spinigera Dana, 1853: 780–1, pl. 52 figs 8a–c.
Isocladus spiniger Miers, 1876b: 113, pl. 3 figs 4, 4b; 1876a: 229. Chilton, 1906: 272. Nierstrasz, 1917: 108; 1931: 197. Naylor, 1961: 9, figs 2a–d. Hurley, 1961: 270.
[Not] *Isocladus spiniger* (Dana). Morton & Miller, 1968: fig. 67.3.

Diagnosis

Isocladus with uropod outer rami lanceolate, with apices acute and turned outwards, and with strongly sigmoid outer margins. Pereonite 7 spine not terminally expanded in mature males, has a small tooth each side of base.

TYPE LOCALITY: Coasts of New Zealand.

MATERIAL EXAMINED

Whangaroa: [44] many spp.
Bay of Islands: [Cop. 6] spp.
Auckland: [950] 3 ♂♂ (8–10 mm); [E957] 1 juv. (6 mm), 1 ♂ (9 mm). *Also*: [47] 2 spp; [39] 20–30 spp; [126] spp; [Gal. 667] 4 ♂♂.
Mt. Maunganui: [E958] 3 juvs (5–6 mm), 1 ♀ (8 mm), 2 ♂♂ (8 mm); [E960] 1 ♀ (7 mm), 1 ♂ (9 mm).
Cape Kidnappers: [Cop. 13] spp.
Mahia Peninsula: [E961] 5 juvs (4–5 mm), 3 ♀♀ (5–7 mm), 5 ♂♂ (6–13 mm); [E962] 1 ♀ (9 mm), 1 ♂ (7 mm).
New Plymouth: [Z2284] 1 ♀ (9 mm), 11 ♂♂ (6–11 mm).
Wellington: [27] 13 spp.
Kaikoura: [104] 1664 juvs (1–6 mm), 294 ♀♀ (5–9 mm), 377 ♂♂ (5–12 mm). *Also*: [E972] 6 spp; [89] 2 spp; [101] 1 sp; [107] 20–30 spp.
Akaroa: [Cop. 18] spp.
Otago Harbour: [34] 2 ♀♀ (7 mm), 2 ♂♂ (5–9 mm). *Also*: [Z2292] 9 spp; [Gal. 597] spp.
Chatham Is: [CIE 11] 1 juv. (6 mm), 26 ♂♂ (6–11 mm), 7 ♂♂ (8–11 mm); [E161] 2 ♀♀ (10–12 mm). *Also*: [CIE 9] 2 spp; [E132] 1 sp.

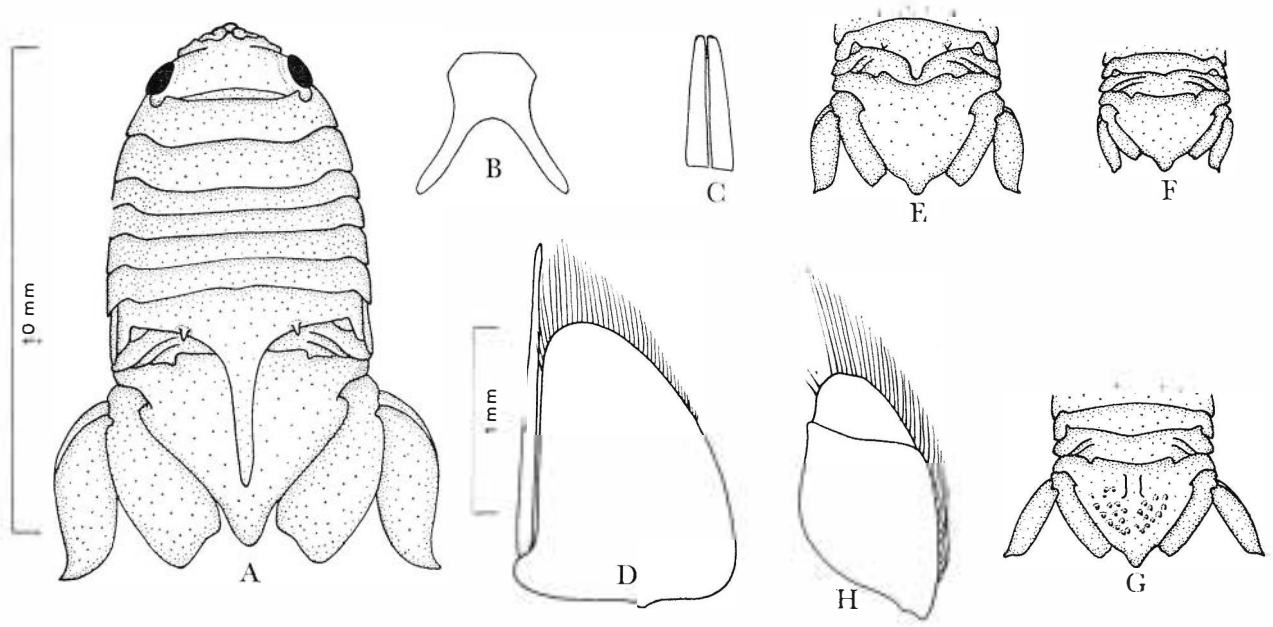


Fig. 55. *Isocladus armatus* (Milne Edwards), mature ♂ except E, F (immature ♂♂) and G, H, (♀): A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus; E–G, pleon, dorsal view; H, pleopod 3, outer ramus.

OTHER RECORDS: "Bay of Islands, along rocky shores" (Dana 1853); "coasts of New Zealand" (Milne Edwards 1840); Christchurch, Sumner (coll. E. W. Bennett, Dec. 1923); Otago Heads, 126 m (coll. Young, Sept. 1924); Stewart I., Paterson Inlet (Monod 1931:23).
HABITAT: Very abundant (up to about 5 000m^{-2}) on moderately sheltered shores, on and under stones, in sandy pools; less abundant (<100m^{-2}) on more exposed shores, in rock pools and crevices (Jansen 1971).
DEPTH RANGE: Intertidal.
REMARKS: The conspecificity of *Isocladus armatus* (Milne Edwards) and *I. spiniger* (Dana) was confirmed by laboratory observation (Jansen, unpubl. data) of live immature males of *I. armatus*. On several occasions such specimens were seen to moult and emerge as mature males of the '*spiniger*' form.

The figure labelled *I. armatus* in Morton & Miller (1968: fig. 71.4) is described as "not quite adult", and it is not possible to attribute it to any of the species described here with certainty.

The figures of *"Isocladus spiniger"* (Morton & Miller, 1968: fig. 67.3) are too diagrammatic to be specifically identifiable, but could be *dulciculus* or *calcareus*. Only *dulciculus* is recorded from north of Castlepoint.

Isocladus calcareus (Dana, 1853) (Fig. 56)

Spheroma calcarea Dana, 1853: 77–7; 1885: pl. 52 fig. 2a–c.
Isocladus magellanensis Richardson, 1906a: 14–15, fig. 18. Stephenson, 1927: 363–4, fig. 26a. Nierstrasz, 1931: 197.
Isocladus magellanicus. Hurley, 1961: 270.
Isocladus calcarea. Menzies, 1962a: 129–30, figs 42b–g.

DIAGNOSIS
Isocladus with uropod outer ramus broad, apex rounded. Pereonite 7 spine in mature males about half pleotelson length, tapering to rounded apex, without small tooth each side of base.
TYPE LOCALITY: 46°53'S, 65°11'W, off Fuegia, 50 fathoms.
MATERIAL EXAMINED
Castlepoint: [E983, E984] 4 juvs (3–5 mm), 2♀♀ (8–9 mm), 1 ♂ (9 mm); [Z2299] 1 ♂ (9 mm).
Kaikoura: [108] 471 juvs (1.6–6 mm), 445♀♀ (5–10 mm), 361♂♂ (5–12 mm). *Also*: [84] 1 sp; [86] 1 sp; [88] 1 sp; [104] many spp.
Oamaru: [131] 1♀ (7 mm), 2♂♂ (10–11 mm).
Otago: [E974] 17 juvs (2–6 mm), 3♀♀ (7 mm); [132] 2 spp; [Z2290] 6 spp.
Stewart I: [Cop. 21] spp.
Snares Is: [64, 72] 7♀♀ (6–8 mm), 1♂ (7 mm).
Auckland Is: [52, 57, 58, 60] 2 juvs (4–5 mm), 8♀♀ (7–8 mm), 1♂ (6 mm); [Cop. 22] spp.
Chatham Is: [CIE 16] 1♀ (8 mm).
HABITAT: More numerous on moderately exposed shores.
DEPTH RANGE: Intertidal, subtidal.

Isocladus dulciculus n.sp. (Fig. 57)

DIAGNOSIS
Isocladus with uropod rami broad; outer ramus has outer margins posteriorly recurved, apex moderately acute and turned outward with small emargination in posterior margin. Pereonite 7 in adult male has small tooth on each side of base of spine; spine tapers to acute apex, is about half pleotelson length. Pleotelson apex broad, rounded.

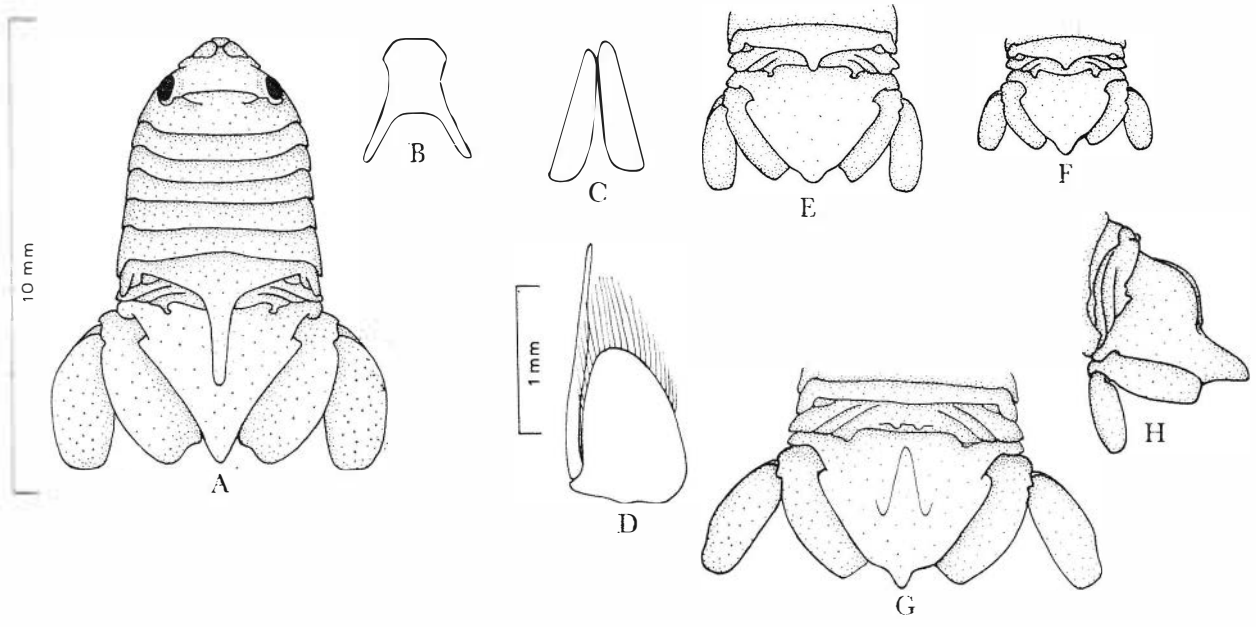


FIG. 56. *Isocladus calcareus* (Dana), mature ♂ except E, F (immature ♂♂) and G, H (♀): A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus; E–G, pleon, dorsal view; H, pleon, side view.

TYPE MATERIAL
Holotype: Canterbury Museum Type No. AQ3405 [125, ♂, 7 mm].
Paratype: Canterbury Museum Type No. AQ3430 [125, 2 immature ♂♂, 1 juv].
TYPE LOCALITY: Leigh, Auckland.
MATERIAL EXAMINED
North Cape: [Cop. 4] spp.
Auckland: [E956, 957] 2 juvs (4–5 mm), 12♀♀ (4–7 mm), 5♂♂ (5–7 mm); [E975, 976, 977] 70 juvs (1.5–4 mm), 31♀♀ (4–5 mm), 24♂♂ (4–7 mm); [139] 1♂ (6 mm). *Also*: [125] 4 spp; [Cop. 11] spp.
Whangaparaoa Peninsula: [E980] 1 juv. (3.5 mm), 1♀ (5.5 mm), 1♂ (7 mm).
Mt. Maunganui: [E959, 960] 3 juvs (1.5 mm), 49♀♀ (5–7 mm), 3♂♂ (5–7 mm).
Gisborne: [E982] 80 juvs (1.5–5 mm), 5♀♀ (5–6 mm). 9♂♂ (4–8 mm).
Coromandel: [Z2280, 2308] 30 juvs (3–7 mm), 8♀♀ (5–7 mm), 5♂♂ (6–7 mm).
Castlepoint: [E983] 4♂♂ (5–7 mm). *Also*: [Z2287] 2 spp.
Wellington: [27] 1♂ (6 mm).
Chatham Is: [CIE 12] 6 juvs (3–5 mm), 11♀♀ (4–8 mm), 15♂♂ (5–7 mm).
OTHER RECORDS: None.
HABITAT: Under stones, in pools, amongst algae, moderately sheltered shores.
DEPTH RANGE: Intertidal to 27 m.
REMARKS: The isopod figured by Morton & Miller (1968: fig. 67.3) as *Isocladus spiniger* may belong to this species.

In describing the fauna of *Corallina officinalis* pools near Auckland, they speak of *Isocladus* as burrowing in coarse sand or nestling in the fronds or basal deposits of *Corallina,* and as being a powerful swimmer, "leaving its refuges to career freely about in pools, ventral surface uppermost . . . The camouflage pattern is in no two species alike".

They also give a vivid description of *"Isocladus armatus"*, which they found to be a typical inhabitant of protected sand beaches in the coarser shell sand of the middle beach, "often a rather narrow strip . . . half swimming, half sand-ploughing, thrusting a path with the rounded head between the coarse sand grains below the water table, and coming to the surface as scavengers by night, or at full tide".

Isocladus inaccuratus n.sp. (Fig. 58)

[Not] *Isocladus spiniger* (in part) of Naylor, 1961: 9, fig. 2a.

DIAGNOSIS
Isocladus with uropod outer ramus narrow-lanceolate with acute, outward-turned apex, moderately sigmoid outer margin. Pereonite 7 dorsal spine in adult males expanded towards apex, without teeth each side of spine base.

TYPE MATERIAL
Holotype: Canterbury Museum Type No. AQ3404 [CIE 22, ♂, 15 mm].
Paratypes: Canterbury Museum Type No. AQ3429 [CIE 22, 18 juvs, 6–8 mm; 21 ♀♀, 7–12 mm; 23 ♂♂ 8–15 mm).
TYPE LOCALITY: The Sisters, Chatham Islands.
MATERIAL EXAMINED
Chatham Is: [CIE 16] 1♀ (16 mm); [CIE 22] 18 juvs (6–8 mm), 21♀♀ (7–12 mm), 24♂♂ (8–15 mm).
OTHER RECORDS: Chatham Is. (coll. S. D. Shand, June 1909; W. R. B. Oliver, Dec. 1909); Naylor (1961:9).
HABITAT: Rock pools.
DEPTH RANGE: Intertidal.
REMARKS: *I. inaccuratus* and *I. armatus* are very similar, but the males are completely separable. Naylor (1961: 9, fig. 2) has apparently confused at least two species: his fig. 2a is a 16 mm adult male *I. inaccuratus,* his fig. 2e is a 13.5 mm immature male *I. inaccuratus,* and his fig. 2b resembles *I. calcareus.* Large samples including animals of all sexes and sizes are needed to avoid this misidentification problem in a group of such closely related species as *Isocladus.*

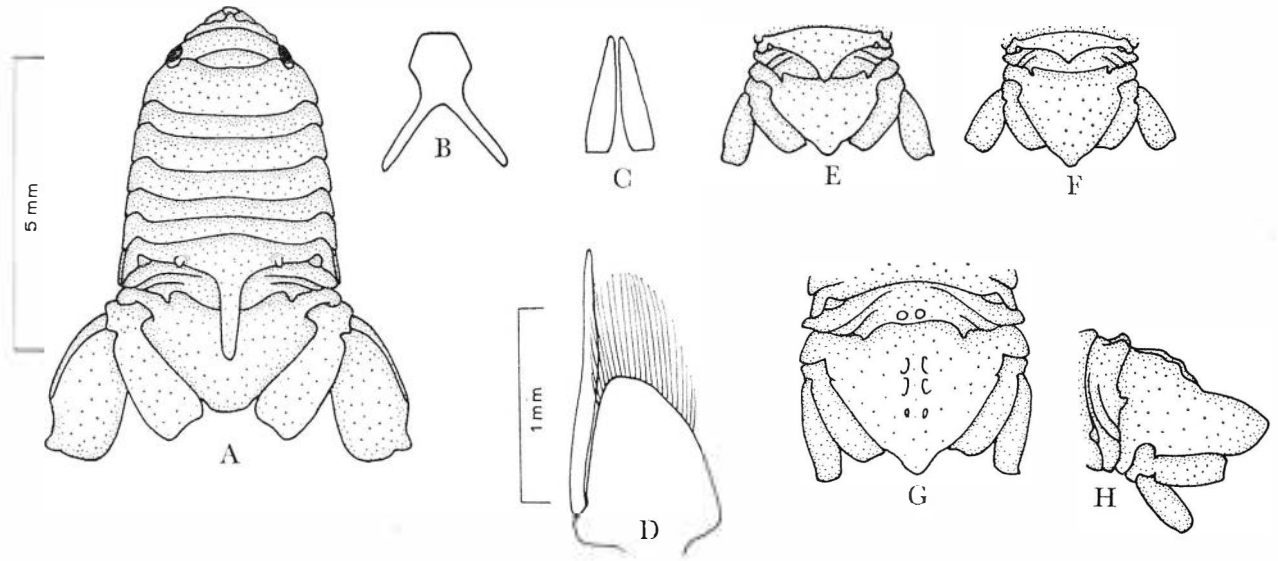


FIG. 57. *Isocladus dulciculus* n.sp., mature ♂ except E, F (immature ♂♂) and G, H (♀): A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus; E–G, pleon, dorsal view; H, pleon, side view.

Isocladus reconditus n.sp. (Fig. 59)

DIAGNOSIS

Isocladus with uropod outer ramus broadly rounded, apex obtuse, feebly emarginate on rear margin and on outer margin posteriorly. Pereonite 7 spine in adult males about three-quarters pleotelson length, parallel-sided, apex rounded, small tooth each side of base.

TYPE MATERIAL

Holotype: NZOI Type No. 135 [E958, ♂, 9 mm].

Paratypes: NZOI Type No. P192 [E958, E959, 23 juvs 2–6 mm; 29 ♀♀ 6–9 mm, 17 ♂♂ 6–9 mm].

TYPE LOCALITY: Mt Maunganui.

MATERIAL EXAMINED

Dargaville: [E952] 2 juvs (6–7 mm), 8♀♀ (6–9 mm), 7♂♂ (6–10 mm). *Also:* [127] about 20 spp.

Whangarei: [E953] 5 juvs (5–6 mm), 2♀♀ (6–7 mm), 3♂♂ (7–10 mm).

Mt. Maunganui: [E958, E959] 23 juvs (2–6 mm), 29♀♀ (6–9 mm), 17♂♂ (6–9 mm).

OTHER RECORDS: None.

HABITAT: Under stones, in rock pools, algal holdfasts, on moderately exposed shores.

DEPTH RANGE: Intertidal.

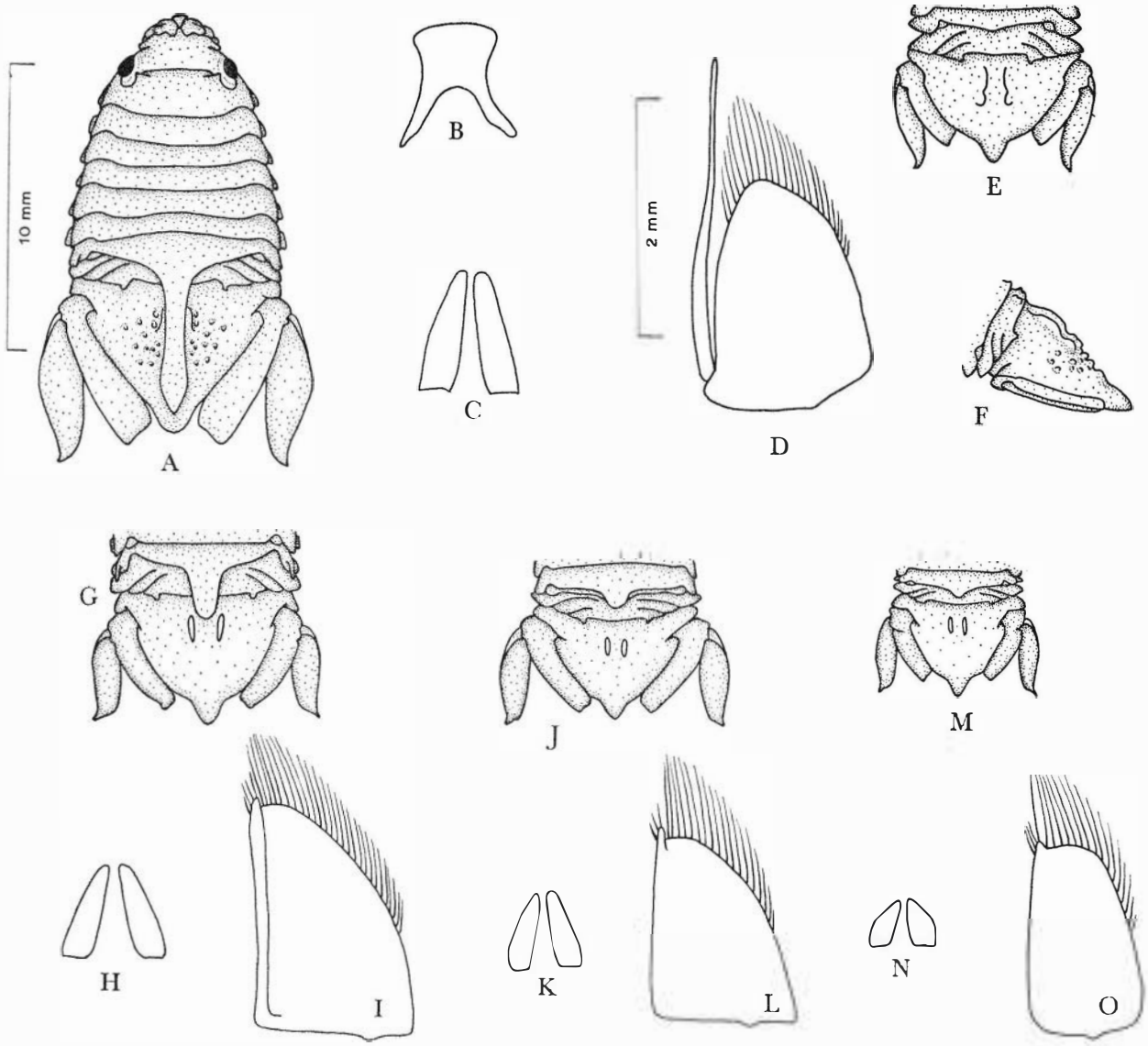


FIG. 58. *Isocladus inaccuratus* n.sp., A–D mature ♂. A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus. E–F, ♀ pleon: E, dorsal view; F, side view. G–O, successive stages in immature ♂♂. G, J, M, pleon, dorsal view; H, K, N, penes; I, L, O, pleopod 2, inner ramus.

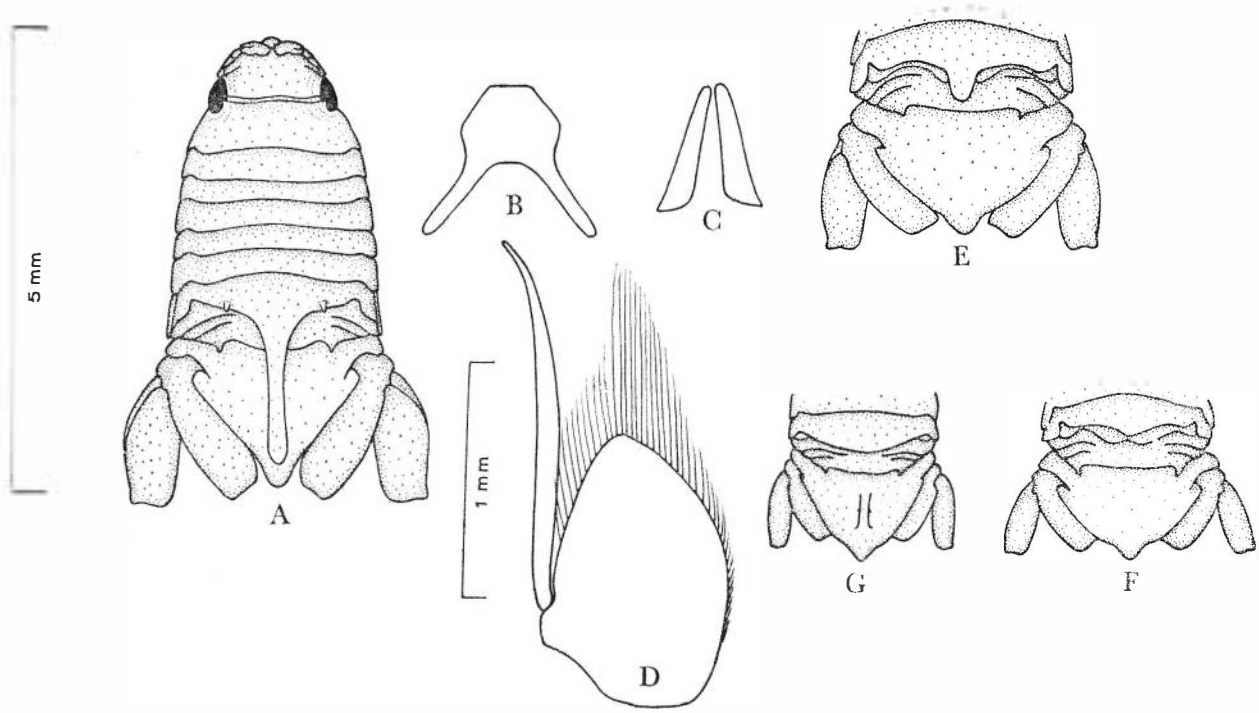


FIG. 59. *Isocladus reconditus* n.sp., mature ♂ except E, F (immature ♂♂) and G (♀): A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus; E–G pleon, d orsal view.

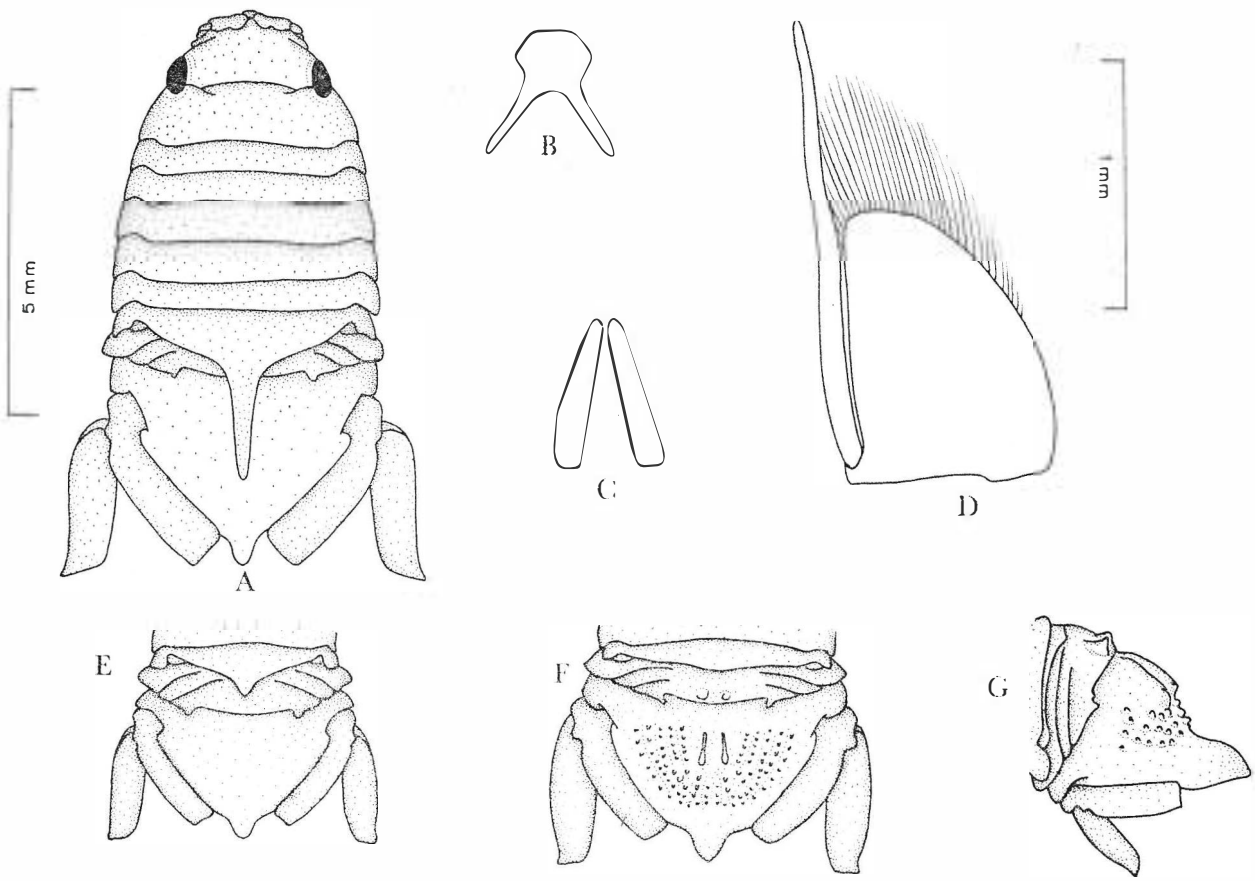


FIG. 60. *Isocladus spiculatus* n.sp., mature ♂ except E (immature ♂) and F, G (♀): A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus; E, F, pleon, dorsal view; G, pleon, side view.

Isocladus spiculatus n.sp. (Fig. 60)

DIAGNOSIS
Isocladus with uropod outer ramus narrow-lanceolate; ramus apex moderately acute, turned outwards, has moderately sigmoid outer margin. Pereonite 7 spine in adult males without apical expansion, about half pleotelson length, lacking teeth each side of spine base.

TYPE MATERIAL
Holotype: NZOI Type No. 136 [Z2309, ♂, 9 mm].
Paratypes: NZOI Type No. P193 [Z2309, 15 juvs, 3–6 mm; 20♀♀, 5–8 mm; 7♂♂ 5–9 mm].
TYPE LOCALITY: Otago Harbour.
MATERIAL EXAMINED
Otago Harbour: [133] 2♀♀ (6–7 mm), 1♂ (9 mm); [43] 2 juvs (4–5 mm), 4♀♀ (6–7 mm), 4♂♂ (6–8 mm); [Z2309] 15 juvs (3–6 mm), 20 ♀♀ (5–8 mm), 8♂♂ (5–9 mm). *Also*: [Z2310] 40–50 spp; [Z2293] 4 spp.
OTHER RECORDS: None.
HABITAT: Sandbanks. Taken in shallow-water plankton at night.
DEPTH RANGE: Intertidal, subtidal.

Pseudosphaeroma* Chilton, 1909

Pseudosphaeroma Chilton, 1909: 653–4. Monod, 1931a: 73–8.
TYPE-SPECIES: *Pseudosphaeroma campbellensis* Chilton, 1909.

DIAGNOSIS
Hemibranchiate Sphaeromatidae with outer ramus of pleopod 3 indistinctly or incompletely divided into two segments; pleopod 4 outer ramus thickened on inner side; pleopod 5 outer ramus thickened on proximal part of inner side. Mature males have well developed appendix masculina on pleopod 2 inner ramus. Maxilliped palp last three segments have prominent lobes; female mouthparts not metamorphosed. Uropod rami well developed in both sexes. Broodplates overlap in midline. Sexes more or less similar.

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF PSEUDOSPHAEROMA

Body flattened; pleotelson smooth, apex rounded with minute, median emargination; uropod outer rami with serrated inner margin and excavate posterior lateral angle ..... CALLIDUM

Body convex; posterior pereonites and pleon tuberculate; pleotelson apex entire, upturned, most prominently in mature males, in which pleotelson also has transverse pair of prominent, bifid tubercles or paired longitudinal ridges, separated by a deep gap; uropod rami smooth ..... CAMPBELLENSIS

*Although some authors have treated the name *Sphaeroma* and its derivatives as feminine nouns, the gender is in fact neuter, and specific names should be in agreement. What is implicit in the 1962 International Rules and Appendices was spelt out in the 1953 Copenhagen Decisions (Art. 13, item 84, no. 7(c)): "The following names are to be treated as neuter in gender. . . (ii) Names with the final term obviously derived from Greek words of neuter gender ending with the letter alpha (Examples: "-soma", "-stigma", "-oma")".

Pseudosphaeroma callidum n.sp. (Fig. 61)

DIAGNOSIS
Pseudosphaeroma with body flattened and smooth. Pleotelson apex rounded and minutely notched medially. Uropod rami equally developed, outer ramus with outer margin excavate distally, posterior margin serrate. Pleopod 3 outer ramus completely but indistinctly divided into two segments.

TYPE MATERIAL
Holotype: NZOI Type No. 133[Sta. C758, TAL, ♂,6 mm].
Paratype: NZOI Type No. P190 [Sta. C758, 1♂, 5 mm].
TYPE LOCALITY: Three Kings Rise.
MATERIAL EXAMINED
Three Kings Rise: [C758] 2♂♂ (5–6 mm).
OTHER RECORDS: None.
HABITAT: Shelf benthos, muddy sand.
DEPTH RANGE: 205 m (one record only).
REMARKS: Although this species is rather different in aspect from *P. campbellensis*, it has been included in *Pseudosphaeroma* because of its pleopods. Monod (1931a: 80–1) included an equally dissimilar species, *P. barnardi*, apparently mainly on the form of the outer rami of pleopods 4 and 5: "Pleopods: . . . IV . . . outer ramus . . . with a respiratory area occupying the inner half of the ramus; V . . . outer ramus . . . respiratory area occupying the inner proximal region of the ramus".

Pseudosphaeroma campbellensis Chilton, 1909 (Fig. 62)

Pseudosphaeroma campbellensis Chilton, 1909: 654–7, figs 15–16. Stephensen, 1927: 368, fig. 26b. Monod 1931a: 67–8, figs 67e, 72–3; 1931b: 25, figs 16d–e, 17. Nierstrasz, 1931: 211. Hurley, 1961: 270–1. Jansen, 1971: 270.

DIAGNOSIS
Pseudosphaeroma with convex body; posterior pereonites raised in transverse ridges, pleonite 1 tuberculate. Pleotelson apex entire, turned upwards, most prominently in mature males; also in mature males pleotelson has transverse pair of prominent, bifid tubercles, or a pair

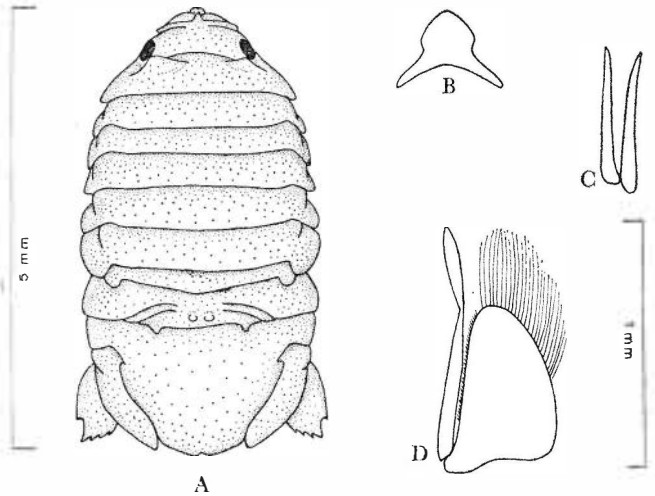


FIG. 61 *Pseudosphaeroma callidum* n.sp., mature ♂: A, whole animal; B, epistome; C, penes; D, pleopod 2, inner ramus.

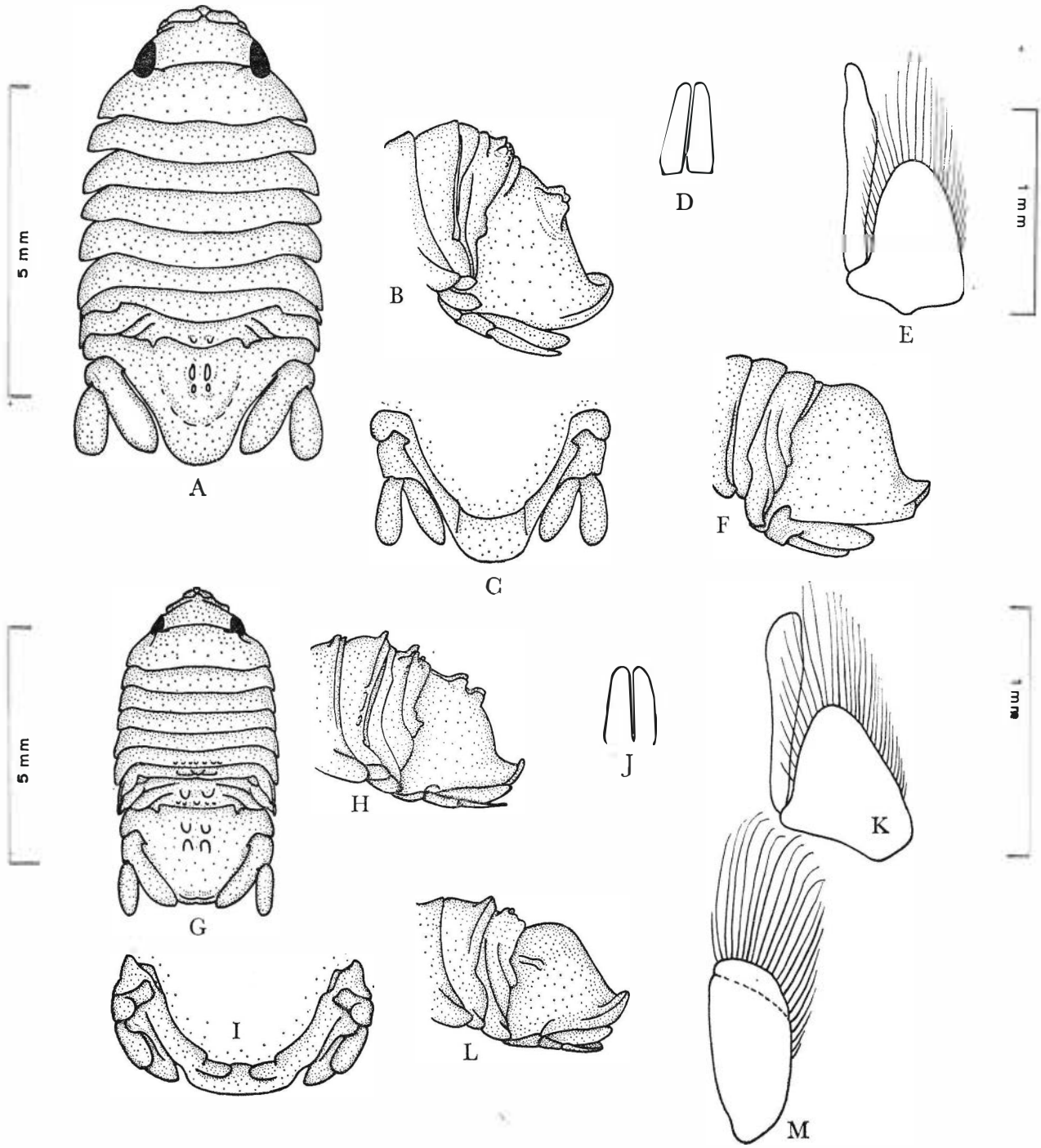


FIG. 62. *Pseudosphaeroma campbellensis* Chilton. A–F from Campbell I. A–E, mature ♂. A, whole animal; B, pleon, side view; C, pleotelson, ventral view; D, penes; E, pleopod 2, inner ramus; F, ♀, pleon, side view. G–M from Heathcote–Avon Estuary, Christchurch. G–K mature ♂. G, whole animal; H, pleon, side view; I, pleotelson, ventral view; J, penes; K, pleopod 2, inner ramus; L–M, ♀: L, pleon, side view; M, pleopod 3, outer ramus.

of longitudinal ridges divided by a variable gap, or is separated into two separate tubercles. Pleopod 3 incompletely and indistinctly divided into two segments. Uropod rami subequal, ovate, margins smooth.

TYPE LOCALITY: Perseverance Harbour, Campbell Island.

MATERIAL EXAMINED

Raglan: [E948] 2 juvs (3 mm), 4 ♂♂ (3–4 mm), 1 ♂ (4 mm).
Auckland: [E95] 1 ♀ (4 mm), 2 ♂♂ (4–5 mm).
Christchurch: [118–120] 10 juvs (2–4 mm), 16 ♀♀ (4–6 mm), 14 ♂♂ (4–5 mm). *Also*: [122] 6 spp; [123] about 14 spp; [124] many spp.
Milford Sound: [Gal. 604] 2 ♂♂.
Stewart I: [75, 76, 81] 9 juvs (2–5 mm), 4 ♀♀ (3–4 mm), 9 ♂♂ (4–5 mm). *Also*: [75, 76, 81] 15 spp; [141] 10 ♀♀ (2.5–4.5 mm), 2 ♂♂ (3.5–4.5 mm); [142] 30 spp (up to 4 mm).
Snares Is: [72, 73] 6 juvs (2–3 mm), 11 ♀♀ (3–4 mm), 3 ♂♂ 4–5 mm).
Auckland Is: [49, 53, 60] 17 juvs (2–5 mm), 17 ♀♀ (4–6 mm), 9 ♂♂ (5–8 mm). *Also*: [2] 4 spp; [6] about 16 spp; [12] about 20 spp; [D190] 1 sp.
Campbell I: [20] 2 ♂♂ (7–9 mm); [140] 260 ♀♀, 22 ♂♂ (Chilton 1909: 653–7).

OTHER RECORDS: Auckland Is: coll. L. Cockayne, July 1903; Port Ross, on the coast under stones at low tide, 27 Nov. 1914 (Stephensen 1927: 368).

HABITAT: Under stones, in pools, on algae; often in or near fresh water.

DEPTH RANGE: Intertidal.

REMARKS: *P. campbellensis* shows considerable variation in the shape of the appendix masculina and in the tuberculation of the pleotelson in mature males. This may indicate the existence of geographic races or subspecies, or of separate species. The different forms nowhere overlap in the distribution of the material examined, which appears to vary continuously from the extremes seen at Campbell Island (Fig. 62A–F) and in the Heathcote–Avon Estuary (Fig. 62G–M), through a variable intermediate from Stewart Island. Until more extensive collection and more detailed study of this species or species-complex is undertaken, it seems advisable to include all the forms in the one species.

Sphaeroma* Latreille, 1802

Sphaeroma Hansen, 1905: 102–3, 115–17. Monod, 1931a: 9–20.

TYPE-SPECIES: *Sphaeroma serratum* (Fabricius, 1787).

DIAGNOSIS

Hemibranchiate Sphaeromatidae with posterior margin of pleotelson lacking notch. Pleopod 3 outer ramus unsegmented. Maxilliped palp last three segments with poorly developed or rudimentary lobes. Pereopods 1–3 with long, plumose setae on segments 3–4. Mature males – pleopod 2 inner ramus has well developed appendix masculina. Broodplates overlap in midline. Sexes similar, no metamorphosis of mouthparts in female.

*See footnote to *Pseudosphaeroma*, p. 67.

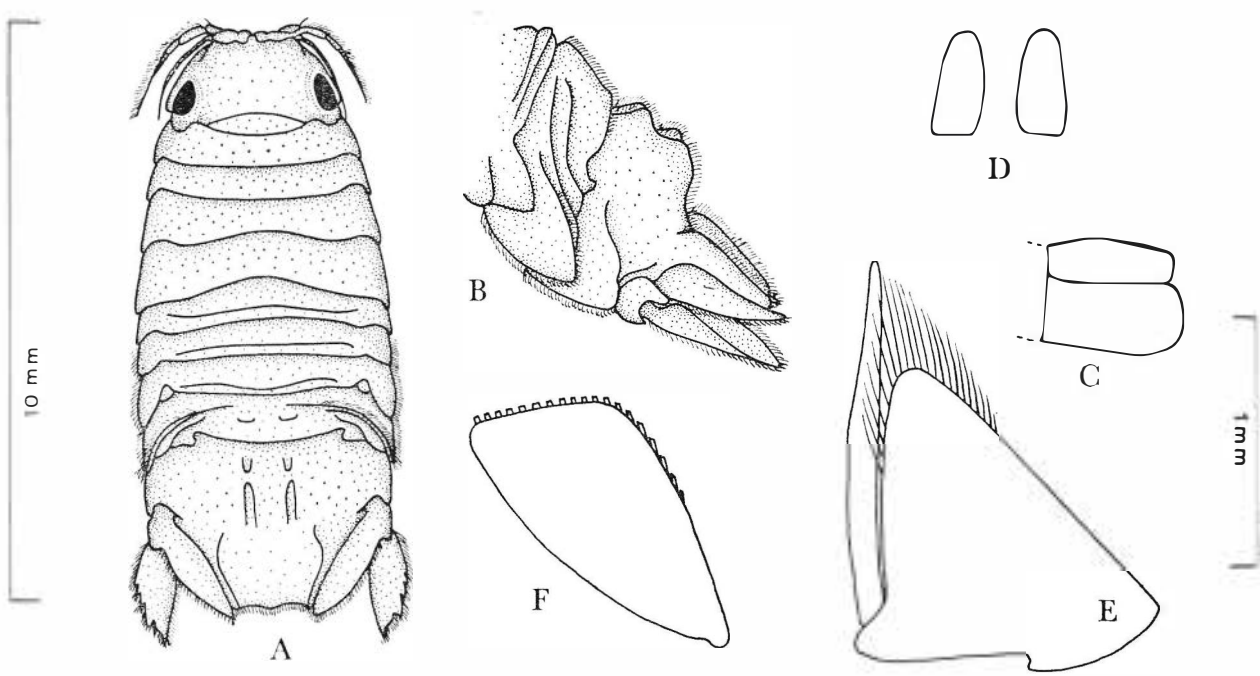


FIG. 63. *Sphaeroma laurensi* n.sp., mature ♂: A, whole animal; B, pleon, side view; C, mandible, incisor process; D, penes; E, pleopod 2, inner ramus; F, pleopod 3, outer ramus (without setae).

KEY TO NEW ZEALAND AND SUBANTARCTIC SPECIES OF SPHAEROMA

Pleotelson with longitudinal row of 4–5 tubercles each side of midline, apex broadly rounded; mandible incisor processes formed by large, central tooth with small tooth each side ..... QUOYANUM

Pleotelson with longitudinal ridge each side of midline, end margin concave each side of median apex; mandible incisor processes formed by two very large, broad teeth ..... LAURENSI

Sphaeroma laurensi n.sp. (Fig. 63)

DIAGNOSIS

Sphaeroma with posterior margin of pleotelson concave each side of median apex, longitudinal ridge each side of pleotelson midline. Uropod rami of equal length, narrow-lanceolate, outer serrate with four teeth on outer margin (excluding apex). Mandible incisor processes with two large blunt teeth.

TYPE MATERIAL

Holotype: NZOI Type No. 134 [E982, ♂, 10 mm].
Paratypes: NZOI Type No. P191 [E982, 4 juvs, 1 ♀].

TYPE LOCALITY: Gisborne.

MATERIAL EXAMINED

Gisborne: [E982] 4 juvs (5–6 mm), 1 ♀ (10 mm), 1 ♂ (10 mm).

OTHER RECORDS: None.

HABITAT: Among algae.

DEPTH RANGE: Intertidal.

REMARKS: This species is named after Dr J. L. Barnard, who collected the specimens.

Sphaeroma quoyanum Milne Edwards, 1840 (Fig. 64)

Sphaeroma Quoiana Milne Edwards, 1840: 206.
Sphaeroma quoyanum (and *quoyana*). Heller, 1868: 137–8. Chilton, 1912: 134; 1919: 11–15, fig. 12. Nierstrasz, 1917: 105–6, figs 38–9; 1931: 192. Paradice, 1926: 319, pl. 42. Hale, 1929; 273–4, figs 270–1. Hurley, 1956: 717; 1961: 269. Morton & Miller, 1968: 240, 396, 403, 538, figs 82.3, 149. Jansen 1971: 270.
Sphaeroma verrucauda? White [*sic*]. Dana, 1853: 779, pl. 52, fig. 6. Miers, 1876: 111. Hutton, 1904: 263. Hansen, 1905: 116.

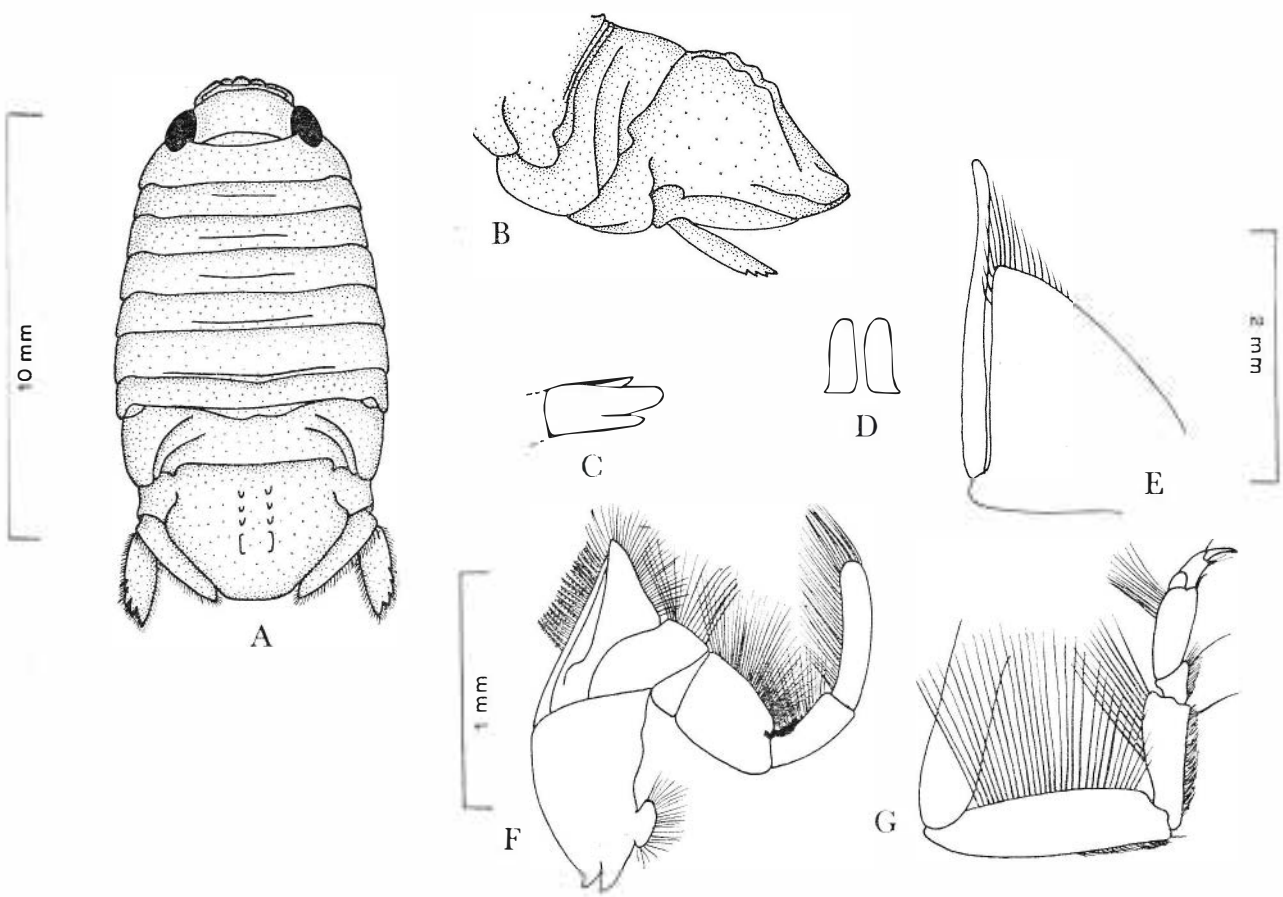


FIG. 64. *Sphaeroma quoyanum* Milne Edwards, mature ♂: A, whole animal; B, pleon, side view; C, mandible, incisor process; D, penes; E, pleopod 2, inner ramus; F, maxilliped; G, pereopod 1.

DIAGNOSIS
Sphaeroma with granulate body; pleotelson apex broadly rounded, without notches, but longitudinal row of 4–5 tubercles each side of midline. Uropod rami of equal length, inner ramus fixed, narrow-lanceolate, outer ramus serrated with 3–4 teeth on outer margin (excluding apex). Mandible incisor process a large, central tooth with small, short tooth each side (often eroded in specimens from sandstone).

TYPE LOCALITY: Coasts of Tasmania.

MATERIAL EXAMINED
Auckland: [126] 6 juvs (4–9 mm), 17 ♀ ♀ (10–13 mm), 9 ♂ ♂ (11–13 mm); [42] 1 ♀ (13 mm). *Also*: [42] 2 spp.
Wellington: [36] 2 juvs (6–11 mm), 3 ♀ ♀ (14 mm), 3 ♂ ♂ (8–13 mm).
Westport: [Z2303] 11 ♀ ♀ (11–15 mm), 11 ♂ ♂ (11–16 mm).

OTHER RECORDS: Tasmania (Milne Edwards 1840); Sydney (Heller 1868, Paradice 1926); Victoria (Chilton 1912); Bay of Islands (Dana 1853); Hobsons Bay, Auckland (Miers 1876); Narrow Neck, Auckland (Chilton 1919); Hawkes Bay (Chilton 1919); Wanganui (Chilton 1919); Kenepuru and Queen Charlotte Sounds (Chilton 1919); Beachhaven and Riverhead, Waitemata Harbour (Morton & Miller 1968).

DEPTH RANGE: Intertidal.

HABITAT: Burrows in soft sandstone, mudstone, papa rock, and timber, usually between tide marks.

REMARKS: Morton & Miller (1968: 240) describe *S. quoyanum* as boring short pits above mean tide level, and lying at the end of the shaft rolled into a compact ball. The pits also provide homes for many secondary occupants, including *Modiolus, Onchidella,* anemones, polychaetes, and gastropods.

Paradice (1926) believed *S. quoyanum* was most prolific where the salinity of the water was periodically reduced by large quantities of rainwater and mud, and noted, "the more the sunlight is excluded from any portion of an embankment, the more damage will be done there by this crustacean". This is borne out in the New Zealand situation: occurrences are noted in mud flats (Wanganui); 1.6 km upstream from the mouths of the Hutt River (Wellington) and the Buller River (Westport); in burrows in sandstone lining the banks and bed of a freshwater stream at Hatfields Beach (Auckland), immediately to the seaward side of the bridge on the north bank, the greatest numbers being above mid-tide level (Jansen 1971); and in friable rock at Riverhead (Waitemata Harbour), a type of locality where "the tidal reaches of streams cut across hard platforms" (Morton & Miller 1968: 402–4).

The degree of serration of the uropod varies from marked to almost absent, apparently unrelated to sex. The females generally appear to have a more rugose telson.

Subfamily PLATYBRANCHIATINAE

Group *Sphaerominae platybranchiatae* Hansen, 1905: 101, 109–15.

DIAGNOSIS
Pleopods 4 and 5, both rami completely without transverse folds, outer rami unsegmented. Pleopod 4, both rami without plumose setae in most genera, inner ramus at most with a few short, terminal, plumose setae, outer ramus rarely with numerous long, plumose setae (*Tecticeps*). Pleopod 5, both rami without plumose marginal setae, outer ramus with squamiferous protuberances in low relief, in rare instances lacking spines or even missing altogether. Pleopod 3 sometimes has plumose marginal setae on both rami, as in pleopod 2, sometimes has inner ramus nearly naked, sometimes both rami naked. Pleopod 1 inner ramus rarely broad, usually narrow. (Pleotelson rounded, or acute.)

REMARKS: Hansen (1905) divided the Platybranchiatinae into four sections: Campecopeini, Monolistrini, Cassidinini, and Ancinini. These should now be considered as tribes.

Cassidina is the only recorded New Zealand platybranchiate. *Paravireia,* which was originally considered by Chilton as resembling *Vireia,* is excluded from Sphaeromatidae by having more than two free, separate pleon segments. (Of the two species of *Vireia* listed by Hansen (1905), *Vireia burgunda* (Dollf) is now treated by European workers as *Caecosphaeroma* (*Vireia*) *burgundum,* and *Vireia berica* (Fabiani) as *Monolistra* (*Typhlosphaeroma*) *bericum*—cf. Daum, 1954; Sket, 1964, 1965).

Tribe **Cassidinini** Hansen, 1905

Section Cassidinini Hansen, 1905: 110, 112–13.

DIAGNOSIS
Body greatly flattened. Pereon strongly expanded; margins of pereon, anterior part of pleon, uropods, and sometimes the two proximal segments of antenna I forming a nearly continuous border with a more or less continuous fringe of short, protruding hairs. Eyes well developed. Antenna I, first two segments of peduncle with their anterior part protruding so that almost their whole length, at least, is visible from above, frequently greatly expanded in front, depressed. Mandibles, molar process well developed. Anterior legs without prehensile hand. Pleopods, inner ramus of pleopod 1 at least somewhat longer than broad, sometimes very narrow. Pleopod 3, both rami with several plumose setae on end margin; outer ramus unsegmented or 2-segmented. Pleopods 4 and 5, both rami without setae, similar, respiratory. Pleotelson end margin short, a real notch always lacking. Broodplates present or absent; brood in chamber formed by external pouches.

Cassidina Milne Edwards, 1840

Cassidina Milne Edwards, 1840: 223–4. Thomson, 1889: 263. Stebbing, 1900: 558–62.
TYPE-SPECIES: *Cassidina typa* Milne Edwards, 1840.

DIAGNOSIS
Platybranchiate Sphaeromatidae with pleopod 3 outer ramus of two segments. Epistome visible in dorsal view between expanded bases of antenna I. Maxilliped palp segment 5 produced in well developed lobe alongside and resembling segment 6. Epimeral plates forming large lateral extensions of pereonites. Head partly recessed into pereonite 1. Uropod outer ramus small, movable, almost vestigial; peduncle and inner ramus fused into one large article lying alongside pleotelson and completing oval outline of animal. Mature males with well developed appendix masculina on pleopod 2 inner ramus. Female mouthparts not metamorphosed. Broodplates present, overlapping in midline. Sexes similar.

Cassidina typa Milne Edwards, 1840 (Fig. 65)

Cassidina typa (or *typus*) Milne Edwards, 1840: 224, pl. 32, figs 10–16. Stebbing, 1900: 559–62. Hansen, 1905: 129–31, pl. 7 fig. 6a. Nierstrasz, 1917: 109, fig. 41. Tattersall, 1921: 226–7. Thomson & Anderton, 1921: 114. Nierstrasz, 1931: 219. Hurley, 1957: 13; 1961: 271.

Cassidina neo-zealanica Thomson, 1889: 264, pl. 14 figs 1–4. Hutton, 1904: 263. Thomson, 1913: 247.

DIAGNOSIS

Cassidina with regular, broad, oval, smooth body, only slightly vaulted in middle. Antenna I short, not longer than peduncle of antenna 2. Pleotelson triangular with blunt, rounded apex.

TYPE LOCALITY: "New Zealand" (*see* Hansen 1905: 130), from Quoy & Gaimard material.

MATERIAL EXAMINED

Off Raglan: [C344] 4 juvs (6 mm), 4♀♀ (6–7 mm), 1♂ (9 mm); [C291] 1 sp.
Off Napier: [22] 8 juvs (5 mm), 1♀ (6 mm), 2♂♂ (5–7 mm).
Wellington: [Cop. 16] spp.
Cook Strait: [VUZ 98] 1♀ (8 mm), 1♂ (8 mm); [VUZ 99] 1 juv. (7 mm), 2♂♂ (8–9 mm); [VUZ 101] 1 juv (6 mm), 2♂♂ (7–9 mm).
Pelorus Sound: [C921] 2♀♀ (6 mm).
Tasman Bay: [24] 2♂♂ (11–12 mm).
Cape Campbell: [35] 9♀♀ (6–8 mm), 2♂♂ (7–11 mm).
Kaikoura: [117] 5 juvs (2–7 mm), 78♀♀ (7–9 mm), 45♂♂ (6–12 mm); [104] 6 spp.
Oamaru: [128] 1♂ (5 mm).
Otago: [Z2285] 21 juvs (3–7 mm), 19♂♂ (7–12 mm); [Z2314] 1 juv. (6 mm), 4♂♂ (9–12 mm).
Foveaux Strait: [B262] 1 juv. (7 mm), 1♂ (9 mm).

OTHER RECORDS: Bay of Islands (Thomson 1889, Nierstrasz 1917); Akaroa (Hansen 1905); North Cape (Tattersall 1921; Nierstrasz 1931).

HABITAT: On kelp, shells, stones. "Usually found creeping on seaweed where its flat form and protective colouring make it somewhat inconspicuous" (Thomson & Anderton 1921).

DEPTH RANGE: 18–1000 m. The three records of over 110 m (VUZ 98, 99, 101) are from deep water in Cook Strait, very close to the shelf, and are probably anomalous on this account, although true.

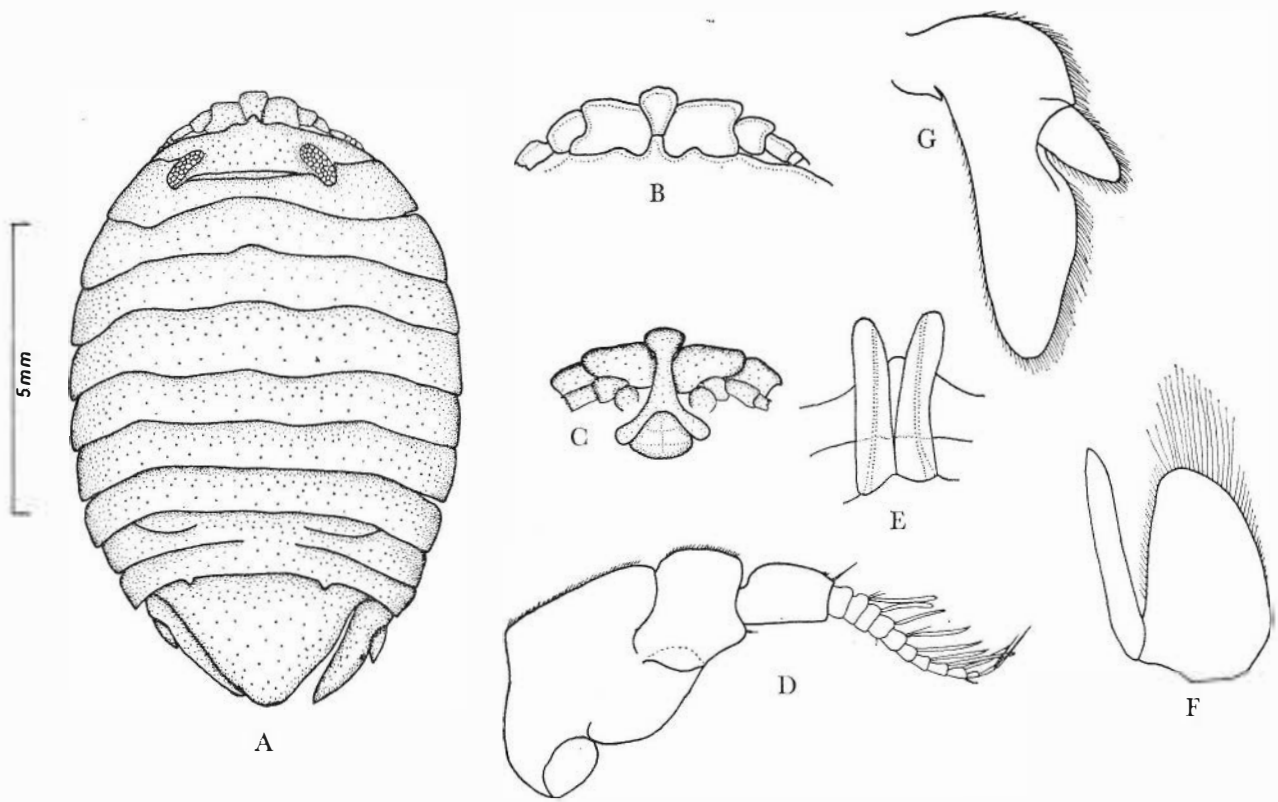


FIG. 65. *Cassidina typa* Milne Edwards, mature ♂: A, whole animal; B, frontal margin of head, epistome and antenna I peduncles from above; C, epistome and antenna I peduncles from below; D, antenna I; E, penes; F, pleopod 2, inner ramus; G, uropod.

GEOGRAPHICAL DISTRIBUTION

The geographical distribution of the 37 shallow-water species of Sphaeromatidae shows some recognisable patterns (Figs 66–69; Plates 1–11).

Only two species, *Exosphaeroma obtusum* and *Pseudosphaeroma campbellensis,* have been recorded from Campbell Island. This represents 5% of the total New Zealand fauna, and seems remarkably meagre, but probably reflects a trend for fewer species the farther south one goes, since only eight (21%) of the New Zealand species are recorded from the Auckland Islands, and 11 (30%) from The Snares.

Antipodes Island also has only two known species. This probably reflects not only its distance from New Zealand but also the small size of the island, making it a very small target in a wide sea; its position south-east of the current system which bathes New Zealand proper (*see* Burling 1961); and especially its lack of suitable niches. Almost all of the expeditions to the Antipodes have landed on the rocky Reef Point or nearby boulder beaches, and we have not had access to any collections from the southern beaches (a useful map is given in Cullen 1969, fig. 1), so it would be unwise to place much emphasis on the extremely limited collections at our disposal. However, it is worth noting that there are no sandy beaches as such. Much of the island is cliffed. There are rock platforms and kelp boulder beaches to the north and east, and there may be restricted patches of coarse gravel in some small coves. Rock pools on the platforms should provide an algal substrate for sphaeromatids, and there are one or two small, rocky beaches on the west coast, but according to Mr R. A. Taylor of Ecology Division, DSIR, who spent some weeks on the island and worked his way around it looking for seal colonies, the overall picture is one of rugged and restricted habitats.

Stewart Island, with 13 species (35% of the total fauna), compares favourably with the 18 species (49%) found south of Kaikoura on the mainland, and can be considered a faunal extension of New Zealand.

The main break in faunal continuity occurs about the Kaikoura region, and the Chatham Islands fauna shows stronger affinities with central and northern New Zealand faunas than with that south of Kaikoura. Fifteen species (31% of the total fauna) have been found on the Chathams; eight of these are also found throughout the North and South Islands, two more are found in both North and South or Stewart Island. Four species (*Isocladus dulciculus, Amphoroidea media, Sphaeroma quoyanum,* and *Dynamenoides decima*) are found north of Kaikoura and on the Chathams, but not south of Kaikoura; *Isocladus inaccuratus* has been found only on the Chathams.

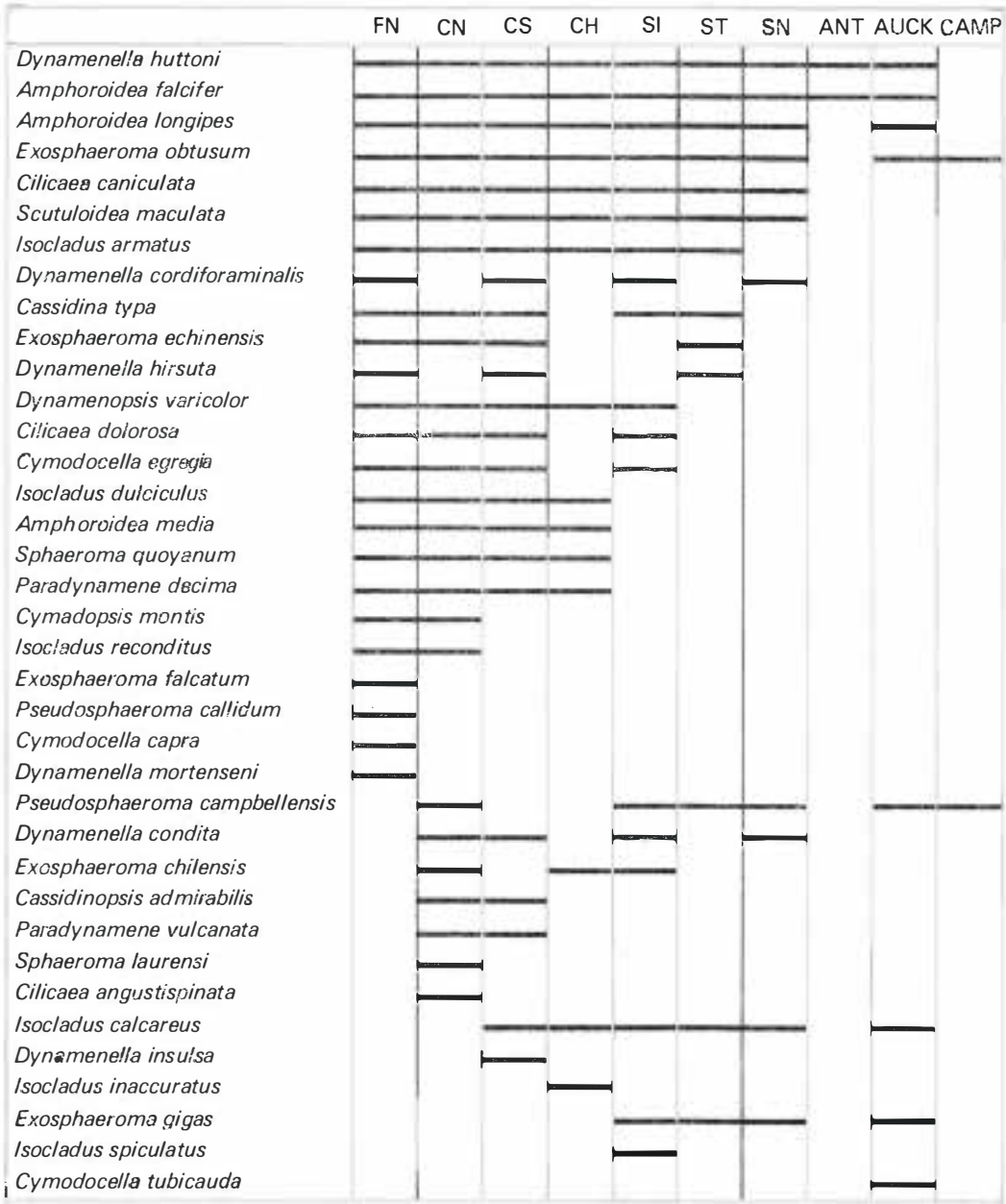
This fits the picture of the Chathams as having a mixed fauna with stronger northern than southern affinities, attributed to the position of these islands in the Subtropical Convergence Region (*see* Burling 1961). Dell (1960) found the Chatham Islands Mollusca "overwhelmingly similar to Cook Strait forms".

While there are insufficient collections of critical species between Wellington and Auckland to allow more than a general statement, two species (*Isocladus calcareus* and *Dynamenella insulsa*) have not been found north of Hawke Bay on the east coast or Wellington on the west. Likewise, two northern species (*Cymodopsis montis* and *Isocladus reconditus*) appear to be absent south of these points.

Finally, there is some indication of a break between the fauna of the far north and of the Auckland–Bay of Plenty region. Four species (*Exosphaeroma falcatum, Pseudosphaeroma callidum, Cymodocella capra,* and *Dynamenella mortenseni*) have not been found south of the Bay of Islands, while seven species, present more or less throughout the rest of New Zealand, are absent north of Hauraki Gulf (*Pseudosphaeroma campbellensis, Dynamenella condita, Exosphaeroma chilensis, Cassidinopsis admirabilis, Dynamenoides vulcanata, Sphaeroma laurensi,* and *Cilicaea angustispinata*).

DEPTH DISTRIBUTION

Most of the New Zealand Sphaeromatidae occur in the intertidal zone. Thus, 24 of the 48 species for which there are data are found in less than 5 m (Fig. 67), a further 9 in less than 100 m, and only 15 species are found deeper. Of these 15, *Cilicaea dolorosa* ranges from 0 to 115 m, *Cymodocella tubicauda* from 0 to 245 m, and *Cymodoce allegra* and *Cymodoce australis* from 0 to 615 m. Two records of these *Cymodoce* species in less than 20 m are of specimens from sponges found in rock pools in the *Durvillea* zone, and these may have been washed up from deeper water; the true range could hence be 20–615 m. (It may also be significant in this connection that *Cymodoce* females and juveniles are often difficult to identify with accuracy.)



DISTRIBUTION OF INTERTIDAL SPHAEROMATID ISOPODS IN THE NEW ZEALAND REGION

FN — North Auckland
CN — Auckland and Central North Island
CS — Cook Strait (Napier–Kaikoura)
CH — Chatham Islands
SI — Kaikoura to Bluff
ST — Stewart Island
SN — Snares Islands
ANT — Antipodes islands
AUCK — Auckland Islands
CAMP — Campbell Islands

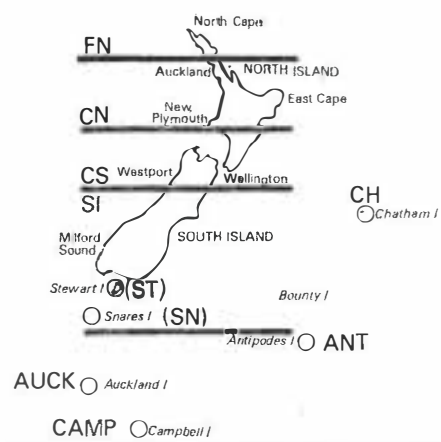


FIG. 66. New Zealand Sphaeromatidae. Distribution of intertidal species.

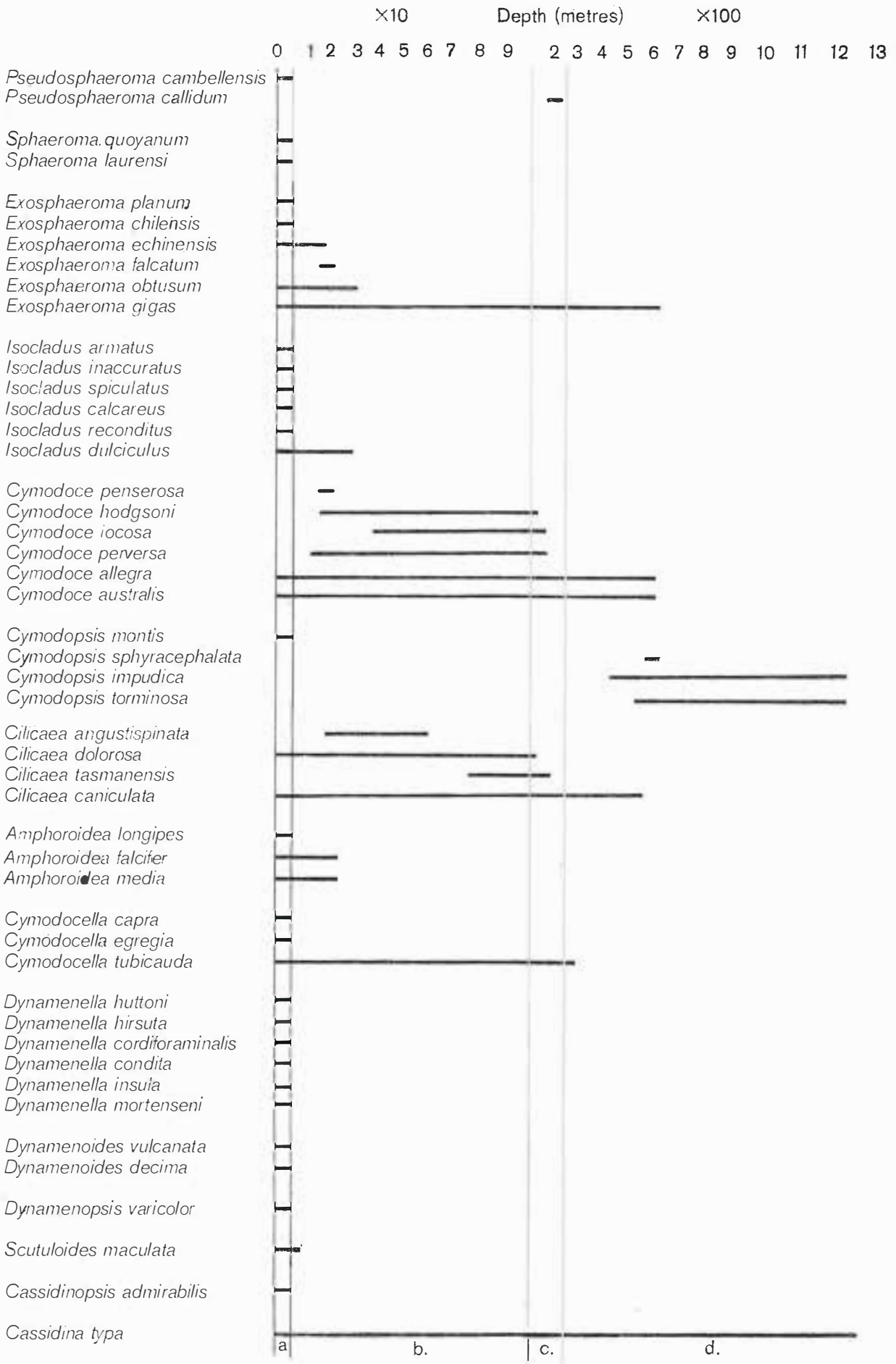


FIG. 67. New Zealand Sphaeromatidae. Depth distribution.
a, lower littoral; b, inner sublittoral; c, outer sublittoral; d, upper bathyal.

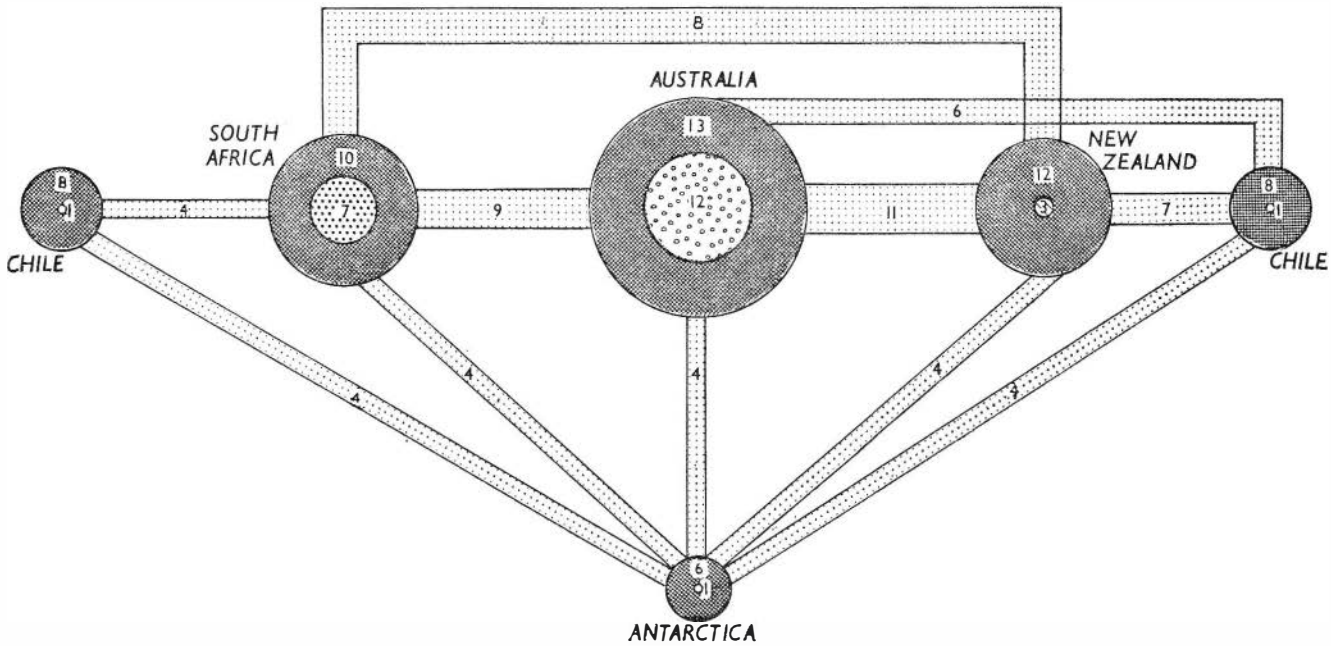


FIG. 68. Distribution of genera of Sphaeromatidae in the Southern Hemisphere. Within the circles, central numbers are of endemic and outer numbers are of non-endemic genera; numbers in bands joining regions are of genera common to those regions.

Exosphaeroma gigas is recorded from 0 to 615 m, but the 615 m record is of two specimens from the Chatham Rise which may have been misidentified and are not available for re-examination. If this record is omitted the range is reduced to 0–143 m, which may be a truer indication of the real depth range of this species.

Eight species range from 17 m or thereabouts to 205 m, and three species (*Cymodopsis impudica, C. torminosa,* and *C. sphyracephalata*) represent the only true deep-water sphaeromatids found so far in the New Zealand region. They range from 420 m to 1225 m.

Of the 15 genera recorded from New Zealand, only six extend into the outer sublittoral (100–250 m), but five, possibly six, reach into the upper bathyal (deeper than 250 m). The other seven appear to be wholly confined to the inner sublittoral.

ZOOGEOGRAPHICAL DISTRIBUTION

Although there are undoubtedly many sphaeromatid species to be recorded or discovered in the Southern Hemisphere, as our own work indicates, there are fortunately several fairly extensive systematic papers available which allow some zoogeographical comparisons to be made—those of K. H. Barnard on South Africa (1940), Menzies (1962) on Chile, Kusakin (1967) on the Antarctic*, the present work on New Zealand, and the papers of Whitelegge (1901, 1902), Hale (1929), and Baker (1926, 1928) on Australia. After taking into account all species of sphaeromatids, littoral and deep-water, schematic diagrams have been constructed (Figs 68, 69) to illustrate several important points of generic and specific distribution.

The generic distribution (Fig. 68) shows links between all major southern regions. The strongest, as might be expected, is between Australia and New Zealand, which are closest together and the most favoured by oceanic currents for transport (from Australia to New Zealand) of the type of rafted debris which might carry seeding populations or individuals. However, significant links are also indicated between South Africa and Australia, New Zealand and Chile, Australia and Chile, and South Africa and New Zealand. This suggests that the general west-to-east oceanic circulation has helped overall distribution. Kusakin (1967) also makes this point, with particular reference to *Exosphaeroma gigas.* (The possibility of invoking continental

*This paper covers an extensive discussion of distribution and zoogeography within the Antarctic region.

drift as an agency is hardly necessary in view of the fact that littoral species are involved.) Weaker affinities between Chile and South Africa (as also the smaller total number of sphaeromatids recorded from Chile) may well be altered by more comprehensive collection in southern South America.

Perhaps the most significant and immediate point is that in each region the endemic genera are the minor proportion. In Australia, it is true, they reach almost 50%, but elsewhere they are less significant. When we turn to species distribution, however, the remarkable point is the very *high* endemic proportion. Except for Chile, where non-endemics represent about 38%, and the Antarctic, where the sphaeromatids are obviously affected by the lack of suitable littoral shores, the proportion of non-endemics is not more than 12%.

Likewise, links between countries are weak. The strongest is that between South Africa and Australia (five species in common, one involving different subspecies). Australia and New Zealand have three species in common. Chile and Antarctica also have three, which is not surprising in view of their closeness to each other.

This suggests that, while there has been sufficient sphaeromatid interchange for genera to become established widely throughout the Southern Hemisphere, this has not been frequent enough to allow the establishment of identical species from country to country. At most it has provided initial representatives of most genera, which have then diversified within each region, giving a remarkably high proportion of endemic species.

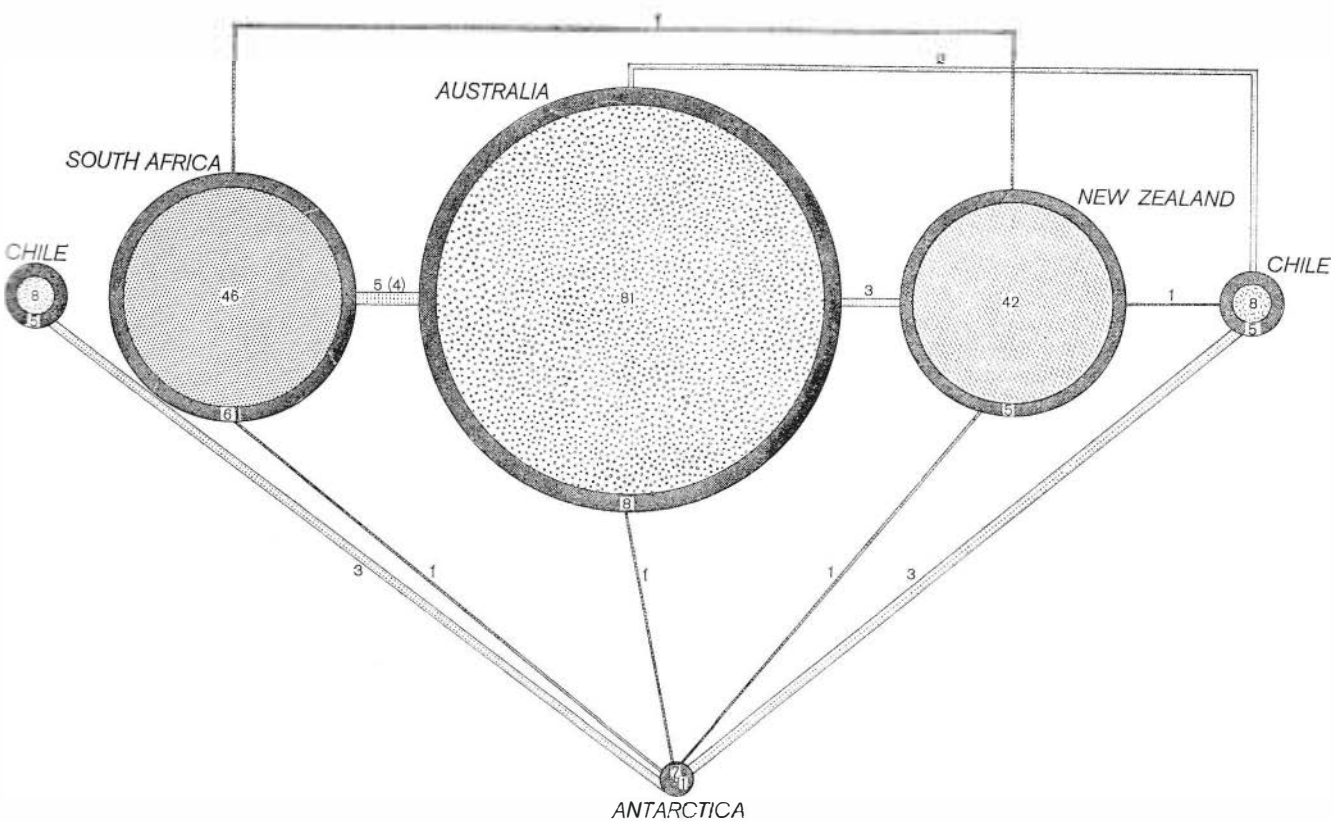


FIG. 69. Distribution of species of Sphaeromatidae in the Southern Hemisphere. Conventions as in Fig. 68.

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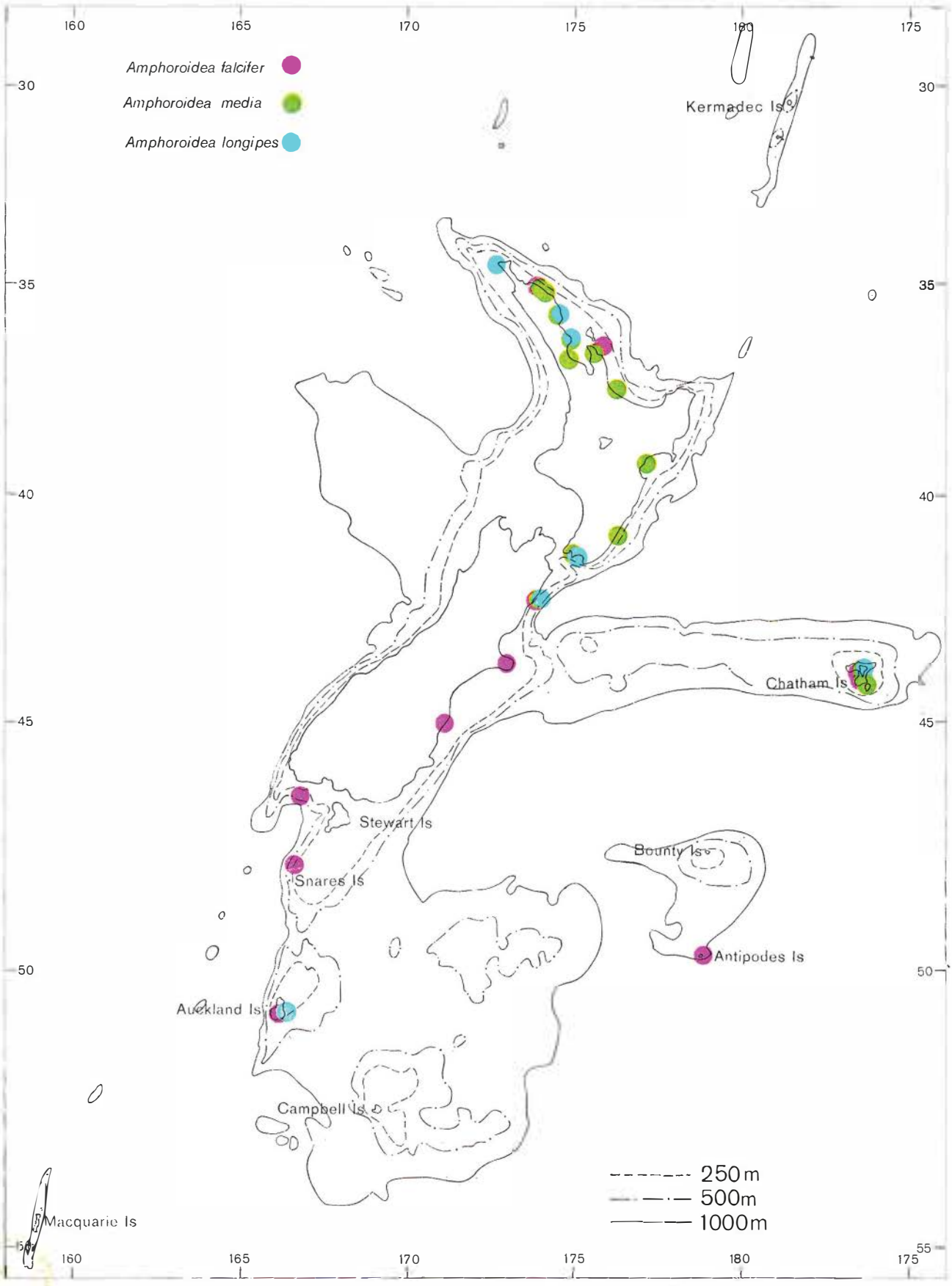
New Zealand Sphaeromatidae: Distribution of species



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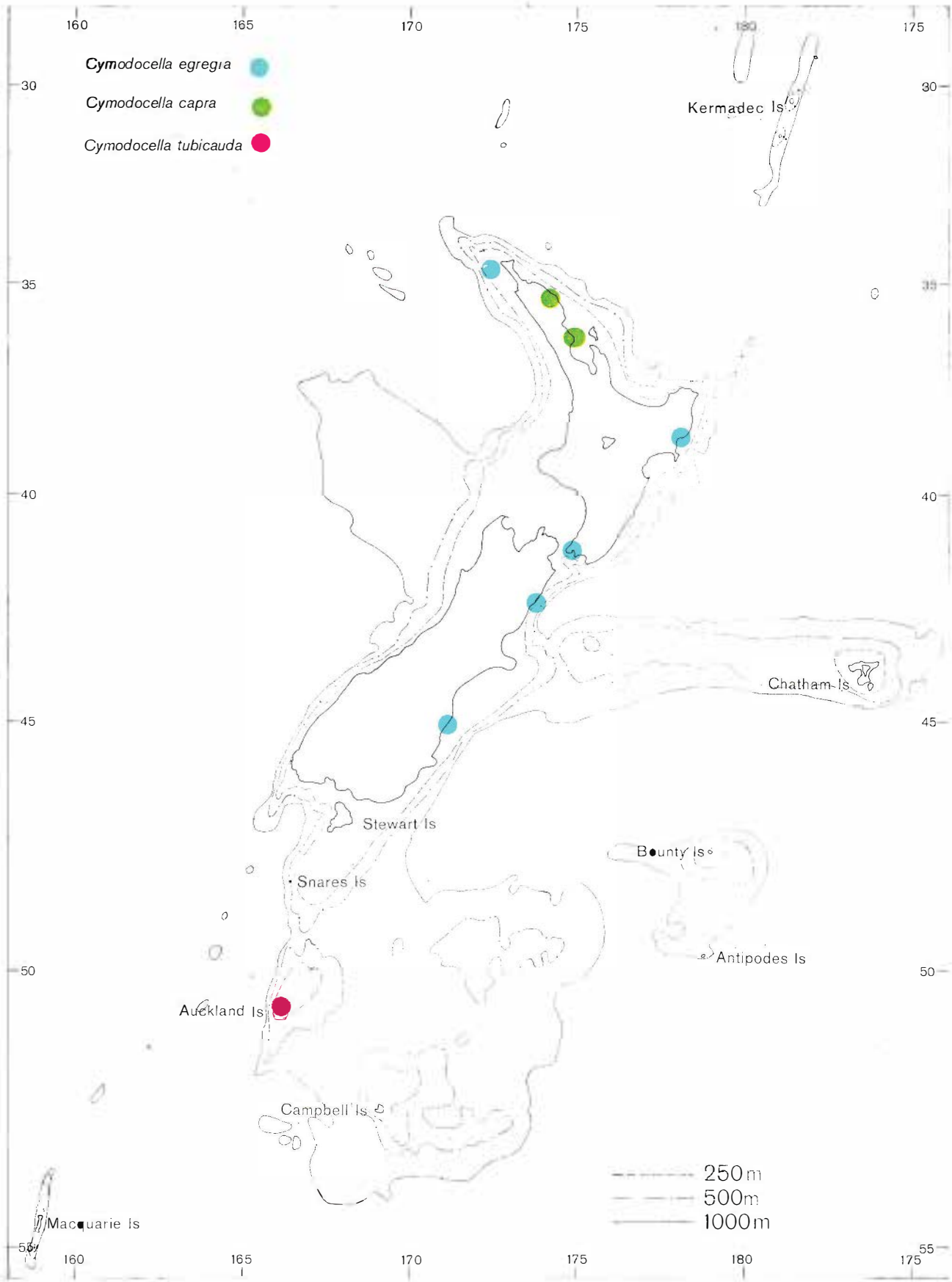

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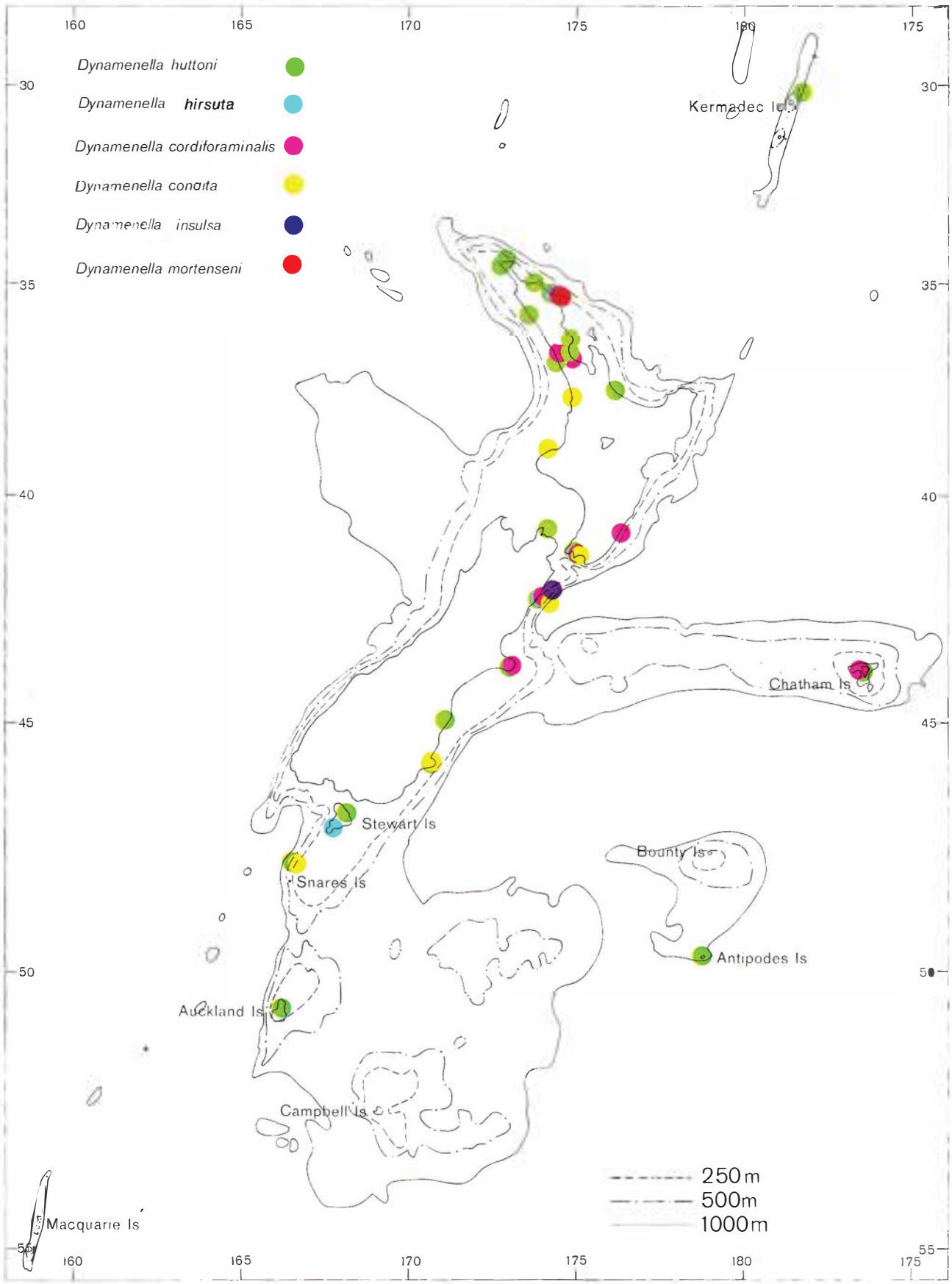

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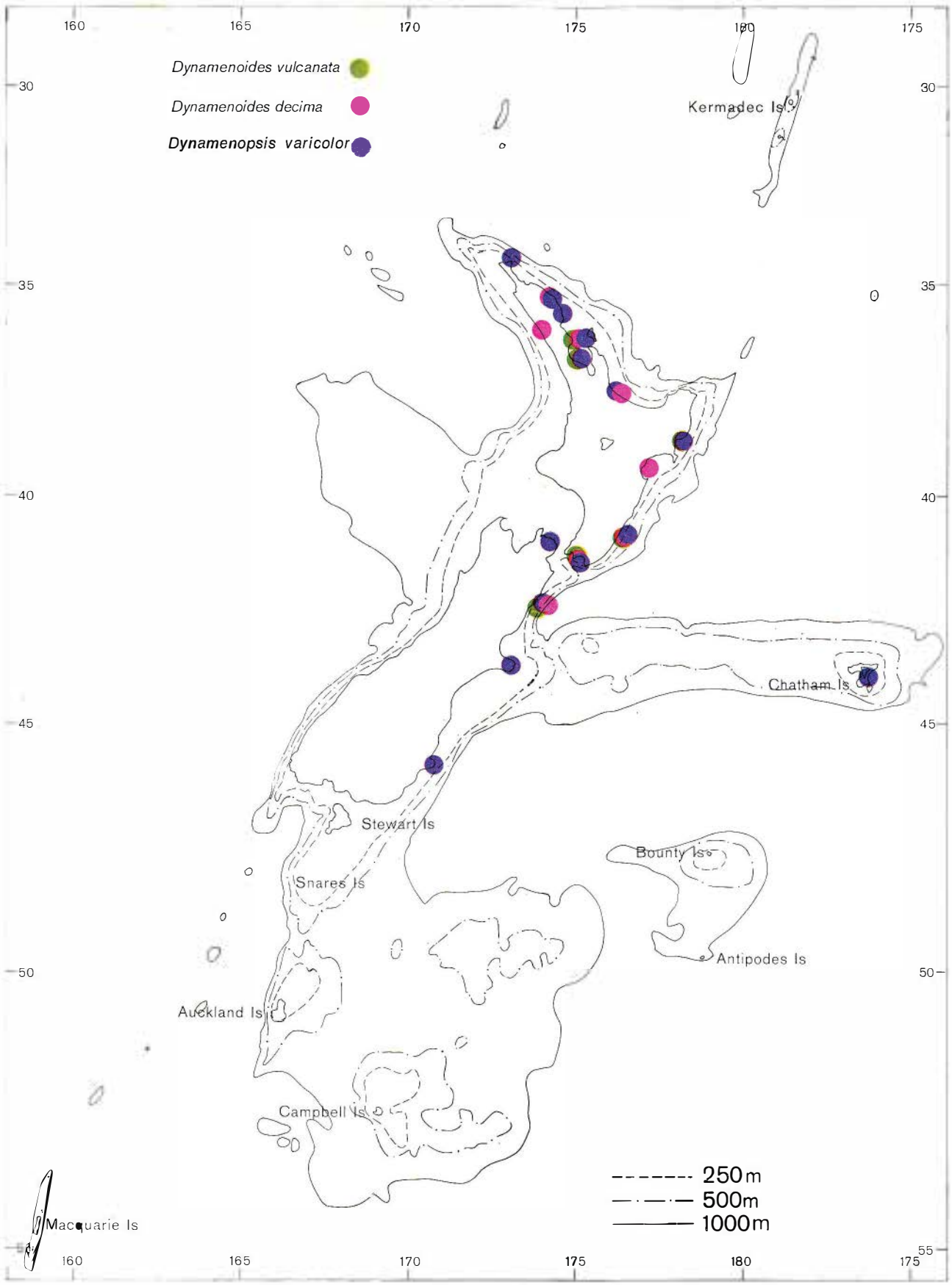

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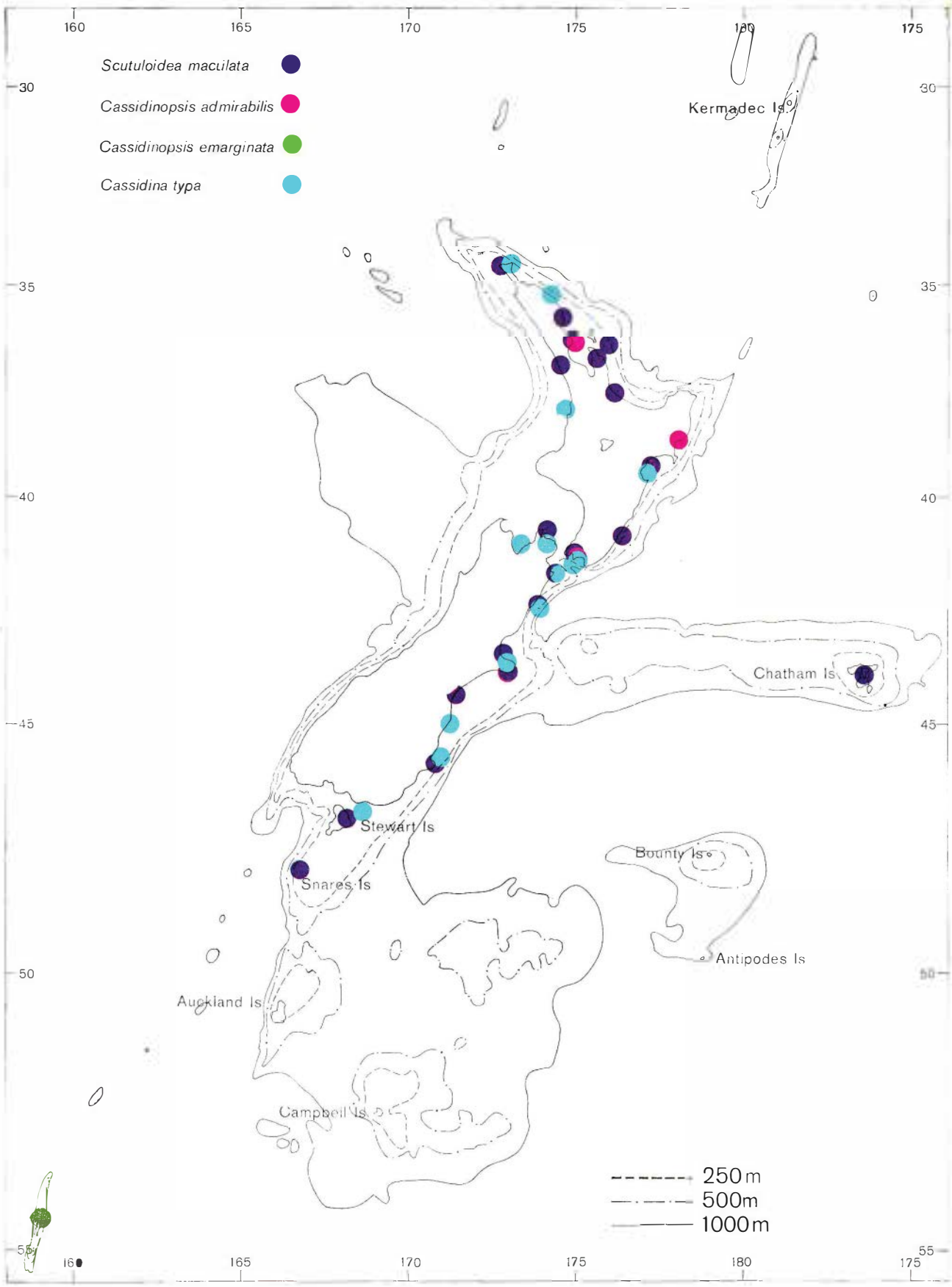

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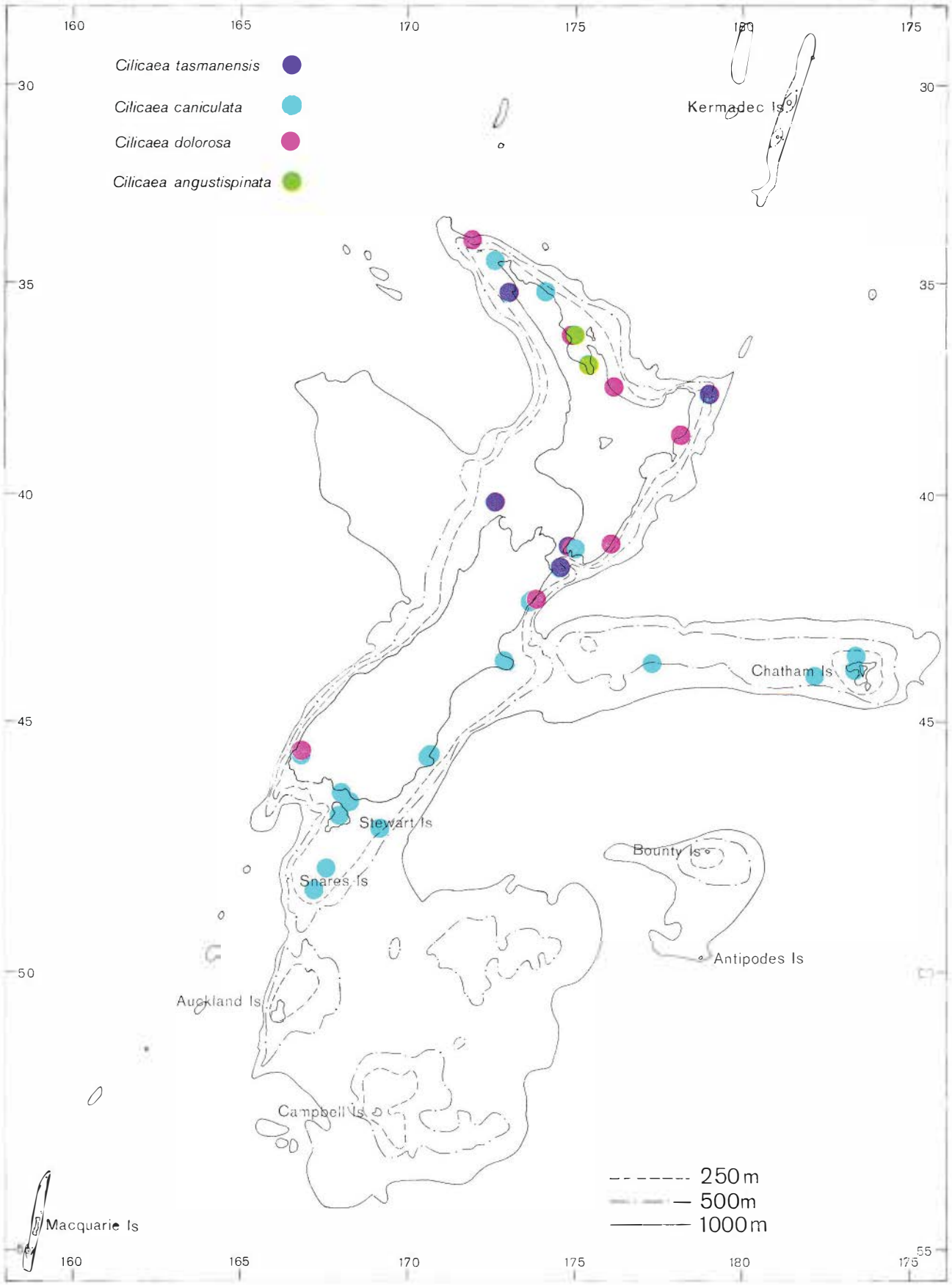

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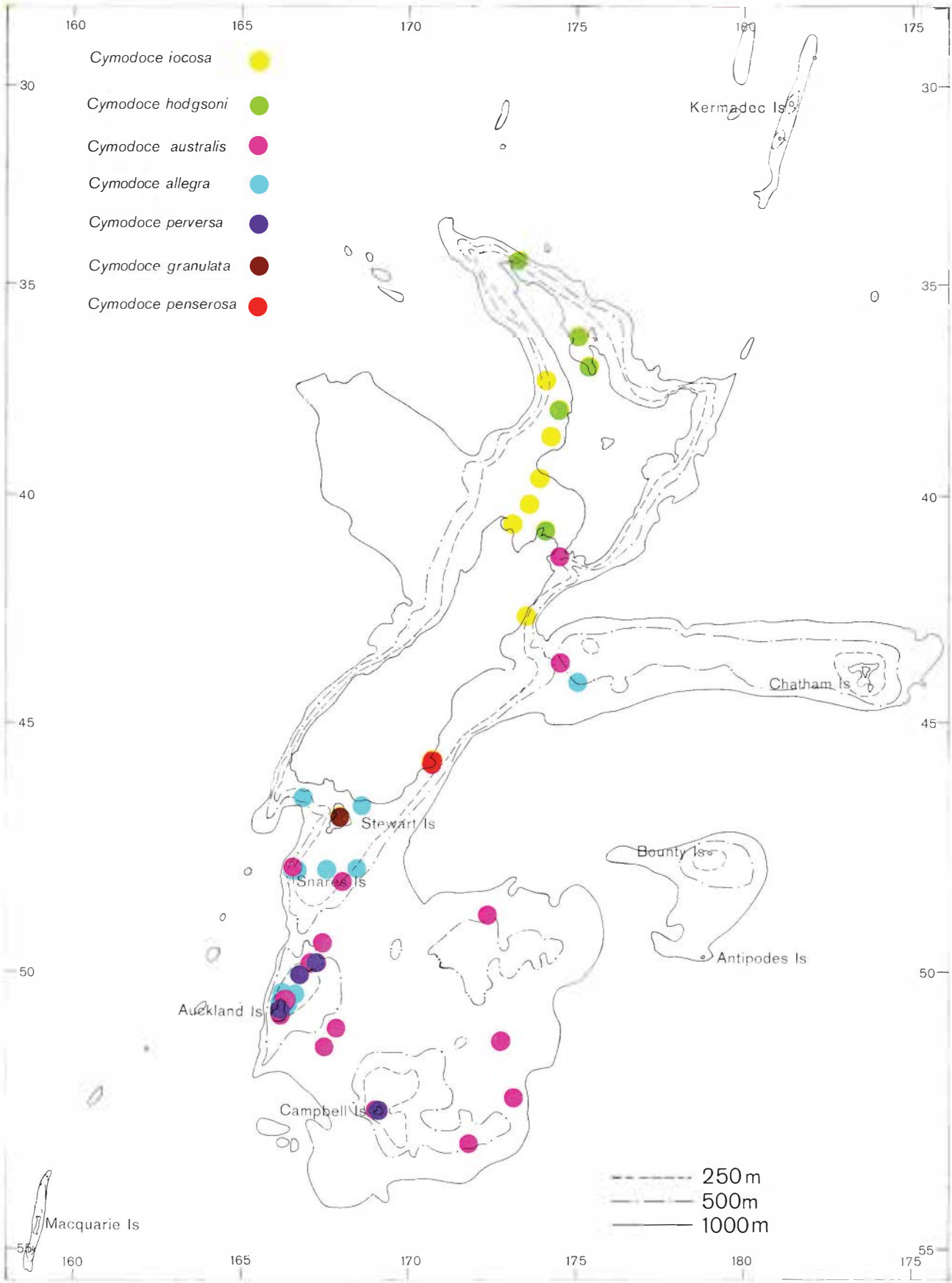

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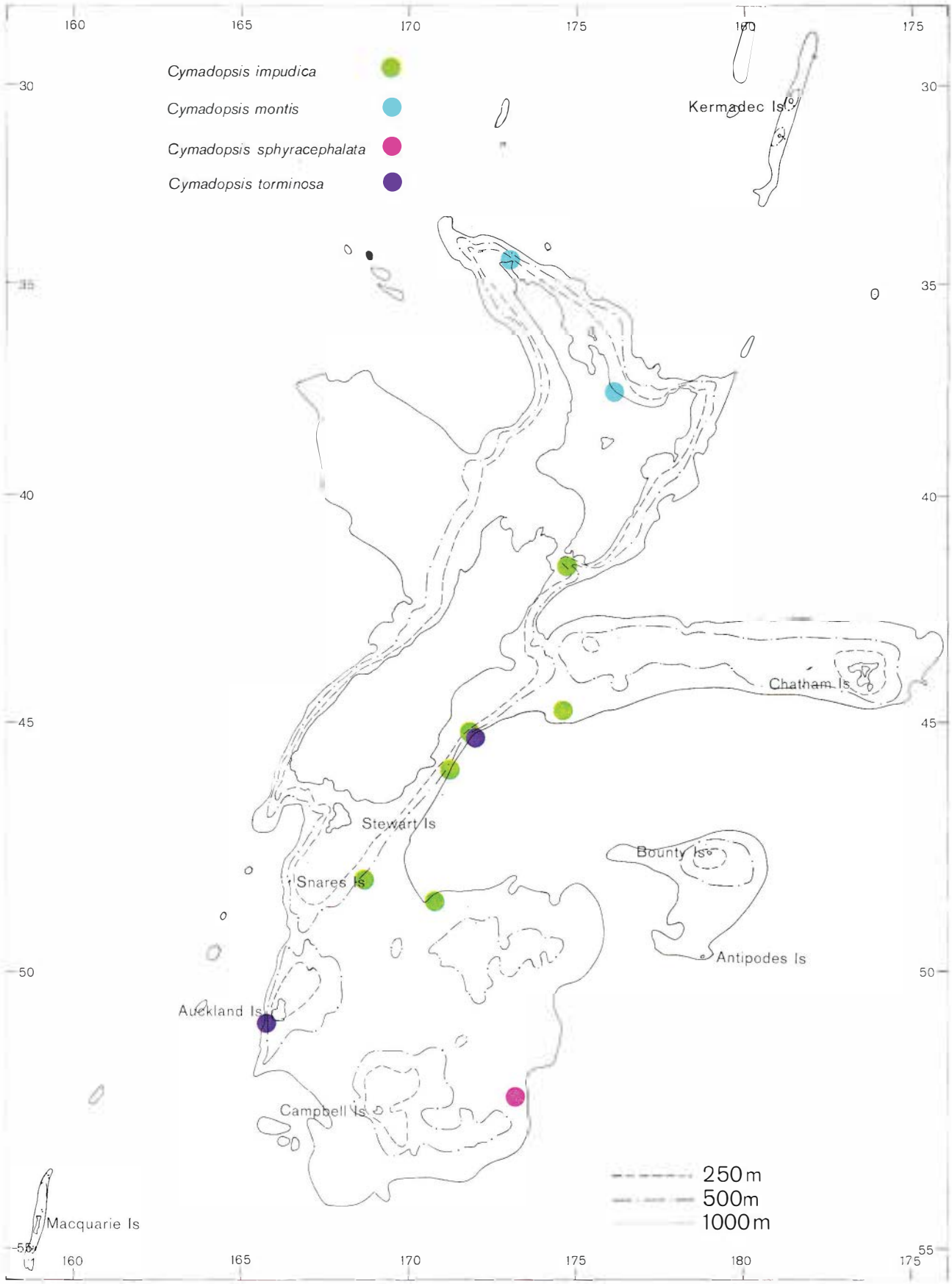

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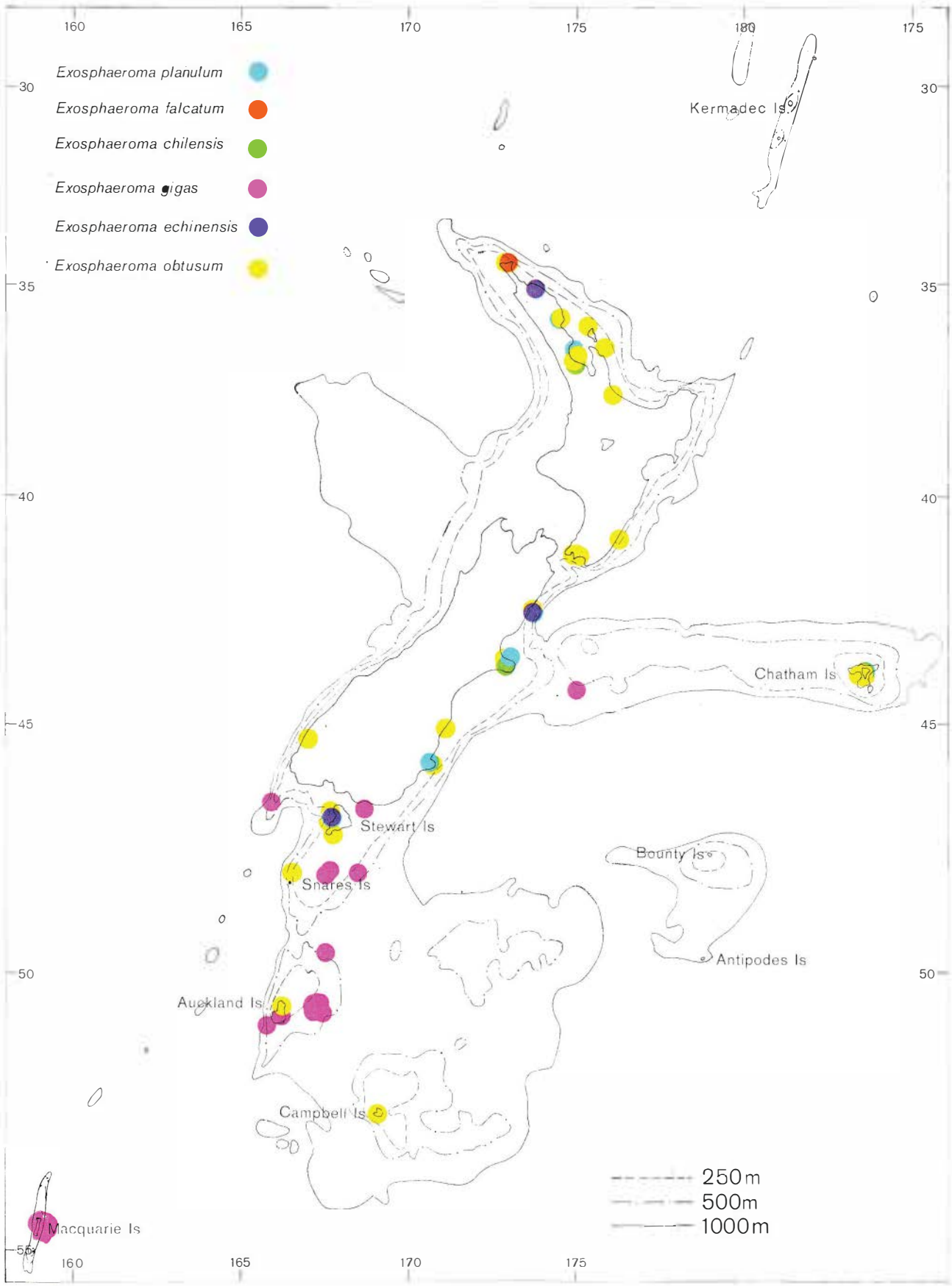

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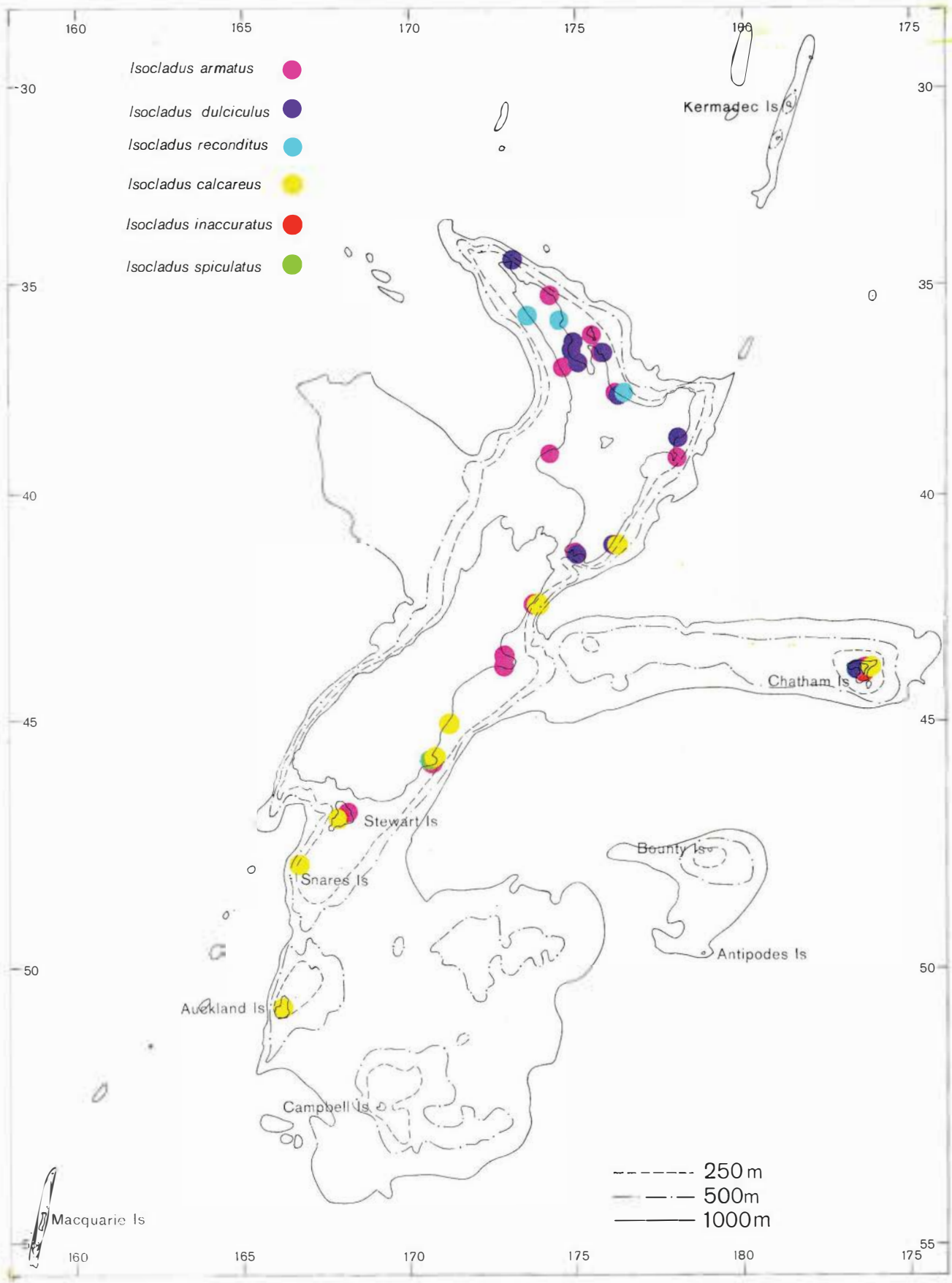

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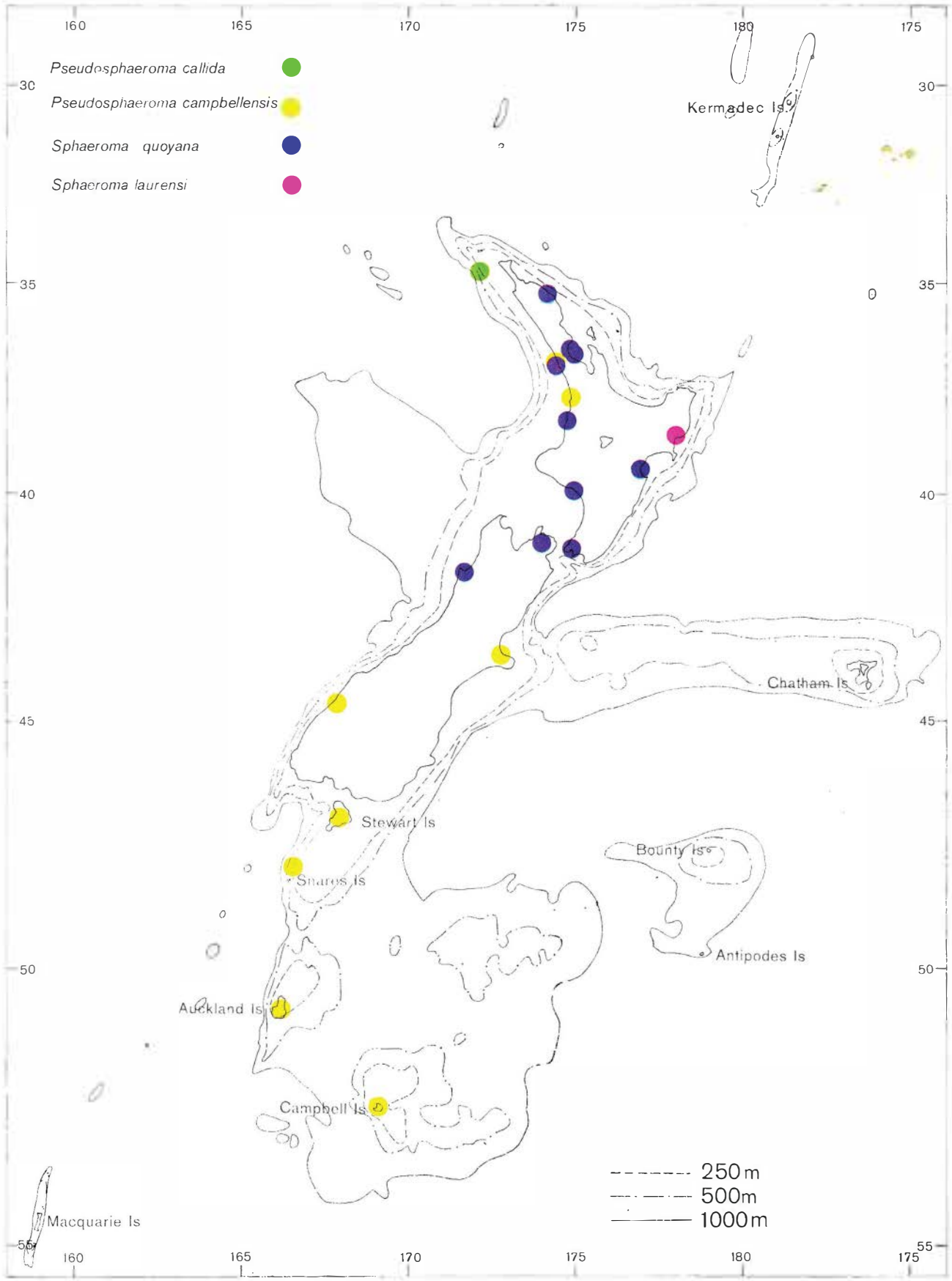

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