ISSN 2538-1016; 62

NEW ZEALAND

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

BULLETIN 210

The Marine Fauna of New Zealand: Algae-living Littoral Gammaridea (Crustacea Amphipoda)

by

J. LAURENS BARNARD

New Zealand Oceanographic Institute
Memoir No. 62

1972

CC BY NC ND

New Zealand Department of Scientific and Industrial Research Bulletin 210

Received for publication July 1970

© Crown Copyright 1972

A. R. SHEARER, GOVERNMENT PRINTER, WELLINGTON, NEW ZEALAND—1972

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

FOREWORD

SINCE the early nineteenth century activity in marine biological research in New Zealand has been continuous. Up to 1900, over 850 papers on the marine zoology of New Zealand had been published. Most of this and later work has appeared as discrete papers, there being relatively few monographic or serial comprehensive treatments of particular taxonomic groups. Despite some substantial contributions in this form, the lack of detailed accounts enabling the ready recognition of species in many groups has hampered the development of ecological work dependent on such identification.

Since 1955 the New Zealand Oceanographic Institute has been developing a programme of research in benthic ecology in the New Zealand region, and the effects of the scarcity of systematic monographs of the marine fauna have been particularly evident. However, in the course of sampling programmes additional material for systematic consideration has been collected, and a number of specialists in systematic groups have interested themselves in the New Zealand fauna.

The work carried out by Dr Barnard and reported here extends his continuing world-wide studies of littoral gammarid amphipods and as well provides for the first time a detailed examination of this segment of our amphipod fauna.

Preliminary editing of the manuscript was done by Dr D. E. Hurley.

J. W. BRODIE, Director
N.Z. Oceanographic Institute,
Wellington

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

CONTENTS

	PAGE
ABSTRACT	7
Introduction	8
Methods and Presentation	9
Acknowledgments	10
Nomenclature and History of New Zealand Gammaridea	10
Diversity of Gammaridea in the Southern Hemisphere	12
The New Zealand Biogeographic Position: Theoretical Considerations	13
Isolation	13
Warm-temperate Regimes	14
The New Zealand Warm-temperate Zone	15
Possible Geographic Affinities of New Zealand Gammaridea	16
Composition and Biogeography of New Zealand Gammaridea	16
Faunal Balance in New Zealand	17
Antarctic Relationships	18
South American Relationships	18
Australian Relationships	19
South African Relationships	19
Californian Relationships	19
Mediterranean Relationships	20
Biogeographic Conclusion	20
Systematics	21
Textual Procedure	21
Identification of Intertidal New Zealand Gammaridea	21
Basic Key to Intertidal Gammaridea of New Zealand	22
Acanthonotozomatidae	31
Amphilochidae	31
Ampithoidae	37
Atylidae	47
Colomastigidae	48
Corophiidae	48
Dexaminidae	49
Eusiridae	63
Gammaridae	95
Isaeidae	124
Ischyroceridae	133
Leucothoidae	137
Liljeborgiidae	138
Lysianassidae	138
Nihotungidae J. L. Barnard, 1972	140
Oedicerotidae	143
Pagetinidae	143
Phoxocephalidae	143
"Family Pleustidae"	146
Podoceridae	146
Sebidae	154
Stegocephalidae	155
Stenothoidae	155
Subfamily Stenothoinae	155
Subfamily Thaumatelsoninae	158

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

CONTENTS—*continued*

	PAGE
Superfamily Talitroidea	163
Suprageneric Taxa in the Talitroidea	163
Family Dogielinotidae	163
Family Najnidae	163
Family Ceinidae	164
Family Eophliantidae	165
Diagnosis of Superfamily Talitroidea	165
Key to Families of Talitroidea	165
Talitridae (sensu lato)	166
The Ecological Taxon	166
Subfamily Hyalinae	167
Ceinidae J. L. Barnard, 1972	168
Ceininae, new subfamily	168
Chiltoniinae, new subfamily	168
Dogielinotidae	178
Eophliantidae, revised	178
Kuriidae	190
Najnidae, new family	190
Phliantidae	193
Taxa Excluded from Talitroidea	194
Dexaminidae	194
Prophliantinae	194
Biancolinidae, new family	195
Ampithoidae, *Amphitholina*	195
APPENDIX I. A: Biogeographic Summary of New Zealand Gammaridea	197
B: Satellite Species	198
APPENDIX II. List of Non-littoral Gammaridean Amphipoda	199
APPENDIX III. Floating References	199
APPENDIX IV. Station List (Locality map, *page* 200)	201
SELECTED BIBLIOGRAPHY	205
INDEX	209

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

The Marine Fauna of New Zealand: Algae-living Littoral Gammaridea (Crustacea Amphipoda)*

by

J. Laurens Barnard

Smithsonian Institution

Washington, D.C., U.S.A.

ABSTRACT

New Zealand gammarideans living in algae, in mostly littoral habitats, now total 113 species in 65 genera; about 80 species and 9 genera are endemic. The New Zealand intertidal zone can be considered a distinct gammaridean biogeographic province, since more than 50 percent of its species are endemic, but there is little evidence of any possible further subdivision.

The northern part of New Zealand, considered by previous biogeographers as a possible warm-temperate outpost, lacks a warm-temperate amphipodan fauna distinct from that of the remainder of New Zealand, though this part is characterised by a low frequency of individuals in the intertidal and marked reductions in individuals of a few species abounding in southern waters. The southern cold-temperate waters show this in reverse. Only four of the common intertidal species in the two regions have distributions limited to warm waters and seven to cold waters. The entire gammaridean fauna is dominated by species with warm-temperate Australian affinities, which may reflect the complexity of current patterns on the eastern shores of New Zealand. The warm-temperate zone is not by definition restricted to the northern third of the archipelago except on the east coast, but amphipods have been studied only on the east coast. The east coast south of Gisborne, in contrast to the north, is heavily populated with intertidal fauna, and in several places, especially in the *Caulerpa* beds of Kaikoura, is among the richest amphipod habitats I have encountered.

There is a similar diversity of species in north and south, but the reduced frequencies of individuals in the north may be associated with reduced densities of flora or the dominance of the alga *Hormosira* which is a poor refuge for amphipods. The only northern species of Gammaridea with high population densities and clear warm-temperate affinities is a *Metaceradocus*.

The potential impoverishment of faunas in New Zealand because of its isolation is counterbalanced by its age and the presence of strong currents from Australia. The weakness of any warm-temperate segregate in the north is inexplicable, unless due to the poorly developed northern marine flora or the short lapse of time since sea surface warmed in the post-Pleistocene. West wind drift contributes a significant but small cold-temperature component throughout the archipelago. New Zealand is considered an outlier of Australia marked by some impoverishment suggesting that viable immigrants have necessarily been eurythermous.

The wide species criteria formerly applied to the New Zealand amphipodan fauna have resulted in their distribution being considered broader than is here accepted, though many appear closely related to Australian species. About a quarter of the fauna has circum-subantarctic generic affinities; the species here added decrease the proportion with cold-water affinities.

New Zealand's isolation is reflected in the paucity of intertidal members of the families Ampithoidae, Leucothoidae, Phliantidae (Australian), the low generic diversity of the Podoceridae, and the low number of aorids (Isaeidae). In part this isolation may be related to the isolation of Australia from

*This study was completed and submitted for publication before the Australian study of J. L. Barnard (1972); conflicts in priority of new names have been resolved to give preference to the Australian study; other references in the New Zealand text to the novelty of names have not been changed.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

the distributional centres of certain taxa. A limited number of species of *Stenothoe* and *Paradexamine* occur monotonously in New Zealand intertidal, compared with Australia. New Zealand is also characterised by evolutionary radiation of the lysianassid genus *Parawaldeckia*.

The New Zealand gammaridean fauna is an anomalous warm-temperate conglomerate lacking the warm-temperate *Cymadusa*, *Chevalia*, *Cheiriphotis*, and *Cerapus* but with increased representation of the cool-water Eusiridae. The warm-temperate element in the whole of New Zealand is characterised by strong representation in the genera *Maera*, *Elasmopus*, *Gammaropsis* (including sublittoral species), *Podocerus*, *Amphilochus*, *Hyale*, *Gitanopsis*, *Metaceradocus*, and the subfamily Cyproideinae. The genera *Ampithoe* (cf. *lessoniae*) and *Ventojassa* are probably ecological substitutes for the missing *Cymadusa* and *Cheiriphotis*. The place of the Phliantidae in Australia may be partially taken in New Zealand by the Ceinidae, which are mostly endemic. Twenty-seven species in 22 genera have distinct antarctic or subantarctic affinities, although two or three genera are not necessarily dominant in cool-waters. Fourteen species in nine genera represent cosmopolitan taxa. Eight species in eight genera are unique to New Zealand and only three of them have any remote subantarctic affinities. Fifteen species in eight genera have unknown affinities, although all but three have no possible subantarctic affinities. The remaining 49 species, representing 27 genera, have clear affinities with warm-temperate regions in Australia or with other places in low latitudes.

At mid level the New Zealand open-sea intertidal zone appears conspicuously impoverished of many substrates such as sponges, tunicates, ascidians, and hydroids suitable for inquilinous gammarideans. Amphipod genera such as *Leucothoe* and *Polycheria* do occur but are primarily confined to sublittoral depths or protected embayments. This lowers the diversity of common intertidal gammaridean taxa of the open sea. Gammaridean associates of pyuran sea-squirts, found so abundantly in embayments, are rare in the wave-dashed intertidal zone.

Many family concepts are revised. The characteristic New Zealand *Ceina* is the type of a new family including two new genera. One is of deep-sea provenance, a clear example—perhaps the first—of deep-sea penetration from low latitudes in the Gammaridea. The Ceinidae, including the freshwater *Chiltonia*, are retained in the superfamily Talitroidea to which are added the Dogielinotidae, Phliantidae, Eophliantidae, and a new family, Najnidae. The Prophliantidae are excluded from the Talitroidea, and a family is created for *Biancolina* which is excluded from the Eophliantidae. *Amphitholina*, previously considered an eophliantid, is returned to the Ampithoidae.

The Eusiridae are revised to include the Calliopiidae as well as the Pontogeneiidae; the Isaeidae, to include the Aoridae as well as the Photidae.

The New Zealand genus *Paracalliope* is retained in the Calliopiidae (=Eusiridae) but its incipient oedicerotid characters are noted. The New Zealand species is split into three, related to marine, brackish-water, and freshwater distribution. The Indian and Philippine species are considered distinct.

A new genus, *Raumahara*, links the Stenothoidae and the Thaumatelsonidae, which are amalgamated.

A new family, Nihotungidae, based on a novel morphotype, is erected for an amphipod which has stenothoid and amphilochid characters and has eyes unique in the Gammaridea.

INTRODUCTION

INTERTIDAL gammaridean Amphipoda living amongst algae at several open-coast localities in New Zealand are examined in this review, and a biogeographical appreciation is attempted. Charles Chilton, George M. Thomson, and Desmond E. Hurley have provided a broad view of this group of Crustacea, but the diversity of habitats requiring study has previously precluded a synoptic study of a single biotope.

The present report was limited by the necessarily short time available, but hopefully it will form one of the bases for a taxonomic handbook that may follow from the examination of the sublittoral fauna by other workers.

My primary interest has been to assemble data on Gammaridea in littoral algal zones using methods previously applied to California, the Galapagos Islands, Panama, and Hawaii to assess specific diversity, impoverishment, and frequency dominance of genera in several Pacific provinces (J. L. Barnard 1969b, 1970). I hoped to accumulate sufficient information to detect distribution patterns, simultaneously pointing out congruities and anomalies in the occupation of available niches by gammarideans of diverse phylogenies. A primary impetus has been my interest in the interrelationships of warm-temperate Gammaridea and in discovering whether northern New Zealand has a strong endemic warm-temperate element. That it does not is as surprising as the discovery that Hawaii has a strong warm-temperate element where none was expected (J. L. Barnard 1970). Possible reasons for these unexpected findings are suggested, but the warm-temperate problem in New Zealand cannot be fully explained. The New Zealand amphipodan fauna as a whole is, however, dominated by warm-temperate elements.

The quantitative objectives of this study have been only partly satisfied because of the complexity of taxonomic problems encountered which prevented more extensive collecting and counting of individuals. Although the material was collected from widely spread geographical localities in New Zealand, the diversity of character in the collections suggests the need for a vastly extended exploration of the algal belt and of other neglected amphipodan biotopes.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Methods and Presentation

In the field, large samples of algae and rocks were whisked in a bucket of seawater laced with formaldehyde to remove amphipods and other motile crustaceans. The bucket contents were screened through a Tyler screen (100 meshes per inch) and the re idue preserved in a solution of seawater and 5 percent formaldehyde. In the laboratory, sample were tran ferred to fresh water, the amphipods sorted and after taxonomic analysis preserved in 70 percent alcohol.

Each sample took about an hour's collection time to assemble the many kilograms of diver e materials—kelp holdfasts, algal turfs, and large algae-covered rock . This indiscriminate method was designed to obtain as many species of Gammaridea as possible in the time available. The density rankings of the species are only approximate because of the crudeness of the collecting method and the necessity of making counts from aliquots, but in most collection the densest swarms of amphipods occurred in one or two discrete algal substrates in contrast to the marked impoverishment of the surrounding substrates. At Kaikoura the greatest number of gammarideans in the open wave da h occurred in the narrow zone of thick algal turf, but in protected waters the richest amphipod fauna was found in the alga *Caulerpa brownii*. At Dunedin the densest swarms of crustaceans were in pterocladian algae. At Leigh the main populations occurred in anastomoses of *Liagora harveyana*, whereas 20 miles away at Huaroa Point the swarms occurred in epiphyte-infested *Cystophora torulosa* or on matted bases of *Colpomenia* sp. At Gisborne the best collections were made on epiphyte-infested *Carpophyllum*. The collection localities, in approximate order of most to least densely populated, were Kaikoura, Wellington, Dunedin, Gisborne, Leigh, Huaroa Point, and Tapeka Point.

The collections were made over a short period in late spring and middle summer and it was not possible to study seasonal variations or the precise components of each substrate. The survey therefore, although cursory, is comparable to similar surveys in Hawaii (J. L. Barnard 1970) and demonstrates a similar diversity of intertidal Gammaridea despite the presence of far greater stands of algae in such ew Zealand localities as Kaikoura than in Hawaii. orth-eastern ew Zealand intertidal algae are, however, far sparser and less diverse than Hawaiian algae, if one discounts the genus *Hormosira* which is a poor ubstrate for amphipods.

Collecting localities in New Zealand were selected to give southern and northern extremes, and the collecting was guided by information on high densities of algae and convenience of localities to marine laboratories. Many good collecting localities were probably overlooked, especially that at Little Papanui on the Otago Peninsula, where seas were too high during the available time. The Dunedin area was further neglected becau e much of our knowledge of New Zealand gammarideans comes from material collected in that area. Kaikoura was selected because of its dense algal growth and its proximity to the Edward Percival Marine Laboratory. Wellington was selected as a control area in the geographic middle of ew Zealand near my base of operation , but it was one of faunal richness. Leigh was selected as a northern extreme on the edge of protected warm water adjacent to the Auckland University Marine Station. De pite the few stations, a large proportion of the known and expected species of ew Zealand Gammaridea was collected and general estimates of their frequency can be suggested.

This paper summarises our knowledge of shallow-water ew Zealand Gammaridea likely to be associated with algae in the littoral zone. Some of the species included were not actually collected in that habitat, but they are included a probable inhabitants. The compilation includes all but a few of the recorded New Zealand Gammaridea, the remaining species which are definitely restricted to the sublittoral benthos being listed in Appendix II. The benthic sublittoral biotope is poorly recorded in ew Zealand except in shallow waters of a few harbour , and many of the species caught only in those places obviously belong in an algal habitat. Previous studies of the Californian intertidal where many of the ublittoral specie tray into intertidal zones support the inclusion of such benthic species in a summary of intertidal floras.

Traditionally, the Kermadec Islands, the Chatham Islands, the Antipode , the Snares, the Auckland Islands, Campbell Island, and Macquarie Island have been included in the ew Zealand region and this convention is followed here, although the Kermadecs and Macquarie are far removed from a strong biogeographic influence of New Zealand proper. The Chatham Islands (Appendix I) are considered part of New Zealand proper because of their similar latitude.

Despite the present work, synonymies of many ew Zealand Gammaridea remain confused or uncertain. I have used question marks in synonymies only in extreme cases of uncertainty; absence of question marks does not imply that I have verified or accepted any of the earlier identifications except those supported by relatively thorough textual accounts or diagrams. Complete synonymies or exhaustive lists of references to New Zealand species have also not been included in this paper but only those reference that will lead the user to basic sources of information. An attempt to account for all published citations of ew Zealand proper has been made by using a checklist compiled by Dr D. E. Hurley.

Summaries of distribution are divided into a New Zealand section and an extrinsic section. Type localities are noted where they give some information on probable incorrect synonymies. ew Zealand distributions are often summarised in initial statement , but locality lists are included to demonstrate the weakness or strength of the ummary and to a si t future collectors to fill gaps or to verify occurrences. The west side of ew Zealand remains practically unexplored. Inten ive col-

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

lecting is also needed in Foveaux Strait, on Stewart Island, in Tasman Bay and its eastern approaches, at Little Papanui on the Otago Peninsula near Dunedin or similar localities, the entire east shore of the North Island, especially around East Cape, and the Three Kings Islands. All of the offshore islands require definitive exploration of littoral biotopes. Gammaridean inhabitants of mussel beds, pomatocerid colonies, sponges, anemones, harbour pilings, and similar epifaunal substrates should be investigated.

Most references in the Selected Bibliography are correlated to the text, but a few important papers influencing the general philosophy or informational content of this paper are also included.

Acknowledgments

Mr J. W. Brodie, Director, and Dr D. E. Hurley of the New Zealand Oceanographic Institute, DSIR, in Wellington made this project possible through their splendid co-operation. Their attention to my smallest needs permitted me unrestricted time for study during my 6 months of residence. I would have to list every other member of the N.Z.O.I. staff to include all who have rendered generous assistance.

My home institute, the Smithsonian Institution, made my journey to New Zealand possible through a travel and salary subvention. Many persons at the Smithsonian Institution supported this study very strongly as well as assuming my duties during my absence. I must mention especially Dr R. S. Cowan, Director of the Natural History Museum, and Dr I. E. Wallen, Head of the Office of Oceanography, for their continuing support of overseas study projects; Dr R. B. Manning, Chairman of Invertebrate Zoology, and Dr T. E. Bowman, Curator of Crustacea, for their many aids in behalf of this study.

In New Zealand, Professor G. A. Knox of Canterbury University gave full support to this project through the Edward Percival Marine Laboratory at Kaikoura, and Dr Peter Jansen at the Kaikoura laboratory assisted materially in leading me to field sites.

Dr J. A. Ballantine, Resident Biologist, and Mr Denis Gordon of Auckland Marine Laboratory at Leigh put extensive facilities at my disposal. Dr Elizabeth Batham, Director of the Portobello Marine Laboratory, kindly assisted field work in Otago.

Mr R. C. Cooper of Victoria University of Wellington helped especially with collections of *Paradexamine*.

The scope of this paper is entirely due to the many preparations made by Dr Hurley in anticipation of my tenure in New Zealand. The availability of references, lists of species, synonymies, diverse amphipodan materials, solid advice, and fruitful discussions all contributed immeasurably to the smooth progress of this study.

NOMENCLATURE AND HISTORY OF NEW ZEALAND GAMMARIDEA

THE study of New Zealand Gammaridea by New Zealand biologists began in the 1870s with the simultaneous interest in small crustaceans of G. M. Thomson and Charles Chilton, although a few species had already been described by Dana (1853) from collections made by the U.S. Exploring Expedition. Papers published by Thomson and Chilton in the 1880s considered New Zealand Gammaridea as discrete members of the world fauna or as having affinities and synonymy with Australian species described by Haswell. Their studies were begun at a time of nomenclatural turmoil in Europe which resulted in a great deal of confusion at generic level. Boeck (1871) laid the stabilising foundations of the European fauna with his extensive descriptions of many known species and his prescient establishment of type species, but his work may have been unavailable to or ignored by Thomson and Chilton. When Sars published his definitive "north polar" works in the middle 1890s and Stebbing's Challenger report (1888) appeared, many New Zealand species had already been described, under strong influence from the sketchy Australian works of Haswell. Chilton and Thomson appear to have relied heavily on Bate's compilation of 1862 which was already out of date, though it had great merit for its time and is still used by modern taxonomists.

Sars and Stebbing together established the modern basis of gammaridean taxonomy by their extensive descriptions and illustrations of minute characters. Sars excelled as an illustrator and investigator of the Norwegian crustacean fauna. His tightly organised and highly balanced plates of drawings, truly works of art, have never been equalled by subsequent carcinologists. Sars complained of Boeck's work and straightened out numerous tangles to lay the basis for the families and genera of the world Gammaridea, but he was hampered by his lack of knowledge of the world fauna. He created

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

some problems, but his illustrations, except for a few very minor oversights, are still used as accurate and detailed representations. The excellence of his plates unfortunately led to the use of his work as a reference "bible" for studies everywhere and influenced gammaridean workers of the early twentieth century to identify species erroneously from other part of the world with his drawings of orwegian species.

Stebbing was an expert illustrator but not of the ability of Sars; he had, however, a world view of the suborder not possessed by Sars and he was also a bibliographer of the first magnitude. His patient disentanglement of the world knowledge (Stebbing 1906) completed the triad of works now forming the foundations of our knowledge in Gammaridea: his annotated bibliography of 1888, his systematic account of the world fauna of 1906, and Sar's (1895) "Crustacea of Norway" have not been matched since.*

The early impetus of Thomson and Chilton in ew Zealand had slowed down in the late 1880s before the works of Sars and Stebbing appeared. There was a small revival of interest in the 1890s, but these few papers came under the influence of Della Valle's (1893) attempt to lump the world Gammaridea into a relatively few species, and here perhaps was born Chilton's later tendency to identify ew Zealand species with extrinsic taxa. Thomson's active publication on the group was nearly at an end by this time, although he finally succeeded in receiving fair treatment from publishers in his drawings of 1897. A thick notebook of Thomson's drawings, held at Portobello Marine Biological Station, demonstrates his regard for detail. Had his early drawings not been so greatly reduced, several taxonomic deficiences would have been avoided.

Despite extensive work in New Zealand over 90 years, the emphasis in the early 1900s wa on the fauna of Auckland, Campbell, Macquarie, and Chatham Islands (Chilton, Walker, Nicholls) while work on the mainland fauna was concentrated in the cool-water Dunedin-Christchurch coastal egment or the very northern tip of the North Island; the northernmost cape of New Zealand attracted study by the *Terra Nova* expedition (K. H. Barnard 1930).

The full impact of Sars's and Stebbing's contributions was not felt until a new generation of taxonomists arose in the 1920s. Stebbing added to many species details that cannot be found in earlier literature. He helped unite several Australian and ew Zealand species because of his *Challenger* studies and his work on Australian *Thetis* material in 1910. Some of those amalgamations have since proved to be ju tified, but others are, at best, dubious. Despite Stebbing's world view of the suborder, he never left England, and the 1,200 miles between ew Zealand and Australia, a significant isolative gap, may have dwindled to insignificance in the mind of a man on the other side of the world.

Chilton's interest in ew Zealand amphipods intensified once more between 1914 and 1926 after several works on purely antarctic collections and after a visit to England where he worked alongside Mrs E. W. Sexton at Plymouth. She was then beginning her studies on life histories of species of *Gammarus* and on *Jassa falcata* and her thinking (exemplified in Sexton and Reid 1951) influenced Chilton to consider a number of ew Zealand species as mere phenotypes of subcosmopolitan species. The flaw in applying her work to other species is that *Jassa falcata* is a known subcosmopolitan species carried from place to place by human agencies.

It remains prudent for the gammaridean taxonomist to assess every difference between analogous but geographically isolated populations and give some nomenclatural acknowledgment of these differences until each case of suspected identity can be verified by life history studies. To add further complications, a search for cryptic pecies hould be undertaken. For instance I recently found in Australia that the commonly di - tributed *Mallacoota subcarinata* (Haswell) is composed of at least seven minutely distinct morphs and is divisible into two or three, if not seven distinct pecies (J. L. Barnard 1972).

The ew Zealand Gammaridea have geographic affinities with Australia and various parts of Subantarctica, but lumping ew Zealand species with Australian and subantarctic species on the basis of gro s similarities is at present unwise. Unsubstantiated amalgamations are discarded in this study and have been so discarded by Hurley in those many portions of the fauna he has studied. Unfortunately, the fauna of ew Zealand must therefore go through yet another phase of uncertain nomenclature while these "species" remain separated, until they are properly compared with their Australian and subantarctic representatives.

Chilton's later works on *Ceina* and *Tetradeion* demonstrated a modern approach. He and Thomson built a knowledge widely strengthened by Hurley that makes the gammaridean fauna of ew Zealand one of the best known as regard diversity and awareness of unusual taxa, of any outside the influence of the most advanced countries of Europe and Asia. Only the fauna of two small localities in America are even as well known as the gammarideans of ew Zealand.

*To this list, one may now add Barnard's 1969 "The Families and Genera of Marine Gammaridean Amphipoda"—Editor

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

DIVERSITY OF GAMMARIDEA IN THE SOUTHERN HEMISPHERE

GAMMARIDEAN genera in the Southern Hemisphere are not significantly less in number than in the Northern Hemisphere (table 1). Although Gammaridea have been unevenly studied in various biotic provinces, the strong diversity of Gammaridea in cold waters can be demonstrated.

The data used by Barnard (1970) are divided into climatic categories (table 1). The table is based on the gross distributions of about 2,700 known species of marine Gammaridea taken from the literature before 1967. Genera are readily divided into (1) those with cosmopolitan distributions in both hemispheres dominated in diversity of species by the tropical components in these genera; (2) cosmopolitan genera not dominated by their tropical species; (3) wholly tropical genera; (4) boreal genera; (5) antiboreal genera; (6) biboreal genera;* (7) bi-warm-temperate genera;* (8) remaining genera (primarily deep-sea endemics not further considered in this treatment).

Boreal genera include those from northern warm-temperate regimes to the high arctic with more than 80 percent (usually over 95 percent) of their species confined to the Northern Hemisphere above the tropics; the antiboreal situation is a mirror image of the boreal. Tropically endemic genera are wholly confined to the tropics. In each of the tropically dominated genera the largest number of species occurs in the tropics, but the genera are significantly represented in nontropical zones. Ubiquitous genera have species well represented throughout high and low latitudes. Biboreal and bi-warm-temperate genera have a bimodal hemisphere distribution, and are not represented in the tropics (in shallow waters).

The total number of species in each category includes only those from the zone in question. For example, the total does not include the stray members of dominantly boreal genera that may occur in antiboreal regions; therefore, the number of species of table 1 is less than 2,700. Deep-sea genera and species that are known to be markedly confined to either hemisphere have been included in categories other than deep-sea. Cumulative totals for North Pacific and North Atlantic faunules are included.

The numerical balance of genera in the north and south is surprising in view of the much smaller southern biotope. This may be compensated for by greater isolation between cool-water segments in the south.

*"bi" here implies north and south together exclusively. The term "amphi" is rejected as meaning opposite sides indefinably separate.

TABLE 1. Genera in large climatic zones. The number of species assigned to these genera is quoted without regard to the individual distributions of the species

	Genera	*Species*
1 Tropical dominant (WT)	12	208
2 Cosmopolitan, not tropically dominant	25	576
3 Tropical endemic	46	96
4 Boreal (arctic to WT)	160	704
5 Antiboreal (antarctic to southern WT)	139	301
6 Biboreal dominant (exclusive)	20	291
7 Bi-warm-temperate (exclusive)	5	12
8 Remainder (mostly deep-sea endemic)	102	308
	509	*
North Pacific	182	676
North Atlantic	194	736
Dominant boreal (arctic-WT)	216†	
Dominant tropical (tropical-bi-boreal)	71†	
Dominant antiboreal (antarctic-anti-WT)	195†	

*Total less than 2,700; *see* text

†Including any deep-sea dominants from "remainder" category

The tropics form a strong barrier dividing gammarideans into two groups dominated by northern and southern genera (table 2). The number of tropically endemic genera together with the number of ubiquitous genera which are tropically dominated is scarcely half the number of cool-water endemic genera in the south and much less than half the number of endemic genera in the north. Although the tropics may eventually prove to have a much higher number of species than broad regions in higher latitudes, it appears that major generic diversification has occurred outside the tropics, but influenced by a tropical barrier. So few genera evolved outside the tropics have transgressed the tropical barrier that only 25 genera are strongly represented in both hemispheres. If other penetrations of the tropical barrier have taken place, they have resulted presumably in full generic evolution with the precursors then becoming extinct on either side.

The North Atlantic Ocean (including its adjacent arctic basins) does not appear impoverished by comparison with the North Pacific, although the North Pacific has large relatively unexplored areas (such as the Alaskan-Oregonian provinces) and will probably prove to have a much higher diversity of taxa than now known. The North Atlantic component includes the Mediterranean and thus is enriched by a few warm-temperate genera, but the Mediterranean diversity is balanced by Japanese and Californian warm-temperate genera in the Pacific. Over twice as many species are

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

known in northern cool waters a in outhern cool waters (table 1). This reflects the taxonomic practice of reporting on recognisably distinct higher taxa (genera) before all the species of tho e taxa are treated or discovered. Since the rate of de cription of new genera seems to have levelled off in shallow-water orthern Hemisphere environments, one might expect that the small numerical difference between north and south will be balanced eventually by further di coveries in the south.

The disparity in numbers of specific descriptions may be seen in table 2.

TABLE 2. umbers of orthern and Southern Hemisphere cold-water endemic genera and specie

	Southern	*Northern*
Monotypic genera . .	84	62
2- pecies genera	20	18
3-species genera	18	22
4-specie genera	17	58
	139	160

THE NEW ZEALAND BIOGEOGRAPHIC POSITION: THEORETICAL CONSIDERATIONS

EW Zealand provide an environment not found in the orthern Hemisphere. It is an ecological unit of medium size, in moderate to strong isolation, with both warm-temperate and cold-temperate waters. One would have to imagine the archipelago of Japan moved eastward a thousand miles to find a comparison in the orthern Hemisphere. Unfortunately, the compari on is defective in so far as ew Zealand is an outlier of a continent lacking a significant proportion of cold-temperate waters and thus is unlike Japan, even if the latter were isolated by a thousand miles. The probability that the shallow waters of New Zealand were strongly affected by Pleistocene migration of cool water-warm water boundaries would also have to be taken into account.

New Zealand would appear then to be an ideal situation to tudy the effects of isolation of species in an environment less restricted than that provided by small islands. Such a study might be the basis of a definite statement on the composition of a medium- ized fauna, of medium to strong isolation, which could be compared with the diversity and composition of (1) highly isolated faunas on small islands, (2) non-isolated faunas on small islands, (3) faunas on continental shores of varying biotopic extent and degrees of isolation.

Isolation

Amphipoda are unusual not only in such biogeographic anomalies as high diversity of genera in boreal regions but also in their mode of reproduction. Since they have no larval development, they lack a phase of life hi tory in which dispersal mechanisms might have evolved. This absence of larval di persion would suggest a strong pressure towards a high degree of endemism in isolated place , but among certain phyletic lines and specially adapted ecological groups there is evidence of wide dispersal. Studies of the Hawaiian and Galapagan faunas (J. L. Barnard 1970) suggest that warm-temperate species have completed long journeys without insular stepping tones. Though one might expect ew Zealand Amphipoda to be highly endemic, they need not necessarily be impoverished in species because of ew Zealand' isolation.

ew Zealand' isolation also has to be con idered in light of the environmental differences between the orthern and Southern Hemispheres. Southern Hemisphere cold-temperate biotopes are small in extent compared with those of the orthern Hemisphere and one might therefore expect the amphipod fauna to be impoverished. The southern third of South America is the largest area of coast and shelf in the southern cold-temperate zone. nlike their counterparts in the Northern Hemi phere, the west and east coasts of South America are directly linked by the Straits of Magellan in the heart of the cold-temperate province so that the two coasts form part of the same ystem. In terms of ecological variety, cold-temperate South America appears equivalent only to one of the four main cold-temperate areas of the orthern Hemisphere. Since neither Tasmania nor ew Zealand project very far into cold-temperate climes, and their cold-temperate faunal character is presumed to be impoverished by the small size of this biozone, the available ecological space would scarcely equal even the small cold-temperate environment of the north-west Atlantic where the warm Gulf Stream and cold Labrador Current have greatly constricted that province in latitude.

The large size of the northern cold-temperate habitat impinging on the fringes of vast continents should

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

favour a high diversity of biotopes. If the cold-temperate zone is old, and if one accepts the thesis that mature ecosystems have high numbers of species, these conditions should favour high diversity. I have some strong doubts that there is such a correlation between the maturity of an ecosystem and the number of species it can support (Margalef 1963). A logical alternative suggests that a mature ecosystem would have fewer species than a middle-aged ecosystem, because the species would also be mature. Natural selection might sort out species which have by genetical adjustment broadened their occupation of niches. That tropical continents have the highest number of species of any biotic zone does not necessarily justify the theory that the oldest regions have the highest number of species, since we do not know whether the tropics had more species during a stage of their youth than they have now.

The generic diversity of Gammaridea is not significantly less in the Southern Hemisphere than it is in the Northern Hemisphere despite the considerably smaller littoral space in the Southern Hemisphere. The expected imbalance may have been lessened by greater isolation of the various parts of the Southern Hemisphere, by post-Paleozoic continental migrations, and by the coincidental low level of ecosystem maturity. This, contrary to the accepted view, I believe, results in more species than in a mature system. In addition, Antarctica provides a significant shallow-water region in a rich planktonic area, not found in the north polar region.

The influence on New Zealand littoral zones of antarctic shores should be relatively weak not only because of the wide oceanic gap and because the polar thermal regime is that much wider, but more importantly, because antarctic shores are ice-bound and poor in higher algae. There are heavy stands of kelp on the Antarctic Peninsula south of Drake Passage, but this is as far away from New Zealand as cold-temperate South America. Nevertheless, sublittoral kelps do occur under the ice canopy. One would expect greater similarity between New Zealand and Antarctica in their epifaunal Amphipoda than in those of their respective sublittoral coastal shelves because of the potential in rafting epifaunal species.

The subantarctic insular stepping stones provided by such island groups as Kerguelen, Campbell, Auckland, Antipodes, and Macquarie, form a suitable pathway for algae-living or sublittoral species with epifaunal niches, but they probably have little importance as way stations in the dispersal of mud-bottom species between Antarctica and New Zealand. The biogeographic importance of Antarctica and subantarctic islands in the Southern Hemisphere lies mainly in providing isolated biotopes which favour evolutionary mechanisms, and thus an increase in the number of species found in the Southern Hemisphere. However, the algae-living Gammaridea have so far proved to be mainly related species in a few cosmopolitan cool-water genera such as *Paramoera*, *Gondogeneia*, and *Aora*. Except from the Kerguelen I lands, explored by the *Challenger* (Stebbing 1888), the Amphipoda of the subantarctic islands are poorly known and application of extensive specialised collecting methods would be very profitable.

The need for insular stepping stones in the Amphipoda is thrown into doubt by the fact that nearly 30 Hawaiian species (25 percent of the fauna) must have travelled more than 2,000 miles to reach the Hawaiian archipelago from the cool-water shores of adjacent continents (J. L. Barnard 1970). Hence, the gap between New Zealand and Antarctica, equivalent in length to that between New Zealand and Australia, appears more important environmentally than in distance.

Because faunal lists of New Zealand Amphipoda have generally included those from the subantarctic islands to the south of New Zealand, the subantarctic appearance of the New Zealand fauna has been unduly emphasised. The elimination of subantarctic elements, especially the many species of *Paramoera*, a genus found in other cold-temperate zones, considerably reduces the cold-water character of the New Zealand fauna.

Because some of the water bathing southern New Zealand comes from warm-temperate climes, New Zealand may not be any more a cold-temperate environment than Tasmania, even though southern New Zealand extends farther south. New Zealand lacks direct shallow-water contact with warm-temperate zones, whereas Tasmania, having that direct contact, may have a greater warm-temperate character. Tasmania may thus represent a cool-temperate outpost under high pressure from warm-temperate environments that are themselves directly connected to tropical regimes.

If the species in an environment are partially a product of immigration pressures, then Tasmania should have many species with warm-water affinities and few with cool-water affinities. To withstand the continual pressure of competitors from warm waters, a cool-water species arriving in Tasmania would have to be highly pre-adapted to the Tasmanian environment. In New Zealand this pre-adaptation should be less necessary, not because a significantly higher number of cool-water species could be expected to reach New Zealand, but because the immigration pressure from warm-water species would be far less than in Tasmania. A cool-water species arriving in cool water in New Zealand might therefore have a greater chance of finding a niche unoccupied by a warm-water species than it would in Tasmania.

Warm-temperate Regimes

When considering dispersal of related groups, warm-temperate localities deserve special attention because of their high degree of isolation from each other. These localities include: Mediterranean Sea–north-west Africa; South Carolina (U.S.A.); Uruguay; South Africa; south-western Australia; parts of New Zealand; Peru; Baja California; southern Japan and adjacent Asian mainland. If areas deserve recognition as a special biotic

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

zone, there should be biotic characters in common. If warm-temperate zones have been connected in the past, they should share groups of related genera. If warm-temperate regions were major centres of evolution, comparable to tropical and boreal zones, they would have significant numbers of endemic genera, whether or not these genera were related to one another from portion to isolated portion of the warm-temperate zone.

Amphipoda are especially important in this context because they are disproportionately diverse in boreal zones and do not progress regularly from highest numbers of species (and especially genera) in the tropics, to lowest numbers towards the poles. In the north a warm-temperate amphipodan fauna is therefore between two zones of high generic diversity and possibly under equal immigration pressure from each direction. That warm-temperate regions have low evolutionary significance is apparent in the low numbers of endemic genera in those regions of the Northern Hemisphere where the warm-temperate zones are in direct contact with tropical and cold-temperate zones. But a significant number of endemic genera occurs in those warm-temperate zones of the Southern Hemisphere which lack contact with cold-temperate zones. This suggests that marine evolutionary centres result from thermal discontinuities as much as from geographic isolation but that the two factors are not necessarily unrelated.

Generic diversity of Gammaridea is believed to occur in three oceanic regions (tropical, boreal, and anti-boreal) and may result from thermal truncation in the three bands. For example, the tropics lack contact with a zone of higher temperature, and both of the boreal regions have little or no contact with zones of lower temperature. (The polar seas are classed as boreal because Gammaridea are divisible mainly as tropical and non-tropical.) This suggests that gammarideans have two thermal centres where the genetic stock has a restricted temperature tolerance. The warm-temperate zone would therefore be an overlap or buffer zone between the two centres of evolutionary radiation. Only where a warm-temperate province was a miniature replica of the major zones because it lacked shallow-water contact with one of the other major thermal zone and thus, like the major zones, would lack the test of evolutionary selection from one direction, could a significant number of endemic stenothermic genera survive against the pressure of taxa entering from either colder or warmer water. Faunal members of each warm-temperate region would be mainly products of isolation from adjacent tropical or cold-temperate zones and the faunal characters of the warm-temperate province would be related to the position and isolation of adjoining provinces. The main similarities between warm-temperate regions would be the presence of related species of tropical affinity, because the north and south boreal bands are known to have few gammaridean genera in common, and because there is little evidence of any direct contact between the various parts of the warm-temperate zones.

The only pair of related genera which are both endemic to northern warm-temperate regions and shared by two of them are *Gaviota** of California and *Cerapopsis* of the Mediterranean Sea. They have no known relationship to circumtropical genera, but they could be relicts of a circumtropical ancestor, now extinct. Warm-temperate regions of the Southern Hemisphere appear to have several generic groups which are possibly related but, e.g., cyproidin amphilochids and other groups, have not yet been adequately studied. The Phliantidae are well represented in related genera, but they are discounted because of their dispersal through tropical waters and they may therefore represent simply offshoots of a common tropical ancestor.

The New Zealand Warm-temperate Zone

To understand warm-temperate regimes, a study of the warm-temperate part of New Zealand seems premature because New Zealand is predictably an outlier of the vast Australian warm-temperate amphipod fauna, so poorly known at the time of writing. An ideal course would have been to explore Australian shores first so as to predict the components that might have reached New Zealand shores. The Australian warm-temperate Amphipoda will probably require many more years of study before their alpha taxonomy is elucidated. But it was considered highly probable that if New Zealand had a distinct warm-temperate zone it could be recognised by finding a segregate of species with ultimate relationships to tropical taxa. This might be contrasted with a cold-temperate segregate with ultimate relationships to ant-arctic taxa. The present study also aimed at discovering, apart from any considerations about warm-temperate faunas, whether the New Zealand algae-living Gammaridea reflected the division of New Zealand into northern, middle, and southern biogeographic provinces as reviewed by Knox (1963a).

The literature hitherto noted by biogeographers (Ekman 1953, Knox 1963a) suggested that the northern third of New Zealand contains a warm-temperate environment. For instance Sverdrup, Johnson, and Fleming (1942, charts II and III) show surface waters varying between 13° and 21°C, well inside the general variation found in other warm-temperate regions of the earth. This New Zealand region lies inside the northern of the three biogeographic provinces reviewed by Knox (1963a).

This concept of environmental stratification by latitude is highly imperfect. New Zealand shores are dominantly washed by warm-temperate waters. Only on the east coast of both islands from Banks Peninsula north to Hawke Bay do cold-temperate characteristics prevail. On the east coast south of Banks Peninsula the northward flowing Southland Current is recognised at the surface as a warm saline tongue. However, as the

*= *Ampelisciphotis* Pirlot

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Southland Current travels northwards through the Mernoo Gap, cool, low-salinity, sub-surface water is brought towards the surface with the result that this current is recognised as a cool, low-salinity tongue of water north of Banks Peninsula. This change in character is probably aided by coastal upwelling of cool, low-salinity water. These cool-temperate characteristics prevail generally as far north as Hawke Bay. However, even north of Banks Peninsula the littoral water may still contain a high proportion of warm-temperate water derived from that component of the Southland Current on the shelf, but this zone is of course the one most modified by run-off (R. A. Heath, pers. comm.).

Since the study of amphipods has historically ignored the west coast of New Zealand, the scope of the present discussion is confined to the east coast. The search for a warm-temperate segregate of amphipods therefore rightly concerns the northern third of the east coast of the two main islands. This warm-temperate shoreline is especially recognisable because of the dominant fucoid, *Hormosira banksii* (*see* Morton and Miller 1968).

Possible Geographic Affinities of New Zealand Gammaridea

To summarise the previous discussion, the distribution of littoral Gammaridea in New Zealand may be influenced as follows:

1. Warm-temperate and cold-temperate zones in shallow waters of New Zealand are strongly isolated from tropical, antarctic, and other cold-temperate zones in the Southern Hemisphere. Though New Zealand is moderately isolated from Australian warm-temperate zones, most immigrant species are likely to have come from Australia.

2. The paucity of intertidal algae in the northern and warmest third of eastern New Zealand would seem disadvantageous to recent warm-temperate immigrants.

3. Pleistocene sea-cooling may have exterminated many warm-temperate species, especially those of limited temperature tolerance confined to the northern third of New Zealand.

The fauna would then be composed of:

(a) Very few recent warm-temperate immigrants of limited temperature tolerance confined to warm parts of New Zealand.

(b) Ancient cool-water immigrants, easily surviving Pleistocene sea-cooling, but having to be pre-adapted to recent sea-warming, and divided into those (i) now confined to cold waters and those (ii) also adapted to warm waters.

(c) Warm-temperate immigrants pre-adapted to the slightly cooler New Zealand waters and filling niches abandoned by cold-temperate species not surviving recent sea-warming. These could be both ancient and recent.

COMPOSITION AND BIOGEOGRAPHY OF NEW ZEALAND GAMMARIDEA

GAMMARIDEANS living in the algal belt now total 113 species in 61 genera, of which 80 species and 9 genera are endemic to New Zealand. The endemicity far exceeds the rule of 50 percent to qualify New Zealand in its entirety as a biogeographic province for gammarideans. But very little evidence of biogeographic divisions within New Zealand is apparent in the Gammaridea. For example, only 11 of the 113 intertidal New Zealand gammarideans appear to be unevenly distributed from north to south on the east coast, but well over half of the species are still poorly known because of sparse collecting (often they are known only from mid New Zealand, at Kaikoura and Wellington).

The following appear to be southern cold-water species (in section b(i)): *Gammaropsis tawahi*, *Hyale hirtipalma*, *Maera incerta*, *Paramoera chevreuxi*, *Parathaumatelson nasicum*, *Pontogeneiella levis*, and *Probolisca ovata*. All but *G. tawahi* and *M. incerta* are known to occur south of New Zealand, further confirming their southern affinities. The following appear to be northern or warm-water species (section a): *Ericthonius pugnax*, *Metaceradocus whakatane*, and *Paracalliope novizealandiae;* and *Taihape karori* has a weakly indicated northern distribution. The first three are related to warm-water species elsewhere, and the fourth is unique to New Zealand. All remaining species appear to be evenly distributed in New Zealand (sections b (ii) and c).

The cool-water character of New Zealand Amphipoda is less evident (Appendix I) than was indicated by previous literature. There are 14 cosmopolitan species (category I), which reduce the species to be considered to 99, 27 percent of which have cold-water affinities and 73 percent of which have warm-water affinities.

Cold-water species (categories II, III) comprise 5 with subantarctic distributions and 22 with smaller ranges.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Warm-water species with broadly warm-temperate, tropical, and general affinities in low latitudes, or with relationships to Northern Hemisphere species that indicate a distributional pathway through low latitudes, are in category IV. Many of these probably have direct Australian affinities.

Warm-water species now known to have direct Australian affinities are in category V which includes a few anomalous species, such as *Bircenna fulva*, even though they may have cooler affinities. Because Tasmania is considered to be so strongly influenced by warm-temperate waters, Tasmanian cool-water species are treated as if they had evolved from warm-water, unless other information is available. *Bircenna* is strictly a cool-water Tasman Sea genus and is therefore basically warm-temperate. *Paradexamine* is also considered a warm-temperate-cool-temperate genus, since most of its species occur in that region and only three species occur in Antarctica. These examples indicate how I have dealt with taxa which were previously thought to be associated to some degree with extremely cold waters.

Category VI includes those unique New Zealand endemic taxa with poorly known affinities or those completely remote morphologically from species elsewhere. Few of these have any affinity with antarctic amphipods and they are therefore considered to be of New Zealand origin, probably derived from warm-water immigrants.

Category VII includes the remaining species with unknown affinities. Few have any remote connection with antarctic regions and they are therefore considered warm-temperate. Lack of information on their affinities reflects mainly the lack of Australian studies. For example, the genus *Liljeborgia* may be of cold-water affinity, but it is also strongly represented in low latitudes and cannot be arbitrarily assigned to the cold-water category. Until the intricate relationships in that genus and several others can be worked out, those species must be considered at best neutral, but provisionally non-antarctic.

If category VII and category I are eliminated and if two species from category VI are considered cold-water along with categories II and III, the percentage of cold-water species in New Zealand climbs to 35 percent (29 species out of 83).

Seventy percent of the 113 species are at present considered endemic to New Zealand, but undoubtedly this figure will be reduced slightly when Australian comparisons can be made. The percentage of endemic species is approximately the same in cold-water and warm-water groups.

These data support the distributional precepts 2 and 3 outlined above in demonstrating the relatively weak influence of cold-water immigrants on New Zealand gammaridean faunas. The absence of any endemic segregate in the warm-temperate zone of north-eastern New Zealand suggests that the high percentage of species in New Zealand generally with warm-temperate affinities represents a group of old species which has been in New Zealand for a long time. They may have become, or were pre-adapted to becoming, widely temperature tolerant, and thus spread to the southern or the colder reaches of the country. But the absence of a truly cold-temperate region in the Eastern Hemisphere prevents us from examining the thermal tolerance of an adjacent continental pool of Gammaridea. We cannot therefore sort out those species that may have been pre-adapted from those that adapted after arrival in New Zealand. This is philosophically relevant in any attempt to predict (1) whether New Zealand would ever have developed a stenothermic gammaridean fauna restricted to warm-temperate waters under uniform conditions or (2) whether only species which were widely tolerant would be able to reach New Zealand. A stenothermic warm-temperate fauna could not readily develop from a pool of eurythermic inhabitants without geographic isolation, and neither could it develop if stenothermic species could not cross the Tasman Sea.

Faunal Balance in New Zealand

The New Zealand Gammaridea are as well balanced phyletically as those of any other warm-temperate region, except perhaps Australia. The families of intertidal Amphipoda have been assessed from the literature and the numbers of genera and species in the families of each region have been added and compared. Anomalies are given in table 3.

All regions have an even distribution of the families Acanthonotozomatidae, Atylidae, Corophiidae, Gammaridae, Hyalidae, Ischyroceridae.

Families represented in only one or two regions have been omitted, for example, the Anamixidae, Bateidae,

TABLE 3. Anomalies of diversity and impoverishment of gammaridean families in shallow waters of warm-temperate provinces

	Exceptionally Diverse	*Impoverished*
New Zealand	Colomastigidae Cyproideinae Eusiridae Liljeborgiidae	Ampithoidae (slightly) Leucothoidae
Australia	Dexaminidae Eusiridae Phliantidae Podoceridae	Stenothoidae (probably unstudied)
South Africa	Cyproideinae Liljeborgiidae Phliantidae	Amphilochinae Eophliantidae (none) Eusiridae Phoxocephalidae
California	Isaeidae	Dexaminidae Cyproideinae Liljebordiidae Podoceridae
Mediterranean		Eophliantidae (none) Liljeborgiidae Phoxocephalidae (none) Podoceridae

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

and Pleustidae in California, the Cressidae in the Mediterranean Sea, and the Ceinidae and Nihotungidae which are largely endemic to New Zealand. New Zealand's isolation is reflected mainly in the low number of Leucothoidae and the slight impoverishment in Ampithoidae—this family is shared to some extent with Australia in the genus *Ampithoe* but not in the genus *Cymadusa*, which is prevalent in Australia and apparently absent in New Zealand. Australia and South Africa share a diverse Phliantidae and South Africa shares with New Zealand a diverse Cyproideinae and Liljeborgiidae, but South Africa is like some Northern Hemisphere regions in the impoverishment of Eophliantidae, Phoxocephalidae, and Eusiridae. These families are normally to exceptionally diverse in New Zealand. The Mediterranean region is considered the most impoverished because it has no exceptionally large families. New Zealand does not have the high generic diversity of Phliantidae and Podoceridae found in Australia, but the number of eusirid genera (about 10) is twice that of any other region. This is the main indication of a cold-water component in the New Zealand gammaridean fauna. It may also be that in New Zealand the Ceinidae are the ecological equivalent of the Phliantidae in Australia.

Antarctic Relationships

Gammaridea from Antarctica include a small number of genera held in common with New Zealand. They are mainly sublittoral, but New Zealand has not been examined sublittorally except by Dr D. E. Hurley and myself in the routine course of sorting dredged samples, so the comparison is based on limited collections. We found some genera with antarctic affinities not previously reported from New Zealand, but it is my impression that few of the following antarctic and American antiboreal sublittoral genera will be found in New Zealand (number of known species in brackets): *Acanthonotozomella* (2), *Acanthonotozomoides* (1), *Anchiphimedia* (1), *Echiniphimedia* (3), *Gnathiphimedia* (3), *Iphimediella* (4), *Labriphimedia* (2), *Maxilliphimedia* (1), *Paranchiphimedia* (1), *Parapanoploea* (1), *Pariphimedia* (2), *Pariphimediella* (5), *Pseudiphimediella* (1), *Amphilochella* (1), *Pseudamphilochus* (1), *Atylopsis* (3), *Pseudericthonius* (1), *Pseudischyrocerus* (1), *Bovallia* (1), *Djerboa* (1), *Eurymera* (1), *Harpinioidella* (1), *Pontogeneoides* (2), *Prostebbingia* (2), *Zaramilla* (1), *Thaumatelson* (3). But there are 8 genera in the Lysianassidae, 4 in the Oedicerotidae, 5 in the Paramphithoidae, 1 each in the Isaeidae and Pleustidae that are likely to be found in New Zealand deep sublittoral waters, because they are known to be morphologically analogous to other genera found in low latitudes elsewhere.

Antarctic sublittoral epifaunas are dominated by Acanthonotozomatidae, Eusiridae, Paramphithoidae, and Stenothoidae. Relationships between Antarctica and New Zealand are especially strong in Eusiridae, Antarctica having about 35 species in 19 genera and New Zealand, 13 species in 10 genera.

Though Antarctica has many genera not recorded from New Zealand, those genera which are common conform strongly in species. Of 113 New Zealand species there are 44 phyletic equivalents in Antarctica; 32 of these are either cosmopolitan species or form related pairs. (Antarctica is taken to be the main continent including South Georgia and excluding Kerguelen and Macquarie Islands.) If the Kerguelen fauna is added, then 5 more phyletic equivalents are added to the 44 above.

Approximately 56 species have been reported from Kerguelen Island (Schellenberg 1926); 33 belong to the shallow-water hard bottom fauna; 26 of those 33 species have phyletic equivalents in New Zealand and most of them are either synonymous with or are related to New Zealand species. However, only *Ceradocopsis* is unique to New Zealand and Kerguelen; all the other taxa are of wide distribution.

Other subantarctic islands cannot be compared properly with New Zealand, because their intertidal zones have been inadequately explored and few dredgings have been made on sublittoral hard bottoms.

South American Relationships

Schellenberg (1931) summarised the gammaridean faunas of Central Chile, the Magellan region, the Falkland Islands, and South Georgia Island. Collecting deficiencies are evident in those areas. The fauna of middle Chile is very poorly known, and in each of the other three areas various taxa are poorly diverse by New Zealand standards: *Hyale*, *Corophium*, *Liljeborgia*, *Elasmopus*, *Ampithoe*, *Maera*, *Podocerus*, *Colomastix*, Amphilochidae, and Eophliantidae. Though South Georgia is considered to be purely antarctic by zoogeographers, I have regarded it as part of the South American complex and find that 46 of New Zealand's 113 species of Gammaridea have phyletic affinities with all four South American areas, but only 34 have affinities with the Magellan area and 23 with South Georgia. The South American data are also low in intertidal species and I have had to adopt Schellenberg's broad use of the term littoral in which he apparently groups all species with depth distributions of 0–100 m. (He uses "sublittoral" for depths exceeding 100 m.)

If infaunal species in the families Lysianassidae, Phoxocephalidae, and Oedicerotidae are eliminated, the number of species of intertidal Gammaridea in South Georgia is reduced to 62 and in the Magellan area to 77. Since these are fewer than the 113 species found in New Zealand, one must reverse the previous procedure in order to compare the smaller fauna with the larger New Zealand fauna.

This method partly compensates for lack of exploration and indicates that New Zealand is more strongly related to South America than considered above. For example, 25 of the 62 South Georgian species and 40 of the 77 Magellan species have phyletic affinities with New Zealand.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Various subantarctic taxa such as *Aora*, *Eusirus*, *Eusiroides*, *Leucothoe*, *Polycheria*, *Seba*, *Haplocheira*, *Hyale hirtipalma*, and *Parawaldeckia* (Appendix I, categories I, II) occur in both New Zealand and South America, but additional comparisons may be made in *Gammaropsis typica*, *Melita inaequistylis*, *Parathaumatelson nasicum*, *Probolisca ovata*, *Ventojassa frequens*, and *Ceina egregia*. Species closely related to *G. typica* and *V. frequens* occur in South America, and *Ceina* has been found in the Juan Fernandez Islands west of South America. The other species are found both in South America and New Zealand, though specimens from both regions have not been closely compared.

In 1931 Schellenberg noted that 66 of 118 benthic gammarideans were endemic to the Magellan area. The total fauna included infaunal species and those from depths exceeding 100 m. He found 23 species common to Australia and New Zealand. Two, *Parharpinia* (=*Paraphoxus*) *villosus* (Haswell) and *Heterophoxus stephenseni* Schellenberg, have since been found to be distinct. In this paper I question his identification of *Melita gayi*, *Aora typica*, *Eurystheus dentatus*, *Lembos fuegiensis*, and *Jassa frequens*—but this scarcely detracts from the strong similarity of these taxa, or related species, between New Zealand and South America.

Probably all 24 species in categories I and II of Appendix I will be found in cold-temperate and warm-temperate South America, and in addition there now appear to be relatives of the following species in categories III to VII: *Haplocheira lendenfeldi*, *Atyloella moke*, *Oradarea novaezealandiae*, two species of *Paramoera*, two species of *Gondogeneia*, one species of *Stenothoe*, *Melita inaequistylis*, *Ventojassa frequens*, one or two species of *Gammaropsis*, one or more of *Liljeborgia*, one of *Paradexamine*, and one of *Ceina*—a total of about 39 comparable species. A comparable figure for Australia is about 75 (including 24 cosmopolitan species); for South Africa, 45; California 23; Mediterranean, 14. In California and the Mediterranean Sea the comparable species are mainly in categories I and II, though a few species in those places may be members of species complexes represented in New Zealand. The low South American figure, in comparison with South Africa, reflects inadequate collecting.

South America has a notable lack of endemic genera and only 15 of 41 Magellanic algae-living species (or 37 percent) have generic affinities with the Norwegian cold-temperate.

Australian Relationships

About 160 species of marine and estuarine Gammaridea have been described from Australia (updated from Sheard 1937)†. About 124 species are basically algae-living in littoral zones. The fauna as presently known is well balanced phyletically. Only three or four species are purely tropical; the remaining 120 are confined to warm-temperate zones or to the "cool-temperate" zone of Tasmania.

The major discontinuities between New Zealand and Australia occur because of genera missing from New Zealand: *Biancolina* (1 known species), *Cerapus* (1), *Cheiriphotis* (1), *Cymadusa* (2), *Cyrtophium* (1), *Dexamine* (1)‡, **Exoediceros* (2), **Gitanogeiton* (1), **Glycerina* (1), **Icilius* (3), **Iphiplateia* (1), *Laetmatophilus* (1),**Leipsuropus* (1), *Ochlesis* (1), *Palinnotus* (1), **Paraoroides* (1), **Paracyproidea* (2), *Paraleucothoe* (1), **Prophlias* (1), **Quasimodia* (3), and **Sancho* (1). (*Dexamine*, *Iphiplateia*, and *Paracyproidea* have analogous genera in New Zealand.) Twelve genera, indicated by asterisks, are endemic to Australia. Species of *Biancolina*, *Cerapus*, *Cheiriphotis*, *Cymadusa*, and *Cyrtophium* could be expected in New Zealand if northern New Zealand were strongly warm-termperate.

The relationships of New Zealand Gammaridea to Australia are strong and may prove stronger when more is known of Australian species. At least 72 of the 113 intertidal New Zealand species (or 64 percent) have phyletic equivalents in Australia. (I have assumed that in the Phliantidae, various warm-temperate genera are phyletically equivalent, but for all other families I have considered as equivalents only those species of genera common to both areas.)

South African Relationships

In contrast to warm-temperate regions of the Northern Hemisphere, South Africa has several shallow-water endemic genera: *Hoplopleon*, *Isaeopsis*, *Exampithoe*, *Macropisthopus*, *Plioplateia*, and *Temnophlias*. *Hoplopleon* and *Plioplateia* have phyletic equivalents in New Zealand (*Neocyproidea* and *Iphinotus*). Like both the Californian and Australian warm-temperate and unlike New Zealand, South Africa has several tropical genera, *Chevalia*, *Cheiriphotis*, *Cerapus*, *Megaluropus*, *Parhyale*, *Cymadusa*, *Ochlesis*, and *Laetmatophilus* which do not have equivalents in New Zealand. South Africa has, in addition, *Calliopiella*, *Parhyalella*, *Palinnotus*, and *Cyproidea*. Of these four, *Parhyalella* is tropical and *Palinnotus* and *Cyproidea* have phyletic equivalents in New Zealand, though New Zealand has fewer phliantids and more cyproidins than South Africa. Sixty-two of 113 New Zealand species (or 55 percent) have specific equivalents in South Africa. South Africa differs from California and New Zealand in lacking the genera *Paraphoxus* and *Gondogeneia*. Fifty-six out of 96 South African species (or 58 percent) show affinities to California. In contrast, only 32 South African species (or 33 percent) show affinities with Norwegian cold-temperate waters.

Californian Relationships

The Californian warm-temperate region, like others in the Northern Hemisphere, is noted for sparsity of

†Papers by Fearn-Wannan (1968) arrived too late for inclusion.
‡Possibly a related genus, if not *Paradexamine*, instead of *Dexamine*

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

endemic genera. No purely littoral endemic genus is known, although three sublittoral endemic genera have been found and the disjunct segment of warm-temperate province in the upper gulf of California has one littoral algae-living genus (J. L. Barnard 1969c).

Like South Africa and Australia, California has tropical genera not yet found in New Zealand: *Cerapus*, *Chevalia*, *Cheiriphotis*, *Cymadusa*, *Megaluropus*, *Parhyale*. In addition it has the tropical genera *Anamixis*, *Leucothoides*, *Eriopisella*, the American endemic *Acuminodeutopus*, *Batea*, *Neomegamphopus*, and *Heterophlias* (equivalent to New Zealand *Iphinotus*), and the boreal genera *Parapleustes*, *Pleustes*, and *Sympleustes*. New Zealand has 62 out of 113 species (or 55 percent) with specific equivalents in California.

Mediterranean Relationships

The metasaline portions of the Mediterranean region have only one narrowly endemic genus, *Cerapopsis*, and thus are typical of northern warm-temperate regions in sparsity of endemic genera. The region appears less influenced by purely tropical immigrants than either California or South Africa, because it has only *Biancolina*, *Cymadusa*, and *Megaluropus* of the tropical group. Strangely, the boreal genera *Pleustes*, *Parapleustes*, and *Sympleustes* appear to be confined to deep sublittoral waters in contrast to California, but the Mediterranean otherwise has a wide diversity of warm- and cold-temperate genera mainly endemic to the North Atlantic region (*Gammarus*, *Pherusa*, *Dexamine*, *Tritaeta*, *Corematopus*, *Microprotopus*, *Cressa*), and it has a high diversity of *Apherusa* instead of members of *Paramoera* and *Gondogeneia* as in California and New Zealand.

Only 55 of New Zealand's 113 species (49 percent) have phyletic equivalents in the Meditteranean, but the Mediterranean has fewer species. The comparison should therefore be reversed: then 44 of 84 Mediterranean species (52 percent) have phyletic equivalents in New Zealand, while 43 of 84 have Australian affinities, but 54 (or 64 percent) have South African and 51 (or 61 percent) have Californian affinities.

Biogeographic Conclusion

The Gammaridea of the extreme ends of the three main islands of New Zealand are not divisible into warm and cold faunas, the whole fauna comprising mainly species with warm-temperate affinities distributed evenly throughout the region. There is a tendency for some species with warm-water affinities to become less abundant in the south and some species with cold-water affinities to become less abundant in the north, but the south nevertheless has many species with warm-water affinities. The absence of a stenothermic warm-temperate element in north-east New Zealand may result from Pleistocene sea-cooling, but the paucity of the littoral flora may also be significant.

The suggestion is made that warm-temperate regions in the eastern half of the Southern Hemisphere are highly unlike those in the Northern Hemisphere, because their shallow-water biotope is thermally truncated towards cold-waters. New Zealand, Tasmania, south-western Australia, and South Africa have little or no contact with a well developed cold-temperate fauna, and their cold-temperate components are therefore impoverished. Their members are mainly of direct tropical origin, but their phyletic histories have been mostly confined to warm-temperate waters in direct contrast to similar faunas in the Northern Hemisphere.

The consequence of this history is perhaps stronger in Gammaridea than in many other marine groups, because Gammaridea are well represented in both tropical and cold-temperate waters; a low input of cold-temperate species into the southern warm-temperate regions therefore represents an asymmetry when compared with northern waters. The asymmetry of the south-eastern warm-temperate environments suggests that they would have a higher percentage of endemic species than Northern Hemisphere warm-temperate zones, because they are terminal outliers of the tropics, where competition with species originating from cold-temperate waters is lacking. These southern regions may therefore contain more relicts than north temperate regions, because their environment has been buffered by biothermal asymmetry. In these circumstances, New Zealand Gammaridea could be considered mainly as a warm-temperate outpost with nine endemic genera (*Maoriphimedia*, *Peltopes*, *Neocyproidea*, *Iphinotus*, *Nihotunga*, *Taihape*, *Waitomo*, *Syndexamine*, *Tetradeion*) and three probably endemic genera represented by *Guernea timaru*, *Apherusa translucens*, and *Calliopius didactylus*. Moreover, there are various genera or incipient subgenera of relict origin: *Paracalliope* (three species in New Zealand, remnants in east Asia), *Ceina* (remnants in Indonesia and Juan Fernandez), *Microdeutopus apopo*, *Ampithoe lessoniae* and *Panoploea spinosa* (other species attributed to *Panoploea* appear generically different). Finally, the trans-Tasman endemic *Bircenna* and the trans-Macquarian *Cylindryllioides* complete a list of at least 20 species significantly associated with the New Zealand region.

In contrast, the Californian warm-temperate has only one endemic genus and the classic warm-temperate of the Mediterranean Sea has at best four or five. When the Australian Gammaridea are better known the present proportion of endemic genera in New Zealand may pale beside that of the Australian warm-temperate region, where 12 endemic genera have already been described.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

SYSTEMATICS

Textual Procedure

The text of this paper is arranged alphabetically by families or superfamilies (Talitroidea only) and alphabetically by genera in each family. The Talitroidea include families Ceinidae, Dogielinotidae, Eophliantidae, Hyalidae, Kuriidae, Phliantidae, and Talitridae, but the latter are placed first within the Talitroidea because a major revision of that superfamily is presented, and diagnostic comparisons are necessary. No Talitridae, Dogielinotidae, or Kuriidae are discussed except in a revisionary framework. The Prophliantidae, Biancolinidae, and the genus *Amphitholina* (Ampithoidae) are appended to the Talitroidea in discussing their rejection from the Talitroidea.

Materials cited in station lists represent aliquot fractions presenting species in proportional ratios to their abundance, but many additional specimens of various species have been sorted and deposited at the New Zealand Oceanographic Institute or the Smithsonian Institution. In several descriptive comparisons many specimens in addition to those cited were available.

Collections marked with "K" came from Kaikoura, and were provided by Prof. G. A. Knox, Professor of Zoology at Canterbury University.

In diagnoses and descriptions, the terms "position" or "mark" with a number are used to fix points a measured distance from the proximal end of an appendage; this distance represents a percentage of the total length of the appendage.

Unless otherwise indicated, new names have been derived from geographic, patronymic, and adjectival words in the Maori language and stand as nouns in apposition to their genera. All new genera are considered as feminine.

Identification of Intertidal New Zealand Gammaridea

A recent world key to the genera of Gammaridea (J. L. Barnard 1969a) provides directions for dissection, slide-making, a checklist of characters, a glossary, and keys to families and genera. Hurley (1958) provides a key to families of New Zealand Gammaridea.

The following annotated key contains only members of the intertidal fauna in New Zealand proper; it excludes most species from outlying islands except those I have been able to examine and characterise. In several places the key refers to the basic gammaridean (Fig. 1), in which the body is laterally compressed, all urosomites are free, uropod 3 is large and biramous, the telson is cleft, the paired eyes are lateral, internal and composed of ommatidial units; antenna 1 bears a secondary ramus (accessory flagellum) of many articles; pereopod 5 is scarcely longer than pereopod 4; gnathopod 2 is slightly to greatly larger than gnathopod 1, the gnathopods are subchelate (article 6 with palm on which dactyl (article 7) closes), remaining thoracic appendages simple (not subchelate); upper lip with rounded lower edge, mandible with triturative molar, serrate incisor, and 3-articulate palp (Fig. 7j), maxilla 1 with 2-articulate palp; maxillipeds with well developed inner and outer lobes and bearing 4-articulate palp (Fig. 6*i*).

The character of uropod 3 usefully divides Gammaridea into gross groups as illustrated in Figs. 2 and 3. The shape is highly specific for the Eophliantidae; Ceinidae and Phliantidae; Stenothoidae, Nihotungidae and Sebidae; Hyalidae; Ampithoidae; various kinds of Ischyroceridae; Podoceridae; and it is characteristic for the following genera: *Melita*, *Corophium*, *Photis*, *Paracorophium*, *Parapherusa*, *Ericthonius*, *Paraphoxus*. The basic uropod 3 has a short peduncle (much shorter than peduncle of uropod 2) and has the rami equal to each other and much longer than the peduncle; the rami are slightly flattened (Figs. 2*a–d*) and strongly to weakly spinose; in a few genera (Fig. 2*c*) the peduncle of uropod 3 is nearly as long as the peduncle of uropod 2, but the rami are even longer. The rami may be as short as or shorter than the peduncle (Figs. 2*f*, *h*, *k*, *m*, *n*, *o*). If one ramus is shortened, it is usually the inner (Figs. 2*e*, *f*, *h*, *m*, *n*, *p*) but occasionally the outer ramus is the shorter (Fig. 2*i*). The outer ramus occasionally has a second article (Figs. 2*c*, *e*, *l*, *o*, *p*).

The elongation of the peduncle of a biramous uropod 3 characterises many families and certain genera of families normally having short peduncles. The peduncle is elongate (as long as peduncle of uropod 2) in the Amphilochidae, Ischyroceridae, Oedicerotidae, Stegocephalidae, Leucothoidae, but in none of those taxa are the rami longer than the peduncle (Fig. 3*a*, *b*, *c*, *g*). Other families have superficially elongate peduncles because the rami are so much shortened (Ampithoidae, Fig. 3*f*).

The loss of one ramus (presumably inner) characterises the Hyalidae, Sebidae, Stenothoidae, Nihotungidae, and the genera *Corophium*, *Ericthonius* and occasionally members of Lysianassidae (Figs. 2*m*, *n*, *q*). The remaining ramus is 2-articulate in Sebidae, Stenothoidae, and Nihotungidae so that the uropod appears to have three articles in tandem. The third urosomite (sixth

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

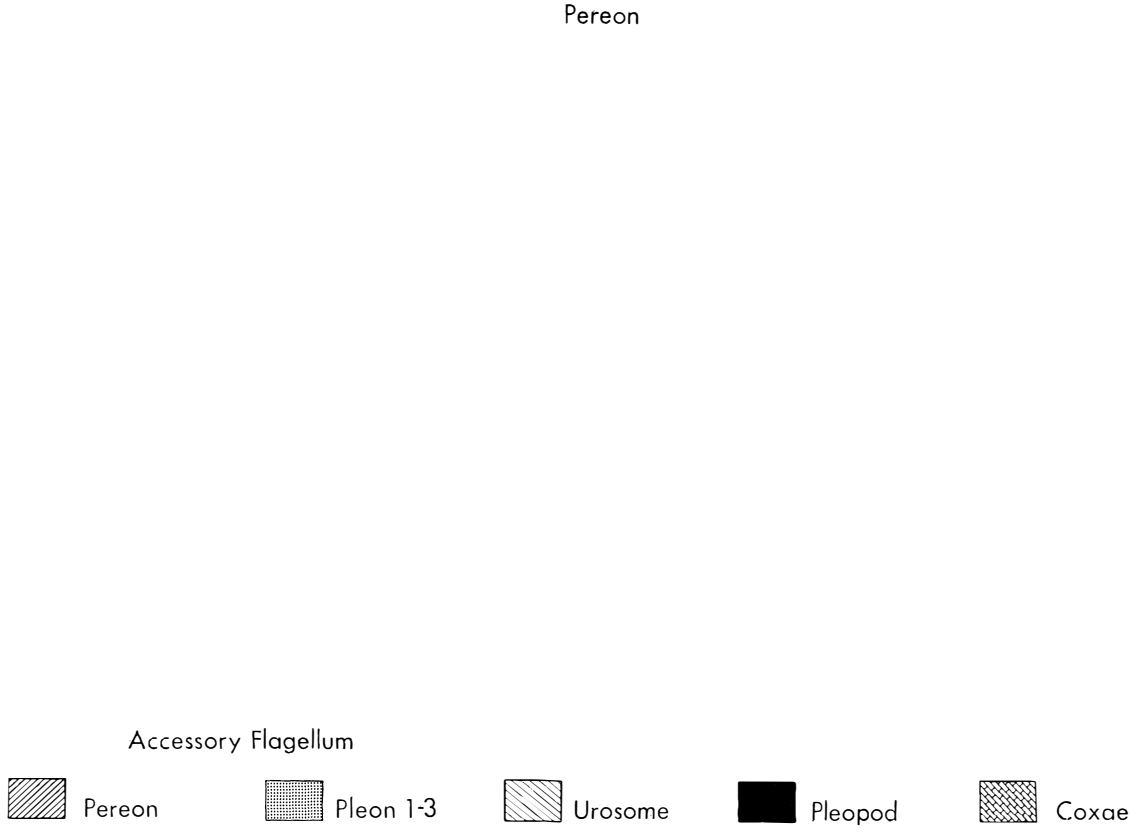


FIG. 1. The basic gammaridean.

pleonite) to which uropod 3 is attached must be clearly identified, as it often appears to be a segment of uropod 3.

The loss of rami completes the sequence. Only a small peduncle remains in the families Eophliantidae, Ceinidae, certain Podoceridae (all those of New Zealand so far) and certain Phliantidae (all those of New Zealand so far). This feature can be confusing because several species of New Zealand Gammaridea bearing large biramous uropod 3 lose the uropod upon preservation, and at least one genus (*Atyloella*) selectively loses the inner ramus. Uropod 3 is frequently lost in *Melita*, *Maera*, *Metaceradocus*, and the families Oedicerotidae, Leucothoidae, i.e., those taxa with massive, elongate uropod 3. Taxa with missing uropod 3 usually have a clearly developed socket remaining, or a broad space and stubby end of urosomite 3 remain between the telson and uropod 2. Genera with vestigial uropod 3 lacking rami have the uropod tucked between the telson and the margins of urosomite 3, or in *Podocerus* have uropod 3 concealed under the telson.

Sars's (1895) Norwegian study remains indispensable because of its wide diversity of illustrations of gammaridean characters. Its figures are occasionally quoted in the following key. The key is broken into parts so that annotations to families may be inserted and so that phyletic groups can be marked with categorical titles.

Basic Key to Intertidal Gammaridea of New Zealand

1. Gnathopod 2 of the characteristic lysianassid form (Sars 1895, pls. 12–40), note combination of elongate article 3, mitten-shaped article 6 with small dactyl, numerous strong stiff setules on article 6, and usually weak texture of pineapple fruit on article 5 ..... Lysianassidae

   Gnathopod 2 lacking one or more characters of the lysianassid form, generally with article 2 short, article 6 not covered with stiff setules, and article 6 otherwise not mitten-shaped and usually enlarged 2

2. Uropod 3 with one ramus or without rami (Figs. 3*h*, *j–q*) Key A

   Uropod 3 with two rami, inner or outer occasionally very small (Figs. 2, 3*a–g*) 3

3. Rami (or at least one ramus) of uropod 3 equal to or shorter than peduncle (Figs. 3*a–g*, *i*), peduncle usually elongate ..... Key B

   Rami (or at least one ramus) of uropod 3 longer than peduncle (Figs. 2*a–e*, *i*, *j*, *p*), peduncle usually short 4

4. Anterior coxae distally acuminate (Sars 1895, pls. 131–133) Acanthonotozomatidae, Key C

   Anterior coxae rounded or quadrate distally 5

5. Urosomites 2–3 coalesced (Figs. 16*a*, 20*g*, 23*h*, 27*b*) 6

   Urosomites 2–3 free 7

6. Body subcylindrical, coxae short, wider (anteroposterior) than long (dorsoventral), gnathopod 1 long, thin, and simple, flagella of antennae shorter than last peduncular articles ..... Colomastigidae, Key M

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

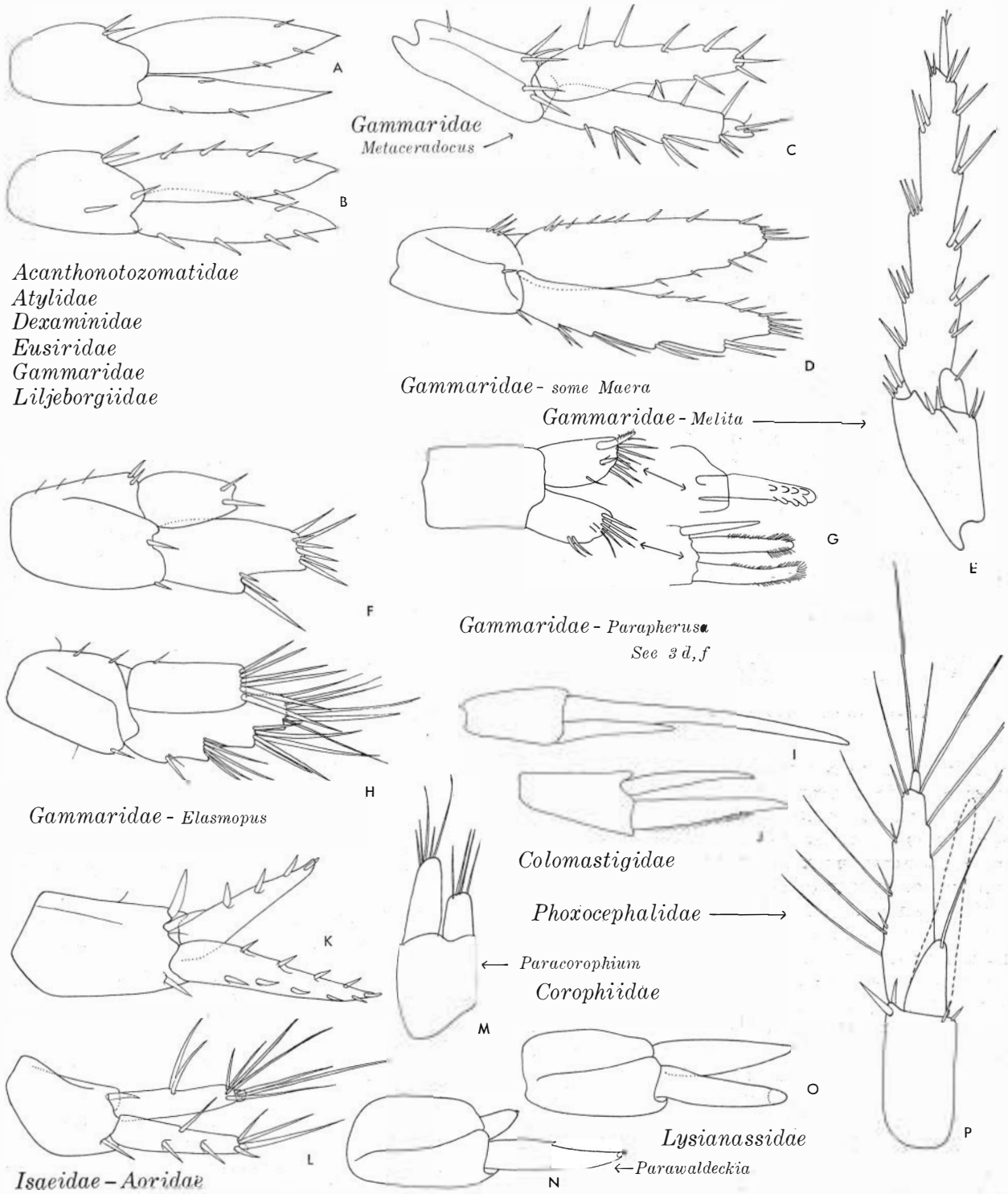


FIG. 2. Uropod 3 of families so marked. Letters are for reference from keys. Figures A and B:
Acanthonotozomatidae have acuminate coxae 1–4.
Atylidae have coalesced urosomites 2–3 and a mandibular palp.
Dexaminidae have coalesced urosomites 2–3 and no mandibular palp.
Eusiridae-Calliopiidae are basic gammarideans with 1–2 articulate accessory flagella.
Gammaridae are basic gammarideans (*see* Fig. 1.).
Liljeborgiidae are basic gammarideans with non-triturative mandibular molar.
Figure P: Phoxocephalidae have a hood-like rostrum.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Body laterally compressed, coxae long, anterior members as long as or longer than broad, gnathopod 1 normally subchelate, some flagella of antennae longer than their peduncles.....Atylidae, Dexaminidae, Key D

7. Telson thick, fleshy, puffy (Figs. 13*c*, *d*, 15*e*), articles 2 and 4 of pereopods 1–2 with conspicuous glandular tissue concealing normal linear striation of muscles (except Podoceridae)...Superfamily Corophioidea, Key E

Telson thin, laminar (occasionally with ventral keel or with lobes tilted to give impression of thickness), pereopods 1–2 lacking glands.....8

8. Accessory flagellum vestigial, composed of one small article or absent.....Eusiridae, Key F

Accessory flagellum well developed usually, bearing at least two articles, often five or more (Fig. 1).....9

9. Mandibular molar forming non-triturative lump (Sars 1895, pl. 187), gnathopods 1–2 similar to each other, large, with long lobes on fifth articles, broadly subchelate palms usually with at least one cycle of hooked spines mixed among cycles of other kinds of spines Liljeborgiidae, Key G

Mandibular molar columnar, cuboidal, strongly triturative (Figs. 7*j*, 13*o*, 22*e*), gnathopods 1–2 dissimilar to each other but usually subchelate, gnathopod 2 often enlarged like gnathopods 1–2 of Liljeborgiidae but not bearing cycle of hooked spines.....10

10. Head with large visor or hood-like rostrum (Figs. 79*a*, *b*) (Phoxocephalidae) 11

Head lacking visor or hood-like rostrum..... Gammaridae, Key H

11. Pleonal epimeron 3 with oblique line of facial setae (investigate carefully, often difficult to see on bleached specimens).....*Paraphoxus australis*

Pleonal epimeron 3 lacking facial setae....*Paraphoxus waipiro*

Key A
(Uropod 3 uniramous or lacking rami)

1. Uropod 3 with well developed ramus bearing two articles so that uropod 3 appears to have three articles in tandem (do not confuse urosomite 3 with an article) (Figs. 3*n*, *q*).....2

Uropod 3 with or without ramus but ramus not biarticulate..4

2. Both pairs of gnathopods chelate, gnathopod 1 larger than 2 and chela short and blunt, coxae 1–4 all short and equal in length and general size (Figs. 87*h*, *k*)..... Sebidae, *Seba typica*

Gnathopod 1 subchelate or simple, gnathopod 2 rarely chelate but often subchelate, coxa 1 much smaller than enlarged coxa 4 (Fig. 90*a*).....3

3. Coxa 1 visible and not hidden by coxa 4, coxae 2 and 3 smaller than coxa 1 (Fig. 77*a*)..... Nihotungidae, *Nihotunga noa*

Coxa 1 hidden by coxa 2, coxae 2 and 3 much larger than coxa 1 (Fig. 90*a*)..... Stenothoidae-Thaumatelsonidae, Key I

4. Body appearance of normal gammaridean (Fig. 1) with large coxae and lateral compression so that body tends to lie on its side.....5

Body appearance abnormal: if coxae large then they are splayed and body is strongly depressed and tends to lie on its back or belly; if coxae small, body appears cylindroid, coxae usually very small.....6

5. Antenna 1 with accessory flagellum (rarely vestigial), gnathopod 2 of lysianassid form described in Basic Key couplet 1, mandibular palp present..... Lysianassidae

Antenna 1 lacking accessory flagellum, mandible lacking palp, gnathopod 2 with short article 3 unlike Lysianassidae.....Talitroidea, Key J

6. Body cylindrical or subcylindrical, vermiform, with pleon (abdomen) not flexed underneath pereon (thorax) (Fig. 100*a*).....7

Body not vermiform, thorax broad and depressed, pleon flexed or partially flexed under thorax or strongly turned towards thorax (Figs. 82*a*, 107*a*, *b*).....8

7. Mandible with palp.....Corophiidae, Key E, part 2

Mandible without palp or palp vestigial..... Eophliantidae, Key K

8. Coxae very large and splayed laterally, body very massive, dorsally depressed, slightly rugose, head and antennae very small and nearly hidden by large anterior coxae (Figs. 107*a*, *b*).....Phliantidae, *Iphinotus typicus*

Coxae very small and not splayed, body not very massive but broadened, slightly rugose, head and antennae large and visible (Fig. 85*a*).....Podoceridae, Key E, part 3

Key B
(Biramous uropod 3 with rami not longer than peduncle)

1. Coxa 1 much smaller than coxa 3 and partly hidden by coxa 2.....Amphilochidae, Key L

Coxa 1 same size or larger than coxa 2.....2

2. Gnathopod 1 strongly carpochelate (Fig. 76*e*)..... Leucothoidae, *Leucothoe trailli*

Gnathopod 1 subchelate or nearly simple.....3

3. Coxa 4 very large, larger than 1–3 combined, all together forming lateral shield, mandible without palp, (pereopod 5 bearing only articles 1 (coxa), 2, and minute 3, articles 4–7 missing..... Stegocephalidae, *Tetradeion crassum*

Coxae 1–4 of normal gammaridean proportions (Fig. 1), mandible with palp, (pereopod 5 with seven articles).....4

4. Telson cleft.....Gammaridae, Key H

Telson entire.....5

5. Inner ramus of uropod 3 much shorter than outer..... (*Paracorophium*, *Photis*), Key E

Rami of uropod 3 subequal in length.....6

6. Telson thin dorsoventrally, laminar.....7

Telson thick dorsoventrally, fleshy (Fig. 15*e*).....Key E

7. Rami of uropod 3 narrowly lanceolate and scarcely spinose (Fig. 3*a*), pereopod 5 extremely elongate..... (*see* Oedicerotidae also) (*Paracalliope*), Key F

Rami of uropod 3 columnar to sublamellar, strongly setose apically (Fig. 2*g*), pereopod 5 scarcely longer than pereopod 4.....(*Parapherusa*), Key H

Key C

Acanthonotozomatidae; anterior coxae acuminate below; posterior part of body with many dorsal processes, but unlike Atylidae and Dexaminidae, urosomites 2–3 uncoalesced; rostrum very large and turned ventrally; gnathopods very slender, simple or minutely chelate (parachelate); uropod 3 with normal peduncle and long rami; telson apically emarginate; mouthparts grouped in conical bundle; mandible bearing palp; all New Zealand members with 3-articulate maxillipedal palp. *See* Hurley (1954g) for review of this family.

1. Pleonal epimera 1–2 each with strong medioposterior tooth (on lateral face), article 2 of maxillipedal palp not produced along article 3.....*Maoriphimedia hinemoa*

Pleonal epimera 1–2 lacking medioposterior tooth, article 2 of maxillipedal palp produced along article 3.....2

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

2. Second articles of pereopods 3–5 with numerous coarse saw-tooth serrations on posterior margins, coxa 6 with blunt posterodistal corner..... *Panoploea spinosa*

Second articles of pereopods 3–5 smooth (or pereopod 5 with one sharp point), very finely serrate, coxa 6 with sharp posterodistal corner..... *Iphimedia haurakiensis*

KEY D

Atylidae and Dexaminidae; characterised by coalescence of urosomites 2–3, body otherwise basically gammaridean; head not elongate and eyes two in number, large and bearing ommatidia, article 4 of pereopods 1–2 not extremely elongate (Ampeliscidae have elongate head, corneal eyes and elongate article 4 of pereopods 1–2). Colomastigidae have cylindroid bodies, short coxae and grossly serrate mandibular apices devoid of normal incisor.

1. Mandible lacking palp.....Dexaminidae 2

Mandible with palp.....6

2. Pereopods 1–5 chelate and prehensile (Fig. 26*a*)..... *Polycheria obtusa*

Pereopods 1–5 simple.....3

3. Pleonites 2–3 with sharp dorsal tooth and subdorsal tooth on each side.....4

Pleonites 2–3 with or without blunt dorsal tooth and no subdorsal tooth on either side.....5

4a. Lateral cephalic lobe anteriorly rounded; pleonite 4 with dorsal tooth and one lateral tooth each side; pleonite 1 with dorsal tooth; each lobe of lower lip with four cones (two large, two small); mandibular spines thick and as long as lacinia mobilis; pleonites 5–6 with one spine each side; palp and outer plate of maxilliped extending equally..... *Paradexamine muriwai*

b. Lateral cephalic lobe with sharp cusp; pleonite 4 with only dorsal tooth; pleonite 1 with dorsal tooth; each lobe of lower lip with two cones of equal size; mandibular spines only one third as long as lacinia mobilis; pleonites 5–6 with two spines each side; palp and outer plate of maxilliped extending equally..... *Paradexamine houtete*

c. Lateral cephalic lobe with sharp cusp: pleonite 4 with only dorsal tooth; pleonite 1 with dorsal tooth; each lobe of lower lip with one cone; mandibular spines ?absent; pleonites 5–6 with ?one spine each side; palp of maxilliped much shorter than outer plate..... *Paradexamine barnardi*

d. Lateral cephalic lobe with sharp cusp; pleonite 4 with only dorsal tooth; pleonite 1 without dorsal tooth; each lobe of lower lip with two cones of unequal size; mandibular spines thin and 0.75–1.00 times as long as lacinia mobilis; pleonites 5–6 with two spines each side; palp and outer plate of maxilliped extending equally... *Paradexamine pacifica*

5. Palp of maxilla 1 with two articles, inner plate of maxilla 2 less than half as long as outer, pleonites 1–4 lacking dorsal carina, pereopods 1–2 with three or four spines on article 6 and with normal dactyls, pereopods 3–5 with diverse lengths, shapes, and setosity and broad article 2 (Figs. 21, 22)..... *Guernea* (?) *timaru*

Palp of maxilla 1 with one article, inner plate of maxilla 2 nearly as long as outer, pleonites 1–4 with strong dorsal carina, pereopods 1–2 with very long dactyls and spiny article 6 (several sets of two or three spines each) (subprehensile), pereopods 3–5 similar among themselves and article 2 thin or of medium breadth..... *Syndexamine carinata*

6. Telson entire, pereopod 5 very elongate, about 1.5 times as long as pereopod 4..... *Paracalliope* (Eusiridae)

Telson cleft, pereopod 5 less than 1.3 times as long as pereopod 4.....(Atylidae, *Atylus*) 7

7. Pleonite 4 with weak dorsal tooth or crest, but no notch, mandibular palp with two articles, pleonites 1–3 with weak dorsal tooth, gills 1–4 simple..... *Atylus reductus*

Pleonite 4 with dorsal crest and deep notch, mandibular palp with 3 articles, pleonites 1–3 with no dorsal teeth, gills 1–4 broadly pinnate or complexly lobed (Figs. 16–17)..... *Atylus taupo*

KEY E

(with parts 1–6)

Corophioidea (considered as a superfamily for these purposes), including Isaeidae (= Aoridae, = Photidae), Corophiidae, Podoceridae, Ischyroceridae, Ampithoidae. Telson fleshy, thick, entire, as broad as long (except Podoceridae); articles 2 and 4 of pereopods 1–2 bearing glands covering muscles (except Podoceridae); mouthparts basic; accessory flagellum present or absent; uropod 3 very diverse but especially characteristic for Ischyroceridae (Figs. 3*b*, *d*, *e*, *g*), Ampithoidae (Fig. 3*f*), and Podoceridae (Fig. 3*l*). Uropod 3 should be mounted on slide dorsal side up for observation: Ischyroceridae have two sublanceolate rami, bearing at most one seta each, outer ramus with slight apical uncinus composed of basally submerged spine or simply bare apex, often with subapical villi or thorns; Ampithoidae have sublamellar rami, well setose, outer with two large reverted hook-spines; Podoceridae have vestigial uropod 3 composed only of peduncle and largely hidden by telson; Corophiidae have either one lamellar ramus (Fig. 3*j*) or two subcolumnar rami, the inner shorter than the outer (Fig. 2*m*) and the peduncle very short; *Photis* has an elongate peduncle, long outer ramus and very short inner ramus (Fig. 3*i*); remaining corophiids have two equal lanceolate rami with apical and marginal spines and setae, outer ramus occasionally with vestigial article 2; in Gammaridae, the genus *Parapherusa* has uropod 3 weakly similar to Ampithoidae (compare Figs. 2*g*, 3*f*) but the apices of the rami have beaded or feathered straight spines and the telson thin and long.

Key E, part 1

1. Gnathopods 1–2 very weak, gnathopod 2 simple, articles 4 or 5 lined posteriorly with very long plumose setae, article 6 often heavily setose (Sars 1895, pls. 219–222; Stebbing 1888, pl. 126).....2

Either of gnathopods 1 or 2 strongly subchelate and enlarged in male, article 5 often heavily setose but shape and setae not like figures of first couplet.....4

2. Uropod 3 biramous (inner short), mandibular palp 3-articulate.....3

Uropod 3 uniramous, mandibular palp 2-articulate (antenna 2 robust in both sexes, urosome broadly flattened).....Key E, part 2, couplet 2

3. Article 4 of gnathopod 2 very short, not apposing nor hiding posterior margin of article 5, antenna 2 slender (but short)..... *Haplocheira barbimana* and *H. lendenfeldi*

Article 4 of gnathopod 2 very long, nearly as long as elongate article 5 and distally forming scoop-like lever apposing posterior margin of article 5 (like *Corophium*,

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

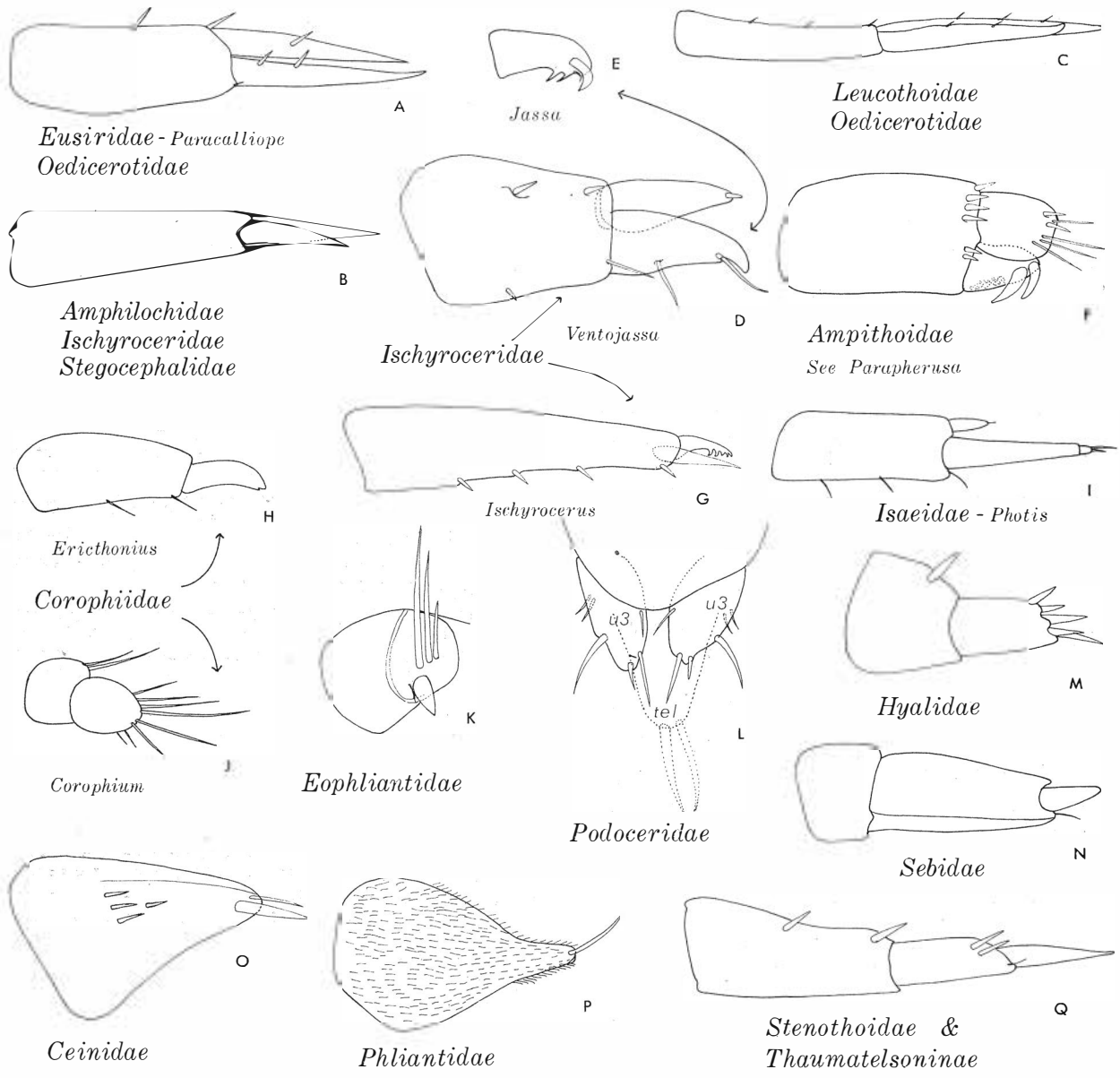


FIG. 3. Uropod 3 of families so marked. Letters are for reference from keys.

Sars 1895, pls. 219–221 but articles 4–5 not tightly appressed), antenna 2 robust.....
Paracorophium excavatum (Key E, part 2)

4. Uropod 3 with one ramus or none.....5
   Uropod 3 with two rami, inner occasionally short.....6
5. Uropod 3 with long peduncle and short, apically curved ramus, telson very short, broad, bearing jewel-like thorn spines forming knurl, male gnathopod 2 strongly carpochelate (like Fig. 72*j*), pereon subcylindrical.....
Ericthonius pugnax (Key E, part 2)
   Uropod 3 formed of small simple flap lacking rami and scarcely visible below telson, male and female gnathopod 2 large but not carpochelate, pereon depressed and broad.....Key E, part 3
6. Telson much longer than broad, thin.....
Parapherusa crassipes (Gammaridae)
   Telson as broad as long, thick and fleshy (Figs. 71*h*, *o*).....7
7. Inner ramus of uropod 3 minute and much shorter than outer ramus (Fig. 67*k*).....
Photis brevicaudata and *Photis* sp.
   Rami of uropod 3 subequal in length.....8

8a. Rami of uropod 3 broad, flat, heavily setose, outer ramus bearing two large articulate hooks (Fig. 3*f*)..Key E, part 4
   b. Rami of uropod 3 lanceolate, lacking any setae or spines except for a maximum of two on each ramus, outer ramus apically curved outward (oil-immersion lens needed), with or without apically curved terminal nail and usually bearing subterminal knobs, villi, or thorns Key E, part 5
   c. Rami of uropod 3 lanceolate, setose and spinose, (outer rarely 2-articulate).....9

9. Gnathopod 1 smaller than gnathopod 2 (confirm this position by diagnosis in Key E, part 6).....
Gammaropsis, Key E, part 6

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Gnathopod 1 larger than gnathopod 2.....10

10a. Male gnathopod 1 ordinarily subchelate.....*Lembos* spp.

b. Male gnathopod 1 carpochelate (doubly) (Fig. 72*j*).....
Microdeutopus apopo

c. Male gnathopod 1 immensely merochelate (Fig. 10*g*, *h*)..
Aora maculata and *Aora* sp.

Key E, part 2

Corophiidae; a heterogeneous group with common character of cylindricalisation of body or depression of urosome as herein restricted; two of three genera here have uniramous uropod 3. *See* Hurley (1954f) for treatment of this family.

1a. Uropod 3 bearing inner ramus (Fig. 2*m*), peduncle short and broad, rami stubby and apically setose, article 4 of gnathopod 2 forming long, projecting, free, setose lobe, mandibular palp with three articles.....
Paracorophium (brackish water, *see* Hurley 1954*f*)

b. Uropod 3 lacking inner ramus (Fig. 3*j*), peduncle and ramus short and broad, ramus apically setose, article 4 of gnathopod 2 very large and setose but appressed to posterior margin of article 5, mandibular palp with two articles (*Corophium*).....2

c. Uropod 3 lacking inner ramus, peduncle elongate, cylindrical, ramus short (Fig. 3*h*), microscopically hooked apically (as in Ischyroceridae), article 4 of gnathopod 2 in both sexes small, moderately setose, gnathopods dominated by large size of articles 5–6, male gnathopod 2 with bifid chela on article 5, mandibular palp with three articles.....
*Ericthonius pugnax**

2. Flattened urosome with coalesced segments forming saucer with slightly turned up margins, uropod 1 attached below urosome, uropod 2 attached on same level with uropod 3, notches absent on lateral margin of urosome.....*Corophium acutum*

Flattened urosome with coalesced segments flat or slightly puffy but lacking upturned rim, uropods 1–2 attached in lateral notches of urosome and uropod 2 attached in notch proximal to level of uropod 3.....3

3. Enlarged male antenna 2 with no processes on posterodistal end of article 5 and with two or three spines on posterior margin of article 4; slender female antenna 2 with spines on posterior margin of article 4 set in single row.....*Corophium sextonae*

Enlarged male antenna 2 with two processes on posterodistal end of article 5 and no spines on article 4; slender female antenna 2 with spines on posterior margin of article 4 occurring in pairs, except for terminal spine.....*Corophium acherusicum*

Key E, part 3

Podoceridae; thorax broad, flat, coxae very short, urosomite 1 elongate, legs usually lost in preservative, abdomen slightly flexed, head visible and with large antennal bases (even if distal articles broken), uropod 3 extremely small and lacking rami, best seen as two anal flaps by cutting away uropods 1–2 and mounting urosomites ventral side up, telson large, elongate and fleshy and bearing long dorsal spines (usually two), pereonite 7 and pleonites 1–2 with low dorsal humps or strong, sharp dorsal teeth.

*Now considered to be in the Ischyroceridae

1. Hand of gnathopod 1 expanded.....*Podocerus cristatus*

Hand of gnathopod 2 unexpanded (Fig. 81*c*).....2

2. Eye set flush with head and not forming bulge, antennae small (Fig. 85*a*).....*Podocerus wanganui*

Eye in strong nacellar bulge on side of head or near front of head, antennae large.....3

3. Eye enclosed within strong bulge set directly at anteroventral corner of head, that bulge forming head corner, though behind bulge small, sharp flange occasionally seen (Fig. 83*a*).....*Podocerus manawatu*

Eye enclosed within bulge set well posterior of sharp anteroventral corner of head (Fig. 81*a*).....*Podocerus karu*

Key E, part 4

Ampithoe

1. Gnathopod 1 with rectolinear hand bearing short transverse palm (Fig. 8*c*).....2

Gnathopod 1 with expanded hand bearing long, oblique palm (Figs. 11*e*, *j*).....*Ampithoe hinatore*

2. Hand of gnathopod 1 armed with large spine set back on hind margin nearly midway and far from obsolescent palm (Fig. 15*g*).....*Ampithoe* sp.

Hand of gnathopod 1 armed with small spine defining short transverse palm (Fig. 8*c*).....3

3. Telson with enormous posterolateral hook on each side (Figs. 13*c*, *d*).....*Ampithoe lessoniae*

Telson with small posterolateral knob(s) on each side (Fig. 9*b*).....*Ampithoe aorangi*

Key E, part 5

Ischyroceridae

1. Outer ramus of uropod 3 bearing strong, distally hooked spine clearly articulate, with base partially submerged in ramus, one edge of ramus with one to three reverted thorns (Figs. 3*e*, *g*).....*Jassa falcata*

Outer ramus of uropod 3 lacking large distal hook, though ramus itself distally hooked and occasionally bearing minute apical setule or articulate scale.....2

2. Solid apex of outer ramus on uropod 3 forming slightly hooked, elongate distal knob with closely adjacent proximal knob (Figs. 74*b*, *e*), outer ramus with one midlateral wire-like seta.....*Ventojassa frequens*

Solid apex of outer ramus on uropod 3 forming strongly hooked, sharp cusp with one to six closely proximal villi or cusps, apex occasionally with setule or scale (Fig. 73*d*).....*Ischyrocerus longimanus*

Key E, part 6

Gammaropsis Liljeborg

The New Zealand species of this genus are poorly known because they are primarily identifiable through conditions of male gnathopods. Various characters of females and juveniles are unevenly reported. Good taxonomic characters occur on all mouthparts and most other appendages (*see* J. L. Barnard 1970). Only two species of the genus have been found in intertidal collections, but a diagnostic key is presented below as an aid in sorting out various sublittoral species. The emarginate telson of two species is unusual and at

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

present cryptic, as it is uncertain whether the emargination is simply the dorsal excavation found on the normally solid, fleshy telson or whether the telson has become thin and nonfleshy. If the latter is true, then those species will be difficult to identify as isaeids in the normal procedure because they will appear to belong with the family Gammaridae; indeed they were originally described in the genus *Maera*. Urosomites 1–2 often have very weak dorsal teeth in this genus; those segments must be mounted dorsal side up so as to detect these weak teeth.

DIAGNOSIS: Accessory flagellum exceeding two articles; article 3 of antenna 1 as long as or longer than article 1; mandible with 3-articulate palp; gnathopod 2 slightly to greatly larger than gnathopod 1, both pairs subchelate; rami of uropod 3 subequal in length; coxae 1–4 subequal in size and shape.

DIAGNOSTIC KEY TO *Gammaropsis*

1. Telson deeply emarginate; hand of male gnathopod 1 narrow, palm slightly excavate; male gnathopod 2 extremely large, article 6 flabellate, with transverse palm bearing two teeth guarding one excavation in middle, defining corner quadrate, dactyl fitting palm but slightly to strongly overlapping face of hand; pereopod 4 slender; urosome presumably without dorsal teeth ..... *haswelli*
2. Telson deeply emarginate; hand of male gnathopod 1 narrow, palm oblique, not excavate; male gnathopod 2 podocerid-like, article 4 triangular and sharply produced freely, article 5 short, narrow, triangular, with long, free subacute lobe posteriorly, hand long and narrow, slightly widening apically and ending sharply at short, transverse palm, dactyl very long and strongly exceeding short palm, dactyl with slight proximal bulge; pereopod 4 slender; urosome presumably without dorsal teeth ..... *chiltoni*
3. Telson unknown but presumed to be non-emarginate; hand of male gnathopod 1 narrow, palm slightly excavate; male gnathopod 2 narrow, hand long, rectangular, palm simple, tumid, nearly transverse, dactyl as long as palm but overriding on to face of hand; pereopod 4 probably slender; urosome unknown ..... *longimana*
4. Telson not emarginate; male gnathopod 1 apparently with slightly inflated hand, palm unexcavate; male gnathopod 2 with large hand, palm nearly transverse, defined by strong tooth, with contiguous tooth, then cavity in middle and subquadrate tooth, dactyl massive, closing between the two contiguous teeth, inner margin of dactyl with prominence not filling main cavity of palm, dactyl also with proximal bulge; pereopod 4 stout; urosomite 1 with three small dorsal teeth..... ..... New Zealand "*crassipes*" and *see Gammaropsis* sp.
5. Telson not emarginate; male gnathopod 1 with broadly inflated hand and unexcavate palm; male gnathopod 2 (Chilton 1921b) with very inflated subelliptical hand bearing slightly oblique palm with two weak excavations, two subcastelliform teeth, one near hinge of dactyl, one in middle of palm plus one weak defining tooth, dactyl fitting palm and with sharp bulge in middle; female gnathopod 2 of regular form, palm oblique and slightly dentate, bearing weak defining cusp; pereopod 4 slender; urosomite 1 with one small dorsal tooth..... ..... *thomsoni*
6. Telson not emarginate; male gnathopod 1 with narrow hand and excavate palm; male gnathopod 2 extremely setose on article 2 (anterior) and articles 5–6, gnathopod 2 narrow, hand long, rectangular, with oblique short palm bearing large tooth near dactylar hinge, small excavation and medium defining tooth, dactyl fitting palm or scarcely so; pereopod 4 slender; urosome without teeth ..... *tawahi*
7. Telson not emarginate; male gnathopod 1 with narrow hand, palm not excavate; male gnathopod 2 with large, elongate, narrow hand, somewhat podocerid-like (resembling *G. chiltoni*) but article 5 with posterior lobe free only in juveniles, becoming immersed between articles 4–6 in adult, hand with proximoposterior lump in juveniles, migrating proximally in adult and assuming appearance of a lobe on article 5 (in resemblance to *G. chiltoni*), distal end of hand with bilobation forming weak palm in juvenile, dactyl about half length of hand in juvenile but elongating greatly in adult to full length of hand; pereopod 4 slender; urosome without teeth ..... *typica*

KEY F

Eusiridae; uropod 3 has two equal rami longer than peduncle; gnathopod 2 is not lysianassid (article 3 short); anterior coxae not acuminate and of basic dimensions; urosomites 2–3 are not coalesced, except in *Paracalliope;* telson thin, cleft or uncleft; accessory flagellum vestigial or absent.

1. Gnathopod 2 extremely elongate, articles 5–6 very long (telson uncleft) ..... (Fig. 30) *Oradarea novaezealandiae*

   Gnathopod 2 of normal gammaridean dimensions.....2
2. Head with long rostrum (Fig. 44*a*) (telson cleft)..... *Pontogeneiella levis*

   Head with short, normal rostrum (Fig. 38*a*).....3
3. Pereopod 5 very elongate, with long straight styliform and setose article 7 (Fig. 35*a*), peduncle of uropod 3 elongate (rami not longer than peduncle) (telson uncleft)..... *Paracalliope novizealandiae*

   Pereopod 5 scarcely longer than pereopod 4, peduncle of uropod 3 not elongate and rami longer than peduncle.....4
4. Telson uncleft (mouthparts as in couplet 8b)..... "*Apherusa*" *translucens*

   Telson cleft.....5
5. Gnathopods with special structure of *Eusirus* (Sars 1895, pls. 146–148), article 6 attached to thin produced apex of article 5.....*Eusirus antarcticus*

   Gnathopods with normal attachment of article 6.....6
6. Hands of gnathopods subcircular to ovate, gnathopods 1–2 of equivalent size, large, palms strongly tumid and evenly lined with one row (on a side) of very large stout spines, maxilla 2 lamellar and with unevenly concentrated group of small setae on inner plate..... *Eusiroides monoculoides*

   Hands of gnathopods subrectangular, gnathopods 1–2 rarely of equivalent size, usually small, palms weakly tumid and unevenly lined with thin, and/or small spines (Figs. 38*c*, *d*), maxilla 2 not lamellar (Fig. 29*m*), setae on outer plate evenly distributed.....7
7. Anteroventral corner of head with sharp process, peduncle of uropod 3 with long, stout apical process supporting inner ramus, latter usually falling off preserved individuals (Fig. 28).....*Atyloella moke*

   Anteroventral corner of head unproduced, uropod 3 without distal peduncular process supporting inner ramus, both rami usually unbroken in preserved individuals 8
8. Inner plate of maxilla 1 thin and with 2–3 terminal setae (Fig. 42*j*), accessory flagellum very small or absent (Fig. 42*k*) (*Gondogeneia*).....9

   Inner plate of maxilla 1 basally expanded and bearing four or more setae along medial margin (Fig. 38*b*), accessory flagellum forming setose lappet as long as article 1 of primary flagellum (Fig. 39*i*) (*Paramoera*).....10

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

9. Pleonal epimeron 3 with broadly rounded posterior margin meeting posteroventral corner far ventrally at slight notch bearing spinule (Fig. 42*n*)..... *Gondogeneia danai*

Pleonal epimeron 3 with angularly rounded posterior margin meeting ventral margin with rounded obtuse corner, no notch and spine (Fig. 43*k*)..... *Gondogeneia rotorua*

10. Uropod 2 (not including distal spines) not extending as far as uropod 1 (Fig. 38*j*)..... *Paramoera chevreuxi*

Uropod 2 extending as far as uropod 1 (Fig. 40*i*)..... *Paramoera rangatira*

KEY G

Liljeborgiidae; with appearance of basic gammaridean but both pairs of gnathopods of similar morphology and enlarged hands bearing several cycles of spines, one cycle usually hooked, hands partially guarded by large lobe of article 5, accessory flagellum very large and long, telson cleft, mandibular molar untriturative, often spinose; dorsal teeth of pleonites often tiny and difficult to observe. Key from Hurley (1954g).

1. Pleonal epimeron 3 lacking posterodistal incision.....2

Pleonal epimeron 3 bearing posterodistal incision.....3

2. Pleonites 1–2 usually weakly 3-dentate dorsally; coxa 4 with smooth posterior margin; article 2 of pereopod 5 not strongly lobed proximally in males, posterior margin minutely serrate, terminal male gnathopod 2 with weak palmar concavity..... *Liljeborgia aequabilis*

Pleonites 1–2 usually strongly 5-dentate dorsally; coxa 4 with notch in middle of posterior margin; article 2 of pereopod 5 strongly lobed anteroproximally in males, gnathopod 2 in terminal males with strongly concave palm..... *Liljeborgia dubia*

3. Pleonal epimeron 3 with two posterodistal teeth..... *Liljeborgia hansoni*

Pleonal epimeron 3 with simple notch posterodistally.....4

4a. Urosomites 1–2 each with strong posterodorsal tooth, article 6 of pereopod 2 posteriorly lined with fine setae, no comb-pectination, dactyls of gnathopods 1–2 with no and five teeth, respectively, on inner margins..... *Liljeborgia barhami*

b. Urosomites 1–2 each with weak posterodorsal tooth, article 6 of pereopod 2 posteriorly lined with about 11 strong spines, no setae, no comb-pectination, dactyls of gnathopods 1–2 with 5–6 and 12–13 teeth, respectively, on inner margins..... *Liljeborgia akaroica akaroica*

c. Urosomites 1–2 each with weak posterodorsal tooth, article 6 of pereopod 2 posteriorly lined with seven short spine setae and fine comb-pectination between setae, dactyls of gnathopods 1–2 with 6 and 9–10 teeth, respectively, on inner margins... *Liljeborgia akaroica maria*

KEY H

Gammaridae; body plan like that of basic gammaridean (Fig. 1) but accessory flagellum occasionally as little as 2-articulate (N.Z. intertidal Eusiridae have non- or 1-articulate accessory flagellum); telson cleft except in *Parapherusa*, that genus with multiarticulate accessory flagellum and characteristic uropod 3 (Fig. 2*g*); mouthparts basic, mandibular palp either with falciform or lanceolate article 3; uropod 3 variable, basically with two equal rami longer than peduncle, but in *Elasmopus* with rami as short as peduncle and inner ramus often shortened, in *Melita* with inner ramus very short and scale-like but outer immensely elongate and 2-articulate; differing from Corophiidea (considered as superfamily) in thin, non-fleshy telson and absence of glands in articles 2 and 4 of pereopods 1–2 (but *see* Podoceridae characterised by vestigial uropod 3).

1. Telson entire, uropod 1 with interramal tooth..... *Parapherusa crassipes*

Telson cleft, uropod 1 without interramal tooth.....2

2. Some or all of pleonites 1–5 with dorsal serrations on posterodorsal and lateral margins (Fig. 65*g*).....3

Pleonites 1–5 dorsally smooth or occasionally pleonite 4 with one or two parasagittal carinae.....5

3 Pleonites 4–5 with small dorsal articulate spines in addition to fixed teeth, article 1 of mandibular palp without distal tooth, gnathopods small in both sexes, article 3 of mandibular palp long (Figs. 65, 66)..... *Metaceradocus whakatane*

Pleonites 4–5 lacking articulate dorsal spines, article 1 of mandibular palp with distal tooth or spine (Fig. 47*b*), gnathopod 2 enlarged in male, article 3 of mandibular palp very short, about as long as article 1.....4

4. Each telsonic lobe with four spines and two setules, pleonal epimera 1–2 not grossly toothed posteriorly, occasionally with very weak and sparse serrations .... *Ceradocus chiltoni*

Each telsonic lobe with two spines and one setule, pleonal epimera 1–2 with heavily serrate posterior margins (Fig. 47)..... *Ceradocus rubromaculatus haumuri*

5. Inner ramus of uropod 3 very short and scale-like, outer ramus very long and 2-articulate (Fig. 61*d*).....6

Rami of uropod 3 equal in length, long or short, article 2 on outer ramus vestigial if present.....8

6. Pleonite 4 with one tooth (presumed dorsal), pleonite 5 with two small teeth (presumed one each lateral), male gnathopod 2 with rectangular hand, well defined palm nearly transverse and short, dactyl very stout, short, fitting palm, female gnathopod 2 with three or four low teeth on palm..... *Melita festiva*

Pleonite 4 smooth dorsally, pleonite 5 with one or two small teeth on each side dorsally, male gnathopod 2 with subovate hand, palm undefined, oblique and curved, dactyl long and slender, tending to ride over palm on to face of hand, female gnathopod 2 with smooth palm defined only by spines.....7

7. Head with deep anteroventral notch (from lateral view), pleonite 5 with two teeth and one spine on each side dorsally, telsonic lobes apically sharp, male gnathopod 1 with large inner hump on dactyl, male gnathopod 1 without hump on hand (Figs. 61, 62, 64)..... *Melita inaequistylis*

Head with anteroventral excavation, no notch, pleonite 5 with one tooth and one spine on each side dorsally, telsonic lobes apically rounded, male gnathopod 1 without hump on dactyl, male hand with large anterior hump (Figs. 61, 62, 63)..... *Melita awa*

8. Palp article 4 of mandible expanded and falcate, inner edge densely armed with closely packed setae forming comb-row (Fig. 49*i*).....9

Palp article 4 of mandible thin, not falcate, bearing a few long setae mostly terminal (Fig. 56*k*).....11

9. Pleonite 4 with one sharp sagittal carina, article 2 of pereopod 5 with deep posterior castelloserrations (male gnathopod 2 heavily setose, palm undefined but with weak distal bilobation, dactyl slender but weakly and asymmetrically bifid apically) (Figs. 50, 51)..... *Elasmopus neglectus*

Pleonite 4 dorsally smooth, article 2 of pereopod 5 with normal (weak and sparse) posterior serrations.....10

10. Telson and uropod 3 very short, lobes of telson evenly rounded, inner ramus of uropod 3 about half as long as outer ramus, article 3 of mandibular palp very

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

stout (Fig. 49*i*), (one member of male gnathopod 2 with inflated dactyl)..... *Elasmopus bollonsi*

Telson and uropod 3 of normal length, lobes of telson weakly and asymmetrically bilobate, inner ramus of uropod 3 about two-thirds as long as outer ramus, article 3 of mandibular palp thin (but falcate) (Fig. 53*g*), (male gnathopod 2 with normally thin dactyl).... *Elasmopus wahine*

11. Inner plate of maxilla 2 with medial setae, head with anteroventral excavation, no notch, no tooth (Figs. 45, 46)..... *Ceradocopsis peke*

Inner plate of maxilla 2 with no medial setae, head with anteroventral notch or tooth.....12

12. Pleonite 4 with two dorsal parasagittal carinae (head with anteroventral notch) (Figs. 59, 60).. *Mallacoota subcarinata*

Pleonite 4 dorsally smooth.....13

13. Pleonal epimeron 3 deeply serrate posteriorly (head with anteroventral tooth and notch) (Figs. 55, 56)..... *Maera mastersi*

Pleonal epimeron 3 posteriorly smooth.....14

14. Palm of male gnathopod 2 perfectly transverse or nearly chelate, each telsonic lobe with terminal spines and group of subdistal spines (head with anteroventral tooth) (Fig. 54)..... *Maera incerta*

Palm of male gnathopod 2 slightly oblique, each telsonic lobe with terminal spines only (head with weak anteroventral tooth) (Figs. 57, 58)..... *Maera tepuni* and *Maera* spp.

KEY I

Stenothoidae; coxa 1 very small and almost completely hidden by coxa 2, coxa 4 very large and forming lateral shield; differs from Nihotungidae in ventral projection of coxae 2 and 3 as far as coxa 4; uropod 3 with one ramus bearing two articles; telson entire; uropod 2 often shortened; palp of mandible variable, often absent; plates of maxilliped very weak.

1. Gnathopod 2 carpochelate (Fig. 91*a*)..... *Raumahara rongo*

Gnathopod 2 subchelate or nearly simple.....2

2. Antenna 1 with large nasiform process, urosomite 1 with large dorsal hump overriding telson (Fig. 90*l*)..... *Parathaumatelson nasicum*

Antenna 1 and urosome without humps.....3

3. Article 2 of pereopods 4–5 linear, mandibular palp present..... *Probolisca ovata*

Article 2 of pereopods 4–5 ovately expanded (Figs. 88*b–c*), mandibular palp absent..... *Stenothoe* spp. (*see S. moe* and *S. valida*)

KEY J

Talitroidea, regular members of Talitridae and Ceinidae (*see also* Key M for Eophliantidae and Key A couplet 8 for Phliantidae). Regular talitroideans of Ceinidae and Hyalidae herein considered have discrete urosomites though urosome often reduced in size, mandible without palp, molar varying from heavily triturative to spike-like but always present and conspicuous; accessory flagellum absent; uropod 3 cylindrical or partially flattened laterally, bearing one ramus or none; body laterally compressed, coxae 1–4 large; telson cleft but lobes often tightly appressed. Key written to cover both sexes, *see* Hurley (1957a) for key to males of *Hyale* and *Allorchestes* and for several figures of parts described in key herein.

1. Uropod 3 without ramus (Fig. 3*o*).....(Ceinidae) 2

Uropod 3 with ramus (Fig. 3*m*).....(Hyalidae) 3

2. Pereopod 3 grossly setose on anterior margins of articles 2, 3, 4; mandibular molar subcolumniform, weakly triturative; head attached normally to body; telsonic lobes appressed and elevated to form tent (seen sagitally) (Figs. 95–97)..... *Taihape karori*

Pereopod 3 lacking long anterior setae on articles 2, 3, 4, mandibular molar forming long smooth thorn; head attached to body in underslung fashion, telson normally flat (Figs. 93, 94)..... *Ceina egregia*

3. Pereopods with distal locking spine on article 6 forming deeply striate arrowhead next to striped lanceolate spine..... *Hyale maroubrae*

Pereopods lacking arrowhead locking spine.....4

4. Pereopodal locking spine occurring as single, large spirally striate column..... *Hyale media*

Pereopodal locking formula composed of at least two spines or, if one spine only, that spine very small and simple 5

5. Uropod 1 with distolateral end of peduncle bearing enlarged spine, this spine much larger than other peduncular spines.....6

Uropod 1 with distolateral end of peduncle bearing unenlarged spine, occasionally mediodistal end with enlarged spine.....8

6. Distal locking spine (and others) on article 6 of pereopods spirally striate..... *Hyale rubra*

Distal locking spine on article 6 unstriate.....7

7. Dactyls of pereopods with very weak distal setule, dactyl without castellopectinations..... *Hyale grenfelli*

Dactyls of pereopods with strong curved seta near middle of dactyl and inner margin of dactyl with strong castellopectinations..... *Hyale grandicornis* f. *thomsoni*

8. Coxa 1 smooth posteriorly (both sexes), palm of gnathopod 1 precisely transverse (both sexes)..... *Allorchestes novizealandiae*

Coxa 1 with sharp acclivity posteriorly, palm of gnathopod 1 slightly to strongly oblique.....9

9. Hand of gnathopod 1 bearing one continuous bundle of posterior setae, distal locking spine single and small.... *Hyale grandicornis*

Hand of gnathopod 1 bearing two or three discrete posterior bundles of setae, distal locking spines of pereopods long and paired..... *Hyale hirtipalma*

KEY K

Eophliantidae; body cylindrical; head noticeably globular, antennae short; mandible without conspicuous palp; urosome small but not depressed; uropod 3 extremely small, scarcely visible, lacking rami; gnathopods poorly setose and thin.

1. Pleopods with one short ramus, maxillipedal palp article 4 with extremely long distal seta about as long as palp (Figs. 103, 104)..... *Cylindryllioides kaikoura*

Pleopods with two well developed rami, maxillipedal palp article 4 with short distal setae.....2

2. In formaldehyde after one to seven days of preservation body bright orange, pereonite 1 (thoracic segment 1) bearing ventral cradle behind head (Figs. 100–102)..... *Bircenna fulva*

In formaldehyde after one to seven days of preservation body bright green, occasionally marked with dark brown or occasionally retaining brown pigment mixed with small splotches of green, body bright green in alcohol for 3–30 days, pereonite 1 lacking ventral cradle (Figs. 105, 106)..... *Wandelia* (?) *wairarapa*

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

KEY L

Amphilochidae; coxa 1 much smaller than coxa 2, coxa 4 very large; uropod 3 with elongate peduncle and two elongate rami; telson entire, often elongate; uropod 2 usually shortened; identification requires careful examination of mandibular molar (couplet 4) and palp (couplet 2) and in *Amphilochus* and *Gitanopsis* the cleaning of gnathopodal palms and dactyls with small brush in order to see dactylar and palmar pectinae (couplet 8). Amphilochidae differ from Stenothoidae in the biramous uropod 3 and additionally from the Nihotungidae in the ventral projection of coxae 2 and 3 as far as coxa 4.

1. Contiguous margins of coxae 3 and 4 abutting (Sars 1895, pl. 79, fig. 2).....2
   Contiguous margins of coxae 3 and 4 overlapping (Sars 1895, pl. 79, fig. 1).....4
2. Mandibular palp 3-articulate, anterior margin and surface of dactyl on gnathopod 1 very weakly toothed (scaled) *Peltopes peninsulae*
   Mandibular palp absent, both margins and surface of dactyl on gnathopod 1 heavily toothed.....3
3. Gnathopod 1 with about five and seven strong teeth on anterior and posterior margins of dactyl, a few small spine-teeth on surface.....*Neocyproidea otakensis*
   Gnathopod 1 with about six and 13 strong teeth on anterior and posterior margins of dactyl, many smaller spine-teeth on surface.....*Neocyproidea pilgrimi*
4. Mandibular molar heavily triturative, cushion-shaped (Fig. 7*j*).....5
   Mandibular molar nearly simple and conical (Fig. 5*c*).....7
5. Gnathopod 2 very large and with process on article 5 reaching almost to end of hand (Fig. 6*g*)....*Gitanopsis kupe*
   Gnathopod 2 either very small (hand much narrower than coxa 2) or with process on article 5 short.....6
6. Hand of gnathopod 2 about 1.1 times as broad as article 2, inner margin of lower lip incised, telson long and narrow, with two terminal notches....*Gitanopsis squamosa*
   Hand of gnathopod 2 more than twice as broad as article 2, inner margin of lower lip smooth, telson ovate, smoothly rounded apically.....*Gitanopsis desmondi*
7. Hand of gnathopod 2 as broad as long..... *Amphilochus marionis*
   Hand of gnathopod 2 about 1.5 times longer than broad....8
8. Dactyls of gnathopods 1–2 neither distally attenuate nor pectinate on inner edge, dactyls fitting palms, gnathopods 1–2 nearly equal in size (Figs. 4,5)..... *Amphilochus opunake*
   Dactyls of gnathopods 1–2 distally attenuate, extended as filiform but apically spatulate claws overriding palms, pectinate on inner edges.....*Amphilochus filidactylus*

KEY M

Colomastigidae; body subcylindrical, urosomites 2–3 coalesced, coxae short; gnathopod 1 filiform, simple, but gnathopod 2 more or less enlarged and subchelate; mandible lacking palp and formed mainly of small body tipped with comb of spines; telson entire. Adults 2–4 mm long. *See* Hurley (1954e) for review of this family.

1. Outer ramus of uropod 3 vestigial, about one eighth as long as inner ramus, article 5 of pereopods 3–5 with sharp anterodistal tooth.....*Colomastix magnirama*
   Outer ramus of uropod 3 about three fourths as long as inner ramus; article 5 of pereopods 3–5 lacking sharp anterodistal tooth.....*Colomastix subcastellata*

ACANTHONOTOZOMATIDAE

The type species of *Panoploea*, *P. spinosa* Thomson, as shown by Hurley (1954g), does not have the palp of maxilla 1 as small as formerly attributed. Chevreux and Fage (1925) listed the type species of *Panoploea* as *P. eblanae*, but that is erroneous. Other species of *Panoploea* differ from *P. spinosa* in the significantly smaller palp of maxilla 1 and a genus for those may have to be created. *Panoploea* thus falls closer to *Iphimedia*, type *I. obesa* Rathke, than hitherto considered. The only strong qualitative character at present obvious in distinguishing *Panoploea* from *Iphimedia* is the deeply serrate second articles of pereopods 3–5.

Iphimedia haurakiensis Hurley

Iphimedia haurakiensis Hurley, 1954g: 778–783, figs. 69–104.

DISTRIBUTION: Hauraki Gulf, off Kawau Island.

Maoriphimedia hinemoa Hurley

Maoriphimedia hinemoa Hurley, 1954g: 772–777, figs. 36–38.

DISTRIBUTION: Hauraki Gulf, off Kawau Island.

Panoploea spinosa Thomson

Panoploea spinosa Thomson, 1880a: 3, pl. 1, fig. 2; Thomson 1880b: 215; Thomson and Chilton, 1886: 150; Thomson, 1889: 262; 1913: 242; Stephensen, 1927: 313–314, fig. 9; Hurley, 1954g: 766–771, figs. 1–35.

DISTRIBUTION: Dunedin Harbour (and Portobello) 7–9 m (4–5 fm) to Hauraki Gulf off Kawau Island; Bay of Islands, dredged; Lyttelton; Auckland Islands, rocky coast.

AMPHILOCHIDAE

Amphilochus filidactylus Hurley

Gitanopsis pusilla. Stephensen, 1949: 8, fig. 1 (not K. H. Barnard, 1916).
Amphilochus filidactylus Hurley, 1955: 209–213, figs. 67–90.

MATERIAL: NZOI Sta. E970 (4), Kaikoura, K800 E (2).

DISTRIBUTION: Otago Harbour, Portobello, off stalk of *Pyura pachydermatina* with *Elzerina blainvillei*; coll. D. E. Hurley, Kaikoura.

EXTRINSIC DISTRIBUTION: Tristan da Cunha; Nightingale.

Amphilochus marionis Stebbing

Amphilochus marionis Stebbing, 1888: 743–746, pl. 38; Stebbing, 1906: 151; 1910: 577–578; ?Schellenberg, 1938: 17.
?Gitanopsis marionis. Schellenberg, 1931: 95.

Schellenberg's (1931) New Zealand record remains

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

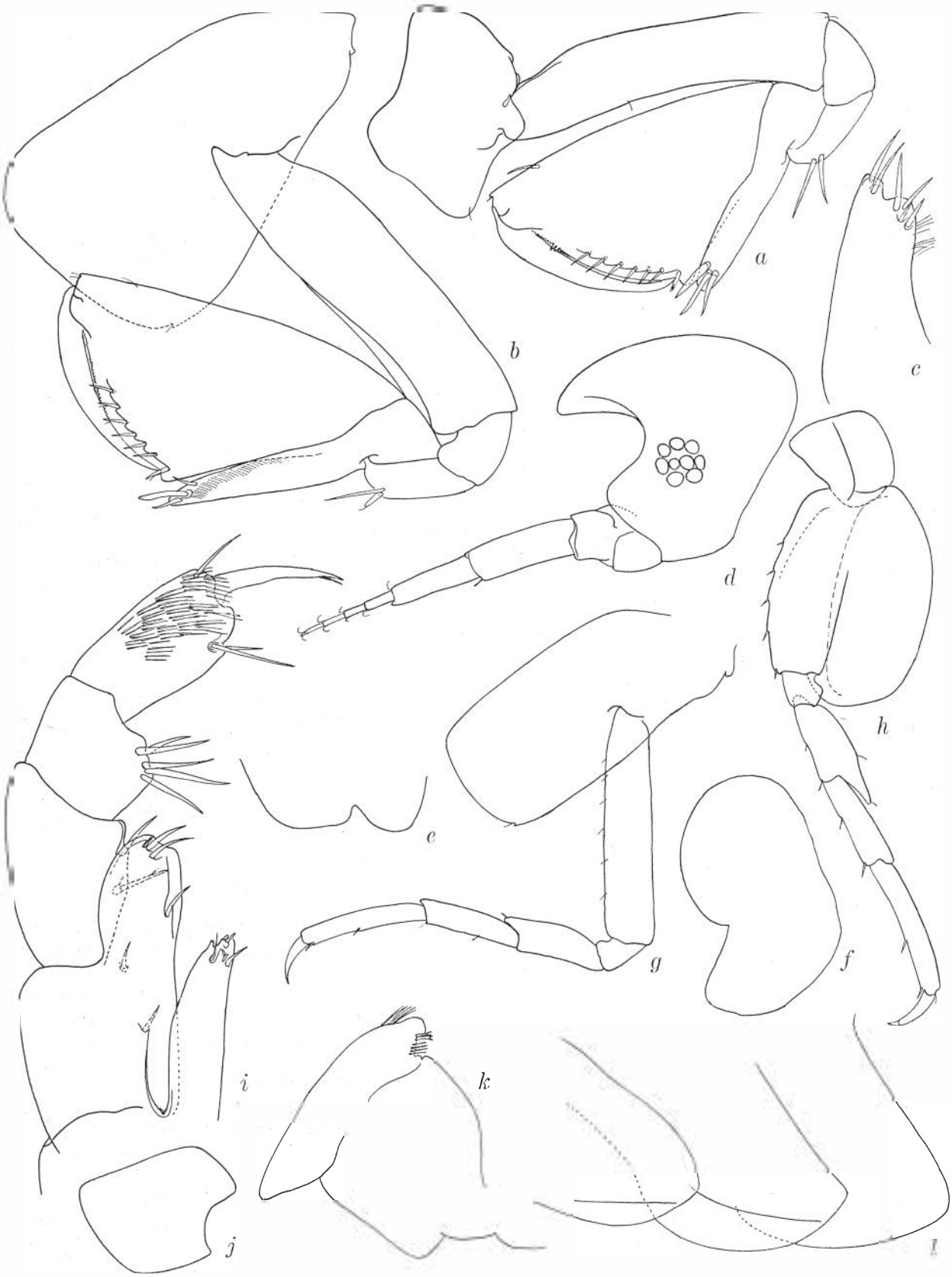


FIG. 4. *Amphilochus opunake* n. sp., holotype, female, 1.9 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, *b*, medial gnathopods 1, 2: *c*, left maxilla 2; *d*, head; *e*, upper lip; *f*, coxa 3; *g*, *h*, pereopods 1, 5; *i*, maxilliped; *j*, coxa 4, reduced in size; *k*, half of lower lip; *l*, pleonal epimera 1–3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 5. *Amphilochus opunake* n. sp., holotype, female, 1.9 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, maxilla 1; *b*, right maxilla 2; *c*, mandibular molar; *d*, right mandibular incisor; *e*, mandibular palp; *f*, inner plate of maxilla 1; *g*, article of 2 pereopod 3; *h*, apex of telson; *i*, palm of medial gnathopod 1; *j*, antenna 1; *k*, telson; *l*, uropod 3.

dubious and his (1938) record from tropical waters highly improbable for this subantarctic species originally described from Marion Island. Probably his New Zealand record refers to *Amphilochus filidactylus* Hurley.

DISTRIBUTION: Lyttelton Harbour (Schellenberg 1931).

EXTRINSIC DISTRIBUTION: Marion Island, 183 m; ? off Manning River, Australia; ? Gilbert Islands; ? Hawaii.

Amphilochus opunake, new species

Figs. 4, 5

DIAGNOSIS: Antennae extending subequally (including apical aesthetascs of antenna 1); rostrum of medium size, lateral cephalic lobe evenly mammilliform; eye clear in formaldehyde and composed of about nine ommatidia only; mandibular molar long, coniform, thin apex sparsely frilled, articles 2 and 3 of palp equal in length, article 3 with sharp apical cusp and one seta; outer plate of maxilla 1 with seven spines, palp debatably biarticulate; maxilla 2, right side normal but lobes of left side not split; coxa 1 roughly quadrate but anteriorly excavate deeply and ventrally less deeply; hands of gnathopods strongly triangular, expanded distally, palms oblique, minutely serrate, dactyls not attenuate, smooth on inner margins except for one notch, palms lined with submarginal row of spines, weakly defined, process of article 5 reaching full length of posterior margin of hand, bearing three large apical spines, article 5 unproduced, bearing two posterior spines, no other major spines present, gnathopods 1–2 large and very similar in size and morphology; dactyls of pereopods simple; pleonal epimera 1 and 3 with rounded posteroventral corners, epimeron 2 with softly quadrate corner; uropod 1 reaching apex of uropod 3, uropod 2

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

extending to end of peduncle of uropod 3; outer ramus of uropod 1 more than 95 percent as long as inner, of uropod 2 about 50 percent, of uropod 3 about 67 percent; telson triangular, elongate.

Tiny accessory flagellum believed to be present.

HOLOTYPE: NZOI No. 78, juvenile female, 1.9 mm.

TYPE LOCALITY: NZOI Sta. E967, Eve Bay, Wellington, New Zealand, intertidal wash of algae, 5 November 1967.

RELATIONSHIP: The unilateral aberrancy in maxilla 2 recalls the generic value of aberrancy in maxilla 2 in taxa such as *Cyclotelson* Potts and *Amphilochella* Schellenberg, but in numerous other characters *A. opunake* shows no relationship to those genera. Within the genus *Amphilochus* this species from New Zealand is unusual in the equality of size in gnathopods 1–2. The species differs from its sympatriot *A. filidactylus* Hurley (1955) in the non-attenuate, unpectinate dactyls of the gnathopods, in the equality of gnathopods 1–2 in size and morphology, and in the presence of an apical spine on mandibular palp article 3.

It bears distant resemblance to *A. manudens* Bate (*see* Sars 1895, pl. 74) but that species has a sharp cusp representing the lateral cephalic lobe, the process on article 5 of gnathopod 1 reaches only halfway along the hand, uropod 3 extends well beyond the apex of uropod 1, the latter has equally extending rami, and the anterodistal corner of the hand is sharply produced.

Amphilochus opunake differs from the widespread *A. neapolitanus* Della Valle in the equality of the gnathopods and the extension of the process on article 5 of gnathopod 1 fully along article 6.

Amphilochus marionis Stebbing (1888, pl. 38) has the hand of gnathopod 2 as broad as long, the palm convexly transverse, lacks a distal seta on the mandibular palp, and has a short, subovate telson.

MATERIAL: NZOI Sta. E967 (7), Sta. E970(1), Sta. E975 (2).

DISTRIBUTION: Kaikoura; Wellington; Leigh.

Gitanopsis desmondi, new species

Gitanopsis pusilloides. Hurley, 1955: 216–220, figs. 119–138 (not Shoemaker, 1942).

The sparse knowledge of taxonomy in this genus and *Amphilochus* available to Dr D. E. Hurley in 1955 has been amplified, especially by J. L. Barnard (1960), to demonstrate that the seemingly minor characters of difference between the New Zealand population and that from Baja California are of specific value. These characters include the slight difference in slope of palm, small differences in size of lobes on fifth articles of gnathopods, and the presence of pectinae on the gnathopodal dactyls. When Shoemaker's species may again be examined there may be found small differences on the maxillipeds.

This species is gratefully dedicated to Dr Desmond E. Hurley who has shed so much light on the Amphipoda and Isopoda of southern waters.

DIAGNOSIS: Body without dorsal cusps; lateral cephalic lobe broadly rounded; eye circular to weakly reniform, with dark core; antenna 1 about two-thirds as long as antenna 2; accessory flagellum formed of one long and one short article; lower lip with straight medial margin on each lobe, each with apical frayed-tip spine-process below broad apical flabellum; maxilla 1 with one seta on inner plate; lobes of maxilla 2 of normal dimensions, each with three apical setae and inner with subterminal medial seta; mediodistal margin on outer plate of maxilliped unexcavate and weakly pectinate; apex with one stout spine and one setule; gnathopods 1–2 of medium enlargement, subequal in size and morphology, hands much longer than broad, more than twice as broad as article 2 but only 70 percent as broad as coxa 2, palms slightly oblique and weakly convex, lobes on fifth articles extending about halfway along sixth, anterodistal corners of hands softly rounded, dactyls with inner pectinations ending at tooth on position 75; pereopodal dactyls simple; pleonal epimera 2–3 with obtusely pointed and extended posteroventral corners; telson oval.

HOLOTYPE: Slide tray 122/11, Chilton collection.

TYPE LOCALITY: Port Chalmers, New Zealand.

MATERIAL: NZOI Sta. E970 (1), Sta. ?E971 (1), Sta. E973 (7), E975 (3).

DISTRIBUTION: Port Chalmers; Dunedin; Kaikoura; Leigh.

Gitanopsis kupe, new species

Figs. 6, 7

DIAGNOSIS: Body without dorsal cusps; lateral cephalic lobe broadly rounded somewhat asymmetrically; eye large, with core of black pigment in alcohol; antenna 2 slightly exceeding antenna 1; gnathopods large, hand of gnathopod 2 as broad as coxa 2 but gnathopod 1 significantly smaller than gnathopod 2, stout lobe of article 5 on gnathopod 1 extending nearly halfway along article 6, palm nearly transverse, grossly pectinate, thin lobe of article 5 on gnathopod 2 nearly reaching end of hand, palm slightly oblique, grossly scalloped, gnathopodal dactyl pectinations on inner margins ending distally in enlarged tooth at about mark 70, gnathopod 2 with small posterior spine on article 4; coxa 1 evenly trapezoidal, neither coxae 1–2 with strong posteroventral notch; pereopodal dactyls with distal suture marked by slight inner swelling armed with very weak setule; pleonal epimera 1 and 3 rounded-quadrate posteroventrally, epimeron 2 with blunt posteroventral cusp; telson of medium length, subpyriform, apically rounded about 75 percent as long as peduncle of uropod 3.

HOLOTYPE: Canterbury Museum AQ3398, male, 2.7 mm. Unique.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

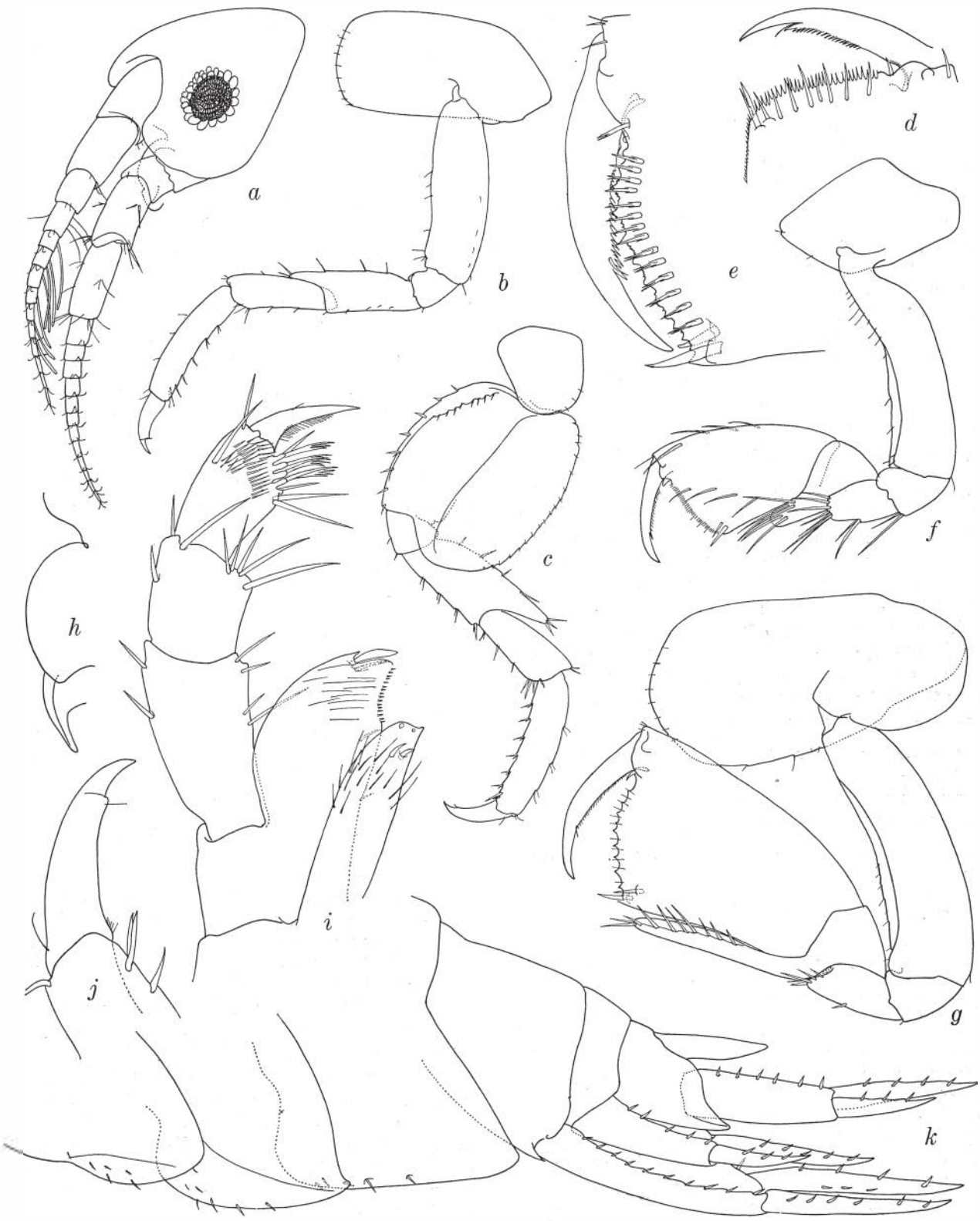


FIG. 6. *Gitanopsis kupe* n. sp., holotype, male, 2.7 mm, Kaikoura K 812S: *a*, head; *b*, *c*, pereopods 1, 5; *d*, *e*, palms of gnathopods 1, 2; *f*, *g*, gnathopods 1, 2; *h*, prebuccal mass; *i*, maxilliped; *j*, dactyl of pereopod 4; *k*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

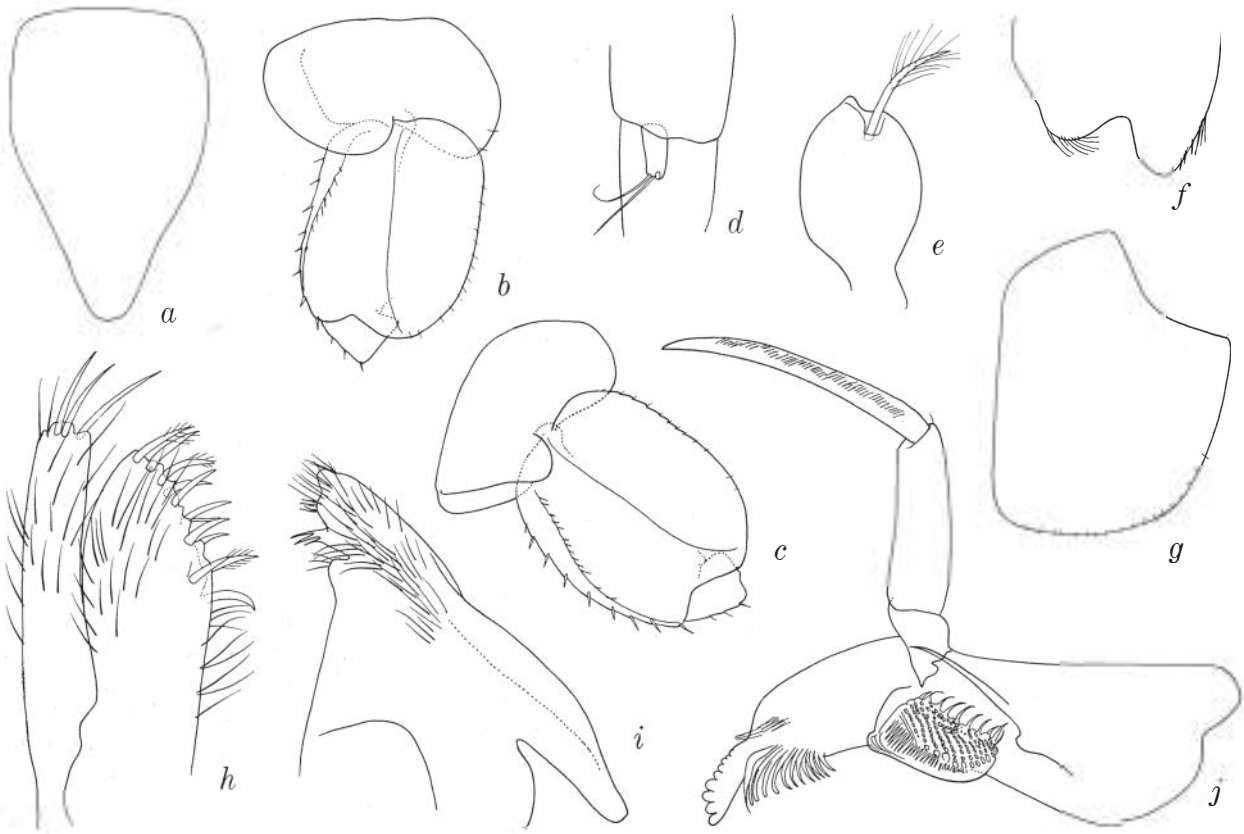


FIG. 7. *Gitanopsis kupe* n. sp., holotype, male, 2.7 mm, Kaikoura K 812S: *a*, telson; *b*, *c*, bases of pereopods 3, 4; *d*, accessory flagellum; *e*, inner plate of maxilla 1; *f*, upper lip; *g*, coxa 4; *h*, maxilla 2; *i*, half of lower lip; *j*, mandible.

TYPE LOCALITY: K812S, Kaikoura, New Zealand.

RELATIONSHIP: The large gnathopods distinguish this species from New Zealand's *G. squamosa* (Thomson), while the inequality of gnathopods 1–2 distinguishes it from *G. desmondi* and superficially from *Amphilochus opunake*, n. sp. Like *A. opunake*, but unlike other New Zealand amphilochids, the process on article 5 of gnathopod 2 extends almost fully along the hand. The hands of *G. squamosa* are much narrower than coxa 2, and gnathopod 1 of *G. desmondi* and *A. opunake* is very similar in size and morphology to gnathopod 2, unlike *G. kupe*.

Gitanopsis pusilla K. H. Barnard (1916) from South Africa and *G. vilordes* J. L. Barnard (1962c) from California have unscalloped palms on gnathopod 2. *Gitanopsis pele* J. L. Barnard (1970) from Hawaii also lacks a scalloped palm on gnathopod 2, has no distal swellings on the pereopodal dactyls, has small gnathopods, no tooth on pleonal epimeron 1, and a slightly narrower telson.

DISTRIBUTION: Kaikoura.

Gitanopsis squamosa (Thomson)

Amphilochus squamosus Thomson, 1880a: 4, pl. 1, figs. 4, 4a; Thomson, 1880b: 214–215, pl. 7, fig. 5; Thomson and Chilton, 1886: 149; Chilton, 1912a: 479; Chilton, 1923a: 84–85; Chilton, 1923b: 240; ?Stephensen, 1927: 308–309.
Gitanopsis squamosa. Schellenberg, 1926: 301–302; Schellenberg, 1931: 95; Stephensen, 1949: 6–7 (key and discussion); Hurley, 1955: 213–216, figs. 91–118.
Gitanopsis antarctica Chevreux, 1912: 104–108, figs. 13–15; Stephensen, 1949: 6–8 (with references).

MATERIAL: NZOI Sta. E966 (5), Sta. E967 (48), Sta. E970 (10), Sta. E971 (10), Sta. E973 (2), Sta. E975 (5), Sta. E977 (9), Sta. E978 (1), Sta. E979 (1), Sta. E982 (1).

DISTRIBUTION: Throughout New Zealand: Dunedin (Otago) Harbour (4–5 fm); Port Chalmers; Lyttelton; ? Auckland Island, rocky coast and shore under stones (Stephensen).

EXTRINSIC DISTRIBUTION: Circumsubantarctic: Scotia Bay; South Orkneys; Wilhelmina Bay (64° 30′ S, 62° W); Graham Land; South Georgia; Kerguelen; Tristan da Cunha; Australia.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Neocyproidea otakensis (Chilton)

Cyproidia otakensis Chliton, 1900: 243–246, pl. 5.
Cyproidea otakensis. Thomson, 1913: 242.
Neocyproidea otakensis. Hurley, 1955: 200–203, figs. 14–38.

DISTRIBUTION: Port Chalmers (Otago Harbour) (surface net) coll. D. E. Hurley; Hauraki Gulf, off Kawau Island, 6 fm.

Neocyproidea pilgrimi Hurley

Neocyproidea pilgrimi Hurley, 1955: 206–208, figs. 51–62.

This specimen differs from Hurley's portrayal in that it has few facial spines on the dactyl of gnathopod 1 and thus resembles *N. otakensis* (Chilton) but the posterior dactylar margin of gnathopod 1 has 10 spines and thus approximates *N. pilgrimi*. The hand of gnathopod 2 is stout as in *N. pilgrimi*, the dactyl of that gnathopod having submarginal anterior spinules weak but articulate. The spine row of each mandible has 10 spines.

MATERIAL: NZOI Sta. E979 (1 specimen 2.7 mm long).

DISTRIBUTION: Banks Peninsula; Hawke Bay; Whangaparaoa Peninsula.

Peltopes peninsulae (Hurley), new combination

Neocyproidea peninsulae Hurley, 1955: 203–206, figs. 39–50.

DISTRIBUTION: Otago Harbour, Portobello, from *Ceramium* off wharf blocks and *Pyura pachydermatina*, coll. D. E. Hurley.

AMPITHOIDAE

Ampithoe aorangi, new species

Figs. 8, 9, 10*a-e*

DIAGNOSIS OF MALE: All pleonal epimera posteroventrally rounded; article 6 of gnathopod 1 slightly longer than article 5, posterior margin of article 5 scarcely lobate but broad, article 6 narrow, rectangular, palm short, transverse, defined by stout spine, dactyl strongly overlapping palm; article 2 of gnathopod 2 with weak anterodistal lobe, article 4 subrectangular and slightly extended posterodistally, article 5 short, with long, narrow posterior lobe, article 6 very long, palm forming great semi-lunar oblique excavation occupying most of hand, defined sharply by weak cusp, palm very sparsely setose, dactyl long, strongly curved, slightly overlapping palm; article 2 of pereopods 1–2 stout, about 1.5 times as long as broad; pereopods 3–5 simple, sixth articles bearing pair of simple locking spines with one simple spine proximally adjacent, dactyls simple; antenna 1 long (on juvenile), antenna 2 thin, flagellum slightly longer than peduncular articles 4–5 combined; lateral lobule of lower lip slightly longer than medial and projecting symmetrically; coxa 1 not produced forward but with small anteroventral nipple; peduncular process of uropod 1 large, that of uropod 2 vestigial, peduncle of uropod 1 with row of lateral setae, both rami spinose; eyes clear (in alcohol), of medium size; telsonic knobs small; uropod 3 of medium elongation; palp of maxilla 1 with article 1 very short and article 2 very long.

FEMALE: Gnathopod 1 like male, gnathopod 2 like that of gnathopod 1 but posterior lobe of article 5 relatively narrower; female-like intersex with gnathopod 2 stouter than in female and with palm weakly defined.

HOLOTYPE: NZOI No. 79, male, 5.3 mm.

TYPE LOCALITY: NZOI Sta. E966, Eve Bay, Wellington, New Zealand, intertidal wash of algae, 5 November 1968.

RELATIONSHIP: This species has many points of relationship to *Pleonexes lessoniae* Hurley, a species now assigned to the genus *Ampithoe*. This affinity is seen in the gnathopods with their transverse palms, the male second gnathopods being small and juvenoid in comparison to various species in northern seas. Perhaps fully terminal males of either species have not been discovered. The female of *A. aorangi* is unknown but would be presumed to be similar to the male in this case.

Ampithoe aorangi differs from *A. lessoniae* in numerous points, a few of which follow: the longer and more disproportionate articles of the palp on maxilla 1; the distinct lobules of the lower lip; the smallness of the telsonic knobs; the presence of spines on the inner rami of uropods 1–2; the presence of an interramal peduncular process on uropod 1; the small point on coxa 1; the narrower inner plate of the maxilliped; and the completely simple pereopods 3–5.

In terms of lower lip *A. aorangi* resembles *A. plea* J. L. Barnard and *A. lindbergi* Gurjanova (*see* J. L. Barnard 1965b) from California but differs from both in the slender and long flagellum of antenna 2.

Ampithoe aorangi differs from the Californian *A. tea* J. L. Barnard (1965b) in the unornamented excavate palm of male gnathopod 2 and the equally projecting apical lobules of the lower lip.

Subadult mouthparts have been illustrated herein. Terminal adults have setae on the lateral margin of the outer plate on the maxilliped, two setae on the inner plate of maxilla 1, the apex of the outer plate of maxilla is more pointed and article 4 of the maxilliped is thinner.

MATERIAL: NZOI Sta. E966 (3), Sta. E967 (1), Sta. E969 (1), Sta. E975 (1), Sta. E978 (7), Sta. E979 (1), Sta. E980 (1).

DISTRIBUTION: Kaikoura to Leigh; Wellington; Whangaparaoa Peninsula.

Ampithoe hinatore, new species

Figs. 11, 12

DIAGNOSIS OF MALE: All pleonal epimera rounded posteroventrally; article 6 of gnathopod 1 longer than

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

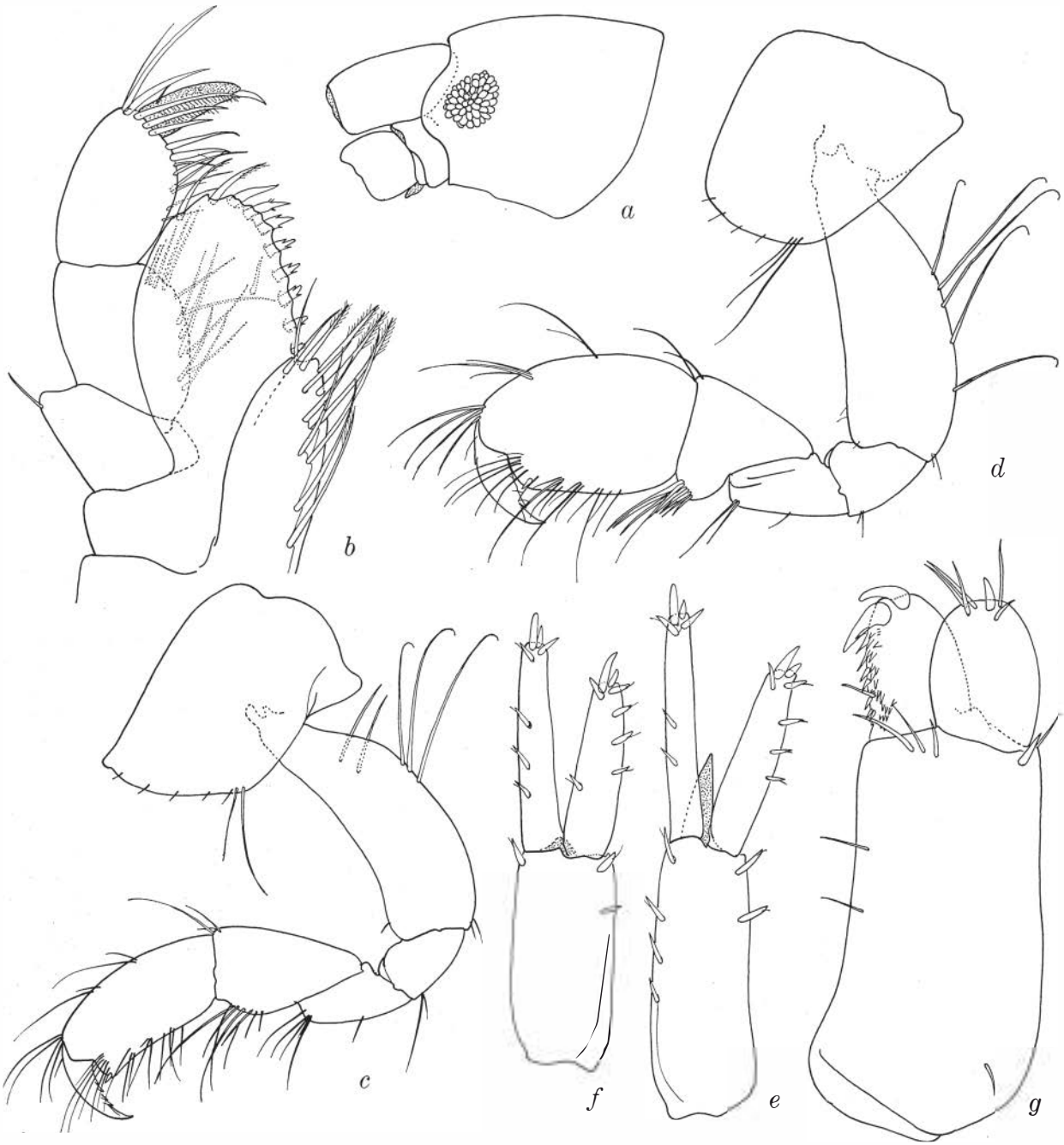


FIG. 8. *Ampithoe aorangi* n. sp., holotype, male, 5.3 mm, NZOI Sta. E 966 [JLB NZ-1]: *a*, head; *b*, maxilliped; *c*, *d*, gnathopods 1, 2; *e*, *f*, *g*, uropods 1, 2, 3 (enlarged).

article 5, latter subtriangular, posterior lobe evenly erect, article 4 with weakly rounded posterodistal lobe not strongly underriding article 5, article 2 with large distolateral lobe, article 6 subrectangular, palm short and oblique, excavate, dactyl strongly overlapping palm, large medial defining spine near defining cusp; gnathopod 2 small, article 2 with mammilliform, strongly setose distolateral lobe, article 4 of medium stoutness, not apically produced, article 5 of normal length for genus, posterior lobe narrow and symmetrical, hand broad but scarcely expanded distally, palm slightly oblique and excavate, with broad defining cusp, dactyl fitting palm; article 2 of pereopods 1–2 less than twice as long as broad; pereopods 3–5 with simple sixth articles bearing distal pair of striate, nearly straight locking spines and one other striate spine proximal to locking pair, dactyl slightly striate; article 2 of pereopod 3 very broad and bearing one or two large anterior notches armed with stout spine; antennal flagella broken distally, but antenna 1 peduncle scarcely exceeding article 4 of peduncle on antenna 2, thus peduncle of antenna 1 relatively shorter than in *A. waialua* J. L.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

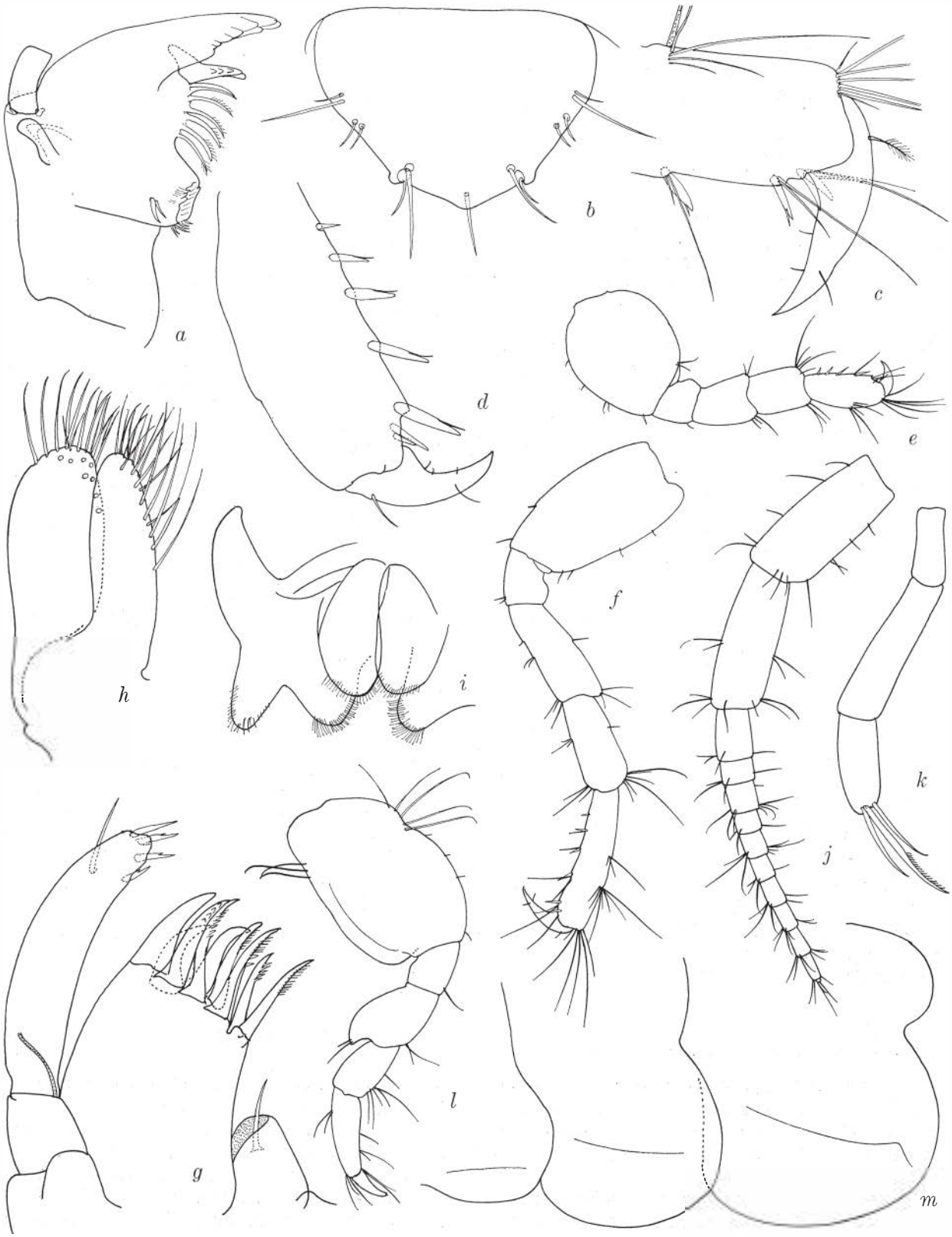


FIG. 9. *Ampithoe aorangi* n. sp., holotype, male, 5.3 mm, NZOI Sta. E 966 [JLB NZ-1]: *a*, mandible (palp articles 2–3 removed); *b*, telson; *c*, *d*, dactyls of pereopods 4, 3; *e*, *f*, pereopods 3, 5; *g*, *h*, maxillae 1, 2; *i*, lower lip; *j*, antenna 2 (articles 1–3 removed); *k*, mandibular palp; *l*, pereopod 1 (coxa 1 removed); *m*, pleonal epimera 1–3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

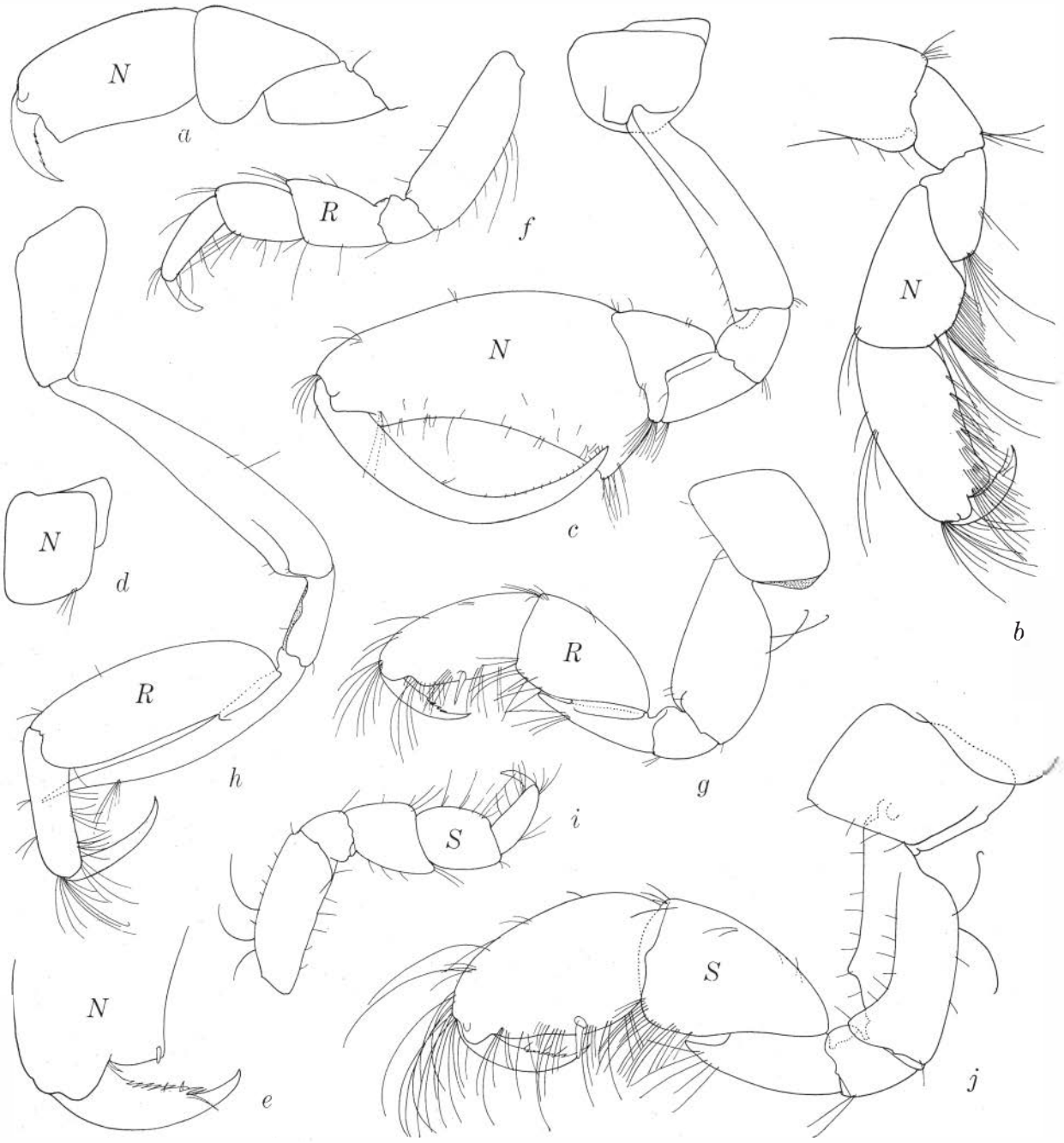


FIG. 10. *Ampithoe aorangi* n. sp., (N), female, 6.8 mm, NZOI Sta. E 978 [JLB NZ-13]: *a*, apex of gnathopod 2, setae removed. Male, 7.8 mm: *b*, *c*, gnathopods 1, 2; *d*, coxa 1; *e*, apex of gnathopod 1, setae removed.
Aora maculata (Thomson) (R), male, 3.2 mm, NZOI Sta. E 967 [JLB NZ-2]: *f*, pereopod 1; *g*, gnathopod 1. Male, 5.7 mm: *h*, gnathopod 1.
Aora sp. (S), male, 5.8 mm: *i*, pereopod 1; *j*, gnathopod 1.

Barnard (1970); peduncles and flagella slender; lateral apical lobule of lower lip much longer than medial; coxa 1 slightly produced forward; peduncular process between rami of uropod 1 obsolescent, formed only of weak cusp, peduncle with short lateral setae; eyes with dark core surrounded by clear ommatidia (in alcohol).

FEMALE: Palm of gnathopod 1 scarcely excavate; gnathopod 2 like gnathopod 1 of male, but article 5 like male gnathopod 2 and palm scarcely excavate, extension on article 4 weaker than in male gnathopod 1.

HOLOTYPE: NZOI No. 80, male, 9.0 mm.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

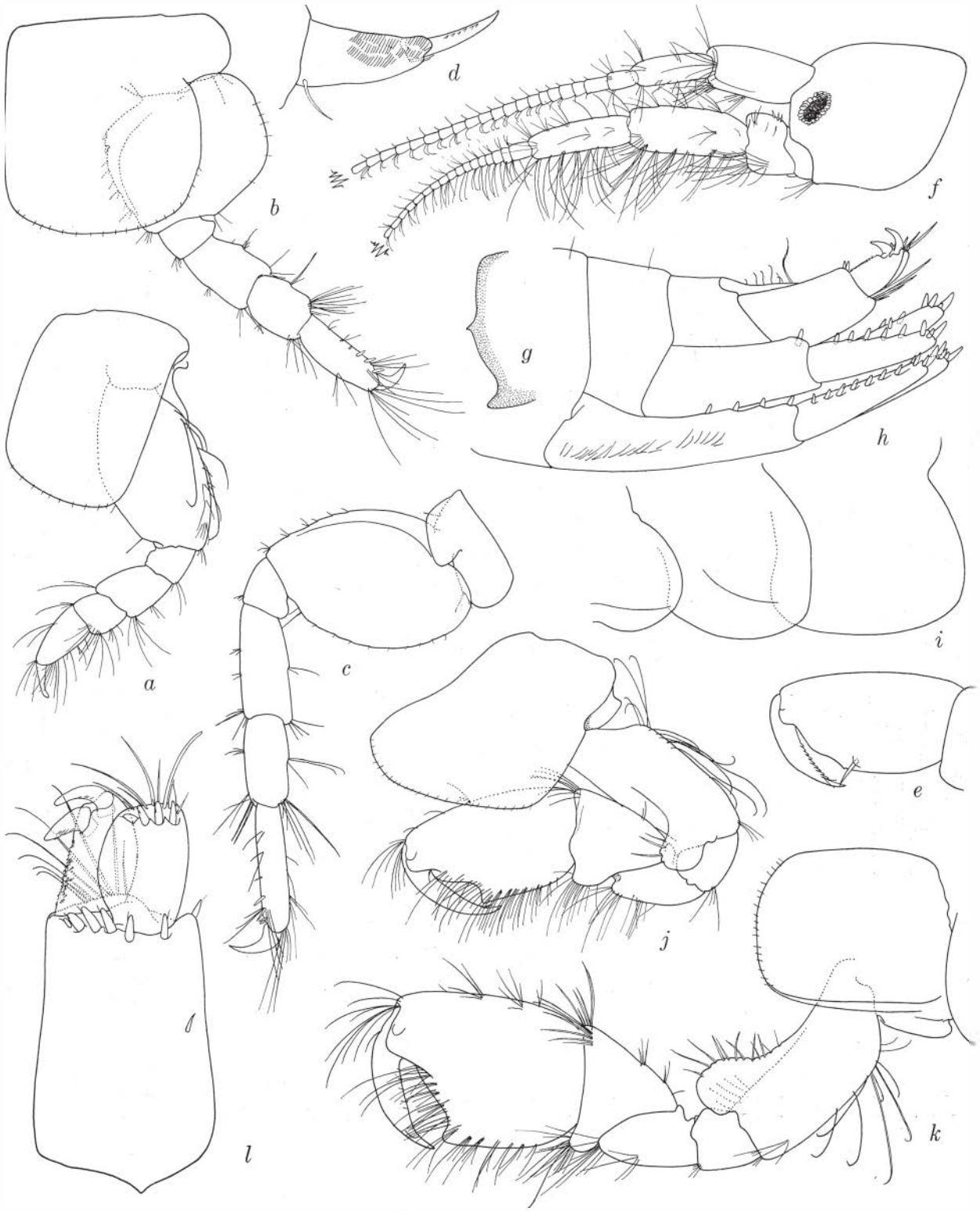


FIG. 11. *Ampithoe hinatore* n. sp., female, 7.3 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, *b*, *c*, pereopods 1, 3, 4; *d*, article 4 of maxillipedal palp; *e*, apex of gnathopod 1, medial, setae removed. Holotype, male, 9.0 mm: *f*, head; *g*, ventral apex of uropod 1 peduncle; *h*, urosome; *i*, pleonal epimera 1–3; *j*, *k*, gnathopods 1, 2; *l*, uropod 3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

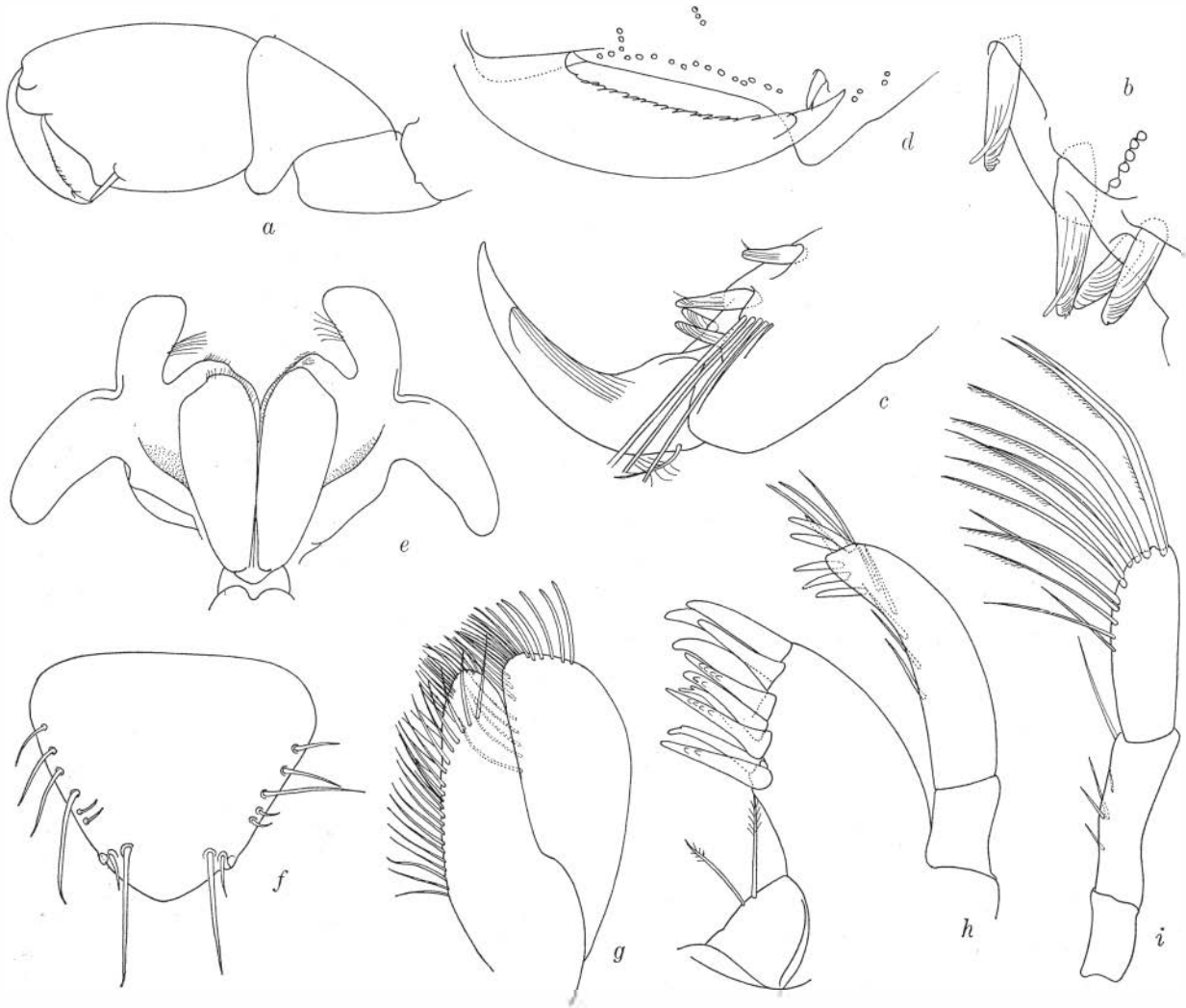


FIG. 12. *Ampithoe hinatore* n. sp., female, 7.3 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, apex of gnathopod 2, medial, setae removed; *b*, *c*, apex of pereopod 4. Holotype, male 9.0 mm; *d*, palm of gnathopod 2, medial setae removed; *e*, lower lip; *f*, telson; *g*, maxilla 2; *h*, maxilla 1; *i*, mandibular palp.

TYPE LOCALITY: NZOI Sta. E970, Kaikoura, New Zealand, intertidal wash of algae, 22 January 1968.

RELATIONSHIP: This species is a near relative of the Hawaiian *A. waialua* L. J. Barnard (1970). Only one good qualitative character distinguishes *A. hinatore*, but numerous characters of quantitative importance reinforce the specific qualifications of the New Zealand species. *Ampithoe hinatore* lacks the distal process on article 4 of male gnathopod 2 seen in *A. waialua*. The hand of male gnathopod 2 is broader in *A. hinatore*, the palm less oblique; article 4 of male gnathopod 1 does not strongly underride article 5; article 5 of gnathopod 2 is normally short; the peduncle of antenna 1 is shorter; the interramal tooth of uropod 1 is even smaller; article 2 of pereopods 1–2 is slightly broader; the eyes have dark pigment.

The outer plate of the maxilliped is like that of *A. aorangi* figured herein, but the lateral margin is densely setose.

MATERIAL: Three specimens from the type locality.

DISTRIBUTION: Kaikoura.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

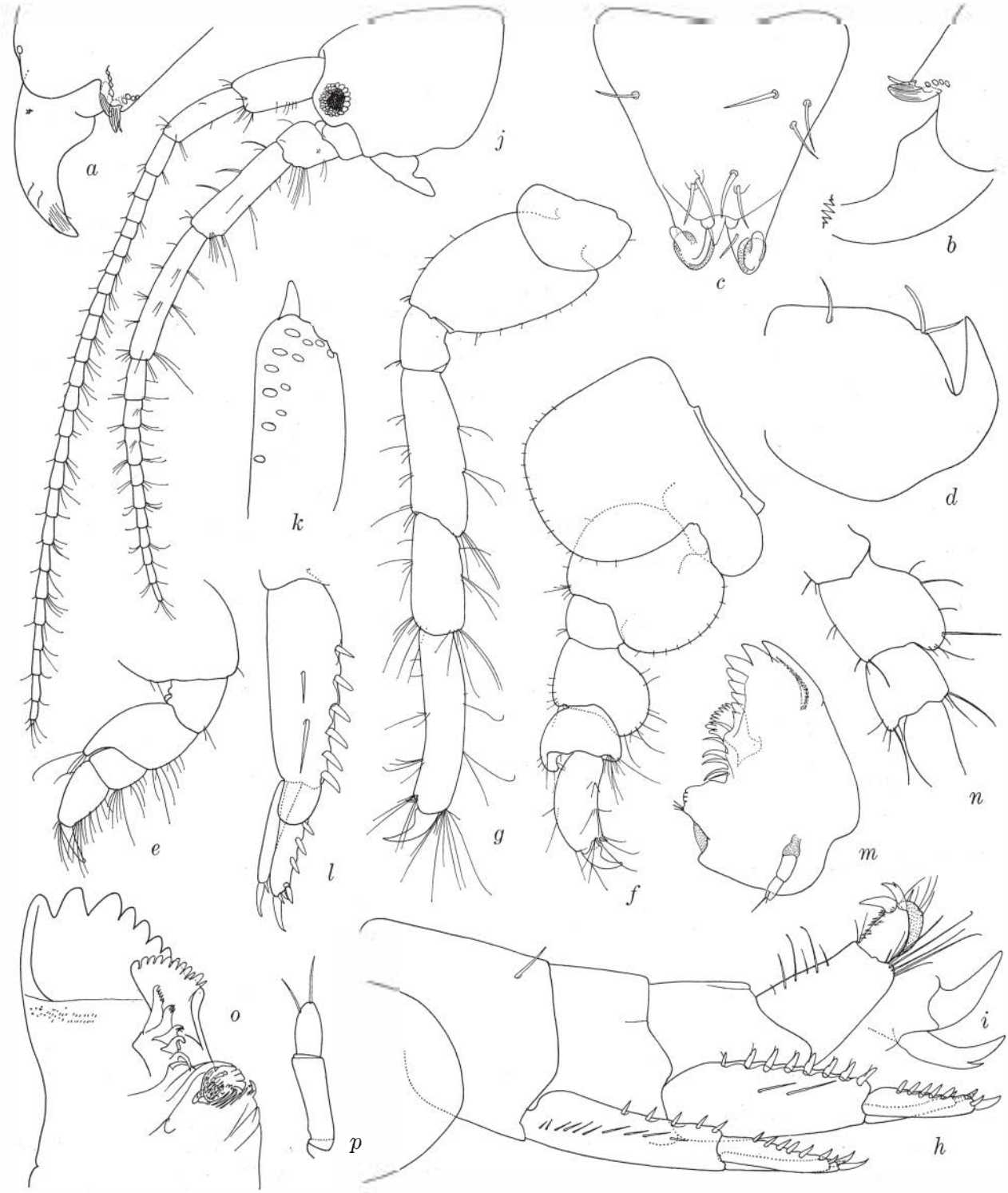


FIG. 13. *Ampithoe* (= *Pleonexes*) *lessoniae* (Hurley), male, 6.2 mm, NZOI Sta. E 975 [JLB NZ-10]: *a*, *b*, dactyls of pereopods 3, 5; *c*, *d*, dorsal and lateral views of telson; *e*, *f*, *g*, pereopods 1, 3, 5; *h*, pleon; *i*, hooks on outer ramus of uropod 3. Male, 4.8 mm, NZOI Sta. E 979 [JLB NZ-14]: *j*, head; *k*, inner plate of maxilliped, setae removed; *l*, aberrant uropod 2 with peduncular lappet; *m*, left mandible, obverse; *n*, part of pereopod 3 (compare *f*); *o*, left mandible; *p*, mandibular palp.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 14. *Ampithoe* (= *Pleonexes*) *lessoniae* (Hurley), male, 6.2 mm, NZOI Sta. E 975 [JLB NZ-10]: *a*, *b*, apices of gnathopods 1, 2, setae removed; *c*, *d*, gnathopods 1, 2; *e*, lower lip. Male, 4.8 mm, NZOI Sta. E 979 [JLB NZ-14]: *f*, apex of gnathopod 2, setae removed.

Ampithoe (Pleonexes) lessoniae (Hurley)

Figs. 13, 14

Pleonexes lessoniae Hurley, 1954d: 620–626, figs. 1–2.

J. L. Barnard (1970) has reduced *Pleonexes* to subgeneric status under *Ampithoe* and has suggested that *Pleonexes* is formed of various species with diverse origins from several species of *Ampithoe*.

Pleonexes lessoniae is as different from known species of *Ampithoe* as it is from species of *Pleonexes* and may require the erection of a subgenus to take note of its species characters. Among these are the extremely short and tumid bilobations on the outer lobes of the lower lip, the shortened uropod 1, the miniature palp of the mandible composed of only two distinct articles, the weak molar, and the slightly bifurcate hook on the outer ramus of uropod 3.

These characters need further examination as more specimens of the species become available, because there is a possibility that two species are involved in the presently known materials. If not, then the species has a high degree of polymorphism. The two specimens at hand differ from each other in the absence or presence of the distolateral peduncular lobe on uropod 2 (present in Hurley's material), the medium to extremely broadened distal articles of pereopod 3 (thin in Hurley's material), the weak to strong palmar excavation and tooth on gnathopod 2 (weak in Hurley's material).

MATERIAL: NZOI Sta. E969 (1), Sta. E975 (1), Sta. E978 (1).

DISTRIBUTION: Wellington; Whangaparaoa Peninsula; Leigh.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 15. *Ampithoe* sp., female, 6.4 mm, NZOI Sta. E 979 [JLB NZ-14]: *a*, lower lip; *b*, apex of gnathopod 2, setae removed; *c*, telson; *d*, mandibular palp; *e*, side of telson; *f*, dactyl of pereoopod 3; *g*, *h*, gnathopods 1, 2.

Ampithoe sp.

Fig. 15

DESCRIPTION OF FEMALE: Unfigured parts following like those shown for *A. hinatore* herein: apex of peduncle on uropod 1, thus interramal tooth vestigial; article 4 of maxillipedal palp; parts like *A. aorangi*: shape of head, thus lobe rounded; pleonal epimera 1–3, except creases missing; maxilla 2; uropod 3, but rami shorter in *Ampithoe* sp.

Antennae missing; eye rounded, with weakly purple core in alcohol; article 1 of mandibular palp as long as article 3 and either nearly as long as article 2; lower lip with unnotched outer lobes; inner plate of maxilliped with one very stout, short, massive apical spine; coxa 1 with subangular, unproduced anteroventral corner, coxa 2 slightly bevelled anteroventrally; gnathopods 1 and 2 closely similar but gnathopod 1 minutely stouter, anteroventral lobe on article 2 stronger, fifth articles scarcely shorter than sixth, latter thinly rectangular, palms obsolescent, defining spine set very proximal to apex of hand, dactyls thus strongly overlapping palms; pereopods 3–5 missing except small regenerate pereopod 3 bearing weak palm on article 6 armed with one slightly spatulate striate spine and one longer, straight, pointed spine; lateral knobs of telson weak.

MATERIAL: Female, 6.4 mm, NZOI Sta. E979.

REMARKS: The affinities of this species are unknown owing to the lack of a male, but the strong setback of gnathopodal palmar spines suggests some affinities with *A. ramondi* Audouin; the unnotched outer lobes of the lower lip show a relationship to *A. lessoniae* (Hurley), but that species has enormous telsonic hooks.

DISTRIBUTION: Whangaparaoa Peninsula.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

FIG. 16. *Atylus taupo* n. sp., male, 5.8 mm, Kaikoura K 085G: *a*, body; *b*, gill of coxa 5. Holotype, female, 9.6 mm, Kaikoura 109; *c*, gill representing coxae 2–5; *d*, *e*, apices of gnathopods 1–2; *f*, pleonal epimera 1–3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 17. *Atylus taupo* n. sp., male, 5.8 mm, Kaikoura K 085G: *a*, accessory flagellum; *b*, *c*, gills of coxae 6, 7. Holotype, female, 9.6 mm, Kaikoura 109; *d*, telson; *e*, dactyl of pereopod 1; *f*, uropod 3; *g*, mandible; *h*, lower lip.

ATYLIDAE

(now synonymous with DEXAMINIDAE)

Atylus reductus (K. H. Barnard)

Nototropis reductus K. H. Barnard, 1930: 382–383, fig. 45.

DISTRIBUTION: North Cape, 20 m.

Atylus taupo, new species

Figs. 16, 17

?Nototropis minikoi. Chilton, 1923b: 242 (not Walker, 1905).

DIAGNOSIS: Rostrum of medium size and blunt; ovato-circular eyes deep burgundy in alcohol, with scarcely any clear peripheral ommatidia; lateral cephalic lobe with softly rounded corners, subocular indentation weak and anteroventral corner obtuse; mandibular palp normally 3-articulate, left lacinia mobilis formed of single plate, right formed of two serrate leaves; inner plate of maxilla 1 with four or five medial setae, palp of right maxilla 1 uniarticulate, of left side biarticulate; other mouthparts generally similar to those of *A. swammerdami* (Milne Edwards) (*see* Sars, 1895, pl. 183); coxae of medium length; locking spines of pereopods composed of pair of spines with weak, clavate apical hook, inner proximal margin of dactyls minutely shagreened, bearing long seta near middle, facial seta attached near luniform slit; article 2 of pereopods 3–4 narrowly pyriform, with weakly produced quadrate posteroventral corner, article 2 of pereopod 5 with obtuse posteroventral lobe; rami of uropod 3 strongly setose apically; telson of regular proportions, lobes apically acute and attenuate, bearing strong spine in each weak notch; only pleonites 4 and 5–6 (coalesced) with dorsal crest, 4 with notch; pleonal epimera all bearing lateral ridge, weak posteroventral tooth; gills of coxae

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

2–5 grossly pinnate in small specimens (5.0 mm), that of coxa 5 bearing accessory medially pointing pinna, gill of coxa 6 simple, small, sausage-shaped, gill of coxa 7 also simple but bearing accessory lobe pointing medially; gills of specimens about 9.0 mm long having pinnae becoming enormously phylliform.

Terminal male not present in collections.

HOLOTYPE: Canterbury Museum AQ3399, female, 9.6 mm.

TYPE LOCALITY: K109, Seal Point, Kaikoura, New Zealand, rocks *ca.* 1962.

RELATIONSHIP: This species is clearly not *A. minikoi* (Walker, 1905) from the Maldive Archipelago, but Chilton's (1923b) remarks are not sufficient to identify his specimen from Puysegur Point with the present material. *Atylus taupo* differs from the sketchily known *A. minikoi* in the presence of a dorsal notch on pleonite 4, in the more slender gnathopod 2, and in the presence of a posterodistal lobe on article 2 of pereopod 5 (Walker implies this lobe is absent in *A. minikoi*). Walker's drawing and description of telsonic clefting do not agree with one another.

The other New Zealand species of *Atylus* is *A. reductus* (K. H. Barnard 1930) and *A. taupo* differs from that in the presence of a dorsal notch on pleonite 4, the absence of weak dorsal teeth on pleonites 1–3, the complex branchiae, the fully triarticulate mandibular palp, and the narrower and more uniformly subrectangular article 2 on pereopod 5 with blunter lobe.

Atylus taupo has clear affinities with Norwegian *Atylus swammerdami* (Milne Edwards) especially in the weak dorsal carination or humping, in the shape of the head and the pinnate gills, but the gills of *A. swammerdami* are of lesser complexity than those in *A. taupo*. The latter species has a softer notch on pleonite 4 than does *A. swammerdami*, has a larger dorsal crest on pleonites 5–6, softer angles on the head, relatively shorter coxae, broader, shorter, and more obtuse posteroventral lobe on article 2 of pereopod 5, no sharp lobes on article 2 of pereopods 3–4, more attenuate apices of the telson and larger apical spines, and stronger setation on the rami of uropod 3.

Atylus homochir (Haswell 1885) (*see* Stebbing 1888, pl. 74) from Australia is like *A. swammerdami* but has simple gills, blunt rostrum, a tooth on article 1 of antenna 1, sharply produced anteroventral corner on the head, weak posteroventral lobe on article 2 of pereopod 5, and sharper (than in *A. taupo*) corner on the notch of pleonite 4.

MATERIAL: All from Edward Percival Laboratory Collections, off Kaikoura: KO85G* (1); KO95Q* (3); K109 (2); K509* (1); CIE Sta. 25 (2). Samples with asterisk from Amer's Beach (or Fyffe Cove), plankton tows, May 1962, May 1965.

DISTRIBUTION: Near Kaikoura, plankton on littoral benthos.

COLOMASTIGIDAE

Colomastix magnirama Hurley

Colomastix brazieri. Chilton, 1921b: 64 (in part, not Haswell).
Colomastix magnirama Hurley, 1954e: 452–428, figs. 32–49.

DISTRIBUTION: Port Chalmers; Otago Harbour, Portobello, off stalk of *Pyura pachydermatina* encrusted with *Elzerina*, coll. D. E. Hurley.

Colomastix simplicauda Nicholls

Colomastix simplicauda Nicholls, 1938: 62–63, fig. 32.

DISTRIBUTION: Macquarie Island, from spongy rock coverings.

Colomastix subcastellata Hurley

Colomastix subcastellata Hurley, 1954e: 420–425, figs. 1–31.

MATERIAL: NZOI Sta. E970 (1).

DISTRIBUTION: Otago Harbour, Portobello, surface and off stalk of *Pyura pachydermatina* encrusted with *Elzerina blainvillei;* coll. D. E. Hurley. Kaikoura.

COROPHIIDAE*

Corophium acherusicum Costa

Corophium acherusicum Costa. Hurley, 1954f: 442–445, figs. 35–39.

DISTRIBUTION: Lyttelton Harbour.

EXTRINSIC DISTRIBUTION: Cosmopolitan.

Corophium acutum Chevreux

Corophium acutum Chevreux. Hurley, 1954f: 439–442, figs. 22–34.

MATERIAL: NZOI Sta. E976 (45), Sta. E977 (3), Sta. E981 (1), Sta. E982 (1).

DISTRIBUTION: Especially in harbours; Lyttelton; Otago; Auckland; Kenepuru Sound; Chatham Islands; Gisborne; Leigh; Tapeka Pt.

EXTRINSIC DISTRIBUTION: Subcosmopolitan.

Corophium sextonae Crawford

Corophium sextonae Crawford. Hurley, 1954f: 433–439, figs. 1–21.

This species may stray into open-sea intertidal floras.

DISTRIBUTION: Wharf structures in Lyttelton and Otago Harbours.

EXTRINSIC DISTRIBUTION: England.

*This family is now considered to include Isaeidae, Aoridae, and Photidae; the superfamily Corophioidea should be recognised to include Corophiidae, Ampithoidae, Ischyroceridae, Podoceridae, and Cheluridae.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

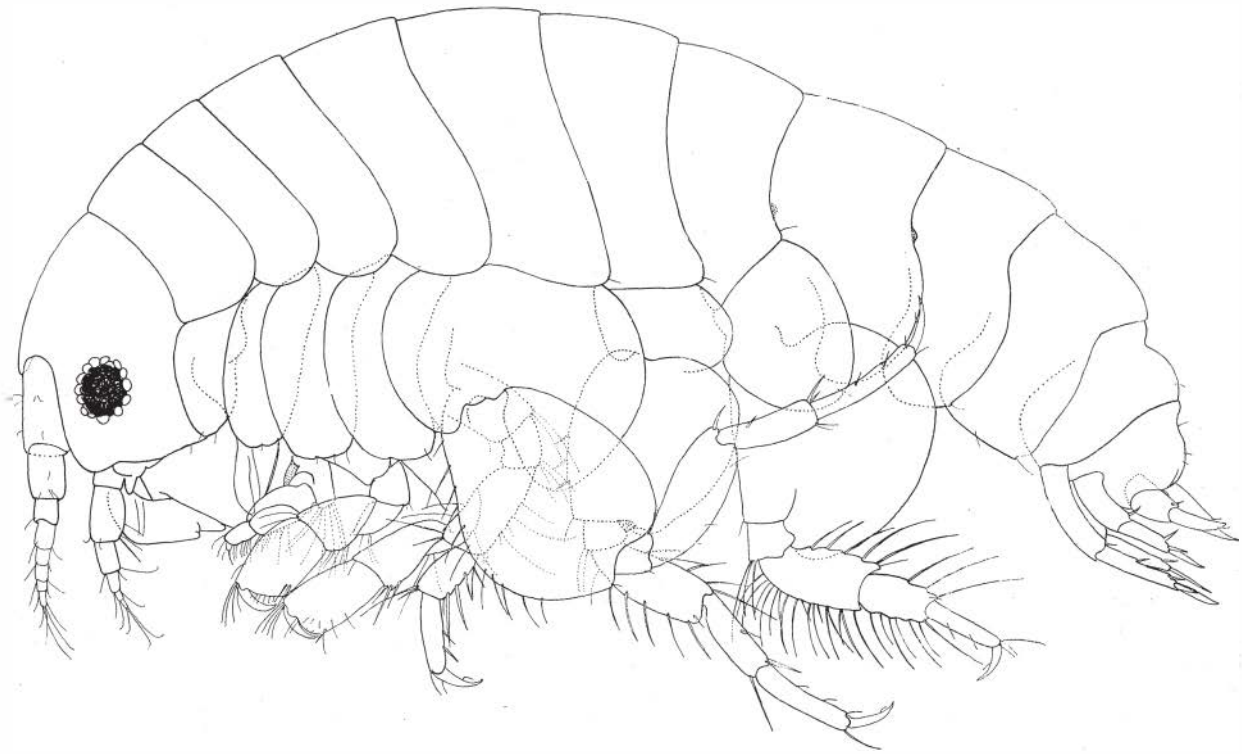


FIG. 18. *Guernea* (?) *timaru* n. sp., holotype, female, 1.9 mm, NZOI Sta. E 980 [JLB NZ-15]: body.

Ericthonius pugnax (Dana)

Ericthonius pugnax Dana, 1852: 218; Hurley, 1954f: 445–450, figs. 40–61.
Pyctilus pugnax. Dana, 1853: 975–976, pl. 67, fig. 4.
Ericthonius brasiliensis. Chilton, 1923b: 242–244, figs. 1–5 (not Dana).

MATERIAL: NZOI Sta. E980 (5).

DISTRIBUTION: D'Urville Rock, Auckland Harbour; Whangaparaoa Peninsula.

EXTRINSIC DISTRIBUTION: Sulu Sea; Banda.

Paracorophium excavatum (G. M. Thomson)

Corophium excavatum Thomson, 1884: 236–237, pl. 12, figs. 1–8; Thomson and Chilton, 1886: 143; Stebbing, 1899b: 241.
Paracorophium excavatum Stebbing, 1899c: 350; 1906: 664; Chilton, 1906d: 704; 1909a: 59 (in part); 1920a: 8; 1920b: 1–8 (in part); Hurley, 1954f: 451–455, figs. 62–83.

A euryhaline brackish-water species that may be collected accidentally in association with seaweed. The purely freshwater populations of this genus in Lake Waikare and Lake Rotoiti are now assigned to *Paracorophium lucasi* Hurley (1954f).

DISTRIBUTION: Brighton Creek, Dunedin (type locality, salt water); same locality later when water nearly fresh; Napier, brackish water; Nelson.

EXTRINSIC DISTRIBUTION: Brisbane River, Australia, brackish water.

DEXAMINIDAE

Guernea (?) **timaru,** new species

Figs. 18, 19

DIAGNOSIS (as a dexaminid): Body of *Dexamine-Guernea-Dexamonica* morphology, lacking any but rudimentary hump on pleonite 4; head with broadly subfalciform lateral lobe, eyes of medium size, with black cores; antennae short and equally projecting, accessory flagellum extremely small, uniarticulate, antenna 2 with strong gland cone and three flagellar articles; prebuccal complex large, hood-shaped from lateral view, lower lip broadly quadrate below, slightly convex on lower margin; mandibles plain, molars forming only weak but sharp cutting edge, untriturative, incisors scarcely toothed except on right mandible, right lacinia mobilis bifid and weakly toothed, left lacinia moblis simpler but slightly larger, spine row lacking; lower lip not clearly analysed, mandibular lobes broad and obtuse, inner lobes, if present not seen; inner plate of maxilla 1 small and without armament, outer plate with seven spines, palp exceeding spines of outer plate, 2-articulate, article 2 longer than article 1; maxilla 2 with very short inner lobe; inner plate of maxilliped short, bud-like, bearing two setae, posteroventral base of maxilliped with pair of large heavily setose lobes projecting ventrally, outer plates large, medially spinose, palp 4-articulate, slightly exceeding outer plate, article 4

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

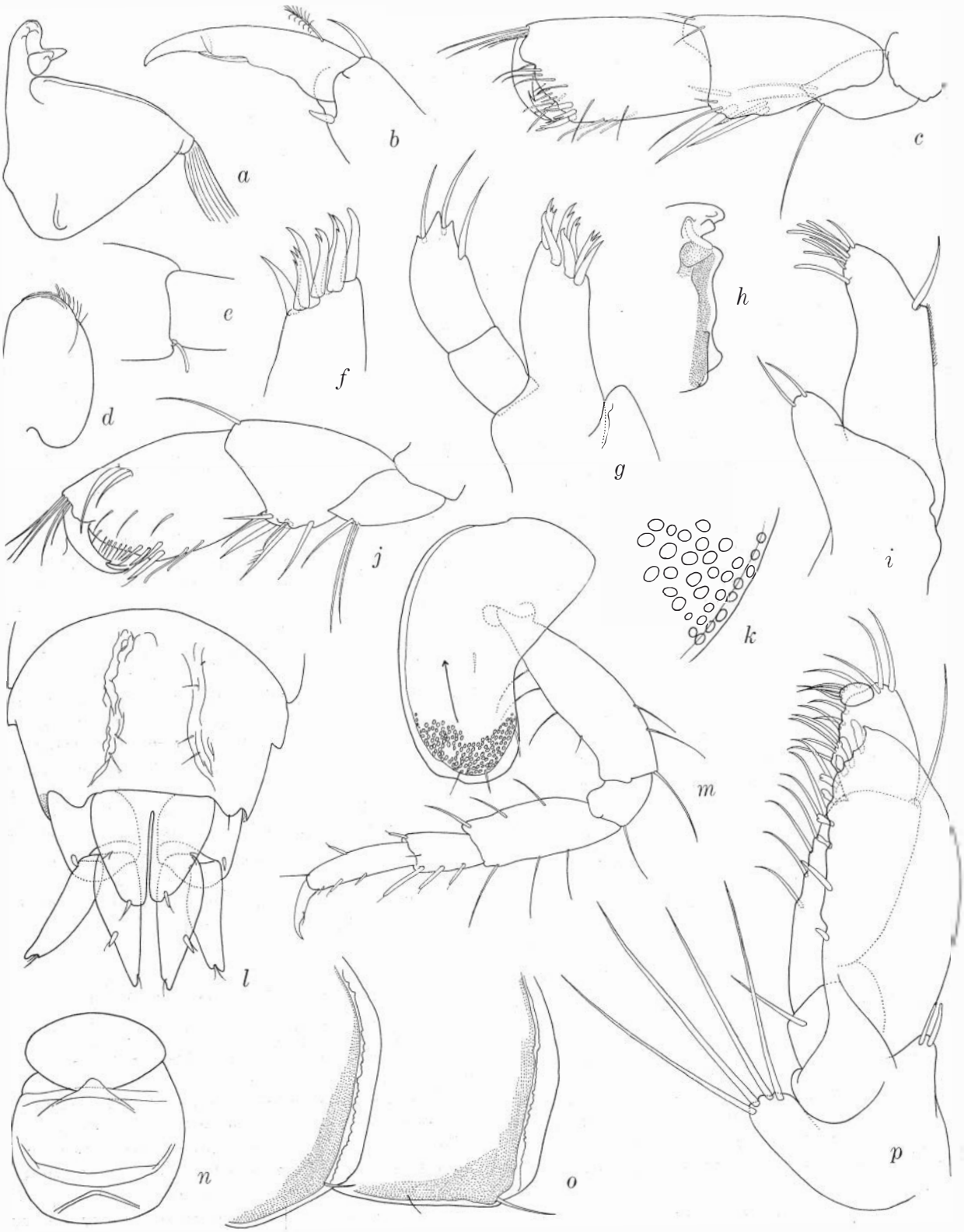


FIG. 19. *Guernea* (?) *timaru* n. sp., holotype, female, 1.9 mm, NZOI Sta. E 980 [JLB NZ-15]: *a*, left mandible; *b*, dactyl of pereopod 1; *c*, apex of gnathopod 2, lateral; *d*, half of lower lip; *e*, accessory flagellum on antenna 1; *f*, outer plate of maxilla 1; *g*, maxilla 1, unflattened; *h*, right mandibular incisor and molar; *i*, maxilla 2; *j*, apex of gnathopod 1, medial; *k*, pits of coxa 5 (and body); *l*, dorsal pleonite 6, telson and pair of uropod 3; *m*, pereopod 2; *n*, upper lip; *o*, pleonal epimera 2–3; *p*, maxilliped.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

vestigial; coxa 1 conspicuously smaller than coxa 2, coxa 5 larger than 3–4 combined, coxa 6 about size of coxa 1, coxa 7 much larger than 6; pereopods 1–2 with heavy spines on article 5; pereopods 3–5 of diverse shapes, lengths, and setosity; pleonal epimera with slight notch bearing seta at posteroventral corners; inner rami of uropods 1–2 scarcely reaching apices of outer rami; rami of uropod 3 with weak apical notch bearing one or two setules, inner ramus with one marginal spine; telson short, deeply cleft, each apex with spine; body and coxae covered with well defined reticulations appearing as tightly packed craters, pleonite 6 with weak dorsolateral rugosal ridge on each side.

HOLOTYPE: NZOI, No. 81, female, 1.9 mm. Unique.

TYPE LOCALITY: NZOI Sta. E980, Huaroa Point, New Zealand, wash of rocks in shallow channels about 25 m from low water, 16 February 1968.

RELATIONSHIP: A subgenus may be required to contain this neozelanican *Guernea* that differs from the north Atlantic generic concept in the long article 2 of the palp on maxilla 1, the shortened inner plate of maxilla 1, and the absence of a seta on the inner plate of maxilla1. The lower lip is unsatisfactorily known. *Guernea petalocera* Ruffo also has a long article 2 on the first maxillary palp.

The biarticulate palp on maxilla 1 distinguishes *G.* (?) *timaru* from the monotypic *Dexamonica* J. L. Barnard from California.

Syndexamine Chilton (1914), a monotypic genus from New Zealand, has a 1–articulate first maxillary palp, long inner plate on maxilla 2, non-diverse thin pereopods 3–5 with subprehensile pereopods 1–2 bearing numerous spines and long dactyls, and bears a strong dorsal carina on pleonites 1–4.

DISTRIBUTION: Whangaparoa Peninsula.

Paradexamine Stebbing

Paradexamine Stebbing, 1899d: 210; Stebbing, 1906: 518–519.

Several problems in the New Zealand species of this genus have not been solved despite the examination of many specimens. Sheard (1938) has redescribed *Paradexamine pacifica* (Thomson) from material in the Chilton collection "originally collected and named by Thomson" and then describes a new species, *P. barnardi* Sheard, based on K. H. Barnard's (1930) material of "*P. pacifica*" from Three Kings Islands. The lectotypes of *P. pacifica* are described as lacking any apical processes on the outer lobes of the lower lip and spines on the mandibles, and no lateral subapical spine on the telsonic lobes, whereas *P. barnardi* has one process on each lobe of the lower lip and one apicolateral telsonic spine. *Paradexamine barnardi* furthermore has a relatively larger outer plate of the maxilliped and longer fifth article of gnathopod 2 than does *P. pacifica*.

Nearly 20 specimens from various localities in New Zealand have been dissected but none corresponds in these character differences to Sheard's descriptions of *P. pacifica* and *P. barnardi*. Specimens at hand have either one major cone (males and juveniles) or two major cones on each lobe of the lower lip (apical) (female) with a minor cone present in any case. All specimens (except the "hybrid" *Paradexamine* sp.) have the outer lobes of the maxillipeds as figured herein, with the palp slightly exceeding the medium-sized plate. All adult specimens have two spines on each side of pleonites 5–6, and article 5 of gnathopod 2 is about 1.3 times the length of article 6. Sheard makes the point that *P. barnardi* has article 5 1.5 times as long as 6 and thus implies in his key that it is much longer than in *P. pacifica*. *Paradexamine barnardi* is based on males and has only one spine on each side of pleonites 5–6.

These differences are difficult to support inasmuch as the males from Three Kings Islands may have been in a pelagic phase not readily collected in intertidal samples, nor can the absence of a cone(s) on the outer lobes of the lower lip be supported with the diversity of contrary examples at hand. The variability of *P. pacifica* may be wider than attested to here and *P. barnardi* may necessarily fall to *P. pacifica* or *P. houtete* with a wider study of pelagic materials. One may note the remarkable hybrid between either *P. houtete* or *P. pacifica* and *P. muriwai* described on p. 57.

Sheard does not mention several points in his description of *P. pacifica* (such as the prominent spine on pleonite 4) nor does he describe and illustrate various characters in his other species *P. moorhousei* and *P. frinsdorfi* that might help determine relationships among the several species. He does not cite the significance of a tooth on pleonite 4 of *P. frinsdorfi* though the tooth is shown in his drawing. His figures of the first maxillary palp of *P. pacifica* do not correspond to the material at hand but do correspond to the thin palp lacking medial setae of *P. muriwai*. The medial setae of his male drawing may simply have been omitted or overlooked.

Paradexamine barnardi Sheard

Paradexamine pacifica. K. H. Barnard, 1930: 389–390, fig. 49 a–c (not Thomson).
Paradexamine barnardi Sheard, 1938: 178–180, fig. 6 A–R.

This species apparently differs from *P. pacifica* in the presence of dorsal teeth on pleonite 1, only one cone on each lobe of the lower lip, only one spine on each side of pleonites 5–6, and the shortened palp of the maxilliped. The latter three characters differentiate *P. barnardi* from *P. houtete* n. sp., and apparently the other characters mentioned in the remarks of *P. houtete* that differentiate it from *P. pacifica* apply to differences between *P. barnardi* and *P. houtete*.

DISTRIBUTION: Three Kings Islands, 0.3 m.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

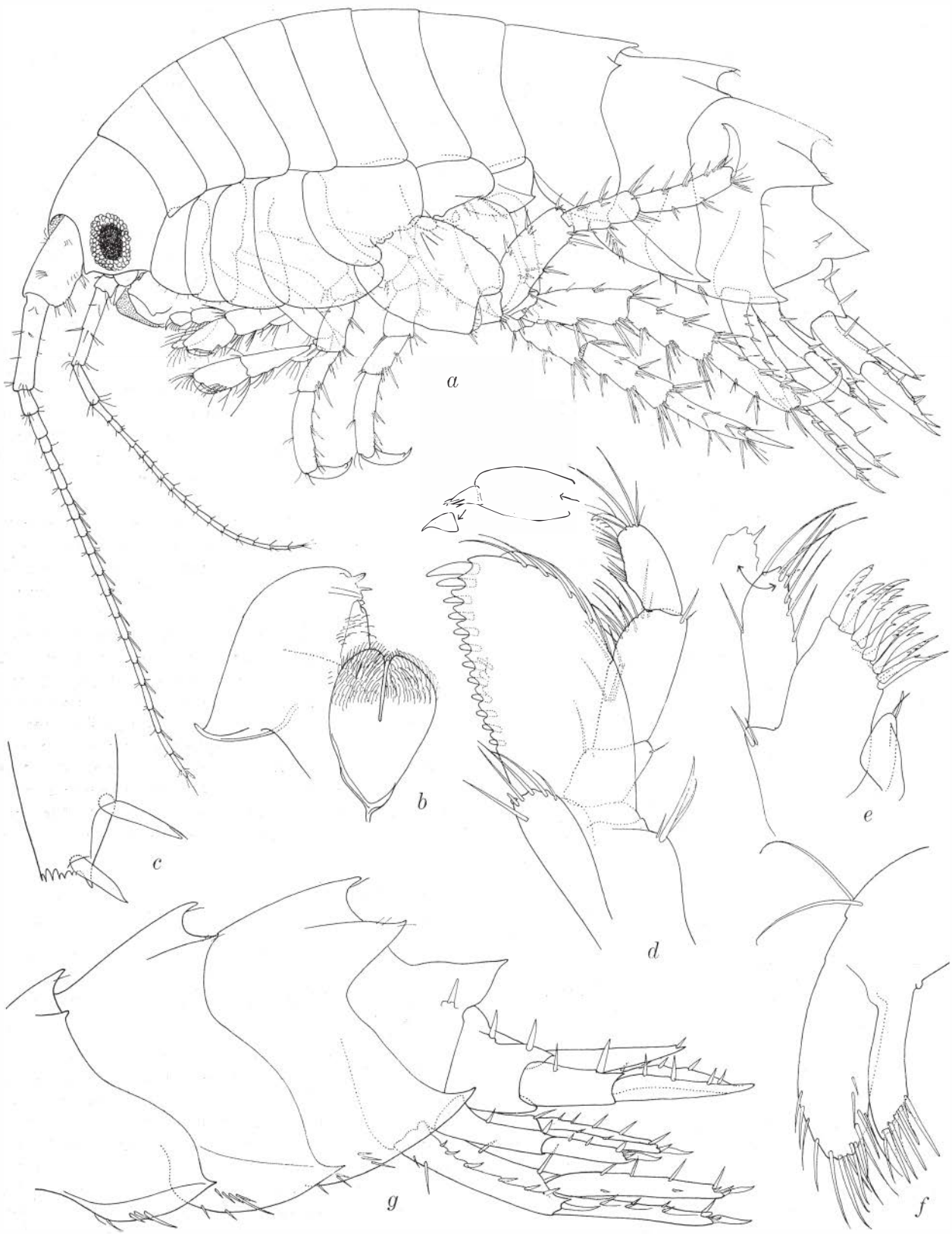


FIG. 20. *Paradexamine houtete* n. sp., holotype, female, 3.7 mm, NZOI Sta. E 979 [JLB NZ-14]: *a*, body; *b*, part of lower lip; *c*, apex of telsonic lobe; *d*, maxilliped; *e*, *f*, maxillae 1, 2; *g*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Paradexamine houtete, new species

Figs. 20–22

DIAGNOSIS OF FEMALE: Lateral cephalic lobe anteriorly pointed; article 1 of antenna 1 with ventral spines arranged in two groups of about two each, article 2 subequal in length to article 1; mandibles, each with two thin, very short spines about one third as long as lacinia mobilis; outer lobes of lower lip with two medium-sized cones subequal in size; palp of maxilla 1 of medium breadth, apex with thin, attenuate, sharp cusp, palp not exceeding outer plate, bearing medial and apical setae, inner plate of normal size and bearing two setae; inner plate of maxilla 2 not significantly shortened; outer plate and palp of maxilliped extending equally; coxa 1 expanded distally, coxae 5–6 with spinulose posteroventral margins; coxa 2 without posterior spine; gnathopods 1–2 with article 5 about 1.2 times as long as article 6, medial face of hand with five plumose spines, dactyls fully pectinate, pectinae about half size of palmar pectinae; article 2 of pereopod 3 about 1.4 times as long as broad; article 6 of pereopods 3, 4 and 5 about 1.25 times as long as article 5; pereopods 4–5 lacking stout spines on posterior margin of article 2, posteroventral lobe obsolescent on pereopods 4–5; pleonal epimera 1–2 with lateral ridge, sharp posteroventral tooth and groups of three and five spines in subradial sets, epimeron 3 with long, sharp tooth and anteroposteriorly listed sets of one, two and three spines on ventral margin and lateral face; pleonites 1–3 with three dorsal teeth each (two lateral, one medial), pleonite 4 with sharp dorsal tooth and one long subdorsal spine on each side, pleonites 5–6 (fused) with two long dorsolateral spines on each side in tandem; telson with moderately broad apices bearing about eight serrations and one spine of medium size set in lateral apical notch, lateral margins of telsonic lobes armed with four to five spines in tandem; basolateral margin of uropod 1 with two spines.

MALE: Eyes enlarged, antennal peduncles with numerous marginal setules, article 2 of antenna 1 further elongate, spines on pleonites 4–6 half as long as in female.

VARIATIONS AND DESCRIPTIONS: Ventral cephalic margin slightly sinuous but not forming insertion support for antenna 2; antenna 1 longer than antenna 2 in bent-down position and in overall measurement, in male longer than in female and reaching 85 percent length of body and exceeding antenna 2 by about six to ten flagellar articles, males rarely with antenna 2 exceeding antenna 1, giant females (6.0 mm) with antennae almost as long as in male; setule tufts occuring on male antenna 1, posterior article 1, and antenna 2, anterior article 4; articles 1–2 of antenna 1 and article 4 of antenna 2 becoming very elongate in male, female with stout spines on article 1 of antenna 1 and article 4 of antenna 2 unlike male; upper lip with truncate ventral margin; left and right lacinia mobili on mandibles composed of distal and proximal serrate plates, left larger and more serrate than right, mandibular molar large, broadly spread over body of mandible, triturative and bearing setal row along sharpest molarial cusp plus main plumose seta; lower lip with distinct inner lobes cleft halfway, mandibular processes formed of rolled edge laterally hooked; inner plate of maxilla 1 bearing two apical setules, outer plate with 11 spines, palp uni-articulate; inner plate of maxilla 2 about half as wide and slightly shorter than outer plate, inner setose only on oblique apical margin; inner plates of maxilliped well developed for dexaminids, bearing one apicomedial spine and one vestigial locking spine and about 5 other setae, outer plates with large simple medial spines, palp article 4 unguiform; coxa 7 with posterodistal tooth, margins of coxae smooth; palms of gnathopods oblique, medial faces of hands with five to ten complex spines in middle row; spines of pereopods sharp; article 2 of pereopod 4 with posteroproximal wing, of pereopod 5 evenly trapezoidal; epimeron 1 with row of three large spines or three large and two small, up to six large and four small; epimeron 2 with row of five to 16 spines; epimeron 3 with posteriormost vertically aligned group ranging from three to five spines and anterior groups or sets of singles varying between four and nine, in most extreme case the spine sets from posterior to anterior have 4, 3, 3, 1, 1, 1, 1, 1, 1, 1 spines each but a medium count might be 5, 4, 3, 1, 1, 1, 1 or 3, 2, 1, 1, juveniles 2.6 mm have only one spine in posterior spine set of epimera 2–3 but juveniles 3.0 mm have five and four spines in those sets; except in small juveniles, epimera with wavy subcastellate posterior margins; telson reaching only halfway along rami of uropod 3 but occasional adults having telson reaching farther; rami of uropod 3 with small number of large marginal spines, no setae developing in male; uropod 1 with continuous spination on outer margin of peduncle. Eyes of juveniles smaller than 2.1 mm are small, the antero-ocular cusp is smaller and blunter and the spines of the telson are slightly smaller, relatively, than in adults.

HOLOTYPE: NZOI No. 82, female, 3.7 mm.

TYPE LOCALITY: NZOI Sta. E979, Huaroa Pt., New Zealand, intertidal wash of algae, 16 February 1968.

MATERIAL: NZOI Sta. E970 (29), Sta. E971 (1), Sta. E975 (10), Sta. E977 (2), Sta. E979 (12), Sta. E980 (1), Sta. E982 (2).

REMARKS: This species is extremely close to *P. pacifica* (Thomson) but appears to be confined to littoral depths (intertidal) in contrast to *P. pacifica* which occurs sublittorally and in neritic situations.

Pleonite 1 develops teeth in juvenile stages, whereas adults of *P. pacifica* never develop teeth on pleonite 1. Article 2 of pereopod 3 is wider in *P. houtete* than in *P. pacifica*, the cones of the lower lip are subequal in size, the mandibular spines are miniaturised, article 2 of antenna 1 in the female is not elongate, the telsonic apices look like those in juveniles of *P. pacifica* in which the apices are narrower than in adults and have the lateral

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

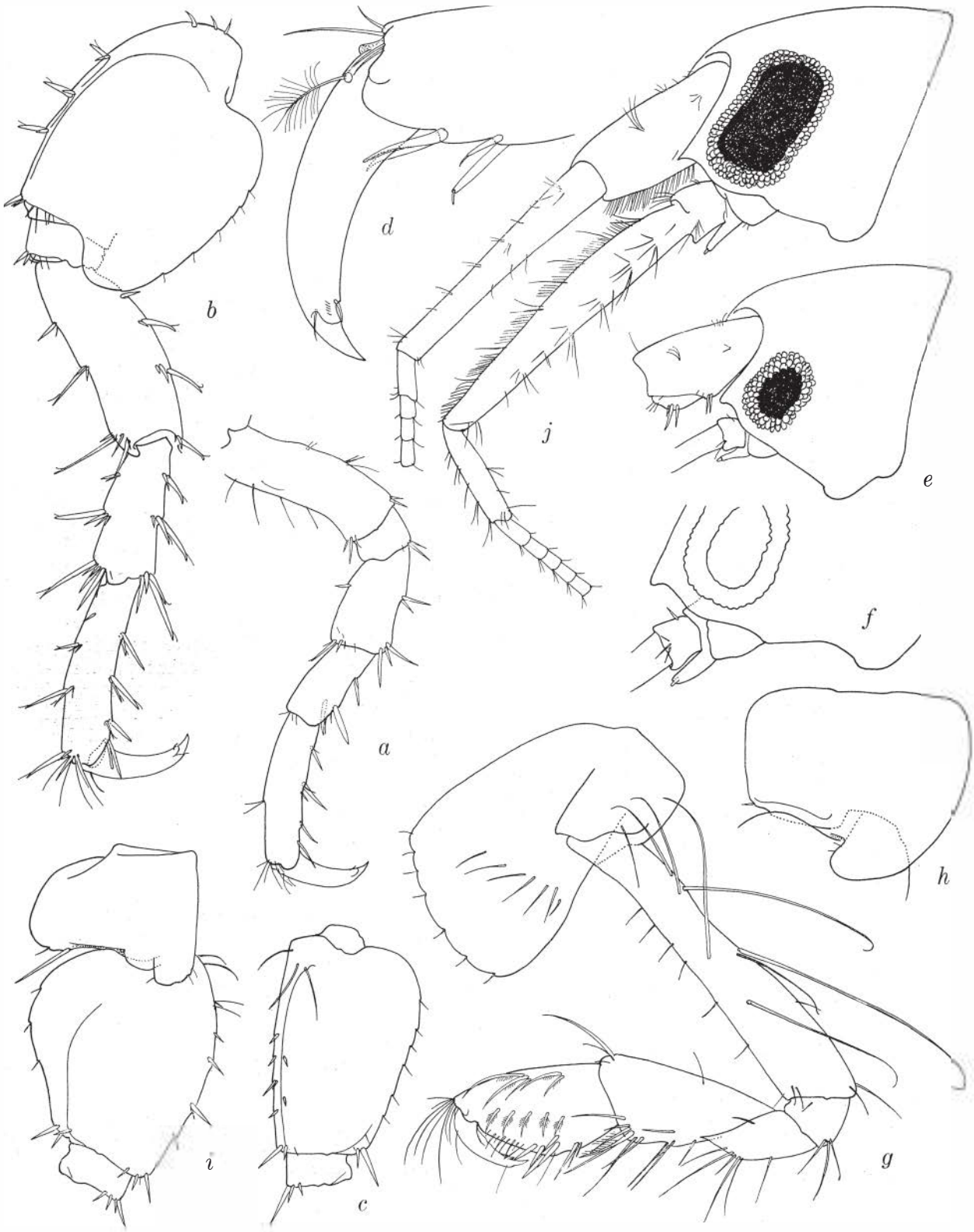


FIG. 21. *Paradexamine houtete* n. sp., holotype, female, 3.7 mm, NZOI Sta. E 979 [JLB NZ-14]: *a*, *b*, *c*, pereopods 2, 3, 5, in part; *d*, dactyl of pereopod 1; *e*, *f*, head; *g*, gnathopod 1; *h*, coxa 5 from right view; *i*, base of pereopod 4 from right view, flattened. Male, 6.0 mm, PMBS: *j*, head.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 22. *Paradexamine houtete* n. sp., holotype, female, 3.7 mm, NZOI Sta. E 979 [JLB NZ-14]: *a*, hand of gnathopod 1, medial; *b*, uropod 3; *c*, posterior face of upper lip; *d*, *e*, mandibles; *f*, articles 2–3 of pereopod 4, unflattened; *g*, accessory flagellum on antenna 1; *h*, apex of gnathopod 2, lateral; *i*, upper lip; *j*, coxa 7, right view; *k*, telson.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

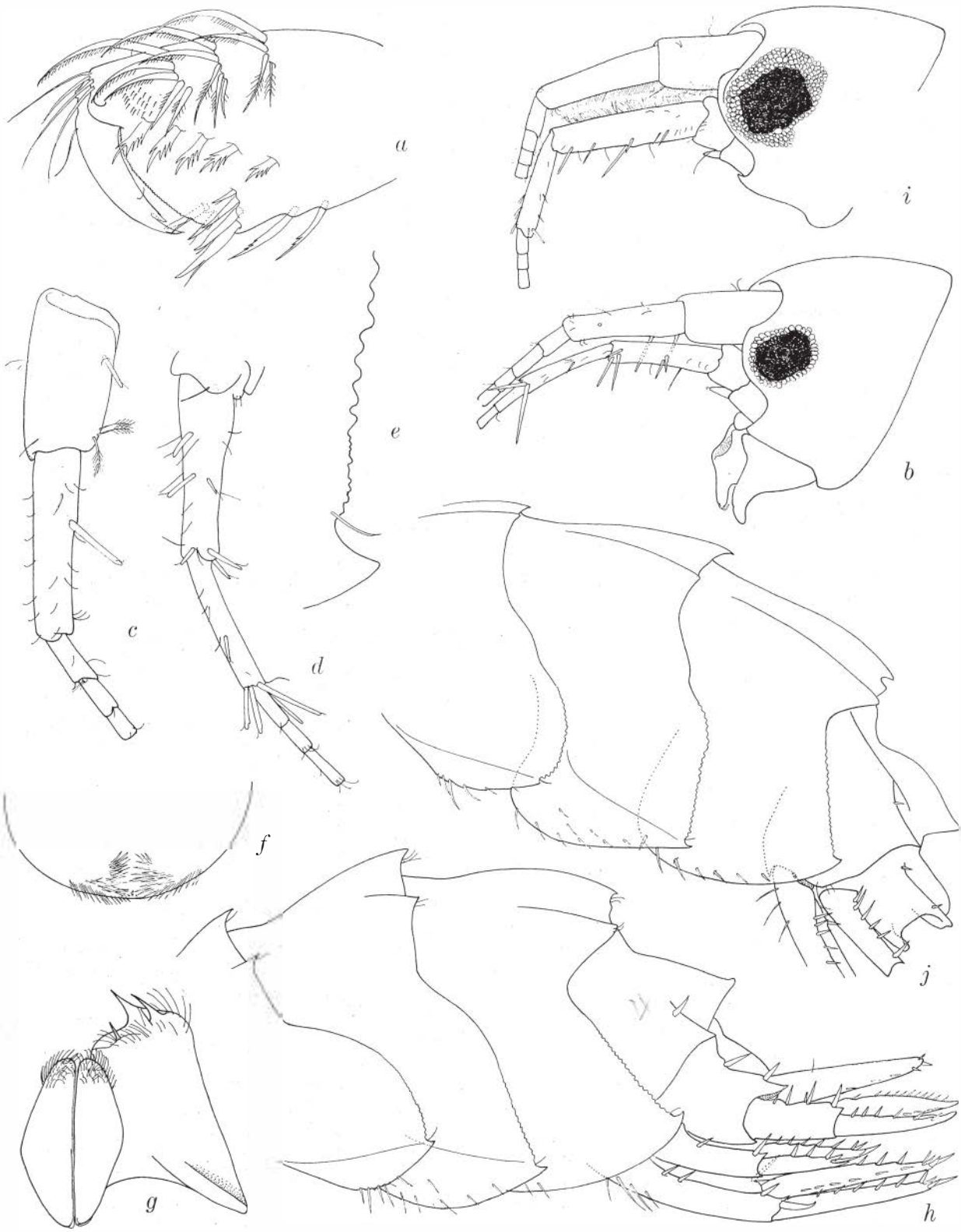


FIG. 23. *Paradexamine muriwai* n. sp., female, 4.2 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, hand of gnathopod 1, medial; *b*, head; *c*, base of pereopod 1, medial; *d*, base of antenna 2, lateral; *e*, posterior edge of pleonal epimeron 3; *f*, posterior face of upper lip; *g*, part of lower lip; *h*, pleon. Holotype, male, 4.7 mm: *i*, head; *j*, part of pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

spine relatively enlarged, and finally, adults of *P. pacifica* as small as 3.5 mm develop stout spines on the posterior margins of article 2 of pereopods 4–5.

DISTRIBUTION: Kaikoura; Gisborne; Whangaparaoa Peninsula; Leigh; intertidal.

Paradexamine muriwai, new species

Figs. 23–25

DIAGNOSIS OF FEMALE: Lateral cephalic lobe anteriorly rounded; article 1 of antenna 1 with two groups of ventral armaments, a basal spine and several distal plumose setules, article 2 about 1.1 times as long as article 1; mandibles with thick spines as long as lacinia mobili, three spines on left, two on right; outer lobes of lower lip with four cones on each, two cones very large; palp of maxilla 1 narrow, apical cusp vestigial, setae only apical, palp not exceeding outer plate, inner plate slightly enlarged and naked; inner plate of maxilla 1 slightly shortened relative to *P. pacifica* and *P. houtete*; outer plate and palp of maxilliped extending equally but palp dominated by outer plate, inner plate uniquely vestigial; coxa 1 not distally expanded, coxae 5-6 with spinulose posteroventral margins, coxae 1–3 with posterior spines; gnathopods 1–2 with articles 5 and 6 subequal in length, medial face of hand with about five prickle-spines, dactyls lacking pectinae besides main inner tooth, pectinae of palms vestigial; article 2 of pereopod 3 about 1.6 or 1.7 times as long as broad; article 6 of pereopod 3 equal in length to article 5, article 5 of pereopod 4 about 1.2 times as long as article 6 and on pereopod 5 about 1.4 times; article 2 of pereopod 5 broad in relation to other New Zealand species, only pereopod 5 with stout posterior spines on article 2; spines of pereopods 1–5 thick and often blunt apically, posteroventral lobe obsolescent only on pereopod 4; pleonal epimera 1–2 with lateral ridge, sharp posteroventral tooth and ventral spines in tandem, only epimeron 2 with one facial spine, epimeron 3 with small tooth and a few ventral spines; pleonites 1–4 with three dorsal teeth each (two lateral, one medial), pleonite 4 with one subdorsal spine on ridge of lateral tooth; pleonites 5–6 (fused) with two medium spines on each side in tandem; telson with moderately broad apices bearing three or four serrations and two small apical spines, lateral margins of telsonic lobes armed with about eight small spines in tandem; baso-lateral margin of uropod 1 with four spines.

MALE: Eyes enlarged, antennal peduncles with numerous marginal setules, article 2 of antenna 1 not further elongate, spines on pleonites 4–6 very small and dorsal teeth of pleonites 1–4 poorly developed.

DESCRIPTION: Anteroventral cephalic margin indented for reception of antenna 2, lateral cephalic lobe with blunt flange anterior to eye; eyes of male about 1.5 times as large as those of female; male antenna 1 about 1.2 times as long as antenna 2 in true length, antenna 2 about as long as length of head and pereon together, female antennae shorter and equal to each other in bent down position and about as long as head and first 5.5 pereonites; male antenna 2 retaining spines on article 4; setular tufts occurring on male antenna 1, posterior margins of articles 1–2, and on anterior margins of article 4 of antenna 2 and weakly on article 5, article 4 of antenna 2 in male becoming elongate, female with stout spines on article 2 of antenna 1 and articles 4–5 of antenna 2; upper lip with truncate ventral margin; left and right lacinia mobili on mandibles composed of distal and proximal serrate plates, left larger and more serrate than right, two or three spines, molar large but not as large as in *P. houtete*, triturative and bearing setal row along sharpest molarial cusps plus main plumose seta detached from molarial apex; lower lip with inner lobes cleft fully or bearing full raphus, outer lobes with mandibular processes slightly rolled or turned on edges but lacking hook; outer plate of maxilla 1 with 11 spines, one pointing medially; inner plate of maxilla 2 more than half as wide but slightly shorter than outer plate, inner setose only apically; spines on outer plate of maxilliped slightly nicked or rudimentarily trifid; coxae 1–3 with posterior spines, coxa 7 without posterior tooth but it and coxae 1 and 6 with wavy serrations similar to those on pleonal epimera; palms of gnathopods weakly oblique; pereopod 4 lacking posterior wing on article 2, flush surface of article 2 on pereopods 4–5 next to body like *Hyale*; telson reaching three fourths along rami of uropod 3; rami of uropod 3 with large number of small spines except outer margin of outer ramus bearing several enlarged spines; uropod 1 with discontinuous spination on outer margin of peduncle; male uropod 3 acquiring ramal setae.

HOLOTYPE: NZOI No. 83, male, 4.7 mm.

TYPE LOCALITY: NZOI Sta. E970, Kaikoura, New Zealand, especially on *Caulerpa brownii*, 22 January 1968.

MATERIAL: 5 specimens from type locality.

REMARKS: The uncuspidate ocular lobe and extra tooth on each side of pleonite 4 distinguish this species from *P. pacifica*, *P. houtete*, and *P. barnardi*.

This species confounds generic classification in the Dexaminidae because the reduction of inner lobes on the lower lip and the maxillary palp bring it near the tropical genus *Dexaminoides* Spandl. In the genus *Paradexamine*, *P. muriwai* is also unusual in the indented antero-ventral cephalic margin, the lack of facial spines on the epimera and their wavy posterior margins, the bluntness of spines on the pereopods (accentuated by algal fuzz), and the interrupted spination on the peduncle of uropod 1.

Adult characteristics are fairly evident in specimens exceeding 2.1 mm in length, but smaller juveniles lack the epimeral waves, have a rudimentary lateral tooth on pleonites 4 and 1, the telson reaches only 60 percent along rami of uropod 3, the head has a weaker antero-ocular flange, and the eyes are small.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

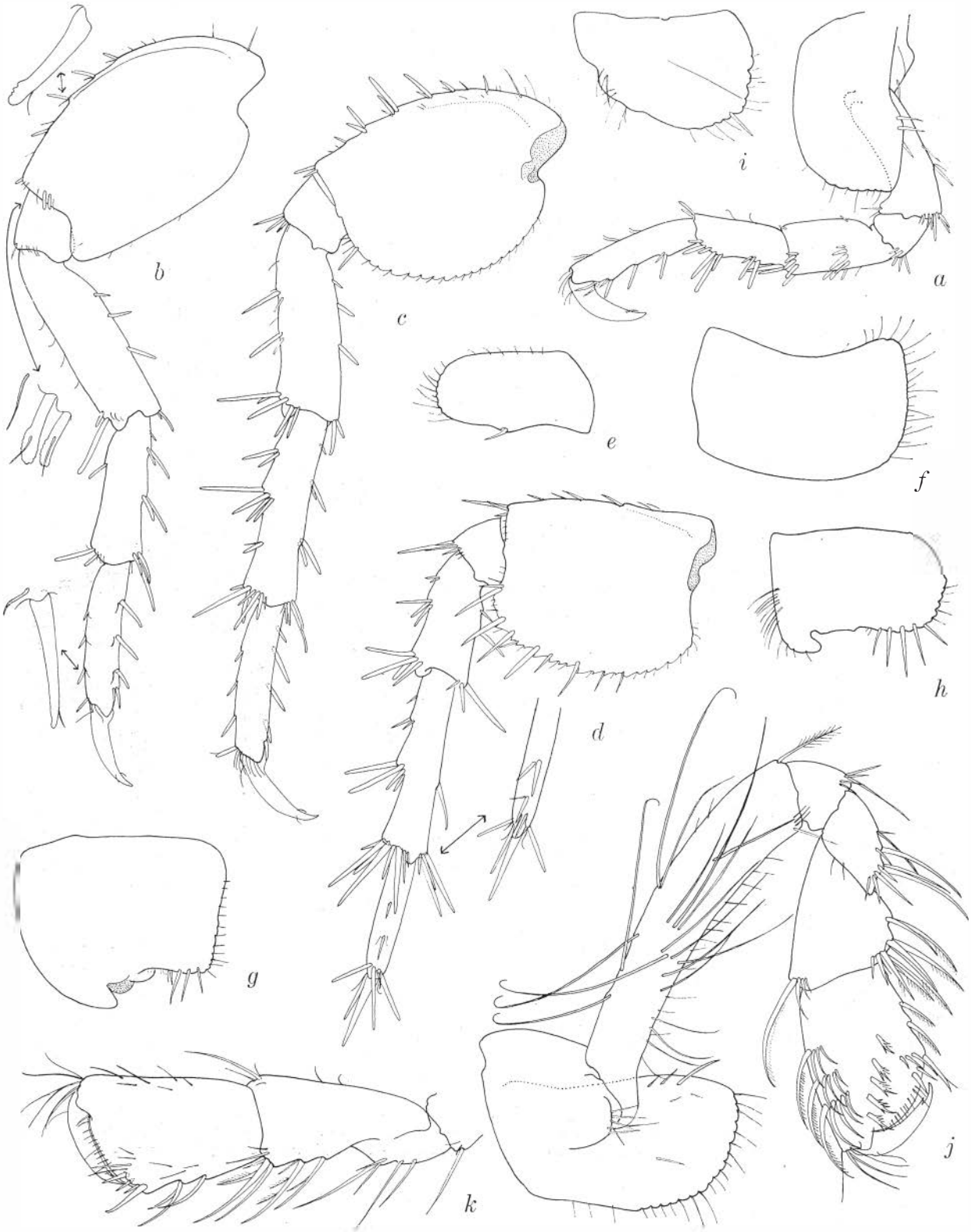


FIG. 24. *Paradexamine muriwai* n. sp., female, 4.2 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, *b*, *c*, *d*, pereopods 1, 3, 4, 5 (latter with offset articles 6–7 from opposite side); *e*, *f*, *g*, *h*, *i*, coxae 2, 3, 5, 6, 7; *j*, *k*, gnathopods 1, 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 25. *Paradexamine muriwai* n. sp., female, 4.2 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, *b*, apex of palp of maxilliped; *c*, medial spine on outer plate of maxilliped; *d*, apex of telsonic lobe; *e*, left mandibular molar; *f*, *g*, right and left mandibles; *h*, dactyl of pereopod 1; *i*, *j*, maxillae 1, 2; *k*, telson; *l*, uropod 3; *m*, maxilliped. Holotype, male, 4.7 mm: *n*, uropod 3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Paradexamine pacifica (Thomson)

Dexamine pacifica Thomson, 1879a: 238, pl. 10B, fig. 4; Thomson and Chilton, 1886: 149; Thomson, 1889: 262.
Paradexamine pacifica. Stebbing, 1899d: 210; Chilton, 1909a: 632; Stebbing, 1910: 602 (key); Chilton, 1911b: 308; Thomson, 1913: 243; Stephensen, 1927: 345–347, figs. 21, 22: K. H. Barnard, 1930: 389–390, fig. 49 a–c; Stephensen, 1938: 246–247; Sheard, 1938: 176–178, figs. 5, 8M.
not *Paradexamine pacifica*. Chilton, 1912a: 501–502 (= *P. fissicauda*, fide K. H. Barnard, 1930, and Stephensen, 1938); Chilton, 1925b: 179; K. H. Barnard, 1930: 389–390, fig. 49 a–c (= *P. barnardi* Sheard).

NOMENCLATURE: Some of these references may belong with the new species *P. houtete*, but they cannot be sorted out at present. Apparently *P. pacifica* occurs only sublittorally whereas *P. houtete* occurs only littorally, but until that conjecture is proved one must assume that the above reference list is correct because it concerns sublittoral records.

DIAGNOSIS OF FEMALE: Lateral cephalic lobe anteriorly pointed; article 1 of antenna 1 with ventral spines arranged in two groups of three or four each, article 2 about 1.3 times as long as article 1; mandibles with thin spines 0.75 to 1.0 times as long as lacinia mobilis, right mandible with two spines, left with three; outer lobes of lower lip with one medium and one very small proximal cone each; palp of maxilla 1 of medium breadth, apex with three or four thin, attenuate, sharp cusps, palp slightly exceeding outer plate, bearing medial and apical setae, inner plate of normal size and bearing two setae; inner plate of maxilla 2 not significantly shortened; outer plate and palp of maxilliped extending equally; coxa 1 expanded distally, coxae 5–7 with spinulose posteroventral margins; coxa 2 with or without spines; gnathopods 1–2 with article 5 about 1.33 times as long as article 6, medial face of hand with six to eight plumose spines, dactyls fully pectinate, pectinae about half the size of palmar pectinae; article 2 of pereopod 3 about 1.6 times as long as broad; article 6 of pereopod 3 about 1.3 times as long as article 5, 0.75 times as long as article 5 on pereopod 5, and on pereopod 4 the two articles are subequal in length; pereopods 4–5 with stout spines on posterior margin of article 2, posteroventral lobe obsolescent on pereopods 4–5; pleonal epimera 1–2 with lateral ridge, sharp posteroventral tooth and groups of six and 12 spines in subradial sets, epimeron 3 with long, sharp tooth and anteroposteriorly listed sets of two, three, four and five spines on ventral margin and lateral face; pleonite 1 dorsally smooth, pleonites 2–3 with three dorsal teeth each (two lateral, one medial), pleonite 4 with sharp dorsal tooth and one long subdorsal spine on each side, pleonites 5–6 (fused) with two long, dorsolateral spines on each side in tandem; telson with broad apices bearing eight to ten serrations and one small spine set lateral in apical notch, lateral margins of telsonic lobes armed with five or six spines in tandem; basolateral margin of uropod 1 with four spines.

MALE: Eyes enlarged, antennal peduncles with numerous marginal setules, article 2 of antenna 1 further elongate, spines on pleonites 4–6 half as long as in female; gnathopodal dactyls also bearing pectinae as in female; larger cone of lower lip slightly enlarged.

JUVENILES, 2.0 mm: Article 2 of antenna 1 subequal in length to article 1; hands of gnathopods with three medial plumose spines each; posterior margins of article 2 on pereopods 4–5 bearing only setae; basolateral peduncle of uropod 1 bearing only one spine; spines of telson relatively larger than in adult, apex of each lobe narrower, bearing about five serrations and thus appearing as in adult *P. houtete*, n. sp.; mandibles, lower lip, pereopod 3 as in adult.

REMARKS: The diagnosis of females is based on specimens about 5.5 to 6.3 mm long and of males, on specimens about 4–5 mm long. Variations in spine numbers on uropod 1, pleonal epimera and gnathopods occur but not on pleonites 4–6. Sheard (1938) selected lectotypes of this species but did not see cones on the lower lip nor did he report on spines occuring on the mandibles, a feature that has specific significance.

MATERIAL: About 20 lots of material collected from sublittoral sand bottoms and light traps by Mr Robert C. Cooper of Victoria University of Wellington; Cooper A67, Chaffers Passage, 10 April, 1967, fine sand 8–9 fm (50 specimens); Canterbury Museum material: Hauraki Gulf, 12 December, 1914 (18 specimens).

DISTRIBUTION: Apparently throughout New Zealand in sublittoral depths and in neritic waters; Stewart Island, Port Adventure, 37–41 fm; Dunedin coast; Lyttelton; Bay of Islands, dredging; Auckland Islands, 19 m, sand, algae, and Carnley Harbour, 2 fm; Campbell Islands, 19–38 m, sandy clay, and Perseverance Harbour.

EXTRINSIC DISTRIBUTION: East coast of Australia (Chilton, 1909a); I have examined an Australian species closely related to, but distinct from, *P. pacifica* that probably erases Chilton's record.

The Campbell Island material of Stephensen (1927) reaches 10 mm in length, much larger than specimens collected in New Zealand and the most remarkable difference seen from his figures is the increase to 20 of the medial prickle-spines on the gnathopodal hands.

Paradexamine sp.

This specimen from NZOI Sta. E970 has 10 characters of *P. muriwai*, one character of *P. houtete* only, one character of *P. pacifica* only, one character shared by *P. houtete-muriwai*, four characters shared by *P. pacifica-muriwai*, and 12 characters shared by *P. houtete-pacifica*. The characters like *P. muriwai* are maxilla 2, shape of inner plates of the maxilliped, shape of coxa 1 (weakly), spines of coxae 1–2, the wavy lines of the coxae and epimera, tooth of epimeron 3, serrations of the telson, and slope of gnathopodal palms. The absence of a dorsal tooth on pleonal epimeron 1 resembles the condition in *P. pacifica*. Like *P. houtete* the mandibular

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 26. *Polycheria obtusa* Thomson, female, 7.2 mm, Blueskin Bay; *a*, dactyl of pereopod 3; *b*, gnathopod 1, lateral; *c*, molar of right mandible; *d*, lower lip; *e*, *f*, maxillae 1, 2; *g*, mandible; *h*, maxilliped. Male, 7.7 mm: *i*, *j*, *k*, *l*, *m*, *n*, *o*, coxae 1, 2, 3, 4 5, 6, 7.

spines are small. Like *P. houtete-muriwai* pereopod 4 has no stout spines on article 4. Characters shared with *P. pacifica-muriwai* are the shapes of pereopods 3 and 5, the spines of pereopod 5, and the presence of a few blunt pereopodal spines. Characters shared with *P. houtete-pacifica* are the sharp cephalic lobe, the anteroventral margin of the head, the presence of only two cones on each mandibular lobe, the inner plate of maxilla 1, the spination on the outer plate of the maxilliped, the continuous spination on the peduncle of uropod 1, the shape of uropod 3, the length of telsonic spines, the sculpture of pleonite 4, and the spine distribution of the pleonal epimera.

In addition to the above characters the following are

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

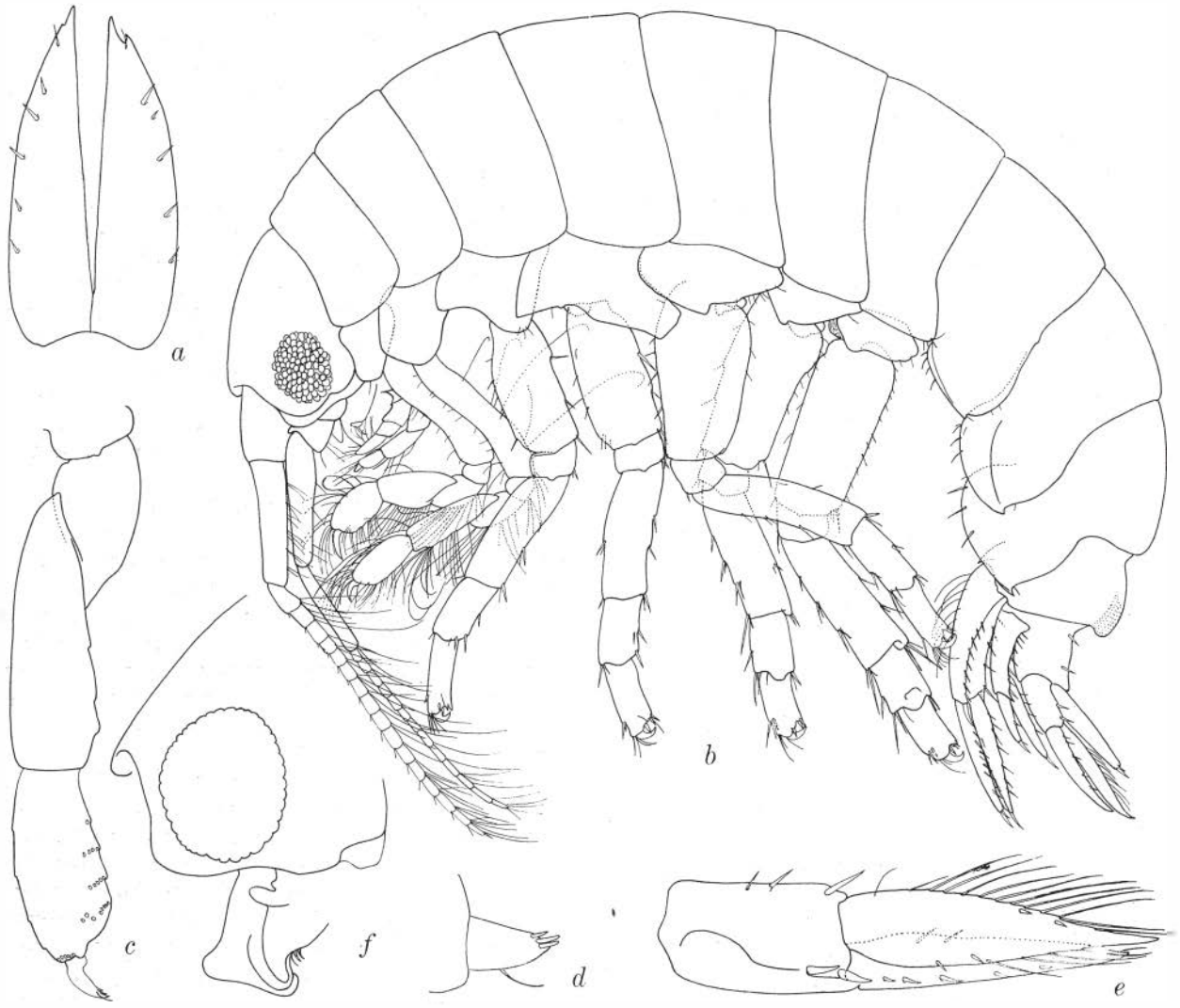


FIG. 27. *Polycheria obtusa* Thomson, female, 7.2 mm, Blueskin Bay: *a*, telson; *b*, body; *c*, gnathopod 2, lateral, setae removed; *d*, article 4 of maxillipedal palp; *e*, uropod 3. Male, 7.7 mm: *f*, head and prebuccal complex.

noted: the gland cone is large, article 4 of antenna 2 and article 1 of antenna 1 have setae, no spines; pereopod 4 has a few posterior spines on article 4; pleonite 2 has a sharp dorsal tooth but no laterals; pleonal epimeron 1 has two spines; epimeron 2 has groups (rear to front) of five, two, and one spines; epimeron 3 has groups of four, two, one and one spines.

The remarkable blending of characters in this specimen suggests hybridisation between two of the three local species but does not detract from the taxonomic characters of specific value separating the taxa.

MATERIAL: NZOI Sta. E970 (young ? female, 2.5mm).

DISTRIBUTION: Kaikoura.

Polycheria obtusa Thomson

Figs. 26, 27

Polycheria obtusa Thomson, 1882: 233–234, pl. 17, fig. 3; Thomson and Chilton, 1886: 147.
Polycheria antarctica. K. H. Barnard, 1930: 390–391, fig. 49d (not Stebbing).

New Zealand *Polycheria* is known so far from only a few specimens, those at hand and those examined by Thomson; the species differs from the Kerguelen form of the genus (Stebbing 1888) in more than 15 characters. Chilton (1912a) and Schellenberg (1931) have amalgamated most species of the genus into *Polycheria antarctica* (Stebbing 1875) and Schellenberg has described several forms in addition to those already known in the literature.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Whether those forms he describes are simply phenotypes or not does not seem to bear directly on the present consideration that the *Polycheria* of New Zealand has a number of distinct characters that may signify its existence at full specific level and this status should be preserved.

Polycheria obtusa, the New Zealand species, differs from *P. kergueleni* (Stebbing 1888, pl. 83) in the following ways: absence of setae on the anteroventral margins of pleonal epimera 2-3; epimera 1–3 with a larger tooth; process of pleonite 4 blunt and pleonite 6 not grossly produced vertically; peduncle of uropod 1 ventrally lined with setae; inner ramus of uropod 2 extending well beyond peduncle of uropod 3 and outer ramus only slightly more than half, or less than two thirds, as long as inner ramus; outer ramus of uropod 3 slightly more elongate; coxae 1–2 not sharply attenuate anteroventrally; coxae 3–5 not as strongly bilobed; thumbs of pereopods not as strongly gaping, with distinct spine distribution and stouter dactyls; hands of gnathopods less expanded distally; maxillipedal dactyl stouter and shorter.

MATERIAL: Blueskin Bay, 1 November 1952, 10 fm, commensal in ascidian, coll. D. E. Hurley (6).

DISTRIBUTION: Stewart Island, 10 fm; Blueskin Bay; Lyttelton; North Cape, 3 m.

Syndexamine carinata Chilton

Syndexamine carinata Chilton, 1914: 332–335, pls. 26, 27.

DISTRIBUTION: East middle of South Island from Oamaru to Lyttelton.

EUSIRIDAE
(=CALLIOPIIDAE, =PONTOGENEIIDAE)

The Calliopiidae are now amalgamated with the Eusiridae and this returns the status of the group to that occurring in Sars's (1895) time. There are now so many obvious cases of evolution in cognate genera from the cleft to the uncleft state of the telson that there remains no evidence of monophyleticism in these character alternatives. There may be some other basis for a familial distinction among various eusirids, but any such conceptual splitting should commence with the full eusirid-calliopiid pool.

Intertidal eusirids often comprise one of the most difficult groups facing a faunistic taxonomist. At the very least the familial complex has been a dumping ground for many morphotypes, but the degree of cleavage of the telson has added difficulties and the ultimate defect in rapid identification may be the resemblance of eusirids to the family Gammaridae. The one grossly consistent character of intertidal eusirids (but not necessarily of sublittoral or pelagic members) is the reduction of the accessory flagellum to a single vestigial article or its complete loss. This circumstance distinguishes eusirids from most members of the Gammaridae bearing an accessory flagellum of two or more articles (often 10 plus).

Identification of almost any gammaridean requires careful preparation of antenna 1 so that the medial surface of article 3 can be observed under high power of a compound microscope, unless a large accessory flagellum can be seen by other means. Specimens with antenna 1 broken off or damaged should be avoided until experience is gained. I repeat the advice (Barnard 1969a) that amphipods collected incidentally in ecological surveys should not be used as training or practice material for students. The pitfalls of sexual dimorphism, juvenility, senilic aberrancies and broken parts frequently discourage the novice. Massive collections of amphipods should be assembled; a sample with 10,000 specimens distributed among a few dozen species should be used as practice material. Sexually mature adults (commencing with ovigerous females for example) should be used and, by an incremental process, the various smaller stages of the juveniles should be connected to the adult. Until a few dozen of the species in a habitat to be surveyed ecologically have been learned, the attempt to identify casual individuals in small quadrat samples is fruitless. The bulk of a standing crop comprises juveniles, whereas the taxonomy of gammarideans is presently based on adults; the subtle differences, often of extreme taxonomic degree, between juveniles and adults, are not to be found in the literature.

An identification scheme of New Zealand eusirids must include some noneusirids resembling the main complex. *Parapherusa crassipes* (Gammaridae) and *Paracalliope novizealandiae* (? Eusiridae) superficially resemble eusirids. *Parapherusa* differs from all intertidal eusirids in the enlarged hand of gnathopod 2, resembling various gammarids, and it bears a visibly elongate accessory flagellum. A final confirmation can be made by dissecting the unique uropod 3 and comparing it with Figs 2–3. *Paracalliope* is difficult to handle in rapid identification counts because it resembles the eusirid *Paramoera*. In preservative about half of the specimens of *Paracalliope* retain pereopod 5 in unbroken condition and that highly elongate appendage is distinctive. Males of *Paracalliope* have enlarged gnathopod 2 unlike other New Zealand eusirids, but the odd twisting of the hand has to be unsnarled before the gnathopod can be seen properly. Females of *Paracalliope* have very weak, thin gnathopods and can be distinguished from all other similar eusirids (except *Oradarea*) by the fact that gnathopod 1 is not slightly larger than gnathopod 2; but this distinction cannot be made for juveniles smaller than 2.5 mm. The peduncle of uropod 3 in *Paracalliope* is elongate unlike other eusirids, and urosomites 2–3 are coalesced, but individuals may have to be mounted on depression slides to observe these characters. By trial and error the subtle size and shape distinctions of the stump of broken pereopod 5 can be recognised as a contrast to any other eusirid. Fortunately most eusirids maintain the unelongate pereopod 5 in unbroken condition after preservation.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

The most easily identified eusirid in the New Zealand intertidal is *Oradarea novaezealandiae*. Gnathopods 1–2 are uniquely elongate and slender (*see* Sars 1895, pl. 162, for *Leptamphopus*). *Oradarea* bears dorsal hump-teeth on pereonite 7 and pleonites 1–2, and the telson is uncleft. Except for *Apherusa translucens* the other eusirids have a cleft telson. *Pontogeniella levis* is the next to be eliminated; it is distinguished from its fellow eusirids by the long rostrum seen by depressing the antennae with a pin.

Eusiroides monoculoides looks initially like species of *Paramoera* in its large reniform eyes, but in all stages it differs from any other eusirid except *Eusirus antarcticus* in the inflated hands of the gnathopods and the short, fifth articles bearing long, thick posterior lobes. Gnathopods 1–2 are of similar size and morphology. *Eusirus* has gnathopodal hands attached to produced apices of article 5 (*see* Sars 1895, pl. 146), and adults of *Eusiroides* have extremely large spines on the palms of the gnathopods. Pleonal epimeron 3 has several deep serrations close together above the posteroventral corner. The inner plate of maxilla 1 differs from that of *Paramoera* and *Gondogeneia* in the presence of only one strong and one weak seta. Maxilla 2 has the inner plate uniquely larger than the outer, strongly ovate and irregularly setose on the medioterminal edge, the apex lacking setae.

The remaining eusirids, *Paramoera*, *Gondogeneia*, *Pontogeneiella*, and "*Apherusa*" *translucens* have gnathopod 1 slightly to strongly larger than gnathopod 2. This condition is unique to those species in New Zealand that otherwise look like the basic gammaridean. A few other taxa in other families also have this condition, but gnathopod 1 is not basically subchelate and not of the ordinary gammaridean appearance (*see Aora maculata*, Fig. 10*g*).

The two common species of *Paramoera* have a distinctly articulate, lappet-like accessory flagellum and the inner plate of maxilla 1 has four or more setae spread on the medial edge. *Gondogeneia* differs from *Paramoera* in its vestigial or missing accessory flagellum and the presence of only two or three terminal setae on a very thin inner lobe of maxilla 1.

The two species of *Gondogeneia* have very large subcircular eyes, whereas the two common species of *Paramoera* and the one species of *Pontogeneiella* have distinctly elongate, medium-sized, and mostly reniform eyes. The first antennal flagellum of *Paramoera* has alternate articles very weakly expanded, but adults (3.0 mm) of *Gondogeneia danai* and *G. rotorua* have every third, fourth, or fifth article expanded broadly. Both species of *Paramoera*, unlike other eusirids, have the posterior margins of the third pleonal epimeron weakly rounded, with a minute tooth marking the posteroventral corner and the margin above the corner with a few small nicks bearing tiny setules.

Finally, there is a species known as "*Apherusa*" *translucens* that so far has been found only in the juvenile stage in the intertidal. In that condition the specimens are very small (2.0 mm long or less), have small eyes, uncleft telson, unelongate pereopod 5, antenna 1 longer than 2 (if unbroken), and vestigial accessory flagellum, but they otherwise have the maxillae of *Paramoera* (and *Paracalliope* and *Pontogeneiella*).

Members of *Liljeborgia* may strongly resemble eusirids, especially because of the large gnathopods (resembling *Eusiroides*) and the large black eyes, but *Liljeborgia* has a strongly bifid antenna 1 with long and conspicuous accessory flagellum. The mandibular molar lacks trituration ridges, the gnathopods have extremely large lobes on the fifth articles, and the palms of the gnathopods do not have the large spines seen in *Eusiroides* but may have two or more cycles of plain and hooked spines occurring very uniformly throughout the lengths of the palms.

Apherusa (?) **translucens** (Chilton)

Panoploea translucens Chilton, 1884a: 263–264, pl. 21, fig. 3; Thomson and Chilton, 1886: 150.
Apherusa translucens. Chilton, 1921a: 220–222, fig. 1.

A new genus should be created for this species, but I hesitate because of the lack of male specimens to confirm Chilton's (1921a) appraisal. Females or female-like juveniles at hand do not exceed 2.2 mm whereas, Chilton had males as large as 9.0 mm. The species was originally based on females corresponding to those at hand. Various characters have not been specifically mentioned by Chilton, though they might be assumed to be identical with those of various members of *Apherusa*. The genus otherwise is composed of 13 species confined to the Northern Hemisphere, now that *Apherusa levis* (Thomson) is removed to *Pontogeniella*. The overall characteristics of *A.* (?) *translucens* fit the *Apherusa* model closely, but the enlarged male gnathopods with gnathopod 1 much larger than gnathopod 2 depart from that model and indicate the need for generic segregation. The correspondence of mouthparts with those of *Paramoera* or *Pontogeneiella* plus the enlarged male gnathopod 1 suggests that *A. translucens* has affinities with those genera but is distinguished from them in the completely uncleft telson. The following notes on material at hand supplement those given by Chilton.

Eyes and rostrum small like those shown by Sars (1895, pl. 155, fig. 2) for "*A. borealis*" = *A. cirrus* (Bate), or eyes medium in size, with distinct dark core, lateral cephalic lobe also similar, nasiform; epistome anteriorly unproduced; antenna 1 about 75 percent as long as body, antenna 2 half as long as body, article 2 of antenna 1 with medial bilobation, accessory flagellum forming weak, broadly conical, nonarticulate scale armed with one setule; mandibular palp article three stout (? juvenoid), slightly falcate and shorter than article 2, with three terminal setae and three subterminal setae on oblique margin; lower lip with weak inner lobes as seen in Sars (1895, pl. 155, fig. 1) for *A. bispinosa* (Bate); inner plate of maxilla 1 like that of *Paramoera*, with medial edge fully lined with seven setae, apicalmost

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 28. *Atyloella moke* n. sp., holotype, female, 8.8 mm, PMBS: *a*, uropod 3, ventral view, inner ramus missing; *b*, apex of telsonic lobe; *c*, accessory flagellum; *d*, prebuccal mass (stippled); *e*, head; *f*, pleonal epimera 1–3; *g*, mandible; *h*, apex of maxillipedal palp; *i*, upper lip; *j*, pleon. Female, 8.0 mm: *k*, gnathopod 2, setae removed; *l*, gnathopod 1, lateral; *m*, maxilliped; *n*, dactyl of pereopod 4; *o*, possible inner ramus of uropod 3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

large seta much larger than others, but apex with short sharp seta also; inner plate of maxilla 2 with oblique submarginal row of six setae, distalmost seta greatly enlarged, plates subequal in width; apex of inner plate on maxilliped with two large, stout, blunt spines and several setae, outer plate with one normal medial maxillipedal spine, three pairs of visibly free ventral setae, and four basoventral setae, lateral apex with three spine setae, palp like that of *A. bispinosa;* gnathopod 2 thinner than gnathopod 1 even in juveniles, dactyl with subterminal inner tooth and setules; pereopodal dactyls with slight hemilunar slit, one inner setule, and about three tiny setules on outer edge; posteroventral lobe on article 2 of pereopod 5 extending downward to distal end of article 3, slightly less on pereopods 3–4; uropods 1–2 in juveniles like those figured by Chilton (1921a) but outer rami lacking marginal spines; telson uncleft, broad basally and short unlike Chilton's figure; epimera 1–3 each with upswept sharp tooth at posteroventral corners, all epimera with facial ridge, those on epimera 2–3 at about 45 degree angles, juveniles with one, one and two ventral spines on epimera 1, 2, 3, whereas Chilton showed five spines on epimeron 3 for adults.

MATERIAL: NZOI Sta. E978 (2), Sta. E979 (8).

DISTRIBUTION: Lyttelton Harbour; Whangaparaoa Peninsula.

Atyloella moke, new species

Figs 28, 29

NOMENCLATURE: This species differs from the other three members of the genus in the blunt, not sharp, epistomal process, but the three species are so highly diverse in other characters that the assignment of *A. moke* to *Atyloella* is warranted until two of the other species have been described in greater detail. *Atyloella moke* differs from the unique *Liouvillea* Chevreux (1912) in the short rostrum, anteroventrally produced head, thick gnathopods, small eyes, poorly setose inner plates of maxillae, and the long accessory flagellum.

DIAGNOSIS OF FEMALE: Accessory flagellum longer than broad; epistome anteriorly rounded; inner plate of maxilla 1 apically truncate and bearing two widely separated setae; inner plate of maxilla 1 not setose medially, bearing one large medio-subterminal seta, other setae terminal; pleonites 1–2 each with single sharp, posteromedial tooth; pleonal epimera 1–3 with bulging, sinous posterior margins forming sharp tooth posterodistally, epimeron 3 with setulose notches above tooth; telson cleft about halfway.

DESCRIPTION: Eyes large, subreniform, burgundy colour in alcohol; antennae 1–2 about as long as body, but precise relations unclear (antennae and inner rami of uropod 3 broken from body before examination and found separately in vial); article 1 of primary flagellum on antenna 1 elongate, about as long as four normal articles; upper lip broadly bilobed; coxa 1 with several small setulose notches at posteroventral corner; article 4 of gnathopods 1–2 with sharp posterodistal cusp; gnathopod 2 distinctly larger than 1 but otherwise similar; inner rami of uropod 3 broken off but possibly one recovered from vial and correctly identified (*see* Fig. 28*o*); uropod 3 with very large peduncular process to support inner ramus. Male unknown.

HOLOTYPE: NZOI, No. 84, female, 8.8 mm.

TYPE LOCALITY: Portobello Marine Biological Station, Otago Harbour, New Zealand, off *Ceramium*, 31 May, 1954, coll. D. E. Hurley.

RELATIONSHIP: *Atyoella magellanica* (Stebbing 1888, pl. 79), the type species of the genus, has no dorsal body teeth, a pointed epistome, and about five setae on the inner plate of maxilla 1. The odd inner plate of maxilla 1 and unpointed epistome of *Atyloella moke* may signify a subgeneric condition.

Atyloella quadridens K. H. Barnard (1930) from Antarctica has two decumbent teeth on each of pleonites 1 and 2. *Atyloella dentata* K. H. Barnard (1932) from the Falkland Islands has a large tooth dorsally on each of pereonite 7 and pleonites 1–2 and a carina on pleonite 3, the telson is cleft only about one quarter its length, the epistome is very acute and attenuate, the accessory flagellum minute, the gnathopods thin, and gnathopod 2 has a concave palm.

The relationships between *Atyloella* and *Liouvillea* are strong in terms of the peduncular process on uropod 3.

Atyloella moke differs generically from *Pseudomoera gabrieli* (Sayce 1901, fresh water Australia), only in the presence of dorsal body teeth, the broad inner plate of maxilla 1, the peduncular process of uropod 3, the slight invagination of the upper lip, and the slightly stronger protrusion of the anteroventral cephalic corner.

MATERIAL: Two females from the type locality.

DISTRIBUTION: Otago Harbour.

Calliopius (?) **didactylus** (Thomson)

Calliope didactyla Thomson, 1879a: 240, pl. 10C, fig. 3.
Calliope didactylus. Thomson and Chilton, 1886: 148.

An enigmatic taxon that, once rediscovered, should be easily recognised by its *Allorchestes*-like gnathopods.

DISTRIBUTION: Mouth of River Taieri, among kelp washed up on the beach.

Eusiroides monoculoides (Haswell)

Figs 67 *l*, *m*.

Atylus monoculoides Haswell, 1880b: 327–328, pl. 18, fig. 4.
Eusiroides caesaris Stebbing, 1888: 970–974, pl. 88.
Eusiroides pompeii Stebbing, 1888: 974–977, pl. 89.
Bovallia monoculoides. Chilton, 1909a: 622–624; 1921b: 66–68; 1924a: 270–271.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 29. *Atyloella moke* n. sp., holotype, female, 8.8 mm, PMBS: *a*, article 3 and flagellar base of antenna 1; *b*, *c*, maxilla 1; *d*, lower lip; *e*, ventral margin of coxa 1; *f*, *g*, *h*, coxae 1, 2, 3; *i*, *j*, *k*, *l*, pereopods 2, 3, 4, 5, in whole or part; *m*, maxilla 2; *n*, mandibular molar; *o*, incisor of left mandible; *p*, telson; *q*, peduncle of uropod 3, dorsal. Female, 8.0 mm; *r*, pereopod 4, medial.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

?Bovallia monoculoides. Stephensen, 1927: 316–317.
Eusiroides monoculoides. Stebbing, 1910: 595; K. H. Barnard, 1916: 174–175; Stephensen, 1949: 15.
?Eusiroides monoculoides. Chevreux, 1908b: 478; ?Schellenberg, 1931: 173–174, fig. 90.
not *Bovallia monoculoides*. Chilton, 1912a: 494–495; 1925b: 177–178 (= *Bovallia gigantea* Pfeffer).
in part *Bovallia gigantea*. Shoemaker, 1914: 74.

Specimens from New Zealand compare almost exactly with Stebbing's *E. pompeii* but differ from his *E. caesaris* in the absence of dorsal teeth on pleonites 1–2 and pereonite 7. The otherwise broad distribution of this species may have blunted the perception that *E. caesaris* (from Melbourne) requires subspecific or fully specific appellation. Differences among the several species of this genus, occurring throughout the world from the northern warm-temperate to Antarctica, are very minor. Until a handbook of New Zealand gammarideans can be produced, students may continue to use the fine figures of Stebbing (1888) in recognising this species. Members of *Eusiroides* are essentially similar to *Paramoera* and in New Zealand may be distinguished from that genus by the tumid gnathopods with distinct lobes on the fifth articles and the extremely stout spines lining the palms (*see* figures of *E. diplonyx* Walker in J. L. Barnard 1970). Small juveniles also have the tumid gnathopods but may have only two palmar spines. The large uni-articulate accessory flagellum distinguishes *Eusiroides* from *Gondogeneia*.

Pleonal epimera 1–3 of small juveniles and medium-sized subadults resemble pleonal epimeron 2 of *Pontogeneiella levis*, but adults of New Zealand *E. monoculoides* have epimeron 3 bulging posteriorly and deeply serrate on the ventral third of the posterior margin. Subadults thus resemble *E. crassi* Stebbing (1888).

Maxilla 1 has the broadly setose inner plate of *Paramoera* (*see P. chevreuxi*, p. 82) but maxilla 2 has a very broadened and lengthened inner plate bearing blunt medial setae clumped together in a single group on the face of the plate. New Zealand specimens have this condition exactly as in *E. diplonyx* (figured by J. L. Barnard 1970) whereas several works mentioned in the synonymy have these setae figured in a spread-out condition, possibly as a misinterpretation in reconstructing this pattern from shrivelled maxillae. Maxilla 2 often shrivels badly in preservatives.

The eyes of *E. monoculoides* are enlarged, black-brown, and of medium reniform shape as in *Pontogeneiella levis* (Fig. 44).

New Zealand *E. monoculoides* compares with figures of *E. diplonyx* Walker (*see* J. L. Barnard 1970) except that article 2 of the mandibular palp is as long as article 3, pereopods 1–2 have a normally thin, straight, apically bifid locking spine, article 1 of the first maxillary palp in adults has an apicolateral seta, and pleonal epimeron 3 bulges more posteriorly and has a few more serrations. The skin texture of *E. monoculoides* (Fig. 67*l*, *m*) differs from that of *E. diplonyx*. In *E. monoculoides* the body and epimera have extremely fine striations composed of minute beads arranged in rows while articles 4–6 of pereopods 3–5 have much larger striations formed of irregularly lumped, larger beads. Uropod 1 of *E. monoculoides* has the same apical form on the peduncle of uropod 1 as seen in *E. diplonyx*. The telson is deeply cleft and the lateral cephalic lobes of juveniles are very noticeably broadened in comparison to members of *Gondogeneia*, *Pontogeneiella*, and *Paramoera*.

MATERIAL: NZOI Sta. E970 (24), Sta. E973 (1).

DISTRIBUTION: Dunedin to Three Kings Islands; Kaikoura; Otago Harbour; ?Auckland Islands, shore, possibly from *Macrocystis;* also Carnley Harbour.

EXTRINSIC DISTRIBUTION: New South Wales, 0–33 fm (type locality); Tasmania; Victoria (southern Australia); South Africa (93 fm); Heard Island (75 fm); Nightingale Island; ?Strait of Magellan; ?Bahia Inutil; ?Tuamotu Archipelago.

Eusirus antarcticus Thomson

Eusirus cuspidatus, Kröyer, var. *antarcticus* Thomson, 1880a: 4–5; 1880b: 216; Thomson and Chilton, 1886: 148.
Eusirus antarcticus. Chilton, 1912a: 490–492; Schellenberg, 1926: 348–349; K. H. Barnard, 1930: 384–385, fig. 46 a, b; Schellenberg, 1931: 173–174; K. H. Barnard, 1932: 188–189; Nicholls, 1938: 98.
Eusirus propinquus. Walker, 1907: 30–31 (not Sars).
Eusirus Bouvieri Chevreux, 1911: 405–407, fig. 3.
?Eusirus laticarpus Chevreux, 1906: 49–54, figs. 27–30.
Eusirus longipes Stebbing, 1888: 965–969, pl. 87 (not Boeck).

DISTRIBUTION: Dunedin Harbour.

EXTRINSIC DISTRIBUTION: Antarctic and subantarctic, 0–385 m.

Oradarea novaezealandiae (Thomson)

Fig. 30

Pherusa novae-zealandiae Thomson, 1879a: 230, pl. 10c, fig. 2.
Pherusa neozelanica. Thomson and Chilton, 1886: 148.
Panoploea debilis Thomson, 1880b: 213–213; 1880a: 3, pl. 1, fig. 3; Thomson and Chilton, 1886: 150; Thomson, 1889: 262.
Leptamphopus novae-zealandiae. Thomson, 1913: 243; Chilton, 1920a: 1–6, figs. 1–5; ?K. H. Barnard, 1930: 369.
Oradarea novae-zealandiae. K. H. Barnard, 1932: 162–163.
Leptamphopus novae zealandiae. Chilton, 1911b: 308.
not *Leptamphopus novae-zealandiae*. Chilton, 1912a: 488–489.

Other questionable references:

Leptamphopus novae zealandiae. Schellenberg, 1926: 351.
Leptamphopus novae-zealandiae. Chilton, 1909a: 621–622.
Leptamphopus novaezealandiae. Stephensen, 1927: 314–315; Stephensen, 1938: 244–245.

NOMENCLATURE: The true records of this species cannot be sorted out completely because the history of its identification is beset with an earlier belief that the New Zealand *Oradarea* was synonymous with Walker's (1903) *O. longimana* from Antarctica. There is some doubt as yet that the two species are not synonymous, but I have not encountered in the intertidal populations of *O. novaezealandiae* the variations in dorsal teeth mentioned by

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

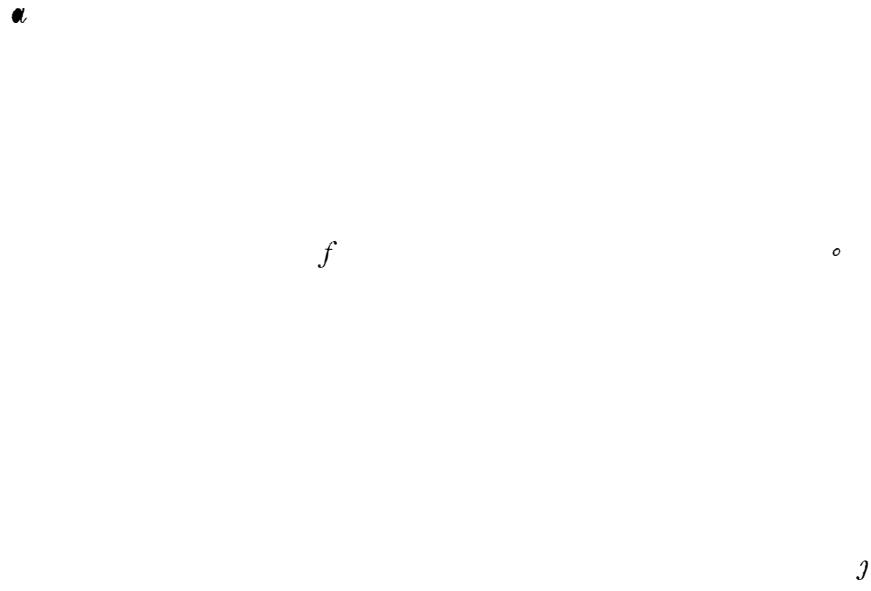


FIG. 30. *Oradarea novaezealandiae* (Thomson), female, 8.2 mm, NZOI Sta. E 970 [JLB NZ-2]: *a*, head; *b*, accessory flagellum (stippled); *c*, *d*, apex of medial gnathopod 2; *e*, spine row on article 2 of medial gnathopod 1; *f*, telson; *g*, medial gnathopod 1, setae removed; *h*, uropod 3; *i*, pereonite 7 and pleonites 1–3, left to right; *j*, pleonal epimera 1–3, left to right.

earlier students. Walker's *Oradarea longimana* is properly known as *O. walkeri* Shoemaker (1930), a new name created for Walker's appellation that became a junior homonym when Shoemaker transferred Boeck's *Leptamphopus longimana* into *Oradarea*. Sars's (1895) portrayal of *L. longimana* was in reality a species different from Boeck's and it was named *L. sarsi* by Vanhöffen (1897) who made it the type species of *Leptamphopus*. Shoemaker was not able to place *O. novaezealandiae* firmly in either genus in 1930 and suggested it might have to be removed to *Halirages*, but the following descriptive notes now establish that *O. novaezealandiae* is at least congeneric with *O. longimana* (Boeck). Since 1930 two more species of *Leptamphopus* have been described, but I believe that *L. litoralis* Gurjanova (1938, 1951) should be removed from *Leptamphopus*, perhaps to the genus *Halirages*. With the transferral of *O. novaezealandiae* out of *Leptamphopus*, there are left two species in the latter genus, *L. sarsi* Vanhöffen and *L. paripes* Stephensen (1931), both occurring only in the high Northern Hemisphere as far as known.

Leptamphopus is characterised by the absence of an accessory flagellum whereas *Oradarea* has a small 1-articulate accessory flagellum. Chilton was not able to find that minute appendage in the New Zealand *Oradarea*, but it occurs in present materials appressed to the side of an invagination on article 3 of antenna 1. Except for *Oradarea edentata* K. H. Barnard (1932) from the South Shetlands, all species of that genus bear posterodorsal teeth in contrast to the members of *Leptamphopus*. Only one other species of *Oradarea* besides *O. longimana* (Boeck) occurs in the Northern Hemisphere or low latitudes (*O. shoemakeri* Pirlot, 1934). The strong congruity between *Leptamphopus* and *Oradarea*, except in the accessory flagellum, suggests that southern members of *Oradarea* immigrated twice to the Northern Hemisphere, one invasion giving rise eventually to *L. sarsi* which may have been the ancestor of *L. paripes*

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Stephensen and the second invasion resulting in the maintenance of *O. longimana* (Boeck) in generic constitution similar to the southern representatives. This generic difference, concerning only the accessory flagellum, is very meagre and may not have generic value once the family Calliopiidae is properly untangled. *Oradarea longimana* (Boeck) generally occurs farther south in the north Atlantic Ocean than do the two species of *Leptamphopus*, and I have identified *O. longimana* from the eastern Pacific Ocean (Catalina Island, California) but that identification needs further study.

Oradarea novaezealandiae has a striking resemblance to *O. longimana* (Boeck) according to the fine figures of Shoemaker (1930) but differs in the following characters:

Anteroventral corner of head bluntly extended, not sharply as in *O. longimana*; lower lip without basal tuberosites; lacinia mobilis of both mandibles more strongly toothed; setose distal portion of article 3 on mandibular palp longer and more oblique; inner plate of maxilla 1 with distalmost seta twice as thick and 1.5 plus times longer than adjacent setae; submarginal row of setae on inner plate of maxilla 2 more strongly oblique than in *O. longimana*; setal spines on anterior margins of article 2 of gnathopods 1–2 very thick and long; palms of gnathopods 1–2 more oblique than in *O. longimana*; pleonal epimera 1–3 with distinct posteroventral points, that point on epimeron 3 very sharp, slightly upturned, and marked by dorsal invagination; telson apically truncate and lacking minute notch; outer ramus of uropod 3 much longer than in *O. longimana*, approximately 85 percent as long as inner ramus in *O. novaezealandiae*. Shoemaker did not know the lengths of the antennae but in *O. novaezealandiae* antenna 1 is longer than antenna 2 by twice the length of the peduncle of antenna 1.

Oradarea novaezelandiae differs from *O. walkeri* (= *O. longimana* Walker, 1903) in the presence of a distinct posterodorsal tooth on pereonite 7, the conspicuously longer outer ramus of uropod 3, the longer fifth article of gnathopods 1–2 (like *O. longimana* (Boeck) as shown by Shoemaker 1930), and the longer first antenna. As these differences between *O. novazealandiae* and Walker's portrayal of *O. walkeri* were not known to Chilton, Chevreux, Schellenberg, and Stephensen, nor to K. H. Barnard until 1932, there was formulated the belief that *O. walkeri* and *O. novaezealandiae* were synonymous. I therefore question any of the indentifications except those mentioned about material collected in New Zealand proper. Auckland Island occurrences should also be verified as to whether they contain *O. novaezealandiae* or *O. walkeri*.

K. H. Barnard (1932) was finally able to examine specimens of *O. novaezealandiae* and wrote that the texture of pits on the chitinous skin of *O. novaezealandiae* distinguished it from any other species of *Oradarea* in the Antarctic region. This appearance gives the body surface a minute pitting similar to that of smooth concrete.

Under the supposition that *O. walkeri* and *O. novaezealandiae* had been proved synonymous, Schellenberg (1931) reported *O. walkeri* from antiboreal South America, but the few points he mentions about that population have congruity with *O. novaezealandiae*. He noted characters of the dorsal body teeth, size of eyes, the pleonal epimera, upper lip, and telson. The overall morphology of that population remains enigmatical.

Finally there should be mentioned again the amazing resemblance pointed out by Chilton (1909a) between the genus *Oradarea* and the monotypic *Djerboa* Chevreux (1906) of Antarctica. They are undoubtedly distinct genera in view of the deeply cleft telson of *Djerboa*, but they signal the unsatisfactory segregation of the Calliopiidae from the Eusiridae on the basis of an uncleft telson. *Schraderia* Pfeffer is a second cognate to *Oradarea*. Most certainly the genera formerly included in the Pontogeneiidae, a family now synonymous with Eusiridae, should be amalgamated with the Calliopiidae, but the problem remains whether the three or four genera with the special gnathopods of *Eusirus* have any merit as an assemblage of major distinction.

In summary, the genera *Lemptamphopus* and *Oradarea* are retained despite their close similarities, because *Leptamphopus*, though poorly diverse, seems to have a single evolutionary origin, possibly from a southern species of *Oradarea*.

MATERIAL: NZOI Sta. E966 (1), Sta. E967 (13), Sta. E970 (1), Sta. E971 (1).

DISTRIBUTION: Throughout New Zealand; ?North Cape, 20 m; Bay of Islands, dredged; Wellington; Kaikoura; Akaroa; Lyttelton; Dunedin Harbour, 4–5 fm; off Stewart Island, Pt. Adventure, 37–41 fm; ?Auckland Islands, 50 m, sandy clay; also Carnley Harbour; ?Campbell Island.

Paracalliope Stebbing

This genus has previously been a member of the Calliopiidae and it is retained in the Eusiridae-Calliopiidae despite its rudimentary oedicerotid and atylid developments explained in sequel. Until now the genus in New Zealand has been represented by one species thought to be spread throughout marine and terrestrial waters, but evidence is presented to demonstrate at least three species in the region, one marine, one brackish-water, and one freshwater. Others may be present, although a wide array of material from streams on both main islands has been studied while material from lakes has yet to be reinvestigated. Charles Chilton identified all New Zealand paracalliopes as one species and united populations from India and the Philippine Islands with that species. The Indian population was long ago accorded specific rank and presumably the Philippine material should also be considered distinct from the others.

DIAGNOSIS: Rostrum small, not exceeding forward extent of lateral cephalic lobe; eyes large, paired, lateral,

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

discontiguous; antennae proportionate; vestigial accessory flagellum present; flagellum of male antenna 1 with a few calceoli; mandibular incisor projecting, toothed, lacinia mobilis large, toothed, molar large, cuboid, triturative; palp article 3 subfalciform normally; lower lip with well developed inner lobes; inner plates of maxillae 1–2 strongly setose medially, maxilla 2 with submarginal oblique setal row on inner plate; palp of maxilla 1 normal and 2-articulate; maxillipeds stout but otherwise basic in male; gnathopods subchelate, female gnathopods weak, those of male stout, fifth articles posteriorly lobate, lobes erect or not distinctly guarding hands, hands twisted medially, palms bearing large spines; pereopods 1–4 with slender distal articles, poorly setose; coxa 4 not posteriorly excavate or weakly so; pereopod 5 normally elongate for family Oedicerotidae, moderately setose, especially dactyl; pleonal epimera with posterodistal points; body dorsally smooth; uropods 1–3 all extending equally, outer rami of uropods 1–2 slightly shortened, peduncle of uropod 3 normally elongate, rami slightly shorter than peduncle; telson normally ovoid, thin, and uncleft; urosomites 2–3 coalesced.

TYPE SPECIES: *Calliope fluviatilis* Thomson.

RELATIONSHIP: This genus stands as an intergrade between the central concepts of the Eusiridae (= Pontogeneiidae and Calliopiidae) and the Oedicerotidae. Transformation from a typical eusirid (for instance *Paramoera*) to a typical oedicerotid (such as *Oediceroides*) would require the following changes:

(1) complete loss of the vestigial accessory flagellum;
(2) anterior extension and enlargement of the rostrum;
(3) dorsomedial contiguity of the eyes;
(4) elongation of pereopod 5 and its dactyl;
(5) modification of the pereopods from a basic slenderness and weak setation to a fossorial condition with enlargement of articles and heavy setation or spination;
(6) elongation of the peduncle of uropod 3.

Paracalliope has characters (4) and (6) in the oedicerotid condition and characters (1), (2), (3), and (5) in the eusirid condition. But character (1) is of dubious familial value so that *Paracalliope* has two of five important oedicerotid characters. Several other oedicerotids do not possess characters (2) and (3). The rostrum is reduced or absent in many species of the Oedicerotidae, often as an obvious secondary reduction, but in those genera with bilaterally discontiguous eyes like *Paracalliope*, *Exoediceros*, and *Parhalimedon* the rostrum is primitively small and typical of the eusirid concept. The Oedicerotidae therefore already contain genera with characters typical of eusirids. The elongation of the peduncle of uropod 3 is an important mark of oedicerotids, but at least one genus of the Calliopiidae, *Metaleptamphopus*, also has that character. The conspicuous elongation of pereopod 5 is perhaps the most important difference between the two families, but it is not an absolute mark of distinction because the epipelagic *Stenopleuroides* of the Calliopiidae has an elongate pereopod 5, perhaps utilised as a suspensorial mechanism. The loss of apical spines on the rami of uropods 1–2 also adds to the oedicerotid character of *Paracalliope*, but such is not an infallible distinction between the two families. The dactylar setosity on pereopod 5 also suggests that *Paracalliope* is more an oedicerotid than it is eusirid.

Fossorial adaption of pereopods is seen in the eusirid *Zaramilla*, but except for pereopod 5, *Paracalliope* has eusirid pereopods, bears an accessory flagellum, an uncleft telson, large dactyls on pereopods 1–2, and an elongate peduncle of uropod 3. *Zaramilla* is definitely another genus showing the close relationship and mode of evolution between the Eusiridae and the Oedicerotidae.

The condition of the telson is no longer believed to signify any familial distinction between the Eusiridae (= Pontogeneiidae) and the Calliopiidae, but oedicerotids generally have the uncleft calliopiid telson with occasional secondary invagination. Several eusirid-calliopiid genera appear to differ from each other primarily in the nonclefting of the telson so that by an extension of this logic one may legitimately compare the oedicerotid *Paracalliope* with several "eusirids" such as *Liouvillea* Chevreux (1912), *Pontogeneiella* Schellenberg (1929), and *Prostebbingia* Schellenberg (1926). *Paracalliope* differs from all in the uncleft telson, the elongate pereopod 5, and more or less in the elongate peduncle of uropod 3 with weakly spinose, thin rami. *Paracalliope* differs from the first two genera in the unexcavate coxa 4.

Among various calliopiids with uncleft telson *Paracalliope* has several characters in common with, and certain resemblances to, *Calliopius* Liljeborg, *Metaleptamphopus* Chevreux, *Sancho* Stebbing, *Atylopsis* Stebbing, *Amphithopsis* Boeck, *Calliopiella* Schellenberg, *Apherusa* Walker, and *Bouvierella* Chevreux. *Paracalliope* differs from all in the presence of inner lobes on the lower lip, but the character has no familial significance in the Eusiridae. The latter three calliopiid genera are very closely related to each other. *Sancho* has special significance because it has distinctly spinose pereopods like oedicerotids and haustoriids, and therefore demonstrates again the repeated modification of eusirids towards the fossorial oedicerotids. *Sancho* also has a partially eusirus-like gnathopod 2 resembling *Paracalliope*, but *Sancho* is extraordinarily flattened. *Metaleptamphopus* is significant because it has the elongate uropod 3 of oedicerotids, but pereopod 5 is not elongate and the dactyls of pereopods 1–5, though short, are deeply pectinate. *Paracalliope* differs from the other calliopiid genera mentioned above mainly in the elongate uropod 3 and elongate pereopod 5.

In the Oedicerotidae *Paracalliope* has affinities with *Bathyporeiapus* Schellenberg (1931), *Exoediceros* Stimpson (1855, *see* Sheard 1936c), *Exoediceropsis* Schellenberg (1931), *Methalimedon* Schellenberg (1931), and *Parhalimedon* Chevreux (1906). These genera are endemic to the Southern Hemisphere except for a tropical species of *Parhalimedon*. *Paracalliope* seems closely related to its Australian cohort *Exoediceros*, but that genus has fully oedicerotid pereopods and lacks dactyls on pereopods

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

1–2. *Parhalimedon* differs from *Paracalliope* in the short coxae and fully oedicerotid pereopods. *Bathyporeiapus* has no accessory flagellum, non-subchelate gnathopod 2, and fully oedicerotid pereopods. *Exoediceropsis* has a large coxa 4, nontriturative mandibular molar, setose pleonal epimera, no accessory flagellum, and bears calceoli on antennae 1–2. *Methalimedon* has unpaired eyes, large coxa 4, slender mandibular palp, and fossorial pereopods.

The typical Northern Hemisphere oedicerotid, from which the central or the extreme concept of the oedicerotid is drawn, usually has neatly rounded pleonal epimera but many of the endemic genera in the Southern Hemisphere have the pointed-quadrate epimera of *Paracalliope*, a character that might be presumed to be primitive to oedicerotids.

Finally, *Paracalliope* must be differentiated from *Carolobatea* Stebbing, the only other oedicerotid genus with presumed shallow-water representation in New Zealand. The type species, *C. schneideri* (Stebbing 1888), comes from Kerguelen Island and has been reported by Chilton from New Zealand, perhaps erroneously (*see* below). *Paracalliope* differs from the type species of *Carolobatea* in the paired eyes; presence of an accessory flagellum; non-oedicerotid head; stouter mandibular palp; greater setosity on the inner plate of maxillae 1–2; relatively shorter article 2 of the maxillipedal palp; unexpanded coxa 1 and poorly setose coxae; the non-fossorial pereopods 3–4; the normally long uropod 1; the relatively shorter rami of uropod 3; and the unrounded pleonal epimera. *Carolobatea* is therefore a typical oedicerotid.

One of the evoluntionary trends that eusirid-calliopiid genera exhibit in their radiation away from Gammaridae has been the partial loss of sexual modification in gnathopods; this is carried through almost completely by oedicerotids. *Paracalliope*, however, retains a strong sexual differentiation in gnathopods.

Despite its partial oedicerotid character *Paracalliope* remains subjectively a eusirid (pontogeneiid-calliopiid). This impression is reinforced by the repeated assignment of the genus to the Calliopiidae by various students, especially Stebbing and Chilton. Also, *Paracalliope* may be a stronger eusirid than oedicerotid in its ecology. Unlike the majority of the extreme but typical oedicerotids, *Paracalliope* has so far been found in littoral epifaunal marine environments, whereas typical oedicerotids are sublittoral mud and sand infaunal dwellers. *Paracalliope* in New Zealand lives in a biogeographic region abundantly supplied with other pontogeneiid-calliopiid amphipods (in proportion to the isolation of New Zealand and its modest shallow-water seabottom area). New Zealand has a fairly unique occurrence of other freshwater calliopiids, besides (two species of *Paraleptamphopus*). These generalities suggest that the New Zealand environment has been especially selective for evolutionary experiments in the Eusiridae, and *Paracalliope* may be a simple case of morphological convergence towards the oedicerotid plan but far outside the main phyletic system. But *Paracalliope* cannot be written off completely and returned to the Eusiridae until further evaluation of other atypical oedicerotids is undertaken. *Paracalliope* is but a step away from those genera, especially *Exoediceros*, previously mentioned. Now known to have at least three species in New Zealand, *Paracalliope* has also escaped to the tropics where two other species have been developed in India and the Philippine Islands. In the opposite view New Zealand perhaps forms the main relict home of this genus.

Paracalliope also has characteristics of the Atylidae, and indirectly of the Dexaminidae. The coalescence of urosomites characterises the Atylidae and the Dexaminidae and the logical morphotypic ancestors of those families reside in the Eusiridae. To segregate Atylidae as a distinct family and not to remove *Paracalliope* to familial status is inconsistent in the sense that *Paracalliope* has at least two more characters of divergence from eusirids than have atylids (*Paracalliope* has an elongate peduncle of uropod 3 and an elongate pereopod 5). That *Paracalliope* is not an atylid is demonstrated in its uropod 3 and pereopod 5, also in its clear chitin (skin). Atylids and dexaminids usually (but not always) have opaque and minutely pebbly skin. The enlarged gnathopod 2 of *Paracalliope* also suggests a primitive retention of a eusirid-gammarid character lost in atylids but also lost in many of the advanced eusirids. Atylids and dexaminids have a cleft telson whereas *Paracalliope* has an uncleft telson; but this character no longer has familial importance in this context. The only justification for hesitating to remove *Paracalliope* to a family of its own resides presently in a poor understanding of certain primitive members of the Oedicerotidae and how *Paracalliope* is related to those taxa.

The possibility that *Paracalliope* originated in New Zealand has strong support in the view that the various aberrant oedicerotid genera are all confined to the Southern Hemisphere while all the typical oedicerotid genera dominate the Northern Hemisphere and have penetrated the southern half of the world mainly in the deep seas. The tropics have a poor representation of oedicerotids, although not as extremely as believed a few years ago.

Paracalliope does not stand in the mainstream of eusirid evolution towards the Oedicerotidae, because the genus has undergone the coalescence of two urosomites, a character apparently unique to either family.

Many facts remain to be collected: (1) better morphological elucidation of other aberrant calliopiids and oedicerotids in the Southern Hemisphere; (2) an understanding of the functional morphology of pereopod 5 and uropod 3 in *Paracalliope* in relation to oedicerotid ecology; (3) a study of cephalic morphology in advanced oedicerotids and the tracing of any special histological or functional developments through unspecialised genera. If *Paracalliope* can be shown to have evolved from a subfamilial group of calliopiid-oedicerotids that are also the logical precursors to the advanced oedicerotids then

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

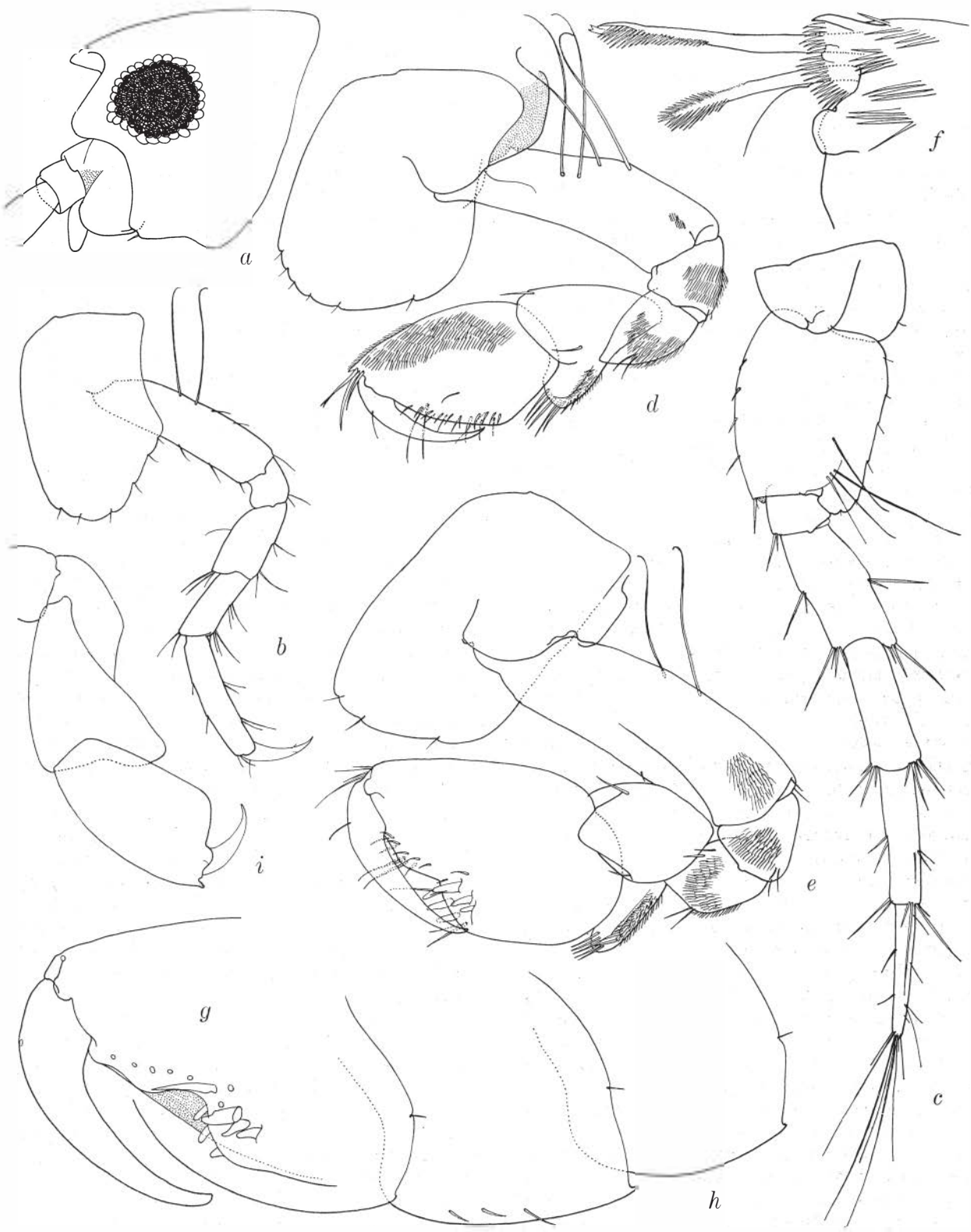


FIG. 31. *Paracalliope fluviatilis* (Thomson), female, 2.9 mm, Hirsch 11: *a*, head; *b*, pereopod 2; *c*, medial pereopod 5. Male, 3.5 mm: *d*, *e*, gnathopods 1, 2; *f*, apex of hand on gnathopod 1; *g*, palm of medial gnathopod 2; *h*, pleonal epimera 1–3. Female, 3.9 mm, Hirsch 6: *i*, outline of gnathopod 1.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Paracalliope should be removed to the Oedicerotidae even though one might be hard pressed to judge the morphofunctional balance between the two families. Because *Paracalliope* has two strong sight-recognition characters of oedicerotids, present identification codes could be simplified by its removal to the Oedicerotidae. This removal would be no great loss to the Eusiridae that now must include the Calliopiidae (*see* p. 63) and that retain a yet confusing plethora of diverse genera, others of which may eventually be removed. But eusirid organisms represent an important grade of evolutionary advancement over Gammaridae, out of which appear to have evolved several main branches of the suborder Gammaridea (J. L. Barnard 1969a). Hence Eusiridae may represent, and have to remain, a systematically confused polyphyletic assemblage of various genera evolved from the primitive gammaridean, that can never be phyletically untangled. The best taxonomic procedures may therefore be to accord any eusirid divergence towards another recognisable family a special place in the family so concerned, unless convergence alone can be proved.

KEY TO SPECIES OF NEW ZEALAND PARACALLIOPE

1. Dactyls of pereopods 1–4 with a distinct slit-mark near distal ends, lateral cephalic lobes sharp, female gnathopods 1–2 and male gnathopod 1 with especially tumid hands apicoposteriorly (gland cone large)..... *P. karitane*, n. sp.

   Dactyls of pereopods 1–4 without distinct slit mark near distal ends, lateral cephalic lobes blunt, female gnathopods 1–2 and male gnathopod 1 without special tumidity 2

2. Gland cone large, lateral cephalic lobes prominent, female gnathopods 1–2 with large posterior lobes on article 5 *P. fluviatilis* (Thomson)

   Gland cone small, lateral cephalic lobes weak, female gnathopods 1–2 with medium sized posterior lobes on article 5..... *P. ?novizealandiae* (Dana)

Paracalliope fluviatilis (Thomson)

Figs. 31, 34*f–j*

Calliope fluviatilis Thomson, 1879: 240, pl. 10C, fig. 4; Thomson and Chilton, 1886: 148 (in part).
Paracalliope fluviatilis. Stebbing, 1906: 297–298 (in part); Chilton, 1906d: 704 (in part); 1909a: 55–56 (in part).
not *Paracalliope fluviatilis.* Chilton, 1920c: 513–514 (Philippine Islands, presumedly a distinct species); 1921c: 529–531, fig. 3 (= *P. indica* K. H. Barnard, 1935).
not *Pherusa australis* Haswell, 1881: 103, pl. 7, fig. 1 (a distinct species to be known as *Paracalliope australis*).

NOMENCLATURE: Those references partially included with *P. fluviatilis* have had their marine records removed to *P. novizealandiae* (Dana), or have had *Pherusa australis* Haswell removed to full specific status. Male gnathopod 1 of the marine Australian species from Botany Bay is distinctly thinner than in any New Zealand species, more like that of *P. indica* than any other member of the genus. This suggests that re-examination of the Australian population would demonstrate other differences.

DIAGNOSIS: Accessory flagellum partially articulate; lateral cephalic lobe of medium size and blunt; complex of articles 1–3 of antenna 2 large; falciform article 3 of mandibular palp of medium stoutness; inner plate of maxilla 1 without apical cusp; hump on male gnathopod 1 palm, near defining area, of medium proportions; female gnathopods 1–2 with large posterior lobes on fifth articles and slender to medium stout subrectangular sixth articles; dactyls of pereopods 1–4 lacking distal slit.

REMARKS: Calceoli occur on articles 1, 2, 3, and 5 of the terminal male, a character contradicting Stebbing's (1906) statement. Calceoli occur on all three of the New Zealand species in terminal males. Characters not illustrated for this species but comparable to drawings for *P. karitane* n. sp. are: the urosome, uroped 3, the inner plate of maxilla 1, the maxillipedal palp (but article 4 is slightly shorter like occasional individuals of *P. karitane*), and the mandibular palp. Characters like those illustrated for *C. novizealandiae* are: lower lip, maxilla 2, maxilla 1 except for the inner plate, and the dactyls of pereopods. One specimen bears faint pectinae on the dactyl of pereopod 2.

Specimens from lakes have not been investigated in this study and may bear taxonomic distinctions.

MATERIAL: Many specimens from numerous streams on North and South Islands collected by A. Hirsch (1958) but material especially from two samples, one on North Island and one on South Island, carefully investigated: Hirsch 6, North Island, Inaha Stream, near Manaia, Taranaki, 21 Nov. 1956; Hirsch 11, South Island, south branch of Waimakariri River, downstream from groynes, 19 June 1956. The North Island female bears a slightly stouter hand with more transverse palm than the South Island female.

DISTRIBUTION: North and South Islands of New Zealand in running fresh waters, type locality Dunedin. Said by Chilton to occur in Lake Waikare and may occur in Lake Rotoiti but contradictorily said both to occur and not to occur in ditches where *Paraleptamphopus caeruleus* seems to be a common inhabitant. Many stream records to be found in Hirsch (1958), these materials identified by Dr D. E. Hurley and confirmed by present examination.

Paracalliope karitane, new species

Figs. 32, 33, 34*a–e*

DIAGNOSIS: Accessory flagellum not articulate; lateral cephalic lobe of medium size and sharp; complex of articles 1–3 of antenna 2 of medium to heavy enlargement; falciform article 3 of mandibular palp of medium stoutness; inner plate of maxilla 1 without apical cusp; hump on male gnathopod 1 near defining area strong; female gnathopods 1–2 with medium to large posterior lobes on fifth articles and apically widened, slightly stout sixth articles with slight humps near palmar

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

FIG. 32. *Paracalliope karitane* n. sp., holotype, male, 4.7 mm, Lower Hutt: *a*, head; *b*, coxa 3; *c*, inner plate of maxilla 1; *d*, dactyl of pereopod 2; *e*, accessory flagellum; *f*, mandibular palp; *g*, pleon. Female, 4.2 mm: *h*, *i*, gnathopods 1, 2: *j*, hand of medial gnathopod 2. Juvenile, 1.8 mm: *k*, coxa 4.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

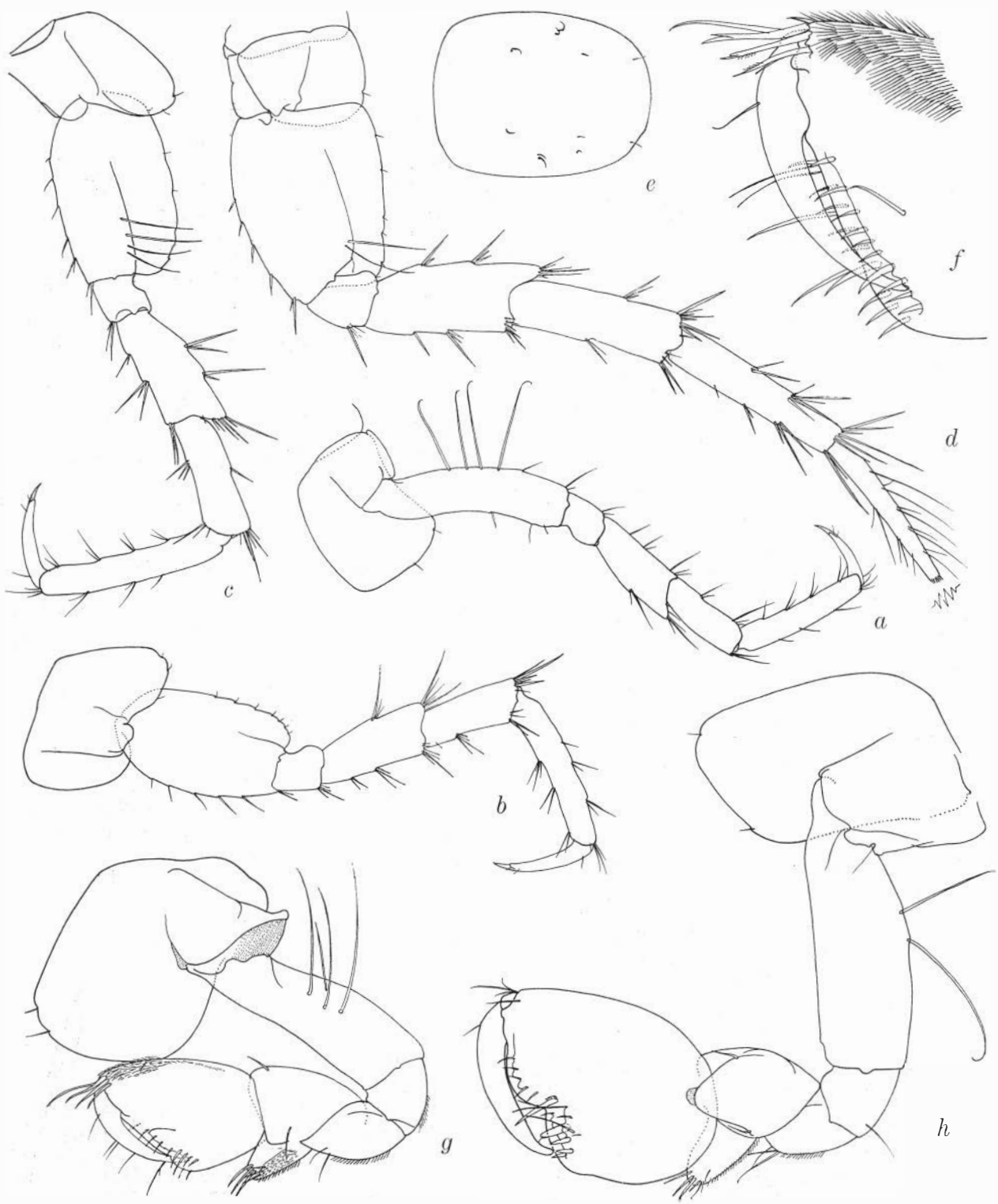


FIG. 33. *Paracalliope karitane* n. sp., holotype, male, 4.7 mm, Lower Hutt: *a*, *b*, *c*, *d*, pereopods 2, 3, 4, 5; *e*, telson; *f*, medial palm of gnathopod 1; *g*, *h*, gnathopods 1, 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

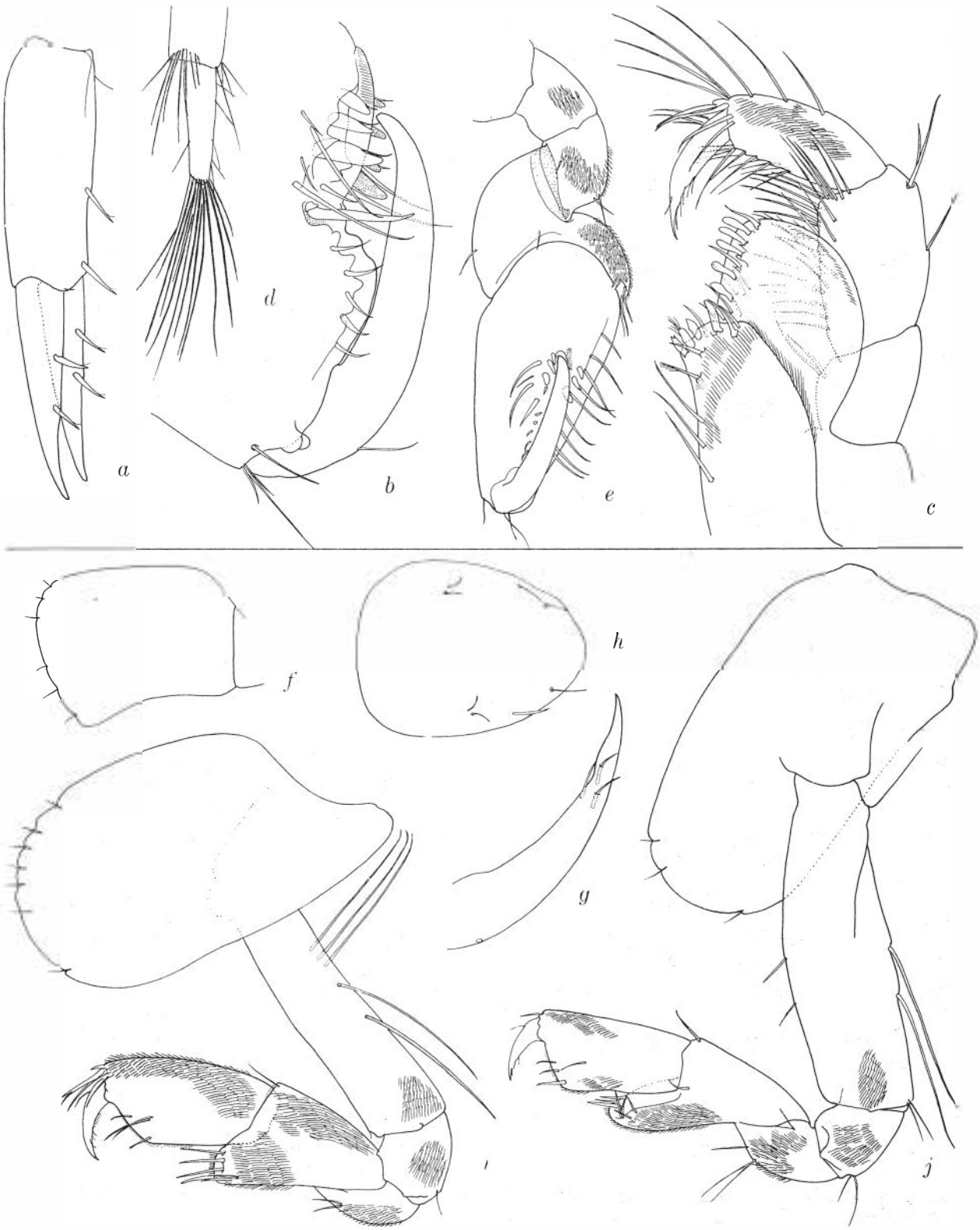


FIG. 34. *Paracalliope karitane* n. sp., male, holotype, 4.7 mm, Lower Hutt: *a*, uropod 3; *b*, palm of medial gnathopod 2; *c*, maxilliped. Female, 4.2 mm: *d*, apex of pereopod 5. Another male: *e*, medial view of gnathopod 2 in twisted position (normal).

Paracalliope fluviatilis (Thomson), male, 3.5 mm, Hirsch 11: *f*, coxa 4; *g*, dactyl of pereopod 1. Female, 2.9 mm: *h*, telson; *i*, *j*, gnathopods 1, 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

defining areas; dactyls of pereopods 1–4 bearing distal slit (or cuticular invagination).

HOLOTYPE: NZOI, No. 85, male, 4.7 mm.

TYPE LOCALITY: "Lower Hutt, June 25, 1951, coll. Dr. Vida Stout"; in Hutt River either in pools of Lower Hutt Reserve, in willows near Hutt Bridge, or at Silverstream, near hospital in duckweed (Dr Stout, pers. comm.).

REMARKS: The precise habitat of the type locality is obscure; it could be marine, brackish water, or fresh water but is believed to be brackish waters; water in the river at these closely spaced localities varies from purely fresh to highly brackish or fully marine depending on the climatic season.

This species differs from the other known species in New Zealand in the sharp ocular lobes, the slits on the pereopodal dactyls, the slightly tumid hands of female gnathopods 1–2, and male gnathopod 1; but like *P. fluviatilis* it has longer pereopodal dactyls than the marine species, *P. novizealandiae*.

The female of *P. fluviatilis* has a noticeably oblique ventral margin on coxa 4 and this occurs in juveniles of *P. karitane*. The enlarged basal articles of antenna 2 are another link of this species with *P. fluviatilis* in contrast to the marine taxon; the gland cone is especially large in *P. karitane* and *P. fluviatilis*.

MATERIAL: A score of specimens from the type locality.

DISTRIBUTION: Hutt River, near Wellington.

Paracalliope ?novizealandiae (Dana)

Figs. 35, 36, 37

?Oedicerus novi-zealandiae Dana, 1853: 934–935, pl. 63, fig. 7; Miers, 1876: 126–127.
?Oedicerus neo-zelanicus. Thomson and Chilton, 1886: 149.
not *Carolobatea novaezealandiae*. Chilton, 1909a: 620–621, fig. 2.

NOMENCLATURE: Dana's species was listed in the uncertain category by Stebbing (1906) who suggested it was identical with *Paracalliope fluviatilis*. Chilton (1909a), however, insisted that he had specimens from New Zealand and identified it with *Carolobatea schneideri* (Stebbing 1888) to which it took priority. There is so little resemblance between *Carolobatea* and *Paracalliope* despite their vaguely confamilial position that it is difficult to understand why Chilton identified Dana's species with Stebbing's unless he misread a figure to the upper right of Dana's drawing of *O. novi-zealandiae* as belonging with the group; that figure bears a resemblance to a gnathopod of a *Carolobatea*. The question now remains whether Chilton did indeed have any species of *Carolobatea* from New Zealand or whether by a peculiar circular process occurring over many years of study he identified marine paracalliopes with carolobateas without re-investigating the literature.

There is no doubt from Dana's figures that *Oedicerus novi-zealandiae* is a member of *Paracalliope*, but the various specific characters of the three species now known do not appear either in Dana's figures of the marine form or in Thomson's figures of the freshwater species.

Thomson's species (the type of the genus) can be re-identified easily because it is widely distributed through running fresh waters of New Zealand and materials in hand verify its presence in both the North and South Islands. Dana's marine species, with type locality of Cororatika (= Kororareka), Bay of Islands in northern New Zealand, is not far removed from the locality of many specimens in hand, from nearby Tapeka Point and throughout New Zealand. But the presence of a third species apparently collected in brackish waters of the Wellington region confuses the issue. Until the true ecological position of the third known species can be learned and the marine species re-identified from topotypical materials, the question mark must remain on my identification. Dana's materials presumably were lost nearly a century ago.

Dana's drawings of the marine *Paracalliope*, collected in small pools on the rocky shores, have antenna 2 and pereopod 5 exaggerated in relation to specimens on hand. The eyes of Dana's species are also smaller, but this may result from preservational losses of peripheral pigment.

DIAGNOSIS: Accessory flagellum partially articulate; lateral cephalic lobe small and blunt; complex of articles 1–3 of antenna 2 of medium size; falciform article 3 of mandibular palp stout; inner plate of maxilla 1 with sharp apical cusp; hump on male gnathopod 1 palm near defining area weak; female gnathopods 1–2 with weak posterior lobes on fifth articles and slender, subrectangular sixth articles; dactyls of pereopods 1–4 lacking distal slit (an internal cuticular invagination?).

REMARKS: The maxillipedal palp has been flattened more in the drawing of this species than in the other species, but they are otherwise congruent. Mandibular palp article 3 of the female is much less falcate than in the terminal male. The palm of male gnathopod 2 is only weakly invaginate in contrast to the other species of the genus.

The sharp cusp on the inner plate of maxilla 1 is often obscure on north New Zealand specimens and a cline for this character may exist.

MATERIAL: NZOI Sta. E967 (23), Sta. E972 (1), Sta. E975 (21), Sta. E976 (57), Sta. E977 (1), Sta. E978 (43), Sta. E979 (1), Sta. E980 (127), Sta. E981 (83), Sta. E982 (12).

DISTRIBUTION: ?Bay of Islands; ?marine populations of *P. fluviatilis* cited by Chilton from Lyttelton and Dunedin; Kaikoura; Wellington; Gisborne; Whangaparaoa Peninsula; Leigh; Tapeka Pt. (a few miles from type locality and possibly the precise spot).

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

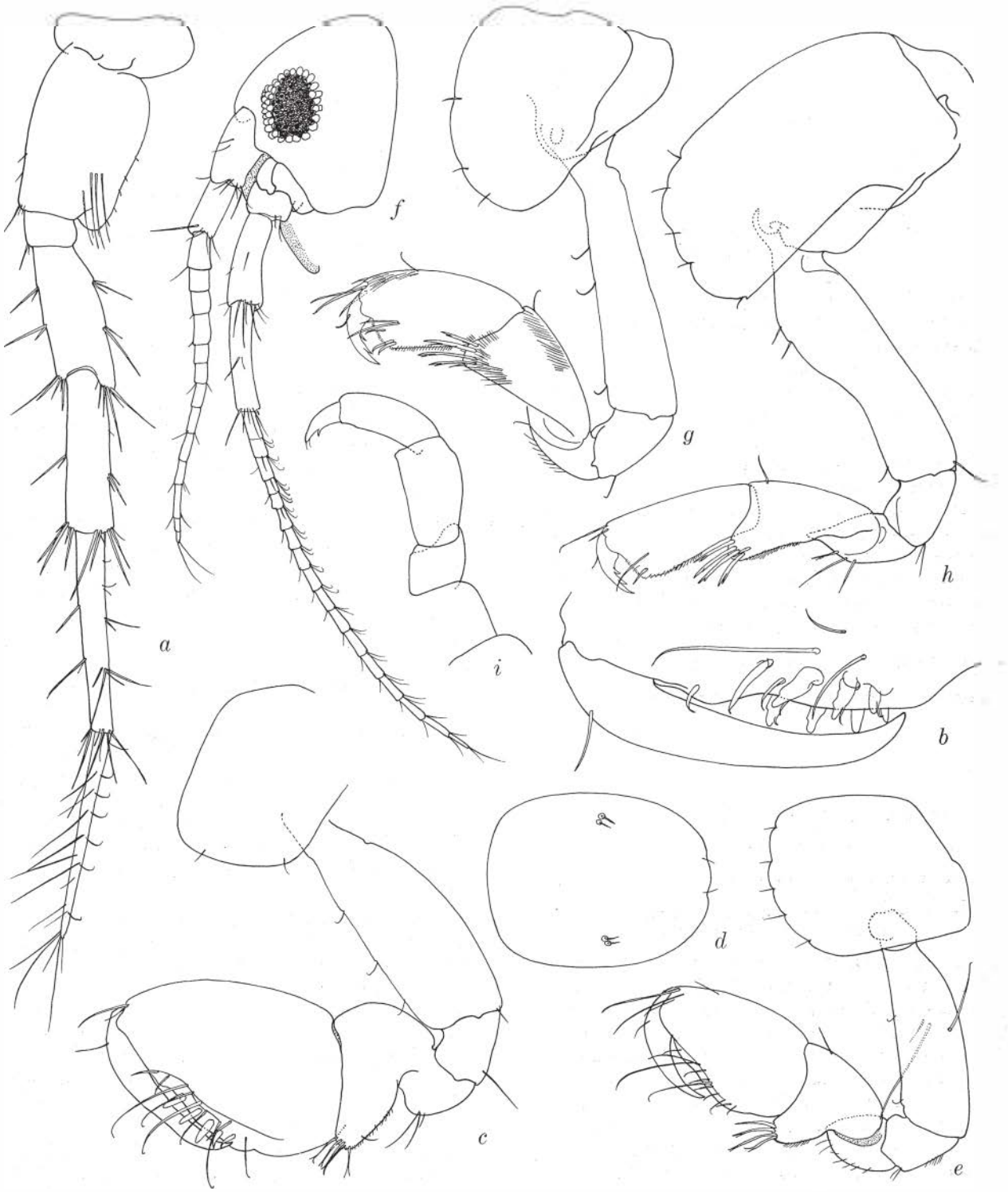


FIG. 35. *Paracalliope novizealandiae* (Dana), male, 2.4 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, pereopod 5; *b*, *c*, gnathopod 2; *d*, telson; *e*, gnathopod 1. Male, 2.0 mm: *f*, head. Female, 2.3 mm: *g*, *h*, gnathopods 1, 2; *i*, maxillipedal palp, setae removed.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

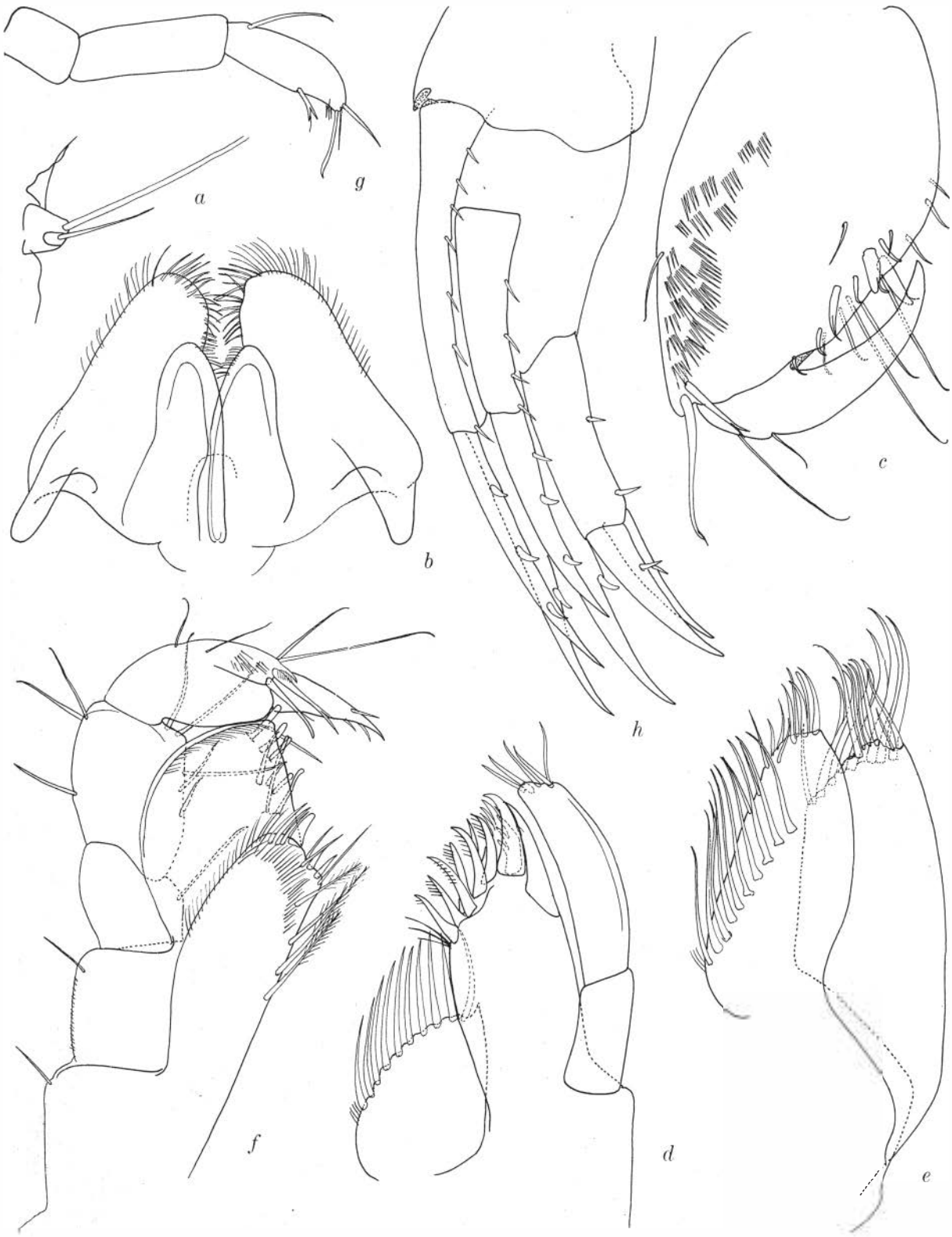


FIG. 36. *Paracalliope novizealandiae* (Dana), male, 2.4 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, accessory flagellum; *b*, lower lip; *c*, medial gnathopod 1; *d*, *e*, maxillae 1; 2, *f*, maxilliped. Female, 2.3 mm; *g*, aberrant mandibular palp. Male, 2.0 mm: *h*, urosome.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

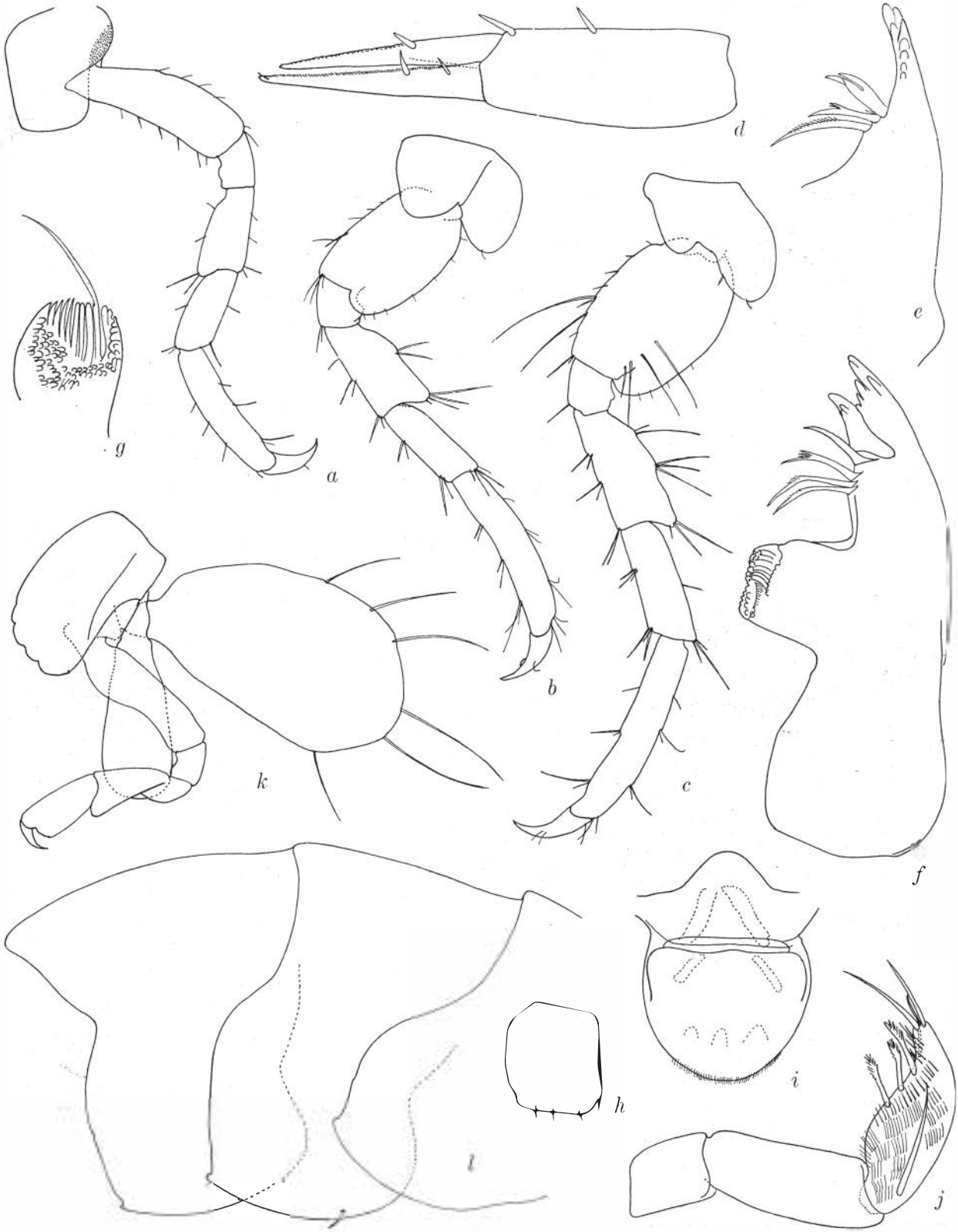


FIG. 37. *Paracalliope novizealandiae* (Dana), male, 2.4 mm , NZOI Sta. E 967 [JLB NZ-2]: *a*, *b*, *c*, pereopods 1, 3, 4; *d*, uropod 3; *e*, right mandible, obverse; *f*, left mandible, obverse; *g* , molar of left mandible; *h*, coxa 4; *i*, upper lip; *j*, mandibular palp. Female, 2.3 mm: *k*, gnathopod 2 with gill and brood lamella; *l*, pleonal epimera 1–3, right to left.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Paramoera Miers

Since Stephensen's (1927) work on this genus in the Auckland Islands, the New Zealand and satellite species have been consolidated to the following members: *Paramoera fasciculata* (Thomson), *P. fissicauda* (Dana), *P. aucklandica* (Walker), *P. chevreuxi* (Stephensen), and freshwater *Paramoera* sp. (= *Atyloides aucklandicus* Walker as identified by Chilton 1909a).

Subantarctic members of *Gondogeneia* and *Paramoera* are still in highly unsatisfactory state in my opinion, as I am yet unable to turn to the literature and easily make sense of the species without painstaking cross-referencing that often terminates blindly. The populations of these widespread species from many localities should be thoroughly and minutely monographed with extensive illustration.

NOTE ADDED IN PROOF, DECEMBER 1971: A new southern genus, *Gondogeneia*, is described by J. L. Barnard (1972) and most New Zealand species formerly placed in *Pontogeneia* are transferred to this new genus. The text of these species has not here been altered to reflect this change.

Paramoera aucklandica (Walker)

Atyloides aucklandicus Walker, 1908: 33–34, figs. 1, 2.
Paramoera aucklandica. Stephensen, 1927: 325.
not *Atyloides aucklandicus*. Chilton, 1909a: 628–630, fig. 3 (*see Paramoera* sp.).

DISTRIBUTION: Auckland Islands.

Paramoera chevreuxi (Stephensen)

Fig. 38, 39

Atyloides Chevreuxi Stephensen, 1927: 339–342, fig. 18.
?Atyloides magellanicus. Chilton, 1909a: 627–628 (not Stebbing, 1888).

DIAGNOSIS OF NEW ZEALAND MATERIAL: Head with short, thin rostrum not exceeding lateral cephalic lobe, indentation for antenna 2 moderately deep; eyes very large, black, reniform; antenna 1 about 45 percent as long as body, antenna 2 about 38 percent as long as body, accessory flagellum formed of subconical articulate lappet, article 2 of peduncle of antenna 1 with mediodistal subconical lobe, alternate articles of flagella on antennae 1–2 slightly inflated in lateral view but narrow articles between appearing tumid from oblique plane, alternate articles of antenna 1 with one calceolus and two aesthetascs, bases of setae occurring in alternate zig-zag pattern from article to article; labral complex weakly rounded anteriorly from lateral view; mandibular palp article 3 shorter than article 2, weakly falcate, densely spinose along 80 percent of inner margin, article 2 sparsely setose for same length; lower lip with small inner lobes appressed to bases of outer lobes; inner plate of maxilla 1 with 6–13 setae enveloping medial margin with increase in age, apicalmost seta slightly longer and stouter than remaining setae; maxilla 2 with dense medial setae and inner plate with oblique submarginal setal row; coxae 1–4 of normal proportions, coxa 4 strongly excavate posteriorly; gnathopods similar between the sexes in New Zealand populations, gnathopod 2 slightly longer than 1, fifth and sixth articles equal in length, hands softly subrectangular, palms oblique and short, with three to four spines on lateral side at defining corner and two medial submarginal spines, subadult gnathopods slightly smaller; pereopodal dactyls with small posterior seta attached to weak hump on position 67; posterior margins of article 4 on pereopods 3–5 with three to four sets of spines; uropod 1 extending nearly halfway along rami of uropod 3 (not including distal spines), uropod 2 extending one quarter along rami of uropod 3, rami of uropod 1 equal in length, outer ramus of uropod 2 about 85 percent as long as inner but often appearing about 67 percent because of oblique projection, all rami moderately spinose, rami of uropod 3 equal in length and heavily spinose; telson cleft about three-fourths its length, with each small apical cleft armed with short seta and bearing one long seta on each side at positions 40–50 and 90–95, each long seta paired with minute setule, pair of additional setules medial to large seta at position 40–50; pleonal epimera 1–2 with weak lateral ridge, 1–3 with weak posteroventral tooth, 2–3 (and 1 in adult) with four to six dispersed tiny serrations, 2–3 with four and five spines on anterior half of ventral margin.

REMARKS: These represent the northernmost records of this species described from the Auckland Islands. Article 5 of female gnathopod 2 is not as fully broadened as in the Auckland population, and articles 5–6 are relatively more elongate. The proximal defining spine occurs at position 65 along the hand and thus occurs more distally than in Auckland material although the palm remains as fully oblique.

Giant specimens of this species, 13 mm long, from "Dunedin" in NZOI collections have, as stated by Chevreux (1927), a "face almost totally as in *P. fasciculata*" indicating that the lateral cephalic lobe develops a deep defining notch in terminal stages. The hands of the gnathopods resemble figures of Stephensen in their slight tumidity and extreme setosity.

MATERIAL: NZOI Sta. E966 (22), Sta. E967 (95), Sta. E969 (1), Sta. E972 (42), Sta. E973 (6), "Dunedin", specimens in NZOI collections.

DISTRIBUTION: Auckland Island and Campbell Island, on shore under stones; Dunedin; Kaikoura; Wellington.

Paramoera fasciculata (Thomson)

Megamoera fasciculata Thomson, 1880a: 5, pl. 1, fig. 5; 1880b: 218–219; Thomson and Chilton, 1886: 146; Thomson, 1889: 261.
Moera fasciculata. Chilton, 1906b: 271.
Aucklandia enderbyi Walker, 1908: 35–36, pl. 5, figs. 3, 4.
Paramoera austrina. Thomson, 1913: 243.
Paramoera fasciculata. Stephensen, 1927: 332–336, figs. 15, 16; 1938: 246.

Stephensen (1927) stated that Thomson apparently did not observe the palmar tumidity on the gnathopods,

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

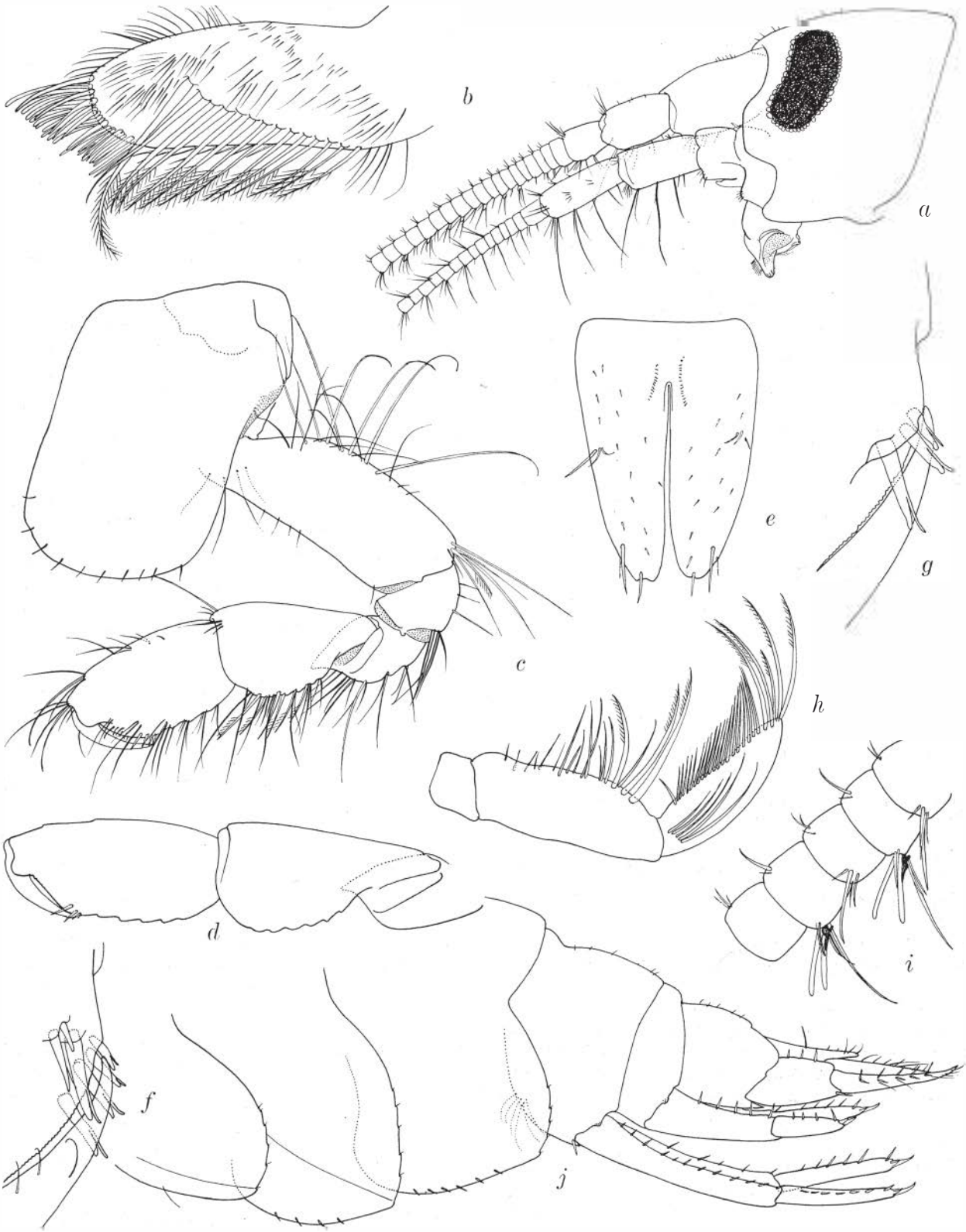


FIG. 38. *Paramoera chevreuxi* (Stephensen), female, 9.0 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, head; *b*, inner plate of maxilla 2; *c*, *d*, gnathopods 1, 2; *e*, telson; *f*, *g*, palmar defining corners of gnathopods 1, 2, medial and lateral consecutively; *h*, mandibular palp; *i*, part of flagellum on antenna 1; *j*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

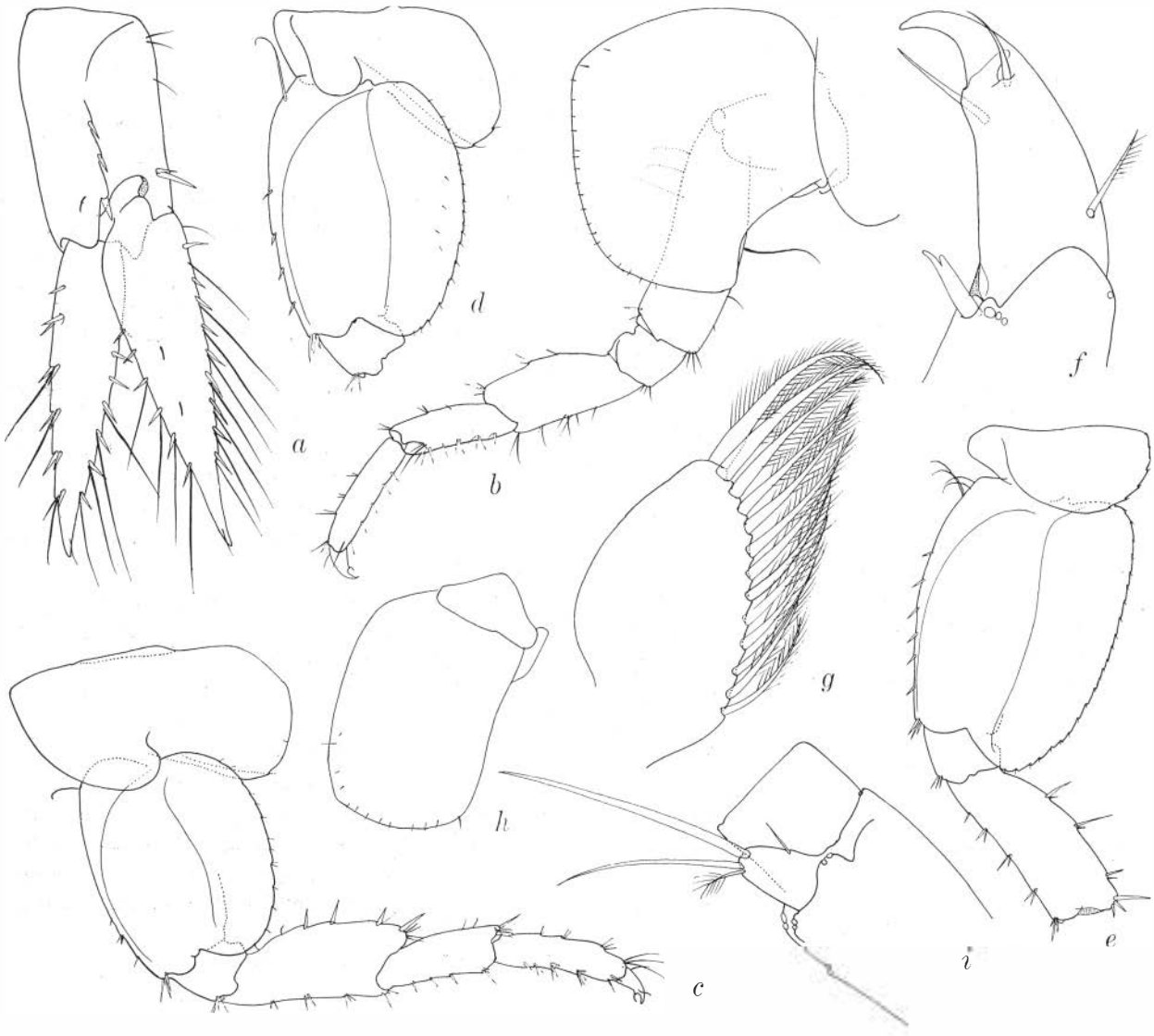


FIG. 39. *Paramoera chevreuxi* (Stephensen), female, 9.0 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, uropod 3; *b*, *c*, *d*, *e*, pereopods 2, 3, 4, 5, in whole or part; *f*, dactyl of pereopod 1; *g*, inner plate of maxilla 1; *h*, coxa 3; *i*, accessory flagellum on antenna 1.

but that injustice must be corrected because Thomson (1880b) definitely mentioned this character.

DISTRIBUTION: Auckland Islands; Campbell Islands, under stones on the shore; rocky coast; Enderby Island; Chatham Islands; Stewart Island; rock pools near Dunedin and Christchurch; Dunedin Harbour, 4–5 fm; Waiwera; Sumner; Timaru; Lyttelton.

Paramoera fissicauda (Dana)

?Paramoera austrina. Chilton, 1909a: 625–626. ?Chilton, 1925a: 317.
?Paramoera (*capensis* f.) *austrina?* Stephensen, 1927: 328–332, figs. 13, 14.
Paramoera fissicauda (Dana). Schellenberg, 1931: 194–197, figs. 99, 100 (with references).

Chilton (1909a) identified his material with *Megamoera fasciculata* Thomson (now *Paramoera fasciculata*) but neither Stephensen nor Schellenberg agreed with that identification.

DISTRIBUTION: All questionable: Campbell Islands, Perseverance Harbour; Auckland Islands, the shore under stones; rocky coast. Chilton (1909a) also records a Thomson identification from Macquarie Island.

EXTRINSIC DISTRIBUTION: Subantarctic.

Paramoera hamiltoni Nicholls

Paramoera hamiltoni Nicholls, 1938: 117–119, figs. 52h, n 60.

DISTRIBUTION: Macquarie Island, entangled in roots of kelp, low tide; fish stomach.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Paramoera macquariae Nicholls

Paramoera macquariae Nicholls, 1938: 119–120, figs. 52j, 61.

DISTRIBUTION: Macquarie Island, left by tide on sandy beach.

Paramoera rangatira, new species

Fig. 40

DIAGNOSIS: Head with short thin rostrum not exceeding lateral cephalic lobe, indentation for antenna 2 moderately deep, cephalic lobe defined by weak notch; eyes very large, burgundy in colour, ovatoreniform; antenna 1 about 45 percent as long as body, antenna 2 about 60 percent as long as body, accessory flagellum formed of subconical articulate lappet, article 2 of peduncle of antenna 1 with mediodistal subconical lobe, alternate articles of flagella on antennae 1–2 slightly inflated in lateral view but narrow articles between appearing tumid from oblique plane, alternate articles of antenna 1 with several aesthetascs, bases of setae occurring in alternate zig-zag pattern from article to article; peduncles of male antennae 1–2 with dense brushes of setules medially; labral complex weakly rounded anteriorly from lateral view; mandibular palp article 3 shorter than article 2, weakly falcate, densely spinose along 90 percent of inner margin, article 2 sparsely setose for same length; lower lip with small inner lobes appressed to bases of outer lobes; inner plate of maxilla 1 with many setae enveloping medial margin, apicalmost seta slightly longer and stouter than remaining setae; maxilla 2 with dense medial setae and inner plate with oblique submarginal setal row; coxae 1–4 of normal proportion, rounded distally, coxa 4 strongly excavate posteriorly and with long posteroventral margin; gnathopods similar between the sexes, and gnathopod 2 almost identical to gnathopod 1 in size, article 6 longer than 5, of medium slenderness and subrectangular, palms slightly oblique, with about three spines on a side at defining corner, fifth articles with subtriangular posterior lobes; pereopodal dactyls with small posterior seta attached to weak hump at position 67; posterior margins of article 4 on pereopods 3–5 with three or four sets of spines; uropods 1 and 2 extending about two thirds along rami of uropod 3, outer rami of uropods 1 and 2 shorter than inner, all rami moderately spinose, rami of uropod 3 equal in length and heavily spinose; telson cleft about 60 percent its length, with weak apical notch bearing one stout spine on each lobe; pleonal epimera 1–2 with strong lateral ridge and very weak posteroventral tooth, epimeron 3 almost evenly rounded at posteroventral corner but all epimera with weak posterior notches and setules, epimera 1–3 with about one, five or six, and six ventral spines each, epimeron 2 with several facial spines.

HOLOTYPE: NZOI, No. 86, male, 7.5 mm.

TYPE LOCALITY: NZOI Sta. E 974, St. Clair, Dunedin, New Zealand, holdfast of *Durvillea antarctica* (giant kelp), 25 January 1968.

RELATIONSHIP: In New Zealand this species has closest resemblance to *P. chevreuxi* (Stephensen) from which it differs in many minor characters. The two species resemble each other in so many characters that illustrations made for *P. chevreuxi* suffice for *P. rangatira* in the following instances: flagellum of antenna 1, maxillae 1 and 2, mandibular palp, lower lip, dactyls of pereopods 1–5, and uropod 3 (except for the absence of long setae on the lateral margins of the rami of uropod 3 in *P. rangatira*).

Paramoera rangatira differs from *P. chevreuxi* in:

(1) the distally rounded coxae;
(2) the relatively larger gnathopods, with thinner hands and more transverse palms plus the distinctly triangular posterior lobes on the fifth articles;
(3) the shorter cleft of the telson and slightly different spination pattern;
(4) the heavy setular tufts on male antenna 2;
(5) the longer uropod 2 and slightly sparser spination on the rami of uropods 1–2;
(6) the additional facial spines on pleonal epimeron 2;
(7) the longer posteroventral margin of coxa 4;
(8) the slightly longer coxae 5–7;
(9) the slight cephalic notch;
(10) the slightly thinner article 4 of pereopods 1–2 and slightly more elongate articles 5–6 on pereopods 1–5.

Paramoera rangatira differs from *P. fasciculata* (Thomson), as illustrated from Campbell Island by Stephensen (1927), in:

(1) the relatively larger gnathopods;
(2) the slight to much sharper posterior lobes on the fifth articles of the gnathopods;
(3) the more oblique palm of gnathopod 1;
(4) the slightly shorter cleft in the telson;
(5) the absence of a "little" tooth on pleonal epimeron 3.

MATERIAL: NZOI Sta. E 974 (7), Sta. E 981 (3).

DISTRIBUTION: Dunedin; Tapeka Pt.

Paramoera schellenbergi Nicholls

Paramoera schellenbergi Nicholls, 1938: 120–122, figs. 52k, 62.

DISTRIBUTION: Macquarie Island, under stones at low water.

Paramoera sp.

Paramoera sp. Nicholls, 1938: 116–117, figs. 52g, 59.

Possibly synonymous with *P. gregaria* (Pfeffer).

DISTRIBUTION: Macquarie Island, rocks under water to 11 fm.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

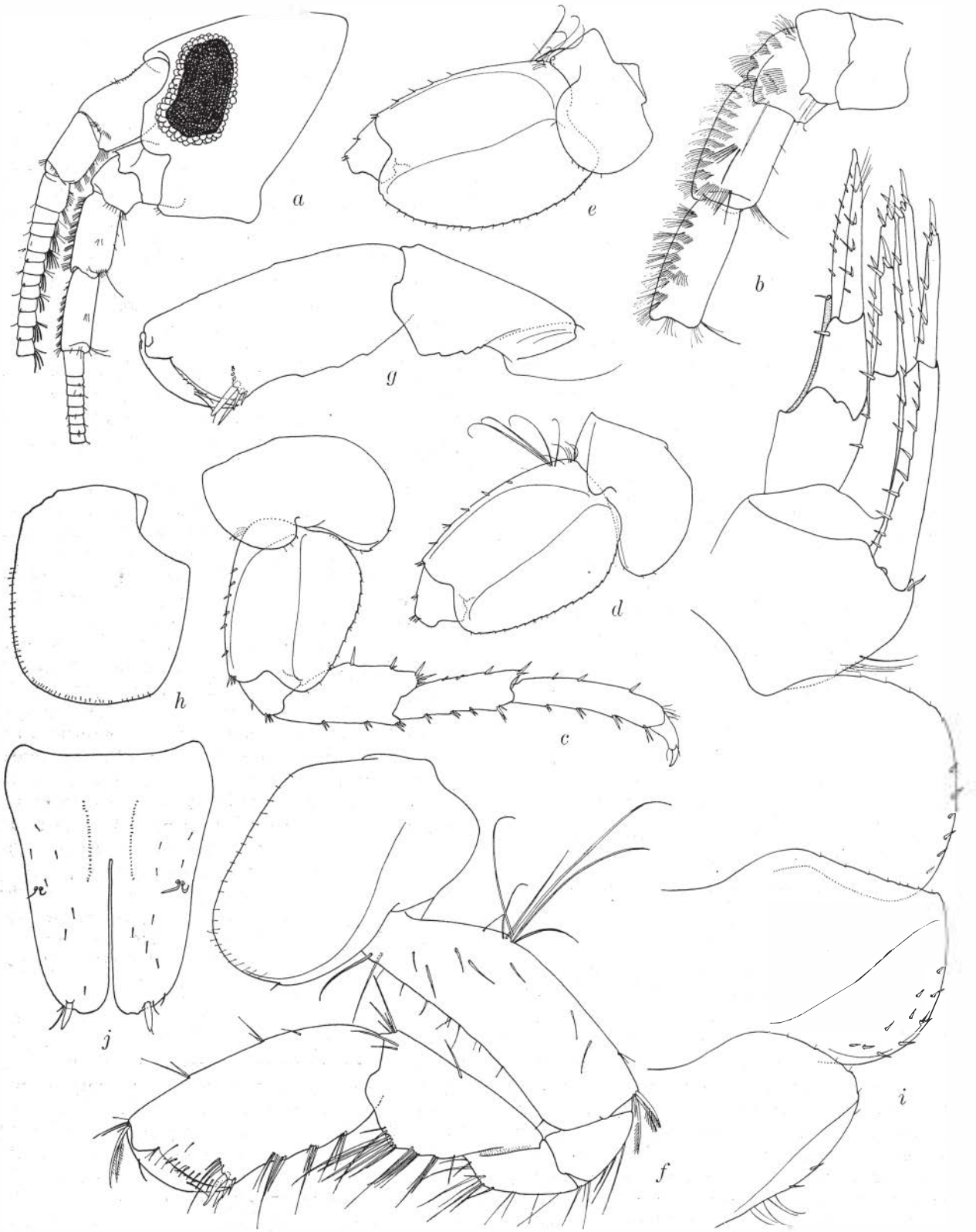


FIG. 40. *Paramoera rangatira* n. sp., holotype, male, 7.5 mm, NZOI Sta. E 974 [JLB NZ-9]: *a*, head; *b*, medial peduncle of antenna 2; *c*, *d*, *e*, pereopods 3, 4, 5, in whole or part; *f*, *g*, gnathopods 1, 2, latter with setae removed; *h*, coxa 4; *i*, pleon. Female, 5.6 mm: *j*, telson.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Paramoera sp.

Atyloides aucklandicus. Chilton, 1909a: 628–630, fig. 3 (not Walker, 1908).

Stephensen (1927) and Schellenberg (1931) infer that Chilton's material differs specifically from that of Walker.

DISTRIBUTION: Enderby Island, freshwater pool.

Gondogeneia J. L. Barnard

Gondogeneia J. L. Barnard, 1972: 191.

Gondogeneia bidentata (Stephensen)

Pontogeneia bidentata Stephensen, 1927: 322–324, fig. 12.

DISTRIBUTION: Campbell Island, on the shore.

Gondogeneia chosroides (Nicholls)

Pontogeneia chosroides Nicholls, 1938: 101–104, figs. 52b, 53.

DISTRIBUTION: Macquarie Island, spongy rock coverings, rocks, roots of kelp.

Gondogeneia chosroides var. **denticulata** (Nicholls)

Pontogeneia chosroides var. *denticulata* Nicholls, 1938: 104–106, fig. 54.

DISTRIBUTION: Macquarie Island, spongy rock coverings and rocks.

Gondogeneia danai (Thomson)

Figs. 41, 42

Atylus danai Thomson, 1879a: 238–239, pl. 10C, fig. 1; Thomson and Chilton, 1886: 149.
?Atylus microdeuteropus Haswell, 1881: 102, pl. 6, fig. 3.
Pontogeneia danai. Stebbing, 1906: 363–364; Chilton, 1912b: 130; Thomson, 1913: 243.
not *Atylus lippus* Haswell, 1880b: 328–329, pl. 20, fig. 1
probably not *Pontogeneia danai*. Chilton, 1912a: 495–496.

NOMENCLATURE: This species has been submerged in *Gondogeneia simplex* (Dana) since 1931 when Schellenberg synonymised the two species. There is no justification for this synonymy, as Fuegian *G. simplex* is still not satisfactorily known. Australian *A. microdeuteropus* fits the present material as far as known from the sketchy original figures, but there may be significant differences between the two populations. *Atylus lippus*, though put with *G. danai* by Stebbing (1906), seems better placed with *Eusiroides monoculoides*; Chilton (1912b) disputed the resemblance of *A. lippus* and *G. danai*.

That the material at hand represents Thomson's species is presumptive on its partial origin from the type locality and the widespread distribution of the species throughout New Zealand. Thomson's original drawings show an erroneous outline of gnathopod 1 and a telson excessively cleft; the latter error may be excused in that the telson appears more deeply cleft under reflected light than under transmitted light owing to the weak dorsal furrowing along the cleft line.

DIAGNOSIS: Head with medium-short thick rostrum scarcely exceeding lateral cephalic lobe, indentation for antenna 2 very shallow or of medium depth; eyes very large and black, circular; antenna 2 strongly exceeding antenna 1, antenna 2 60–67 percent as long as body, antenna 1 only 40–45 percent as long as body, accessory flagellum formed of fused setose scale, free in many terminal adults; flagellum of antenna 1 with every other or every fifth article slightly inflated distally and bearing aesthetascs, antennae bearing calceoli; labral complex weakly rounded anteriorly from lateral view; mandibular palp article 3 shorter than article 2, weakly to strongly falcate, with nearly all of its distal inner margin heavily spinose; inner lobes of lower lip absent; inner plate of maxilla 1 very slender and bearing three apical setae; maxilla 2 with setae extending down only 35 percent on medial margin of medial plate; coxae 1–4 short and strongly quadrate except for coxa 2, coxa 4 narrow to broad and excavate or unexcavate posteriorly; male gnathopod 1 much stouter than gnathopod 2, rectangular hand much longer than article 5, palm oblique, with one or two or occasionally three spines on a side near defining corner, gnathopod 2 similar; terminal female gnathopods slightly smaller and thinner than male; gnathopodal dactyls smooth on inner margins; pereopodal dactyls with curved distal slit and setule, posterior margins of fourth articles of pereopods 3–5 with one to four sets of spines; uropod 1 reaching end of uropod 2 and both reaching nearly halfway along uropod 3, outer ramus of uropod 1 more than 80 percent as long as inner, of uropod 2 about 70 percent as long as inner, outer rami lacking dorsal spines, (except aberrantly), inner rami with one spine each, rami of uropod 3 weakly spinose and setose; telson cleft one-fifth its length, each lobe with or without slight lateral notch armed with two setules, telson basally widened slightly, with slightly concave lateral margins; pleonal epimera 1 and 2 with posteroventral tooth and lateral ridge, epimeron 3 broadly rounded posteriorly, with posteroventral notch and spine set deeply forward.

REMARKS AND RELATIONSHIPS: This species appears to be widespread throughout New Zealand, but there is considerable variation in terminal adults in various collections. Several characters seem subject to clinal variation: the posteroventral notch of epimeron 3 is weak in northern specimens; the number of unswollen articles between swollen members on the flagellum of antenna 1 is fewer in northern populations than in southern. Geographically intermediate populations at Wellington have the fewest (one) while adult specimens from north of Auckland have two or three, their juveniles having one or two. Southern specimens from Dunedin have four unswollen articles between each swollen member and their juveniles have one, two, or three. The

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

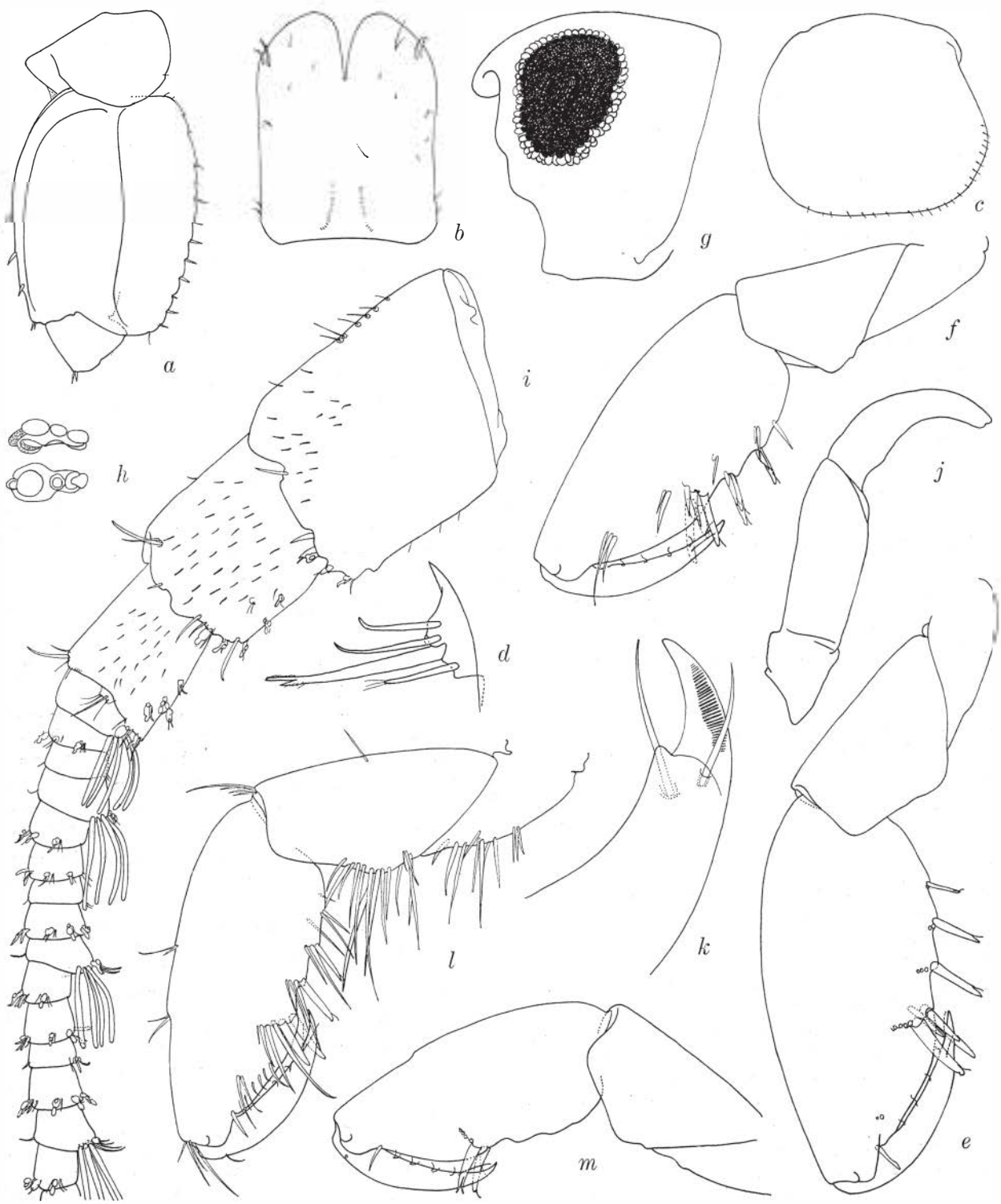


FIG. 41. *Gondogeneia danai* (Thomson), male, 5.2 mm, NZOI Sta. E 979 [JLB NZ-14]: *a*, articles 1–2 of pereopod 5; *b*, telson; *c*, coxa 4; *d*, accessory flagellum; *e*, *f*, gnathopods 1, 2, setae removed. ?Intersex, 3.5 mm: *g*, head. Female, 5.8 mm: *h*, calceoli of antenna 1; *i*, base of medial antenna 1; *j*, outline of mandibular palp; *k*, dactyl of pereopod 2; *l*, *m*, gnathopods 1, 2, latter with setae removed.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

taxonomic value of the number of unswollen articles thus is reduced in importance as a specific character. Ultimate body size seems to be much smaller in northern (warm-water) specimens than in the southern members. Coxa 4 is poorly developed in the Wellington population but well developed in others.

The diminutive form from Wellington is especially distinct from adults collected at Dunedin, which differ from the Wellington form in:

(1) the slightly deeper anteroventral cephalic inset;

(2) four instead of one unswollen articles between each swollen article on the flagellum of antenna 1;

(3) the grossly higher number of spines everywhere, for example, Dunedin adults have the following numbers of ventral spines on pleonal epimera (compare Fig. 42*n* for Wellington): pleonal epimera 1 = three, 2 = three, 3 = six;

(4) mandibular palp article 3 is highly falcate;

(5) inner plate of maxilla 2 with three of the giant medial setae instead of one or two;

(6) rami of uropod 3 more strongly setose and broader;

(7) article 2 of pereopods 3–5 broader and weak posterior setules of Wellington material developed as stout spinules in Dunedin material;

(8) coxa 4 much wider and weakly excavate.

The variability of the flagella on antennae 1–2 is wide, but for the sake of future comparison the following formula is stated for the largest female (5.8 mm) available in the collections. The number of calceoli seen from medial view (including laterals) on the flagella is listed and the letter "x" appended to the numbers on those segments that are swollen and bear aesthetascs; each number represents a segment, commencing from the base of the flagellum. Antenna 1 = 0, 3, 1, 1x, 3, 4, 1, 5, 1x, 3, 5, 1, 5, 1x, 3, 5, 1, 3, 1x, 3, 4, 1, 1, 6, 1x, 3, 5, 1, 5, 1x, 3, 1, 5, 1, 3, 1, 3, 1, 2, 0. Antenna 2 = 1, 4, 1, 1, 4, 1, 4, 1, 4, 4, 1, 4, 1, 4, 4, 1, 4, 4, 1, 4, 4, 1, 4, 1, 4, 4, 1, 4, 4, 1, 4, 1, 4, 4, 1, 4, 1, 4, 4, 1, 4, 4, 1, 4, 4, 1, 4, 1, 4, 2, 0, 0, 0. Calceoli occur on the posteromedial faces of articles 1–3 of antenna 1 and articles 3–5 of antenna 2.

Three aberrant individuals of this species occur in NZOI Sta. E 979. The eyes have increased enormously in size and the head has become swollen dorsolaterally apparently as a result of the ocular enlargement. No sexual characters are apparent, either brood lamellae or penial processes. The gnathopods are as poorly developed as those of Wellington populations, but the outer ramus aberrantly bears a marginal spine and pereopods 3–5 have the extreme development of spinules on article 2. Pleonal epimera 1–3 also are heavily spinose despite the juvenility of the gnathopods; pereopods 1–5 have especially heavy castellations in addition to the facial rays; antenna 1 flagellum has two unswollen articles between each swollen article. The upper lip is like that of *P. inermis* (Kroyer) (*see* Sars 1895, pl. 159).

Gondogeneia danai belongs with the species complex including *G. antarctica* Chevreux (1906), *G. subantarctica* Stephensen (1938) (= *G. antarctica* of Stephensen 1927), and *G. bidentata* Stephensen (1927). It seems closest to *G. bidentata* if the dorsal teeth of that species are ignored. To show how character dissimilarities drop out with northward increments, the relationships of the neozelanican species are described below in terms of northerly progression from the southernmost species, *G. antarctica.*

Gondogeneia danai differs from *G. antarctica* Chevreux (1906) in the following characters:

(1) the presence of posterior spines on article 4 of pereopods 3–4;

(2) the square coxae 1, 3, with coxa 2 often smaller than 1;

(3) the strong difference in size of male gnathopods 1 and 2 from each other;

(4) the slightly shorter telson;

(5) the deeper cephalic indentation for the reception of antenna 2;

(6) the fewer setae on the inner plate of maxilla 1;

(7) the presence of a posteroventral tooth on epimera 1–2 and the indented spine on epimeron 3;

(8) the relatively shorter uropod 3 and relatively longer uropods 1–2;

(9) the slender hands of the female gnathopods.

Differences from *G. subantarctica* (Stephensen, 1938 = *G. antarctica* of Stephensen 1927) (Campbell and Auckland Islands) omit characters (1), (2), (3), (4) and (5) while character (6) is unknown in *G. subantarctica.* Character (7) is a valid difference, character (8) applies in moderate extent and in addition: (9) the eyes are larger; (10) the telson is slightly less deeply cleft. *Gondogenia danai* occasionally has the same but slightly weaker castellate serrations on the dactyls of the pereopods shown by Stephensen for *G. subantarctica* but more significantly has a series of rays on the distal face of the dactyl.

Gondogenia danai resembles *G. bidentata* in eyes and telson and does not differ in characters (1), (4) and (8). Character (3) is unknown in male *G. bidentata* and character (6) is also unknown and there are slight differences in characters: (2) a smaller coxa 4; (5) shallower cephalic indentation; (7) pleonal epimera 1–2 are similar but epimeron 3 of *G. bidentata* lacks the indented spine, has a diamond-shaped posterior margin with distinct posteroventral sweep-point; (11) *G. bidentata* has a dorsal tooth on pleonites 1 and 2.

MATERIAL: NZOI Sta. E967 (23), Sta. E969 (34), Sta. E971 (38), Sta. E973 (1), Sta. E974 (5), Sta. E975 (13), Sta. E977 (18), Sta. E978 (13), Sta. E979 (35 + 3 aberrations), Sta. E981 (6).

DISTRIBUTION: Stewart Island northward throughout New Zealand to Tapeka Pt.; Dunedin, rock pools; Akaroa; Bluff; Timaru; Lyttelton; Sumner; Wellington; Kaikoura; Whangaparaoa Peninsula; Leigh.

EXTRINSIC DISTRIBUTION: ?New South Wales; ?Victoria.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

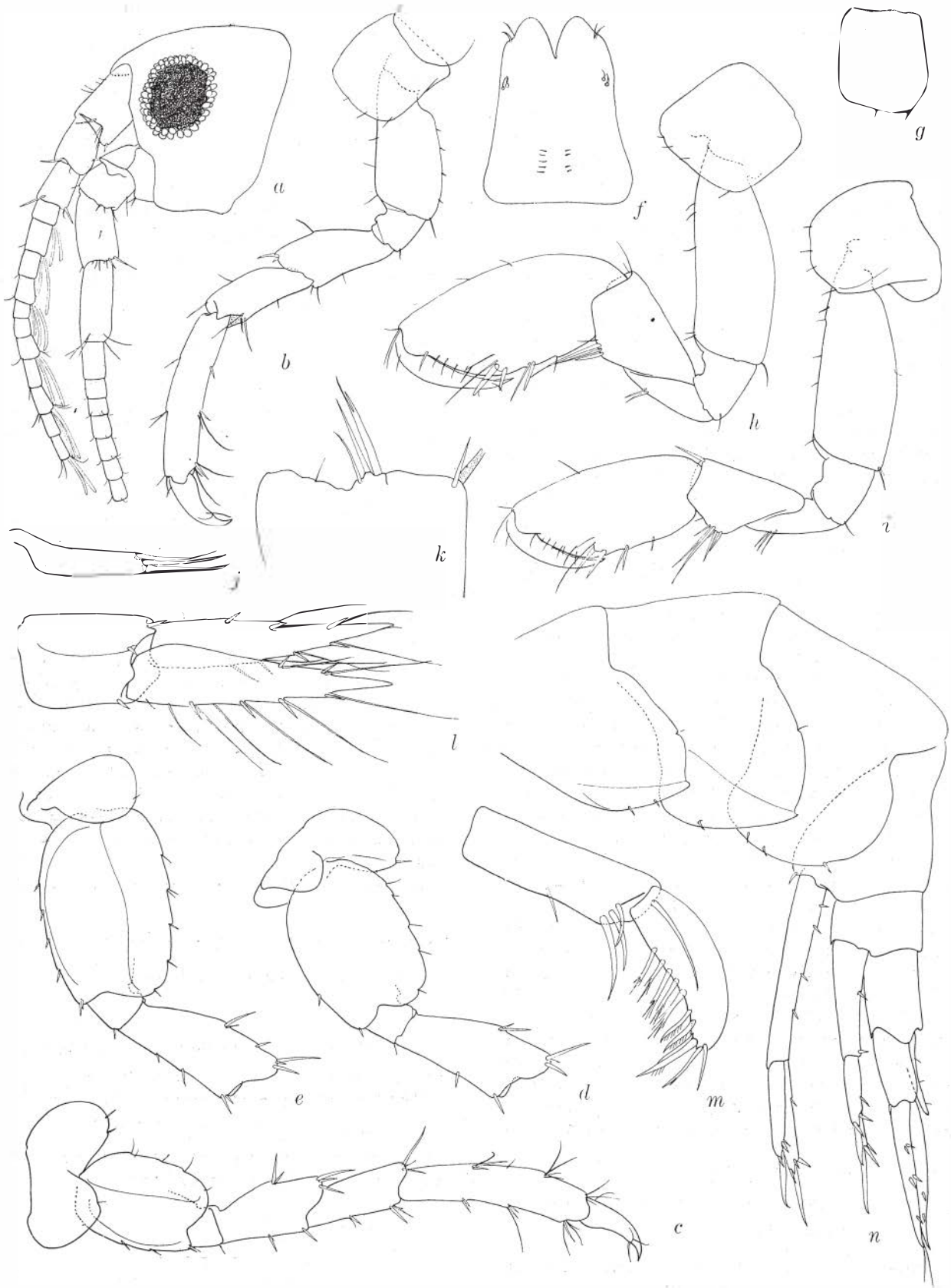


FIG. 42. *Gondogeneia danai* (Thomson), male, 2.4 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, head; *b*, *c*, *d*, *e*, pereopods 1, 3, 4, 5; *f*, telson; *g*, coxa 4; *h*, *i*, gnathopods 1, 2; *j*, inner plate of maxilla 1; *k*, area of accessory flagellum; *l*, uropod 3; *m*, mandibular palp articles 2–3. Male, 2.3 mm: *n*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Gondogeneia rotorua, new species

Fig. 43

DIAGNOSIS: Head with short, medium-thick rostrum scarcely exceeding lateral cephalic lobe, indentation for antenna 2 very shallow; eyes large and black, ovatocircular; antenna 2 slightly more than 40 percent as long as body, antenna 1 about 30 percent as long as body; accessory flagellum formed of partially fused setose scale, with weak sclerotic lines indicating partial articulation, flagellum of antenna 1 (about 27 articles) with every third article broadened and bearing aesthetascs (six sets of three, last six or seven articles not involved and ignoring irregularities at basal growth points), every article distal to each swollen article bearing anterior-dorsal calceolus(i); proximal third to half of antenna 2 flagellum bearing one to two small calceoli on every other article (young male without calceoli on either antenna); labral complex weakly rounded from lateral view; mandibular palp article 3 shorter than article 2, strongly falcate and thin, with nearly all inner margin heavily spinose; inner lobes of lower lip absent; inner plate of maxilla 1 thin, with apical cusp and two setae; maxilla 2 with setae extending down only 35 percent on medial margin of medial plate; coxae 1–3 of normally medium size, coxa 4 large and weakly excavate posteriorly; male gnathopod 1 much larger and stouter than gnathopod 2, ovatorectangular hand much longer than article 5, palm oblique, with about four spines on a side near defining corner; gnathopod 2 very thin, article 6 short, bearing two (or one) spines on a side at defining corner; female gnathopods 1–2 thin like male gnathopod 2, gnathopod 1 slightly larger than 2; gnathopodal dactyls smooth on inner margins; pereopodal dactyls with curved distal slit and setule, posterior margins of fourth articles of pereopods 3–5 with one set of spines (pereopods 1–2 like that figured for *G. danai* but article 4 slightly stouter); uropod 1 reaching end of uropod 2 and both reaching nearly half way along uropod 3, outer ramus of uropod 1 more than 80 percent as long as inner, of uropod 2 about 60 percent as long as inner, outer rami with one dorsal spine, inner with one, rami of uropod 3 moderately spinose and setose (urosome thus with aspect figured for *G. danai*); telson cleft more than 40 percent of its length, each lobe with smooth apex and small pair of apicolateral setules, telson slightly broader and shorter than in *G. danai*, pleonal epimera 1–2 with lateral ridge and very weak posteroventral tooth, epimeron 3 broadly trapezoid and with softly rounded posteroventral corner but posteriormost ventral spine not set in notch.

HOLOTYPE: NZOI No. 87, male, 3.6 mm.

TYPE LOCALITY: NZOI Sta. E970, Kaikoura, New Zealand, wash of intertidal algae, 22 January 1968.

RELATIONSHIP: This species differs from small individuals of *G. danai* (Thomson) in the thinner first maxillary inner plate bearing only two (not three) setae plus an apical cusp; in the slightly more ovate eye; the large and slightly excavate coxa 4; the deeply cleft telson; the slightly articulate accessory flagellum; the grossly different sizes of male gnathopods 1–2; and the more trapezoidal, less broadly rounded epimeron 3 lacking a posteroventral spine in a notch. Character differences of accessory flagellum, coxa 4, and gnathopods do not apply to adults of *G. danai* and *G. rotorua*.

Gondogeneia rotorua differs from *Paramoera edouardi* Schellenberg (= *Pontogeneia magellanica* Stebbing of Chevreux (1906), fide Schellenberg (1929, 1931)) in the smaller cleft of the telson, the fewer setae on the inner plate of maxilla 1 (*P. m.* has ?four), the significantly short antenna 1, the alternatively swollen flagellar articles of antenna 1, the non-reniform eye, and the even size of female gnathopods (in *P. m.* female gnathopod 1 is slightly smaller than gnathopod 2). *Paramoera edouardi* is a *Paramoera* in terms of antennal flagella, but the absence of an accessory flagellum (Chevreux 1906) and the low number of setae on the inner plate of maxilla 1 suggest that it might better be classified as a *Gondogeneia*.

Gondogeneia rotorua differs from *G. georgiana* (Pfeffer 1888) in the slender hand of gnathopod 2 (in either sex). *Gondogeneia simplex* (Dana 1853 and *auct.*) is distinguished by the sharp posteroventral corner of article 2 on pereopod 5, the short setae on the inner plate of maxilla 1 and the gap of three to five normal articles between every swollen article on the flagellum of antenna 1.

Gondogeneia antarctica Chevreux (1906) has a short cleft telson and a broader, more strongly setose inner plate of maxilla 1 than does *G. rotorua*. These few differences indicate that *G. rotorua* is most closely related to *G. subantarctica* Stephensen (1938) (= *G. antarctica* Chevreux of Stephensen 1927) from Auckland Island and Campbell Island. The two species may actually represent subspecies of a single epigenotype. *Gondogeneia rotorua* is characterised by the weak posterventral tooth on pleonal epimera 1–2 and the reduction from three to two of the setae on the inner plate of maxilla 1.

MATERIAL: NZOI Sta. E970 (8), Sta. E973 (1).

DISTRIBUTION: Dunedin; Kaikoura.

Gondogeneia subantarctica (Stephensen)

Pontogeneia subantarctica Stephensen, 1938: 245–246.
Pontogeneia antarctica. Stephensen, 1927: 319–322, figs. 10–11 (not Chevreux, 1906).
?Paramoera austrina var. Walker, 1908: 34–35.

DISTRIBUTION: Auckland Islands, Campbell Island, on the shore under stones; rocky coast.

Gondogeneia sp.

Pontogeneia antarctica Chevreux. Chilton, 1909a: 624 (not Chevreux, 1906).

Every article 3 of antenna 1 flagellum is produced and

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

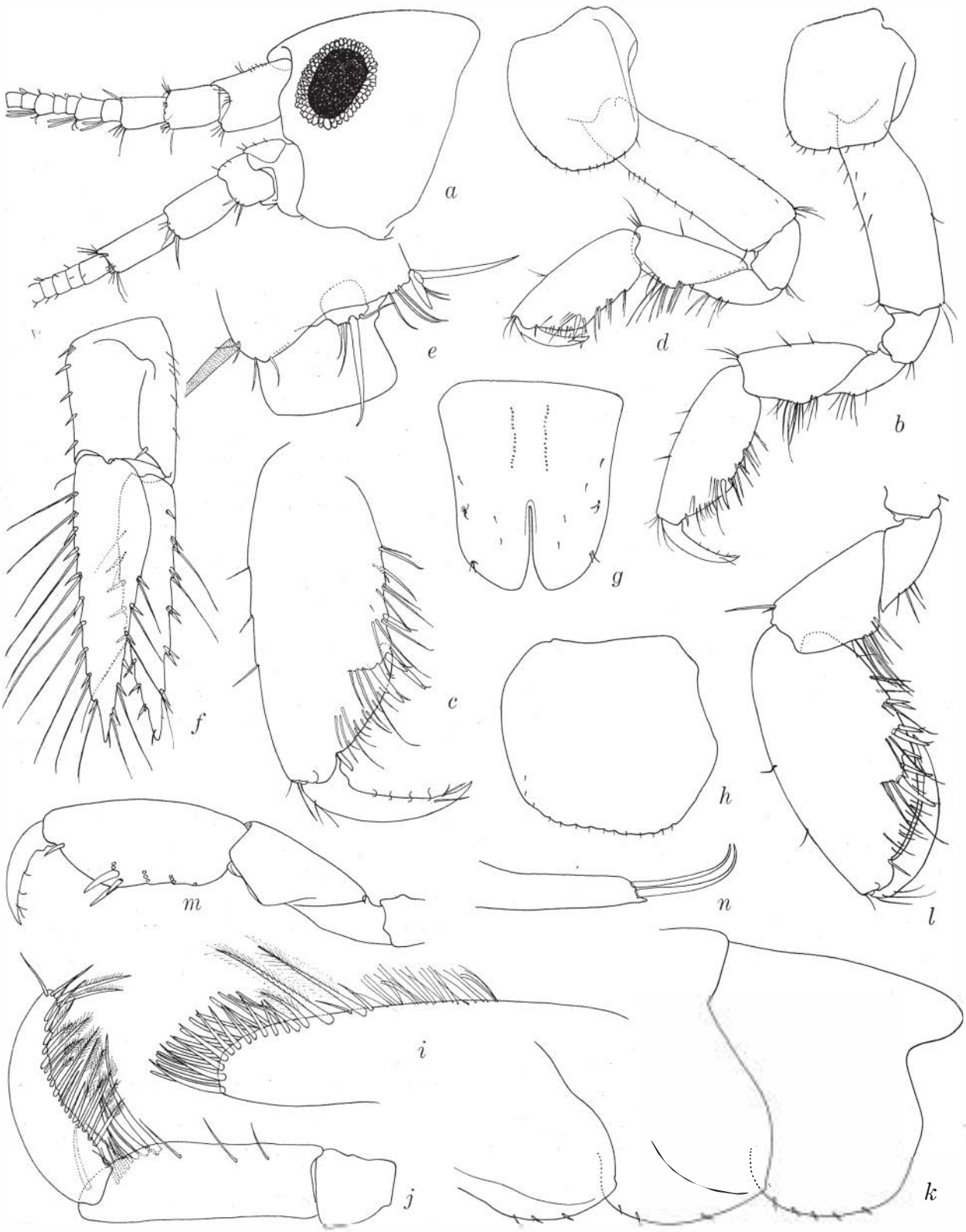


FIG. 43. *Gondogeneia rotorua* n. sp., female, 6.7 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, head; *b*, *c*, gnathopod 1; *d*, gnathopod 2; *e*, accessory flagellum on antenna 1; *f*, uropod 3; *g*, telson; *h*, coxa 4; *i*, inner plate of maxilla 2; *j*, mandibular palp; *k*, pleonal epimera 1–3. Male, holotype, 3.6 mm: *l*, *m*, gnathopods 1, 2; *n*, inner plate of maxilla 1.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

thus Stephensen (1938) suggests that the species is not identical with *G. subantarctica* Stephensen.

DISTRIBUTION: Campbell Island; Carnley Harbour, Auckland Islands; Antipodes Islands.

Pontogeneiella brevicornis (Chevreux)

Atyloides brevicornis Chevreux, 1906: 79–84, figs. 45–47.
Pontogeneiella brevicornis. Chilton, 1925b: 178; Schellenberg, 1929: 278; Schellenberg, 1931: 191; K. H. Barnard, 1932: 200, fig. 118f; Nicholls, 1938: 109, figs. 52c, 56.

DISTRIBUTION: Macquarie Island, spongy rock coverings and rocks.

EXTRINSIC DISTRIBUTION: Antarctica, generally distributed.

Pontogeneiella levis (Thomson), new combination

Fig. 44

Amphithonotus levis Thomson, 1879b: 330, pl. 16, figs. 1–4; 1880b: 215, pl. 7, fig. 6; Thomson and Chilton, 1886: 148.
Apherusa levis. Chilton, 1921a: 222–224, fig. 2; K. H. Barnard, 1930: 369.
?Paramoera (*austrina* (Sp. Bate) var.) *megalophthalma* Haswell. Stephensen, 1927: 336–339, fig. 17 (not *Atylus megalophthalmus* Haswell, 1881, nor Chilton, 1921b).
Paradexamine laevis. Thomson, 1913: 243.

NOMENCLATURE: Stephensen recognised this species as worthy of nomenclatural distinction, but he believed it to be identical with Chilton's identification of Haswell's species from Australia. Whether Chilton's material did represent Haswell's species is not known and *Atylus megalophthalmus* needs clarification. Meanwhile it is prudent to examine the generic position of the New Zealand species since it is not even congeneric with Chilton's "*Paramoera austrina* var. *megalophthalma*". That species has an accessory flagellum, a deeply cleft telson and a thin, acute rostrum. The figures appended here supplement Stephensen's portrayal of the male lacking antennae by illustrating female gnathopods, the accessory flagellum, pleonal epimera, a flattened uropod 3, mandibular palp, and a slightly different head, having a distinct notch below the lateral lobe.

DIAGNOSIS: Head with long rostrum exceeding forward extent of lateral lobe, rostrum of medium breadth and apically blunt; lateral cephalic lobe marked ventrally with distinct notch, anteroventral corner of head bluntly rounded; eyes large and black, reniform; antenna 1 scarcely exceeding antenna 2, antenna 1 as long as head and six pereonites, accessory flagellum absent, medial margin of article 3 on antenna 1 with setose distal bulge; flagellum of antenna 1 with every other article slightly inflated distally and bearing aesthetascs, antennae lacking calceoli; labral complex weakly rounded anteriorly from lateral view; mandibular palp article 3 as long as article 2, weakly falcate, with more than half its distal inner margin heavily spinose, article 2 poorly setose; lower lip with weak but distinct inner lobes; inner plate of maxilla 1 with about 10–15 setae, distalmost member longer and stouter than penultimate; maxilla 2 with dense medial setae and submarginal oblique setal row on inner plate; coxae 1–2 with two, three or four posterior spines, coxa 1 nearly evenly quadratiform, coxa 4 deeply excavate posterodorsally; male gnathopod 1 stouter but shorter than gnathopod 2, rectangular hand much longer and broader than article 5, palm oblique, with about six dispersed spines at defining corner, gnathopod 2 similar but slightly thinner, with article 5 slightly longer, palm with ?one spine at defining corner; female gnathopods weak, similar in breadth of narrowly rectangular hands, with about four spines at defining corners, fifth article of same relative proportions as in male; dactyls of both sexes deeply serrate on inner margins; pereopodal dactyls unknown as all distal pereopodal articles missing; uropod 1 scarcely reaching end of uropod 3 but uropod 2 slightly exceeding uropod 3, outer ramus of uropod 1 about two thirds as long as inner ramus, of uropod 2 about 60 percent as long as inner ramus, rami of uropods 1–2 regularly spinose, rami of uropod 3 heavily spinose and sparsely setose; telson cleft about one fifth its length, each lobe with small apical setule, telson otherwise of normal dimensions; pleonal epimeron 1 broadly rounded posteroventrally, epimera 2–3 with small posteroventral tooth, epimeron 3 with normal posterior bulge and weak serrations.

RELATIONSHIP: This species belongs with *Pontogeneiella* Schellenberg in view of the reorganisation of the Pontogeneiidae made by Schellenberg (1929). The heavily setose inner plates of the maxillae distinguish *P. levis* from *Pontogeneia*, and the absence of an accessory flagellum distinguishes the species from *Paramoera*. *Pontogeneiella levis* differs from both of the other known antarctic species of the genus, *P. brevicornis* (Chevreux 1906) and *P. longicornis* (Chevreux 1906), in the long rostrum and very short cleft of the telson. The New Zealand species especially resembles *P. brevicornis* in the presence of stout spines on coxae 1–2.

Pontogeniella levis bears superficial resemblance to several heavily rostrate members of *Pontogeneia*. It differs from those in the poorly cleft telson and the disparity in size of male and female gnathopods. In addition, *Pontogeneia rostrata* Gurjanova (1938, 1951) has more elongate fifth articles of the gnathopods. *Pontogeneia minuta* Chevreux (1908) and *Pontogeneia* "*minuta*" of J. L. Barnard (1959) have a lobate article 5 of female gnathopod 2 guarding article 6; the latter has a short article 3 on the mandibular palp. *Pontogeneia longleyi* Shoemaker (1933) also has a short article 3 on the mandibular palp and shorter fifth articles of the female gnathopods than does *P. levis*. Nagata's (1960) *Pontogeneia* sp. is very similar to *P. levis* but like the other species has a deeply cleft telson.

So far no definitive adult males have been found in the New Zealand collections and there remains doubt that the New Zealand population is identical with that from

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

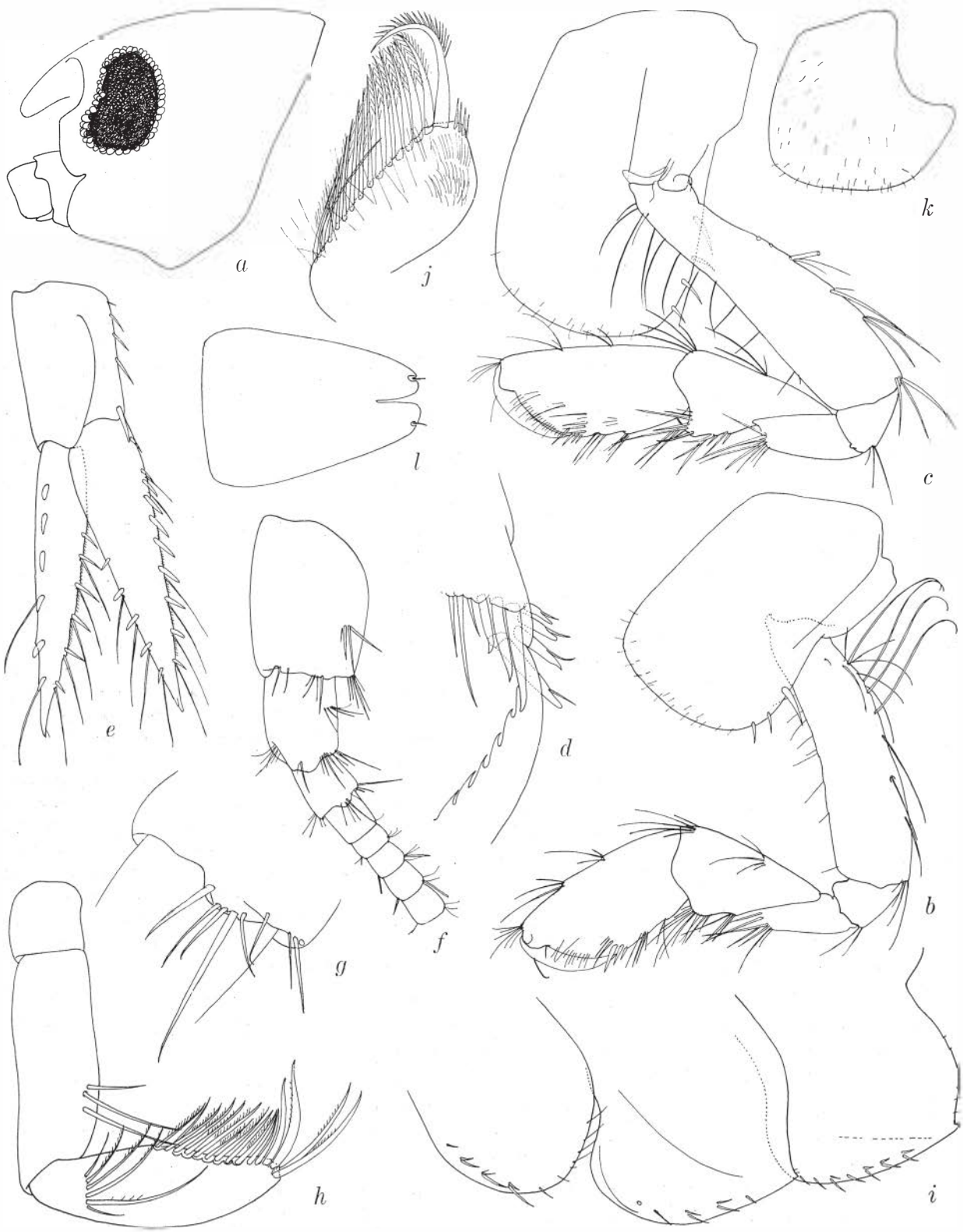


FIG. 44. *Pontogeneiella levis* (Thomson), female, 7.2 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, head; *b*, *c*, gnathopods 1, 2; *d*, palm of medial gnathopod 2; *e*, uropod 3; *f*, base of antenna 2, medial; *g*, view of apicomedial edge of article 3 on antenna 1; *h*, mandibular palp; *i*, pleonal epimera 1–3. ?Male, 5.7 mm, NZOI Sta. E 970 [JLB NZ-5]: *j*, inner plate of maxilla 1; *k*, coxa 4. Juvenile, 4.0 mm, NZOI Sta. E 967 [JLB NZ-2]: *l*, telson.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Campbell Island (Stephensen 1927) in which male gnathopods become very enlarged. Several large New Zealand specimens, without brood lamellae and lacking penial processes, cannot yet be determined as males. They have small gnathopods like those of females.

MATERIAL: NZOI Sta. E966 (2), Sta. E967 (25), Sta. E970 (4), Sta. E971 (16), Sta. E973 (1), Sta. E975 (1), Sta. E981 (1).

DISTRIBUTION: Dunedin Harbour, 4–5 fm (Otago Harbour); open coast of Dunedin; Blueskin Bay; Akaroa; Timaru; Lyttelton; Kaikoura; Wellington; Leigh; Tapeka Pt.; North Cape; ?Campbell Island. Rare north of East Cape.

Schraderia serraticauda (Stebbing)

Atyloides serraticauda Stebbing, 1888: 920–924, pl. 78; Chilton, 1909a: 627; Chilton, 1921a: 224.
Paramoera serraticauda. Stephensen, 1927: 339.
Schraderia serraticauda. K. H. Barnard, 1932: 205; ?Nicholls, 1938: 114, fig. 52e.

K. H. Barnard demonstrated the validity of Stebbing's species and segregated it from the type species, *S. gracilis* Pfeffer (1888), and suggested (but questioned) that Chilton's and Stephensen's material belongs with *S. serraticauda.*

DISTRIBUTION: Auckland Islands, on the shore under stones; rocky coast; and Carnley Harbour. ?Macquarie Island.

EXTRINSIC DISTRIBUTION: Melbourne, Australia, 60 m (type locality).

GAMMARIDAE

Ceradocopsis peke, new species

Figs. 45, 46

DIAGNOSIS: Accessory flagellum 3-articulate; anteroventral corner of head with deep excavation; article 3 of mandibular palp much shorter than article 2, bearing three apical and one subterminal setae; anteroventral corner of coxa 1 extended obtusely; palm of gnathopod 2 regularly oblique; telsonic lobes with several large spines; inner ramus of uropod 3 not reaching apex of article 1 on outer ramus.

DESCRIPTION: Eyes with irregular dark cores surrounded by a few irregularly placed clear ommatidia; lateral cephalic lobe evenly rounded above, slightly flattened anteroventrally; mandible with tumid bulge between spine row and molar; joint between articles 1–2 of mandibular palp scarcely evident; lower lip without inner lobes, bearing weak marks simulating inner lobes; inner plate of maxilla 1 with four or five setae lining medioterminal edge; maxilliped stout; medial comb row on hand of gnathopod 1 composed of very small sharp setae; coxa 2 as long as coxae 1 and 3; coxa 1 with slight, flat posteroventral recess; coxa 7 with anterior lobe like coxa 6; male gnathopod 2 with many heavy setae medially, palm bearing three of four pairs of spines, defining corner with one lateral and three medial spines, female hand slightly smaller than male and spines relatively larger than in male; pereopodal dactyls slightly serrate on inner edge, final sharp serration marking constriction bearing three heavy setules, locking spines simple; articles 4–5 of pereopods 3–5 broadened subrectangles; pleonal epimera 1–3 with small posteroventral tooth and slightly above with weak accessory tooth or notch bearing setule; apices of uropods 1–2 poorly spinose (compared with various species of *Elasmopus*); uropod 3 short, outer ramus 2-articulate, article 2 very short and with sharp apicomedial cusp and several stiff terminal setae, inner ramus much narrower than outer, failing slightly to reach apex of article 1 of outer ramus; telson short, variable, apices of lobes usually unornamented in female and bearing two stout spines in recesses, male with slight to strong apical waves and two or three terminal spines and one apicolateral spine.

HOLOTYPE: NZOI, No. 88, male, 3.9 mm.

TYPE LOCALITY: NZOI Sta. E969, Kaikoura, New Zealand, intertidal wash of kelp holdfasts and various red algae, 22 January 1968.

RELATIONSHIP: This species belongs with the until now monotypic Kerguelenian genus *Ceradocopsis* Schellenberg (1926) but differs from the type species in the slightly better development of the mandibular palp, the slightly broader upper lip (from anterior view) and in the stout maxillipeds. Those characters might reflect subgeneric differences, but the medial setosity of the inner plates on maxillae 1–2, and the presence of article 2 on the outer ramus of uropod 3 reflect the relationship. *Ceradocopsis peke* is otherwise like a miniature *Elasmopus*, but the setose maxillae and the absence of a cephalic notch distinguish *Ceradocopsis.*

Other specific differences seen in *C. kergueleni* Schellenberg are the following:

(1) the accessory flagellum is 5-articulate;
(2) article 2 of the mandibular palp is longer than article 3;
(3) article 3 of the mandibular palp bears only two terminal setae;
(4) coxa 1 is more sharply produced anteriorly;
(5) the inner plate of maxilla 1 has six setae;
(6) the telson lacks stout spines;
(7) the palm of male gnathopod 2 (presumably the male) is less oblique than in *C. peke;*
(8) the anteroventral cephalic excavation is shallower;
(9) the inner ramus of uropod 3 slightly exceeds article 1 of the outer ramus.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

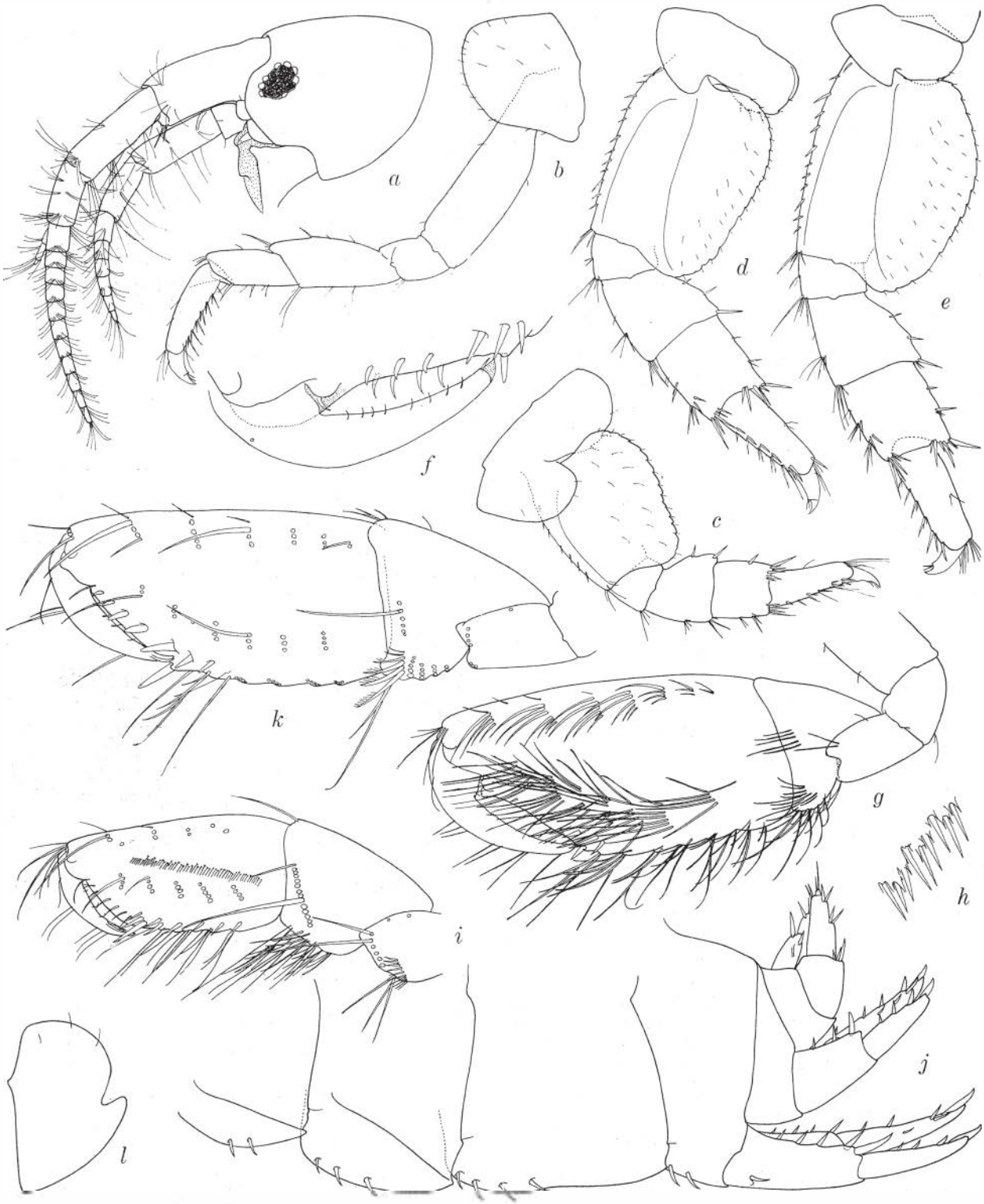


FIG. 45. *Ceradocopsis peke* n. sp., holotype, male, 3.9 mm, NZOI Sta. E 969 [JLB NZ-4]: *a*, head; *b*, *c*, *d*, *e*, pereopods 1, 3, 4, 5; *f*, palm of gnathopod 2, medial; *g*, gnathopod 2, medial; *h*, comb row on hand of gnathopod 1, medial; *i*, gnathopod 1, medial; *j*, pleon. Female, 4.0 mm: *k*, gnathopod 2, medial; *l*, coxa 7.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 46. *Ceradocopsis peke* n. sp., holotype, male, 3.9 mm, NZOI Sta. E 969 [JLB NZ-4]: *a*, gnathopod 1, medial; *b*, telson; *c*, *d*, coxae 1, 4; *e*, detail of anteroventral cephalic corner; *f*, *g*, right and left mandibles; *h*, mandibular palp; *i*, maxilla 1; *j*, dactyl of pereopod 4; *k*, uropod 3. Female, 4.0 mm: *l*, telson; *m*, prebuccal mass, lateral; *n*, maxilla 2; *o*, lower lip; *p*, outer plate of maxilliped; *q*, maxilliped.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Ceradocopsis peke has the unusual feature of an anterior lobe on coxa 7 (not mentioned for *C. kergueleni*).

MATERIAL: The holotype and three other specimens from the type locality.

DISTRIBUTION: Kaikoura.

Ceradocus chiltoni Sheard

Moera spinosa. Chilton, 1883: 81, pl. 3, fig. 2 (not Haswell); 1884b: 1044; Thomson and Chilton, 1886: 147.
Ceradocus rubromaculatus. Chilton, 1916b: 369 (not Stimpson).
Ceradocus (*Denticeradocus*) *chiltoni* Sheard, 1939: 289–290, figs. 6–8.

DISTRIBUTION: Chatham Islands; Dunedin; Akaroa; Auckland; Great Barrier Island.

Ceradocus rubromaculatus haumuri, new subspecies

Fig. 47

DIAGNOSIS: Pleonites 1–5 evenly dentate dorsally; each lobe of telson with two spines and one setule, spines highly unequal in length; pleonal epimera 1–2 with posterior margins cut into numerous teeth of medium size, teeth of epimeron 3 large; mandibular palp article 3 shorter than article 1; coxa 1 sharply extended forward anteroventrally; palm of male gnathopod 2 precisely oblique and lacking teeth; article 2 of pereopod 3 with posterodistal corner broadly obtuse, pereopod 5 with small sharp corner, pereopod 4 of intermediate condition.

HOLOTYPE: NZOI, No. 89, male, 9.5 mm.

TYPE LOCALITY: NZOI Sta. E966, Eve Bay, Wellington, intertidal wash of algae, 5 November 1967.

RELATIONSHIP: This subspecies has pereopods like those of New Zealand *C. chiltoni* Sheard but the low number of telsonic spines fits Sheard's (1939) classification scheme. The teeth of pleonal epimera 1–2 are well developed like those of *C. r. rubromaculatus* in contrast to the poorly developed teeth of *C. chiltoni*.

The subspecies *haumuri* differs from Australian *C. r. rubromaculatus* in the rounded, not sharp, posterodistal corner of article 2 on pereopod 3 and in the highly unequal condition of each pair of spines on the telson.

MATERIAL: NZOI Sta. E966 (1), Sta. E969 (1).

DISTRIBUTION: Wellington.

Elasmopus Costa

Elasmopus and *Maera* have hitherto appeared to form two distinct lines of evolution marked by the falcate, pectinosetose article 3 of the mandibular palp in *Elasmopus* and the simple, linear, and poorly setose palp of *Maera.* But some members of *Maera* such as *M.* cf. *mastersi* reported herein and others throughout the world with elongate uropod 3, appear to be more remote from basic members of *Maera* than do some species of *Elasmopus.* The convergence between some species of *Maera* and *Elasmopus* is nowhere more striking than between *Maera subcarinata* and *Elasmopus neglectus.* Though these species differ generically in mandibular palp article 3, they share the accessory spinose rugosity on the mandibular molar, the pointed palp of maxilla 1 bearing medial setae, a pair of long cones on each outer lobe of the lower lip, a velvety lobe on article 3 of the maxillipedal palp, and the heavy apical setosity on the inner plate of the maxilliped. They also have a medially bifid article 2 of antenna 2, composed of a medial process plus the gland cone, and both have dorsal ornamentation on pleonite 4, *E. neglectus* a single medial carina and *M. subcarinata* a pair of carinae. *Maera subcarinata* is now placed in a new genus *Mallacoota* by J. L. Barnard (1972).

Elasmopus bollonsi differs from the plan in the weakness of the molarial rugosity and the presence of only one cone on each lobe of the lower lip. Pleonite 4 has no carina and article 2 of antenna 2 is simple.

Maera cf. *mastersi* has no rugosity on the molar, and no lobe on article 3 of the maxillipedal palp.

Elasmopus bollonsi Chilton

Figs. 48, 49

Elasmopus bollonsi Chilton, 1915: 328–330, figs. 11, 12.

This species has strong affinities with *Elasmopus spinidactylus* Chevreux (1908b) (tropical Pacific) not only in the presence of unusual castelliform teeth on the pereopodal dactyls but also in the short accessory flagellum (two articles tipped with rudimentary third), the short telson with broadly rounded apices and two or three large spines per lobe, the short inner ramus of uropod 3, the heavily setose apical ends of the sixth articles on pereopods 3–5, and the posteroventral notch on article 2 of pereopods 3–5. But *E. bollonsi* differs from *E. spinidactylus* in the simple, unbent locking spine on the pereopods and in the morphology of male gnathopod 2. The male of *E. spinidactylus* has numerous medial setae on the hand, a falconiform palmar process, undefined palm, and an uninflated dactyl; the female has a smaller edition of the male morphology lacking the falconiform process on the palm. The female of *E. bollonsi* has a normal gnathopod 2 of *Elasmopus* with distinct palm, and the male has a slightly defined palm, grossly inflated dactyl, and sparse setae on the medial surface of the hand. The male specimen at hand has the left gnathopod 2 enlarged but right gnathopod 2 is a small member of female morphology. Male coxa 2 is much shorter than coxae 1 or 3, whereas right coxa 2 is of normal length. The lower lip has one small cone on each outer lobe and the mandibular palp article 3 is heavily falcate.

Maxillae 1–2 are like those of *Elasmopus neglectus* (normal) and the maxillipeds are also like *E. neglectus* in the presence of a lobe on palp article 3, and the general setosity and spinosity of the inner plate. The mandibular

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

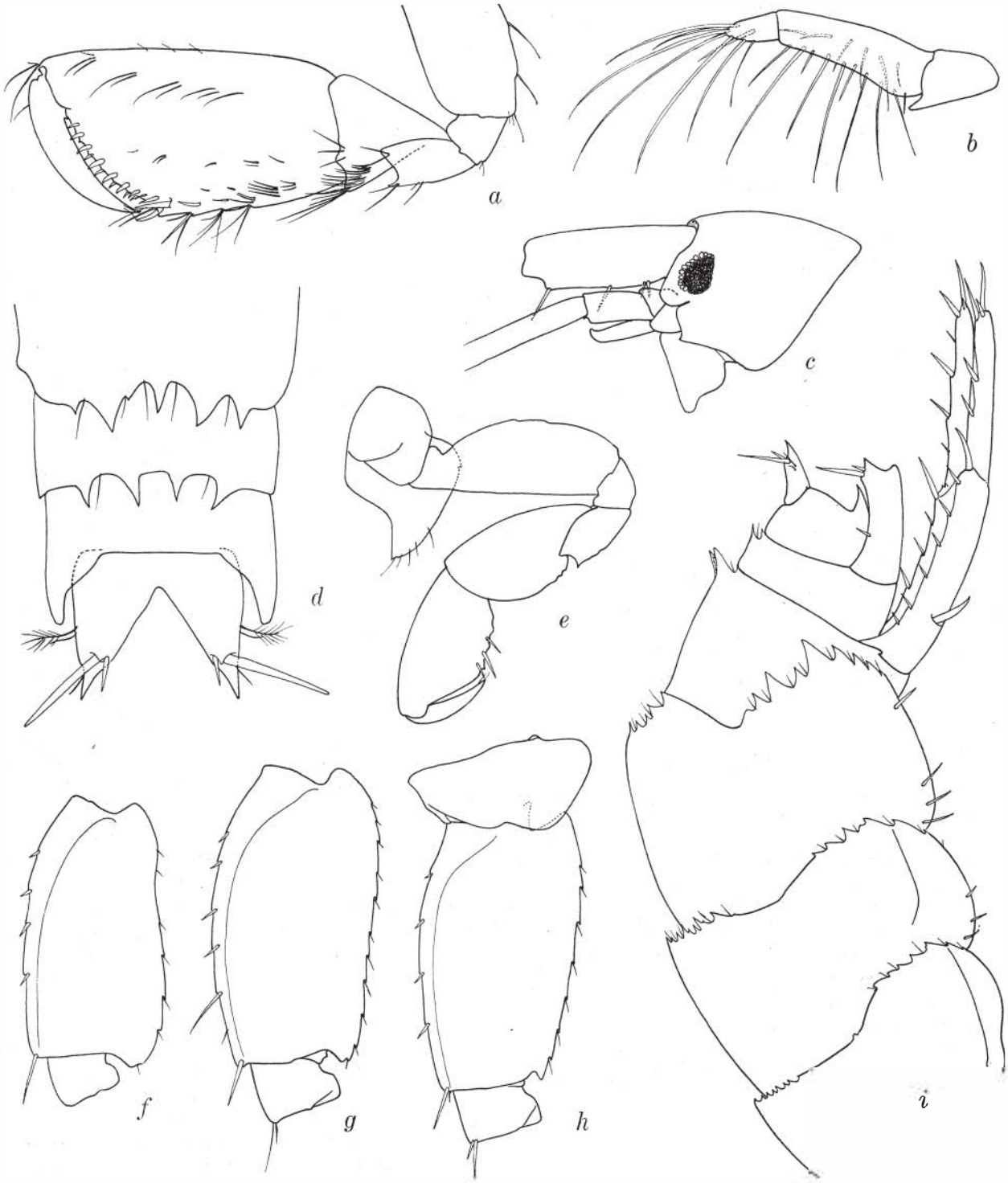


FIG. 47. *Ceradocus rubromaculatus haumuri* n. subsp., holotype, male, 9.5 mm, NZOI Sta. E 966 [JLB NZ-1]: *a*, medial gnathopod 2; *b*, mandibular palp; *c*, head; *d*, dorsal pleonites 4–6 and telson; *e*, gnathopod 1, setae removed; *f*, *g*, *h*, article 2 of pereopods 3, 4, 5; *i*, pleon less uropod 3 and rami of uropod 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

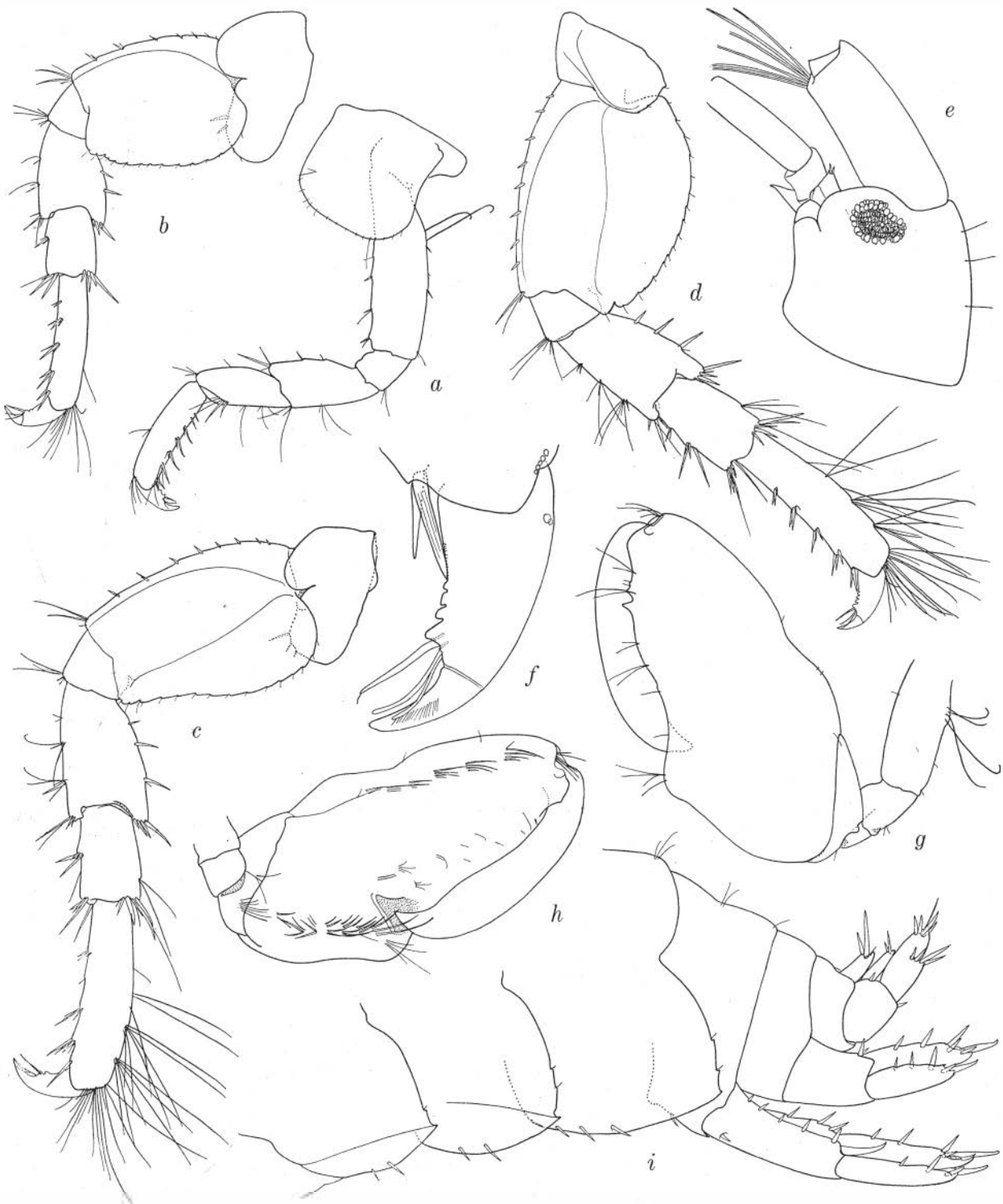


FIG. 48. *Elasmopus bollonsi* Chilton, male, 7.0 mm, Kaikoura K 800C: *a*, *b*, *c*, *d*, pereopods 2, 3, 4, 5; *e*, head; *f*, dactyl of pereopod 5; *g*, gnathopod 2, left lateral; *h*, gnathopod 2, left medial; *i*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

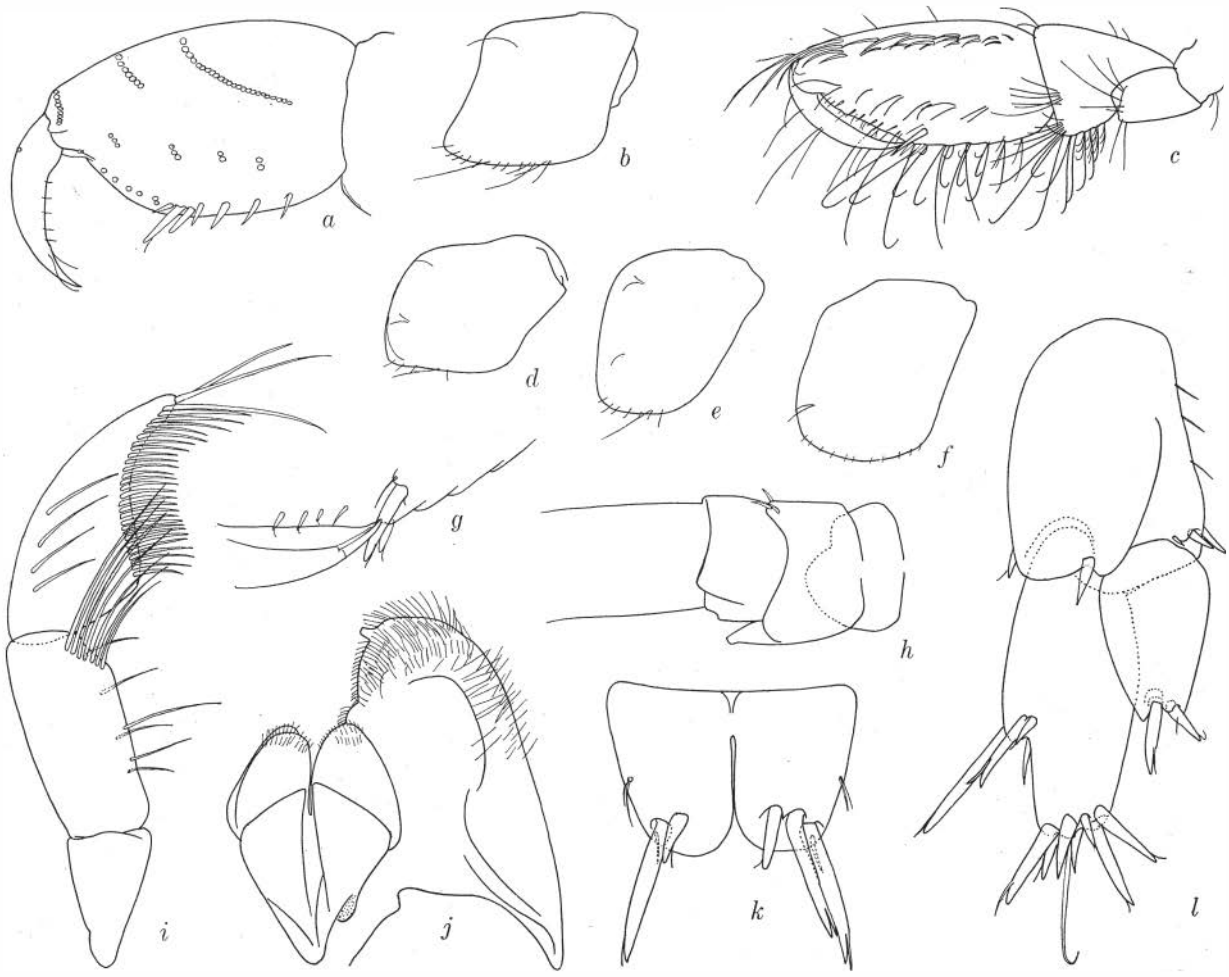


FIG. 49. *Elasmopus bollonsi* Chilton, male, 7.0 mm, Kaikoura K 800C: *a*, apex of gnathopod 1, medial; *b*, left coxa 1; *c*, right gnathopod 2, medial; *d*, *e*, coxa 2 of left and right sides; *f*, left coxa 3; *g*, palm of gnathopod 2, medial; *h*, articles 1–3 of antenna 2, medial; *i*, mandibular palp; *j*, part of lower lip; *k*, telson; *l*, uropod 3.

molar is nearly like that of *Maera* cf. *mastersi* but bears a very weak rugosity apparently representing a rudiment of that heavily spinose accessory rugosity seen in *E. neglectus* and *Maera subcarinata*. The gland cone of *E. bollonsi* is simple.

MATERIAL: Kaikoura, K 800C, Morgan's Pool, tip of Seal Reef, 14 January 1966 (1 male, 7.0 mm).

DISTRIBUTION: Off Three Kings Islands, 60 fm; Kaikoura.

Elasmopus neglectus Chilton

Figs. 50, 51

Elasmopus neglectus Chilton, 1915: 326–328, figs. 7–10.

REMARKS: Figures supplementing and confirming those of Chilton (1915) are given. The medioterminal portion of article 5 and the medial surface of article 6 on male gnathopod 2 are very setose.

Drawings of lower lip, maxilla 1, body of mandible, and the maxillipedal palp presented for either *Maera subcarinata* or *Elasmopus neglectus* correspond in both species. The lower lip of either species has two large cones on each outer lobe.

Female pereopods 4–5 resemble those of the male in possessing strong castelloserrations on article 2.

MATERIAL: NZOI Sta. E969 (4), Sta. 970 (37).

DISTRIBUTION: Otago (Blueskin Bay) to Mokohinau Island.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

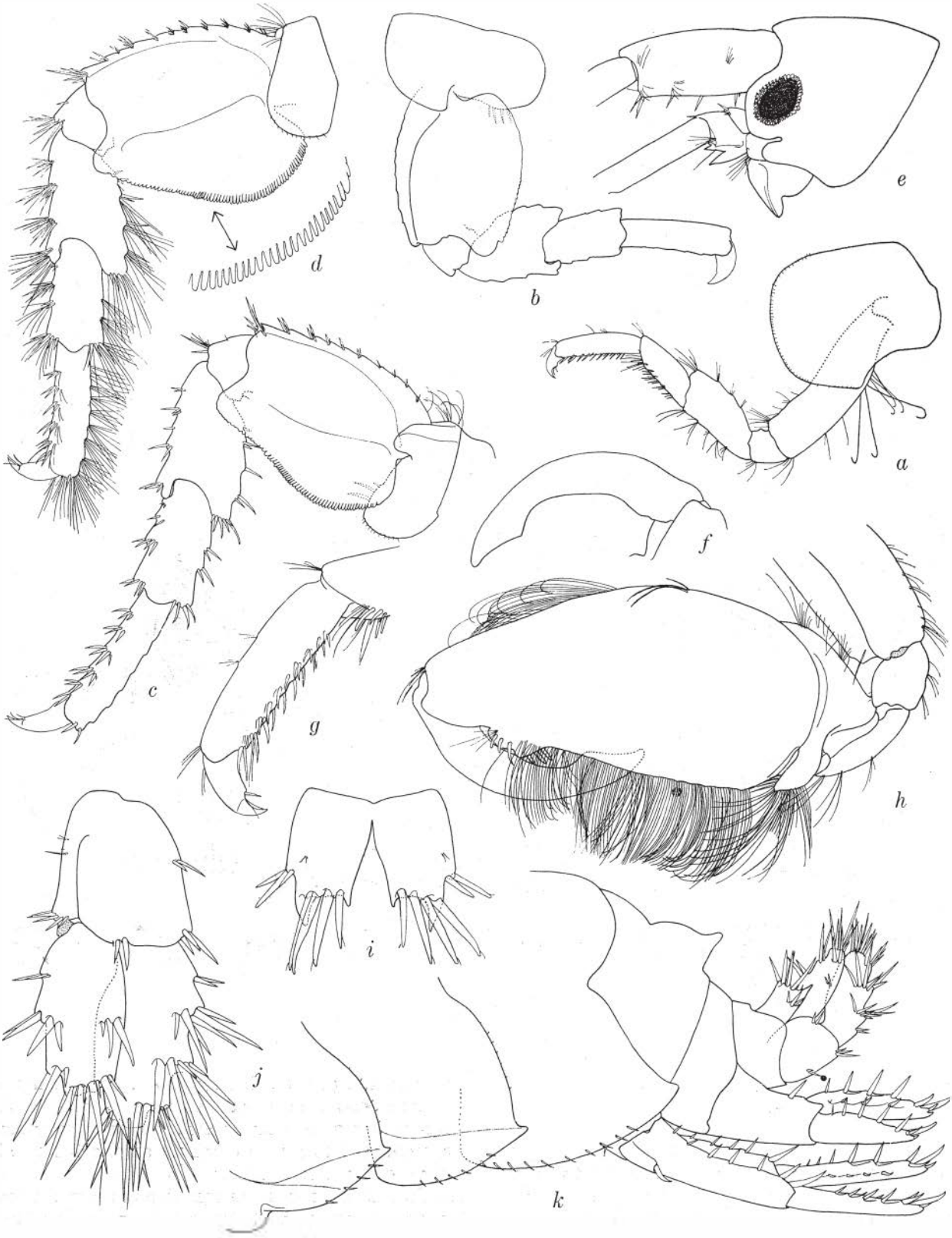


FIG. 50. *Elasmopus neglectus* Chilton, male, 14.5 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, *b*, *c*, *d*, pereopods 2, 3 (setae and spines removed), 4 (setae removed), 5; *e*, head; *f*, dactyl of gnathopod 2; *g*, apex of pereopod 2; *h*, gnathopod 2, lateral; *i*, telson; *j*, uropod 3; *k*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

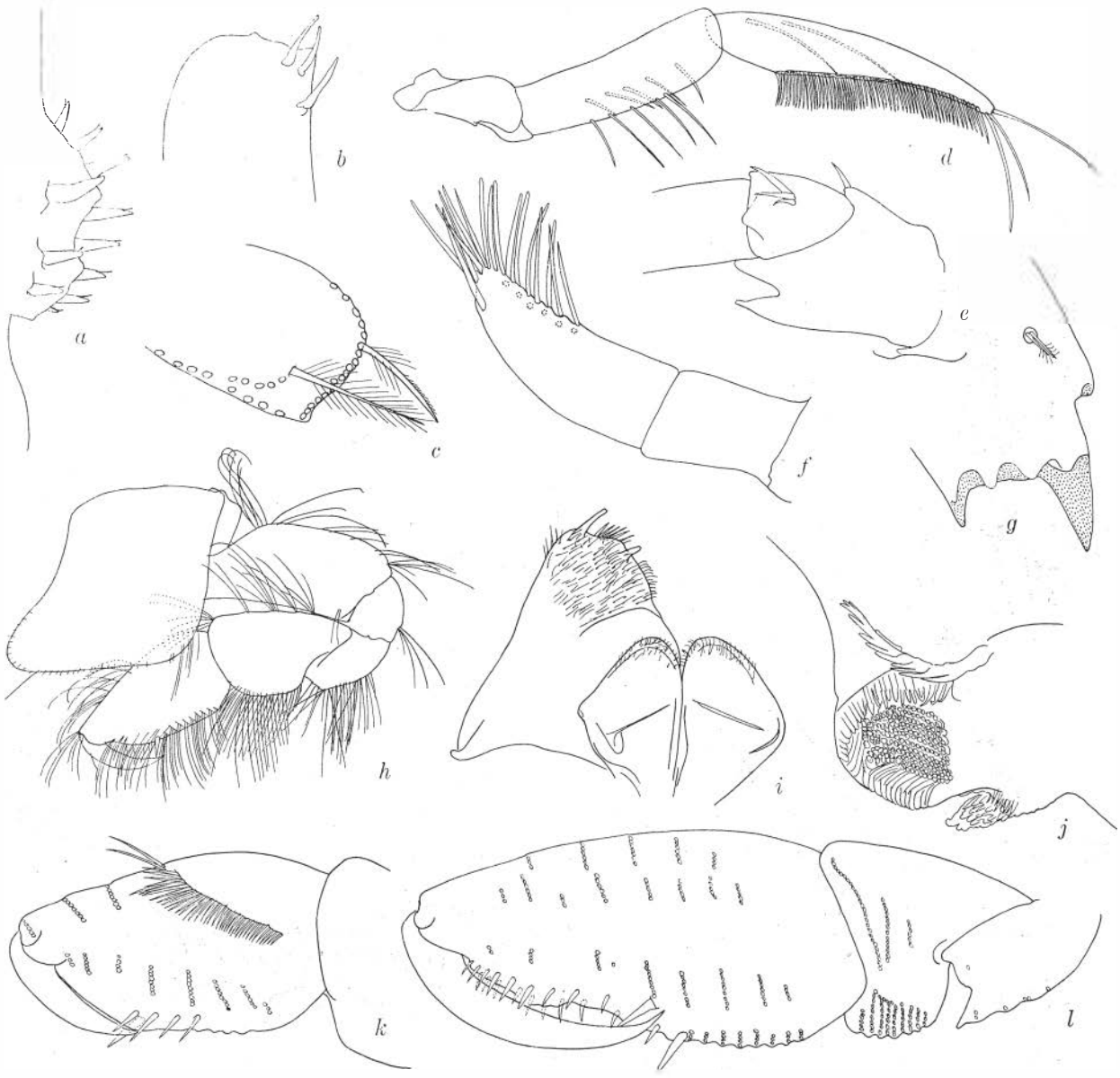


FIG. 51. *Elasmopus neglectus* Chilton, male, 14.5 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, palm of gnathopod 2, medial; *b*, *c*, ventral and dorsal surfaces of inner plate on maxilliped; *d*, mandibular palp; *e*, article 2 of antenna 2, medial; *f*, palp of maxilla 1; *g*, apex of telson; *h*, gnathopod 1; *i*, part of lower lip; *j*, mandibular molar. Female, 12.0 mm: *k*, *l*, apices of gnathopods 1, 2, medial.

Elasmopus wahine, new species

Figs. 52, 53

DIAGNOSIS: Eyes with dark cores surrounded by unpigmented ommatidia (in alcohol); falcate article 3 of mandibular palp thin and very elongate compared with very short article 2; coxae 1–2 with long ventral setae, coxa 3 with shorter setae, coxa 4 with setules only; coxa 2 of male shorter than coxae 1 and 3; article 2 of antenna 2 with simple gland cone; male gnathopod 2 with normally oblique palm defined by small cusp, bearing low, broad, spinose process in middle and weak, spinose process near dactylar insertion, dactyl slender, evenly curved and fitting medial pocket on hand, female gnathopod 2 with evenly spinose palm defined by large spine and bearing three spines in tandem on medial surface of hand near palmar defining corner; locking spines on article 6 of pereopods simple and straight, dactyls with distal constriction marked with sharp acclivity and three slender setules, one setule slightly dominant; article 2 of pereopods 3–5 regularly serrate, article 2 of pereopods 3–4 subrectangular, that of

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

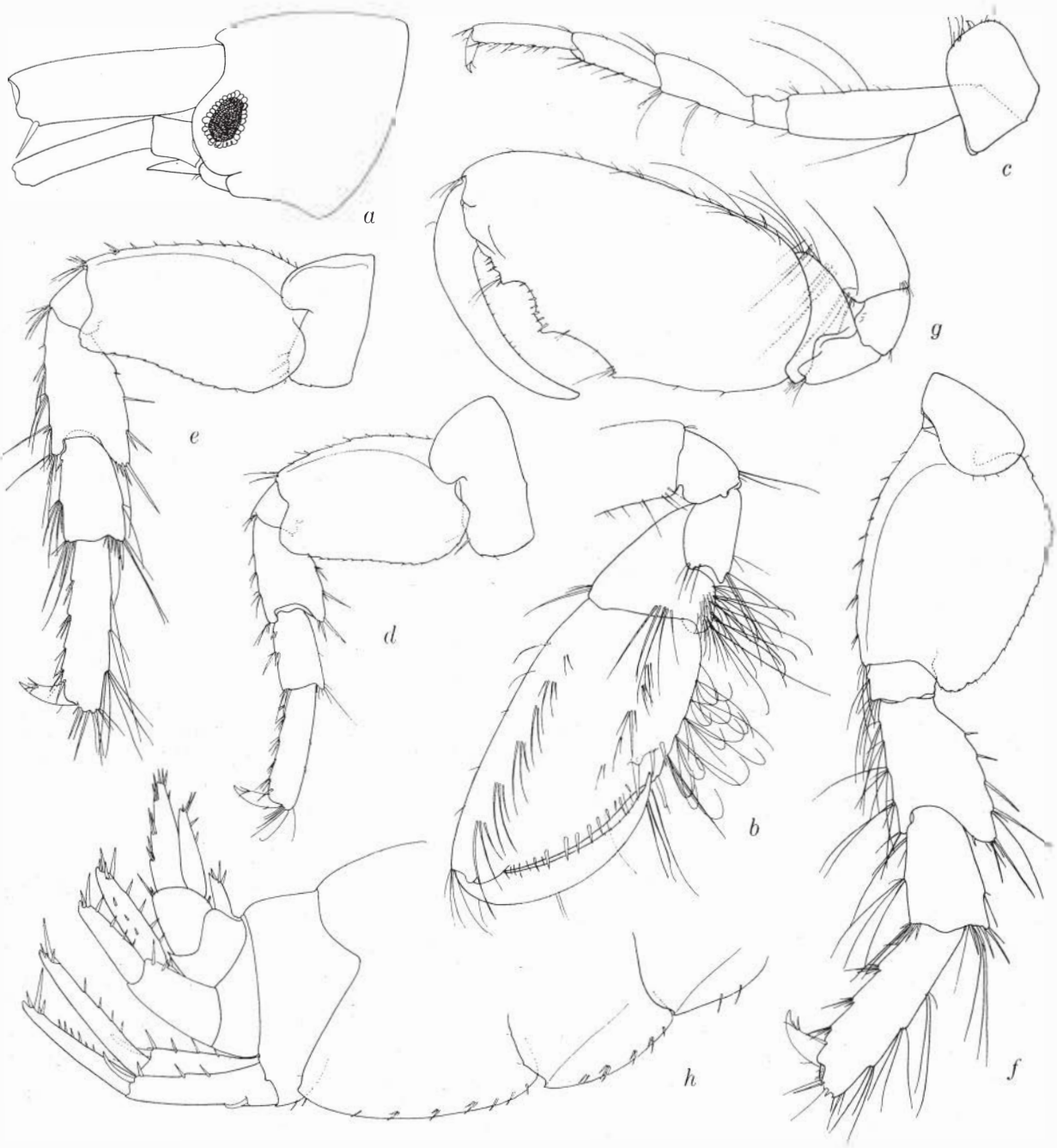


FIG. 52. *Elasmopus wahine* n. sp., female 6.8 mm, NZOI Sample 6: *a*, head; *b*, medial gnathopod 2. Holotype, male, 10.0 mm: *c*, *d*, *e*, *f*, pereopods 1, 3, 4, 5; *g*, lateral gnathopod 2; *h*, pleon.

pereopod 5 normally winged, article 6 of pereopods 4–5 apicoposteriorly extended; pleonal epimera 1–2 with small posteroventral tooth and lateral ridge, epimeron 3 with weaker tooth and nearly straight posterior margin; inner ramus of uropod 3 about two thirds as long as outer, bearing two large spines on truncate apex and two medial spines in tandem; telson of ordinary proportions, each lobe with extended and rounded medial apex and with two lateral, subterminal spines, in young individuals and females telsonic apices with deep apicolateral invaginations.

HOLOTYPE: NZOI, No. 90, male, 10.0 mm.

TYPE LOCALITY: CIE Sta. 19, off Cape Young, 18 January 1954.

RELATIONSHIP: This species resembles various taxa that have affinities with *E. rapax* Costa, but *E. wahine* differs from *E. rapax* in the shortened inner ramus of uropod 3. Male gnathopod 2 is discounted in these comparisons as gross resemblances occur among the various species and minor differences often develop late in the life histories of the species. *Elasmopus mutatus* J. L. Barnard

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

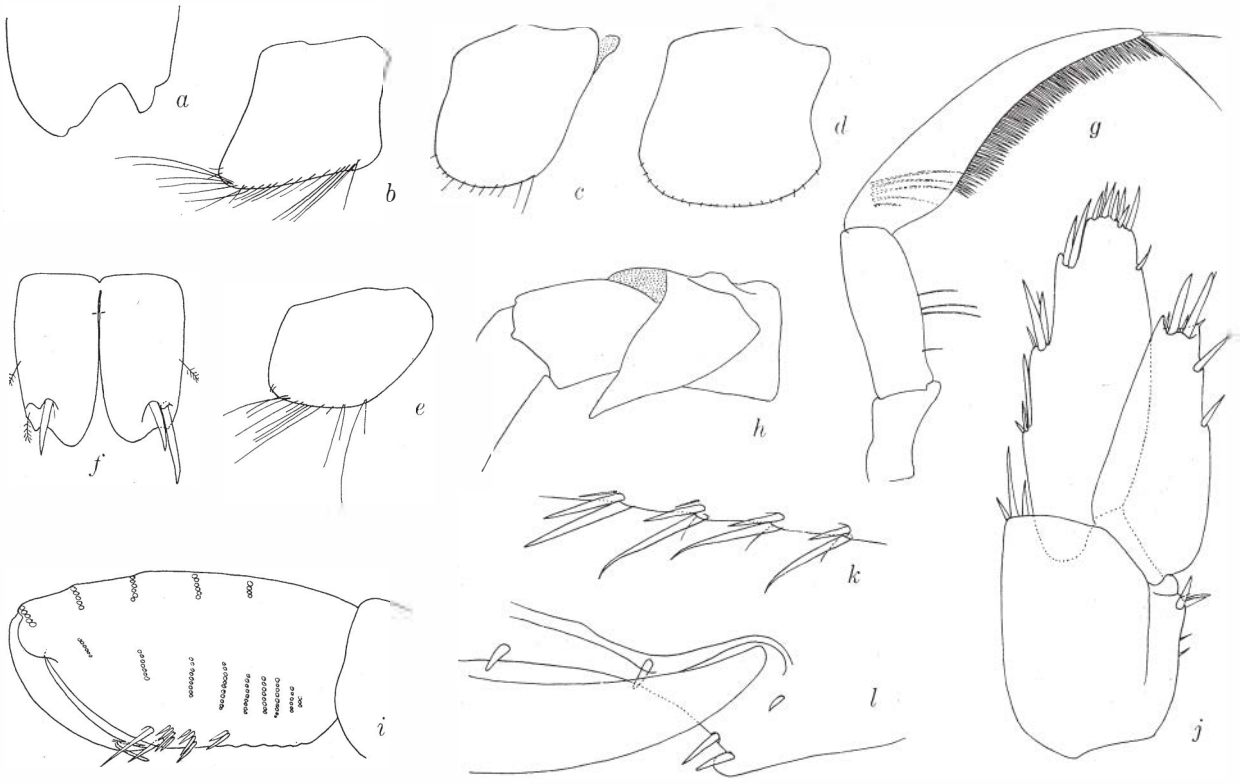


FIG. 53. *Elasmopus wahine* n. sp., female, 6.8 mm, NZOI Sample 6: *a*, apex of telson. Holotype, male, 10.0 mm: *b*, *c*, *d*, *e*, coxae 1, 2, 3, 4; *f*, telson; *g*, mandibular palp; *h*, articles 1–3 of antenna 2, medial; *i*, gnathopod 1, medial setae removed; *j*, uropod 3. Male, 10.5 mm: *k*, posterior edge of article 6 on pereopod 1; *l*, palm and dactyl of gnathopod 2, medial.

(1962b) from California has many resemblances to *E. wahine* and differs primarily in the presence of a detached process and spine on the face of the hand of male gnathopod 2, which in *E. wahine* is probably represented by the marginal pocket for the tip of the dactyl. *Elasmopus mutatus* also does not have extended sixth articles of pereopods 4–5 and dense setae on the hind margin of the hand on male gnathopod 2.

The tropical Pacific *E. pseudaffinis* Schellenberg (1938, *see* J. L. Barnard 1965a) has equal rami of uropod 3 and narrow telsonic lobes with very poor terminal spines.

Elasmopus calliactis Edmondson (*see* J. L. Barnard 1970), from Hawaii, has a chisel-shaped locking spine on article 6 of pereopods 1–2, and a simliar Hawaiian species, *E. hooheno* J. L. Barnard (1970), has sabre-shaped locking spines on pereopods 1–5. A final Hawaiian species, *E. piikoi* J. L. Barnard (1970), has the chisel-spines on pereopods 1–2, a thick mandibular palp article 3, an elongate telson with narrow, deeply incised apices, and the inner ramus of uropod 3 is nearly naked and elliptical.

The mandibular molar of *E. wahine* is of the ordinary kind like that of *Maera mastersi* (*see* p. 109) and the remaining mouthparts are like those of *E. neglectus* (*see* p. 101).

MATERIAL: 6 specimens from the type locality: CIE Sta. 19.

DISTRIBUTION: Off Cape Young.

Maera carnleyi (Stephensen)

Elasmopus carnleyi Stephensen, 1927: 342–345, figs. 19, 20.

DISTRIBUTION: Auckland Islands, under stones; rocky coast.

Maera incerta Chilton

Fig. 54

Moera (sic) *incerta* Chilton, 1883: 83–84, pl. 3, fig. 3; Thomson and Chilton, 1886: 147.
?Elasmopus viridis (Haswell). Stephensen, 1927: 342.
not *Maera viridis* Haswell, 1880b: 333–334, pl. 21, fig. 1; Chilton, 1916b: 362–365, figs. 3, 4; 1921b: 73.

The name of the New Zealand species is returned to *M. incerta* and the senior Australian synonym is excluded without definite proof of their distinction. They were put together originally by accepting an unjustifiably wide degree of variability, in view of the non-tropical position of the populations, their isolation from each

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

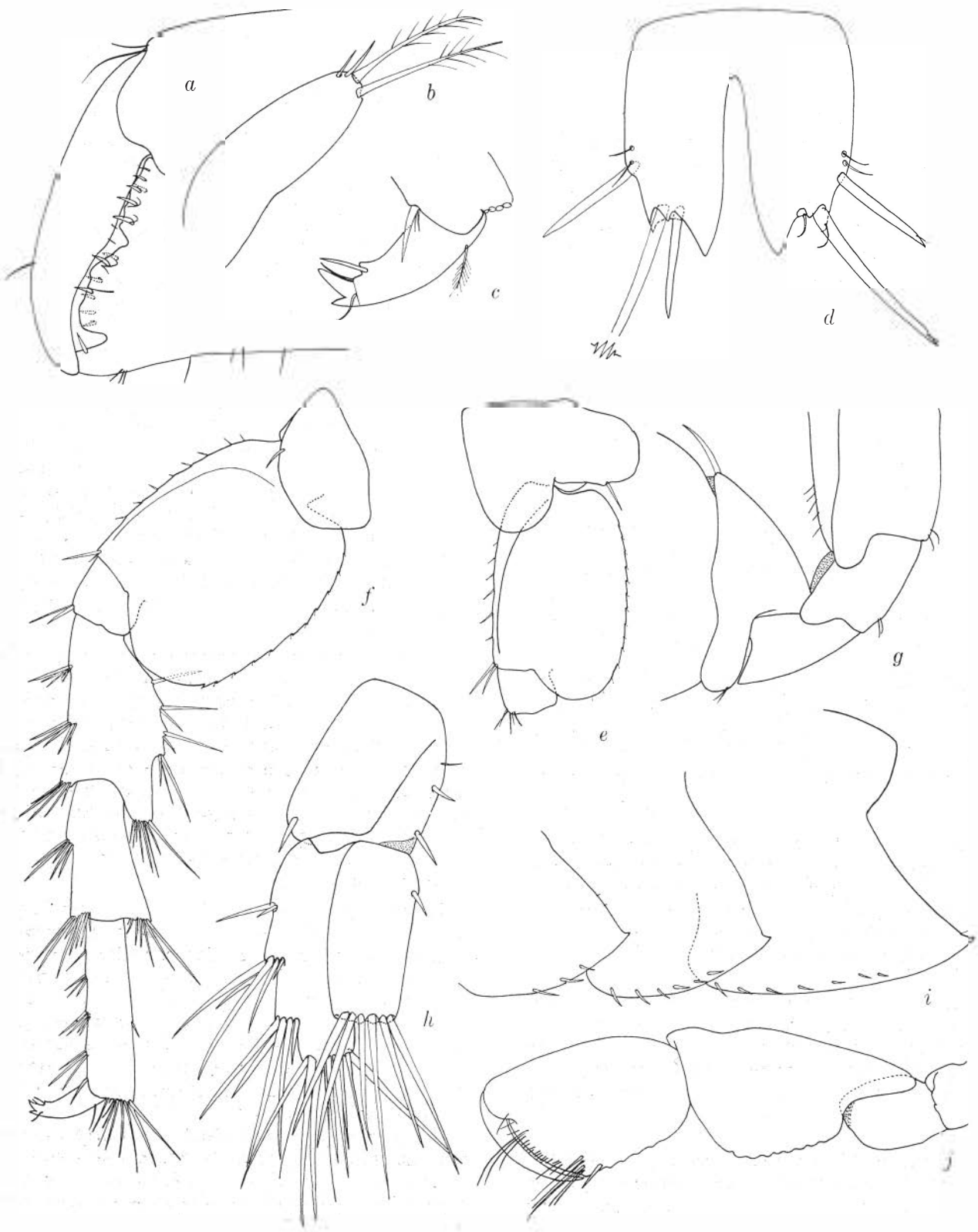


FIG. 54. *Maera incerta* Chilton, male, 8.7 mm, NZOI Sta. E 966 [JLB NZ-1]: *a*, palm of gnathopod 2, medial; *b*, inner plate of maxilla 1; *c*, dactyl of pereopod 4; *d*, telson; *e*, *f*, pereopods 3, 5; *g*, articles 2–5 of medial gnathopod 2; *h*, uropod 3; *i*, pleonal epimera 1–3; *j*, lateral gnathopod 1, setae removed.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

other, and small differences illustrated between the New Zealand and Australian members plus awareness that other non-tropical populations can be distinguished from the *Maera inaequipes* complex.

At least seven species have been described in a section of the genus *Maera* that might be named the *M. quadrimana* complex. They are characterised in combination by the transverse palms on gnathopod 2 and a sharp tooth on the anteroventral corner of the head (not exclusive). The deep-sea *Maera loveni-danae* group is excluded by one or more of the following characters: smallness of coxae, lack of cephalic tooth, or extremely elongate rami of uropod 3. The species in the *M. quadrimana* complex are listed below with notes on their characters:

Maera quadrimana (Dana): rami of uropod 3 equal; telsonic apices oblique, slightly concave, with three spines each; article 2 of pereopods 4–5 broadly or narrowly subrectangular; palm of male gnathopod 2 with three sinuses, defining tooth 1.5 times as long as adjacent sinus, dactyl without inner acclivity.

Maera pacifica Schellenberg: rami of uropod 3 unequal; telsonic apices oblique, slightly concave, with three spines each; article 2 of pereopods 4–5 broadly ovate; palm of male gnathopod 2 with two sinuses, anterior sinus weak, defining tooth twice as long as adjacent sinus, dactyl acclivity strong.

Maera kaiulani J. L. Barnard: rami of uropod 3 slightly unequal; telsonic apices deeply bifid and bearing two spines each; article 2 of pereopods 4–5 subovate to subrectangular; palm of male gnathopod 2 with weak sinuses, defining tooth small, dactylar acclivity obsolescent.

Maera rathbunae Kunkel: rami of uropod 3 unequal; telsonic apices broadly truncate and strongly ?setose (spinose); article 2 of pereopods 4–5 presumably ovate; palm of male gnathopod 2 with one shallow, irregular, gross sinus, defining tooth equal in length to sinus, dactyl with weak inner hump.

Maera inaequipes (Costa): rami of uropod 3 unequal; telsonic apices deeply bifid or notched, each with two spines; article 2 of pereopods 4–5 broadly ovate; palm of male gnathopod 2 with two sinuses, defining tooth equal in length to adjacent sinus, dactylar acclivity strong.

Maera serrata Schellenberg: rami of uropod 3 unequal typically, equal in Hawaiian populations; telsonic apices deeply bifid, bearing two or three spines each, often highly unequal; article 2 of pereopods 4–5 narrowly ovatorectangular; palm of male gnathopod 2 with two sinuses, defining tooth equal to adjacent sinus, dactylar acclivity strong; pleonal epimeron 3 weakly serrate posteriorly (unique to this species in this complex).

Maera viridis Haswell: rami of uropod 3 unequal; telsonic apices deeply excavate but not "bifid", with three spines each; article 2 of pereopods 4–5 ovate; palm of male gnathopod 2 with two sinuses, defining tooth about 1.5 times as long as adjacent sinus, dactylar acclivity strong; if Chilton's (1916b and 1921b) material belongs with *M. viridis* then the male anterior palmar sinus becomes extremely deep and the palm protrudes in chelate fashion.

Maera incerta Chilton: rami of uropod 3 unequal; telsonic apices bifid, not strongly, bearing two apical spines, distolateral margin of each lobe with accessory acclivity and spine; article 2 of pereopods 4–5 broadly ovate; palm of male gnathopod 2 slightly chelate in terminal adult, with two weak sinuses, defining tooth about 1.5 times as long as adjacent sinus, dactyl with weak hump.

Maera sp. (= *M. inaequipes* identified by J. L. Barnard 1959, from California): rami of uropod 3 unequal; telsonic apices oblique but obliquity opposite to that of other species, with distalmost point occurring laterally, each lobe with six spines (thus with affinities to *M. rathbunae*); article 2 of pereopods 4–5 broadly ovate; palm of male gnathopod 2 with two sinuses, anterior sinus very deep, defining tooth small and equal to small adjacent sinus, dactylar acclivity large; anterior margin of article 2 on gnathopod 2 heavily spinose (unique in this species-group).

Maera sp., *see M. inaequipes* and *Maera* sp. herein: part of Thomson's (1882, p. 235) material from Stewart Island is referred to *M. inaequipes* only provisionally, the palm being more ragged than normally found in this species, but the palm may be sufficiently transverse to be referred to the *M. quadrimana* complex of species; the other portion of the material apparently bears a fairly simple oblique palm. The ragged-palmed "species" may represent a new species, but if the simple-palmed form is the female then the species would not be referrable to the complex under question.

The synonymic coalescence of various world populations in this species group appears to be premature, despite Chilton's belief in wide variability and despite J. L. Barnard's (1959 and 1962b) partial amalgamations. Although differences may seem to be minor and juvenile stages similar among various species, no precisely identical terminal adults have been found to transgress long geographic distances among purely warm-temperate localities, except perhaps the Mediterranean population of *M. inaequipes* that was identified by Schellenberg (1938) from the tropical Pacific. Schellenberg was a discriminating taxonomist who did not synonymise *M. pacifica* with *M. quadrimana* as might easily have been done and his action calls attention to the need for keeping the nomenclature of these "species" dispersed. If the tropical Pacific *M. inaequipes* is indeed identical with the Mediterranean, the situation would be exceptional to a pattern of *quadrimana*-dispersal into various areas isolated from the western tropical Pacific (e.g., California,

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 55. *Maera mastersi* (Haswell), female, 9.9 mm, Shelly Beach, Otago Harbour: *a*, gnathopod 1, medial, setae removed; *b*, dactyl of pereopod 5; *c*, *d*, *e*, *f*, pereopods 2, 3, 4, 5. Female, 12.2 mm: *g*, head; *h*, pleon. Male, 11.8 mm: *i*, left gnathopod 2 (and like female gnathopod 2, both sides); *j*, right male gnathopod 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

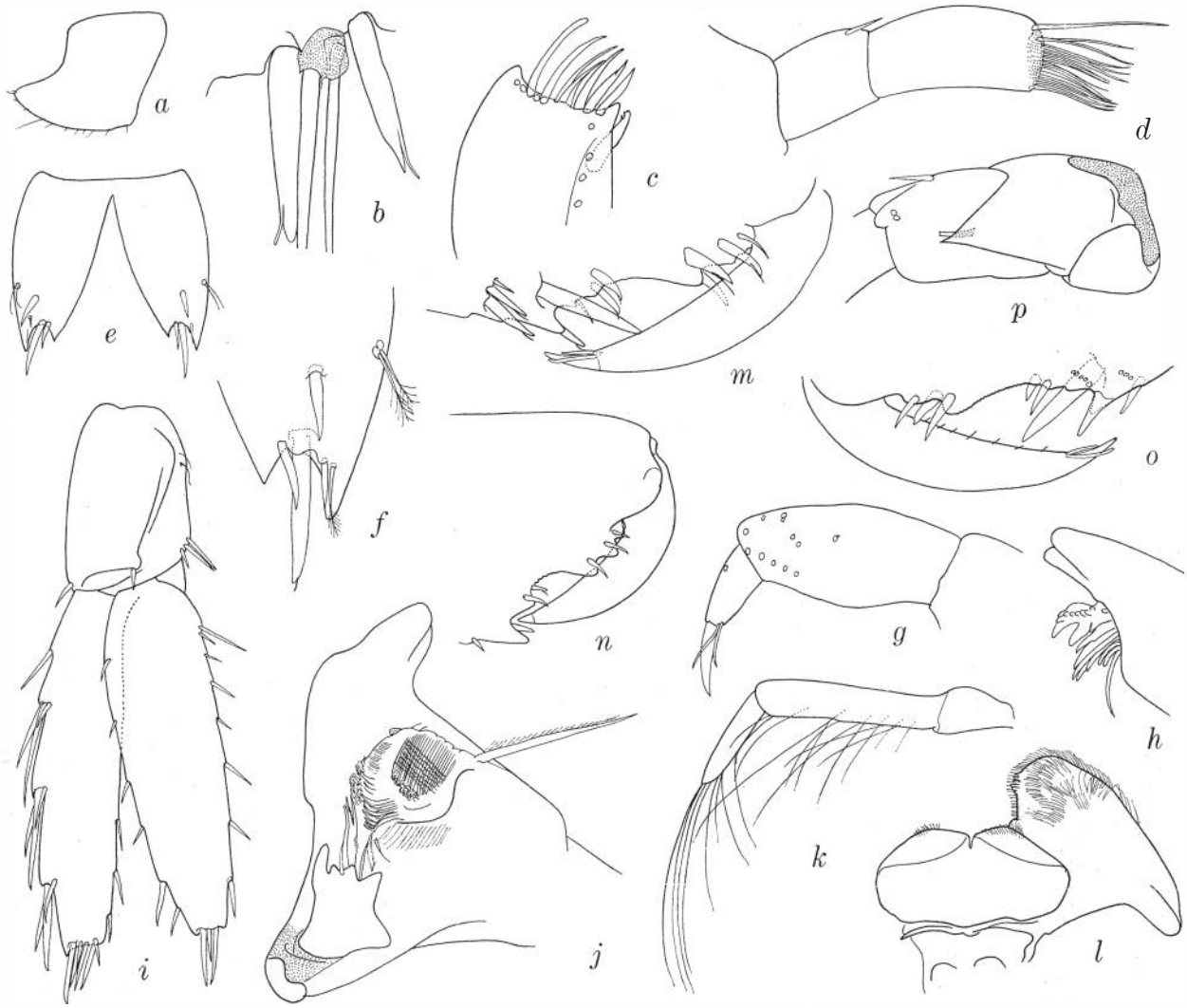


FIG. 56. *Maera mastersi* (Haswell), female, 9.9 mm, Shelly Beach, Otago Harbour: *a*, coxa 1; *b*, apex of outer ramus on uropod 3; *c*, inner plate of maxilliped; *d*, palp of maxilla 1; *e*, telson; *f*, apex of telson; *g*, apex of maxillipedal palp; *h*, right mandibular incisor; *i*, uropod 3; *j*, left mandible; *k*, mandibular palp; *l*, part of lower lip. Male, 11.8 mm: *m*, palm of left gnathopod 2, medial; *n*, palm of right gnathopod 2, lateral; *o*, palm of left gnathopod 2, lateral; *p*, medioventral base of antenna 2.

New Zealand, warm-temperate Australia, Bermuda, Hawaii). Whether these species are simply subspecies is academic and the use of *quadrimana* as a central dispersing species only a matter of example.

The presence of proximolateral telsonic spines on the New Zealand population of this species-group suggests strong distinction from other world members but especially from the Australian populations now known.

Uropod 3 has a small, thin article 2 on the outer ramus hidden among the apical spines.

MATERIAL: NZOI Sta. E966 (3), Sta. E967 (5), Sta. E969 (1), Sta. E970 (2).

DISTRIBUTION: Lyttelton Harbour; Kaikoura; Wellington; ?Auckland Islands, on the shore under stones; rocky coast.

Maera mastersi (Haswell)

Figs. 55, 56

Megamoera Mastersii Haswell, 1880a: 265–266, pl. 11, fig. 1.
Megamoera thomsoni Miers, 1884: 318–319, pl. 34, fig. B.
Maera mastersii. Stebbing, 1906: 439.
Maera mastersi. Sheard, 1936c: 177–179, fig. 3, pl. 17, fig. C.

New Zealand individuals of this species differ from Sheard's Australian figures in the slightly better developed palm of male gnathopod 2, whereas the palm figured by Sheard for a male is more like that of female specimens from New Zealand. The teeth on pleonal epimera 1–2 of New Zealand specimens are more poorly developed than in Australian specimens and the serrations on article 2 of pereopod 5 are weak in New Zealand individuals. Sheard does not show any large distolateral peduncular spine on uropod 1 but this may have been an oversight

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

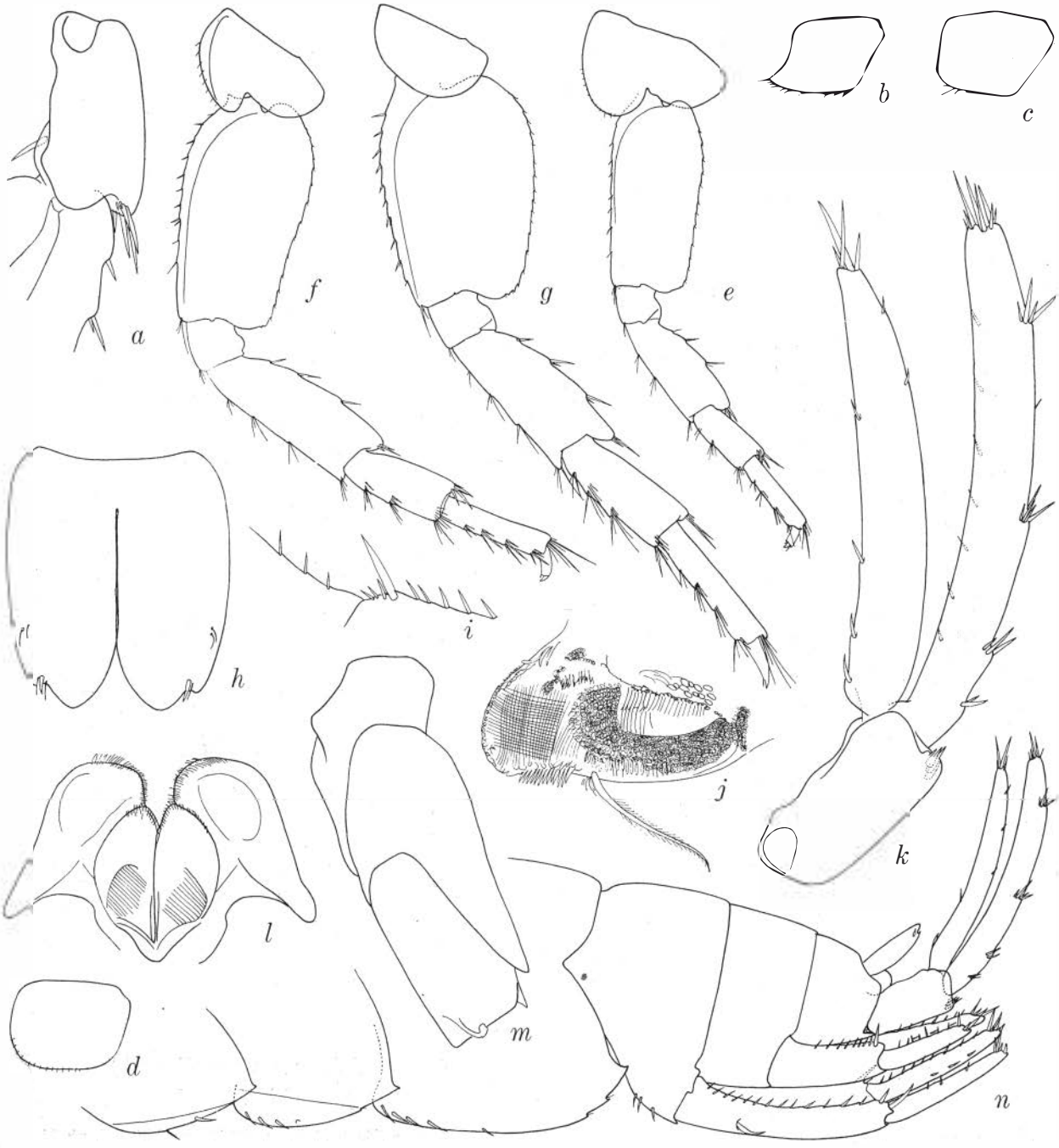


FIG. 57. *Maera tepuni* n. sp., holotype, male, 15.8 mm, CIE. Sta. 49: *a*, right uropod 3; *b*, *c*, *d*, coxae 1, 2, 4; *e*, *f*, *g*, pereopods 3, 4, 5; *h*, telson; *i*, inner margin of peduncle on uropod 1; *j*, mandibular molar; *k*, left uropod 3; *l*, lower lip; *m*, medial base of peduncle on antenna 2; *n*, pleon.

or the spine may have been broken off in his material.

Mouthparts differ from those of *M. subcarinata* in that the mandibular molar lacks the accessory spinose process, the palp of maxilla 1 is apically truncate and bears only terminal setae, palp article 3 of the maxilliped lacks the apical process and the pattern of setae, and their shape differ on the inner plate of the maxilliped (*see* Fig. 56). The gland-cone article of antenna 2 does not bear a medial process as in *M. subcarinata*. The eyes of *M. mastersi* are pale eosin in alcohol.

MATERIAL: Otago Harbour, Shelly Beach, gravel pools, 30 July 1953, coll. D. E. Hurley (6); Portobello Marine Biological Station, on *Pyura*, 31 June 1954, coll. D. E. Hurley (3).

DISTRIBUTION: Otago Harbour.

EXTRINSIC DISTRIBUTION: Torres Strait to Southern Australia, 0–17 m.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

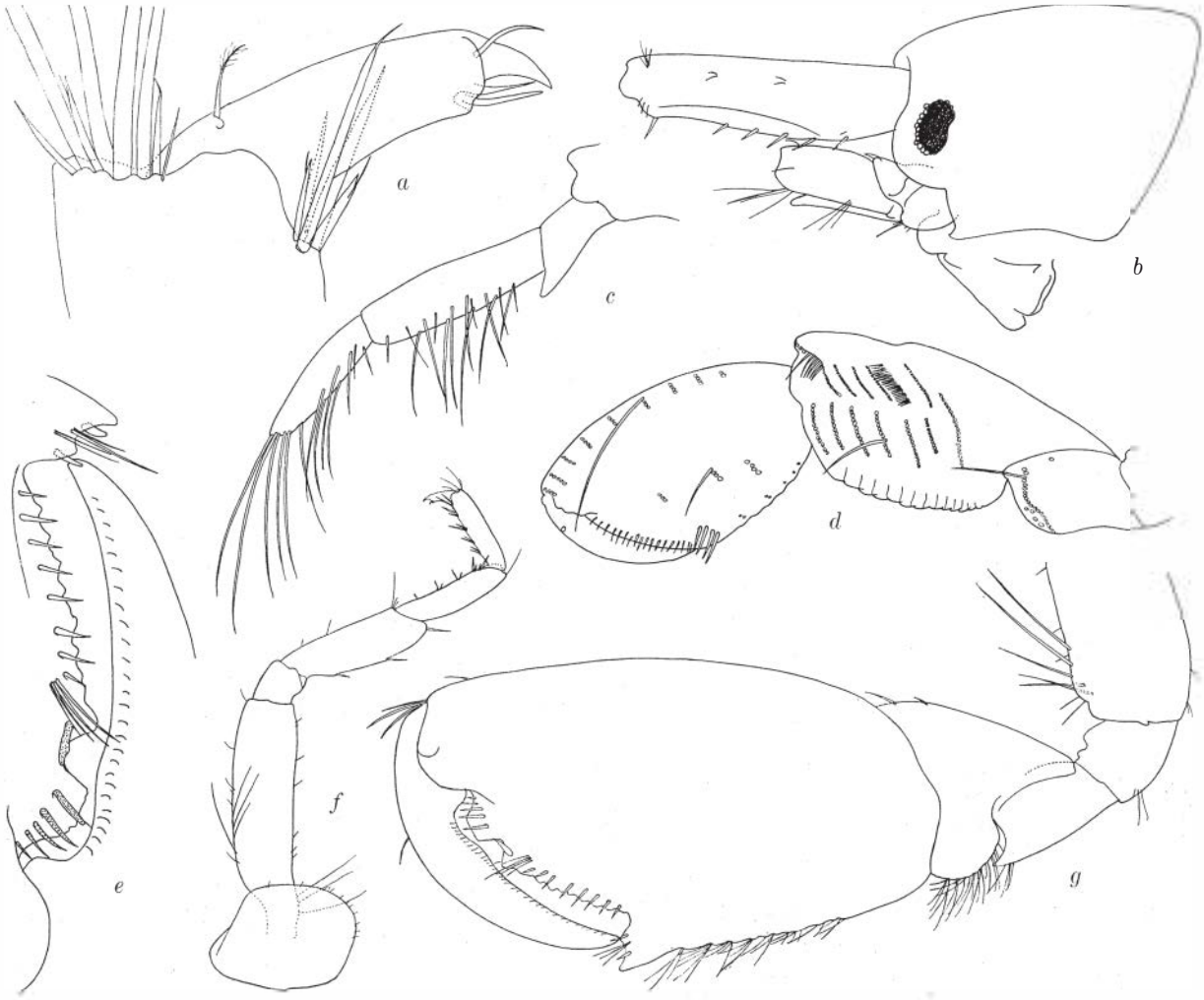


FIG. 58. *Maera tepuni* n. sp., holotype, male, 15.8 mm, CIE Sta. 49: *a*, dactyl of pereopod 4; *b*, head; *c*, mandibular palp; *d*, gnathopod 1, setae removed; *e*, palm of gnathopod 2, lateral; *f*, pereopod 1; *g*, gnathopod 2, medial.

Maera tepuni, new species

Figs. 57, 58

?Moera quadrimanus. Thomson, 1882: 235–236, pl. 17, fig. 4a (in part, not Dana).

DIAGNOSIS OF MALE: Body 15.8 mm long. First antenna 6.8 mm long, second antenna 4.7 mm long; accessory flagellum with 10 articles tipped with vestigial eleventh; lateral cephalic lobes quartocircular, eyes small, mostly black, anteroventral corner of head with weak tooth; article 1 of mandibular palp with sharp cusp as in genus *Ceradocus;* coxa 1 with anteroventral conical extension; coxae short but overlapping; gnathopod 1 with slight anterodistal extension; article 2 of gnathopod 2 unlobed, article 4 with sharp posterodistal cusp, posterior lobe of article 5 broad, palm oblique, defined by large weakly bifid process, palm bearing deep notch near base of dactyl and lined with spinules, dactyl fitting palm short of defining process; pereopods 3–5 thin but second articles of medium expansion, with rounded posteroventral corners, dactyls with strongly distal constriction bearing two stout setules and one small facial setule, locking spines long, straight; uropod 3 greatly elongate, rami curved and about 2.5 times as long as peduncle; telson long, deeply cleft, apices narrowly rounded and bearing weak distolateral invagination armed with spinule and one or two setules; pleonal epimera 1–3 with small sharp posteroventral tooth, epimeron 2 with one and epimeron 3 with two strong ventral serrations; pleon dorsally smooth.

HOLOTYPE: NZOI, Sta. 91, male, 15.8 mm. Unique.

TYPE LOCALITY: CIE Sta. 39, Port Hutt.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

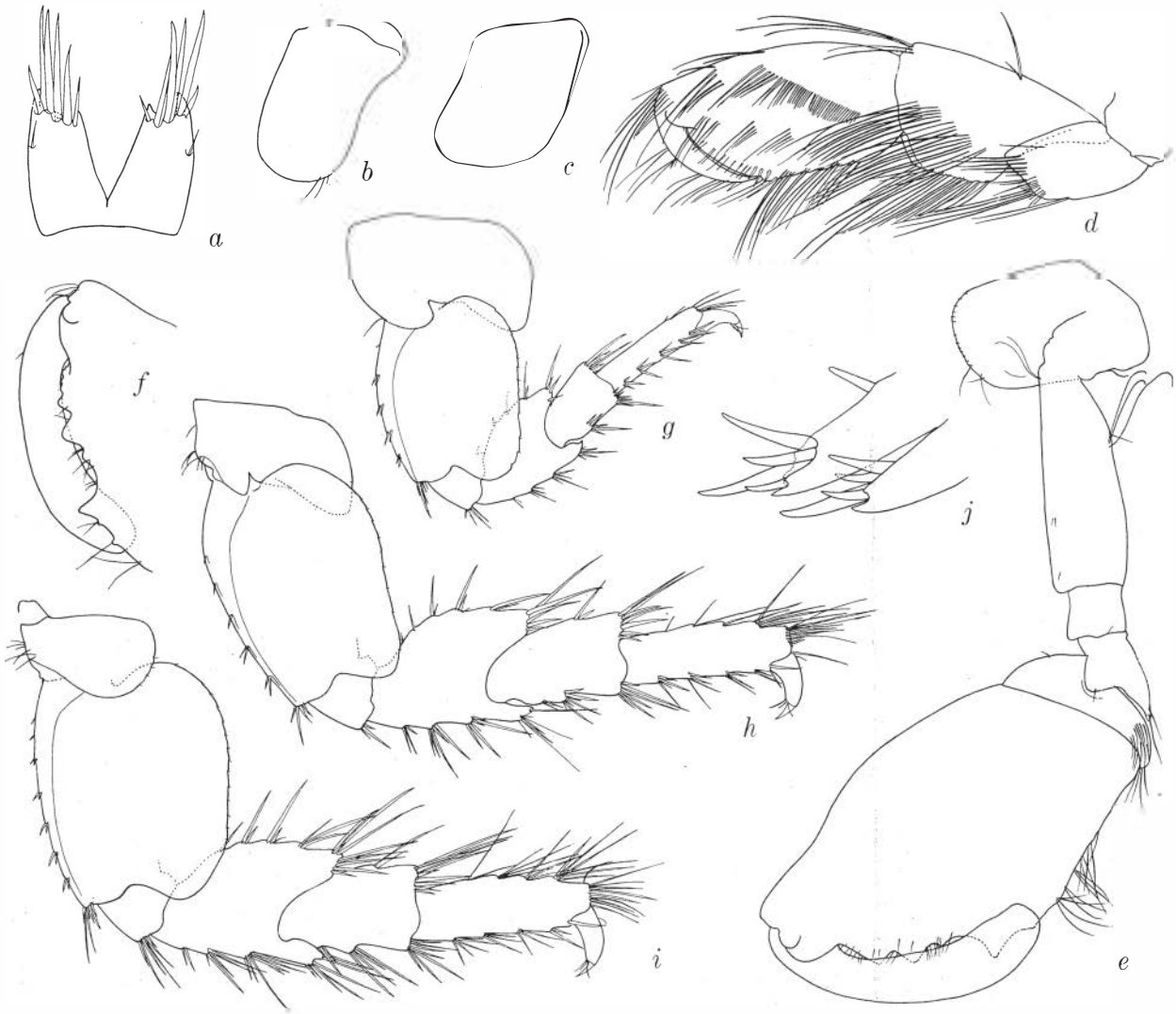


FIG. 59. *Mallacoota subcarinata* (Haswell), male, 10.7 mm, PMBS: *a*, telson; *b*, *c*, coxae 3, 1; *d*, gnathopod 1, medial; *e*, gnathopod 2; *f*, palm of gnathopod 2, lateral; *g*, *h*, *i*, pereopods 3, 4, 5; *j*, apices of rami on uropod 2.

RELATIONSHIP: This species has strong affinities with *Maera pfefferi* K. H. Barnard (1932) from South Georgia Island in view of the very long uropod 3 and the palmar sculpture of gnathopod 2, but differs from that species in the rounded posteroventral corner of pereopod 5 article 2.

Uropod 3 is much longer than in the similar *M. hirondellei* Chevreux (*see* Chevreux and Fage 1925, from the Mediterranean Sea) and the telsonic apices are much broader in *M. tepuni* than in *M. hirondellei*.

Maera tepuni has a first maxillary palp and a maxillipedal palp like those figured here for *M. mastersi;* the inner plate of maxilla 1 has three long and two short terminal setae; the inner plate of the maxilliped is like that of *M. mastersi* but it has three ventral (obverse) coupling spines.

DISTRIBUTION: Port Hutt.

Maera spp.

Moera quadrimanus. Thomson, 1882: 235–236, pl. 17, fig. 4b (not Dana) (in part, fide Chilton, 1916b) (not fig. 4a = *M. tepuni*, n. sp.).
Maera mastersii. Chilton, 1916b: 367–369 (not Haswell); 1925a: 317.
?Maera mastersii. Chilton, 1911a: 564 (not Haswell).
Maera quadrimana. Thomson and Chilton, 1886: 146 (in part).
Maera inaequipes. Chilton, 1916b: 365–367, figs. 5, 6.

The members of this complex (including *M. simile* Stout from California) require study on a global scale and until that time the so-called *M. inaequipes* of New Zealand satellite islands must remain questionably with that appellation. Basic references to the European populations include Stebbing (1906, p. 435) and Chevreux and Fage (1925, p. 240). Chilton's material, possibly *M. tepuni*, n. sp., has especially elongate uropod 3 but he discounted that difference and Thomson's male

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 60. *Mallacoota subcarinata* (Haswell), male, 10.7 mm, PMBS: *a*, head; *b*, apex of telson; *c*, mandibular palp; *d*, apex of maxillipedal palp; *e*, inner and outer plates of maxilla 1; *f*, pereopod 2; *g*, uropod 3; *h*, pleon. Female, 9.3 mm: *i*, gnathopod 2, medial, setae removed.

(fig. 4b) has a more ragged palm of gnathopod 2 than normally considered for *M. inaequipes*. J. L. Barnard's (1959) identification of this species is probably erroneous as those Californian specimens appear to belong with the *M. quadrimana* complex (*see Maera incerta* p. 105)

Miers (1884, p. 318) and Sheard (1936c, p. 177) have adequately described the Australian *M. mastersii* (Haswell, 1880a, p. 265) but Thomson's figures of *M. quadrimanus* from Stewart Island do not conform to the weak gnathopod 2 of *M. mastersii*. Chilton identified part of Thomson's material with *M. mastersii* but there is no confirmation of this opinion. Chilton considered that Thomson's pl. 17, fig. 4a, belongs with *M. inaequipes* (Costa) to which I have referred it only provisionally because the palm of gnathopod 2 is more oblique and ragged than generally accepted for *M. inaequipes* and the figure suggests it belongs with *M. tepuni*, new species. The far extent into high latitudes of this record also throws doubts on its veracity. The plain gnathopod of pl. 17, fig. 4b, was referred by Chilton to *M. mastersii*, but this obvious error also casts doubt on Chilton's other Australian records of *M. mastersii* (Chilton, 1921b, p. 72), since he may not have had the true *M. mastersii* at that time. When Thomson's materials are finally identified properly it may be wise to disregard Chilton's (1916b) records until they can be verified by newly collected material from his localities.

DISTRIBUTION: Thomson: Paterson Inlet, Stewart Island; Port Pegasus. Chilton adds: Moeraki; off Cape Maria van Diemen, 50 fm; Chatham Islands.

Mallacoota J. L. Barnard

Mallacoota J. L. Barnard, 1972: 243.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Mallacoota subcarinata (Haswell)

Figs. 59, 60

Megamoera sub-carinata Haswell, 1880b: 335, pl. 21, fig. 4; Chilton, 1884b: 1039.
Moera petriei Thomson, 1882: 236–237, pl. 18, fig. 3; Chilton, 1883: 82, pl. 2, fig. 4.
Moera subcarinata (and *sub-carinata*). Chilton, 1884c: 230–231; Thomson and Chilton, 1886: 146; Thomson, 1889: 261.
Elasmopus subcarinata and *Elasmopus persetosus* Stebbing, 1888: 1019–1025, pl. 98.
Elasmopus subcarinatus. Chilton, 1892: 261; Walker, 1904: 275, pl. 5, fig. 34; Stebbing, 1906: 441–442; Walker, 1909: 335; Stebbing, 1910: 602, 643; Thomson, 1913: 243; Chilton, 1915: 321–326, figs. 1–6; 1921b: 76.

All material at hand represents form 2 of this species noted by Chilton (1915) in which male gnathopod 2 has a spatulate dactyl, the hand is poorly furnished with setae, and the three teeth of the palm are small to medium in size. Immature males of form 1 have a sharp dactyl with subterminal thorn and two of the palmar teeth are large, whereas terminal males of form 1 have a shortened, thick dactyl and the palm has lost the teeth. Both extremes of form 1 have the hand heavily setose. Specimens from Stewart Island and Sydney - Australia (Chilton, 1884c) belong to form 1, whereas specimens from Lyttelton Harbour belong with form 2. Stebbing's (1888) New Zealand material with enigmatic locality (1100 fm) is also supposed to belong with form 1.

I doubt that the situation of formae is clear; there is a possibility that Chilton assembled notes over the years that confused *M. subcarinata* with *Elasmopus neglectus* which has a male gnathopod 2 remotely similar to form 1 of *M. subcarinata* but with urosomite 1 having only one dorsal carina. There is also some question as to the logic of the so-called transformation of a highly complex gnathopod 2 into the simplified stage of adult form 1.

The material at hand has the general appearance of *M. insignis* as figured by J. L. Barnard (1970) but male pereopods 3–5 are more slender in *M. subcarinata* and male gnathopod 2 has a distinct palm.

MATERIAL: Portobello Marine Biological Station, reef, 15 May 1952, on *Pyura* spp., coll. D. E. Hurley (50+), NZOI Sta. E970 (13).

DISTRIBUTION: Throughout New Zealand; Stewart Island, Port Pegasus, dredge; Port Chalmers; Otago Harbour; Waipapapa Pt., Timaru Beach; Lyttelton; Bay of Islands, 8 fm; Three Kings Islands; erroneously listed by Stebbing (1888) from 1100 fm off New Zealand.

EXTRINSIC DISTRIBUTION: South and eastern Australia (0–35 fm); Ceylon; South Africa.

Melita awa, new species

Figs. 61*a–h*, 62*a–i*, 63

DIAGNOSIS: Accessory flagellum 3-articulate plus tiny fourth article; lateral cephalic lobes deep, anteroventral corner of head without notch; eyes round, dark cores surrounded by one layer of clear ommatidia; prebuccal complex evenly rounded anteriorly; article 3 of mandibular palp slightly shorter than article 4 and bearing only terminal setae; mandibular molars without accessory flakes; inner plates of maxillae 1–2 with five medial setae (medioterminal on maxilla 1); coxa 1 not attenuate anteriorly; hand of male gnathopod 1 with large anterior hump, dactyl slender, curved, without hump, fitting convex transverse palm; female gnathopod 1 without hump on hand; male gnathopod 2 with unlobed articles 2–3, hand ovatorectangular, palm oblique and rounding on to posterior margin of hand, undefined, dactyl of medium length, normal, overriding palm on to medial face of hand, that face with weak hollow defined by two ridges, one ridge with one spine, anterodistal part of palm with small thorn-like spines, posterior margin of hand strongly setose; article 4 of gnathopod 2 with sharp but not attenuate posterodistal extension; female gnathopod 2 normal for that sex; coxa 4 poorly expanded and weakly excavate posteriorly; pereopodal dactyls distally smooth (lacking marginal serrations) but with weak marginal striations in middle; article 2 of pereopods 3–4 with subconical posterodistal projection, article 2 of pereopod 5 proximally expanded and distally narrowed; pleonal epimera 1–3 with small posteroventral tooth with two weak serrations on ventral margin anterior to tooth; pleonite 4 dorsally smooth, pleonite 5 with one weak tooth and articulate spine on each side dorsally; telson short, broad, each apex sharp, unbifid, bearing subterminal medial group of two long and one or two short spines, and lateral group of two or three spines.

HOLOTYPE: NZOI, No. 92, male, 4.5 mm.

TYPE LOCALITY: NZOI Sta. E987, Hutt River, Lower Hutt, New Zealand, on levee near Mudie Street, in roots of dead submerged tussock grass, in saline water, 30 March 1968.

RELATIONSHIP: In New Zealand this species must be compared with *M. inaequistylis* (Dana), which it superficially resembles. *Melita inaequistylis* differs from *M. awa* in many characters, but some of these occur only in large terminal adults of *M. inaequistylis*, a species that reaches 10 mm or more in length, whereas *M. awa* apparently reaches only about 4.5 mm. *Melita inaequistylis* differs from *M. awa* in:

(1) the longer accessory flagellum (five plus one tiny articles);
(2) the presence of an anteroventral cephalic notch with accessory cheek below it;
(3) the anteriorly produced subconical prebuccal mass;
(4) the strongly setose mandibular palp with article 3 longer than 2;
(5) the presence of a large serratoflabellate flake on the side of the left mandibular molar;
(6) the presence of eight medial setae instead of five on the inner plates of maxillae 1–2;
(7) the presence in terminal adults of a process on article 3 of the maxillipedal palp;
(8) the lack of a hump on the hand and the presence of a hump on the dactyl of male gnathopod 1;
(9) configurations of male gnathopod 2;

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

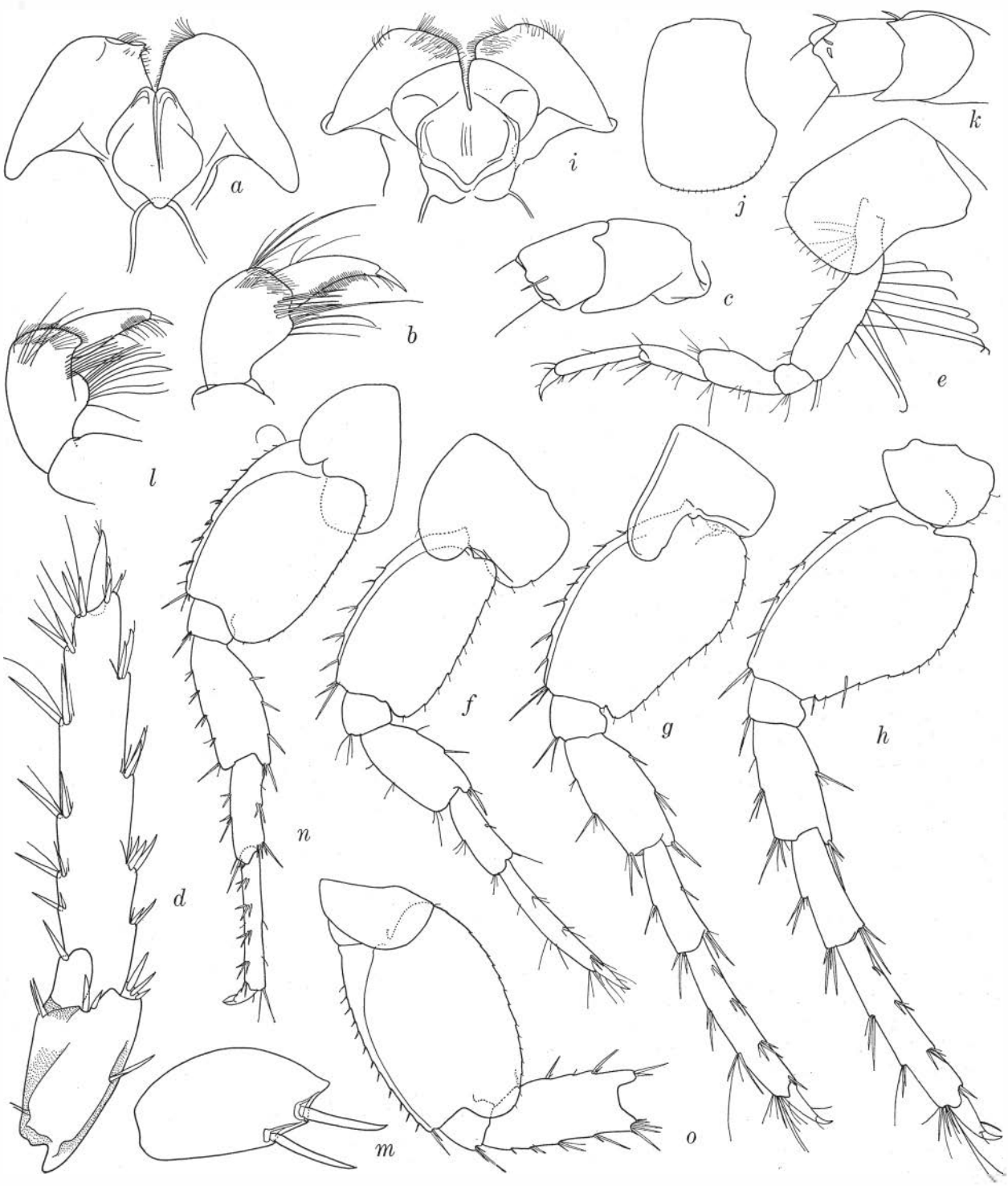


FIG. 61. *Melita awa* n. sp., holotype, male, 4.5 mm, NZOI Sta. E 987 [JLB NZ-18]: *a*, lower lip; *b*, apex of maxillipedal palp; *c*, medial base of antenna 2; *d*, uropod 3. Female, 4.5 mm: *e*, *f*, *g*, *h*, pereopods 2, 3, 4, 5.

Melita inaequistylis (Dana), male, 9.9 mm, NZOI Sta. E 971 [JLB NZ-6]: *i*, lower lip; *j*, coxa 4; *k*, medial base of antenna 2; *l*, apex of maxillipedal palp; *m*, inner ramus of uropod 3; *n*, *o*, part of pereopods 3, 5.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

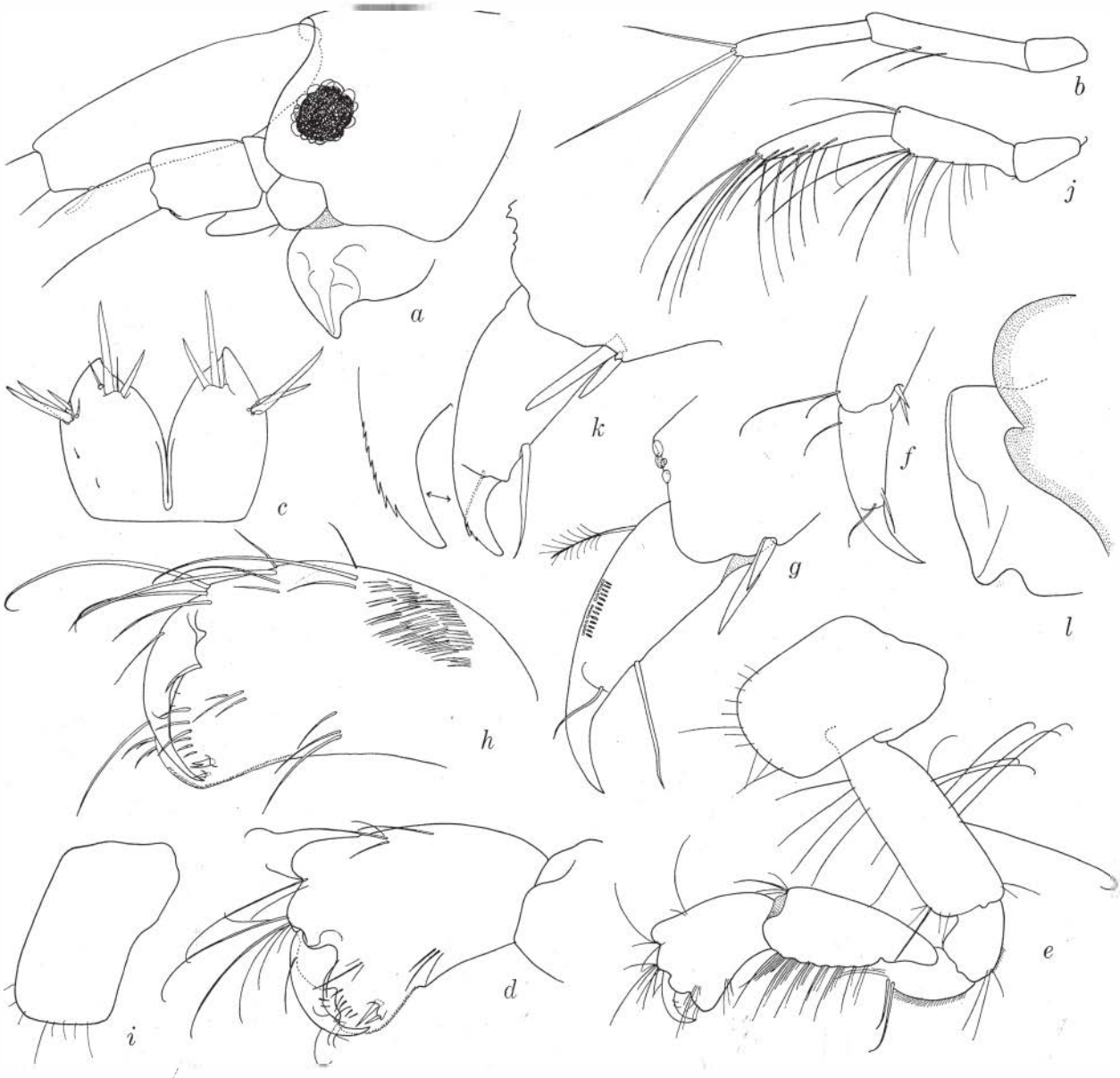


FIG. 62. *Melita awa* n. sp., holotype, male, 4.5 mm, NZOI Sta. E 987 [JLB NZ-18]: *a*, head; *b*, mandibular palp; *c*, telson; *d*, articles 6–7 of gnathopod 1, medial; *e*, gnathopod 1. Female, 4.5 mm: *f*, *g*, dactyls of pereopods 2, 4; *h*, articles 6–7 of gnathopod 1, medial; *i*, coxa 3.

Melita inaequistylis (Dana), male, 9.9 mm, NZOI Sta. E 971 [JLB NZ-6]: *j*, mandibular palp; *k*, dactyl of pereopod 5; *l*, prebuccal mass, lateral view, head lobe stippled.

(10) the symmetrical and evenly ovatorectangular article 2 of pereopods 3–5 with broadly rounded posterodistal corner;
(11) a slightly shorter article 2 of the outer ramus on uropod 3;
(12) a different telsonic configuration (*see* Fig. 62);
(13) the presence of two teeth on each dorsal side of pleonite 5;
(14) the absence of posteroventral serrations on the pleonal epimera;
(15) the broadly expanded and strongly excavate coxa 4;
(16) article 5 of pereopods 1–5 is slightly elongate compared with *M. awa*;
(17) terminal female gnathopod 2 defined by three mediofacial spines instead of two.

Melita awa resembles *M. zeylanica* Stebbing (1904) but the latter has a bulge on the dactyl but no bulge on the hand of male gnathopod 1 and has distinctly medial spines on the telsonic lobes. The Hawaiian *M. pahuwai* J. L. Barnard (1970) also has medial telsonic spines, a distinctly channelled medial face on the hand of gnathopod 2, a slight bulge on the dactyl and no bulge on the hand of male gnathopod 1, and lacks ventral serrations on the pleonal epimera.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

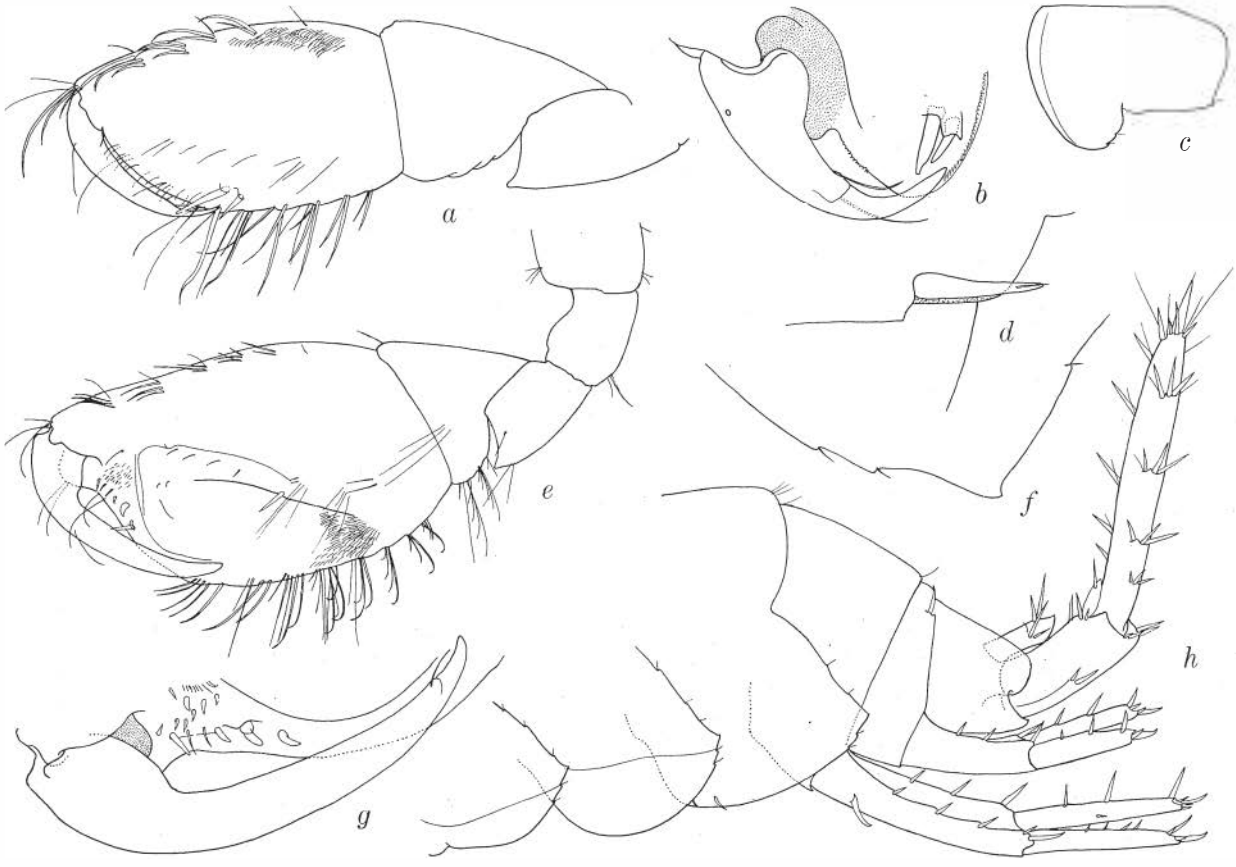


FIG. 63. *Melita awa* n. sp., female, 4.5 mm, NZOI Sta. E 987 [JLB NZ–18]: *a*, gnathopod 2, medial. Holotype, male, 9.9 mm: *b*, apex of gnathopod 1, medial, setae removed; *c*, coxa 6; *d*, spine and weak cusp of pleonite 5 (figure tipped on its side); *e*, gnathopod 2, medial; *f*, pleonal epimeron 3, enlarged; *g*, palm of gnathopod 2, medial; *h*, pleon.

MATERIAL: 30+ specimens from the type locality; Heathcote Estuary, off *Ulva*, 17 June 1953 (6).

DISTRIBUTION: Hutt Estuary; Heathcote Estuary.

Melita festiva (Chilton)

Moera festiva Chilton, 1884b: 1037–1039, pl. 46, fig. 2.
Melita festiva. Chilton, 1916b: 359–362, figs. 1–2; ?Hurley, 1957b: 6–7.

DISTRIBUTION: Auckland Harbour; Cook Strait area, 38 fm, grey mud.

EXTRINSIC DISTRIBUTION: Type locality: Sydney Harbour.

Melita inaequistylis Dana

Figures 61*i–o*, 62*j–l*, 64

Amphitoë (*Melita*) *inaequistylis* Dana, 1852: 214.
Amphitoë (*Melita*) *tenuicornis* Dana, 1852: 215.
Melita tenuicornis. Dana, 1853: 963–965, pl. 66, fig. 5; Thomson, 1880a: 5; Thomson, 1880b: 218; Thomson and Chilton, 1886: 147; Thomson, 1889: 261; ?Chilton, 1906b: 271.
Paramoera tenuicornis. Miers, 1875: 75; 1876: 127–128; Thomson, 1879a: 241, pl. 10c, fig. 5.
Melita inaequistylis. Chilton, 1909a: 630–631; Thomson, 1913: 243; ?Stephensen, 1927: 345; ?Chilton, 1911a: 564; ?Chilton, 1925a: 317.
Not *Amphitoe gayi* Nicolet, 1849: 236, pl. 2, figs. 6a, b.
Not *Melita gayi*. Schellenberg, 1931: 203; Stephensen, 1949: 22.
Not *Melita inaequistylis*. Stebbing, 1914: 366; K. H. Barnard, 1916: 191–192.
Not *Maera tenuicornis*. Walker, 1904: 273–275, pl. 5, fig. 33.
Not *Melita zeylanica* Stebbing, 1904: 22–24, pl. 5.

NOMENCLATURE: The type locality of this species is New Zealand, but it has been identified or synonymised with other species from South America, South Africa, New Zealand subantarctic islands, and Ceylon. Many of these identifications are obviously erroneous, obscure, or unjustified. The South African species as recorded by K. H. Barnard is clearly distinct from *M. inaequistylis*, so is that recorded by Schellenberg from South America. Walker and Stebbing both have distinct Ceylonese species, though Stebbing's *M. zeylanica* is very close to *M. inaequistylis*. I therefore reject Nicolet's Chilean species as a senior synonym for *M. inaequistylis* until better proof that the two are synonymous.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 64. *Melita inaequistylis* (Dana), male, NZOI Sta. E 967 [JLB NZ-2]: *a*, medial gnathopod 2, with setae not drawn to right of line; *b*, apex of medial gnathopod 1; *c*, telson; *d*, apex on outer ramus of uropod 3; *e*, lateral cephalic notch; *f*, coxa 1; *g*, one pair of teeth on pleonite 5 (has two pairs); *h*, pleon. Another male: *i*, pereopod 5. Female; *j*, apex of medial gnathopod 1; *k*, coxa 6.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Melita inaequistylis clearly lacks a dorsal tooth on pleonite 4 and bears a pair of teeth on each dorsolateral side of pleonite 5. Each pair of teeth on pleonite 5 embraces an articulate spine. Schellenberg and K. H. Barnard have considered the South American and South African populations to be extremely close to Norwegian *M. palmata* (Montagu), but *M. inaequistylis* differs from that species in the presence of a cephalic notch, a short accessory flagellum with four long plus one tiny articles, a slender female gnathopod 2, a broader inner plate of maxilla 1 with its setae confined to a distal truncation, a weakly setose inner plate of maxilla 2 with only four setae plus the absence of a tooth on pleonite 4, and the presence of two pairs of teeth on pleonite 5 (instead of one pair). *Melita inaequistylis* thus resembles only *M. oregonensis* J. L. Barnard (1954) of any other *Melita* in pleonal tooth formula.

Melita inaequistylis differs from *M. zeylanica* in the presence of an anterodistal falcate lobe on article 6 of male gnathopod 1, the poorly setose medial edge of the inner plate on maxilla 2, the distinct presence of two pairs of dorsal teeth on pleonite 5, the longer and more slender pereopods 3–5, the small article 2 on the outer ramus of uropod 3, the lack of spines on the medial edges of the telsonic lobes, and the more slender gnathopod 2 of the female. Stebbing (1904) noted a long article 1 of the first maxillary palp shown by Dana (1853) but that is erroneous; article 1 of that palp is only 40 percent as long as article 2, not 67 percent.

Melita oregonensis lacks article 2 on the outer ramus of uropod 3, has many medial spines on the telsonic lobes, and apparently the dactyl of male gnathopod 2 does not override on to the medial face of the hand.

DIAGNOSIS: Accessory flagellum about 5-articulate plus tiny sixth article; lateral cephalic lobes deep, defined by anteroventral notch below which is enlarged cheek; eyes round, dark cores surrounded by one layer of clear ommatidia; prebuccal complex grossly and conically produced forward; article 3 of mandibular palp slightly longer than article 2, densely setose terminally and on inner edge; left mandibular molar with large serrato-flabellate flake on side; inner plates of maxillae 1–2 with eight medial setae (medioterminal on maxilla 1); coxa 1 not attenuate anteriorly; hand of male gnathopod 1 without anterior hump, but with strong distal process at base of dactyl, dactyl with deep inner bulge, fitting convex transverse palm; female gnathopod 1 without hump on hand; male gnathopod 2 with unlobed articles 2–3, hand ovatorectangular, palm oblique and rounding on to posterior margin of hand, undefined, dactyl of medium length, normal, overriding palm on to medial face of hand, that face filled sparsely with setae, posterior margin of hand also setose; article 4 of gnathopod 2 with weak posterodistal extension; female gnathopod 2 normal for that sex; coxa 4 broadly expanded and posteriorly excavate; pereopodal dactyls with weak distal serrations on margin; article 2 of pereopods 3–5 evenly ovate, posterodistal corners broadly rounded; pleonal epimera 1–3 with small posteroventral tooth, and very weak ventral serrations; pleonite 4 dorsally smooth, pleonite 5 with pair of teeth and one spine on each side dorsally; telson of medium length, each apex sharp, unbifid, bearing subterminal medial group of two spines and lateral group of two spines.

REMARKS: A juvenile specimen of *M. inaequistylis*, roughly equivalent to adults of *M. awa*, has one palp of the maxilliped with simple article 3 and other palp with a process like that of adults. The inner plate of maxilla 1 has five setae, and the inner plate of maxilla 2 has two large and three small medial setae, the two large setae being paired with two of the small setae. The left mandibular molar has a flake like that of the adult and the telson and lower lip are also like those of the adult. The mandibular palp has a setal pattern similar to that of the adult but the setae are sparser. Pereopodal dactyls have two serrations and no small hump near the distal suture.

MATERIAL: NZOI Sta. E967 (50), Sta. E970 (8), Sta. E971 (11), Sta. E973 (2), Sta. E975 (2), Sta. E976 (1), Sta. E977 (5), Sta. E980 (9), Sta. E981 (2), Sta. E982 (4).

DISTRIBUTION: Throughout New Zealand; Auckland Islands, on the shore and in Carnley Harbour, under stones; ?Chatham Islands; ?Kermadec Islands; Dunedin, rock pools; Timaru; ?Taieri River, washed in from sea (possibly *M. awa*); Waiwera; Lyttelton; Kaikoura; Wellington; Gisborne; Auckland; Whangaparoa Peninsula; Leigh; Bay of Islands; Tapeka Pt.

Melita sp.

Melita palmata (Montagu), Chilton 1911a:564–565 (not Montagu).

DISTRIBUTION: Kermadec Islands.

Metaceradocus whakatane, new species

Figs. 65, 66

DIAGNOSIS OF FEMALE: Anterolateral corner of head produced as sharp tooth below deep sinus, lateral lobe shallow but sharply truncate; eyes irregularly reniform, with blood-red to bright red elongate cores irregularly surrounded by clear ommatidia in formaldehyde and alcohol; antenna 2 longer than antenna 1, flagellum of antenna 1 about 1.6 times as long as peduncle, flagellum of antenna 2 slightly longer than peduncle of antenna 2, accessory flagellum slightly longer than article 5 on peduncle of antenna 2 and bearing eight articles in adult; prebuccal mass rounded anteriorly from lateral view; mandibular palp article 3 scarcely falciform, as long as article 2, heavily spinose on two-thirds of inner margin, distal half of article 2 with about six setae, molar strongly triturative, right side with flake and medium-length seta; inner plate of maxilla 1 with two thirds of inner margin strongly setose; coxa 1 quadrate, anteroventral corner with attenuate point; gnathopods of medium stoutness

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

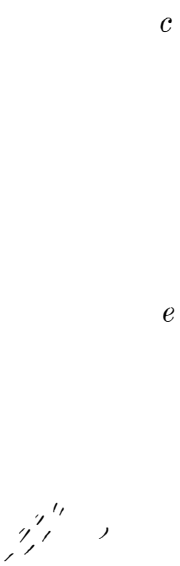


FIG. 65. *Metaceradocus whakatane* n. sp., holotype, female, 6.0 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, *b*, pereopods 4, 5; *c*, head; *d*, gnathopod 1; *e*, *f*, gnathopod 2; *g*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

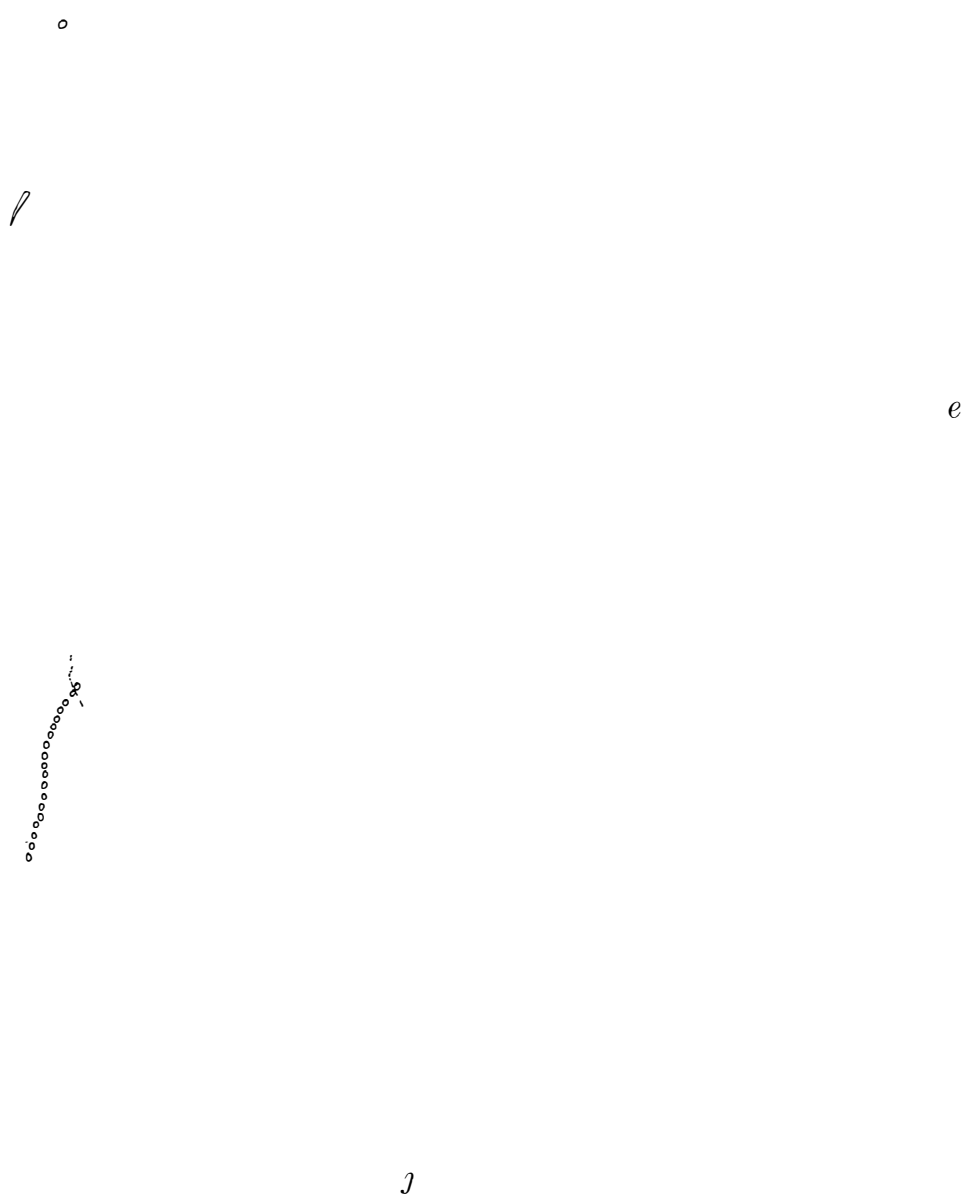


FIG. 66. *Metaceradocus whakatane* n. sp., holotype, female, 6.0 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, abnormal telson; *b*, top of pleonite 4; *c*, inner plate of maxilla 1; *d*, mandibular palp; *e*, uropod 3; *f*, *g*, pereopods 1, 3; *h*, outline of maxilla 2; *i*, dactyl of pereopod 4; *j*, lateral enlargement of pleonite 4; *k*, coxa 4; *l*, lower lip. Juvenile, 3.7 mm: *m*, half of normal telson.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

for genus, fifth articles shorter than sixth, palms slightly convex, well marked, with about three and seven spines near defining areas on gnathopods 1 and 2, respectively; locking spines of pereopods nearly simple, one spine with slightly frilled terminal bulbosity, dactyl minutely pectinate on inner edge and bearing stout seta; article 2 of pereopods 3–5 slender; uropods not strongly disproportional in contrast to type species of genus, outer rami of uropods 1–2 slightly shorter than inner rami, all rami heavily spinose, uropod 1 peduncle with large distolateral spine; uropod 3 relatively short, outer ramus slightly longer than inner, with short article 2; telson short, lobes laterally, apically and medially spinose, apically bifid; pleonites 1–5 extensively serrate dorsally and laterally almost to juncture of epimera on pleonites 1–3, dorsally with regular pattern of teeth, pleonites 4–5 with several spines; pleonal epimera 1–2 each with one posteromedial serration and thin strong posteroventral tooth, epimeron 3 with about six posterior teeth, one forming posteroventral corner, ventral margins of epimera spinose.

HOLOTYPE: NZOI, No. 93, female, 6.7 mm. Telson in poor condition.

TYPE LOCALITY: NZOI Sta. E967, Eve Bay, Wellington, New Zealand, intertidal wash of algae, 5 November 1967.

RELATIONSHIP: *Metaceradocus whakatane* differs from the type species of the genus, *M. perdentatus* Chevreux (1925) from Senegal, in the presence of a cephalic tooth and sinus, the elongation of the accessory flagellum, the presumed presence of a second article on the outer ramus of uropod 3 (Chevreux's figure possibly unclear), the narrower article 2 of pereopods 3–5, the relatively short uropod 3, longer uropod 2, presence of only one serration on pleonal epimeron 2, the weaker falcation of mandibular palp article 3, the stronger setation on the inner plate of maxilla 1, the stouter female gnathopods with shorter fifth articles and stronger palms with markedly large spines, and the sharp point on coxa 1.

The New Zealand species differs from Californian *M. occidentalis* J. L. Barnard (1959) in the cephalic sinus and tooth, the narrower rami of uropod 3 having a thicker cross section, the presence of article 2 on the outer ramus of uropod 3, the sharp point on coxa 1, the deeply serrate posterior margin of epimeron 3, the short article 5 on female gnathopod 2, less disproportion in the lengths of articles 4–5 on pereopods 1–2, the longer palm and hand of female gnathopod 1, the more convex and setose margin on the inner plate of maxilla 1, and the near equality in width of plates on maxilla 2 (*see* Fig. 66*h* for maxilla 2 of *M. whakatane*).

Australian *Paraceradocus micramphopus* Stebbing (1910) belongs with *Metaceradocus* because the type and only other species of *Paraceradocus* Stebbing differs from *Metaceradocus* generically in the presence of only one distal setule on the inner plate of maxilla 1, the flabellate rami of uropod 3, the absence of dorsal serrations and spines on the pleon, the very stout antenna 2 with short flagellum, and the enlarged male gnathopod 2. *Metaceradocus whakatane* differs from *M. micramphopus* in the narrower article 2 of pereopods 3–5, the shorter dactyls of pereopods 1–5, the longer and more excavate palm of female gnathopod 1, the stouter female gnathopod 2 with longer palm, and apparently in the presence of a cephalic tooth and sinus.

Metaceradocus Chevreux differs from *Ceradocus* Costa in the absence of a tooth on article 1 of the mandibular palp, in the long article 3 of the mandibular palp, the small gnathopods of both sexes, and in the presence of small articulate dorsal spines on pleonites 4–5 in addition to the fixed teeth and serrations.

MATERIAL: NZOI Sta. E966 (1), Sta. E967 (3), Sta. E970 (11), Sta. E971 (1), Sta. E975 (1), Sta. E977 (40), Sta. E982 (1).

DISTRIBUTION: Kaikoura; Wellington; Gisborne; Leigh.

Parapherusa crassipes (Haswell)

Fig. 67*a–g*

Harmonia crassipes (and *Harmomia crassipes*) Haswell, 1880b: 330–331, 349, pl. 19, fig. 3; Chilton, 1883: 82–83, pl. 2, fig. 5; 1884b: 1044; Haswell, 1885: 106–107, pl. 16, fig. 9; Thomson and Chilton, 1886: 147; ?Thomson, 1889: 261.
Parapherusa crassipes. Chilton, 1909a: 630; 1916c: 201–206, pls. 8–10; 1920a: 6; Stephensen, 1949: 18–21, figs. 7–8.

Chilton and Stephensen have made this species well known and proved that it occurs circumferentially in the antiboreal belt. A few more morphological notes can be added: the pleonal epimera of the New Zealand population have posteroventral corners as described by Stephensen from his Tristanean material and the lateral surface of each has an oblique ridge ending at the middle of the ventral margin and marked with a spine; the head has a distinct anterolateral notch below the eye as in species of *Elasmopus;* spines on the inner and outer rami of uropod 3 appear similar to those of Stephensen (*see* Fig. 67*b, d*); articles 4–5 of pereopods 4–5 have lateral surficial spinules; the inner plate of maxilla 1 has the shape shown by Stephensen and the eyes are large; maxilla 2 also fits Stephensen's suggestion; the interramal tooth on uropod 1 of Wellington material is intermediate in length between those shown by Stephensen and Chilton; the skin has a very fine sandpaper texture; the outer plate of maxilla 1 bears 11 spines; the mandibular molar is large, quadrocuboidal, strongly triturative, and bears a seta; a lacinia mobilis occurs on both mandibles.

Parapherusa clearly has characters relating it to the genera *Elasmopus*, *Ceradocus*, and *Maera*. The maxillae resemble those of *Ceradocus*, the mandibular palp is falcate like that of *Elasmopus* but the accessory flagellum is long like *Maera*, while uropod 3 could be derived from that of an *Elasmopus* with short broad rami.

MATERIAL: NZOI Sta. E966 (14), Sta. E967 (17), Sta. E969 (79), Sta. E970 (87), Sta. E971 (17), Sta. E973 (1), Sta. E975 (3), Sta. E977 (51), Sta. E979 (1), Sta. E980 (1).

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

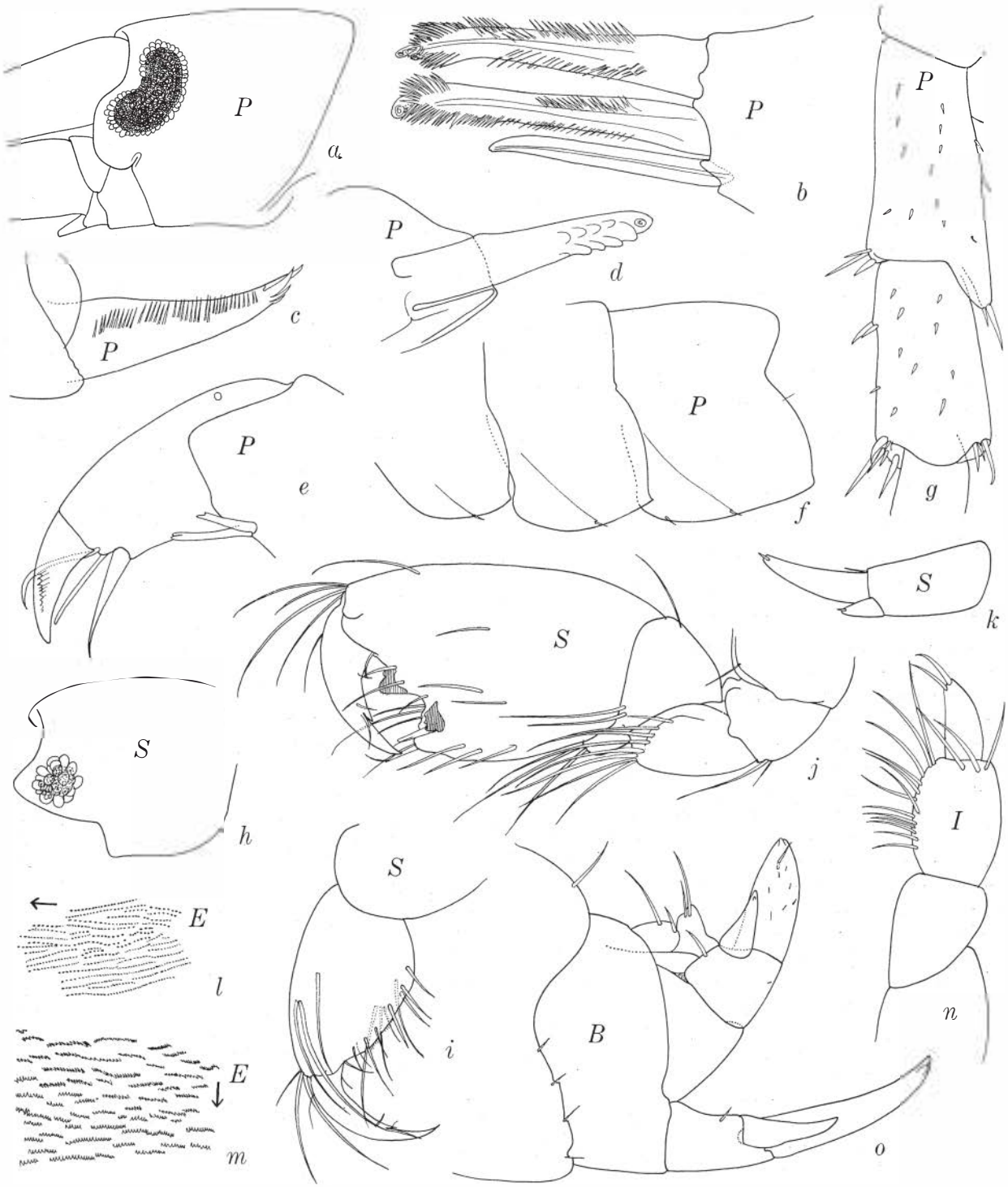


FIG. 67. *Parapherusa crassipes* (Haswell) (P), male, 6.0 mm, NZOI Sta. R 967 [JLB NZ-2]: *a*, head; *b*, apex of inner ramus on uropod 3; *c*, palp article 4 of maxilliped; *d*, apex of outer ramus on uropod 3; *e*, dactyl of pereopod 2; *f*, pleonal epimera 1–3; *g*, articles 4–5 of pereopod 5.

Photis sp. (S), juvenile, 1.6 mm, NZOI Sta. E 970 [JLB NZ-5]: *h*, head; *i*, *j*, apices of gnathopods 1, 2; *k*, uropod 3.

Eusiroides monoculoides (Haswell) (E), male, 9.5 mm, NZOI Sta. E 970 [JLB NZ-5]: *l*, skin texture of body, epimera and antennae; *m*, skin texture of articles 4–6 of pereopods 3–5, arrows point dorsally.

Iphinotus typicus (Thomson) (I), male, 2.5 mm, NZOI Sta. E 982 [JLB NZ-17]: *n*, maxillipedal palp.

Bircenna fulva Chilton (B), male, 2.5 mm, NZOI Sta. E 969 [JLB NZ-4]: *o*, urosome and pleonal epimeron 3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

DISTRIBUTION: Throughout New Zealand; Antipodes Island; Dunedin; Lyttelton; Timaru; Kaikoura; Wellington; Whangaparaoa Peninsula; Leigh; ?Bay of Islands.

EXTRINSIC DISTRIBUTION: New South Wales; Victoria; Tristan da Cunha.

ISAEIDAE (= AORIDAE = PHOTIDAE)*

Aora maculata (Thomson)

Figs. 10*f-h*

Microdeutopus maculatus Thomson, 1879b: 331, pl. 16, figs. 5–8.
Microdentopus (sic) *maculatus*. Thomson, 1880b: 217–218, pl. 8, fig. 7; Chilton, 1882a: 173–174, pl. 8, fig. 3.
Aora typica. Thomson, 1879b: 331; 1880b: 216–217; Thomson and Chilton, 1886: 147; Thomson, 1889: 261–262; ?Chilton, 1909a: 645–646; ?Chilton, 1911a: 565; Thomson, 1913: 245; ?Stephensen, 1927: 352; ?Stephensen, 1938: 261–262.

Before 1906 various species of *Aora* were distinguished from Chile, the north Atlantic Ocean, New Zealand and two species from Kerguelen. In 1906 Stebbing synonymised all of them but continued to note the differences among the various forms in different geographic areas. These differences seem sufficiently consistent to designate the various forms as geographic races, but the presence of two forms (races) on Kerguelen Island and two on Tristan da Cunha suggests that the distinguishing characters signify full speciation analogous to the two species of the cognate genus *Aoroides* in the Hawaiian Islands. The names *Aora maculata* (Thomson), *A. kergueleni* Stebbing, *A. trichobostrychus*, and *A. gracilis* (Bate) are revived and added to *A. typica* Krøyer and *A. atlantidea* Reid. The formae *Aora typica* f. *gibbula* K. H. Barnard (1932) and *A. t.* f. *anomala* Schellenberg (1926 and 1931) are raised to specific rank. Possibly the two forms recorded by Stephensen (1949) deserve nomenclatural distinction from *A. typica*, as there may be differences besides those recognised by Stephensen in the "*typica*" and "*gracilis*" forms.

Aora maculata differs from north Atlantic *A. gracilis* in the unmodified ovate article 2 of male pereopod 5; from *A. kergueleni* in the very short interramal tooth on uropod 2; from Kerguelenian *A. trichobostrychus* in the absence of a posteroventral setal brush on article 2 of male gnathopod 1 (and *A. trichobostrychus* possibly lacks interramal teeth on both uropods 1–2, *see* Stebbing 1888); from Chilean *A. typica* in the absence of a triangular process on article 2 of male gnathopod 1; from west African *A. atlantidea* in the absence of a strong anterior setal brush on the hand of male gnathopod 1; from South African *A. gibbula* in the unexpanded base of article 2 on male gnathopod 1 and the normally long article 6; from South African *A. anomala* in the absence of a small process on article 5 of male gnathopod 1 and the normally slender and elongate article 6. *Microdeuteropus tenuipes* and *M. mortoni* Haswell (1880b) from Australia are insufficiently described, but are undoubtedly members of *Aora* and are probably synonymous.

Males of *A. maculata* pass through stages resembling those of other species of *Aora*, but the terminal male (6.4 mm) has an enormous gnathopod 1 fully as long as the body (incorporating coxa 1 in length of gnathopod 1), coxa 1 becomes elongate as in *Aoroides columbiae* Walker, with the sharp anteroventral corner eventually rolling inward and a pellucid area developing anteroventrally to the insertion of article 2; the palmar spine on gnathopod 1 of juvenile males is lost; and the brush of setae on article 4 is placed similarly to that of *A. gracilis* in contrast to the Kerguelen species. The interramal process of uropod 2 is as long as the small spines on the margins of the rami and compares favourably with that on *A. gracilis* (material from Ireland examined).

Pleonal epimera 1–3 have a weak facial ridge extending obliquely towards the small tooth and notch at the posteroventral corners; Sars did not show ridges or sharp teeth, but the Irish material has them in close similarity to *A. maculata* and the Kerguelenian species. The outer ramus of uropod 3 has a minute barrel-shaped article 2 and so does *A. gracilis* according to the Irish material. The eyes have darkly pigmented cores. The mandibular palp resembles that of *A. trichobostrychus*, but the spine-setae on the dominant margin occur only on the distal half and the pair of setae on the opposite margin lie distally as in the palp of *A. kergueleni*. The lower lip is like that shown by Sars (1895) for *A. gracilis*; the telson is broad as in *A. gracilis* and *A. kergueleni*; gnathopod 2 has the proportions shown for *A. gracilis* but the palm is more tumid; and the maxillipeds of males have a massive radial brush of setae on their ventral surface.

MATERIAL: NZOI Sta. E966 (21), Sta. E967 (270), Sta. E969 (11), Sta. E970 (35), Sta. E971 (131), Sta. E972 (38), Sta. E973 (19), Sta. E975 (187), Sta. E976 (83), Sta. E977 (131), Sta. E978 (81), Sta. E979 (5), Sta. E980 (25), Sta. E981 (67), Sta. E982 (54).

DISTRIBUTION: Throughout New Zealand; ?Campbell Island, ?Stewart Island; Dunedin; Sumner; Timaru; Lyttelton; Kaikoura; Wellington; Gisborne; Auckland; Whangaparaoa Peninsula; Leigh; Bay of Islands; Tapeka Pt.; ?Kermadec Islands.

Aora sp.

Figs. 10*i-j*

Males differ from similar-sized males of *A. maculata* in maintaining their juvenoid condition, with stoutening of the hand of gnathopod 1, retention of the palmar spine, shortness of the process on article 4, development of an anterodistal, lateral lobe on article 2, and

*Now considered as synonymous with Corophiidae

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

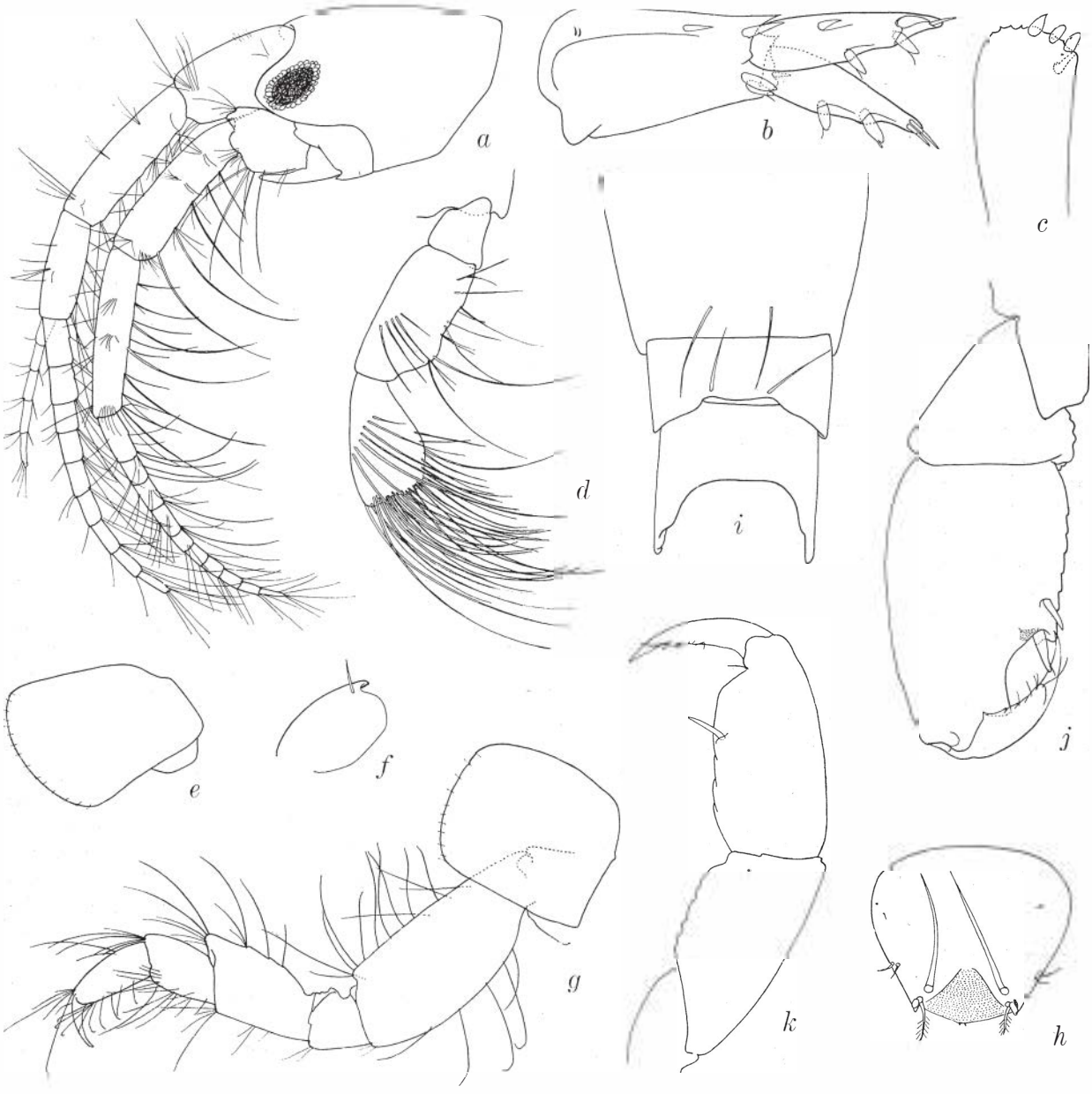


FIG. 68. *Gammaropsis tawahi* n. sp., holotype, male, 3.5 mm, NZOI Sta. E 969 [JLB NZ-4]: *a*, head; *b*, uropod 3; *c*, inner plate of maxilliped; *d*, mandibular palp; *e*, coxa 1; *f*, inner plate of maxilla 1; *g*, pereopod 1; *h*, telson. Male, 4.0 mm: *i*, dorsal urosome. Female, 3.8 mm: *j*, *k*, gnathopods 2, 1, medial, setae removed.

maintaining the shortness of article 3. In addition gnathopod 1 bears a small conical process on the anteromedial margin of article 2, a rudiment similar to that found in *A. typica* of South America and *Aora* sp. of Tristan da Cunha. Coxa 1 also is maintained in the female-juvenoid condition.

MATERIAL: NZOI Sta. E967 (1), Sta. E970 (3), Sta. E979 (108), Sta. E980 (2).

DISTRIBUTION: Kaikoura; Wellington; Whangaparaoa Peninsula.

Gammaropsis chiltoni (Thomson)

Maera Chiltoni Thomson, 1897: 447–449, pl. 10, figs. 1–5.
not *Eurystheus longicornis* Walker, 1907: 35–37, pl. 12, fig. 21.
Eurystheus chiltoni. Chilton, 1920a, 7.

That Walker's Antarctic species does not belong with *G. chiltoni*, despite Chilton's (1920a) belief, is seen in the proportions and characters of the telson, uropod 2, uropod 3, and gnathopod 1.

DISTRIBUTION: Bay of Islands and Mokohinau Island, 8–25 fm, latter extreme on seaweed.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Gammaropsis crassipes (Haswell)

Moera crassipes Haswell, 1881: 103–104, pl. 7, fig. 2.
Gammaropsis crassipes. Stebbing, 1899c: 350.
Eurystheus crassipes Chilton, 1920a: 7.

Specimens studied by Chilton (1920a) from Wellington and Auckland Harbours are characterised by the large size and breadth of pereopod 4. *See* note with *Ventojassa frequens*.

DISTRIBUTION: Wellington to Auckland.

EXTRINSIC DISTRIBUTION; Australia: Port Jackson (type locality) and Jervis Bay.

Gammaropsis haswelli (Thomson)

Maera Haswelli Thomson, 1897: 449–451, pl. 10, figs. 6–10.
Eurystheus haswelli. Chilton, 1920a: 6–7.

DISTRIBUTION: Bay of Islands (8 fm) to Stewart Island; Chatham Islands.

EXTRINSIC DISTRIBUTION: New South Wales (Chilton, 1920a).

Gammaropsis longimana (Chilton)

Paranaenia longimanus Chilton, 1884a: 261–262, pl. 20, fig. 2.
Paranaenia longimana. Thomson and Chilton, 1886: 144.
Eurystheus longimanus. Stebbing, 1906: 616.

DISTRIBUTION: Lyttelton Harbour.

Gammaropsis tawahi, new species

Figs. 68, 69

DIAGNOSIS: Lateral cephalic lobe evenly ovatoconical, eye also ovatoconical and nearly horizontally placed, with dark core; antennae projecting subequally, short, flagellum of antenna 1 shorter than peduncle but accessory flagellum nearly half as long as primary; gland cone long; epistome with long sharp anterior lobe; right mandibular molar with heavily developed proximal flake and long seta, left molar with short seta only, palp of medium stoutness (*see* Fig. 68*d*); mandibular lobes of lower lip of medium length and pointed; inner plate of maxilla 1 with distal hook and setule; inner plate of maxilliped with three simple distal spines and one locking spine; gnathopod 1 heavily setose posteriorly, article 5 with truncate posterior lobe, article 5 nearly as long as 6, latter with excavate palm in male, unexcavate in female, palm defined by strong spine, dactyl strongly overlapping palm; gnathopod 2 with heavily setose margins on article 2 (anterior), articles 5 and 6 (anterior and posterior), article 2 with mammilliform anterodistal lobe, article 5 of medium length, about half as long as 6, lateral in male with oblique, short palm bearing anterior tooth near hinge of dactyl, followed by excavation and strong defining tooth, female gnathopod 2 with weaker palmar teeth but bearing two strong spines near defining corner, not present in male, dactyl fitting palm or scarcely so; all pereopods ordinary and slender, dactyls simple and bearing only one lateral setule; uropod 1 with long sharp interramal tooth on peduncle, tooth on uropod 2 very short; peduncle of uropod 3 elongate, rami subequal to peduncle, bearing stout spines, outer with two pairs of spines and one terminal seta, inner with two spines and two terminal setae, setae short and stout; telson with medium dorsal excavation, two posterolateral knobs, two long dorsal setae; pleonal epimera 1–3 each with posteroventral notch and round tooth; urosomites 1 and 2 untoothed dorsally, 1 bearing straight dorsal margin, 2 bearing slightly excavate margin, each segment with two dorsal setae.

HOLOTYPE: NZOI, No. 94, male, 3.5 mm.

TYPE LOCALITY: NZOI Sta. E969 Kaikoura, New Zealand, intertidal wash of kelp holdfasts and various red algae, 22 January1968.

RELATIONSHIP: This species appears to be a cognate of *Gammaropsis crassipes* (Haswell) from Australia and reported by Chilton (1920a) from Wellington and Auckland Harbours. The female gnathopods match those shown by Haswell for the Australian species, but pereopods 3–4 are very slender whereas *G. crassipes* has pereopod 5 especially broadened though not strongly. Chilton (1920a) mentions that Wellington and Auckland materials also have the enlarged pereopod 4. Male gnathopod 2 is very distinct from that of the female.

A weak resemblance to *G. longimanus* (Chilton) also occurs in *G. tawahi* through the setosity of male gnathopod 1 with its slightly excavate palm, but article 5 of *G. longimanus* is much longer than *G. tawahi*. Male gnathopod 2 of *G. longimanus* also has numerous setae, but they appear not to be as long as those of *G. tawahi* and the palm is ordinarily tumid with the dactyl overriding on to the face of the palm.

MATERIAL: NZOI Sta. E966 (11), Sta. E969 (50), Sta. E970 (11), Sta. E973 (3).

DISTRIBUTION: ?Dunedin; Kaikoura; Wellington.

Gammaropsis typica (Chilton)

Figs. 70, 71

Paranaenia typica Chilton, 1884a, 259–260, pl. 19, fig. 1; Thomson and Chilton, 1886: 144.
Paranaenia dentifera. Chilton, 1884a: 260–261, pl. 21, fig. 2 (not Haswell, 1880b); Thomson and Chilton, 1886: 144.
Moera dentifera. Chilton, 1884b: 1044.
?Moera dentifera Haswell, 1880b: 332, pl. 20, fig. 4.
Gammaropsis dentifera. Stebbing, 1899c: 350.
?Eurystheus dentifer. Schellenberg, 1931: 243–245, fig. 125.

Stebbing (1906) synonymised Chilton's *Paranaenia typica* with Haswell's *Moera dentifera*, but whether Stebbing was able to compare Australian and New

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

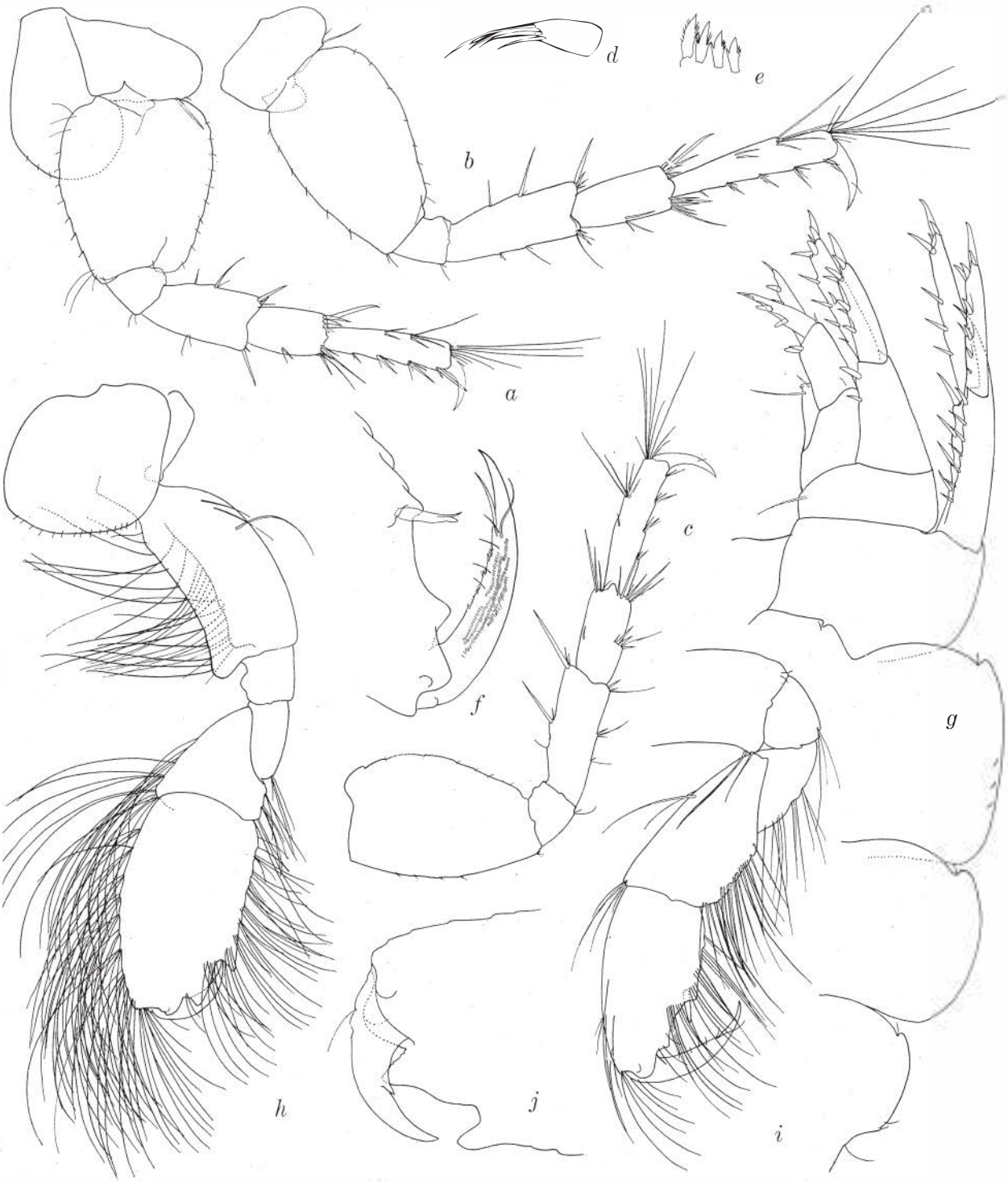


FIG. 69. *Gammaropsis tawahi* n. sp., holotype, male, 3.5 mm, NZOI Sta. E 969 [JLB NZ-4]: *a*, *b*, *c*, pereopods 3, 4, 5; *d*, maxilliped palp article 4; *e*, spines on inner plate of maxilliped; *f*, apex of gnathopod 1, medial; *g*, pleon; *h*, gnathopod 2; *i*, gnathopod 1; *j*, palm of gnathopod 2, medial.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

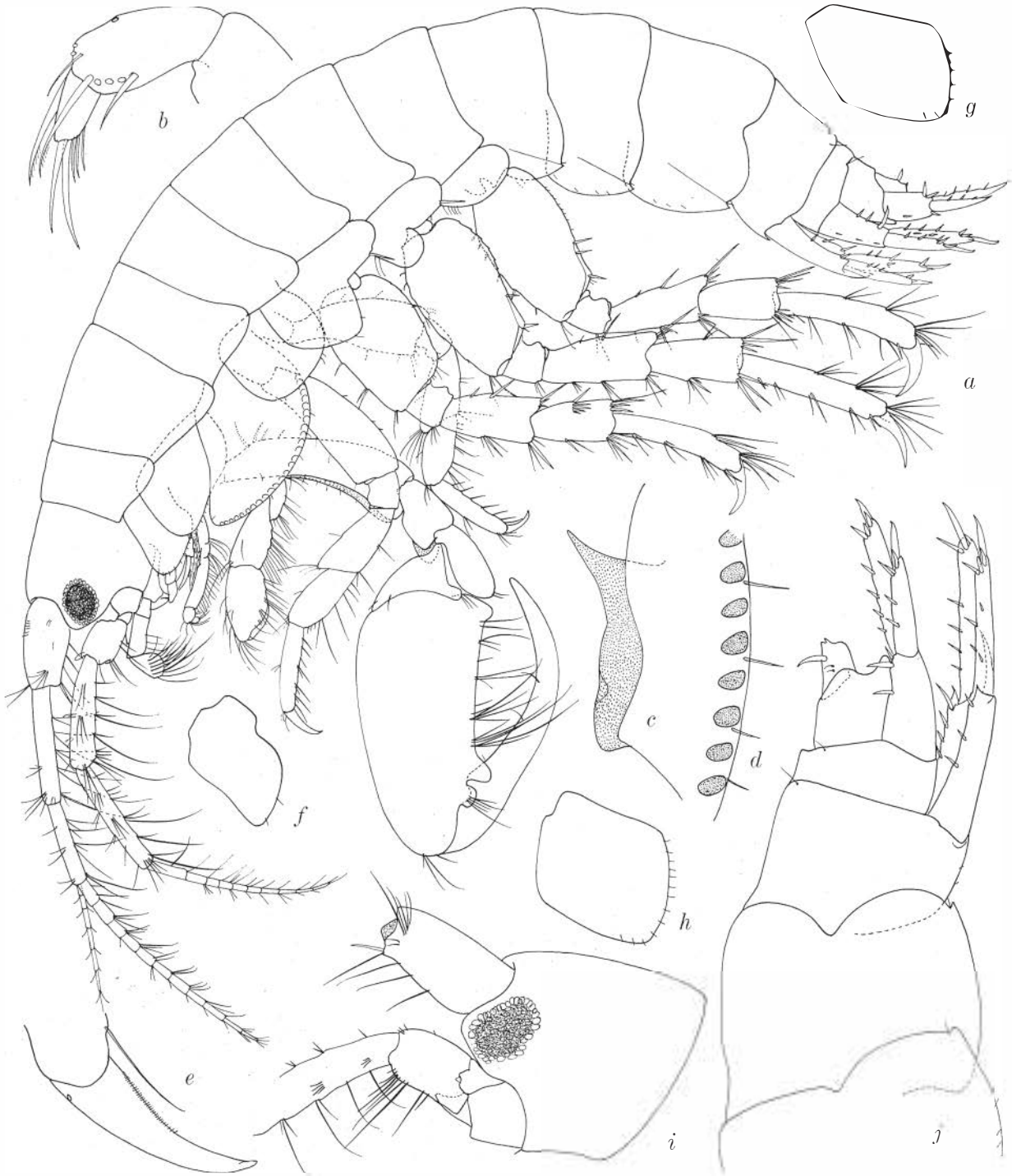


FIG. 70. *Gammaropsis typica* (Chilton) (cf. *dentifer* Haswell), male, 4.1 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, body; *b*, articles 3–4 of maxillipedal palp; *c*, epistome, lateral, shaded; *d*, coxa 3 and stridulating pads; *e*, dactyl of pereopod 1 (pectinae not occurring on pereopods 3–5). Female, 3.5 mm: *f*, *g*, *h*, coxae 1, 2, 3. Male, 4.3 mm: *i*, head; *j*, pleonites 2–6, less uropods 1–3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

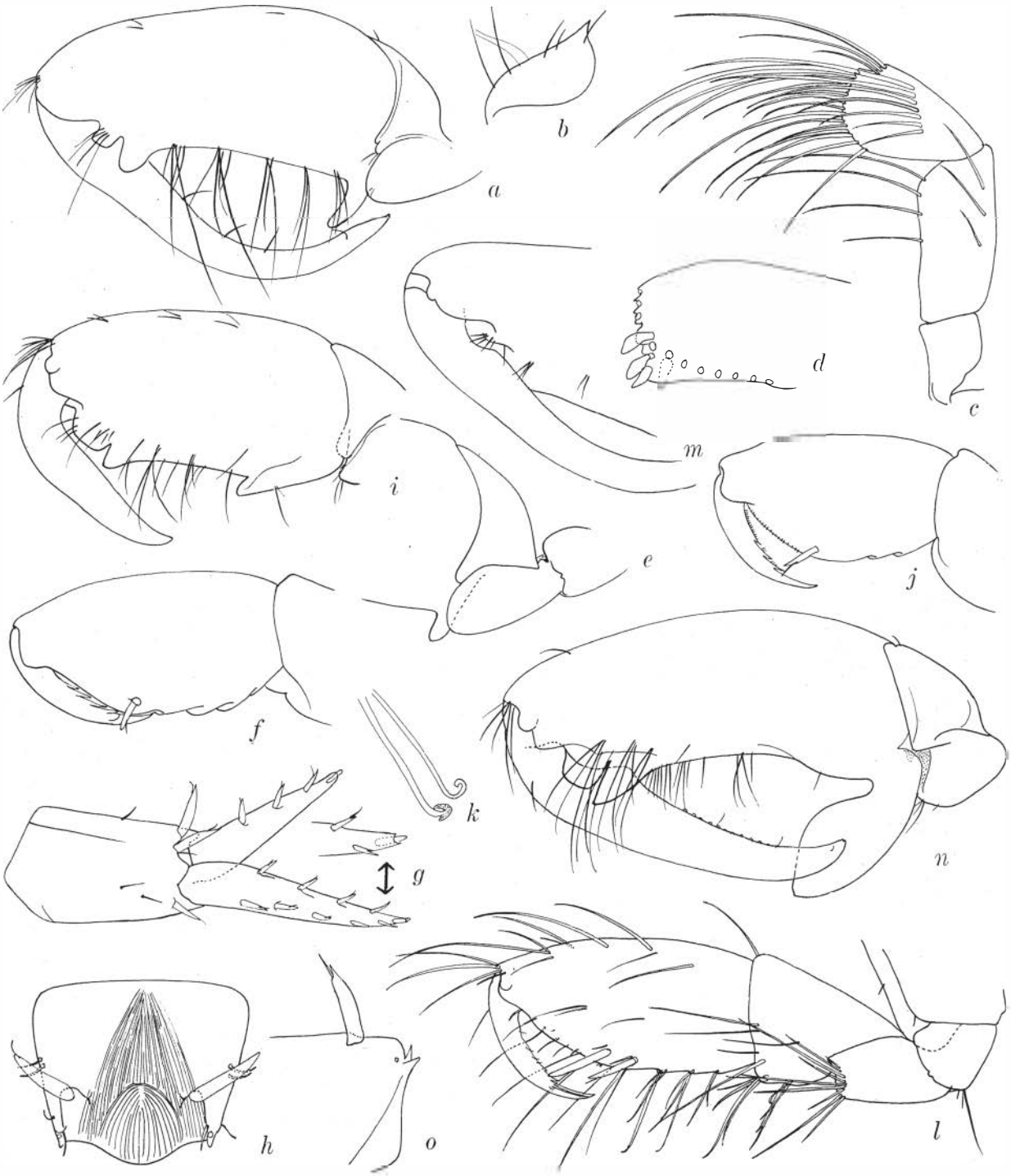


FIG. 71. *Gammaropsis typica* (Chilton) (cf. *dentifer* Haswell), male, 4.1 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, lateral gnathopod 2. Male, 4.3 mm: *b*, inner plate of maxilla 1; *c*, mandibular palp; *d*, inner plate of maxilliped; *e*, articles 2–5 of gnathopod 2; *f*, gnathopod 1, medial, setae removed; *g*, uropod 3; *h*, telson. Male, 3.4 mm: *i*, medial gnathopod 2. Female, 3.5 mm: *j*, medial gnathopod 1; *k*, curl-tipped setae of brood lamellae; *l*, medial gnathopod 2. Male, 4.1 mm: *m*, apex of medial gnathopod 2. Male, 4.2 mm: *n*, gnathopod 2; *o*, side of telson.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Zealand specimens together is unknown. Apparently, from his description in 1906, Stebbing must have seen specimens but their locality is uncertain.

Schellenberg's few figures and scant remarks on South American specimens indicate that uropod 3 has a longer peduncle, gnathopod 1 has a strongly expanded article 6, and gnathopod 1 in immature males has distal serrations on the palm unlike the New Zealand specimens. The sequence of maturation in male gnathopod 2 appears different to that in specimens at hand from New Zealand, but Schellenberg's figure of a well developed male corresponds roughly to Fig. 71*i*, though the South American dactyl is more strongly curved, the hand has a more evenly ovate form basally, and the distal palmar teeth are not as prominent as in New Zealand specimens.

Pereonite 2 of the New Zealand male is elongate, apparently in compensation for the anteriorly elongate coxa 3. Ratios of the head and pereonites are roughly as follows: head 70, pereonites 1 = 30, 2 = 59, 3 = 40, 4 = 48, 5 = 57, 6 = 63, 7 = 57.

The antennae are subequal in length and equal the length of the head and the first 5 pereonites together. The left mandibular molar has a flake and very small seta. Maxilla 2 is stout and the lower lip is normal for the genus.

MATERIAL: NZOI Sta. E966 (67), Sta. E967 (275), Sta. E969 (51), Sta. E970 (211), Sta. E971 (234), Sta. E973 (81), Sta. E974 (1), Sta. E975 (50), Sta. E977 (65), Sta. E978 (2), Sta. E979 (129), Sta. E980 (6), Sta. E982 (129).

DISTRIBUTION: Dunedin; Lyttelton Harbour; Kaikoura; Wellington; Gisborne; Whangaparaoa Peninsula; Leigh.

Gammaropsis thomsoni Stebbing

Gammaropsis thomsoni Stebbing, 1888: 1103–1107, pl. 115.
Eurystheus thomsoni. Stebbing, 1906: 613–614; Chilton, 1921b: 81–83, figs. 13a–c; Chilton, 1923a: 92–93; ?Hurley, 1957b: 7.

DISTRIBUTION: Cook Strait area, 50–200 fm, mud, gravel; type locality is east of New Zealand, 2000 m (1100 fm), obviously erroneous.

EXTRINSIC DISTRIBUTION: Southern Australia; Botany Bay; Wata Mooli.

Gammaropsis sp.

?Eurystheus afer. Chilton, 1912a: 510–511, pl. 2, figs. 30–34 (not Stebbing, 1888).
Eurystheus dentatus. Chilton, 1920a: 7–8 (not Chevreux, 1900).

The New Zealand material of Chilton (1920a) is removed from the synonymy of *E. dentatus* (Chevreux) because the expanded fourth articles of pereopods 3–5 do not fit the type drawings from the Azores, nor has male gnathopod 2 been shown yet to fit the type. Chilton's (1912a) record of this species from Antarctica is also doubtfully identical with the New Zealand population and already was shown by Chilton (1920a) to be distinct from *E. afer*.

DISTRIBUTION: Cook Strait; Cape Saunders, Stewart Island.

EXTRINSIC DISTRIBUTION: Kermadec Islands (Chilton, 1920a); ?Gough Island, 100 fm.

Haplocheira barbimana (Thomson)

Gammarus barbimanus Thomson, 1879a: 241–242, pl. 10D, fig. 1.
Haplocheira typica Haswell, 1880a: 273, pl. 11, fig. 2; 1885: 106, pl. 16, figs. 4–8.
Corophium barbimanum. Thomson and Chilton, 1886: 143 (not including *C. lendenfeldi*).
Haplocheira barbimana. Stebbing, 1888: 1177; Walker, 1907: 35; Chilton, 1912: 510; Thomson, 1913: 245; Schellenberg, 1926: 375.
Haplocheira plumosa Stebbing, 1888: 1172–1177, pl. 126.
Haplocheira barbimanus. K. H. Barnard, 1930: 391; Schellenberg, 1931: 232; K. H. Barnard, 1932: 235.

DISTRIBUTION: Auckland Islands, 19 m, sand algae; Dunedin coast. Type locality unknown.

EXTRINSIC DISTRIBUTION: South-eastern Australia; Kerguelen (222 m); antarctic shelf, 0–457 m; South Georgia, 27–155 m; South Orkneys; Falklands.

Haplocheira lendenfeldi Chilton

Corophium lendenfeldi Chilton, 1884a: 262–263, pl. 20, fig. 1.

K. H. Barnard (1932, p. 237) suggests that this species, originally synonymised with *Haplocheira barbimana* by Thomson and Chilton (1886), may remain distinct. There may be differences between the species in the shape of article 2 on pereopods 3–5 and in the sharpness or bluntness of the lateral cephalic lobe. *Haplocheira barbimana* appears to have a sharp lobe and *H. lendenfeldi* a blunt lobe according to the literature.

DISTRIBUTION: Lyttelton Harbour.

Lembos sp. No. 1

?Autonoe kergueleni Stebbing, 1888: 1087–1091, pl. 111.
Autonoe kergueleni Stebbing. Thomson, 1902: 464.
Lembos kergueleni (Stebbing). Chilton, 1909a: 646 (specimen from Snares Island only).

Possibly Thomson and Chilton have identified this species correctly, but part of Chilton's material is obviously not *L. kergueleni*. Possibly this and other members of "*Lembos*" refer to females of *Aora*.

DISTRIBUTION: Bay of Islands; Snares Island.

Lembos sp. No. 2

Lembos kergueleni. Chilton, 1909a: 646–647, fig. 12 (specimen from Campbell Island only) (not Stebbing, 1888).

Male gnathopods 1 and 2 could not conceivably develop from the *Lembos kergueleni* morphotype.

DISTRIBUTION: Perseverance Harbour, Campbell Island, 8 fm.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Lembos sp. No. 3

Lembos kergueleni. Chilton, 1909a: 647 (specimen from Macquarie Island only).

This specimen is removed from the *L. kergueleni* concept only as a precautionary measure to alert students to the possibility that another species exists.

DISTRIBUTION: Macquarie Island.

Lembos sp. No. 4

not *Autonoe philacantha* Stebbing, 1888: 1082–1087, pl. 110.
Lembos philacantha. Chilton, 1921a: 224.
Lembos philacanthus. Chilton, 1921b: 77–79, figs. 11 a–c (in part, not the figures).

Chilton's (1921b) figures of material from Tasmania differ from Stebbing's figures of type material from Bass Strait in the general anachronistic development of male gnathopod 1; neither could be the juvenile of the other. Stebbing's species has the palm deeply excavate and oblique, and the hand broadened and short, with article 5 elongate (but broad) whereas Chilton's material has a normal *Lembos* gnathopod 1 with transverse palm weakly excavate with shortened article 5 plus a small tooth on article 4. Gnathopod 2 of Chilton's male has a slightly excavate, semilunar transverse palm, while Stebbing's has the normally oblique, slightly convex palm.

If doubt is cast on Chilton's identification of *Lembos philacantha* from Tasmania, then doubt must be cast on his identification of the species from the Chatham Islands (mentioned in 1921a) and the general occurrence of the species in New Zealand (1921b). These occurrences of the species must be rejected from a New Zealand species list until better evidence comes forth.

Chilton's (1921b) figures look more like those of *Lembos kergueleni* (Stebbing 1888) than of *L. philacantha* and may have an affinity to that species.

DISTRIBUTION: Chatham Islands. "New Zealand".

DISTRIBUTION OF *L. philacantha*: Type locality: Bass Strait, 71 m; Tasmania.

Microdeutopus apopo, new species

Fig. 72

DIAGNOSIS OF MALE: Eyes small, round, dark core surrounded by several clear ommatidia; flagellum of antenna 2 shorter than article 5 of peduncle, bearing three articles, first elongage, third vestigial; lateral cephalic lobes broad and head not anteroventrally excavate; upper lip evenly rounded below; article 2 of mandibular palp shorter than article 3, latter with apical cusp, spine row of right mandible with only one spine; article 3 of maxillipedal palp with hooked process distally, dactyl very long; coxa 1 evenly rectangular and not sharply produced anteroventrally; article 5 of gnathopod 4 bearing two posterodistal teeth, article 6 with medium-sized posterior adze-shaped process in middle of straight margin and small proximal tubercle, article 2 with anterior hollow marked distolaterally with rounded lobe, mediodistally by nipple-like hump; gnathopod 2 thin; epimera 1–3 with notch and tooth at posteroventral corner; uropod 1 with long interramal process, uropod 2 without process; rami of uropod 3 shorter than peduncle, both uniarticulate and bearing long thick apical setae, peduncle broad; telson of medium elongation for genus, with slight posterior protrusion, scarcely excavate dorsally.

HOLOTYPE: NZOI, No. 95, male, 2.1 mm. Unique.

TYPE LOCALITY: NZOI Sta. E977, Leigh, New Zealand, wash of *Liagora harveyana*, intertidal, 15 February 1968.

RELATIONSHIP: The geographically nearest known species of this genus to New Zealand is *M. haswelli* Stebbing (=*Microdeuteropus chelifer* Haswell, 1880b, p. 340, from eastern Australia. Despite the absence of pereopods 3–5 and antenna 1, plus the absence of a female, the unique New Zealand specimen differs from *M. haswelli* in the unexcavate posterior margin of article 6 on gnathopod 1 bearing a process.

Maxillae 1 and 2 are normal for the genus, the inner plate of maxilla 1 bearing one seta, the inner plate of maxilla 2 bearing a medial submarginal row of setae.

The apical process on mandibular palp article 3 and on maxillipedal palp article 3, the short mandibular palp article 2, and the unnotched upper lip suggest characters possibly marking a subgenus of *Microdeutopus*.

DISTRIBUTION: Leigh.

Photis brevicaudata Stebbing

Photis brevicaudata Stebbing, 1888: 1068–1072, pl. 108.
Photis brevicaudata. Chilton, 1921a: 225, fig. 3.

DISTRIBUTION: Gannet Island, Auckland (38° S), 50 m.

EXTRINSIC DISTRIBUTION: Type locality: Melbourne, Australia, 60 m.

Photis sp.

Figs. 67*h-j*

MATERIAL: NZOI Sta. E970 (young individual, 1.6 mm).

REMARKS: This species differs from the Australian *P. brevicaudata* Stebbing (1888), reported by Chilton (1921a) to occur in New Zealand, in the absence of a large palmar spine on gnathopod 1, in the subtly different shape of gnathopod 2 palm, and in the absence of long apical setae on the outer ramus of uropod 3. These differences are strong enough for specific distinction but may not have been considered so by Chilton if this was the species he identified with *P. brevicaudata*.

DISTRIBUTION: Kaikoura.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

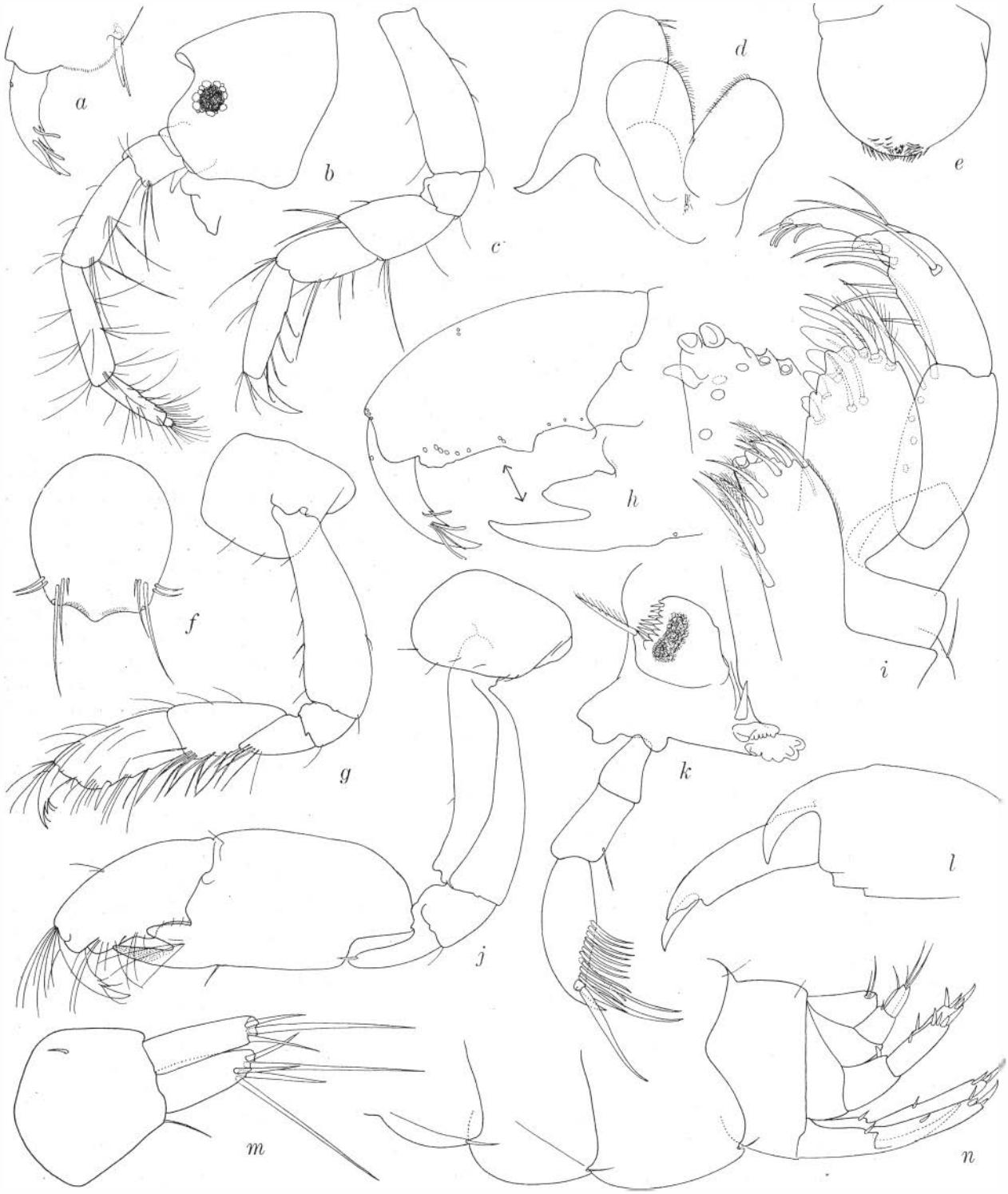


FIG. 72. *Microdeutopus apopo* n. sp., holotype, male, 2.1 mm, NZOI Sta. E 977 [JLB NZ-12]: *a*, apex of gnathopod 2, medial; *b*, head; *c*, either pereopod 1 or 2; *d*, part of lower lip; *e*, upper lip; *f*, telson; *g*, gnathopod 2; *h*, articles 6–7 of gnathopod 2 with apex of article 5 appended; *i*, maxilliped; *j*, gnathopod 1; *k*, mandible; *l*, articles 3–4 of maxillipedal palp; *m*, uropod 3; *n*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

ISCHYROCERIDAE

Three species with abundant individuals occur in the New Zealand intertidal. They are generally small, rarely exceeding 5 mm in length, and often occur in high profusion. Superficially they have the appearance and similar pigmentation of *Aora maculata* and might also be confused with black-eyed (but obviously not red or clear-eyed) members of *Gammaropsis*. Minute inspection of uropod 3 demonstrates that it has a cylindrically elongate peduncle with rami shorter than the peduncle. There is scarcely any sense in attempting to go through generic identification with these taxa when it is simpler to identify them directly to a specific level. The genera *Jassa* and *Ischyrocerus* are difficult to distinguish except in known terminal males, often rare in certain samples. Male members of *Jassa* have a distinct posterior tooth on the palm of gnathopod 2 that points distalwards, whereas *Ischyrocerus* males have no palmar tooth or one that points perpendicularly from the palm.

Jassa falcata is easily distinguished by examination of the outer ramus of uropod 3 under high power microscopy. The apex of the ramus has a long, stout, distally curved or hooked spine partially immersed into the ramus; on the inner part of the ramal curve occur one or two large (relative to the ramus) cusps distinctly reverted towards the base of the ramus (Fig. 3*e*). *Ventojassa frequens* has a very plain outer ramus as if the hook of *Jassa falcata* had been completely coalesced with the ramus; the slightly hooked apex of the ramus is blunt and bears a weak subterminal knob. *Ischyrocerus longimanus* has an outer ramus with a series of sharp inner cusps, between two and six in number. The apical cusp points inwardly in weak resemblance of the distal hook-spine of *J. falcata* but in *I. longimanus* it is solidly coalesced with the ramus; the remaining cusps are not reverted. Occasionally the apex on the outer curve bears a weak cusp but it often occurs as a distinct articulate setule so small as not to be confused with the heavy hook of *J. falcata*. Occasionally the apex of the ramus has the setule thickened as a spinule and moved into terminal position. The inner cusps may be large or small. The most frequently occurring condition is that of three large cusps and a setule on the outer ramus. One might consider that variations from this plan (two to six, large or small) mark different species, but they have all been linked together indirectly by their occurrence in pairs on various individuals. A careful study should be made, however, in plotting frequencies of these variables in relationship to other characters of the phenotypical complex in *I. longimanus* on the possibility that one or more cryptic species are involved. There may be juveniles of a sublittoral population mixed in with the intertidal *I. longimanus* that have phenotypes with uropods similar to those of *I. longimanus*. In other places where I have studied ischyrocerids the uropodal morphology has appeared to be more consistent than in *I. longimanus*, but one might consider that the low diversity of ischyroceri in New Zealand has reduced selective pressures against various phenotypes. Rami with six small cusps ("denticles") occur occasionally paired with normal rami (left or right sided) and there may be relative size differences in rami that could be described as "pygmy" and "giant".

Ischyrocerus longimanus (Haswell)

Fig. 73

Wyvillea longimana Haswell, 1880b: 337, pl. 22, fig. 7; ?Stephensen, 1927: 353–354.
Podocerus cylindricus Say. Kirk, 1879: 402 (not Say).
Podocerus longimanus. Chilton, 1884a: 255–256, pl. 17, fig. 2; 1884b: 1044; Thomson and Chilton, 1886: 143.
Ischyrocerus anguipes var. *longimanus*. K. H. Barnard, 1930: 393; ?K. H. Barnard, 1932: 243.
Ischyrocerus anguipes. Chilton, 1921a: 227–229 (not Krøyer).
?Ischyrocerus longimanus. Stephensen, 1949: 45–46.

Stephensen (1949) was correct in regarding this species as distinct from *I. anguipes* Krøyer, but his specimens from Tristan da Cunha may be separable from the New Zealand species in that the small thumb on male gnathopod 2 is reverted. *Ischyrocerus longimanus* differs from *I. anguipes* in the presence of that rudimentary proximal thumb on the hand of male gnathopod 2, the distally located defining area on the palm of gnathopod 1, and the presence of a strong comb-row and slight distal acclivity on the dactyls of gnathopod 1 and pereopods 1–5. The mandibular palp of the southern species is slightly stouter than that of *I. anguipes*. The second articles of pereopods 1 and 2 are strongly quadrate anterodistally and article 2 of pereopod 4 is posterodistally subacute.

The comb on the outer ramus of uropod 3 is variable and not necessarily correlated with size or maturity, as young males may have six teeth, whereas older males occasionally have fewer.

Young females have gnathopod 1 like that of males, and gnathopod 2 is like gnathopod 1 of males but the lobe on article 5 is slightly narrower. A few large females, 2.5 mm or longer, have very thin gnathopods (*see* Fig. 73*l*, *m*); their other characteristics conform to males of *I. longimanus* and they are presumed to belong with this species, as no other kind of male is found to correspond with these females. Female coxa 1 is not as pointed as that of males. Lateral cephalic lobes vary in both sexes, but especially in the females with thin hands, towards a more conical form than illustrated here, but occasional specimens have even blunter lobes.

MATERIAL: NZOI Sta. E966 (4), Sta. E967 (373), Sta. E969 (67), Sta. E970 (7), Sta. E971 (69), Sta. E973 (176), Sta. E974 (1), Sta. E978 (51), Sta. E979 (104), Sta. E981 (57), Sta. E982 (40).

DISTRIBUTION: Throughout New Zealand; Auckland Islands on the shore under stones; Dunedin; Worser Bay; Lyttelton Harbour; Kaikoura; Wellington; Gisborne; Whangaparaoa Peninsula; Tapeka Pt.; North Cape, 3 m.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

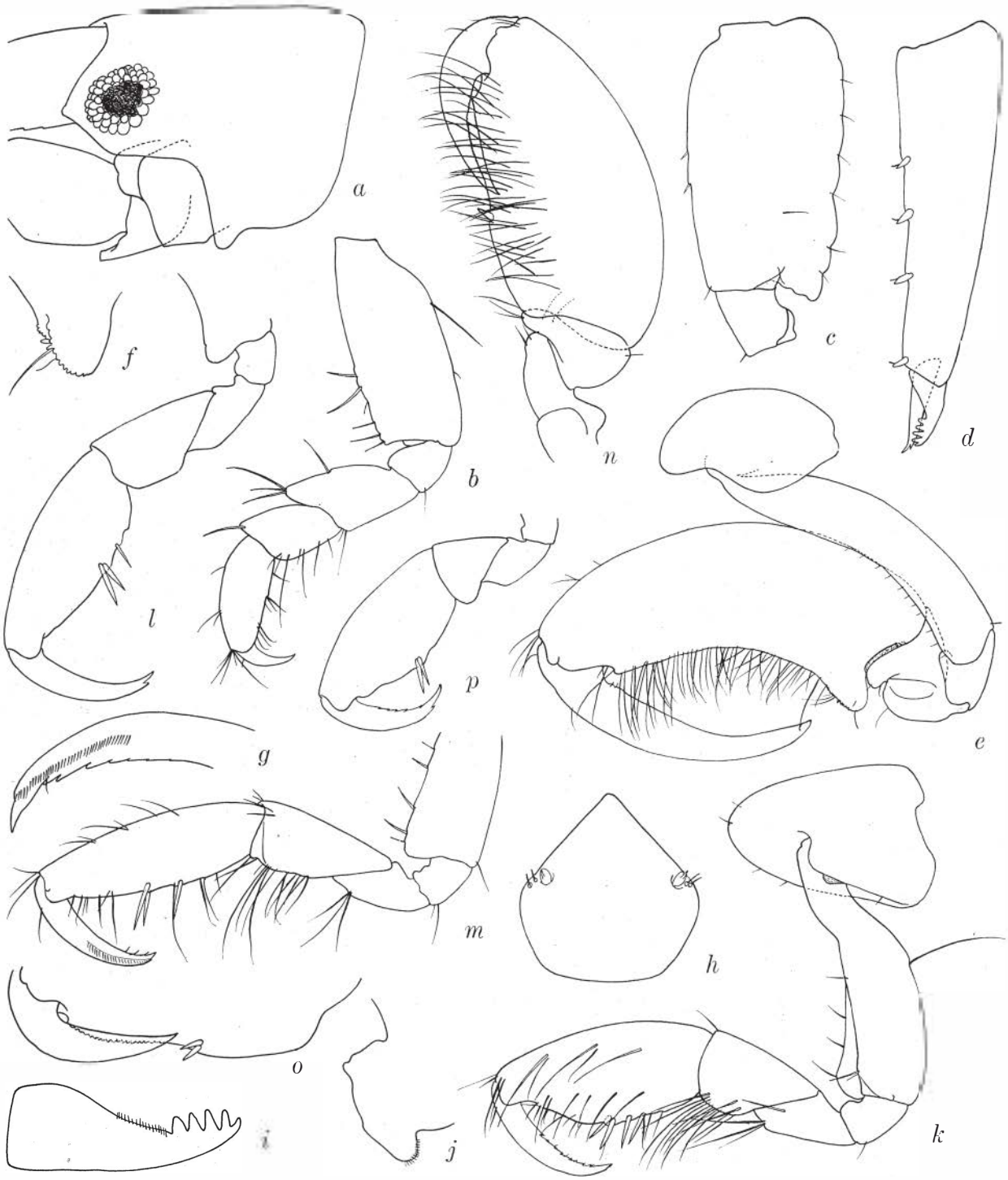


FIG. 73. *Ischyrocerus longimanus* (Haswell), male, 2.5 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, head; *b*, *c*, pereopods 1, 4; *d*, uropod 3; *e*, gnathopod 2; *f*, palmar lump of gnathopod 2; *g*, dactyl of gnathopod 1, medial; *h*, telson; *i*, outer ramus of uropod 3; *j*, side of upper lip; *k*, gnathopod 1. Female, 2.6 mm: *l*, *m*, gnathopods 1, 2. Young male, 2.0 mm: *n*, *o*, gnathopod 2. Young female, 2.2 mm: *p*, gnathopod 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

EXTRINSIC DISTRIBUTION: Type locality, Port Jackson, New South Wales; Tristan da Cunha; Nightingale; Inaccessible.

Jassa falcata (Montagu)

Podocerus australis. Haswell, 1880b: 338, pl. 21, fig. 8; 1882: 270–271; Miers, 1884: 319–320.
Podocerus falcatus (Montagu). Sars, 1895: 594–595, pl. 212.
Podocerus odontonyx Sars, 1895: 597–598, pl. 212, fig. 2.
Podocerus validus (Dana). Thomson and Chilton, 1886: 143.
Jassa pulchella Leach. Chilton, 1909a: 647; Stebbing, 1910: 649; Thomson, 1913: 245; Stephensen, 1927: 354; ?Stephensen, 1938: 262.
Jassa falcata. Chilton, 1921a: 22; Nicholls, 1938: 127–128; Sexton and Reid, 1951: 29–91, pls 4–30.

Out of scores of references to this species only those from New Zealand, the subantarctic islands, and Australia, plus the classic figures of Sars and the ultimate analysis of Sexton and Reid are included.

MATERIAL: NZOI Sta. E973 (30 ♀ and juvs.), Sta. 974 (3).

DISTRIBUTION: Auckland Islands, rocky coast and on carapace of crab, *Halicarcinus planatus;* ?Campbell Island; Lyttelton Harbour; Dundein; "frequently . . . to . . . body of crawfish *Jasus edwardsii*", Chilton (1909a), presumably meaning in New Zealand waters; Macquarie Island.

EXTRINSIC DISTRIBUTION: Cosmopolitan.

Ventojassa J. L. Barnard

Ventojassa J. L. Barnard, 1970: 204–205.

DIAGNOSIS: Ischyrocerid with one or more wire-like setae on outer ramus of uropod 3; accessory flagellum multiarticulate; palm of male gnathopod 2 with large tooth or cusp; coxa 1 of normal proportions, thus nearly as long as coxa 2; coxa 5 about as long as coxa 4.

TYPE SPECIES: *Eurystheus ventosa* J. L. Barnard (1962a).

REMARKS: *Ventojassa* was described by J. L. Barnard (1970) for *Eurystheus ventosa* J. L. Barnard (1962a), a species occurring in California and Hawaii. *Ventojassa* was established for *E. ventosa* to distinguish a genus especially characterised by the presence of wire-like setae on the outer rami of uropod 3. *Jassa frequens* of New Zealand is transferred to *Ventojassa* and apparently *Parajassa georgiensis* Schellenberg (1931), from South Georgia and Ushuaia, should also be transferred to *Ventojassa* as it has a small seta in the middle of the outer edge on the outer ramus of uropod 3. I am uncertain whether *P. georgiensis* has a vestigial accessory flagellum like other species of *Parajassa;* to admit *P. georgiensis* to *Ventojassa* on this basis would require redefinition of *Ventojassa* to include species with vestigial accessory flagellum.

A fourth species of *Ventojassa* may be represented by *Jassa frequens* as identified by Schellenberg (1931) from Valparaiso; he states uropod 3 has two or three long setae on the outer ramus but gives no other details.

Ventojassa frequens (Chilton)

Figs. 74, 75

Podocerus frequens Chilton, 1883: 85, pl. 3, fig. 2; Thomson and Chilton, 1886: 143.
Podocerus latipes Chilton, 1884a: 258, pl. 19, fig. 2; Thomson and Chilton, 1886: 143.
Jassa frequens. Chilton, 1921a: 227, fig. 4; ?Schellenberg, 1931: 253 (Valparaiso).

DESCRIPTION: Antennae of medium stoutness and length for family, article 3 of antenna 1 as long as article 1, accessory flagellum 3+ articulate; eyes with black central core; epistome with broadly conical process; mandibular molars lacking flake, right molar with weak compound rugosity and setule bundle plus long plumose seta, mandibular palp with setal pattern similar to *V. ventosa* (J. L. Barnard 1970); remaining mouthparts grossly similar to those of *J. falcata* (Montagu) (*see* Sars 1895, pl. 212), hand of gnathopod 1 narrowly ovate; article 2 of male and female gnathopod 2 with narrowly mammilliform anterodistal lobe, article 5 short and semilunar, posterior lobe with long setae in female, short in male, hand in male long, rectangular, palm occupied by narrow, deep incision marking broad thumb, dactyl overlapping palm, hand in female very broad, palm with quadrate incision and pair of large spines on rudimentary thumb, dactyl fitting palm; pereopod 4 slightly to strongly enlarged in both sexes, much larger and longer than pereopod 5, article 6 of pereopods 3–5 lined with spines; pleonal epimera with weak posteroventral lump and notch; interramal peduncular tooth well developed on uropods 1–2; outer ramus of uropod 3 normally with slight apical hook (not articulate) and subterminal knob and bearing two faint subterminal setules, midlateral margin with long wiry seta, occasionally one of terminal setules replaced by wiry seta, inner ramus with one articulate apical spinule; telson with two pairs of dorsolateral "hooks", generally straight processes, aberrantly hook of one pair on one side undeveloped.

Ventojassa differs from *Jassa* Leach in the presence of one or more lateral setae on the outer ramus of uropod 3, the presence of two large articulate spines on the palm of gnathopod 2 in one or both sexes, and the presence of one to three pairs of conspicuous hooks on the telson.

Ventojassa frequens differs from *V. ventosa* in:

(1) the presence of a deep excavation and one thumb on the palm and the deep excavation on the palm of female gnathopod 2;

(2) the narrower hand of gnathopod 1;

(3) the broader and slightly shorter epistomal process;

(4) the presence under normal circumstances of a subapical lateral knob on the outer ramus of uropod 3;

(5) the relatively shorter and stouter antennae;

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

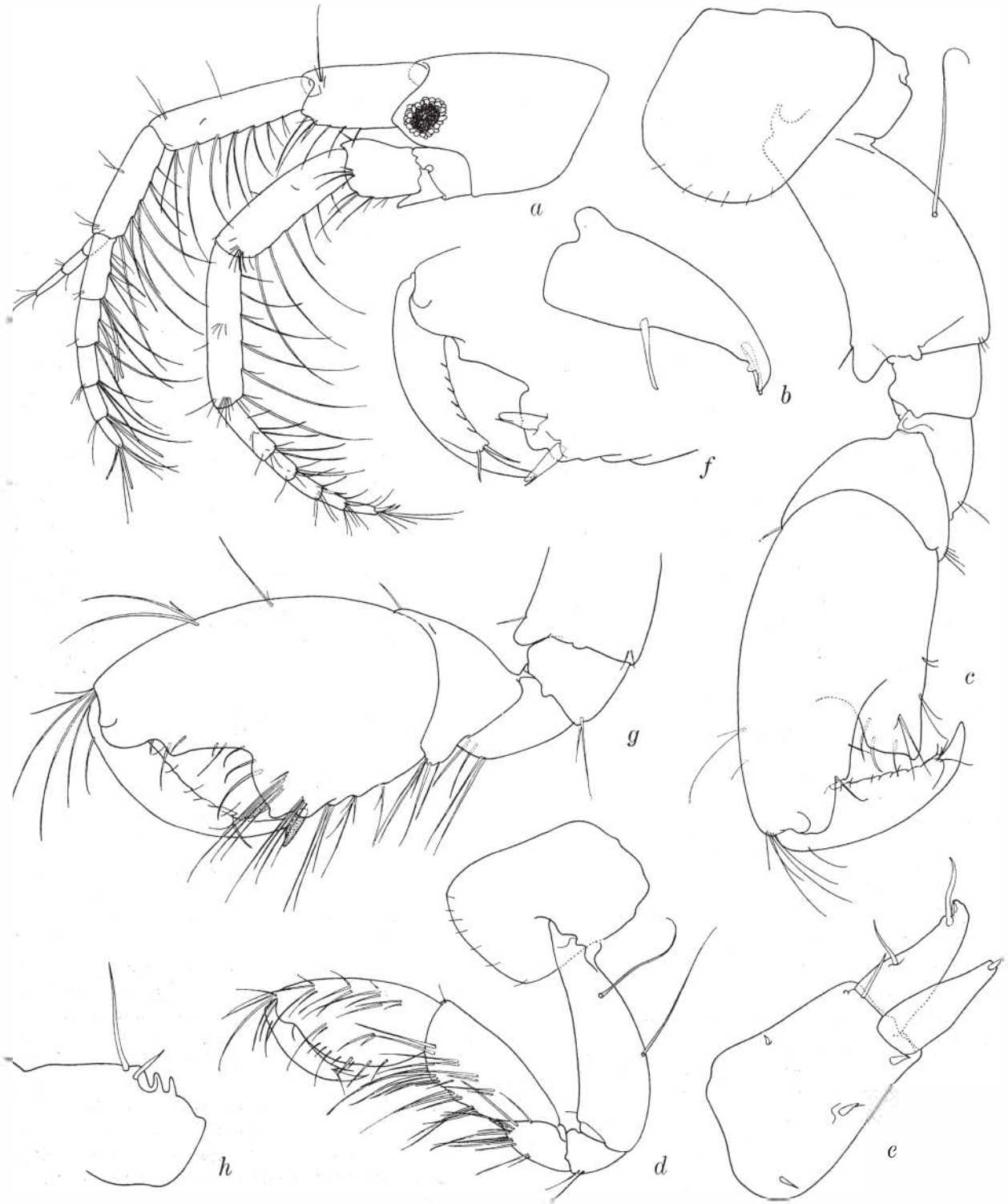


FIG. 74. *Ventojassa frequens* (Chilton), male, 3.3 mm, NZOI Sta. E 979 [JLB NZ-14]: *a*, head; *b*, outer ramus of left uropod 3; *c*, gnathopod 2; *d*, gnathopod 1; *e*, right uropod 3. Female, 3.0 mm: *f*, palm of gnathopod 2, medial; *g*, gnathopod 2, lateral; *h*, side of telson.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

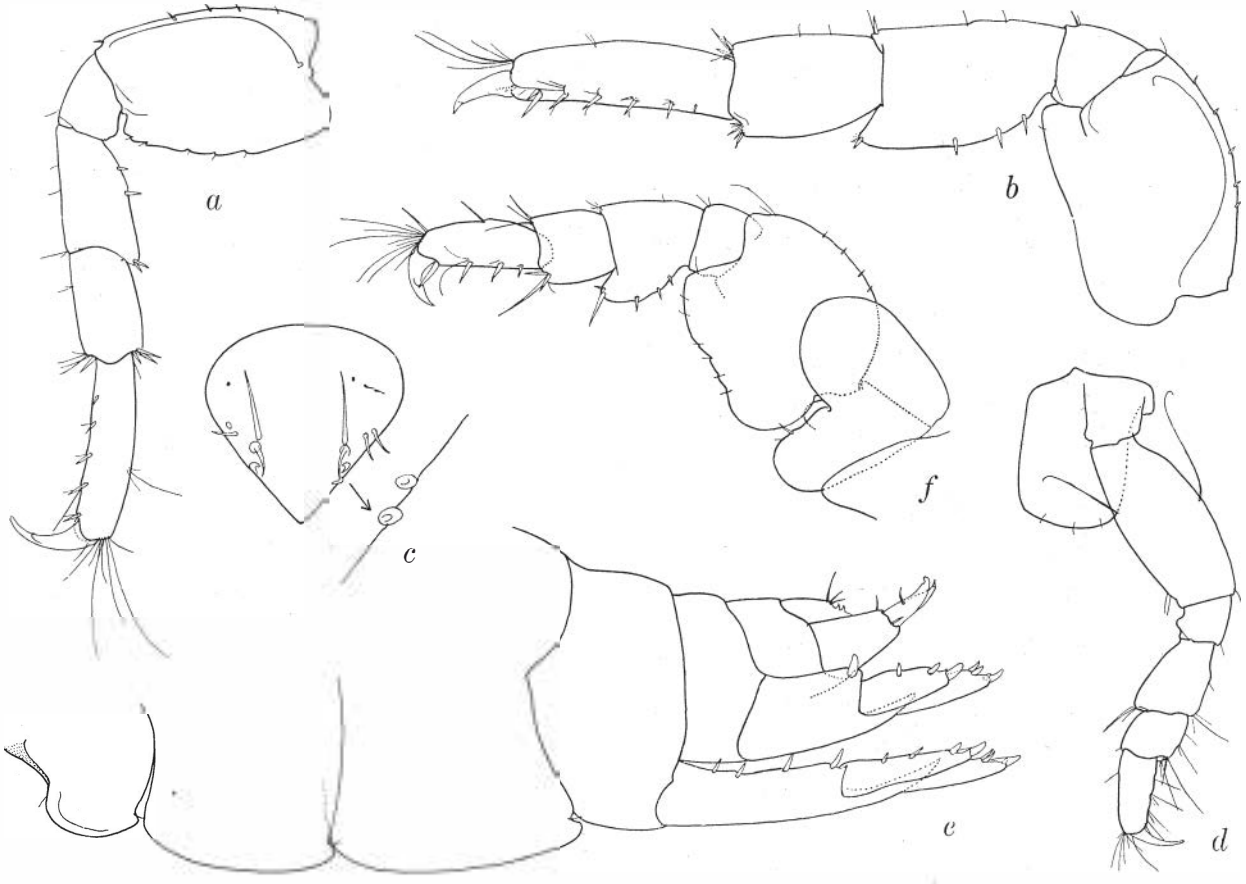


FIG. 75. *Ventojassa frequens* (Chilton), male, 3.3 mm, NZOI Sta. E 979 [JLB NZ-14]: *a*, *b*, pereopods 3, 4, less coxae; *c*, telson; *d*, pereopod 1; *e*, pleon. Male, 2.7 mm: *f*, pereopod 3.

(6) the stout pereopod 4 in both sexes, with pereopod 5 shorter than 4;

(7) the row of stout spines on article 6 of pereopod 4;

(8) the much weaker anterodistal lobe on article 2 of gnathopod 2;

(9) the slightly stouter pereopods 1–2;

(10) the very slightly longer peduncular tooth on uropod 2; and

(11) the absence of a flake on the right mandibular molar.

Ventojassa frequens differs from *Parajassa georgiensis* Schellenberg (1931), a species that possibly belongs with *Ventojassa*, in the unexpanded hand of gnathopod 1, the presence of a notch and setule on pleonal epimeron 3, and in the much more deeply excavate palm of gnathopod 2 (either sex).

Possibly Chilton's (1920a) reference to *Gammaropsis crassipes* was based on specimens of *Ventojassa frequens*.

MATERIAL: NZOI Sta. E966 (2), Sta. E969 (10), Sta. E970 (4), Sta. E973 (5), Sta. E975 (1), Sta. E977 (1).

DISTRIBUTION: Dunedin; Lyttelton Harbour, roots of *Macrocystis* and other seaweeds; Kaikoura; Leigh; Wellington.

LEUCOTHOIDAE

Leucothoe trailli Thomson

Fig. 76

Leucothoe traillii, Thomson, 1882: 234–235, pl. 18, fig. 1; Thomson and Chilton, 1886: 148; Chilton, 1912b: 129–130.
Leucothoe spinicarpa. Chilton, 1923a: 88 (not Abildgaard).

Sheard (1936b) and Chilton (1923a) placed *L. trailli* in *L. spinicarpa* as part of the general trend since the 1920s of synonymising various species of *Leucothoe* with *L. spinicarpa*. *Leucothoe tridens* Stebbing (1888) was also placed in *L. trailli* by Chilton (1912b) but is here removed; Stebbing (1906) considered all of these species distinct. *Leucothoe tridens* was described from a sample supposedly collected off New Zealand at a depth of 1,100 fm, but that may be erroneous as *L. tridens* has subsequently been thought to be a species of the tropical Pacific.

Leucothoe trailli differs from *L. spinicarpa* in:

(1) the longer article 3 of the mandibular palp;

(2) the apparently larger anterior cephalic crest;

(3) the stouter outer plate of maxilla 2;

(4) the tumid palp article 1 of maxilla 1 lacking a distinct articulation with article 2;

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

(5) the plain inner plate of maxilla 1;

(6) the much broader article 2 of pereopods 3–5;

(7) the softly quadrate posteroventral corner on pleonal epimeron 3;

(8) the broader coxa 2.

The ovatorectangular article 2 of pereopod 5 on *L. tridens* does not fit the configuration of *L. trailli.*

Coxa 1 of juveniles is more softly rounded anteriorly than in the adult form figured here.

MATERIAL: Portobello Marine Biological Station, on wharf piles, 30 July 1952, coll. D. E. Hurley (2); Kaikoura, K 819G, Morgan's Pool, 19 January, 1966; K 824H, Morgan's Pool, same date (2).

DISTRIBUTION: Port Pegasus (5 fm), Paterson Inlet (10 fm), Stewart Island; Otago Harbour; Lyttelton; Kaikoura; Hauraki Gulf (25 fm).

LILJEBORGIIDAE

Liljeborgia aequabilis Stebbing

Liljeborgia aequabilis Stebbing; 1888: 988–990 (no plate); 1910: 588–589; K. H. Barnard, 1930: 364–365; ?Pirlot, 1936: 301, fig. 125; Hurley, 1954g: 786–791, figs. 105–138.
Liljeborgia brevicornis. Chilton, 1921b: 64–65 (not Bruzelius).

DISTRIBUTION: Off Otago Heads; Tasman Bay; Hokianga Harbour; Hauraki; some records of 17–20 fm; North Cape, 20–37 m.

EXTRINSIC DISTRIBUTION: South-eastern Australia; Bass Strait; off Coogee.

TYPE LOCALITY: Off East Moncoeur Island, 39° 10′ 30″S, 146° 37′ 0″E, 38 fm; ?Sulu, 15 m.

Liljeborgia akaroica Hurley

Liljeborgia akaroica Hurley, 1954g: 796–798, figs. 160–183.

MATERIAL: NZOI Sta. E970 (1).

DISTRIBUTION: Akaroa; Lyttelton-Dunedin; Kaikoura; off West King; only depth record is 60–65 fm; var. *maria:* off Cape Marie, 80 fm.

Liljeborgia barhami Hurley

Liljeborgia barhami Hurley, 1954g: 798–801, figs. 184–201.

DISTRIBUTION: Torrent Bay, between Golden and Tasman Bays.

Liljeborgia dubia (Haswell)

Eusirus dubius Haswell, 1880b: 331–332, pl. 20, fig. 3.
Eusirus affinis Haswell, 1885: 101, pl. 14, figs. 2–4.
Liljeborgia haswelli Stebbing, 1888: 985–988, pl. 92; Thomson, 1902: 463; ?Walker, 1903: 60.
Liljeborgia dubia. Chilton, 1909a: 619–620; Thomson, 1913: 243; Chilton, 1921b: 65; K. H. Barnard, 1930: 365, fig. 35; ?Pirlot, 1936: 300–301, fig. 125; Hurley, 1954g: 796.
not *Liljeborgia dubia.* Chilton, 1912a: 485–486.

The synonymy and references to this species are very dubious reflecting the specific name. K. H. Barnard (1930) has specimens with both three and five dentations on pleonites 1–2, a further complication.

DISTRIBUTION: Snares, rock pools; Otago Heads and Harbour; Tasman Bay, trawling, in upper whorls of hermit crab shells; Bay of Islands; North Cape, 0–20 m; Three Kings Islands, 0–3 m.

EXTRINSIC DISTRIBUTION: Tasmania (type locality); Australia; South Africa; ?Antarctica, Cape Adare, 26 fm; ?Indonesia.

Liljeborgia hansoni Hurley

Liljeborgia hansoni Hurley, 1954g: 791–795, figs. 139–159.

DISTRIBUTION: Off Otago Heads, 18–20 fm.

LYSIANASSIDAE

Nearly all members of this family collected so far in the New Zealand intertidal belong to the genus *Parawaldeckia*, under study by Dr D. E. Hurley. At least five species have been found in this survey and perhaps eight others occur in sublittoral depths.

Lysianassidae are characterised by their small, thin gnathopod 2 (*see* Sars 1895, pls, 12–40 or, Stebbing, 1888, pls. 18–34) in which article 3 is elongate (occasionally also in Sebidae, Stegocephalidae, and a few genera of other families, *see* J. L. Barnard 1969a). Article 6 (the hand) is mitten-shaped or at least bears a very short dactyl, articles 5–6 are covered with stiff setules, and article 5 is often covered posteriorly with a texture like that of a pineapple fruit. Antenna 1 is short and thick, articles 2–3 being partially telescoped into a large article 1; the accessory flagellum is usually well developed.

Parawaldeckia is characterised by the size reduction of the inner ramus on uropod 3 (Fig. 2*n*); the peduncle often becomes grossly expanded; the upper lip and epistome become coalesced into a solid piece. The body is very hard, shiny, and white in preservative.

Acontiostoma marionis Stebbing

Acontiostoma marionis Stebbing, 1888: 709–713, pl. 30.
Acontiostoma magellanicum Stebbing, 1888: 714–716, pl. 31; Chilton, 1912a: 462–463; Stebbing, 1914: 356; Schellenberg, 1931: 5; K. H. Barnard, 1932: 32–33; Nicholls, 1938: 10–11, fig. 1.

See K. H. Barnard (1932) for colour notes questioning the New Zealand identification of this species.

DISTRIBUTION: ?Lyttelton Harbour; Macquarie Island, near low-tide mark.

EXTRINSIC DISTRIBUTION: Marion Island, 90–135 m; Cape Virgins, 55 fm; Gough Island, 100 fm; Falkland Islands, roots of *Macrocystis* and 16 m; Kerguelen; Magellan Strait area; Lagotowia, 10 fm.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

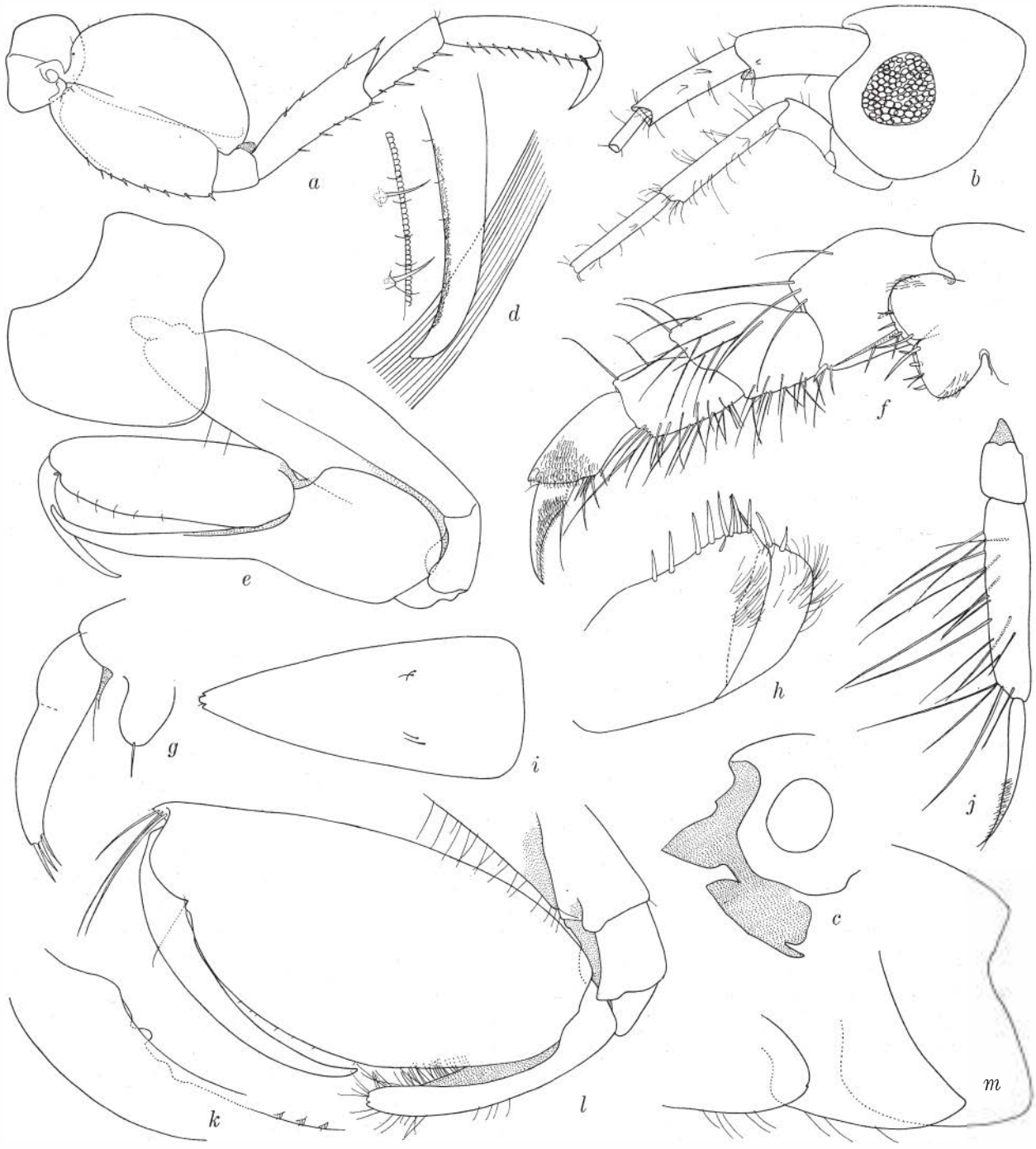


FIG. 76. *Leucothoe trailli* Thomson, female, 7.1 mm, Kaikoura K 824H: *a*, pereopod 5; *b*, head; *c*, head showing sagittal crest; *d*, apex of carpoprocess with striate dactyl on gnathopod 1; *e*, gnathopod 1; *f*, maxilliped; *g*, inner plate and palp of maxilla 1; *h*, maxilla 2; *i*, telson; *j*, mandibular palp; *k*, palm of gnathopod 2, medial; *l*, gnathopod 2, lateral; *m*, pleonal epimera 1–3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Parawaldeckia spp.

Lysianassa kroyeri. Thomson, 1879a: 237 (not Bate).
Lysianassa sp. Thomson and Chilton, 1886: 149–150; Walker, 1908: 33.
?Nannonyx kidderi. Chilton, 1909a: 615–617; 1911a: 563; Thomson, 1913: 242 (not Smith).
Parawaldeckia kidderi. Stephensen, 1927: 300–303, fig. 2 (not Smith).

These identifications should have new names, as Smith's *Lysianassa kidderi* comes from Kerguelen and because several species of *Parawaldeckia* have been found in New Zealand waters in examinations made by Dr D. E. Hurley and myself. Dr Hurley is preparing a monograph on this genus.

MATERIAL: NZOI Sta. E966 (2), Sta. E967 (36), Sta. E969 (15), Sta. E970 (27), Sta. E971 (3), Sta. E972 (20), Sta. E973 (35), Sta. E974 (11), Sta. E975 (1), Sta. E976 (1), Sta. E977 (2), Sta. E980 (1), Sta. E982 (1).

DISTRIBUTION: Throughout New Zealand; Auckland and Campbell Islands on shore under stones at low tide, "the shore", rocky coast, and 10 fm in sand and algae; Snares Island; Stewart Island; Otago - Dunedin; Lyttelton; Kaikoura; Wellington; Gisborne; Whangaparaoa Peninsula; Leigh; ?Kermadec Islands.

Parambasia (?) **rossi** Stephensen

Parambasia (?) *Rossii* Stephensen, 1927: 303–305, figs. 3,4.

DISTRIBUTION: Auckland Islands, 10 fm, sand, algae.

Pseudambasia bipartita Stephensen

Pseudambasia bipartita Stephensen, 1927: 305–306, fig. 5.

DISTRIBUTION: Auckland Islands, rocky coast.

NIHOTUNGIDAE J. L. Barnard, 1972

DIAGNOSIS: Uropod 3 uniramous, ramus biarticulate as in Stenothoidae; telson short and entire; accessory flagellum obsolescent; body with aspect of cyproidin amphilochids or certain stenothoids, coxa 4 very large, posteriorly excavate and posterodistally extended, coxa 1 normal size though smaller than coxa 4, but coxae 2 and 3 much smaller than 1; inner plates of maxilliped styliform, outer plates very large, palp of maxilliped at least 3-articulate; gnathopods simple and very feeble; article 2 of pereopods 3–5 slender; urosomites free; mandible styliform and bearing 3-articulate palp; palp of maxilla 1 forming long blade.

TYPE GENUS: *Nihotunga* J. L. Barnard (1972)

REMARKS: The diagnosis of the family has several characters potentially superfluous and others could have been omitted so as not to prejudice possible future species and genera from being admitted to this family. For instance, species with large subchelate gnathopods, coalesced urosomites, a small accessory flagellum, reduced coxa 1 and enlarged coxae 2–3, or inflated second articles of pereopods 3–5 could be admitted here because the essential characters are the combination of uniramous uropod 3, and the large outer plates of the maxilliped. The large maxillipedal plates divorce this family from its obvious "mimics", the Stenothoidae (including Thaumatelsonidae and Cressidae) and the Pagetinidae, whereas the uniramous uropod 3 separates Nihotungidae from cyproidin Amphilochidae. A styliform mandible is completely foreign to stenothoids, whereas the basic amphilochid mandible could form a precursor to the condition in *Nihotunga*.

The uniramous uropod 3 with biarticulate outer ramus immediately suggests that this genus is a member of the stenothoid complex but the logic then fails. A complete reversion of the stenothoid maxillipedal condition would be required as well as redevelopment of a long stenopodous mandibular palp. *Nihotunga* differs from either amphilochids or stenothoids in its enlarged coxa 1 and reduced coxae 2–3.

Maxilla 1 of *Nihotunga* is extremely unusual. On first sight the appendage appears to be composed of similar inner and outer plates with several plumose setae to which is attached a long, almost flagellate palpar blade. But a fourth lobe also occurs to suggest two different interpretations. When maxilla 1 is dissected and mounted a small subquadrate lobe with heavily sclerotised margins overlies the first maxillary complex and by analogy it can be related to the similar inner lobes of cyproidin amphilochids, like *Mokuoloe* J. L. Barnard (1970). If this lobe in *Nihotunga* is the true inner plate, then the larger setose medial plate must represent the true outer plate and the larger setose lateral plate may represent the palp. The geniculate and acute blade may therefore represent a protrusion of completely unique occurrence in gammarideans. But the so-called inner lobe actually forms a lateral shield in the buccal complex thus suggest-that it is a basal process of the maxilla and that the blade therefore represents the palp.

Nihotunga appears to be basically a cyproidin amphilochid in which the following modifications have taken place: reduction in size of antennae; broadening of the upper lip; loss of molar and styliformisation of mandible; development of a unique maxillary blade; slight reduction and styliformisation of inner plates of maxillipeds; complete simplification of gnathopods; enlargement of coxa 1 and reduction of coxae 2–3; loss of the inner ramus of uropod 3 with enlargement of a distal spine on the outer ramus to assume the aspect of a second article; reduction in length, with terminal rounding of the telson.

Nihotunga J. L. Barnard, 1972

DIAGNOSIS: With the characters of the family.

DESCRIPTION: Head with lateral lobes broadly extended forward, rostrum very small, attachment of antenna 1

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 77. *Nihotunga noa* n. g., n. sp., female, 1.25 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, body; *b*, head; *c*, maxilliped; *d*, maxillipedal palp; *e*, *f*, maxillae 1, 2; *g*, mandible; *h*, upper lip (reduced from *g*); *i*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

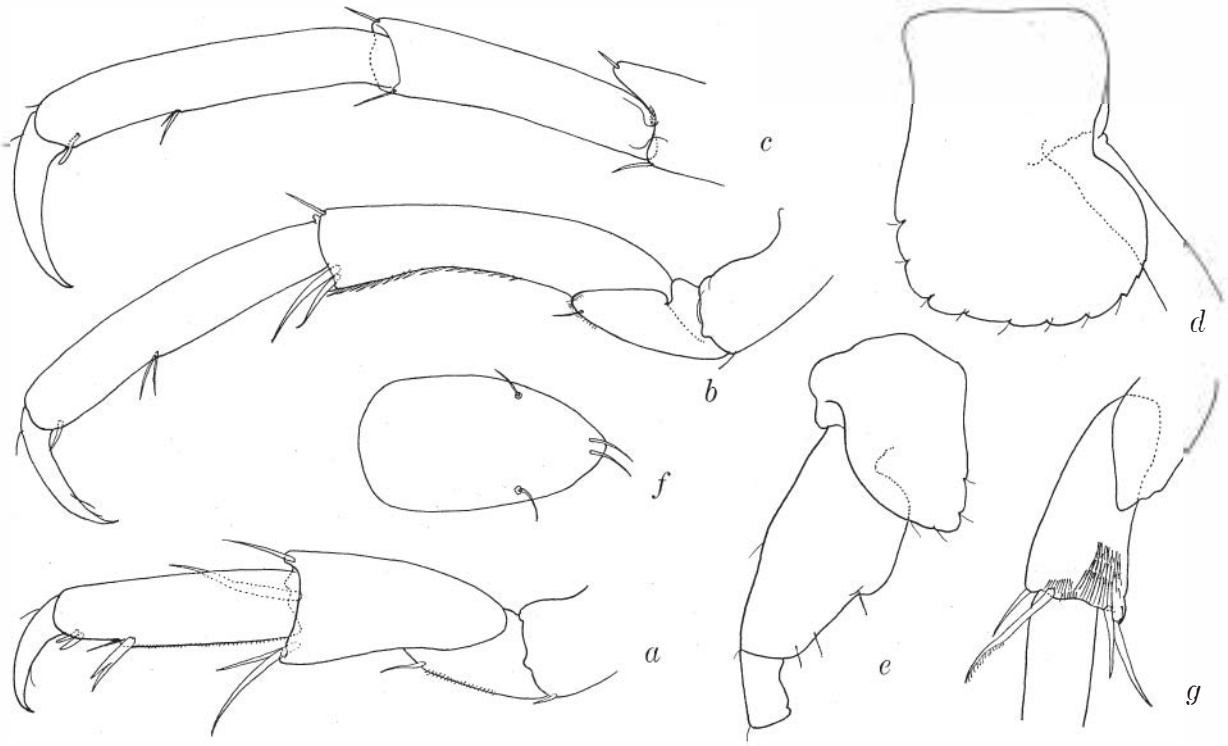


FIG. 78. *Nihotunga noa* n. g., n. sp., female, 1.25 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, *b*, lateral gnathopods 1, 2; *c*, lateral pereopod 1; *d*, lateral coxa 1; *e*, base of lateral pereopod 5; *f*, telson; *g*, article 5 of medial gnathopod 1.

deeply recessed dorsally, antennae short, accessory flagellum absent; epistome unproduced, upper lip very broad and slightly incised; mandible styliform, molar absent, lacinia mobilis long and rod-like, palp long and naked, article 2 shorter than others; lower lip unknown; palp and outer plate of maxilla 1 similar, palp uniarticulate, inner plate naked and attached in position overriding other plates, appendage with long, slightly to strongly geniculate lateral blade capable of being extended far outside buccal mass but lacking any visible internal muscles, possibly used as epistomal wiper or as piercing stylet; maxilla 2 with subequal lobes, inner bearing distal bifidation probably composed of two setae completely coalesced with plate, outer plate with several articulate setae, plates similar to each other; maxilliped with styliform inner plates bearing apical spine, outer lobes long and broad, poorly ornamented, palp 3-articulate and curving around outer plates, article 2 with distoventral process, article 3 non-unguiform and apically spinulose; coxa 1 large, coxae 2–3 much smaller, coxa 4 very large and with long, deep posterior lobe and posterodorsal excavation fitting visible coxa 5, coxa 4 partially covering coxae 1–3 but not coxae 6–7; gnathopods 1–2 simple, articles 6–7 of gnathopod 2 scarcely different from pereopods 1–2 but article 4 of normal shortness, article 5 with weak posterodistal broadening, gnathopod 1 with distal locking spines and subterminal "palmar" spine, article 4 with weak posterodistal broadening; pereopods 3–4 with linearly narrowed article 2, pereopod 5 with proximally broadened but distally narrowed article 2; urosomites all free and dorsally palpable; uropods 1–2 biramous; uropod 3 uniramous, ramus short and apparently bearing strong distal spine (not article 2?); telson short, covering urosomite 3 dorsally, entire, apically rounded; pleopods normally biramous.

TYPE SPECIES: *Nihotunga iluka* J. L. Barnard (1972).

Nihotunga noa, new species

Figs. 77, 78

DIAGNOSIS: With the characters of the family and genus.

DESCRIPTION: Basal portion of antenna 2 attached to medial surface of large plate forming lateral cephalic lobe; antenna 1 bearing long aesthetascs; eyes of four very black inkblots and retaining pigment after several weeks in alcohol, anterior margin of dorsal eye bearing eight anterior visible ommatidia in alcohol, the two dorsalmost and the third from the bottom bright red, remaining ommatidia clear (this character is consistent from specimen to specimen), ventralmost ommatidium extended forward on black lobe of upper eye; lower eye with three or four anteroventral ommatidia; in formalin eye showing many lateral surficial red ommatidia, posterodorsal margin of upper eye with contiguous

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

morular gland; pleonal epimera with deep posterior subventral notch and seta, posterodistal corners broadly rounded and attenuate on epimeron 3; in alcohol body colour relatively uniform pale grey from distance, on closer view with slight brownish cast on very pale blue matrix, colour retained in alcohol for long period; in formalin body often with oxidised fluorescent colour (bright yellow-green); skin very smooth except on magnification under oil immersion when seen to bear extremely fine punctation nearly unresolvable under magnification of about 1,200 diameters; mandibular palp projecting dorsally behind lateral cephalic lobe.

HOLOTYPE: NZOI, No. 96, ovigerous female, 1.25 mm.

TYPE LOCALITY: NZOI Sta. E970, Kaikoura, New Zealand, intertidal wash of algae, 22 January 1968.

MATERIAL: NZOI Sta. E970 (91), Sta. E971 (1), Sta. E973 (3).

DISTRIBUTION: Dunedin; Kaikoura.

OEDICEROTIDAE

Carolobatea sp.

Carolobatea novae-zealandiae. Chilton, 1909a: 620–621, fig. 2 (not Dana, see *Paracalliope*).
?Halimedon schneideri Stebbing, 1888: 839–843, pl. 59.
?Carolobatea schneideri. Stebbing, 1906: 252.

Oedicerus novizealandiae Dana (1853) is not a member of *Carolobatea* despite Chilton's assertion.

Whether Chilton's Auckland Island material is synonymous with *C. schneideri* needs confirmation in light of the sexual differences he notes in material from the type locality, Kerguelen Island. Chilton wrote that he also had this species from the New Zealand coast, but it has not been confirmed.

DISTRIBUTION: Auckland Island; ?New Zealand coast.

EXTRINSIC DISTRIBUTION: ?Kerguelen Island.

PAGETINIDAE

Heterocressa monodi Nicholls

Heterocressa monodi Nicholls, 1938: 57–58, fig. 29.

DISTRIBUTION: Macquarie Island, siftings from kelp.

PHOXOCEPHALIDAE

Paraphoxus australis (K. H. Barnard)

Phoxus batei. Thomson, 1882: 232–233, pl. 17, fig. 2 (not Haswell).
Protophoxus australis K. H. Barnard, 1930: 335–336, fig. 12.
Pontharpinia australis. Hurley, 1954b: 581–587, figs. 1–28.

MATERIAL: NZOI Sta. E981 (1).

DISTRIBUTION: Throughout New Zealand, mainly sublittoral, rare in intertidal; Three Kings Islands; Spirits Bay (N. Auckland Province); Tapeka Pt.; Cook Strait, 20–30 fm; Port Chalmers; Otago Harbour; Paterson Inlet, Stewart Island, 7 fm.

Paraphoxus waipiro, new species

Figs. 79, 80

DIAGNOSIS OF FEMALE: Head short, broad, unconstricted from dorsal view; eyes of medium size, black; epistome-labrum rounded anteriorly from lateral view; claw of maxillipedal palp with apical spine; palms of gnathopods very oblique, hand of gnathopod 1 much more slender than hand of gnathopod 2, both hands tapering slightly, article 5 of gnathopod 1 moderately elongate and with posterior margin free but that of gnathopod 2 short and posteriorly trapped by article 4, length ratio of article 6 to 5 in gnathopod 1 = 26 : 18, of gnathopod 2 = 28 : 13; pereopods 3–5 short, slender; ratio of widths of articles 2, 4, 5, 6 in pereopod 3 = 19 : 12 : 8 : 4, in pereopod 4 = 27 : 10 : 8 : 4: article 2 of pereopod 5 broad, ratio of length to width = 40 : 33, posterior margin with four weak posterior acclivities, ventral margin broadly convex, sweep point reaching middle of article 4; uropod 1 peduncle with two distolateral spines, uropod 2 with four peduncular spines, outer ramus of uropods 1–2 each with one marginal spine, inner rami naked, all rami with distal nails; inner ramus of uropod 3 one third as long as outer ramus; telson of medium breadth, apex of each lobe broadly rounded, bearing distolateral notch armed with large spine, two fringed setules mediolaterally; pleonal epimera 1–2 with rounded-quadrate posteroventral corners, epimeron 3 with bulbously quadrate posteroventral outline bearing two weak notches, epimera 2–3 with several ventral setae.

MALE: With normal secondary sexual modifications: eyes enlarged, flagellum of antenna 2 elongate, rami of uropod 3 equal in length and strongly setose, pleonal epimeron 3 with broadly rounded posteroventral outline.

DESCRIPTION: Mandibular palp thin, article 3 with five distal setae, article 2 with one short seta at positions 40 and 100; antenna 1 normal, accessory flagellum with five articles; inner plate of maxilla 1 with one stiff short seta; outer plate of maxilliped with three spines.

HOLOTYPE: NZOI, No. 97, female, 3.8 mm.

TYPE LOCALITY: NZOI Sta. E967, Eve Bay, Wellington, New Zealand, intertidal wash of algae, 5 November 1967.

RELATIONSHIP: This species cannot be Haswell's (1880a) *Phoxus Batei*, because the fifth article of gnathopod 2 of that species is clearly elongate and free, and the inner ramus of uropod 3 is longer than that on *P. waipiro*. *Phoxus Batei* has been considered to be a synonym of *P. rostratus* (Dana). Thomson's (1879a, pp. 232–234, pl. 17, fig. 2) identification of *Phoxus Batei* has been allocated to *Paraphoxus australis* (K. H. Barnard, 1930).

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

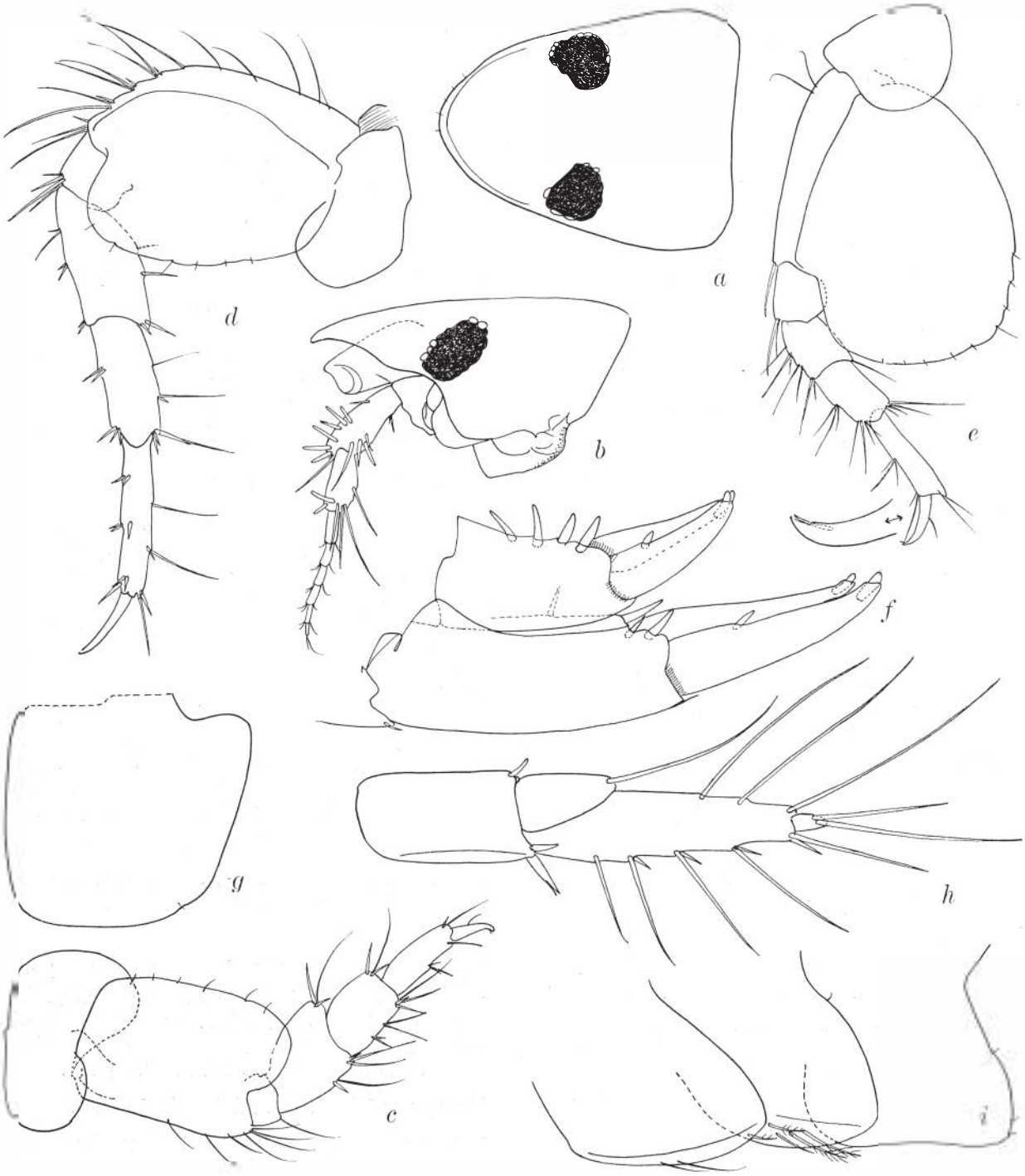


FIG. 79. *Paraphoxus waipiro* n. sp., holotype, female, 3.8 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, *b*, head; *c*, *d*, *e*, pereopods 3, 4, 5; *f*, uropods 1, 2; *g*, coxa 4; *h*, uropod 3; *i*, pleonal epimera 1–3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

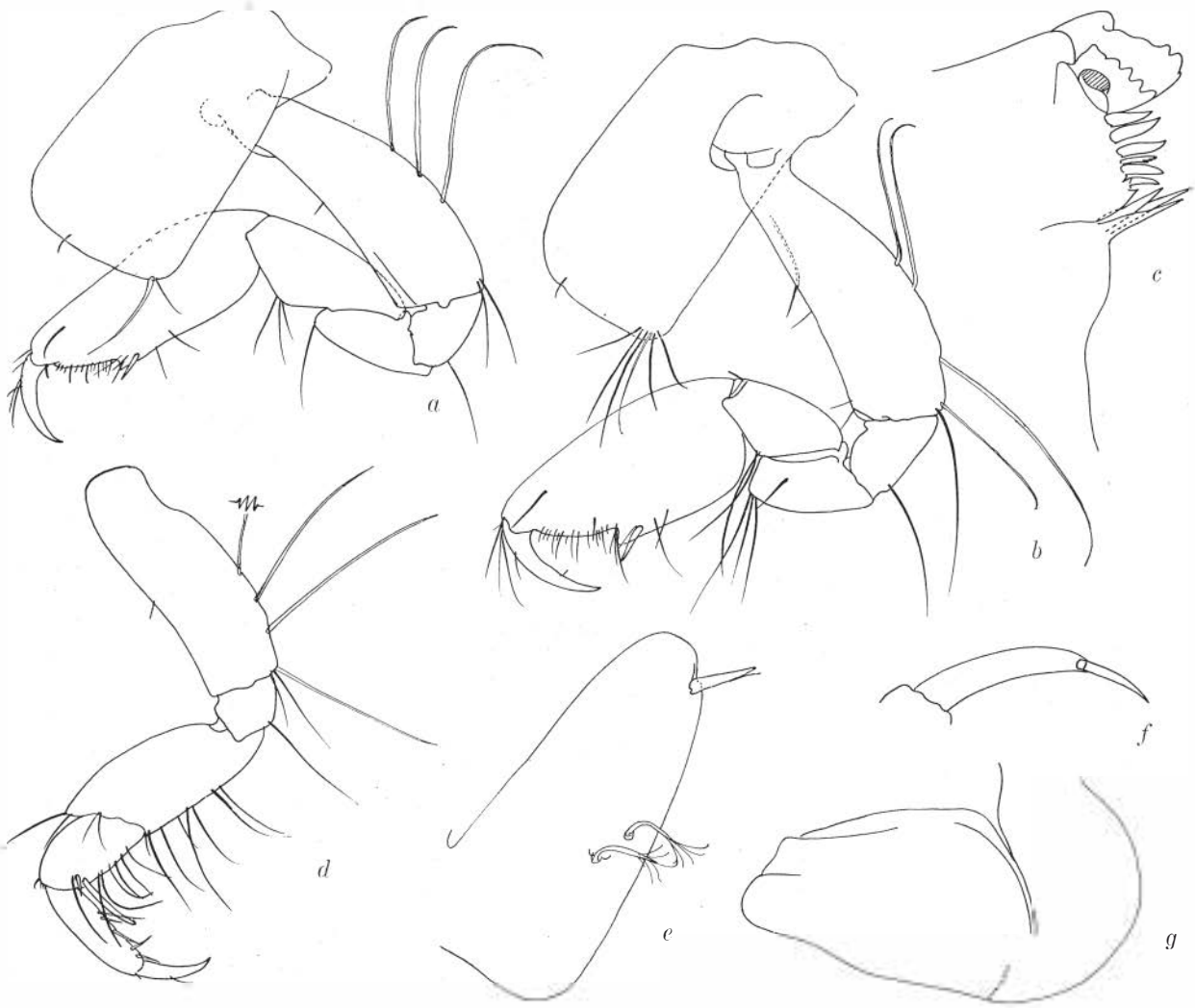


FIG. 80. *Paraphoxus waipiro* n. sp., holotype, female, 3.8 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, *b*, gnathopods 1, 2; *c*, left mandible; *d*, pereopod 1; *e*, one lobe of telson; *f*, article 4 of maxillipedal palp; *g*, upper lip from right side.

Paraphoxus waipiro resembles *P. simplex* (Gurjanova 1938, 1951) especially in the short article 5 of gnathopod 2, but the hands of *P. waipiro* are narrower and article 5 of gnathopod 1 is longer than in *P. simplex*. *Paraphoxus calcaratus* (Gurjanova 1938, 1951) is also close to *P. waipiro* but has an oblique facial row of setae on epimeron 3 and distally broadened hands on the gnathopods. *Paraphoxus stebbingi* J. L. Barnard (1958) (*see Ponthar-pinia pinguis* of Stebbing 1897, pl. 9B) has an elongate article 5 on gnathopod 2, much broader articles on pereopods 3–4 and even narrower hands with nearly transverse palms on the gnathopods.

Paraphoxus sinuatus (K. H. Barnard 1932, *see* J. L. Barnard 1960) has a longer and apically narrower head than *P. waipiro*, broader gnathopodal hands, longer article 5 of gnathopod 2, and many other differences.

Paraphoxus tattersalli J. L. Barnard (1958) (*see Parharpinia villosa* of Tattersall 1922) is closest of any *Paraphoxus* to *P. waipiro* and the two species are undoubtedly descendents of a common ancestral line. Tattersall's material from the Abrolhos Islands has similar gnathopods, pereopods, pleonal epimeron 3 (to the male at hand), but uropod 3 was not described. *Paraphoxus tattersalli* differs from *P. waipiro* in the presence of eight spines on the outer plate of the maxilliped, in the shortness of the major spine on article 5 of pereopods 1–2 (only half as long as article 6); the peduncle of uropod 2 has eight spines, and the length ratio of articles 6 to 5 on gnathopod 1 = 20: 10, on gnathopod 2 = 21: 6. The fifth articles of the Abrolhos species are thus shorter than in *P. waipiro*. The spination differences may owe something to the larger body size (6 mm) of *P. tattersalli*.

MATERIAL: NZOI Sta. E967 (42), Sta. E970 (26), Sta. E971 (1), Sta. E973 (9), Sta. E975 (1), Sta. E976 (5), Sta. E977 (2), Sta. E980 (46), Sta. E981 (1), Sta. E982 (4).

DISTRIBUTION: Dunedin; Kaikoura; Wellington; Gisborne; Whangaparaoa Peninsula; Leigh; Tapeka Pt.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

"Family PLEUSTIDAE"

"Pleustes panoplus (Krøyer)"

Pleustes panoplus (Krøyer). Kirk, 1879: 402; Thomson and Chilton, 1886: 150.

This record could refer to several New Zealand species but is undoubtedly erroneous and should be struck from a species list of New Zealand.

DISTRIBUTION: Wellington (Worser Bay, in tangled seaweed).

PODOCERIDAE

Podocerus capillimanus Nicholls

Podocerus capillimanus Nicholls, 1938: 129–130, fig. 67.

DISTRIBUTION: Macquarie Island, spongy rock coverings.

Podocerus cristatus (Thomson)

Cyrtophium cristatum Thomson, 1879b: 331–332, pl. 16, figs. 9–15; 1880b: 219–220, pl. 8, fig. 8; Thomson and Chilton, 1886: 143.
Podocerus cristatus. Thomson, 1913: 245; Chilton, 1926: 513–515, fig. 2; Hurley, 1957b: 7.

Differing from other New Zealand species in the expanded hand of gnathopod 1.

DISTRIBUTION: Dunedin Harbour, 4–5 fm, among sertulariae and seaweeds: "Common in New Zealand", roots of seaweed; on *Boltenia;* Lyttelton; Cook Strait area, 50–200 fm, mud, gravel.

Podocerus karu, new species

Figs. 81*a–k*, 83*k*, 84*j–l*

DIAGNOSIS: Eye distinctly set back from weakly angular anteroventral corner of head, eye forming bulge laterally, with distinct core of dark pigment; accessory flagellum of medium length, composed of one long article tipped with subcoalesced article 2; antenna 2 elongate; article 3 of mandibular palp slightly thin for genus; coxa 1 formed of rectangular lateral shield and anteroventrally projecting, slightly turned, mesially projecting, conical extension; coxa 2 and ventral margin of pereonite 2 widened especially in terminal male; article 5 of gnathopod 1 with truncate, rectangular posterior lobe, article 6 moderately expanded, palm distinct from posterior margin of hand, armed with long setae and about three slender spines in male, fewer spines in small females; anterodistal margins of article 2 on male gnathopod 2 strongly lobate bilaterally, weaker in female, article 4 of medium size in male, with strong distal cusp, article 5 scarcely evident, article 6 elongate, tumid, hemioval, palm long, with long setae, defined by one weak spinose acclivity, palm with strong distal castellations (one thick, four thin), remainder of palm with only three distally located waves, dactyl fitting palm; female article 4 large, protruding, heavily spinose, article 5 well developed, article 6 subcircular, palm extending along most of posterior margin of hand, defined by two spinose acclivities; article 2 of pereopods 1–5 with obsolescent lobation on anterior or posterior margins, active margin of article 6 on pereopods with three or four evenly spaced clumps of thin spine-setae; outer rami of uropods 1–2 reaching about 0.67 and 0.60 along inner rami, uropod 1 with strong interramal tooth, uropod 2 with obsolescent tooth, terminal spines of all rami especially elongate; telson long, apicoposteriorly nasiform but dorsal lobe not erect, bearing two stout spines; dorsal tooth-carina on pereonite 7 and pleonites 1–2 weakly rounded.

HOLOTYPE: NZOI, No. 98, male, 3.4 mm.

TYPE LOCALITY: NZOI Sta. E967, Eve Bay, Wellington, intertidal wash of algae, 5 November 1967.

RELATIONSHIP: Like *Podocerus manawatu* n. sp. this species is apparently neither of those previously recorded from New Zealand, and with *P. manawatu* forms a pair of species with many similarities between them. The male has distal palmar sculpture that might link it with *P. cristatus* (Thomson) and there is a weak possibility that the latter species represents giant terminal males with expanded hand of gnathopod 1 and enlarged palmar processes of gnathopod 2. I have not seen specimens of *P. cristatus.*

A remarkable conformity exists between *P. manawatu* and *P. karu* in the following characters, many of which have not been refigured for *P. karu*; antennae 1–2; female gnathopod 2; telson; uropod 3; epimera; pereopodal dactyls. The coxae are generally similar except that coxa 1 of *P. karu* is wider than that of *P. manawatu.* The carina of pereonite 7 and pleonites 1–2 is more softly rounded in *P. karu* than in *P. manawatu.* Other small differences seen in *P. karu* are the following: slightly stouter mandibular palp; weak lobation of article 2 on the pereopods; longer terminal spines of uropods 1–2. The strongest differences are the ocular position in *P. karu* and the palmar processes of male gnathopod 2 hidden among long setae. Palmar setae of *P. manawatu* are short and sparse.

The epistome is unproduced.

Hatched juveniles in the brood pouch of female have a head with small unbulging eye (Fig. 83*k*).

The position of eyes in adults and juveniles of *P. karu* and *P. manawatu* is sufficiently consistent for sight recognition of the species, but occasional individuals of *P. manawatu* have some of the lateral cephalic lobe showing laterally. The subtle difference in dorsal segmental outline (the posterior carina) can be detected sufficiently well to identify the species.

Podocerus karu differs less from *P. variegatus* Leach than does *P. manawatu,* but one notable difference is the set-back eye of *P. karu* and presumably the faint palmar castellations on male gnathopod 2.

MATERIAL: NZOI Sta. E967 (24), Sta. E970 (19), Sta. E971 (3), Sta. E973 (6), Sta. E975 (5), Sta. E977 (19), Sta. E978 (2), Sta. E979 (7).

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 81. *Podocerus karu* n. sp., holotype, male, 3.4 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, head; *b*, obsolete ventral tooth on peduncle of uropod 2; *c*, gnathopod 1; *d*, mandibular palp, setae removed; *e*, outer ramus of uropod 1; *f*, dorsal outline (from lateral view) of pereonites 6–7 and pleonites 1–3; *g*, lateral gnathopod 2; *h*, palm of gnathopod 2 enlarged with one seta drawn. Female, 3.7 mm: *i*, *j*, *k*, articles 2–3 of pereopods 3, 4, 5, lateral.

Podocerus manawatu n. sp., holotype, male, 4.9 mm, NZOI Sta. E 967 [JLB NZ-2]: *l*, palm of gnathopod 2 enlarged with one seta drawn, same proportions as *h*.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

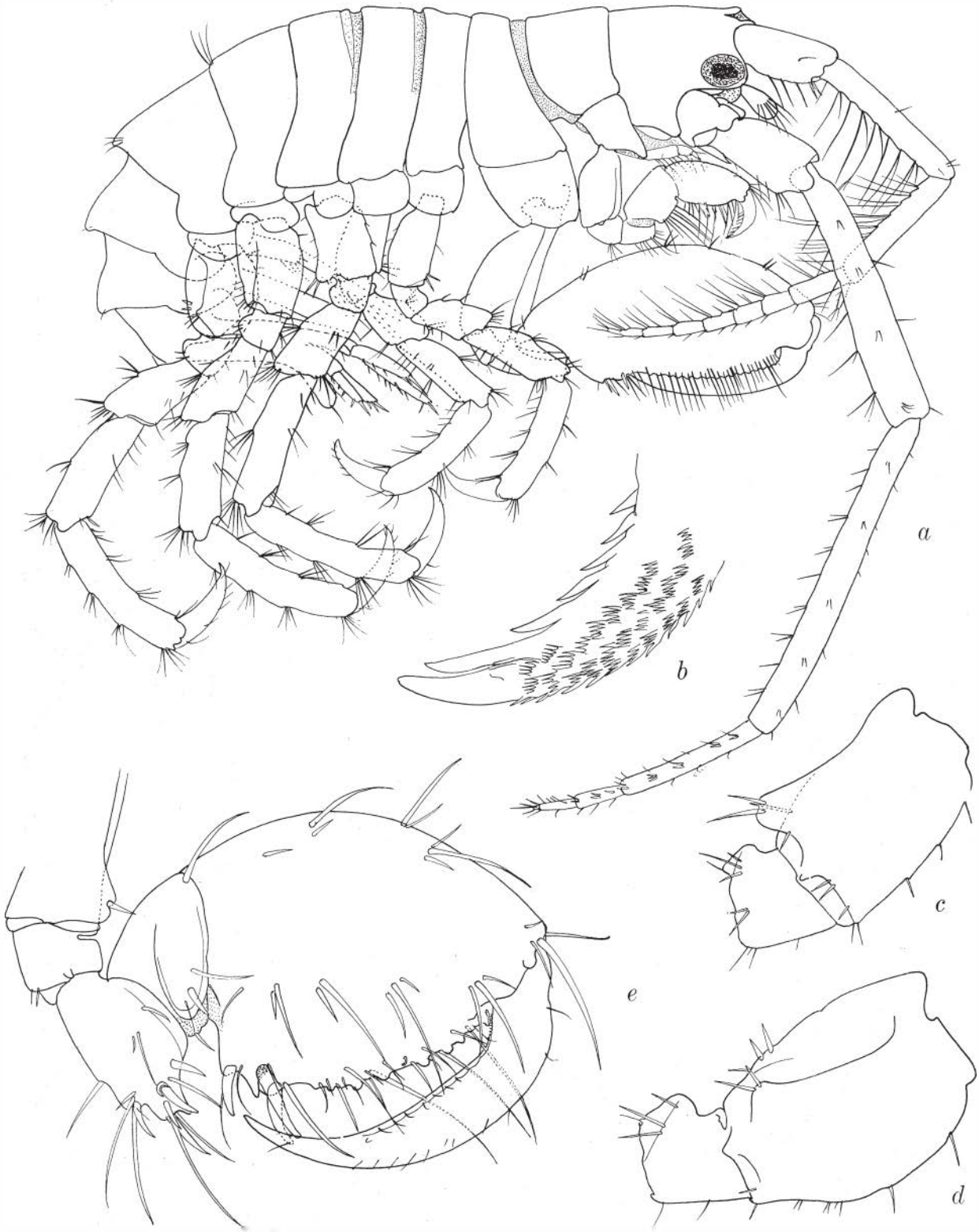


FIG. 82. *Podocerus manawatu* n. sp., holotype, male, 4.9 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, body; *b*, dactyl of medial gnathopcd 1; *c*, *d*, bases of pereopods 3, 5. Female, 2.2 mm: *e*, lateral gnathopod 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 83. *Podocerus manawatu* n. sp., holotype, male, 4.9 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, head; *b*, palm of gnathopod 2; *c*, base of pereopod 4; *d*, interramal tooth of uropod 1; *e*, urosome; *f*, telson, with spines of uropod 3 projecting from lateral margins; *g*, articles 2–5 of lateral gnathopod 2; *h*, lateral gnathopod 1. Female, 2.2 mm: *i*, coxa 1; *j*, apex of lateral gnathopod 1.

Brood pouch juvenile of *Podocerus karu*, 0.7 mm: *k*, head and pereonite 1.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

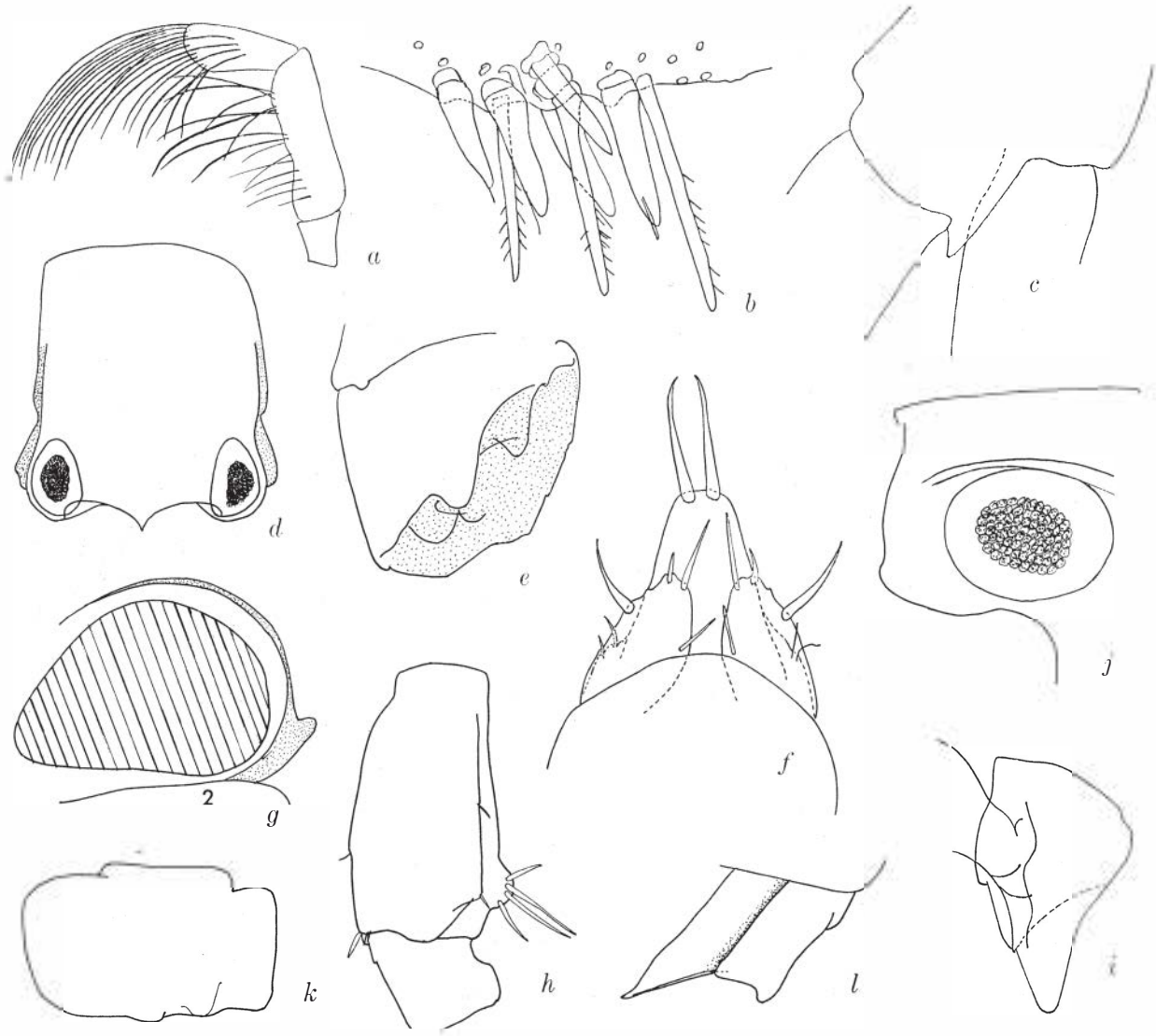


FIG. 84. *Podocerus manawatu* n. sp., holotype, male, 4.9 mm, NZOI Sta E 967 [JLB NZ-2]: *a*, mandibular palp; *b*, palmar defining point of gnathopod 1; *c*, interramal tooth of uropod 2; *d*, head, dorsal; *e*, right coxa 2, medial view; *f*, both members of uropod 3 below telson, ventral view; *g*, ocular lobe from ventrolateral showing anterior cusp; *h*, articles 2–3 of pereopod 2; *i*, left coxa 1, medial view.

Podocerus karu, juvenile female, 2.5 mm: *j*, ocular lobe; *k*, *l*, coxae 2, 1, left lateral.

DISTRIBUTION: Dunedin; Kaikoura; Wellington; Whangaparaoa Peninsula; Leigh.

Podocerus manawatu, new species

Figs. 81*l*, 82, 83, 84

DIAGNOSIS: Eye forming bulge of anterolateral cephalic corner, but hiding small cusp on cephalic lobe medial to ocular bulge, eye with distinct core of dark pigment; accessory flagellum of medium length, composed of one long article tipped with subcoalesced article 2; antenna 2 elongate; article 3 of mandibular palp thin for genus; coxa 1 formed of rectangular lateral shield and anteroventrally projecting, slightly turned, mesially projecting conical extension, coxa 2 and ventral margin of pereonite 2 widened especially in terminal male; article 5 of gnathopod 1 with truncate, rectangular posterior lobe, article 6 scarcely expanded, palm indistinct from posterior margin of hand, armed with long setae and about five stout spines in male, fewer spines (generally one) in female; anterodistal margins of article 2 on male gnathopod 2 strongly lobate bilaterally, weaker in female, article 4 in male small, with weak distal cusp, article 5 scarcely evident, article 6 elongate, tumid, hemioval, palm long, with short setae, defined by two spinose acclivities, palm with minute waves of tubercles, no distal processes, dactyl fitting palm; female article 4 large, protruding, heavily spinose, article 5 well developed, article 6 sub-

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

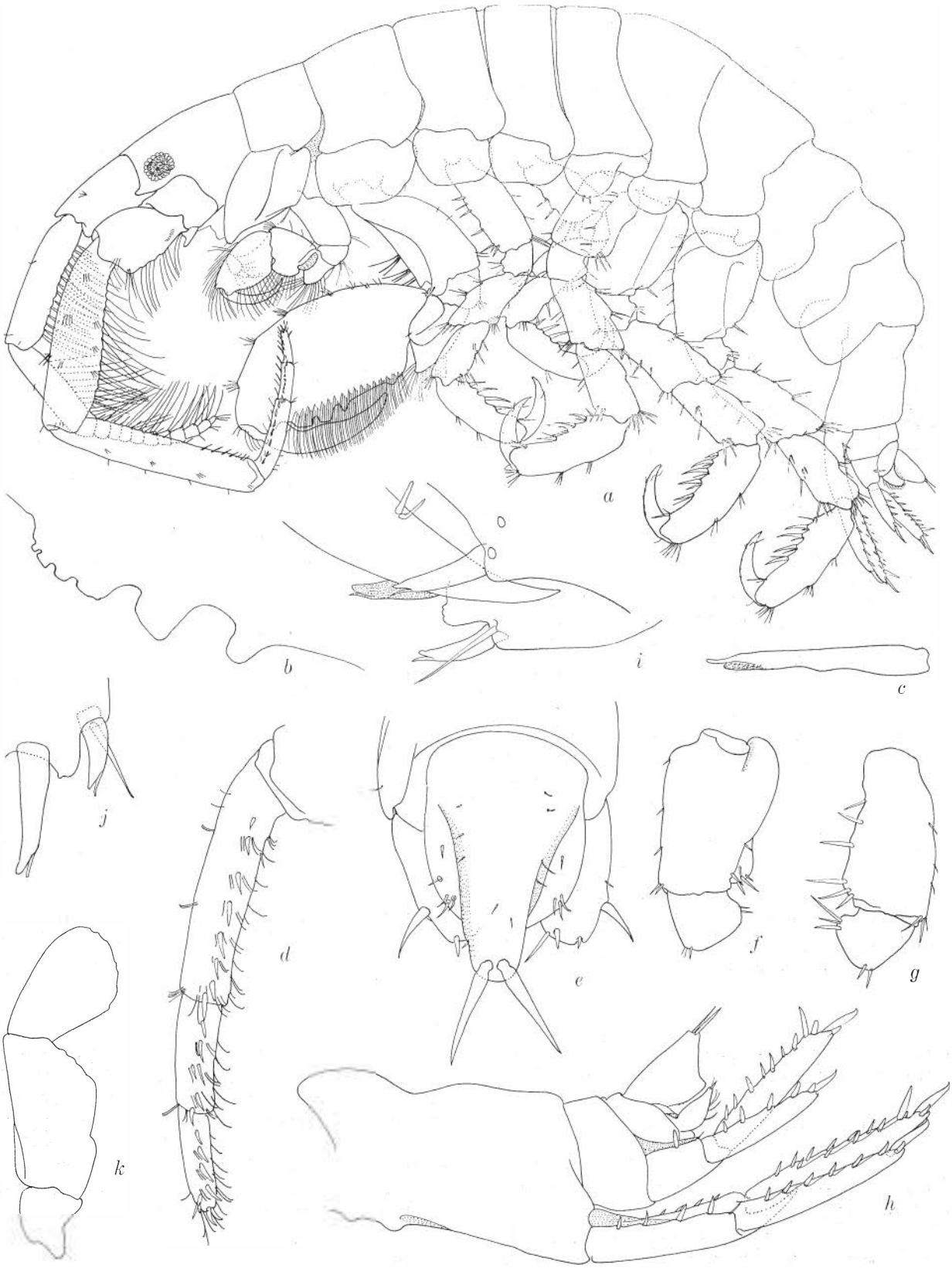


FIG. 85. *Podocerus wanganui* n. sp., holotype, male, 7.7 mm, NZOI Sta E 973 [JLB NZ-8]: *a*, body; *b*, palmar outline of gnathopod 2; *c*, spine on pereopod 2; *d*, flagellum of antenna 2; *e*, telson and pair of third uropods; *f*, aberrant articles 2–3 of right pereopod 3; *g*, articles 2–3 of left pereopod 2; *h*, urosome. Female, 5.2 mm: *i*, *j*, palmar defining corner of gnathopod 2, lateral and medial; *k*, outline of mandibular palp.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

circular, palm extending along most of posterior margin of hand, defined by two spinose acclivities; article 2 of pereopods 1, 2, 4, 5 weakly bilobate anteriorly or posteriorly, pereopod 3 with one strong posteroventral lobe, active margin of article 6 on pereopods with about four evenly spaced clumps of thin spine-setae; outer rami of uropods 1–2 reaching about 0.67 and 0.60 along inner rami, uropod 1 with strong interramal tooth, uropod 2 with tiny tooth; telson long, apicoposteriorly nasiform but dorsal lobe not erect, bearing two stout spines; dorsal tooth-carina on pereonite 7 and pleonites 1–2 sharp.

HOLOTYPE: NZOI, No. 99, male, 4.9 mm.

TYPE LOCALITY: NZOI Sta. E967, Eve Bay, Wellington, New Zealand, intertidal wash of algae, 5 November 1967.

RELATIONSHIP: This species is not identifiable with either of the two species of *Podocerus* previously recorded from New Zealand. Those species are the Australian *Podocerus* "*laevis*" (Haswell) (= *P. wanganui*, n. sp.) reported by Chilton (1926), and *Podocerus cristatus* (Thomson 1879b) described from Dunedin Harbour and reported again by Thomson (1880b) and Chilton (1926) and from Australia under the synonyms of *Cyrtophium dentatum* Haswell (1880b) and *Dexiocerella dentata* Haswell (1885). It is unclear whether the various references to these two species were properly identified, but *Podocerus manawatu* n. sp. differs from all in the weak article 4 of male gnathopod 2 and the expanded hand of gnathopod 1; from most in the lack of processes on the palm of male gnathopod 2; and from *P. laevis* in the presence of a dorsal tooth-carina and the regular distribution of thin spines on the active margins of article 6 on the pereopods.

The juvenile lacks the dorsal tooth-carina, but no variation in terminal adults has been detected.

The epistome is acutely produced.

This species seems to differ least of any from *Podocerus variegatus* Leach (*see* Chevreux and Fage 1925) but is marked by the dorsal tooth-carinae, the sharp coxa 1, and the short setae of male gnathopod 2.

Podocerus manawatu is also close to "*Platophium laeve* (Haswell)" of Walker (1904) from the Gulf of Manaar, but that species has a rhomboid coxa 1, an expanded hand on gnathopod 1, articles 4 and 5 especially of male gnathopod 2 are larger, and pereopod 3 has a subquadrate posteroventral corner on article 2 lacking spines.

"*Podocerus brasiliensis* (Dana)" of J. L. Barnard (1970), from Hawaii, generally seems to represent various identifications of *P. brasiliensis* in gross differences from *P. manawatu:* the absence of a tooth-carina, long setae on male gnathopod 2 palm, numerous telsonic spines, subquadrate, trapezoidal but non-acute coxa 1, and expanded hand of gnathopod 1.

MATERIAL: NZOI Sta. E966 (11), Sta. E967 (16), Sta. E969 (5), Sta. E971 (1), Sta. E973 (7), Sta. E975 (55), Sta. E978 (5), Sta. E979 (80), Sta. E980 (1), Sta. E982 (3).

DISTRIBUTION: Dunedin; Kaikoura; Wellington; Gisborne; Whangaparaoa Peninsula; Leigh.

Podocerus wanganui, new species

Figs. 85, 86

Podocerus laevis. Chilton, 1926: 513–515, fig. 1 (not Haswell, 1885).

NOMENCLATURE: There may be strong similarities between New Zealand and Australian species of this genus that led Chilton to identify neozelanican specimens with *P. laevis.* The widely distributed material at hand seems typical of Chilton's notes and drawings, but it differs in several gross points from material sketchily described by Haswell from Australia. The antennae are much shorter than described by Haswell and article 2 of antenna 1 is shorter and the flagellum of antenna 2 much longer than he described. The hand of gnathopod 1 of *P. laevis* seems much broader than in neozelanican material, but Haswell's drawings may not be reliable, as he apparently did not properly discriminate articles 3–5 of gnathopod 2.

DIAGNOSIS: Eye in terminal adult small, distinctly posterior to sharp anterolateral cephalic corner, eye not forming any lateral bulge and with distinct core of dark pigment; accessory flagellum of medium length and formed of 1 article, antenna 2 not elongate; article 3 of mandibular palp of normal stoutness; coxa 1 broad, formed of weak rectangular lateral shield and well developed anterodistal coniform extension, coxa 2 and ventral margin of pereonite 2 widened in terminal male; article 5 of gnathopod 1 with truncate, rectangular posterior lobe becoming adze-shaped in male, article 5 moderately expanded near base, armed with long setae and six or seven stout spines in both sexes; anterodistal margins of article 2 on gnathopod 2 strongly lobate bilaterally but medial lobe sharply nasiform, lobes weaker in female, article 4 of medium size in male, with strong distal attenuation, article 6 slightly elongate, tumid, hemioval, palm long, with long setae, defined by weak tooth and bearing two narrow and one broad teeth near distal end, palm with minute waves of tubercles, dactyl just failing to reach palm; female article 4 large, protruding, spinose, article 5 well developed, article 6 ovatocircular, palm extending along most of posterior margin of hand, defined by two spinose acclivities; article 2 of pereopods 1–5 with only one well developed lobe anteriorly or posteriorly, active margin of article 6 with about five strongly spinose acclivities covering proximal two thirds of margin; outer rami of uropods 1–2 reaching about 0.80 and 0.70 along inner rami, uropod 1 with strong interramal tooth, uropod 2 lacking tooth; telson long, apicoposteriorly nasiform but dorsal lobe not erect, bearing two stout spines; dorsal humps of pleonites 1–3 weak.

HOLOTYPE: NZOI, No. 100, male, 7.7 mm.

TYPE LOCALITY: NZOI Sta. E973, St. Clair, Dunedin, New Zealand, intertidal wash of algae, 25 January 1968.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

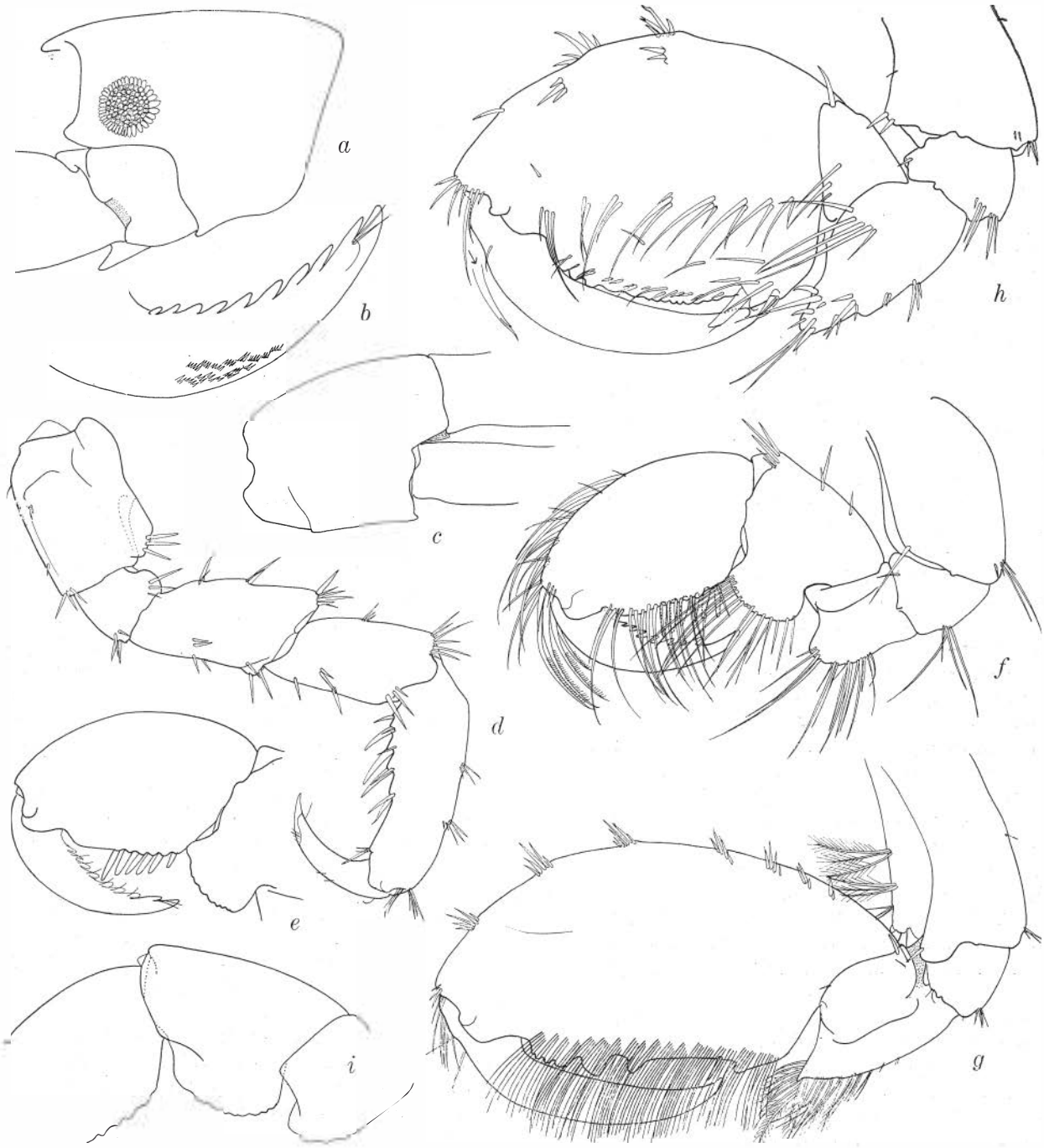


FIG. 86. *Podocerus wanganui* n. sp., holotype, male, 7.7 mm, NZOI Sta. E 973 [JLB NZ-8]: *a*, head; *b*, dactyl of gnathopod 1; *c*, ramal-peduncular ventral junction of uropod 2; *d*, pereopod 3; *e*, *f*, gnathopod 1; *g*, gnathopod 2. Female, 5.2 mm: *h*, medial gnathopod 2; *i*, outline of article 5 on gnathopod 1.

RELATIONSHIP: This species differs from *P. laevis* (Haswell) as outlined in the nomenclatural section above. It differs from other intertidal New Zealand species at hand by the flat-sided head having no ocular bulge, the short antennae, the heavy pereopodal spination on article 6, and in the male by the special configuration of palmar teeth on gnathopod 2. *Podocerus lobatus* (Haswell 1885) and the "*P. lobatus*" of Pirlot (1938) have a weak affinity with *P. wanganui* but need re-investigation of many details.

MATERIAL: NZOI Sta. E973 (2).

DISTRIBUTION: Cape Maria van Diemen; "New Zealand, common in roots of seaweed; on *Boltenia*"; Dunedin.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

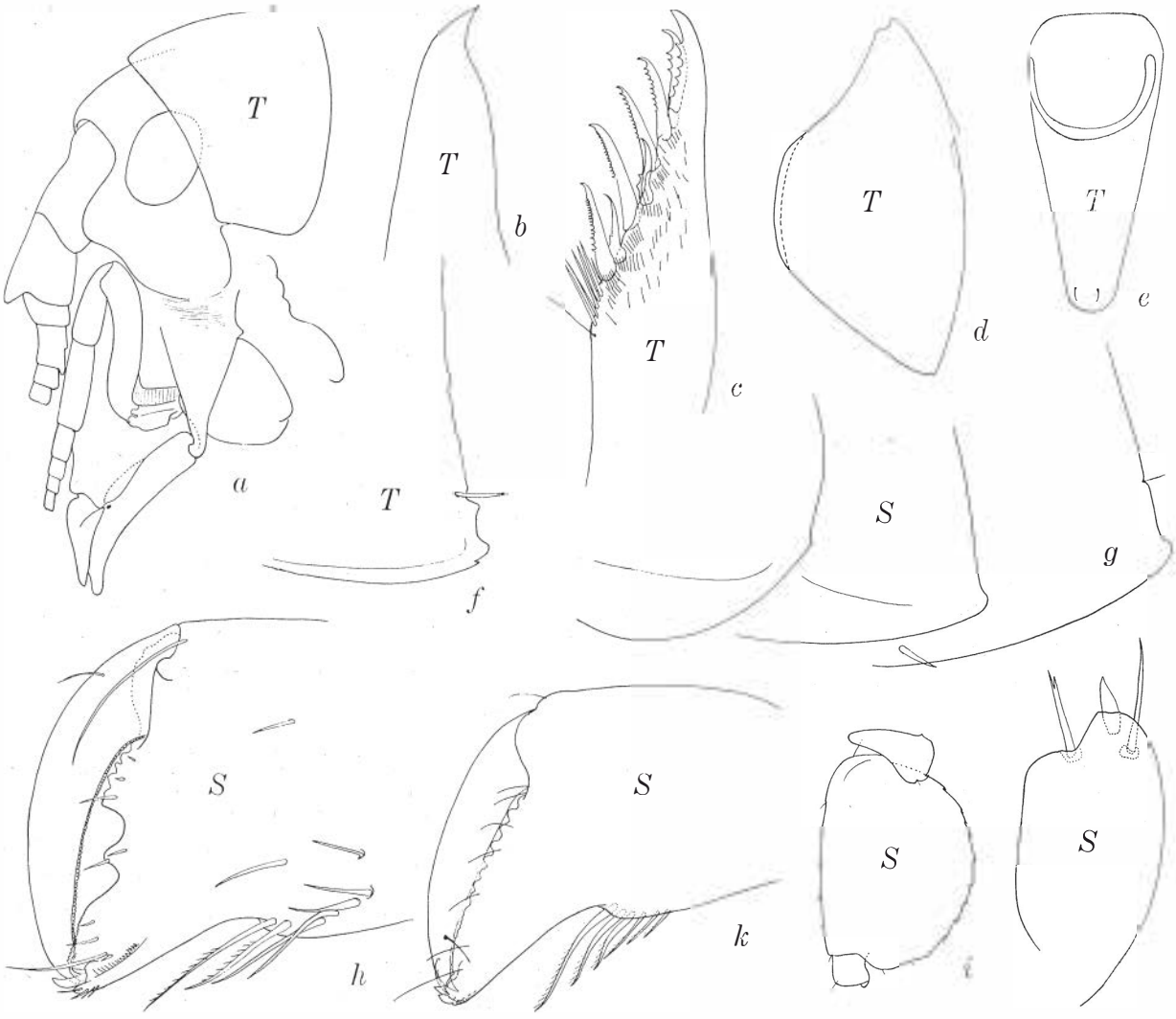


FIG. 87. *Tetradeion crassum* (Chilton) (T), female, 3.3 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, head; *b*, apex of one lobe of lower lip, setules omitted; *c*, outer plate of maxilla 1; *d*, coxa 1; *e*, telson; *f*, pleonal epimeron 3.

Seba typica (Chilton) (S), male, 2.4 mm, NZOI Sta. E 967 [JLB NZ-2]: *g*, pleonal epimera 1–3; *h*, apex of gnathopod 1, medial; *i*, base of pereopod 5; *j*, inner plate of maxilliped. Juvenile, 2.0 mm: *k*, apex of gnathopod 1.

SEBIDAE

Seba typica (Chilton)

Figs. 87*g–k*

Teraticum typicum Chilton, 1884a: 257–258, pl. 18, fig. 1.
Seba saundersii. Chilton, 1892: 260–261 (not Stebbing 1875).
Seba typica. Thomson and Chilton, 1886: 148; Chilton, 1906c: 572–573, 1 fig.; 1924a: 269.
?Seba typica. Chilton, 1921b: 56–59, fig. 6.

Chilton considered all species of *Seba* to be synonymous and Stebbing (1906) placed *S. typica* with *S. saundersi* Stebbing, but the various members have since been treated as good species. This procedure should be continued until some clear evidence to the contrary is available. Chilton's (1921b) material from Flinders Island, Bass Strait, is thus questioned in the synonymy above and would most certainly have been described as a distinct species by most workers. It has several morphological differences from New Zealand *Seba*, among the most prominent being the large inflated article 4 of pereopod 5 and the moderately large article 4 on pereopod 4. The Flinders material thus resembles *Seba antarctica* Walker (1907) and *S. subantarctica* Schellenberg (1931).

Schellenberg (1931) has coalesced *S. armata* (Chevreux) and *S. dubia* Schellenberg (1926) under *S. saundersi* Stebbing (1888), but geographically this seems to be an oddly disjointed amalgamation. *Seba typica* differs from those forms or species in the broader article 2 of pereopod 5. It differs from *S. saundersi*, *S. dubia*, and *S. saundersi* forma *georgiana* in the broad, ornamented palm of male gnathopod 1, which in the other species has a stout but attenuate thumb and narrow hand. *Seba saundersi* has the posterior margin of the hand fully setose from its base up to the posterior declivity and

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

has a shortened peduncle of uropod 1 in comparison to other species. *Seba armata* (*see* Chevreux and Fage 1925) has a different configuration of pleonal epimera 1–3 from *S. typica* and the dactyl of male gnathopod 1 has a proximal hump.

Seba typica may be compared with *S. ekepuu* J. L. Barnard (1970) to save repetitive illustrations. The two species are similar in antennae except that article 1 of antenna 1 is slightly shorter in *S. typica*; they are also similar in head, maxillae 1–2, pereopods 1–4, and uropods 1–3 except that *S. typica* has a spine on the inner ramus of uropod 2. The telson of *S. typica* is slightly narrower than that of *S. ekepuu*, the mandibular palp has two setae on article 2, maxillipedal palp article 4 has a distinct, small apical nail, and the inner plate of the maxillipeds is strongly different (compare Fig. 87*j*). The coxae of *S. typica* are slightly broader than those of *S. ekepuu* and article 2 of pereopod 5 is evenly hemicircular on its posterior half and not distally tapering as in *S. ekepuu*.

MATERIAL: NZOI Sta. E967 (3), Sta. E970 (2), Sta. E975 (1), Sta. E976 (6), Sta. E977 (1), Sta. E980 (4), Sta. E981 (3).

DISTRIBUTION: Lyttelton; Kaikoura; Wellington; Whangaparaoa Peninsula; Leigh; Tapeka Pt.

STEGOCEPHALIDAE

Tetradeion crassum (Chilton)

Figs. 87*a–f*

Cyproidea (?) *crassa* Chilton, 1883: 80–81, pl. 3, fig. 1; Thomson and Chilton, 1886: 150.
Tetradeion crassum. Stebbing, 1899d: 207; 1906: 157; Chilton, 1924b: 631–637, figs. 1–20; K. H. Barnard, 1930: 329; Hurley, 1955: 197–199, figs. 1–13.

The unique species of an unusual stegocephalid genus, *Tetradeion crassum*, was redescribed by Chilton (1924b) in good detail, but Hurley (1955) has corrected a number of points not adequately represented in Chilton's apparent free-hand drawing of the body. Though *Tetradeion* is easily recognised, a few more minor points are added plus further notes on true variations that occur in several individuals of the species.

Antenna 2 has the basal insertion point removed to a far ventral position for a stegocephalid, with article 2 vaguely apparent and article 1 indistinguishable, though weak scleritic lines suggest its presence. The peduncle is clearly geniculate at the base of article 3 and is flexed dorsally so that article 3 lies along the anterior cephalic margin. In Wellington specimens the lengths of articles 3–5 are intermediate between the extremes noted by Chilton and Hurley. The general relationships in length resemble those drawn by Chilton but articles 4 and 5 are slightly more elongate and relatively unequal, article 4 being the shorter.

Apices of the lower lip in one specimen are simple and sharp, unlike the typically ragged condition.

The outer plate of maxilla 1 is figured herein in flattened condition to show the spine distribution.

Article 4 of the maxillipedal palp is articulate and one third of its distal extent is composed of an articulate spine.

Articles 5 and 6 of pereopods 1–5 are relatively more elongate and article 4 shorter and stouter than in specimens hitherto reported.

Pleonal epimeron 3 is figured to confirm Hurley's reconstruction.

The telson is slightly more elongate in a large specimen at hand than shown by Chilton.

MATERIAL: NZOI Sta. E966 (1), Sta. E967 (6), Sta. E970 (17), Sta. E971 (1), Sta. E973 (9), Sta. 979 (1), Sta. E982 (1).

DISTRIBUTION: New Zealand; Brighton (off *Elzerina blainvillei*); Dunedin; Oamaru; Lyttelton; Kaikoura; Wellington; Hawkes Bay; Gisborne; Whangaparaoa Peninsula; North Cape (3 m).

STENOTHOIDAE

Subfamily STENOTHOINAE

Probolisca ovata (Stebbing)

Figs. 89*f–j*

Metopa ovata Stebbing, 1888: 764–767, pl. 44.
Metopella ovata. Stephensen, 1927: 309; Nicholls, 1938: 48.
?Metopella ovata. Chilton, 1923b: 241.
Probolisca ovata. Gurjanova, 1948: 323.

One specimen of this species has been compared minutely with Stebbing's original description of the species and found to differ only in the following minor points:

(1) the inner plate of the maxilliped has an additional medial subterminal spine;

(2) male coxa 2 is slightly less comma-shaped;

(3) the palms of the gnathopods are nearly perfectly transverse;

(4) coxa 4 is slightly deeper posteriorly.

In addition the dactyls of the pereopods have a long comb-row and a weak distal acclivity only slightly indicated in Stebbing's drawings. The pleonal epimera are illustrated here from oil-immersion microscopy. The following appendages compare strictly with Stebbing's drawings: mandibles (but palps are here illustrated), maxillae, maxillipeds (except noted above), gnathopods (except noted above), pereopods, uropods, telson, and accessory flagellum.

MATERIAL: NZOI Sta. E966 (1), Sta. E973 (77 + juvs.), Sta. E974, (9).

DISTRIBUTION: Campbell Island, on the shore (Stephensen); Macquarie Island (locality uncertain. Nicholls 1938); Dunedin; Wellington.

EXTRINSIC DISTRIBUTION: South Orkneys; Strait of Magellan, 55 fm (Patagonia).

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

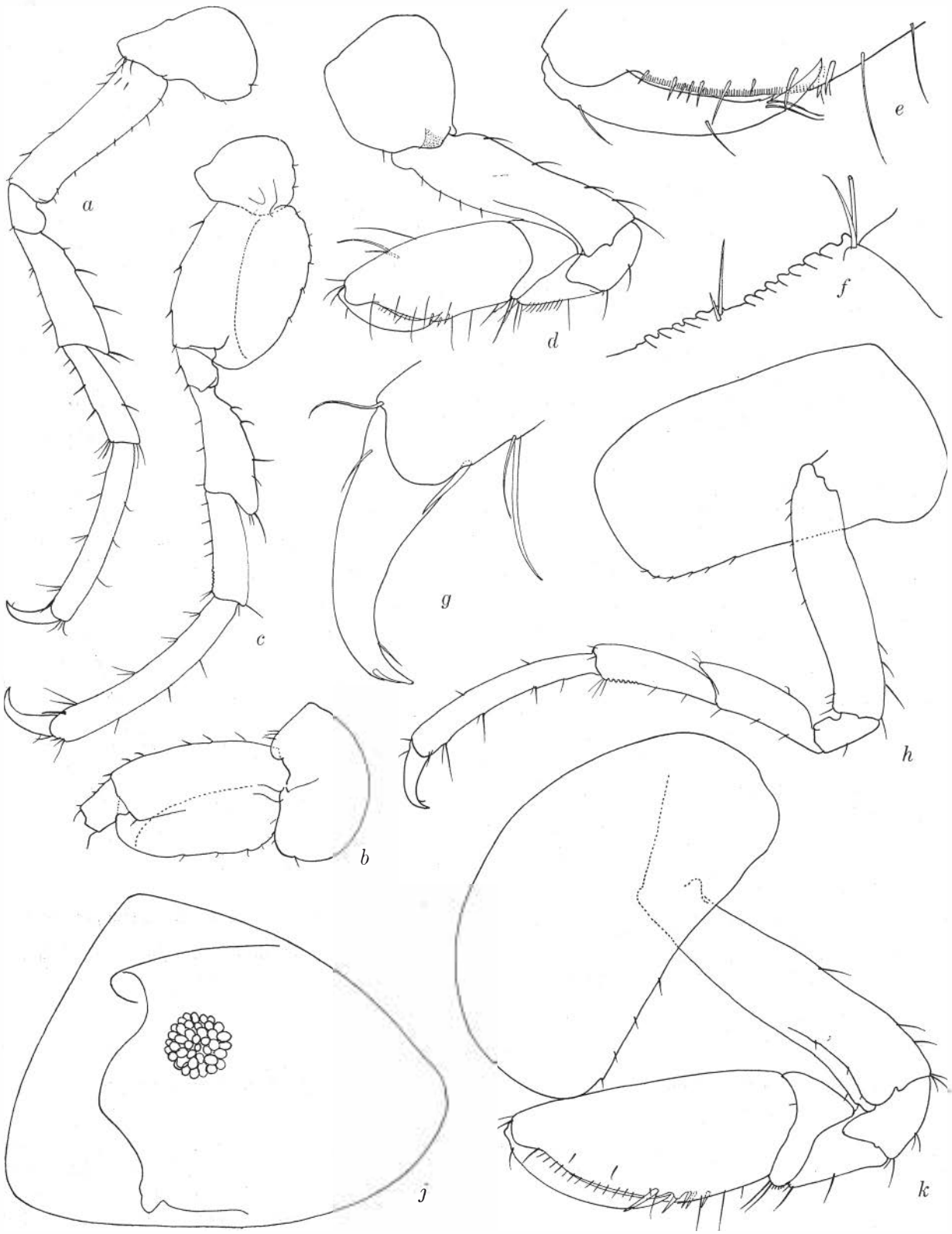


FIG. 88. *Stenothoe moe* n. sp., holotype, female, 3.0 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, *b*, *c*, pereopods 3, 4, 5; *d*, *e*, gnathopod 1; *f*, article 2 of pereopod 5, showing stridulating lumps; *g*, dactyl of pereopod 1; *h*, pereopod 1; *i*, head; *j*, coxa 4; *k*, gnathopod 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

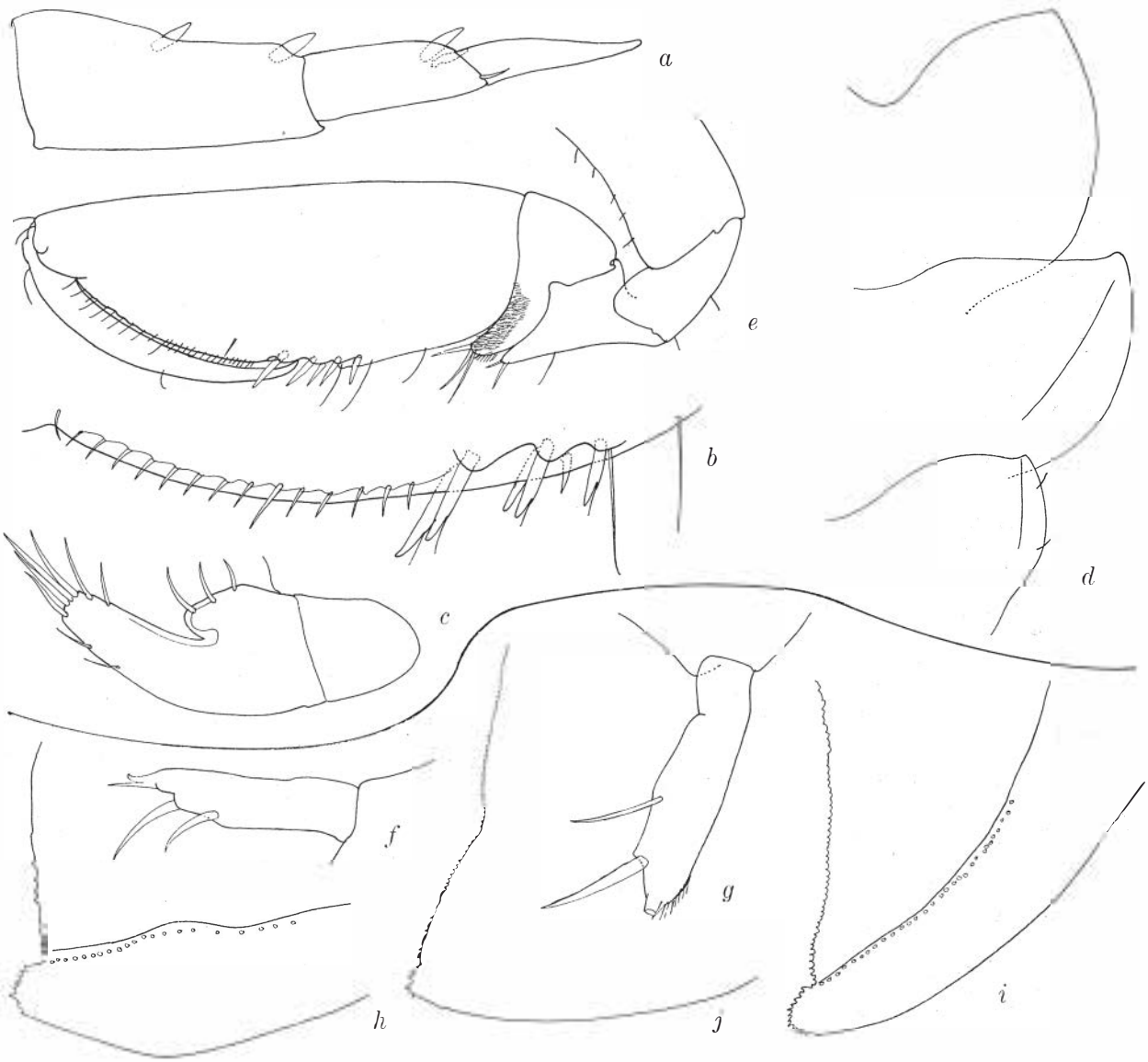


FIG. 89. *Stenothoe moe* n. sp., holotype, female, 3.0 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, uropod 3; *b*, palm of gnathopod 2; *c*, maxilla 2; *d*, pleonal epimera 1–3. Male, 2.4 mm: *e*, gnathopod 2.
Probolisca ovata (Stebbing), female, 1.7 mm, NZOI Sta. E 966 [JLB NZ-1]: *f*, *g*, mandibular palps; *h*, *i*, *j*, oil immersion views of posteroventral corners on right pleonal epimera 1, 2, 3.

Proboloides aurorae (Nicholls)

Metopoides aurorae Nicholls, 1938: 49–51, fig. 26.

DISTRIBUTION: Macquarie Island, in roots of kelp washed up after storm.

Stenothoe aucklandicus Stephensen

Stenothoe aucklandicus Stephensen, 1927: 311–313, fig. 8.

DISTRIBUTION: Auckland Islands, Carnley Harbour, under stones; Masked Island, rocky coast.

Stenothoe moe, new species

Fig. 88, 89*a–e*

DIAGNOSIS: Lateral cephalic lobe evenly submammiliform, anteroventral corner of head with slight downward protrusion; eyes of medium size, clear in alcohol; antenna 1 half length of body, antenna 2 nearly as long as antenna 1, length ratio of articles 1, 2, 3 of antenna 1 = 34:21:18, ratio of articles 4–5 of antenna 2 = 28: 33; maxilla 2 with vestigial inner lobe; gnathopod 1 with thin posterior lobe of article 5 tightly compressed to article 6 by triangular distally extending article 4, slightly under-

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

riding lobe of article 5 in terminal adults, article 6 of moderate stoutness but distinctly elongate, palm strongly oblique, nearly as long as posterior margin of hand and defined by two spines, dactyl smooth, palm pectinate; female gnathopod 2 representing enlarged version of gnathopod 1, with three or four spines (on each side) defining palm, male gnathopod 2 much larger and hand much more elongate; female coxa 2 slightly comma-shaped, that of male more strongly so: article 5 of pereopods 1–5 with slight stridulating lumps, locking spines simple, dactyls with weak distal setule and slight terminal sculpture, fourth articles narrow and poorly produced; rami of uropod 1 subequal, those of uropod 2 equal in length, outer rami of uropod 1 with three or more spines, of uropod 2 with one spine, inner ramus of uropod 1 with two or more spines, of uropod 2 with one spine; ramus of uropod 3 slightly longer than peduncle, longest extents of both articles of ramus equal: telson with two spines on each side, one in juveniles, and two spines unequal in intermediate stages; pleonal epimera 1–2 each with small posteroventral tooth, epimeron 3 evenly and sharply quadrate.

Maxilla 1, maxillipeds and mandibles grossly like those of *S. marina* (Bate) (*see* Sars 1895, pl. 80).

HOLOTYPE: NZOI No. 101, female, 3.0 mm.

TYPE LOCALITY: NZOI Sta. E967, Eve Bay, Wellington, intertidal wash of algae, 5 November 1967.

REMARKS: *Stenothoe moe*, *S. aucklandicus* Stephensen (1927), and *S. adhaerens* Stebbing (1888) have the aspect of the well-known northern *S. monoculoides* (Bate) in gnathopod 1 but have an elongate peduncle on uropod 3, various spines on the telson, and interequal rami of uropod 2. *Stenothoe moe* differs from *S. aucklandicus* in the absence of a midpalmar cusp on the gnathopods, the broader, more attenuate coxa 4, the stridulating lumps on the pereopods (which are weak on pereopod 3), and weaker spination on articles 5–6 of pereopods 1–5. It differs from *S. adhaerens* in the stridulating lumps, and the much narrower and less produced fourth articles of the pereopods.

Material of a species of *Stenothoe* from Timaru, New Zealand, cited by Chilton (1883 and 1884b) as *Montaguana* and *Montagua miersii* may belong with *S. moe*, but one cannot extend the identification to include Haswell's Australian *S. miersii* (which may be synonymous with *S. valida*) if Chilton (1923a) has correctly linked presumed females with males of that species. *Stenothoe miersii* could be a female of *S. valida* but it might be the female of another species or a male of yet another species. Specimens from Lyttelton cited by Chilton do not belong with *S. moe*, as they have small points on the gnathopodal palms. Presumably *S. moe* is distinct from Australian *Stenothoe miersii* because of the more oblique palm of gnathopod 1 in *S. moe*.

The stridulating lumps have been found only in the Wellington material, considered typical.

MATERIAL: NZOI Sta. E966 (2), Sta. E967 (41), Sta. E969 (14), Sta. E970 (45), Sta. E971 (14), Sta. E973 (12). Sta. E975 (16), Sta. E977 (3), Sta. E979 (5), Sta. E982 (8),

DISTRIBUTION: Dunedin; Kaikoura; Wellington; Gisborne; Whangaparaoa Peninsula; Leigh.

Stenothoe ?valida Dana

?Stenothoe valida Dana. Chilton, 1923a: 95–98, figure 5; 1924a: 270.
?Stenothoe adhaerens Stebbing. Chilton, 1892: 259–260 (not Stebbing).
?Montaguana miersii. Chilton, 1883: 79 (in part, material from Timaru, N.Z. probably is *Stenothoe moe*, n. sp.) (not Haswell).
?Montagua miersii. Chilton, 1884b: 1043 (in part, material from Timaru, N.Z. probably is *Stenothoe moe*, n. sp.) (not Haswell).
?Stenothoe ornata K. H. Barnard, 1930: 341, fig. 16.
?Probolium miersii. Thomson and Chilton, 1886: 150.

Chilton's (1923a) thesis that *S. miersii* (Haswell) is *S. valida* may be true, but the lack of illustrated details connecting Haswell's probable female to males of *S. valida* needs confirmation, and until that proof is available I cite Chilton's (1883) reference with the phrase "not Haswell". Chilton's (1883 and 1884b) references are obviously to non-males of *S. valida* (either true females of *S. valida*, females of some other species, or males of some other species) and they should be questioned until verified. But Chilton (1923a) definitely had New Zealand males of a *valida*-like species. There remains some difficulty in identifying this species (*see* J. L. Barnard 1970) and therefore I place a question mark on this whole problem.

DISTRIBUTION: Lyttelton; Port Chalmers; Cook Strait.

Subfamily THAUMATELSONINAE, new status

Parathaumatelson nasicum (Stephensen)

Fig. 90

Metopella nasica Stephensen, 1927: 309–311, fig. 7.
Parathaumatelson nasica. Gurjanova, 1938: 387.
Pseudothaumatelson nasica. J. L. Barnard, 1964: 71.

Pseudothaumatelson patagonicum Schellenberg (1931) was selected by J. L. Barnard (1969a) as type species of *Pseudothaumatelson* Schellenberg (1931). Schellenberg included *Metopella nasica* Stephensen in his genus but did not select a type. Gurjanova created *Parathaumatelson* for *Metopella nasica*, but J. L. Barnard (1964) pointed out the technical synonymy of *Parathaumatelson* with *Pseudothaumatelson* and synonymised the genera because Schellenberg had already included *P. nasicum* with *Pseudothaumatelson*. I now consider that the two species are not congeneric and revive the former status of both in removing *M. nasica* from *Pseudothaumatelson*.

This taxonomic problem extends beyond the two genera because of the Stenothoidae being unnaturally systematised by certain characters of mouthparts. The use of mouthparts as generic criteria, though valuable, throws together odd combinations of species with highly diverse gnathopodal morphology in the Stenothoidae and this is carried over into the thaumatelsonin section of

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 90. *Parathaumatelson nasicum* (Stephensen), ?sex, 1.5 mm, NZOI Sta. E 973 [JLB NZ-8]: *a*, body; *b*, head; *c*, right mandible; *d*, dactyl of pereopod 1; *e*, *f*, apices of gnathopods 1–2, lateral. ?Sex, 1.6 mm: *g*, upper lip; *h*, *i*, maxillae 1, 2; *j*, maxilliped; *k*, oblique right posterodorsal view of urosome; *l*, pleon.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

the stenothoids in the case at hand. There are several examples of species with obvious gnathopodal relationships forming pairs and triads of taxa now separated from each other generically on the basis of metameric differences in mandibular and maxillary palps. The problem of relationships is difficult to solve but vast material and computer assistance could shed light on the mouthpart situation. My belief that stenothoid genera at present signify not phyletic lines but grades of evolution suggests that the following differences between the thaumatelsonins at hand denote their generic separation.

The genera *Parathaumatelson* and *Pseudothaumatelson* have unusual characters in common: the nasiform process on antenna 1 and the similarity in urosomal outline, with a dorsal hump of urosomite 1 slightly overriding the fleshy telson, and with miniaturisation of urosomites 2–3. But the following characters of *P. nasicum* differ from those of *P. patagonicum*: the lack of a mandibular palp, better developed spination on the extramolarial space, longer antenna 1 with its shortened article 2, longer antennal flagella, absence of accessory flagellum, low diversity of gnathopods 1–2 with elongate rectangular hands, unbulging article 4, and absence of sharp lobes on articles 4–5 of gnathopod 2. In *P. patagonicum* gnathopod 1 is smaller than 2, has a short oval hand, and article 4 bulges deeply to form an underriding space between it and article 5.

The New Zealand specimens fit those shown by Stephensen (1927) for the type material of *P. nasicum* from the Auckland Islands, but several drawings supplement characters he did not include which may be of specific value. For example, the dactyls of the pereopods have a strong comb-row.

The epimera are microscopically ragged but not as grossly as in *Probolisca ovata* (see p. 155).

MATERIAL: NZOI Sta. E973 (8).

DISTRIBUTION: Auckland Islands, on the shore under stones; rocky coast; Dunedin.

Raumahara J. L. Barnard, 1972

DIAGNOSIS: Gnathopod 2 carpochelate; mandible lacking palp; palp of maxilla 1 biarticulate; antenna 1 lacking nasiform process on article 1; pereopods 3–5 with thin article 2; urosome and uropods of normal stenothoid dimensions; telson of normal dimensions, flattened.

TYPE SPECIES: *Raumahara dertoo* J. L. Barnard, 1972.

GENERIC COMPOSITION: To include *Prothaumatelson carinatum* Shoemaker (1955), from subarctic Alaska (Pt. Barrow).

REMARKS: This genus bridges the differences between the Stenothoidae and the Thaumatelsonidae to such an extent that the two families become qualitatively inseparable. The concept of a subfamily Thaumatelsoninae remains useful to recognise the three most typical genera, *Thaumatelson* Walker, *Prothaumatelson* Schellenberg, and *Pseudothaumatelson* Schellenberg as stenothoids with more or less gross modifications of the urosome, either full or partial coalescence of segments, with enlarged, vertically heightened, and laterally compressed telson or with posterior vaulting of one or more urosomal segments. Those characters differ inconsistently from genus to genus or species to species so that no clear, nonarbitrary statement can be made to define thaumatelsonids at full family level. The possibility that *Raumahara* occurs on the ancestral line to *Prothaumatelson* because of the congruent gnathopod 2, the fact that the type species of *Raumahara* is a stenothoid and not a thaumatelsonid, and the fact that the other two genera of thaumatelsonids have normal stenothoid gnathopods suggest that the various thaumatelsonins are but a polyphyletic group of highly specialised stenothoids in which modifications towards a solidified urosome have occurred in diverse ways.

Raumahara differs from other taxa of thaumatelsonins in the near absence of urosomal modifications. The "typical" thaumatelsonin has a greatly enlarged telson with vertical compression and a relative reduction in the urosome so that the telson dominates the complex; uropods 2 and 3 are relatively much smaller than uropod 1; more or less coalescence of segments occurs and occasional dorsoposterior vaulting occurs. *Raumahara* does have slightly disproportionate uropods in comparison to many stenothoids, but the telson, though slightly lengthened and spineless, is not laterally compressed. It bears deeply inserted sensory setules.

Raumahara carinatum (Shoemaker) is said to have urosomites 2–3 coalesced but that fact needs reinvestigation because the segments of *R. rongo* also appear coalesced until disarticulated. Urosomite 2 is found to be clearly distinct though dorsally obsolescent. *Raumahara* differs from its thaumatelsonin analogue *Prothaumatelson* in the absence of a mandibular palp, in the small flat telson, in the relatively even proportions of the urosome and its appendages and in the absence of a dorsodistal process on article 1 of antenna 1. *Raumahara* and *Prothaumatelson* differ from *Thaumatelson* and *Pseudothaumatelson* in the presence of a carpochelate gnathopod 2. That kind of gnathopod is not found in other stenothoid genera. Since *Raumahara* is obviously on a line of relationship containing *Prothaumatelson*, the former genus is included in the subfamily Thaumatelsoninae, but it should be accorded a position of transition between the two concepts. The two subfamilies are retained only as concepts and not as phyletic realities until these relationships can be explained.

Raumahara rongo, new species

Figs. 91, 92

DIAGNOSIS: Palm of gnathopod 1 transverse; dactyls of pereopods 1–5 short; coxa 2 distally broad and scarcely pointed; antenna 2 distinctly longer than antenna 1.

DESCRIPTION: The illustrations form the description;

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

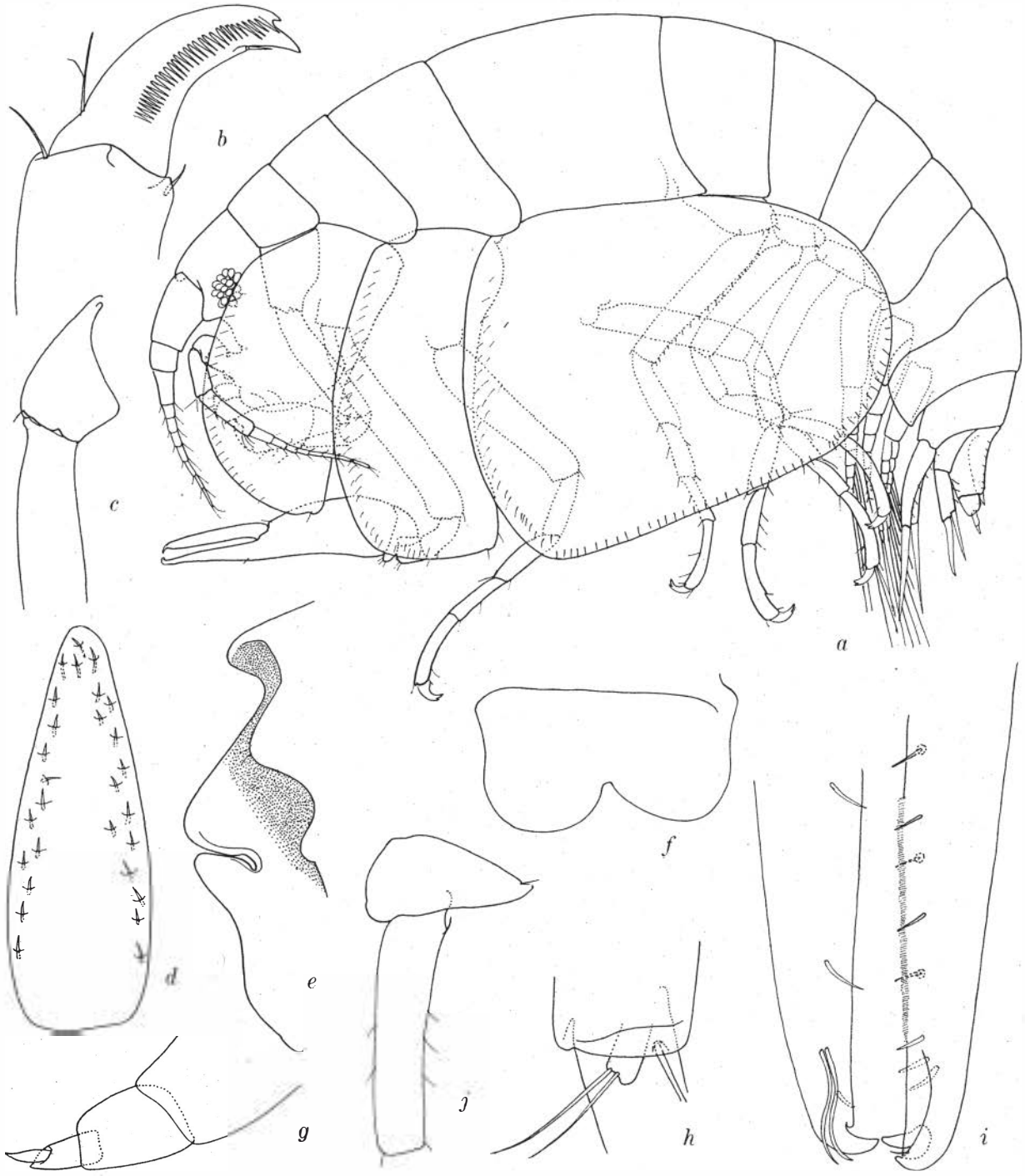


FIG. 91. *Raumahara rongo* n. g., n. sp., holotype, female, 2.1 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, body; *b*, dactyl of pereopod 5; *c*, coxa 1 and part of article 2, medial; *d*, telson; *e*, centre line of head; *f*, upper lip; *g*, uropod 3 attached to part of urosomite 3; *h*, accessory flagellum on antenna 1; *i*, apex of gnathopod 2. Female, 1.9 mm: *j*, coxa 5 and part of article 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 92. *Raumahara rongo* n. g., n. sp., holotype, female, 2.1 mm, NZOI Sta. E 970 [JLB NZ-5]: *a*, *b*, lateral gnathopod 1; *c*, *d*, mandibles; *e*, *f*, maxillae 1, 2; *g*, head; *h*, maxilliped; *i*, pleon.

body and coxae (those portions free to the environment) covered abundantly with very shallow craters armed with small, deeply inserted sensory setules, these ornaments easily visible under high-power stereoscopy by using oblique reflected light on shiny cuticle; body and eye bright orange to pink in 2-day formaldehyde, fading in alcohol; palm and dactyl of gnathopod 1 forming tight ciliatory space; outer plate of maxilla 1 with only six spines; minute accessory flagellum present.

HOLOTYPE: NZOI, No. 102, female, 2.1 mm.

TYPE LOCALITY: NZOI Sta. E970, Kaikoura, New Zealand, intertidal wash of algae, 22 January 1968.

REMARKS: The diagnosis distinguishes this species from *R. dertoo* and *R. carinatum* (Shoemaker), the only other species of the genus.

MATERIAL: NZOI Sta. E970 (89), Sta. E971 (1), Sta. E975 (2), Sta. E979 (13), Sta. E982 (4).

DISTRIBUTION: Kaikoura; Gisborne; Whangaparaoa Peninsula; Leigh.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Superfamily Talitroidea

Suprageneric Taxa in The Talitroidea

Bulycheva (1957) raised the family Talitridae to superfamily rank and created two new families, the Hyalidae and Hyalellidae, to join the Talitridae (*sensu stricto*). Although her arrangement was not perfect and has been criticised, more by word of mouth than in print, it opened new avenues of thought about the evolution of, and relationships within, the Talitroidea and closely related taxa. Two decades ago the literature contained scarcely any hint of familial diversity within talitrids. They were considered a tightly knit group represented by the hyalids, a marine group, the hyallelids, a freshwater group, and the talitrids, a terrestrial group. Bulycheva essentially arranged the genera into families representing these ecological groups. Although her morphological criteria do not precisely fit the three families and there is at least one conspicuous exception in the ecological position of a genus, her classification has strength and logic. Its weakness lies not so much in her arrangement as in Linnean nomenclature, with its two-dimensional structure and relatively small number of classificatory ranks.

Perhaps the strongest criticism of the Talitroidea concept is the equal status given the Hyalidae with other gammaridean families outside the Talitroidea. This could be rebutted by reducing the three talitroidean families to subfamily level.

The Talitroidea are more interesting to non-taxonomic biologists than are most marine gammarideans because they include numerous terrestrial species with patterns of distribution which may correlate with ages of islands or sequences of geostrophism; or their distribution patterns may shed some light on such sequences. The absence of truly terrestrial species in South America and the almost complete absence of freshwater species in the Northern Hemisphere are just two of the enigmas.

One often tends to attribute a great age to a group of organisms lacking close relationships. With poorly noticed exceptions, the Talitroidea have had the appearance of a tightly knit group with little relationship to other families of Gammaridea. Bulycheva considered only the classic talitroidan genera, but her scheme has opened the door to the admission of other families into the Talitroidea. So far, my re-evaluation does not appear to contribute any information to the origin of the group, but it demonstrates the probable radiation of marine talitroids into other than freshwater and terrestrial groups, and lessens the previous belief that talitroideans were morphologically isolated.

Family Dogielinotidae

The most incontestable addition to the Talitroidea is the family Dogielinotidae of Gurjanova (1953). This relationship has been suggested to me by Dr E. L. Bousfield. At present the Dogielinotidae comprise two genera and three species of marine (or brackish), shallow-water, burrowing talitroideans (J. L. Barnard 1967) with antennae, pereopods, and uropods 1–2 as in the Haustoriidae. The family is also characterised by a pendant epistomal lobe, perhaps another burrowing adaptation. Dr Bousfield (pers. comm.) has for description several more dogielinotid species from high latitudes of the north Pacific Basin, to which the family is believed to be confined.

Family Najnidae

Two "aberrant" genera of talitroids were generally unnoticed until Bulycheva partitioned the family. Bulycheva placed *Najna* of Derzhavin (1937) in the Hyalidae, but *Najna* differs from the Hyalidae not only in having an uncleft telson, giving it the appearance of a hyalellid, but also from the other talitroideans in having the mandibular molar replaced with a large spine or two. The basic talitroidean has retained a well developed triturative molar despite its invasion of freshwater and parallel emergence on to land. *Najna* also has irregularly shaped anterior coxae and the ramus of uropod 3 has become vestigial. Uropod 3 has its counterpart in the freshwater *Chiltonia* complex in the Hyallelidae and this might reduce its family significance in *Najna*. But this reduction in a marine genus may have more evolutionary significance than in a freshwater genus. There are many changes in the freshwater Gammaridae of Baikal, or of troglobitic Gammaridea, parallelling similar morphological changes that have been given family significance in marine groups. Coalescence of urosomites, loss of accessory flagella, pleopodal rami and mouthpart palps occur commonly in freshwater gammarids. Some changes of consistent qualitative character have been accorded family rank but a plethora of unusual, truly gammarid species remains; these may represent incipient families.

Najna, with its reduced molar and uropod 3, and coalesced telson lobes, vaguely suggests a stage incipient to the Phliantidae. The forehead of *Najna* has become significantly distinct in outline as if the antennae had moved ventrally. This appears to be a stage preceding the spherical head of many eophliantids, but even more, the ultimate flattening of the head in certain eophliantids and many phliantids. Irregularities of the anterior coxae suggest that *Najna* is not on the evolutionary sequence leading to Phliantidae because that family has a rigidly truncate ventral line on its anterior coxae. Moreover, *Najna* retains the slick, shiny, unornamented body of the marine talitroidean in contrast to the rugose pitted body and splayed coxae of the Phliantidae. In this, *Najna* stands closer to the Eophliantidae in which the body is smooth and cylindrical and has reduced anterior coxae. Reduction in size of the male gnathopod 2 in *Najna* has parallels in terrestrial talitroideans but here seems to have no family significance because reduction also occurs in the marine Bermudan talitroid *Insula* and because the opposite has occurred in *Ceina*.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Najna is certainly a significant departure from the basic talitroidean, and though it may not have differences as significant as, for example, those between the Amphilochidae and Leucothoidae, it does differ from Hyalidae as significantly as the Hyalellidae do, and I have created a family for it.

Family Ceinidae

Ceina Della Valle (1893) was established for *Nicea egregia* Chilton (1883) from New Zealand (*Ceina egregia* was adequately redescribed by Chilton in 1919a). Chilton's nomenclature disguises the fact that he believed he had a species of *Hyale*, as *Hyale* was later to be found a senior synonym of *Nicea*. Chilton thus clearly recognised *Ceina* as a talitroid. Stebbing (1906) retained *Ceina* in the Talitridae and in his key placed it next to the New Zealand freshwater *Chiltonia*, which it closely resembles in uropod 3 and maxillipeds. Pirlot (1936) described *Periphlias carinatus*, the type of a new genus from Indonesia and in 1938 synonymised the genus and species in Chilton's *Ceina egregia* after his error was pointed out by Schellenberg. Actually *Periphlias* and *Ceina* are synonymous, but the two species are distinct.

Following Bulycheva's arrangement of Talitroidea, Gurjanova (1958 and 1962) removed *Ceina* to the Prophliantidae. This family, proposed by Nicholls (1939) for the new genus *Prophlias*, has since been rearranged (J. L. Barnard 1964*) to exclude all genera included in it by Nicholls and Gurjanova except *Prophlias* and *Haustoriopsis* Schellenberg (1938). Gurjanova, while including *Ceina* in Prophliantidae, had already moved to Eophliantidae most of the necessary genera. Barnard also created the family Kuriidae for *Kuria* Walker and Scott, and removed *Ceina* to the Phliantidae.

I now propose a family Ceinidae for *Ceina*. Like *Najna*, but more so than *Najna*, *Ceina* represents a strong intergrade between talitroids and phliantids. It has characters of both families but is readily distinguished from either. Like *Najna* it has an aberrant mandibular molar—a long, conical, non-triturative protuberance. Though the molar may be more massive than that of a talitroid, its loss of trituration surface is significant; phliantids have a vestigial molar hump. *Ceina* has a flat subcircular peduncle and no ramus on uropod 3; phliantids do also with some reservations. The telson of *Ceina* resembles that of some species of *Allorchestes*, distinctly cleft but flat, with the lobes tightly appressed; the telson of phliantids is uncleft and reduced in size.

Ceina resembles phliantids in gross appearance to the extent of having a rough skin texture. It has rudimentary dorsal humps; but unlike phliantids, its body is not depressed and its coxae are not splayed. The coxae are like those of phliantids in forming an even ventral line and in having a heavy line marking the subcuticular boundary and minute setular lines perpendicular to the stripe which the subcuticular boundry forms. Pereonite 1 in *Ceina* is dorsally extended so that the head hangs below it like those phliantids in which the head also hangs but is camouflaged by the splayed, anteriorly extended coxae. *Ceina's* head is large like that of talitroids, whereas the phliantid head is relatively inconspicuous.

I am struck by the similarity of heads in overall position, when preserved, in some hyalids, certain eophliantids, and *Ceina*. Hyalids are often preserved with partial anterior flexion so that the anterior segments pull slightly apart and the head becomes semigeniculate below; this is like the normal appearance of a *Ceina*, but even the latter becomes exaggerated in preservation. Eophliantids often occur in rigor mortis with the head completely flexed below. I presume that eophliantids have an extremely altered head musculature to permit the head to rotate for tunnelling in algal stipes, while *Ceina* and certain hyalids may have preadaptions for this function. Preservational defects may indicate this flexibility of the head.

That *Ceina* is not on a precisely direct line of evolution to phliantids but is only an indicator of a stage of evolution is seen in the remarkably chelate gnathopod 2 of males, which is not found in phliantids and marine talitrids. The basic male talitroid has an enlarged subchelate hand in gnathopod 2. J. L. Barnard (1969a) has suggested that the primitive amphipod necessarily has a strongly dominant gnathopod 2 but that subsequent evolution has mostly resulted in reduction of that gnathopod. Re-emergence of male gnathopod 2 as a dominant appendage occurs again and again in amphipods in highly specilised genera far removed from the conceptual primitive member. The genetic flexibility of gnathopod 2 is unquestioned. Its odd shape in *Ceina* may be a mark of adaptation or it may be a special requirement for an intermediate stage between talitroids and phliantids. In this intermediate niche, the chelate gnathopod 2 may have special selectional value but this would not have precluded neotenous survival of *Ceina* elsewhere. In that case, the female and juvenile kind of gnathopod 2 could have been selected, thus resulting in evolution back towards advanced talitroids and phliantids.

Like various phliantids, prophliantids, and eophliantids, but not *Najna*, *Ceina* apparently has article 1 of antenna 2 coalesced with and incorporated into the head.

If *Ceina* represents a remarkable grade of evolution between talitroids and phliantids, a second genus from New Zealand, *Taihape*, is an equally remarkable stage between talitroids and *Ceina*, thus narrowing the gap even further. *Taihape* has rough skin, rudimentary dorsal bulges, coalesced article 1 of antenna 2 and many other similarities to *Ceina*, but the mandibular molar is intermediate between that of talitroids and *Ceina*, since it remains subcylindrical and has extremely weak apical rugae. Uropod 3 strikingly resembles that of

*See J. L. Barnard, 1970, *Crustaceana, 19:* 161 for full synonomy of Atylidae and Prophliantidae with Dexaminidae.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

freshwater New Zealand *Chiltonia*. The telson is dorsally cleft, though it is unlike that of *Ceina* in being appressed together as a tent, as in *Hyale* and certain members of *Allorchestes*. (Note: *Allorchestes* can possibly be divided into two genera on the shape of its telson†.) The head of *Taihape* remains rigidly in normal position after preservation. Numerous other small points suggest that *Taihape* is not the direct ancestor of *Ceina* any more than *Ceina* is a direct living ancestor of phliantids, but the two genera are probably descendants of genera that were themselves ancestors of phliantids. *Taihape* could be retained in Hyalidae without much disturbance to that concept, but it cannot be happily assigned to the Ceinidae any more than Bulycheva's arrangement of the Talitroidea permitted perfect assignment of the original talitroideans. If one were to to use the dorsal humps of *Taihape* as a qualitative distinction from hyalids, one would immediately be faced with *Allorchestes carinatus* Iwasa which has dorsal humps or crests in certain demes of its Bering Sea population. There is, however, little doubt in my mind that the uropod 3 of *Taihape* represents a fundamental departure from the hyalid facies.

A third ceinid genus, *Waitomo*, new genus, has a normal hyalid molar.

A divergence from Hyalidae towards Phliantidae could be envisioned through *Ceina*, *Taihape*, and *Waitomo*. The phliantids may have arisen from the Hyalidae through increase of dorsal rugosities, strong depression of body, flexion of the pleon under the pereon, reduction in size of head, reduction in size and coalescence of telsonic lobes, and further reduction and occasional loss of manibular molar.

Family Eophliantidae

The Eophliantidae as now constituted remain a puzzle and may represent a polyphyletic group. The presence on uropod 3 of two rami (*Amphitholina*) or their vestiges (other genera) does not suggest affinities with the Talitroidea even though hatched brood-pouch juveniles of the phliantid *Palinnotus* have the eophliantid morphology, with cylindrical bodies, large head, small and normal pereonite 1 (J. L. Barnard 1970). One is tempted to suggest that Phliantidae have arisen from Eophliantidae by a reversal of cylindricalisation but alternatively, one might suggest a neotenous evolution of Eophliantidae through the Phliantidae. The latter would require the redevelopment of two rami on uropod 3 and a reversal to smooth skin. *Amphitholina* Ruffo‡ (previously considered an eophliantid) has distinctly biramous ampithoid uropod 3. This would suggest that the Eophliantidae are cylindricalised ampithoids with spherical or flattened heads for tunnelling into algae, but *Amphitholina* clearly belongs in the Ampithoidae because of its uropod 3 and not in the Eophliantidae.

†*Allorchestes* is to be restricted to species with vestigial palp on maxilla 1 and a flat, square and poorly cleft telson.

‡ = *Biancolina cuniculus* Stebbing but not *B. algicola* Della Valle.

Biancolina, which has two fully developed non-ampithoid rami, is here removed from the Eophliantidae and a new family created for it. This clarifies the Eophliantidae and reduces them to a compact group with clearly degenerate uropod 3 bearing only vestiges of rami. Whether the terminal peduncular structures of this uropod represent two rami is questionable but could possibly be elucidated from the embryology of the group. The removal of *Biancolina* takes out of the Talitroidea a genus that is clearly foreign to the group despite its convergent cylindrical body.

Diagnosis of Superfamily Talitroidea

Mandibular palp absent; uropod 3 basically uniramous, rarely with scale-like inner ramus, outer ramus fundamentally cylindrical, short, unflattened but ramus often becoming vestigial or occasionally absent; peduncle short; eyes ommatidial, normally paired; coxae 1–4 evenly elongate, usually quadratiform but rarely becoming pyriform, never acutely narrowed; mandibular incisor normal, lacinia mobilis present except in degenerate phyletic lines; inner lobes of lower lip usually absent; tube-spinning adaptations absent; pereopods 1–2 lacking glands, article 4 not abnormally elongate; inner plate of maxilla 1 poorly setose; plates of maxilliped well developed, palp broad and well developed but occasionally with terminal reduction; rostral structures poorly developed; urosomite 1 never elongate; telson not fleshy but otherwise variable; pereopods 4–5 subequal in length and generally similar in appearance; coxa 1 never significantly reduced in size relative to coxa 2 and 3; accessory flagellum absent; mouthpart field grouped quadrately.

Composition: Talitridae with subfamilies Talitrinae, Hyalinae, Hyalellinae; Dogielinotidae; Ceinidae with Ceininae and Chiltoniinae; Najnidae; Phliantidae; Kuriidae; Eophliantidae.

Differentiation: The combination of fundamentally uniramous uropod 3 and absence of mandibular palp differentiates Talitroidea from other gammaridean groups except those families in the Stenothoidae complex that have coxa 1 reduced in size in proportion to coxa 3.

Key to Families of Talitroidea*

1. Mandibular molar fully triturative.....2
   Mandibular molar not fully triturative.....5
2. Epistome with pendant lobe, antenna 2 especially heavily spinose on peduncle.....Dogielinotidae
   Epistome evenly rounded in front, antenna 2 with very weak or no spines on peduncle.....3
3. Urosomites coalesced.....Kuriidae
   Urosomites free.....4
4. Uropod 3 with ramus.....Talitridae
   Uropod 3 without ramus.....Ceinidae
5. Mandibular molar represented by articulate spines..... Najnidae
   Mandibular molar represented by fixed process or absent....6

*Ceinidae are cited twice in the key.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

6a. Body strongly depressed, coxae large and splayed, telson entire, abdomen strongly flexed beneath thorax, uropod 3 very small, hidden from lateral view, and tucked beneath telson (all marine).....Phliantidae
b. Body strongly cylindroid, coxae small, subovate and not splayed, telson cleft, abdomen unflexed, uropod 3 very small, hidden from lateral view, and tucked mostly beneath telson (all marine).....Eophliantidae
c. Body strongly compressed laterally, coxae large and not splayed, telson weakly cleft in marine forms, entire in freshwater forms, abdomen unflexed, uropod 3 small but visible from lateral view.....Ceinidae

TALITRIDAE *(sensu lato)*

DIAGNOSIS: Representing the basic talitroidean and containing the subfamilies Talitrinae, Hyalinae, and Hyalellinae but not Najnidae or three genera in the Chiltonia complex; body laterally compressed, rarely with dorsal carinae or humps; skin smooth*; head laterally compressed and unswollen asymmetrically; antennae without large spines; coxae 1–4 normally quadrate and unsplayed; mandibular molar heavily triturative, spine row well developed; setae of brood lamellae variable, often curl-tipped, occasionally simple in terrestrial members, urosomites free; uropod 3 with well developed ramus, rarely with scale-like inner ramus.

REMARKS: The family is divisible into three subfamilies that represent distinct ecological habitats, the Hyalinae in purely marine waters, the Hyalellinae mostly in fresh waters, and the Talitrinae on land, either as sandhoppers or truly terrestrial hoppers in forests (arboreal)—leaf-moulds, grasslands, and gardens. *Chiltonia*, *Austrochiltonia*, and *Afrochiltonia* are removed to the Ceinidae.

The Talitrinae and Hyalinae seem to be clearly distinct ecologically and by themselves would seem to be phyletically distinct in that the terrestrial genera do not appear to have evolved independently from various hyalids, or if they did there has been so much convergence in the terrestrial species and so much other differentiation in the Hyalinae that any polyphyleticism is completely disguised. But the Hyalellinae pose a problem; four of their genera are clearly limnetic, the monotypic *Insula* is marine, and *Parhyalella* has a mixture of marine, strand, and freshwater species. The situation would be clearer if the morphology of *Insula* Kunkel (1910) were better known; the fleshy uncleft telson suggests that *Insula* has evolved independently and is worthy of subfamily rank (as inferred by Bulycheva 1957). If this were so, the only problem in the other three families would be the ecological diversity of *Parhyalella*.

Few systematists have ever mentioned difficulty in determining whether a talitrid is fundamentally terrestrial, marine, or freshwater. Even if some of the species in terrestrial genera have been found in fresh water, they basically belong with terrestrial genera; the marine genera, now reduced to four, have been clouded in the past by various taxa better allocated to new families. The *Hyalella-Chiltonia* freshwater group seems not to have been confused with marine genera and the chiltonias are now removed from the family Hyalellidae.

Dissatisfaction with Bulycheva's neat arrangement of the subfamilies (families in the sense used by Bulycheva) is mainly on diagnostic points which had been accorded family importance but are truly variable; thus *Parallorchestes*, an obvious hyalin, has a 2-articulate first maxillary palp that is a partial diagnostic feature of talitrins—yet several talitrins actually lack a maxillary palp. Bulycheva synonymised *Parallorchestes* with *Parhyale* but *Parhyale* has a 1-articulate maxillary palp. *Parhyalella*, with uncleft, smooth telson, belongs with the Hyalellinae, but some members have such terrestrial pre-adaptations as reduced length of antenna 1. *Parhyalella* deserves study as a possible link between hyalins and talitrins on the one hand and hyalins and hyalellins on the other. Its existence alone suggests to me that Bulycheva's families should be reduced to subfamily rank.

Parhyalella may be a composite genus requiring further splitting. It contains marine species that may simply be hyalins in which the telson lobes have coalesced, as well as a few talitrins in which telson lobes have also coalesced with loss of spines but with retention of certain terrestrial characters such as disproportionate antennae. It could be that *Parhyalella* represents multiple links between hyalins and hyalellins, but it also has species in an early stage of pre-adaptation to the terrestrial regime. For *Parhyalella* to be a link between hyalins and talitrins would require an illogical reversal in telsonic morphology.

Bulycheva's arrangement should not be discarded because of a few exceptions in gill structure, maxillary palps, and spination when adding the word "usually" to various taxonomic definitions would allow acceptance of the concepts. This word is highly valuable in allowing taxa in various evolutionary stages to be taken into account in the fairly rigid Linnean system. Bulycheva's arrangement was justified; it may need modification, but it has greatly stimulated new studies on the intratalitrid evolution.

THE ECOLOGICAL TAXON

A non-morphological character is of little value to the systematist arranging organisms by shapes, but it is useful in indicating the need to look more closely at the morphology of populations which may later prove to contain cryptic species. A few species have been described solely on the basis of behaviour and function.

Despite the apparent ease with which talitrids have emerged from sea to land without major revolution in morphology, the apparently minor physiological and behavioural changes that have been visualised may be far more extreme to the amphipod than to the human observer. Hence, it seems highly significant that the migration of amphipods on to the land has only succeeded in one family of Recent amphipods. Whether sandhoppers may invade the fully terrestrial biome more

*An Australian *Hyale* has been found with weak cuticular pits resembling those of Ceinidae and Phliantidae.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

than once is not as significant as the fact that sandhoppers are pre-adapted for such penetration. To reach that pre-adaptation has required natural selection of many genetic changes. Terrestrial amphipods may prove to be diverse in genera and species, but in the complete gammaridean complex they represent only a narrow range of morphological diversity. They, like Baikalian gammarids, may often replicate characters typical of marine families of Gammaridea. A talitrin remains a recognisable talitrin whether it loses pleopods, palpar articles, uropodal rami, or develops new characters such as lengthening pereopodal articles. Some of the difficulty we have in accepting the terrestrial talitrids as a highly compact group, not fully distinct from their marine ancestors, is the repetition of characters known to distinguish marine families. Some of these characters, in terrestrial organisms, seem very radical and might even tempt taxonomists to divide terrestrial talitrids into groups of rank higher than genera. But we should remember that these organisms now operate in a different world of natural selection from that in the sea. The tightly knit group of talitrins no longer has competition from other Amphipoda, and selection in the marine environment no longer affects them except for having determined the genosomes they have taken ashore.

Talitrins may then develop characters that seem radically diverse to a marine taxonomist. Undoubtedly those terrestrial selective mechanisms are no less stringent, and this stringency may be estimated by the absence of any visible new order evolving out of talitrins. Perhaps they are youthful and that potential is still untested. In either case, the significance of talitrins in the overall diversity of Gammaridea is of small importance. They may give information about the overall genetic variety of gammarideans that would be difficult to detect in the marine groups, but the major lesson is to show that despite long lines of evolution, gammaridean genes may retain the potential to redevelop phenotypic characters seemingly lost. Selective mechanisms thus suppress these characters but do not necessarily result in permanent loss of genetic potential. A trend to enfeeblement of gnathopods may be reversed in an evolutionary sequence of considerable magnitude, and may again be of positive selection value. Such changes may occur very easily in a group of organisms in a highly distinct environment and they do not necessarily indicate a high degree of genetic input or long periods of slow change and adjustment; they may lack that rank we philosophically attribute to a genus, even though flocks of species in a biogeographic province may assume the magnitude and appearance of genera.

Subfamily Hyalinae

Allorchestes compressa Dana

Allorchestes compressus Dana. Stephensen, 1927: 351; ?Stephensen, 1938: 261.

An unclarified species.

DISTRIBUTION: Auckland Islands, on the shore or under stones; ?Campbell Island.

Allorchestes novizealandiae Dana

Allorchestes novi-zealandiae (and variant without hyphen) Dana, 1852: 207; 1853: 894–896, pl. 61, fig. 1; Miers, 1876: 125; Chilton, 1926: 517–518; Stephensen, 1938: 261; Hurley, 1957a: 927–931, figs. 147–169.
Allorchestes intrepida Dana, 1852: 207.
Allorchestes neo-zelanica. Thomson and Chilton, 1886: 144; ?Thomson, 1889: 260, pl. 13, fig. 3.
Hyale chiltoni Thomson, 1889: 206–207; Thomson, 1913: 245.
Hyale prevostii. Thomson, 1899: 204–205 (in part, not Milne Edwards).

DISTRIBUTION: Throughout New Zealand from Cape Maria van Diemen south to Foveaux Strait and Stewart Island; Chatham Islands.

Hyale campbellica (Filhol)

Hyale campbellica (Filhol). Chilton, 1909a: 644; Hurley, 1957a: 909–910.

This species remains of dubious identification.

DISTRIBUTION: Campbell Island.

Hyale grandicornis (Krøyer)

Nicea novae-zealandiae Thomson, 1879a: 235–236, pl. 10B, fig. 1.
Nicea neo-zelanica. Thomson and Chilton, 1886: 144.
Hyale novaezealandiae. Thomson, 1895: 211; Chilton, 1909a: 643; Nicholls, 1938: 125, figs. 64 d–f.
Hyale grandicornis (Krøyer). Hurley, 1957a: 904–909, figs. 1–23 (with references); Stephensen, 1949: 33–37, figs. 14–15.

MATERIAL: NZOI Sta. E976 (1), Sta. E978 (20), Sta. E980 (1), Sta. E981 (1).

DISTRIBUTION: Macquarie; Snares; Chatham Islands; Stewart Island; Otago region; Whangaparaoa Peninsula; Leigh; Tapeka Pt.

EXTRINSIC DISTRIBUTION: Apparently circum-subantarctic and circum-south warm-temperate with outposts in northern warm-temperate.

Hyale grenfelli Chilton

Hyale grenfelli Chilton, 1916a: 362–366, figs. 1–5; 1917a: 273–276, figs. 1–3; Hurley, 1957a: 919–922, figs. 91–117.

MATERIAL: NZOI Sta. E967 (117), Sta. E970 (101), Sta. E971 (19), Sta. E975 (5), Sta. E977 (172).

DISTRIBUTION: Kaikoura; Wellington; Mokohinau Is.; Leigh.

Hyale hirtipalma (Dana)

Allorchestes hirtipalma Dana, 1853: 888, pl. 60, fig. 4.
Nicea fimbriata Thomson, 1879a: 236, pl. 10B, fig. 2; Thomson and Chilton, 1886: 144.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Hyale trigonochir Walker, 1908: 37–38, pl. 5, figs. 5–7.
Hyale hirtipalma. Chilton, 1909a: 643; Stephensen, 1938: 261; Nicholls, 1938: 124–125, figs. 64a–c; Stephensen. 1927: 351; Stephensen, 1949: 30–33, fig. 13; Hurley, 1957a: 922–926, figs. 118–146.
Hyale fimbriata. Thomson, 1895: 211.

MATERIAL: NZOI Sta. E973 (7), Sta. E974 (13).

DISTRIBUTION: Auckland Islands and Campbell Island, on the shore under stones; Enderby Island; Antipodes Islands; Macquarie Island (roots of kelp, under stones); fish stomach; Brighton; Dunedin.

EXTRINSIC DISTRIBUTION: Apparently circum-subantarctic.

Hyale maroubrae Stebbing

Hyale maroubrae Stebbing, 1899a: 405–406, pl. 32c; Hurley, 1957a: 913–916, figs. 51–71 (with references).

MATERIAL: NZOI Sta. E967 (31), Sta. E972 (76).

DISTRIBUTION: Lyttelton; Kaikoura; Wellington.

EXTRINSIC DISTRIBUTION: Type locality, New South Wales; South Africa.

Hyale media (Dana)

Hyale media (Dana). Stephensen, 1949: 37–41, figs. 16–17; Hurley, 1957a: 916–919, figs. 72–90 (with references).

DISTRIBUTION: Dunedin to Auckland.

EXTRINSIC DISTRIBUTION: Various subspecies on islands, such as Tristan da Cunha; Nightingale; Puerto Rico; Cuba; Accessible; Cape Verde; Hawaii; ?Japan; but also recorded from continental regions such as the Congo, Brazil.

Hyale rubra (Thomson)

Nicea rubra Thomson, 1879a: 236, pl. 10B, fig. 3; Thomson and Chilton, 1886: 144.
Hyale pontica. Thomson, 1899: 205–206 (not Rathke); 1913: 244.
Hyale rubra. Hurley, 1957a: 910–913, figs. 30–50.

MATERIAL: NZOI Sta. E966 (57), Sta. E967 (28), Sta. E969 (318), Sta. E970 (49), Sta. E971 (357), Sta. E972 (2), Sta. E973 (246), Sta. E975 (100), Sta. E976 (3), Sta. E977 (67), Sta. E978 (6), Sta. E979 (61), Sta. E981 (28), Sta. E982 (40).
DISTRIBUTION: Throughout New Zealand.

EXTRINSIC DISTRIBUTION: A widespread cool-water Pacific Ocean species divisible into subspecies.

Hyale sp.

Hyale lubbockiana Sp. Bate. Thomson, 1899: 206.

This identification has not been further elucidated.

CEINIDAE J. L. Barnard, 1972

DIAGNOSIS: Talitroidea with laterally compressed bodies, marine forms with rough skin and humps, freshwater members with smooth* skin and no humps; head laterally compressed; antennae non-spinose; coxae 1–4 of normal quadrate proportions, not splayed; mandibular molar triturative but becoming progressively non-triturative and spike-like in advanced marine forms; setae of brood lamellae in marine members with flattened apical curl; urosomites free; uropod 3 lacking ramus.

DESCRIPTION: Upper lip occasionally bilobed slightly; palp of maxilla 1 present or absent; article 4 of maxillipedal palp well developed, unguiform; telson weakly cleft in marine forms, entire in freshwater forms.

CEININAE, new subfamily

DIAGNOSIS: Ceinidae with slightly to strongly cleft telson.

TYPE GENUS: *Ceina* Della Valle.

COMPOSITION: *Taihape*, new genus; *Waitomo*, new genus.

CHILTONIINAE, new subfamily

DIAGNOSIS: Ceinidae with uncleft telson.

TYPE GENUS: *Chiltonia* Stebbing.

COMPOSITION: *Afrochiltonia* K. H. Barnard; *Austrochiltonia* Hurley.

REMARKS: If *Parhyalella* links hyalins and non-marine subfamilies in the Talitridae, then the new genus *Waitomo* provides a parallel link between hyalins and ceinids, because the molar retains its full triturative condition, whereas *Taihape* of the Ceinidae has a weakly developed molar. Only *Ceina* has the fully unique spike-like molar. The molar of ceinids is not therefore its main morphological character, whereas the condition of uropod 3 is of primary importance in marine species. This distinction crosses old family and ecological boundaries to match the chiltonian uropod 3 and suggests that ceinids and chiltonias have some direct phyletic connection. They are morphologically distinct in telson structure. That *Waitomo*, the least specialised ceinid with hyalin molar and weakly roughened skin, is found in bathyal depths suggests that the initial evolution of the ceinid line may have taken place in deep waters away from competition by sublittoral hyalins, but that once various adaptations had been accumulated the ceinids reinvaded sublittoral depths and occupied niches significantly different from those of hyalins. Alternatively *Waitomo* could be a relict of the early evolution of the ceinids, and *Ceina* and *Taihape* could have replaced former waitomoan sublittoral populations. An end in the trend towards

*Specimens of *Chiltonia mihiwaka* (Chilton) have been examined; the cuticle bears shallow pits or punctations and has short scattered setae embedded and encapsulated.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

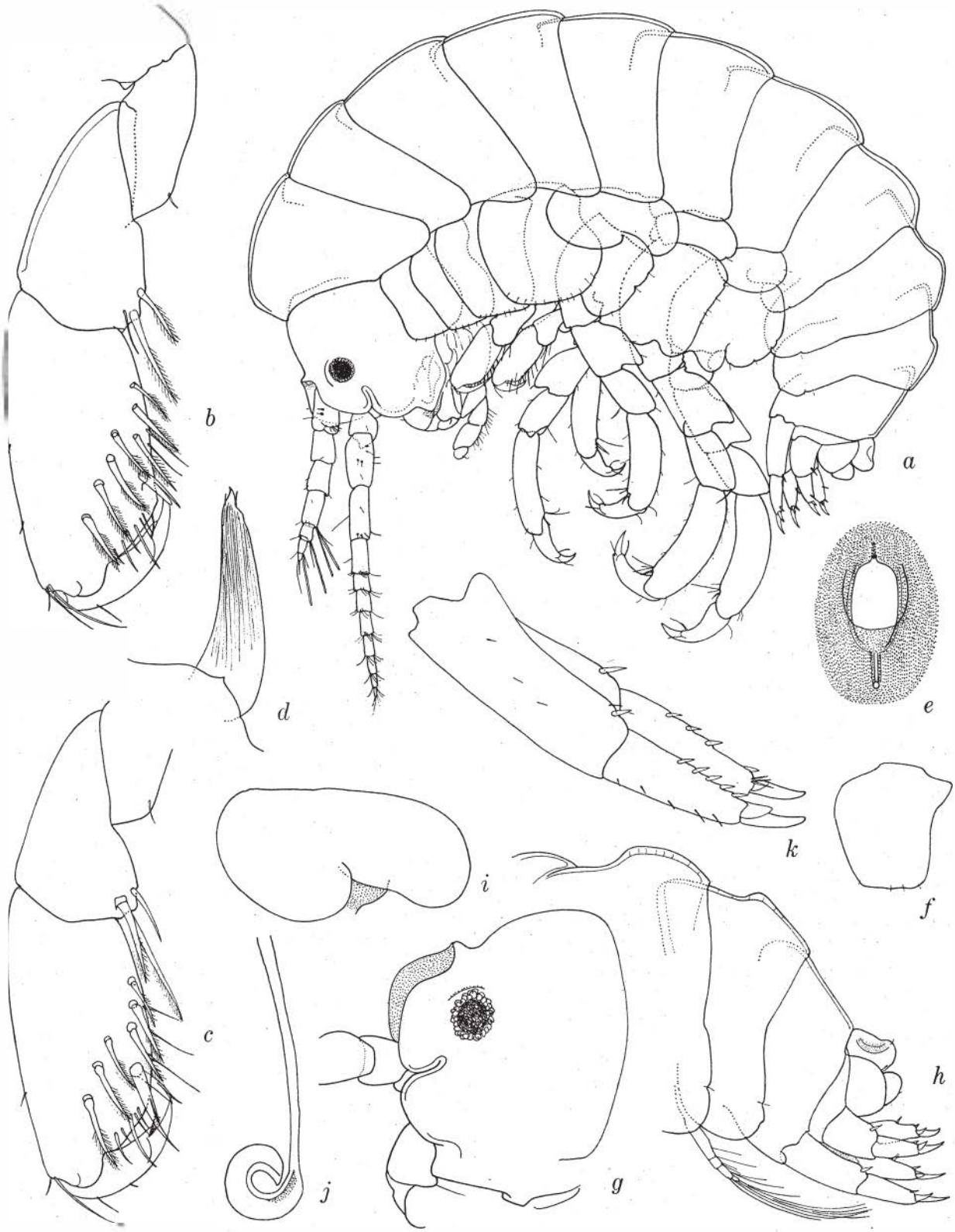


FIG. 93. *Ceina egregia* (Chilton), female, 3.6 mm, NZOI Sta. E 966 [JLB NZ-1]: *a*, body; *b*, *c*, gnathopods 1, 2, medial; *d*, right mandibular molar (striate): *e*, cuticular pit; *f*, coxa 3; *g*, head; *h*, pleonites 2–6. Female, 6.2 mm: *i*, coxa 5; *j*, brood lamellar seta. Male, 6.3 mm: *k*, uropod 1.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

extremely rough skin would be needed for ceinids invading fresh water. This suggests that the chiltonias have a different ancestry from the American freshwater hyalellins, despite at least one morphological convergence, the uncleft telson.

There are numerous biogeographic anomalies. If chiltonias are derived from marine ceinids, the ceinids survive in the marine world next to the most diverse assemblage of chiltonias, but the chiltonias have escaped to Australia and South Africa where marine ceinids are still unknown. This may indicate a former marine dispersal of a group which now survives in only a few areas. The exclusion of South America from an old Gondwanaland could be partially supported by this evidence. New Zealand shorelines appear to lack parhyalellins, but middle America has at least two and other species are distributed in India, Africa, Europe, and Hawaii. South America, thus isolated from the ceinid invasion of fresh water, was open to invasion by Tethyan hyalellins with adaptations like those of ceinids. The South African fresh water was closed to parhyalellins through either late marine dispersion or early occupation of the available niche by a chiltonian. Marine ceinids also occur in Indonesia (Sulu) and near South America (Juan Fernandez Islands) suggesting dispersion from a New Zealand control. Some might argue that they are relicts of a former wide dispersal, but the similarity of the Fernandez *Ceina* to the New Zealand species suggests a late dispersal from New Zealand.

Further speculation is unprofitable at present. We need studies on the biotopes and functional morphology of the genus *Parhyalella*, the diversity and biogeography of the South American freshwater *Hyalella;* we need a search of the South American littoral for *Parhyalella* in tropical waters, and for ceinids in cool waters, new studies on the South African chiltonian (*Afrochiltonia*), and extensive exploration of tropical African fresh waters where purely aquatic amphipods seem to be missing. That New Zealand's isolation has been important in providing an evolutionary base (or, alternatively, a reserve for relicts) is shown by the presence of Ceinidae, *Chiltonia*, *Paracalliope*, *Paracorophium*, *Paraleptamphopus*, *Phreatogammarus*, and a *Paracrangonyx*. The presence of *Paracalliope* in India and the Philippine Islands and of chiltonias in Australia and South Africa is also relevant to this argument. Perhaps both solutions apply.

Ceina Della Valle

Ceina Della Valle, 1893: 530; Stebbing, 1906: 554–555; Chilton, 1919a: 119–120.
Periphlias Pirlot, 1936: 295.

DIAGNOSIS: Rostrum weak and erect; antenna 1 longer than or equal to 2 and bearing numerous apical aesthetascs; epistome evenly rounded anteriorly; upper lip weakly incised; mandibular molar forming long thorn, not triturative; palp of maxilla 1 absent, small inner plate with several setules, outer plate with eight or nine spines; lobes of maxilla 2 subequal in width and length, armed terminally with stout setal spines, inner with only setules on medial edge; inner plate of maxilliped as long as outer plate, latter with sparse medial spines, palp very long and thick, with elongate and laterally extended article 1 and long unguiform article 4 bearing one or two stout apical spines and fascicles of minute setules on inner margin, palp article 3 with midapical comb of setal spines, article 2 with medial group of several spine setae, palp otherwise moderately setose; gnathopods 1–2 similar in female, hands elongate, rectangular, palms short but oblique, dactyls fitting palms defined by large spine, article 5 also partially elongate, gnathopods small; male gnathopod 2 becoming very large, article 5 becoming obsolescent and article 6 strongly chelate; pereopodal dactyls with luniform slit, two large and one small setules; pereopods 3–5 poorly setose; pleonites 4–5 not extended posteroventrally; telson formed of flat plate partially cleft; uropod 3 composed only of weakly spinose peduncle, rami absent; gills formed of simple flattened sacs; brood lamellae slightly reniform and bearing curl-tipped setae; head marked with deep lateral notch.

TYPE SPECIES: *Nicea egregia* Chilton (*see* following).

Ceina carinata (Pirlot)

Periphlias carinatus Pirlot, 1936: 295–298, figs. 121–123.
Ceina egregia. Pirlot, 1938: 329–330 (not Chilton)

DISTRIBUTION: Sulu, 13 m.

Ceina platei Schellenberg

Ceina platei Schellenberg, 1935: 230–231, fig. 3.

DISTRIBUTION: Juan Fernandez Islands.

Ceina egregia (Chilton)

Figs. 93, 94

Nicea egregia Chilton, 1883: 77–78, pl. 2, fig. 2; Thomson and Chilton, 1886: 144.
Ceina egregia Della Valle, 1893: 530, pl. 58, figs. 14–21; Thomson, 1899: 207; Stebbing, 1906: 554–555; Chilton, 1919a: 120–129, figs. 1–25.
Not *Periphlias carinatus* Pirlot, 1936: 295–298, figs. 121–123.
Not *Ceina egregia.* Pirlot, 1938: 329–330.

Ceina carinata (Pirlot) differs from *Ceina egregia* in the anteriorly projecting, subconical coxa 1, the strong point and excavation on coxa 4, the larger coxa 2, and the larger and sharper teeth on pereonite 1 and pleonites 1–3. The inner plate of maxilla 1 in *C. carinata* is acutely pointed.

Urosomite 3 of *Ceina egregia* is a shell surrounding the base of the telson. Uropod 3 is very flat and essentially a continuation of the shell. The upper lip is slightly bilobed and appears most strongly bilobed when in normally curled position. Juveniles have a molar like adults, sharply conical. Chilton's figures of molars may have dealt with poorly preserved material.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

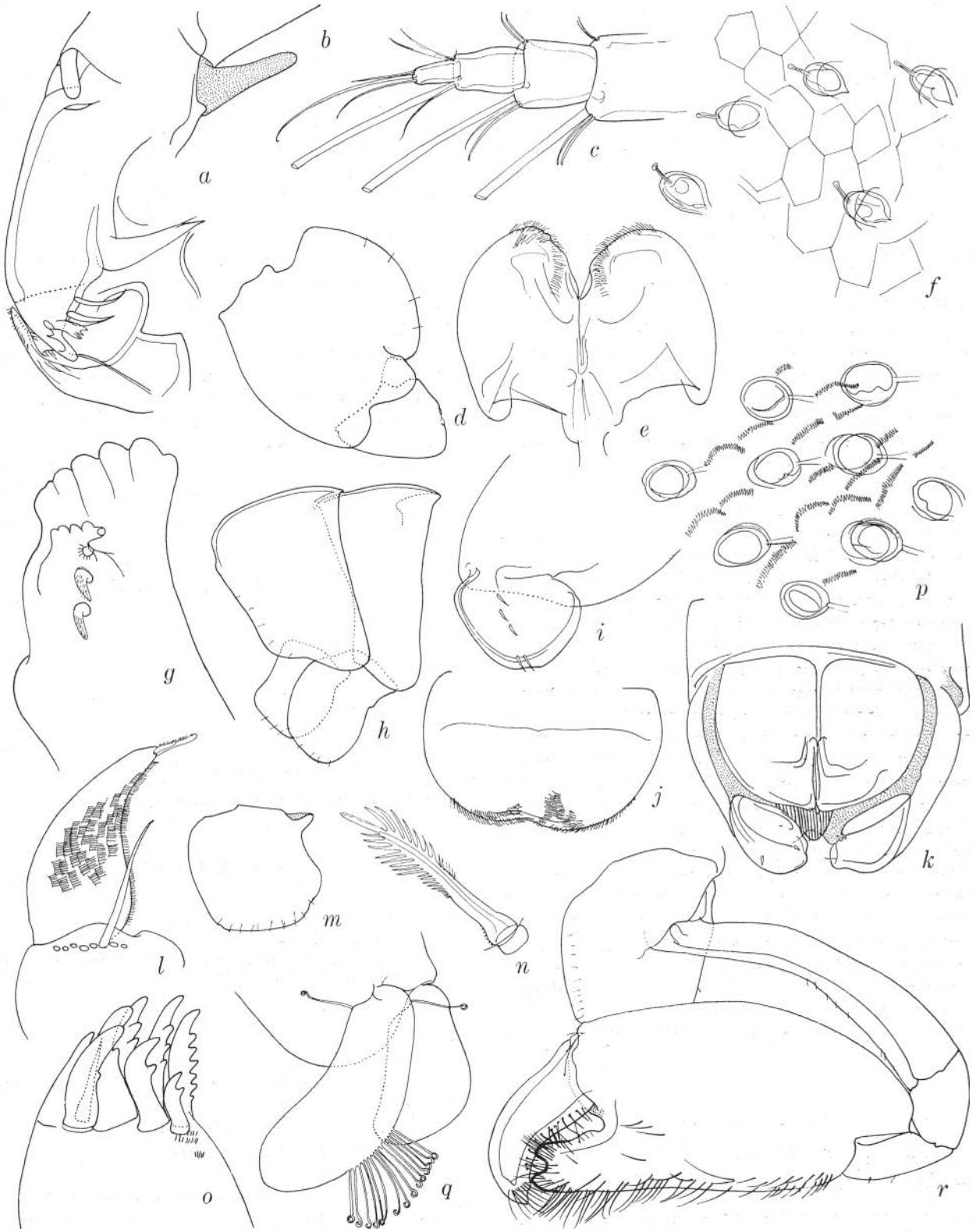


FIG. 94. *Ceina egregia* (Chilton), female, 3.6 mm, NZOI Sta. E 966 [JLB NZ-1]: *a*, left mandible, view from right ventral oblique (M = molar; UL = upper lip); *b*, inner plate of maxilla 1, stippled; *c*, apex of antenna 1; *d*, articles 2–3 of lateral pereopod 5; *e*, lower lip; *f*, cuticular surface of posterior body segment, dorsal towards top, anterior to left; *g*, left mandible; *h*, pereonites and coxae 1–2; *i*, uropod 3; *j*, upper lip; *k*, telson and third uropods, dorsal; *l*, dactyl of maxillipedal palp; *m*, coxa 4; *n*, seta of gnathopod 1; *o*, outer plate of maxilla 1. Female, 6.2 mm: *p*, cuticular surface on dorsal edge of pereonite 1; *q*, brood lamella and gill of coxa 4, most of lamellar setae removed (they extend full circumference between terminal setae marked). Male, 6.3 mm, NZOI Sta. E 970 [JLB NZ-5]: *r*, medial gnathopod 2.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

The body, coxae, and article 2 of pereopods 3–5 are covered with conspicuous pits open to the environment; they are deep and partially occluded by a semi-lunar chitinous flange; at either extremity of the oval pits are two insertions, one larger than the other; one of the insertions has the appearance of an immersed seta. The body surface is also covered with an extremely faint polygonal pattern of striae and frequently bears curved rows of weak pectinae.

Female brood lamellae bear curl-tipped setae of medium length. The curls are flat, nearly perfect circles without wrinkles.

Stomachs of several individuals contain dense masses of epiphytical green algae of unilocular form.

The head bears a deep but weakly distinct notch below the eye perhaps marking the coalescence of article 1 of antenna 2 with the head.

MATERIAL: NZOI Sta. E966 (6), Sta. E967 (2), Sta. E969 (1), Sta. E970 (23), Sta. E971 (1), Sta. E977 (2).

DISTRIBUTION: Lyttelton; Kaikoura; Wellington; Leigh.

Taihape, new genus

DIAGNOSIS: Rostrum well developed, falcate; antennae 1–2 subequal in length, antenna 1 stouter than 2 and bearing numerous aesthetascs; epistome evenly rounded anteriorly; upper lip moderately incised; mandibular molar prominent but weakly triturative; palp of maxilla 1 uniarticulate, bearing one apical serrate spine and nearly reaching base of lateral spine on outer plate, inner plate with two smooth setae, outer plate with nine spines; lobes of maxilla 2 subequal in width and length, armed with stout setal spines, inner with only setules on medial edge; inner plate of maxilliped nearly as large as but reaching only 67 percent along outer plate, latter with serrate medial spines, palp very long and thin, with elongate article 1, and long claw-shaped article 4 bearing one stout apical spine and fascicles of minute setules on inner margin, palp 3 with midapical comb of setal spines, article 2 with medial group of several spine-setae, palp otherwise poorly setose; gnathopods 1–2 essentially equal to each other in size and morphology in both sexes, hands elongate, rectangular, palms short but oblique, dactyls fitting palms defined by large spine, article 5 also elongate, gnathopods small; pereopodal dactyls with luniform slit, two large and one small setules; pereopod 3 grossly setose on anterior margins of articles 2, 3, 4, other pereopods weakly setose; pleonite 4 extended posteriorly and ventrally, pleonite 5 weakly so; telson composed of two pieces partially split dorsally but closely appressed to each other in vertical plane to form high tent covering dorsum of pleonite 6 and touching pleonite 5; uropod 3 composed only of spinose peduncle, rami absent; gills simple flattened sacs; brood lamellae more or less shaped as boomerangs and bearing curl-tipped setae.

TYPE SPECIES: *Taihape karori*, new species.

RELATIONSHIP: *Taihape* bears strong resemblance to the family Dogielinotidae of the Northern Hemisphere, but it lacks the pendant epistomal lobe of that family and lacks heavy spines on the antennae and pereopods. The oddly setose pereopod 3 of *Taihape* is the only outward evidence of the possible or potential fossorial mode, but the antennae are relatively short and stiff. *Taihape* has been found in the Wellington intertidal algal zone, though it may be a digger in sand pockets among rocks. *Taihape* could be a descendent of a protodogielinotid and lives today in a grade of morphological evolution more primitive than that of Dogielinotidae. But it does exhibit some advancement over many talitroideans in the miniaturisation of the gnathopods and their similarity to each other while the antennae remain relatively generalised. Though greatly appressed, the telsonic lobes are dorsally distinct from one another. The well developed claw-like palp article 4 on the maxilliped forms the primitive grade in Talitroidea and excludes superficial affinity with the various genera near *Chiltonia*.

The similarity of gnathopods 1 and 2 suggests affinities with *Insula* Kunkel (1910) from Bermuda, but in *Taihape* the gnathopods are much smaller. *Insula* is said to have a thick, solid, uncleft telson and it has a distinct ramus on uropod 3. The affinities of *Insula* are otherwise obscure and it should be re-evaluated with fresh materials.

Taihape karori, new species

Figs. 95, 96, 97

DIAGNOSIS: With the characters of the genus.

DESCRIPTION: An extremely weak dorsolateral planation occurs on article 2 of antenna 1 in resemblance of a stronger condition in the Dogielinotidae; attachment of antenna 2 poorly defined below lateral cephalic lobe; only outer ramus of uropod 1 with marginal spine; locking spine of pereopods with weak apical hook; body and coxae covered with irregular rows and groups of microscopic scallops often extended as sharp spinules.

Colour in 1-day formaldehyde: large-bodied holotype completely bright orange; smaller-bodied juveniles 2–3 mm, bright magenta to purple, body splotched with large areas of white posterior to pereonite 5.

HOLOTYPE: NZOI, No. 103, female, 5.7 mm.

TYPE LOCALITY: NZOI Sta. E967, Eve Bay, Wellington, New Zealand, intertidal wash of algae, 5 November 1967.

MATERIAL: NZOI Sta. E967 (3), Sta. E975 (2), Sta. E977 (1), Sta. E978 (1), Sta. E980 (1), Sta. E982 (1).

DISTRIBUTION: Wellington; Gisborne; Whangaparaoa Peninsula; Leigh.

Waitomo, new genus

DIAGNOSIS: Rostrum obsolescent; antenna 1 much longer and stouter than antenna 2, flagellum of antenna 1

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

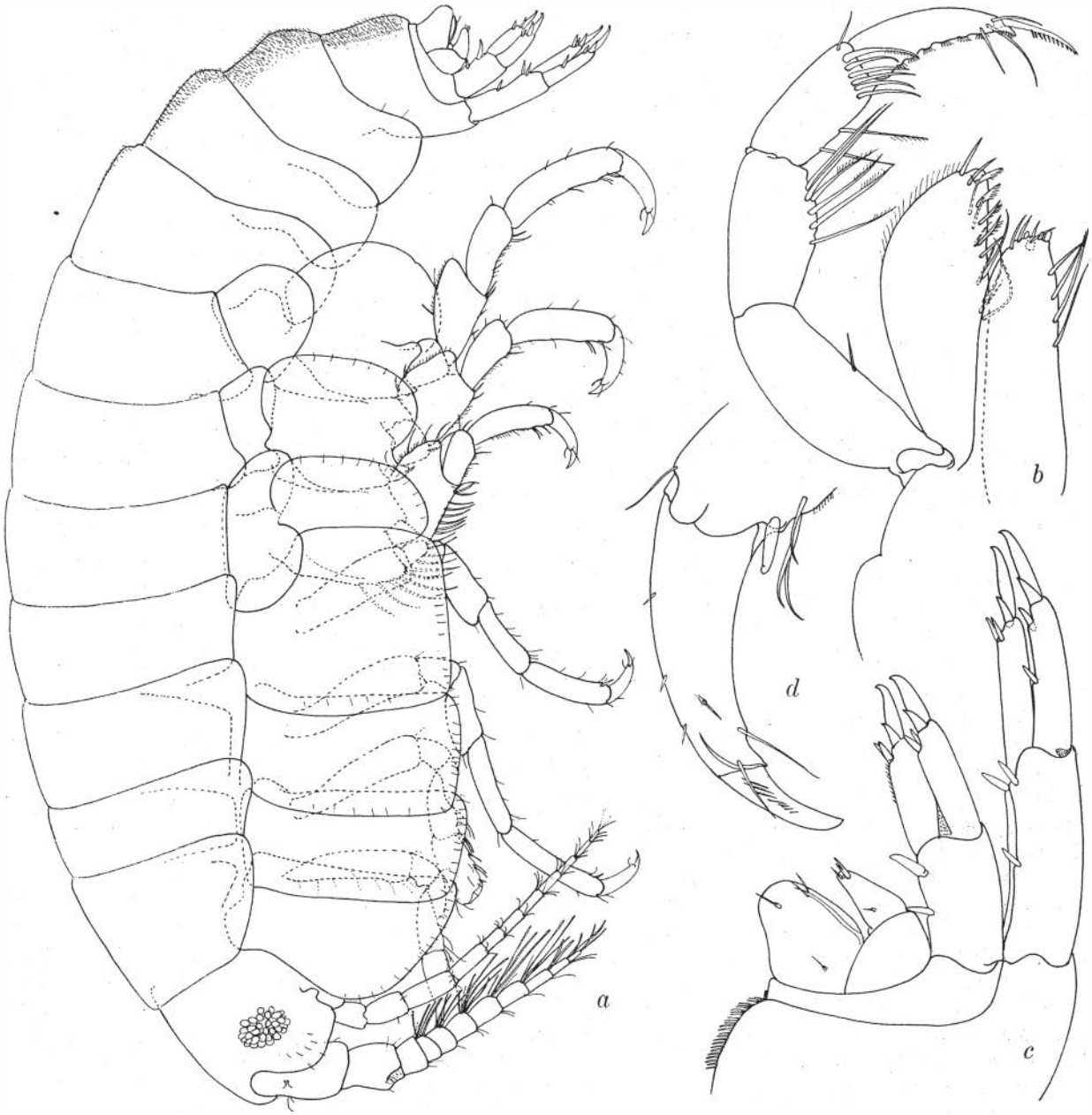


FIG. 95. *Taihape karori* n. g., n. sp., juvenile, 3.6 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, body; *b*, maxilliped; *c*, urosome. Holotype, female, 5.7 mm: *d*, dactyl of pereopod 1.

stout and bearing numerous aesthetascs; epistome evenly rounded anteriorly; upper lip almost evenly rounded below; mandibular molar large and heavily triturative; palp of maxilla 1 uniarticulate and vestigial, inner plate with two plumulose setae, outer plate with nine spines; lobes of maxilla 2 subequal in length, inner narrower than outer, inner with oblique mediodistal margin armed with a few stout spine setae; inner plate of maxilliped smaller than and reaching only halfway along outer plate, latter with no medial spines except several pairs of ventral medially submarginal spines, palp stout but elongate, articles 1–3 subequal in length, article 4 rectoconiform, not unguiform, bearing long apical spine, palp article 3 with midapical comb of setal spines, article 2 with few medial spine-setae, palp otherwise poorly setose; gnathopods 1–2 essentially equal in size and morphology (female unknown), hands elongate, rectangular, palms short and transverse, dactyls

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

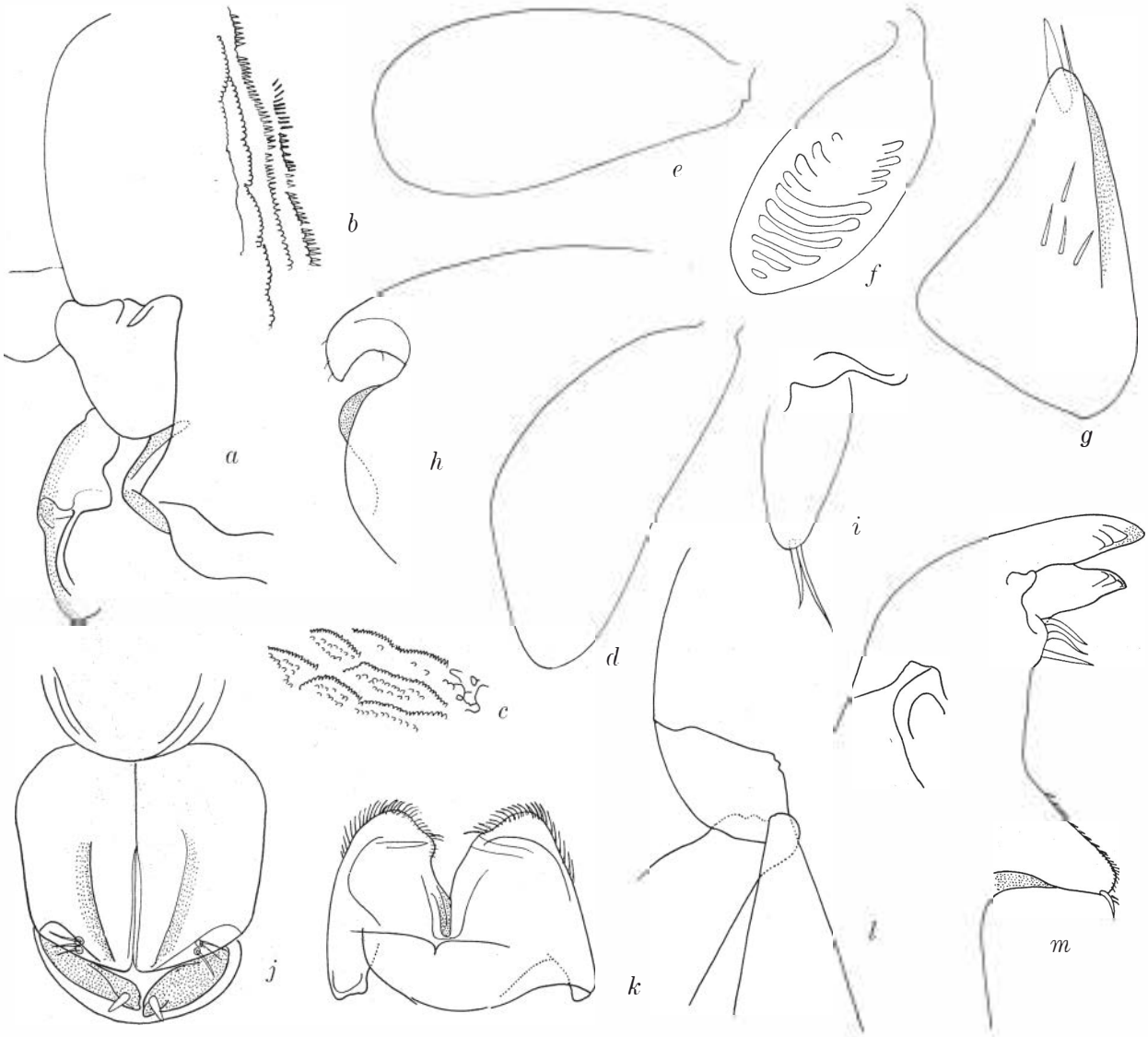


FIG. 96. *Taihape karori* n. g., n. sp., juvenile, 3.6 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, attachment of antenna 2 to head and upper lip. Holotype, female, 5.7 mm: *b*, *c*, skin of pereonite 4 and coxa 3; *d*, *e*, *f*, gills of coxae 2, 3, 5; *g*, uropod 3; *h*, head; *i*, inner plate of maxilla 1; *j*, telson and both members of uropod 3; *k*, lower lip; *l*, attachment region of maxillipedal palp; *m*, mandible.

fitting palms defined by spine, article 5 also elongate, gnathopods small; pereopodal dactyls with luniform slit, one large and one small setule; pereopods 3–5 normally talitroidean (hyalid); pereon and metasome with dorsal tooth-carinae; telson with lobes coalesced halfway; uropod 3 composed only of weakly spinose peduncle, rami absent; gills formed of simple flattened sacs; female brood lamellae unknown.

TYPE SPECIES: *Waitomo manene*, new species.

RELATIONSHIP: *Waitomo* stands closer to the hyalid line of talitroideans than does *Ceina* or *Taihape*, because the mandibular molar retains its large size and strong trituration surface. The upper lip is almost evenly rounded below, and the maxillipedal palp is stout. The telsonic lobes, like those of *Ceina*, are partially coalesced as in some members of *Allorchestes* but in contrast to those of *Taihape*. The palp on maxilla 1 is vestigial in contrast to that in *Taihape*.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 97. *Taihape karori* n. g., n. sp., holotype, female, 5.7 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, maxilla 2; *b*, mandible; *c*, *d*, brood plates of coxae 3, 5; *e*, outer plate of maxilla 1; *f*, pereopod 3; *g*, upper lip; *h*, *i*, medial gnathopods 1, 2, setae on *h* removed; *j*, maxilla 1.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

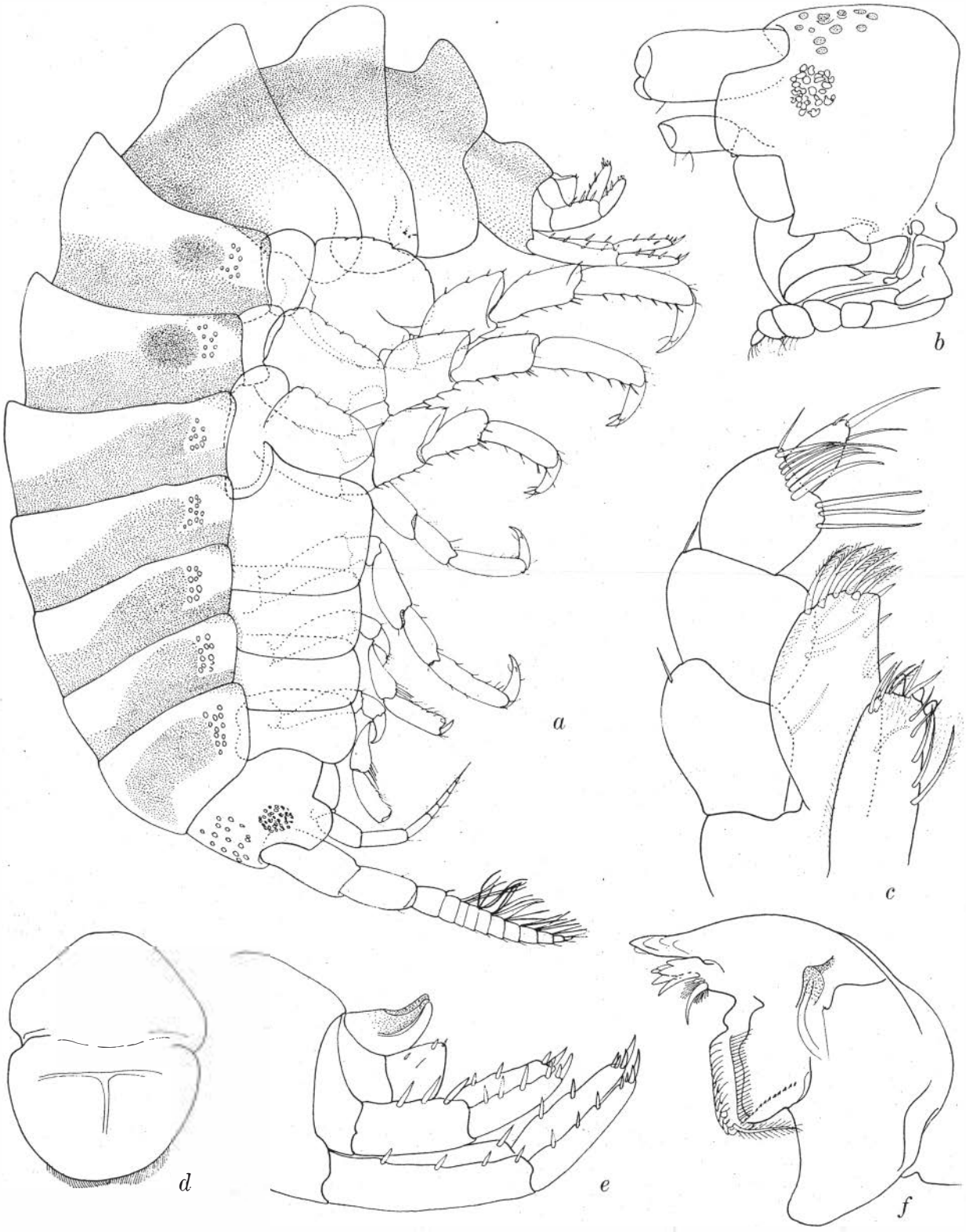


FIG. 98. *Waitomo manene* n. g., n. sp., holotype, male, 6.4 mm, NZOI E-417; *a*, body; *b*, head; *c*, maxilliped; *d*, upper lip; *e*, urosome; *f*, mandible.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 99. *Waitomo manene* n. g., n. sp., holotype, male, 6.4 mm, NZOI E-417: *a*, maxilla 1; *b*, telson and uropod 3, dorsal; *c*, articles 2–3 of pereopod 5, lateral; *d*, left mandibular molar; *e*, maxilla 2; *f*, "ommatidia"; *g*, *h*, gnathopods 1, 2, lateral and medial, latter enlarged. Male, 7.4 mm: *i*, palp of maxilla 1.

Waitomo manene, new species

Figs. 98, 99

DIAGNOSIS: With the characters of the genus.

DESCRIPTION: Lateral cephalic lobe adze-shaped; eyes very weak and composed of wrinkled flakes; body very strongly compressed, scarcely as broad as length of coxa 1, dorsal carina very thin, lateral surfaces of pereonites with weak depressions but near ventral margins produced into weak lumps; anterior portion of body, especially head and pereonal lumps, covered with shallow craters, chitin extremely rigid and brittle, opaque because of subsurface blemishes but clearing and becoming flexible in glycerine; chitin without especially noticeable surficial pattern except occasional polygons or extremely fine granulation; lower lip like that of *Taihape*.

HOLOTYPE: NZOI, No. 104, male, 6.4 mm.

TYPE LOCALITY: NZOI Sta. E417, off Oamaru, New Zealand, 860 m, 13 October 1965.

MATERIAL: NZOI Sta. E417 (2, larger 7.4 mm), Sta. E709 (1), Sta. F744 (1).

RECORDS: The type locality and NZOI Sta. E709, off Cape Turnagain, 1642–1683 m; Sta. F744, ESE of Castlepoint, 1609 m.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

DOGIELINOTIDAE

DIAGNOSIS: Talitroidea with laterally compressed bodies, smooth skin and no humps; head laterally compressed; epistome with pendant anterior lobe; antennae spinose; coxae 1–4 of normal quadrate proportions; mandibular molar heavily triturative; setae of brood lamellae with curled tips; urosomites free; ramus of uropod 3 vestigial or absent.

DESCRIPTION: Upper lip broadly rounded below; palp of maxilla 1 vestigial; maxillipeds normal; telson short, broad, shortly cleft.

TYPE GENUS: *Dogielinotus* Gurjanova.

COMPOSITION: *Haustorioides* Oldevig.

KEY TO THE GENERA OF DOGIELINOTIDAE

1. Uropod 3 with one ramus.....*Dogielinotus*
   Uropod 3 lacking rami.....*Haustorioides*

Dogielinotus Gurjanova

Dogielinotus Gurjanova, 1953: 235.

TYPE SPECIES: *Allorchestes moskvitini* Derzhavin.

Dogielinotus moskvitini (Derzhavin)

Allorchestes moskvitini Derzhavin, 1930: 94–95, pl. 5, fig. 1.
Dogielinotus moskvitini. Gurjanova, 1953: 235, figs. 15–16; Gurjanova, 1962: 429 (in part).

North-western Pacific.

Dogielinotus loquax J. L. Barnard

Dogielinotus loquax J. L. Barnard, 1967: 284–287, figs. 1–4.

North-eastern Pacific.

Haustorioides Oldevig

Haustorioides Oldevig, 1958: 343.

TYPE SPECIES: *Haustorioides munsterhjelmi* Oldevig.

Haustorioides munsterhjelmi Oldevig

Haustorioides munsterhjelmi Oldevig, 1958: 343–347, figs. 1–15.

North-western Pacific.

EOPHLIANTIDAE, revised

DIAGNOSIS: Talitroidea with cylindrioid bodies; skin smooth; heads spheroid; antennae nonspinose; coxae short and small; mandibular molar non-triturative, often vestigial or absent; mandibular spine-row becoming obsolescent; setae of brood lamellae curl-tipped; urosomites 2–3 occasionally coalesced; uropod 3 composed of plate lacking rami.

DESCRIPTION: Upper lip entire or slightly bilobed; mandibles usually slightly flattened but maintaining distal twist; palp of maxilla 1 absent; gnathopods parachelate and very thin; telson composed of two free triangular lobes (like *Hyale*).

TYPE GENUS: *Eophliantis* Sheard (1936a); partially obscure.

COMPOSITION: *Bircenna* Chilton; *Ceinina* Stephensen; *Cylindryllioides* Nicholls; *Lignophliantis* J. L. Barnard 1969 b; *Wandelia* Chevreux.

REMARKS: Genera formerly included with this family and now removed are *Amphitholina* Ruffo (1953) and *Biancolina* Della Valle (1893). The former is returned to the Ampithoidae where a subfamily might be created for it. Though it has a cylindrioid body, it retains so much of its ampithoid character, that it should not be included with those Eophliantidae having talitroidean characters. *Biancolina* is removed to a family of its own, discussed below and on page 195.

If Eophliantidae were considered alone, without noting their relationships to Talitroidea in general, one might logically retain *Biancolina* in the family as a primitive member retaining biramous uropod 2. But if the affinities of the Eophliantidae, as composed herein, lie with the Talitroidea, then a strongly biramous uropod 3 is antithetical, for all other talitroideans have essentially a uniramous cylindrical uropod 3. The rare presence of a scale-like inner ramus in *Parhyale* and *Parallorchestes* does not detract from the completely foreign uropod 3 of *Biancolina*. Other characters of difference from talitroideans are noted in the diagnosis of the Biancolinidae (page 195). The retention of *Biancolina* in the Eophliantidae would neatly reinforce an intrafamilial evolutionary scheme and did in fact suggest that scheme to me initially.

There are general trends within eophliantid genera towards reduction of coxae in the sequence of *Wandelia-Bircenna-Eophliantis-Ceinina-Cylindryllioides*; a loss or reduction of lacinia mobilis in the sequence of *Wandelia* to *Ceinina;* incision of head from *Bircenna* to *Ceinina;* loss of inner lobes on lower lip from *Wandelia* to the others; shortening of maxilliped palp in a reverse order from *Ceinina* to *Bircenna*; expansion of pleopodal peduncles from *Ceinina* to *Bircenna* and *Wandelia* with an aberrancy in *Cylindryllioides*, again in reverse order and suggesting that the prototypical eophliantid may have had expanded peduncles and that narrowing is the evolutionary trend.

The loss or reduction of lacinia mobilis would seem to be a disadvantage to a burrowing organism, as the lacinia mobilis should double the rasping ability of the mandible; however, the strongly rotating head coupled with the flattening of the incisor may together be better for boring soft living tissues of algae than would the normal mandible used by *Chelura* to bore or rasp wood

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

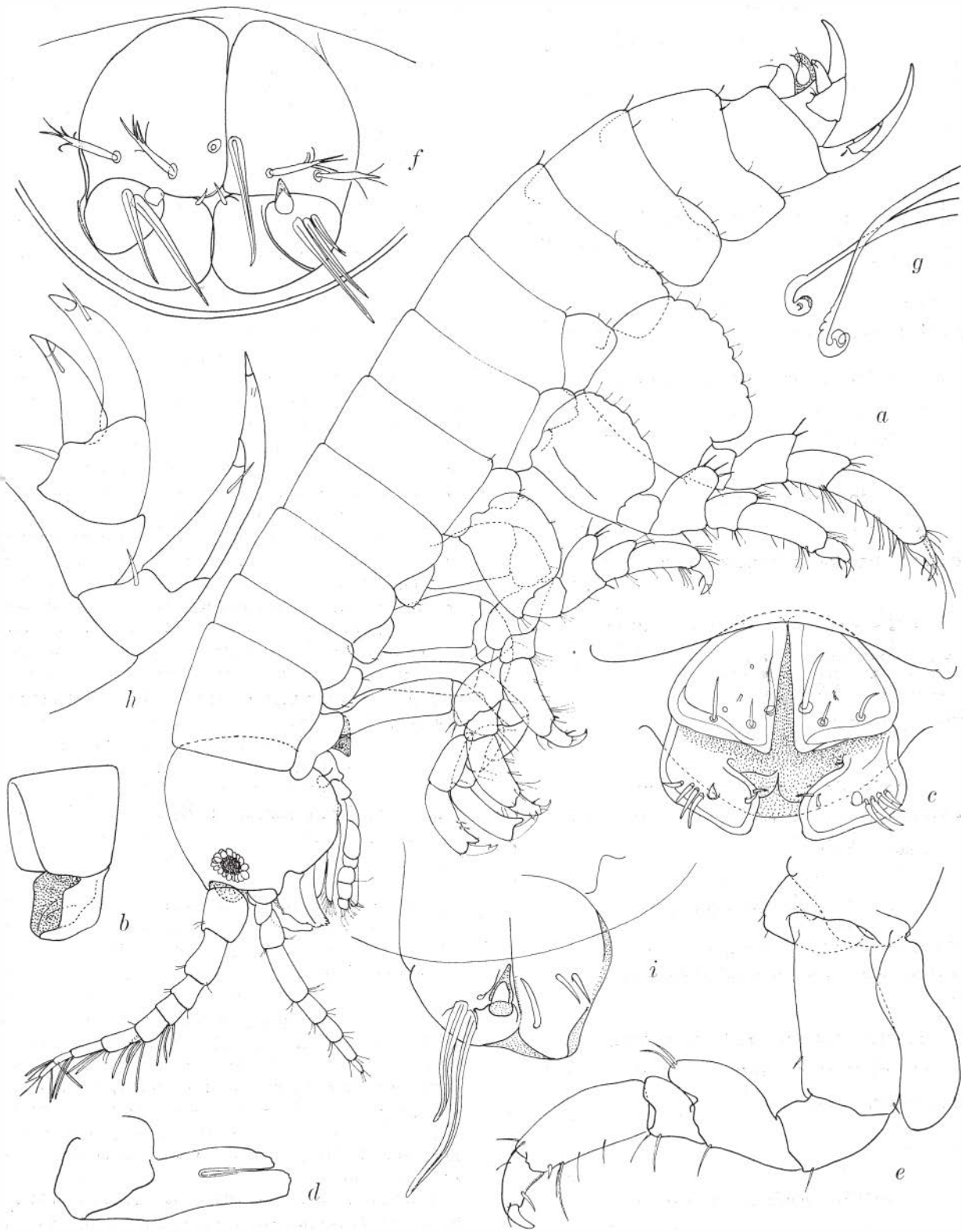


FIG. 100. *Bircenna fulva* (Chilton), male, 2.6 mm, NZOI Sta. E 966 [JLB NZ-1]: *a*, body; *b*, pereonite 1 and ventral cradle; *c*, telson and both members of uropod 3, dorsoposterior oblique view; *d*, outline of maxilla 2; *e*, medial pereopod 1. Female, 1.9 mm: *f*, telson and both members of uropod 3, dorsal and flattened; *g*, curl-tipped setae of brood lamellae; *h*, uropods 1, 2. Another male: *i*, uropod 3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Living plant tissues may actually have to be shaved rather than rasped and the buccal mass of *Wandelia wairarapa* (from New Zealand) appears well suited to that task; the mandibles project in such a way as to suggest a blade in a razor.

The presence of inner lobes on the lower lip of a few eophliantids is non-talitroidean, and the vestigial mandibular palp of a member of *Wandelia* is enigmatical.

The strong peduncular paddles on the pleopods may be a substitute for decreased ramal lengths necessarily advantageous because of confinement of the organism in a tunnel, but the reduction of the adaptation in *Cylindryllioides* can only suggest that this genus has a habitat distinct from its congeners. *Ceinina* is reported to penetrate the stem of the brown alga *Undaria pinnatifida* and the pleopodal paddles seem very solid, although the peduncle is not as expanded as in other eophliantids. *Ceinina* does retain strong, sharply serrate lacinia mobili, has the thinnest body of eophlinatids and generally the shortest legs and antennae, and is therefore well adapted as a tunneller. Perhaps the other species bore into more tender species of algae.

One point in favour of the derivation of eophliantids from Ampithoidae (like *Amphitholina*) is the presence of rudimentary parachelate gnathopods in several species of *Ampithoe*; they occur especially on the first pereonite but occasionally in females, and rarely in males, on the second pereonite.

Bircenna Chilton

Bircenna Chilton, 1884a: 264; 1909b: 61; Sheard, 1936a: 460; Nicholls, 1939: 328.

DIAGNOSIS: Body of medium thickness, coxae very short, coxa 1 elongate and slightly bilobed; pereonite 1 elongate or ?not and with ventral flange; pleonites 5–6 coalesced; head not incised for reception of antenna 2 but produced and guarding ventral margin of peduncle on antenna 2; gland cone of antenna 2 well developed and projecting medioventrally; upper lip rounded below and setulose; mandibles of normal stoutness, in at least two species with lacinia mobilis small and resembling spine of spine row but falciform or bifid and thus distinct from two spines in spine group; but incisor bearing lateral rugosity suggesting coalesced planiform lacinia mobilis resembling free plate in *Wandelia*; mandibles with medial tubercle suggesting molar and left molar of type species with chitinous mark in normal molarial position possibly marking vestigial palp; lower lip without inner lobes; inner plate of maxilla 1 thin and bearing long stout seta; maxilla 2 with normally thin plates and one very conspicuous falciform seta on inner plate; inner plates of maxilliped equal to or slightly longer than outer, with three short cuspidiform terminal spines, palp exceeding plates by one article or slightly more, articles progressively thinner, article 4 rectangular, distally spinose; article 5 of gnathopods long; article 2 of pereopods 1–2 thin; distal portions of pereopods 3–5 of normal thinness; peduncle of pleopods widely expanded, bearing two umbrella-shaped locking spines; inner rami of pleopods in type species with proximal hook-bulge; uropod 3 vestigial, formed only of planiform peduncle guarding posterior margin of telson and bearing apical spine, cusp, and several setae; telson with two softly triangular lobes fully separate; eyes with core of dark pigment retained in alcohol.

TYPE SPECIES: *Bircenna fulva* Chilton.

REMARKS: The ventral flange is apparently unique to this genus; perhaps it forms a cephalic cradle or locking device to prevent excessive flexion of the head as well as to provide a socket for rotation while the organism burrows. Several species of *Hyale* from Australia have a rudimentary flange on pereonite 1. The body of *Bircenna* has not reached the extremely thin hemicylinder of *Ceinina* but is very solid, though less so than *Wandelia wairarapa* of New Zealand.

KEY TO THE SPECIES OF *Bircenna*

1. Outer rami of uropods 1–2 reaching less than 75 percent along inner rami, locking spine on pereopods 1–5 very small, parachela of gnathopods strong..... *fulva*
   Outer rami of uropods 1–2 reaching more than 75 percent along inner rami, locking spine on pereopods 1–5 large, parachela of gnathopods weak.....2
2. Parachela of gnathopods triangular, pereopod 5 length about twice height of pereonite 7..... *ignea*
   Parachela of gnathopods quadrate, pereopod 5 length about equal to height of pereonite 7..... *nichollsi*

These species are very close to each other as seen from the key.

Bircenna ignea Nicholls

Bircenna ignea Nicholls, 1939: 329–333, figs. 9, 10.

South-western Australia.

Bircenna nichollsi Sheard

Bircenna nichollsi Sheard, 1936a: 461–463, fig. 4.

South Australia.

Bircenna fulva Chilton

Figs. 67*o*, 100, 101, 102

Bircenna fulvus Chilton, 1884a: 264, pl. 21, fig. 1.
Bircenna fulva. Thomson and Chilton, 1886: 149; Chilton, 1909b: 61, figs. 1–3.

DIAGNOSIS: Gnathopods 1–2 with sharp, obliquely turned and protruding parachelation; locking spine of pereopods 1–5 small; articles 2–7 of pereopod 5 together twice as long as height of pereonite 7; proximal part of article 2 of pereopod 5 broadened disproportionally to distal part; article 4 of pereopod 5 not nasiform; outer ramus of uropod 1 ranging from 0.5 to 0.67 length of inner ramus; outer ramus of uropod 2 ranging from 0.5 to 0.75 length of inner ramus.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 101. *Bircenna fulva* (Chilton), male, 2.6 mm, NZOI Sta. E 966 [JLB NZ 1]: *a*, *b*, left mandible; *c*, *d*, *e*, right mandible; *f*, left mandibular scar enlarged; *g*, *h*, maxillae 1, 2; *i*, *j*, inner and outer plates of maxilliped; *k*, maxilliped; *l*, upper lip, anterior view; *m*, part of lower lip.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

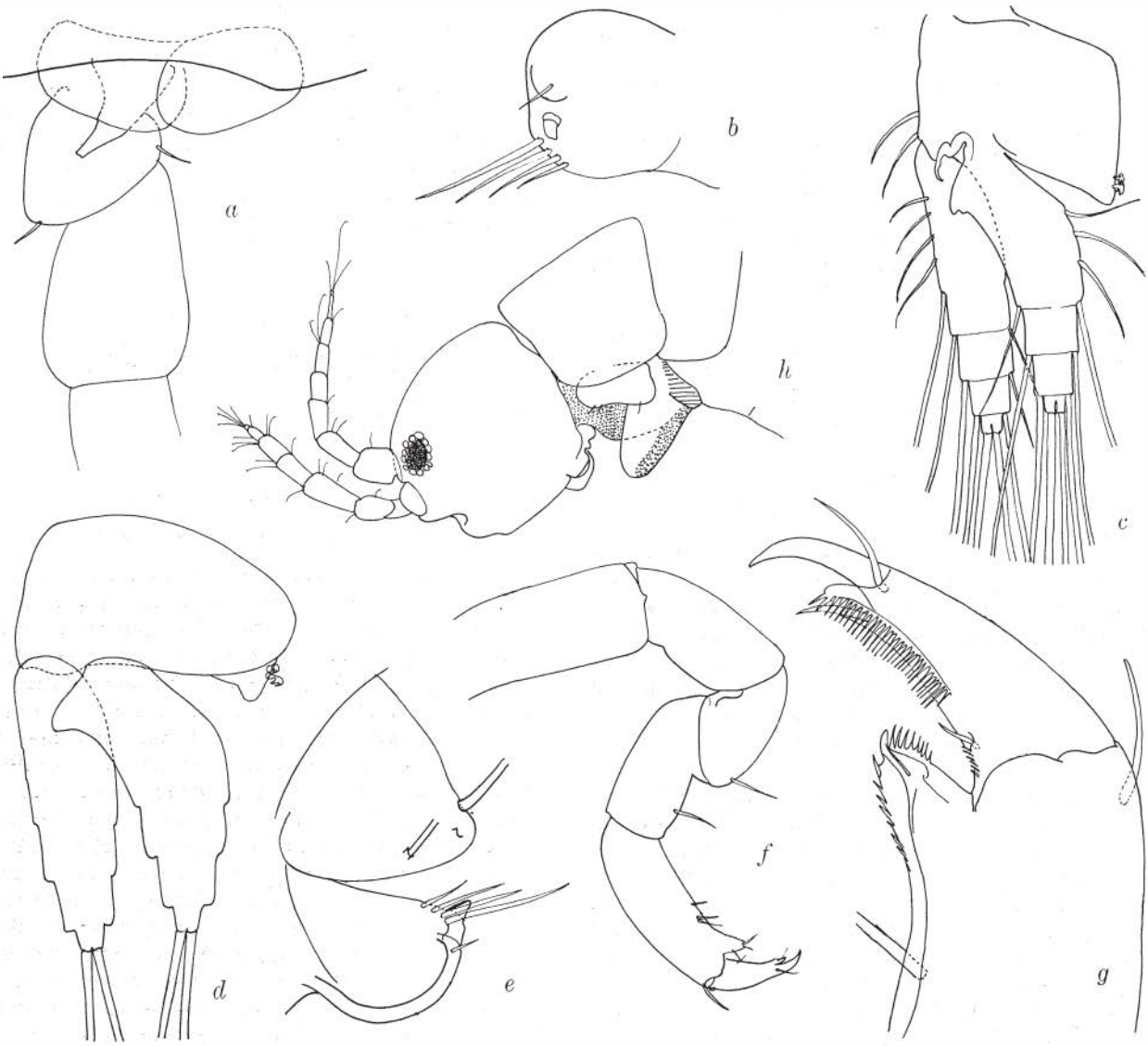


FIG. 102. *Bircenna fulva* (Chilton), male, 2.6 mm, NZOI Sta. E 966 [JLB NZ-1]: *a*, articles 1–4 and part of 5 of antenna 2; *b*, uropod 3; *c*, *d*, pleopods 1, 3, setae cut or removed; *e*, half of telson, from dorsolateral view; *f*, *g*, gnathopod 1. Female, 1.9 mm: *h*, head, pereonite 1 and ventral cradle.

DESCRIPTION: Maxilla 1 bearing small fold of chitin probably marking vestige of palp; ventral flange of pereonite 1 shaped like shovel; female brood lamellae with curl-tipped setae irregularly anther-shaped; right and left mandibles each with medial tubercle, possibly representing molar, only left mandible with fold of chitin in normal molar position possibly representing vestige of palp; gland cone on antenna 2 prominent but hidden from lateral view and projecting ventromedially; uropod 3 in largest male (2.6 mm) with four lateroposterior setae adjacent to spine in middle, upper surface not marked into sections as in smaller male and female specimens; all pleopods in both sexes with proximal hook on inner ramus; each pleopod with pair of umbrella-shaped coupling hooks. Terminal adults from Sta. E970 have the inner ramus of uropod 2 grossly thickened and the outer rami of uropods 1 and 2 slightly smaller than in other specimens encountered in New Zealand (Fig. 67*o*).

REMARKS: Uropod 3 not only undergoes some change with aging but appears slightly different in various aspects; it consistently bears a large medial spine adjacent to several setae posterior and lateral to the spine. These ornaments occur on a slight bulge marked off with lines from the medial portion of the uropod when flattened directly; if flattened obliquely the medial portion appears to bulge.

In 2-day formaldehyde the body is pale orange, fading in alcohol.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Uropods 1–2 have faint, jewel-like terminal nails embedded in the tips; they are scarcely evident, except under high-power magnification, in contrast to the apical uropodal spines on *Wandelia wairarapa* n. sp. from New Zealand.

The diagnosis differentiates *B. fulva* from its trans-Tasman relatives *Bircenna nichollsi* Sheard (1936a, S. Australia) and *B. ignea* Nicholls (1939, SW Australia).

MATERIAL: NZOI Sta. E966 (19), Sta. E967 (2), Sta. E969 (13), Sta. E971 (1), Sta. E975 (8), Sta. E978 (8), Sta. E979 (8), Sta. E980 (5), Sta. E981 (1).

DISTRIBUTION: Lyttelton Harbour; Kaikoura; Wellington; Whangaparaoa Peninsula; Leigh; Tapeka Pt.

Ceinina Stephensen

Ceinina Stephensen, 1933: 63–68.

DIAGNOSIS: Body thin and theoretically hemicylindrical, coxae small, coxa 1 narrow and not bilobed; pereonite 1 lacking ventral flange and not elongate; pleonites 5–6 apparently coalesced; head incised for reception of antenna 2; gland cone of antenna 2 not evident; upper lip ventrally truncate and broad; mandibles broad but not stout, each side with strong deeply serrate lacinia mobilis, no spines, no molar, no tubercles; lower lip lacking inner lobes; inner plate of maxilla 1 thin and bearing one stout distal seta; maxilla 2 of normal thinness and inner plate bearing one short or long falciform seta; inner plates of maxillipeds reaching extent of outer plates, bearing one or two stout cuspidiform spines; maxillipedal palp exceeding plates by two articles, articles decreasing in width consecutively, palp article 4 rectangular and bearing stout distal spine and two setae; article 5 of gnathopods long; article 2 of pereopods 1–2 slightly inflated but not as strongly as on pereopods 3–5; distal portions of pereopods 3–5 normally widened; peduncle of pleopods of medium expansion, inner rami subproximally expanded but not as irregularly as in *Bircenna*; uropod 3 vestigial, formed only of planiform peduncle more or less guarding posterior margin of telson and bearing apical cusp and seta; telson with two subovate lobes fully separate; eyes with black pigment; brood plates extremely large, setae possibly not curl-tipped and very short.

TYPE SPECIES: *Ceinina japonica* Stephensen.

REMARKS: This genus is also characterised by the harpinia-like pereopod 5 with elongate lobe on article 2.

Wandelia japonensis Nicholls (1939) is presumably a synonym of *Ceinina japonica*, though Nicholls's rendition of the species differs in several points from that of Stephensen, most of which may be due to misinterpretation. Nicholls used a few figures made by Chilton, one of which shows the lacinia mobilis with articulate spines, whereas Stephensen shows them as deep serrations. Nicholls may have overemphasised the pereopodal fuzz underemphasised by Stephensen. Possibly Chilton's figure of a tumid article 4 on the maxillipedal palp resulted from crushing. Nicholls's uropod 3 may also represent a portion of the pleon. Views of the telson and lower lip may differ among the drawings as a result of tilting. The numerous congruencies in pereopods, brood plates, gnathopods, pleopods, overall character of mandibles, and other mouthparts suggest synonymy as conceived by Gurjanova (1958).

Ceinina japonica Stephensen

Ceinina japonica Stephensen, 1933: 63–68, figs. 1–4.
Wandelia japonensis Nicholls, 1939: 325–328, figs. 6–7.

Japan, Hokkaido.

Cylindryllioides Nicholls

Cylindryllioides Nicholls, 1938: 58–59; 1939: 333.

DIAGNOSIS: Body thin, coxae very short, coxa 1 broad but not bilobed; pereonite 1 not elongate and lacking ventral flange or bearing rudiment; pleonites 5–6 coalesced; head invagination distinct (in one species); gland cone of antenna 2 rudimentary (in one species); upper lip weakly bilobed or rounded; mandibles of normal stoutness, with spines and small bifid or simple lacinia mobili, incisors narrow and serrate, one species with very spinose molar; lower lip without inner lobes; inner plate of maxilla 1 thin and bearing large apical seta; maxilla 2 with slightly broadened plates, inner with short subfalciform seta on medial lobe; inner and outer plates of maxillipeds extending subequally, inner with three cuspidiform spines, palp exceeding plates by two articles, articles decreasing in width successively, article 4 slightly tumid and bearing very long apical setae; article 5 of gnathopods long; article 2 of pereopods 1–2 thin; distal portions of pereopods 3–5 of normal dimensions; peduncle of pleopods thin, pleopods uniramous; uropod 3 vestigial, forming flat knob bearing apical jewel with two or three apical setae; telson with two strongly triangular lobes together forming triangle; eyes with or without dark pigment.

TYPE SPECIES: *Cylindryllioides mawsoni* Nicholls.

REMARKS: The uniramous pleopods mark this genus distinctly. The line of fuzz in the molar position of the mandibles in Nicholls's figures may represent the apices of the lower lip, as these often stick to the mandibles in dissection, but the second known species has spinose molars.

Cylindryllioides mawsoni Nicholls

Cylindryllioides mawsoni Nicholls, 1938: 59–61, figs. 30, 31; Nicholls, 1939: 333.

Macquarie Island, shore.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Cylindryllioides kaikoura, new species

Figs. 103, 104

DIAGNOSIS: Upper lip evenly rounded ventrally; lower lip with narrow mandibular lobes; lacinia mobilis bifid on one mandible, simple on other mandible; uropod 3 with heavy apical jewel-spine; article 2 of pereopod 5 strongly triangular; triangular lobes of telson very broad.

HOLOTYPE: Canterbury Museum AQ 3400, male, 2.7 mm. Unique.

TYPE LOCALITY: K800E, Kaikoura, New Zealand, Morgan's Pool, tip of Seal Reef, 14 January 1966.

RELATIONSHIP: The diagnosis distinguishes the New Zealand species from *C. mawsoni*, the only other known species of the genus. The differences noted are all problematical; some may be real differences of specific value, but the absence of a jewel-spine on uropod 3 of *C. mawsoni* needs confirmation as do the undissected shapes of the telson and lower lip. The shape of pereopod 5 alone is not of specific value but is an indication of the differences between the two species. The upper lip may not have been observed properly by either Nicholls or me.

The mandibular molar of *C. kaikoura* is composed of a weak hump bearing several sets of 4-fingered combs and one long apically bifid spine; Nicholls shows setae in the molar position as if part of the lower lip overlay that area. The eyes of *C. kaikoura* lack pigment but the unique specimen has been preserved for 2 years. I lost the second maxillae during dissection and cannot report on their structure. Pereonite 1 has a very weak ventral hump, possibly a rudimentary cephalic cradle.

DISTRIBUTION: Kaikoura.

Eophliantis Sheard

Eophliantis Sheard, 1936a: 457.

DIAGNOSIS: Body of medium thickness, coxae small, coxa 1 elongate and scarcely bilobed; pereonite 1 lacking ventral flange and not elongate; pleonites 5–6 separate; head incision unknown; condition of gland cone unknown; upper lip unknown; mandibles of normal stoutness and resembling those of *Bircenna*, with lateral incisorial rugosity possibly representing lacinia mobilis, but with possible lacinia mobilis represented by one of two or three spines in spine row, at least one mandible with medial ?molar; but paratype male with enormous rugose lacinia mobilis in normal position on a left mandible; lower lip unknown; inner plate of maxilla 1 thin and bearing one stout seta; maxilla 2 with normally thin plates and apparently one weak falciform seta on inner plate (besides remaining setae); maxilliped as in *Bircenna fulva* according to Sheard; article 5 of gnathopods long; article 2 of pereopods 1–2 thin; distal portions of pereopods 3–5 of normal thinness; peduncle of pleopods broadly expanded, apparently bearing two umbrella-shaped coupling hooks; inner rami of pleopods not clearly shown as to expansion; uropod 3 problematical, possibly like that of *Bircenna* but according to Sheard biramous, rami tumid; ocular pigment not stated.

TYPE SPECIES: *Eophliantis tindalei* Sheard.

REMARKS: This genus is full of unsolved problems; unknown are conditions in the upper lip, lower lip, gland cone, cephalic incision, and small details of the maxillipeds. There appears to be confusion over the mandibles and uropod 3, and this obscures the validity of the genus. Nicholls (1939) borrowed a small and immature cotype and found uropod 3 like that of *Bircenna* and not biramous as stated by Sheard; Nicholls also illustrated a distal nail on one ramus of uropod 2, not shown by Sheard. Sheard showed two basically different kinds of mandibles and in essence Nicholls shows a third kind, one member of the pair having a lacininia mobilis intermediate between Sheard's extremes of large and absent. At least two and possibly three species are mixed in the type material unless the various observations result from misinterpretations. It is notably easy to view uropod 3 of a *Bircenna* from the side and visualise two distinct lobes and this may have occurred in Sheard's initial observation of *Eophliantis*. If *Eophliantis* has the *Bircenna* uropod 3 as shown by Nicholls, then the genus differs from *Bircenna* primarily in the absence of a pereonal flange, but Sheard also identified a distinct pleonite 6 in *Eophliantis*. The parachela of *E. tindalei* paratype is extremely produced, and uropod 1 is reduced in size in the type and female, but I consider the paratype to belong in a genus distinct from *Eophliantis* because the type (presumably holotype as considered by Sheard) has a weak parachela on the gnathopods.

Pereopods of the female drawn by Sheard seem badly shrivelled and pereopod 3 is highly abnormal, as if the posterior lobe of article 2 were confused with a gill and not properly connected; the appearance suggests a long posterior lobe of the coxa with a thin article 2; article 5 is especially short and has a long, thin nasiform lobe. The female could possibly represent a species of *Bircenna* close to *B. fulva* from New Zealand in light of the small locking spine of the pereopods and the slightly shortened outer rami of uropods 1–2 that match those in females of *B. fulva* but differ from males, which have shorter outer rami.

The cotype figured by Nicholls may have affinity with *Wandelia wairarapa* of New Zealand and may thus represent a fourth eophliantid in Sheard's material.

If Sheard had not so definitely drawn a distinct pleonite 6 on his type male, one might be able to align it more closely with the figured female and thus reduce the species to two, Sheard's type male, his female being one species, and Sheard's immature specimen and Nicholls's cotype another.

Eophliantis tindalei Sheard

Eophliantis tindalei Sheard, 1936a: 457–460, only figs. 1a, b, c d, e, h, i, j, l; 3f; possible female, figs. 2a, b, c, d, h, i, j, k l, m, n, o.

Tasmania.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

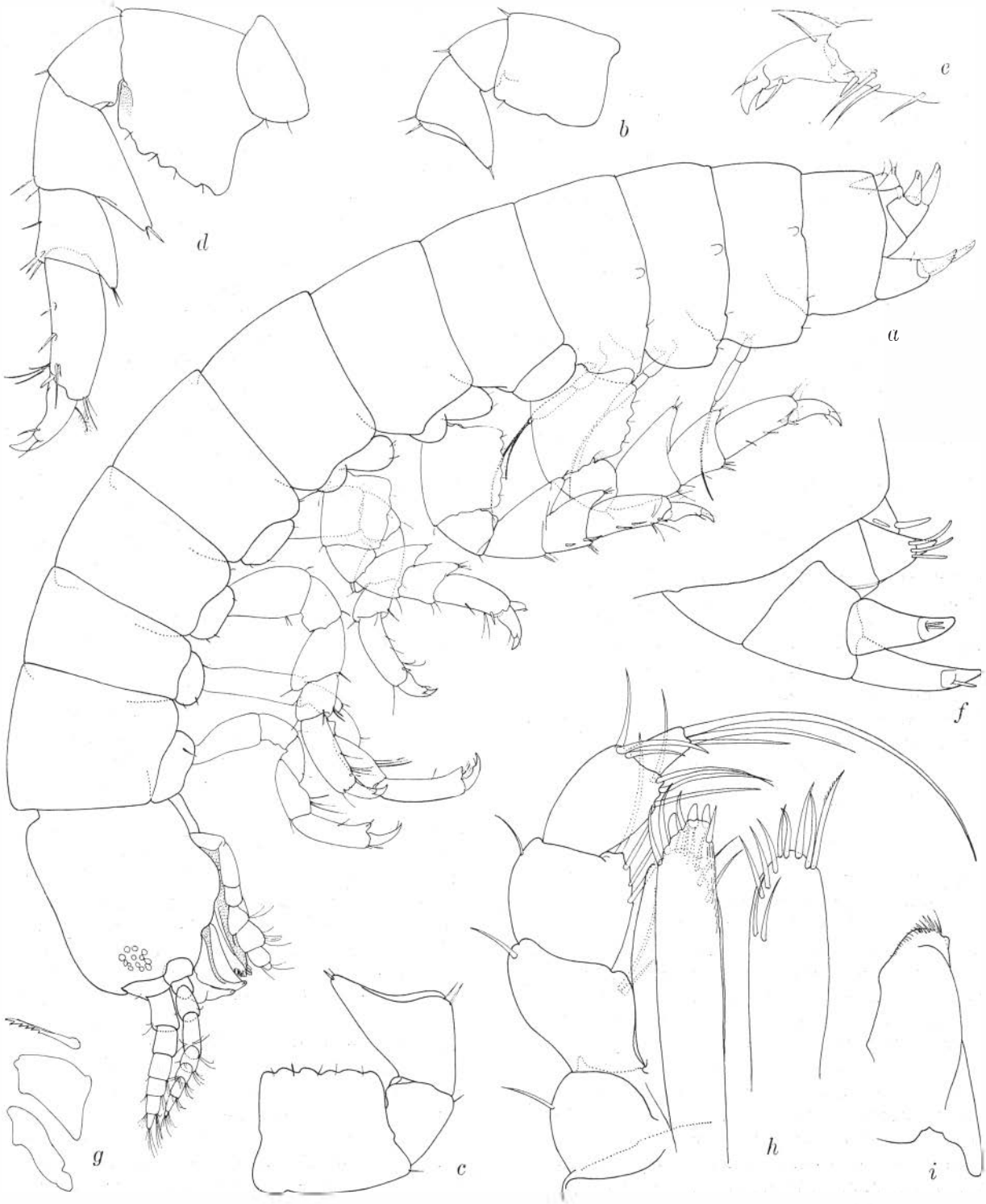


FIG. 103. *Cylindryllioides kaikoura* n. sp., holotype, male, 2.7 mm, Kaikoura K 800E: *a*, body; *b*, *c*, *d*, pereopods 3, 4, 5, in whole or part; *e*, dactyl of pereopod 2; *f*, urosome; *g*, several spines on outer plate of maxilla 1; *h*, maxilliped, with one outer plate to right; *i*, half of lower lip.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



FIG. 104. *Cylindryllioides kaikoura* n. sp., holotype, male, 2.7 mm, Kaikoura K 800E: *a*, inner plate of maxilla 1; *b*, pleopod 3; *c*, right mandible with lacinia mobilis of left mandible offset; *d*, *e*, apices of gnathopods 1, 2, medial; *f*, ventral outline of pereonite 1 to show weak ventral hump (H = head); *g*, outer plate of maxilla 1; *h*, upper lip; *i*, setal fringe on molar right mandible; *j*, telson and pair of uropod 3, dorsal.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Unknown genus and species

Eophliantis tindalei Sheard, 1936a: 457–460 (in part), only figs. 1f, g, k; 2e.

Tasmania.

Wandelia Chevreux

Wandelia Chevreux, 1906: 44; Nicholls, 1939: 324.
Bircenna. Sheard, 1936a: 460 (in part, not Chilton).

DIAGNOSIS: Body thick, coxae of medium size, coxa 1 of normal width (type) or broad, not bilobed; pereonite 1 elongate or not (type) and lacking ventral flange; pleonites 5–6 apparently coalesced in type; head incision for reception of antenna 2 unknown in type but present in another species; gland cone of antenna 2 absent, article 2 of antenna 2 bearing rounded flange, articles 1 and 2 of antenna 2 pressed to curve of head and not freely projecting; upper lip rounded below and setulose in type but broadly subquadrate, unsetulose, very thin, and transparent in second species; mandibles of normal dimensions, type species with strong lacinia mobilis in at least left mandible and bearing presumed vestigial palp of 1 article bearing two setules; second species with smooth mandibular incisors, lamellar, serrate lacinia mobilis on left mandible, spiniform on right, each mandible with two spines, no palps, no molars; lower lip without inner lobes in type, bearing small inner lobes on second species; inner plate of maxilla 1 thin and bearing two setae in type, one in second species; maxilla 2 with normally thin plates and one inconspicuous falciform seta on inner plate; inner plates of maxillipeds extending subequally, inner plate with one to three stout cuspidiform spines besides other setae; maxillipedal palp extending about two articles beyond plates, articles progressively thinner, article 4 slightly elongate, subrectangular or substyliform, apically setose; article 5 of gnathopods long; article 2 of pereopods 1–2 thin; distal portions of pereopods 3–5 of normal dimensions; peduncle of pleopods in type of medium expansion, inner rami on type with proximal expansion; in second species peduncles broadly expanded and inner rami with strong sharp hook at proximal expansion, peduncle bearing one serrate locking spine; uropod 3 vestigial, formed only of planiform peduncle guarding posterior margin of telson and bearing apical setae and/or spine; telson with two softly triangular lobes fully separate; eyes with core of dark pigment.

TYPE SPECIES: *Wandelia crassipes* Chevreux.

REMARKS: The second known species of the genus, described below, may require a new genus, but so many congruities occur and so little is known of speciation in eophliantids that generic concepts are unclear. Most of the multispecific genera of eophliantids have species so closely interrelated that in other families these might be considered as morphological subspecies. They may have to be so treated if one determines that the second known species of *Wandelia* can be logically retained in *Wandelia*. This will depend on further discoveries.

The new species from New Zealand differs in generic characters from *Wandelia crassipes* as follows: broad coxa 1; upper lip quadrate and asetulose; breadth of lacinia mobilis in left mandible and small size of serrations; absence of mandibular palp (questionable in type species); smoothness of mandibular incisors; presence of inner lobes on lower lip (possibly overlooked in type); inner plate of maxilla 1 with only one seta and seta larger than in type; widely expanded pleopodal peduncles with hook on inner rami.

Other possible character comparisons may occur in the right mandible, pleopodal coupling hooks, and cephalic incision of the type species.

Wandelia crassipes Chevreux

Wandelia crassipes Chevreux, 1906: 45–49, figs. 24–26; Nicholls, 1939: 324–325.
Bircenna crassipes. Chilton, 1909b: 62; Chevreux, 1912: 113–114; Sheard, 1936a: 460 (key).

Port Charcot (40 m); Wandel Island (40 m); Isle Petermann (3 m).

Wandelia (?) **wairarapa,** new species

Figs. 105, 106

DESCRIPTION: Eyes retaining dark pigment in alcohol; head with anterolateral incision for reception of antenna 2, latter with articles 1 and 2 plastered to curve of head and not freely projecting; antenna 1 in male with first flagellar article strongly inflated, normally thin in female, bearing long aesthetascs in both sexes; epistome rounded from lateral view, upper lip softly subquadrate, smooth, very thin and transparent; left mandible with broad, flat lacinia mobilis set in seatment so surface flush with extremes of incisor, right incisor also with mostly unserrate straight margin as in left, right lacinia mobilis spiniform, each mandible with two spines, no molars, no palps; lower lip with inner lobes very poorly preserved, small, fragile but visible in undissected lower lip filling normal position; inner plate of maxilla 1 thin and bearing one medium sized apical seta, outer plate with eight spines, palp absent and no mark present; maxilla 2 with normally thin lobes, inner bearing one medial falciform seta; plates of maxillipeds extending equally, inner with three cusp spines, palp exceeding plates by two articles, articles decreasing in width successively, article 4 subrectangular, apically setose; gnathopods thin, article 5 elongate, parachela small but sharp, bearing sharp scales, dactyl with strong apical accessory tooth and thin strap-seta on inner apical edge, covered with inner and outer row of large pectinae; article 4 of pereopods 1–5 moderately nasiform in male, on pereopod 3 strongly nasiform in female, pereopod 5 larger than and similar to pereopod 4 but posterior lobe of article 2 occurring medial to article 3; pereopodal locking spines large (one per pereopod); coxae of medium

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

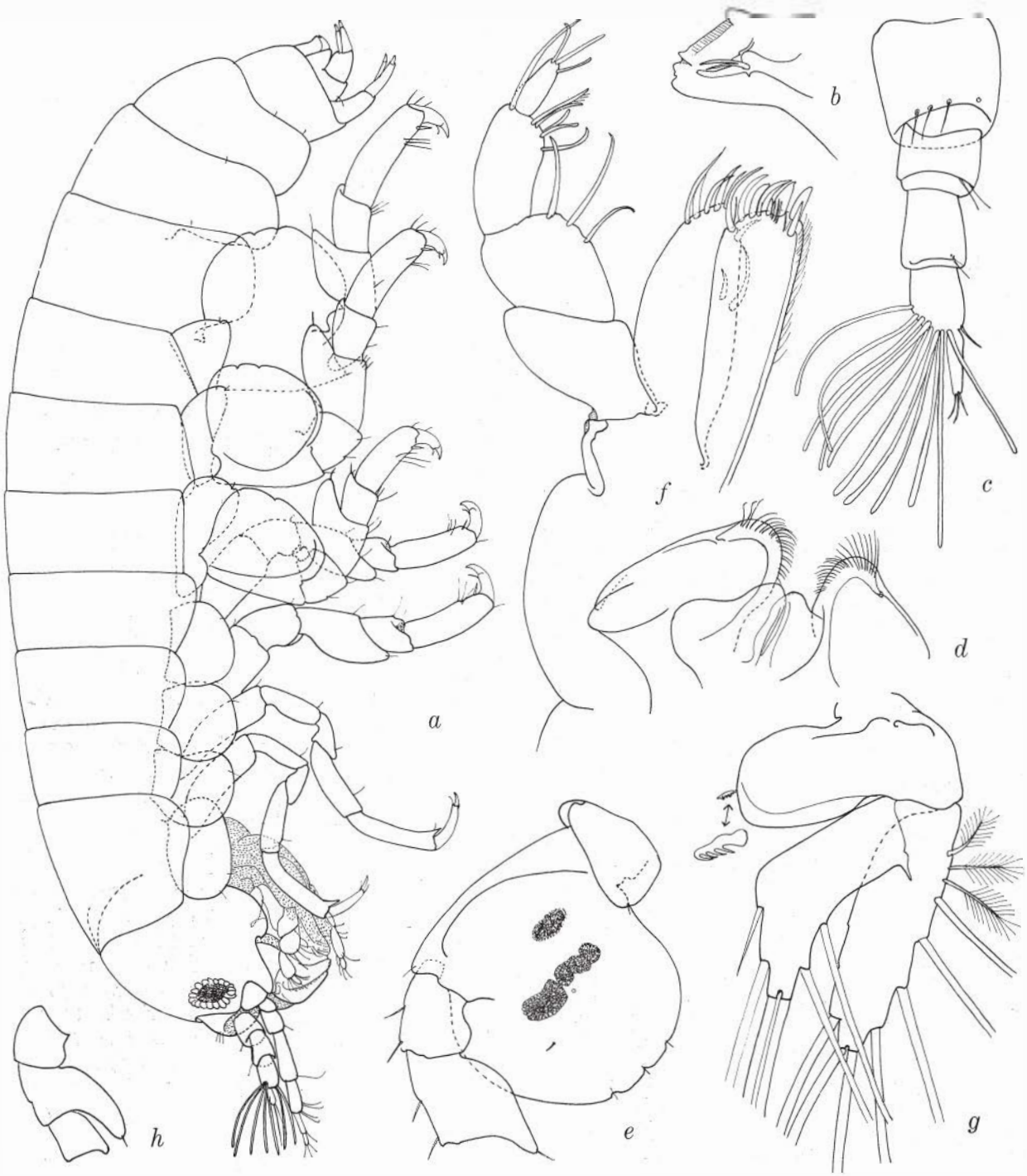


FIG. 105. *Wandelia wairarapa* n. sp., holotype, male, 1.8 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, body; *b*, right mandibular incisor; *c*, antenna 1; *d*, lower lip; *e*, base of pereopod 5. Male, 1.7 mm; *f*, maxilliped; *g*, pleopod 3. Female, 1.8 mm: *h*, articles 3, 4, 5 of pereopod 4.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

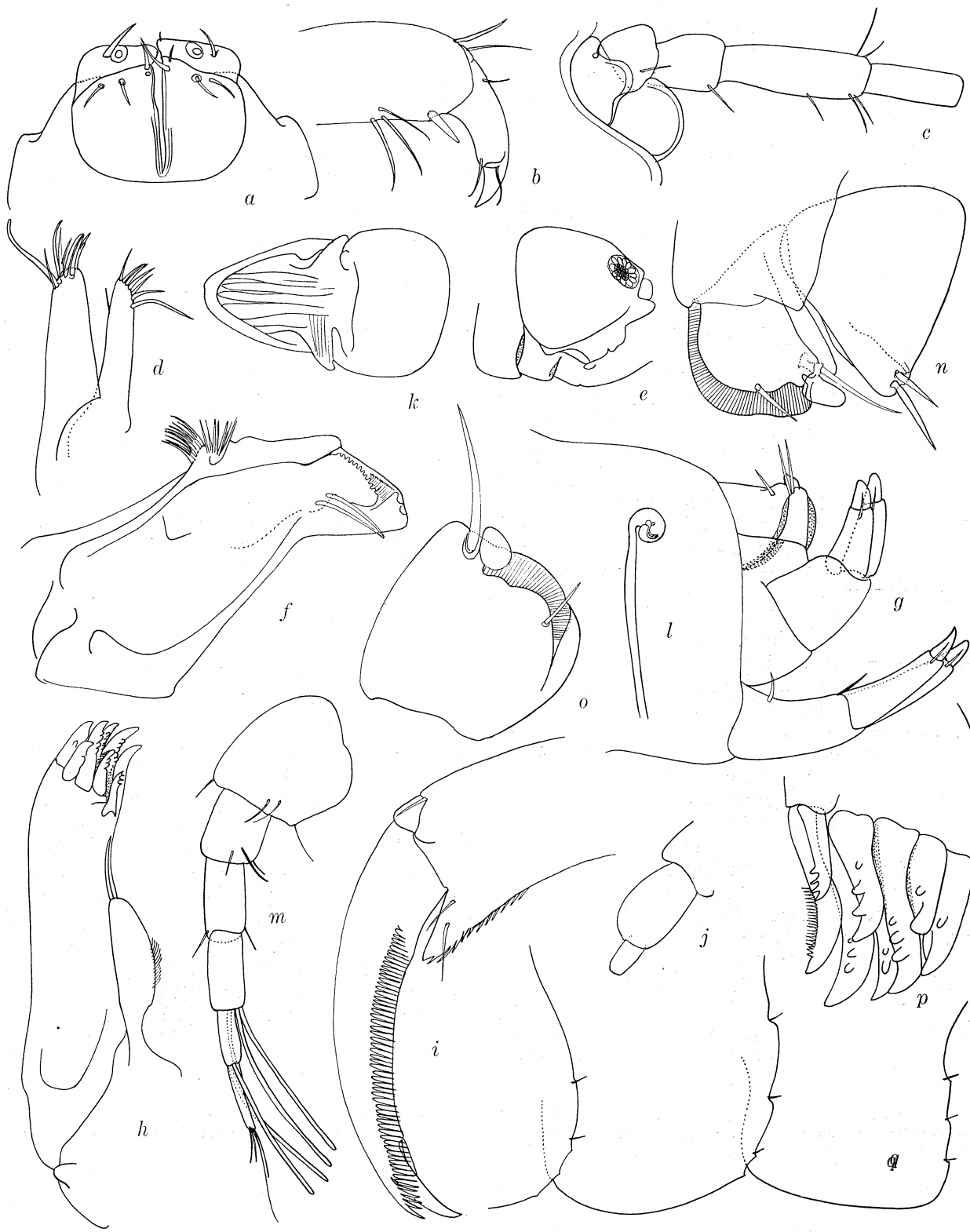


FIG. 106. *Wandelia wairarapa* n. sp., holotype, male, 1.8 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, telson and both members of uropod 3; *b*, apex of pereopod 5; *c*, medial antenna 2; *d*, maxilla 2; *e*, ventral shape of pereonite 1 from lateral view; *f*, left mandible; *g*, unosome; *h*, maxilla 1; *i*, apex of medial gnathopod 1; *j*, articles 3, 4, 5 of antenna 1 on side opposite to Fig. 105c. Female, 1.8 mm: *k*, upper lip and epistome from anterior view (on their sides); *l*, curl-tipped seta of brood lamella; *m*, antenna 1. Male, 1.7 mm: *n*, uropod 3 and one lobe of telson from dorsolateral view; *o*, flattened uropod 3; *p*, outer plate of maxilla 1, flat; *q*, pleonal epimera 1–3.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

size, mostly contiguous, coxa 1 broad; pleonal epimera softly quadrate and with two or three weak posterior notches and setules; pleonites 5–6 coalesced; pleopods with widely expanded peduncles each bearing one serrate coupling hook, inner rami proximally expanded and bearing sharp thin hook; rami of uropods 1–2 subequal in length, each bearing distinct distal nail; uropod 3 planiform, erect, guarding posterior margin of telson, each bearing one jewel spine at midapex, spine easily unseated, each uropod 3 also bearing one large and one small seta, lacking lobes or lumps; telson with two free softly triangular lobes, together forming square; pereonite 1 elongate, without ventral flange or bare indication of such.

HOLOTYPE: NZOI, No. 105, male, 1.8 mm.

TYPE LOCALITY: NZOI, Sta. E967, Eve Bay, Wellington, New Zealand, intertidal wash of algae, 5 November 1967.

REMARKS: Under the generic heading are remarks about the nonconformity of this species to the *Wandelia* concept, but the overall resemblance is so strong that the species is provisionally included. The body is extremely solid and hard, the head subspherical, breaking into pieces by shattering when strongly clasped with tweezers rather than bending easily as in other eophliantids. But the head is so hard and smooth that it is very difficult to grasp without tweezers sliding free.

In formaldehyde immediately after collecting, the organisms appear variegated with brown and green, but after a few days and immediately in alcohol, the body turns bright green. Dark green glands formed of tightly packed small cells occur in groups of three to eight morulas scattered throughout the body, coxae 1–5 and article 2 of pereopods 3–5. The green colour persists 2 months or longer in alcohol.

Wandelia wairarapa differs from *Ceinina japonica* Stephensen in the larger coxae, broader article 2 of pereopod 5, presence of inner lobes on the lower lip, smaller female brood plates, broader peduncles of pleopods, and the flat, flush, left lacinia mobilis.

MATERIAL: Four specimens from the type locality.

DISTRIBUTION: Wellington.

KURIIDAE

DIAGNOSIS: Talitroidea with laterally compressed bodies, essentially no dorsal bulges, and spinulose skin; head laterally compressed; antennae nonspinose; coxae 1–4 normally quadratiform; mandibular molar with weak triturative surface; urosomites all coalesced; uropod 3 with well developed ramus.

DESCRIPTION: Parent article of outer plate on maxilliped elongate; 4-articulate maxillipedal palp very long, article 4 rectoconical and apically spinose or setose; gnathopods very thin, elongate, and weakly subchelate; telson formed of two narrow triangular plates basally joined; upper lip, lower lip, maxillae, pleopods, brood lamellae unknown.

TYPE GENUS: *Kuria* Walker and Scott.

REMARKS: Possibly urosomite 1 is free, as Walker and Scott (1903) show a line in that position, but they state that all segments are coalesced.

This family differs from the Ceinidae in the coalescence of at least two urosomites, the extremely thin gnathopods with short palms, and the presence of a ramus on uropod 3. Kuriidae differ from the Najnidae in the coalesced urosomites, the presence of a distinct mandibular molar, the thin gnathopods, the spinulose skin, and normal coxae 1–4.

Kuria Walker and Scott

Kuria Walker and Scott, 1903: 228.

Kuria longimanus Walker and Scott

Kuria longimanus Walker and Scott, 1903: 228–229, pl. 14B, fig. 5.

Abd-el-Kuri.

NAJNIDAE, new family

DIAGNOSIS: Talitroidea with laterally compressed body, smooth skin, and no bulges; head compressed but with slight anterodorsal flattening and shift of antennae ventrally; antennae nonspinose; coxae 1–2 subpyriform; mandibular molar replaced with one or two long spines; setae of brood lamellae normally curl-tipped; urosomites free; uropod 3 with vestigial ramus.

DESCRIPTION: Upper lip slightly bilobate; palp of maxilla 1 present; article 4 of maxillipedal palp small, not unguiform; telson short, broad, entire. Curl-tipped setae of brood lamellae with normal terminal anther but gerontic females occasionally with short aberrant setae set in deep cysts and supernumerary to normal setae (specimens of *Najna* sp. in U.S. National Museum re-examined).

TYPE GENUS: *Najna* Derzhavin.

Najna consiliorum Derzhavin

Najna consiliorum Derzhavin, 1937: 97, pl. 6, fig. 2; Gurjanova, 1951: 826–827, fig. 578.
not *Najna ?consiliorum*. J. L. Barnard, 1962c: 157–160, figs. 21–22.

Najna sp.

Najna ?consiliorum. J. L. Barnard, 1962c: 157–160, figs. 21, 22.

North-east Pacific.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

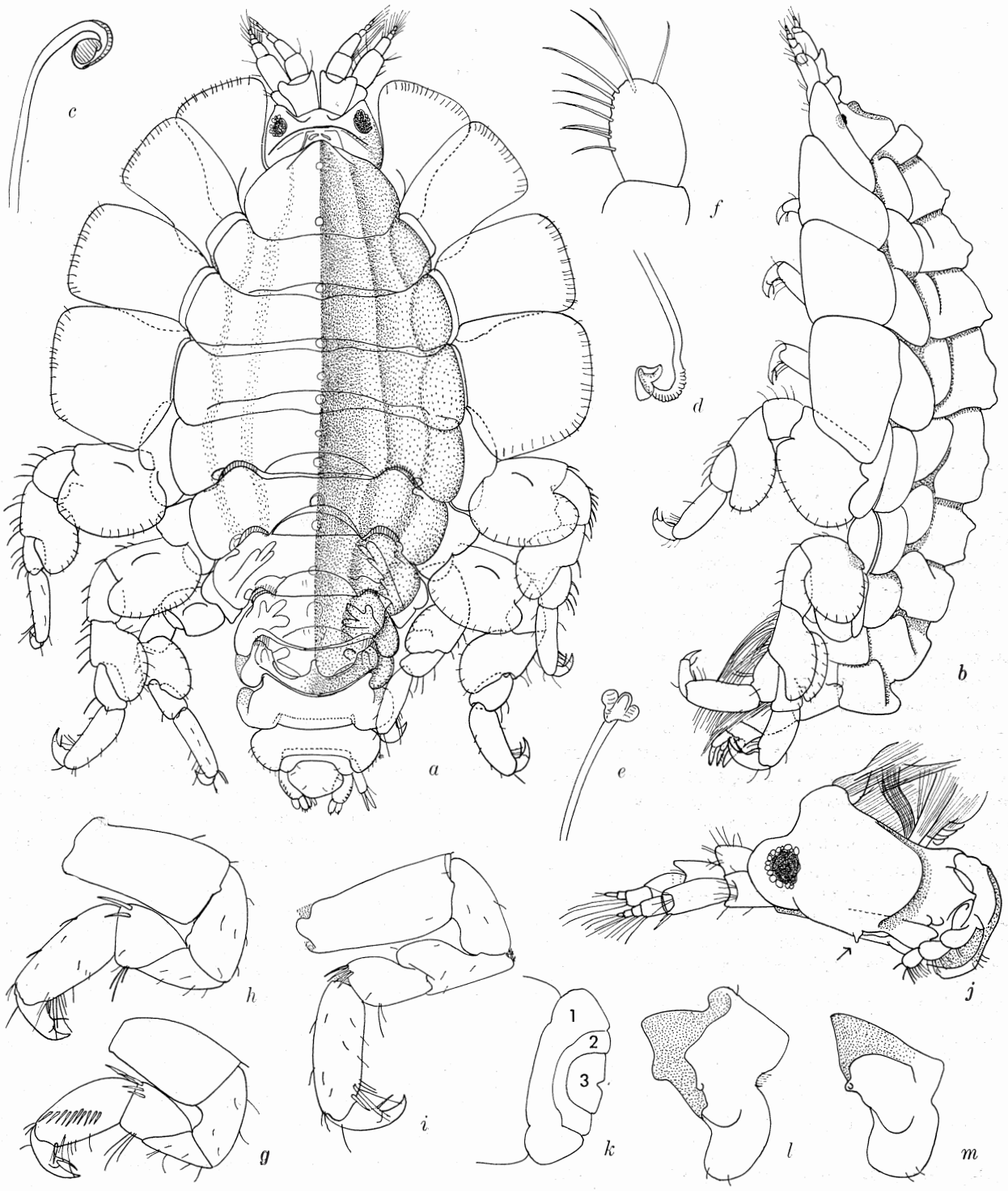


FIG. 107. *Iphinotus typicus* (Thomson), female, 2.7 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, *b*, body, dorsal and lateral; *c*, *d*, *e*, curl-tipped setae of brood lamellae; *f*, article 3 of maxillipedal palp; *g*, *h*, medial gnathopods 1, 2; *i*, medial pereopod 1; *j*, lateral head; *k*, ventral urosomites 1–3; *l*, *m*, lateral pleonal epimera 2–3 flattened from side.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

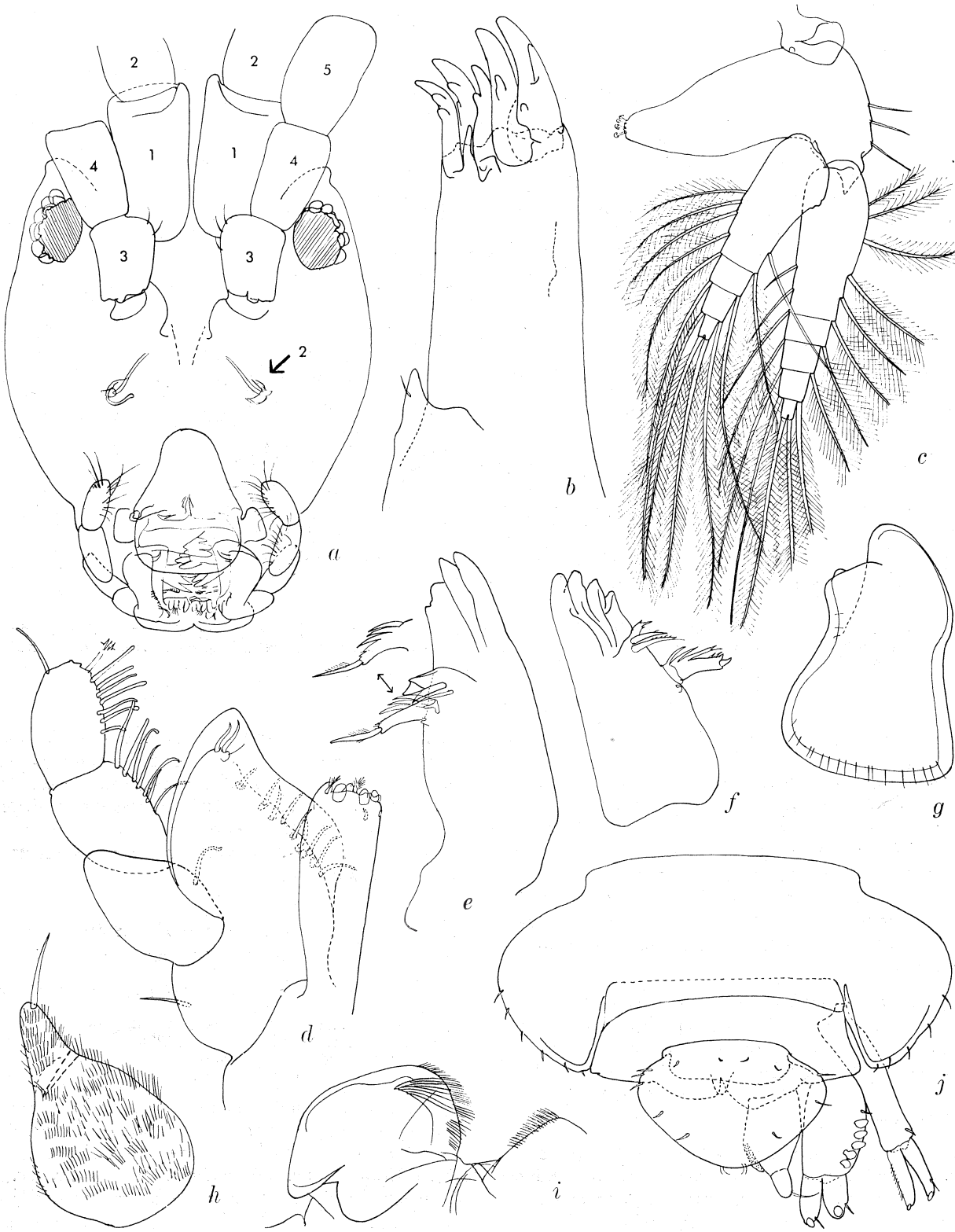


FIG. 108. *Iphinotus typicus* (Thomson), female, 2.7 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, ventral view of head, arrow indicating gland cone; *b*, maxilla 1; *c*, pleopod 2; *d*, maxilliped; *e*, *f*, right and left mandibles; *g*, coxa 1, left; *h*, uropod 3; *i*, part of lower lip; *j*, dorsal urosome.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

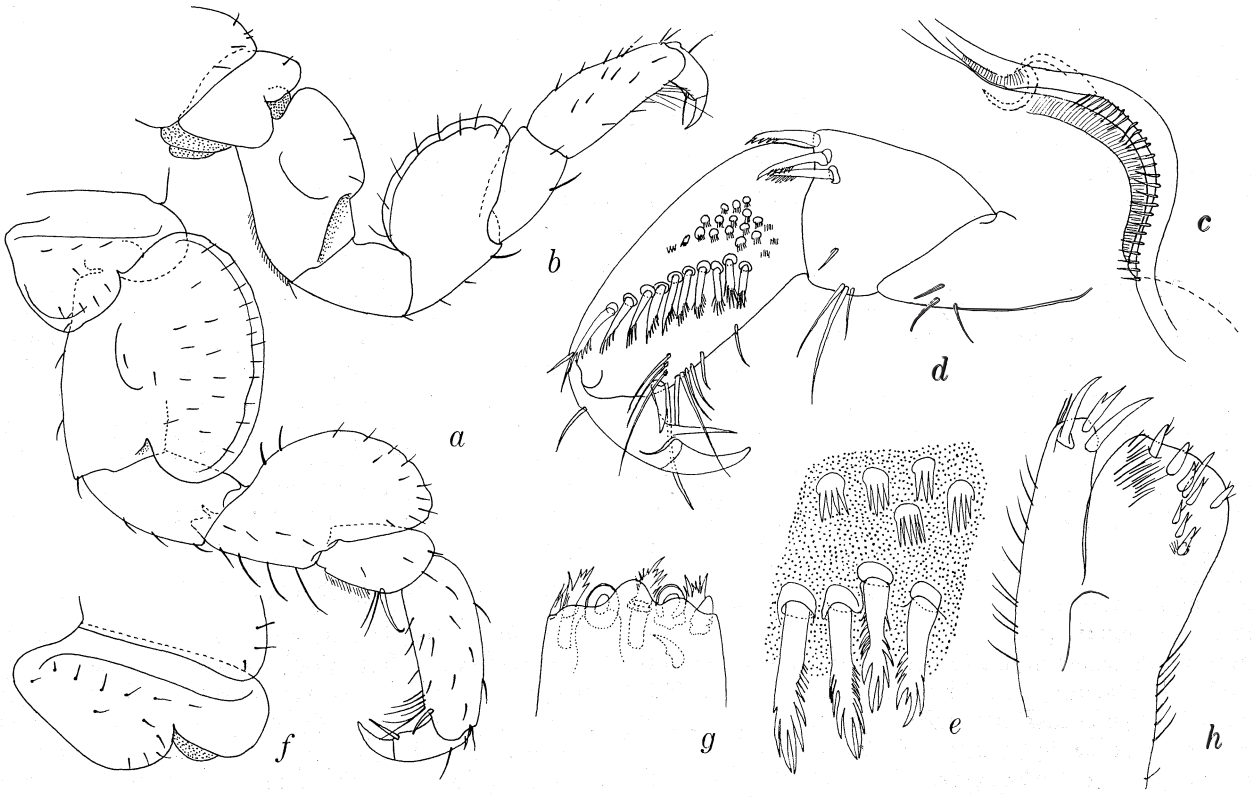


FIG. 109. *Iphinotus typicus* (Thomson), female, 2.7 mm, NZOI Sta. E 967 [JLB NZ-2]: *a*, *b*, pereopods 4, 5; *c*, dorsal joint between pereonites 5–6; *d*, *e*, gnathopod 1 and enlargement of spines and combs; *f*, left coxa 3; *g*, inner plate of maxilliped; *h*, maxilla 2, flattened.

PHLIANTIDAE

DIAGNOSIS: Talitroidea with deeply depressed, rugose bodies, skin smooth or rough; head very small, depressed, bearing very small, nonspinose antennae; coxae 1–4 broadly splayed but normally rectangular (not pyriform); mandibular molar nontriturative, forming hump or spike or absent; setae of brood lamellae curl-tipped as far as known; urosomites often with more or less coalescence, urosome or pleon strongly flexed under pereon; uropod 3 with 1 ramus or none.

DESCRIPTION: Mouthparts shifted to functional posterior margin of head; articles 1–2 of antenna 2 amalgamated with head; inner lobes of lower lip variable; palp of maxilla 1 vestigial or absent; palp of maxilliped 2–4 articulate; occasionally uropods 1–2 reduced; telson usually small and entire.

REMARKS: Other talitroideans have partial cephalic amalgamation of article 1 on antenna 2 but phliantids carry this to an extreme. The presence of any inner lobes on the lower lip casts a measure of doubt on phliantid-talitroidean relationships.

COMPOSITION: *Phlias* Guerin (obscure genus, possibly senior synonym of *Pereionotus*), *Heterophlias* Shoemaker, *Pariphinotus* Kunkel (probably synonym of *Heterophlias*), *Iphinotus* Stebbing, *Iphiplateia* Stebbing, *Palinnotus* Stebbing (possible synonym of *Pereionotus*) *Pereionotus* Bate and Westwood, *Plioplateia* K. H. Barnard, *Quasimodia* Sheard. Enigmatical genus *Temnophlias* K. H. Barnard, possibly assignable to Eophliantidae or requiring erection of new family.

See J. L. Barnard (1969a) for further notes and references to this family.

Iphinotus typicus (Thomson)

Figs. 67*n*, 107, 108, 109

Iphigeneia typica Thomson, 1882: 237–238, pl. 18, fig. 4. Thomson and Chilton, 1886: 144.
Iphinotus Chiltoni Stebbing, 1899a: 419–421, pl. 35B.
Iphinotus typicus. Stebbing, 1906: 204–205; Thomson, 1913: 242; Stephensen, 1927: 313.
Iphinotus typica. Thomson, 1902: 464–465.

Thomson originally described this species with three maxillipedal palp articles, but Stebbing found a fourth unguiform article in his material. Specimens at hand either bear or lack the fourth article. Its presence or absence seems to bear no relation to size of the body, but individuals lacking the fourth article also have the minute nipple-projections of the dorsal humps minimised. Possibly two cryptic species are mixed together and *I. chiltoni* would remain valid.

Stebbing's specimen was 5.0 mm long whereas the largest at hand is 2.7 mm, the smallest 2.1 mm. These

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

small specimens lack marginal spines on the outer ramus of uropod 2 as shown in Stebbing's figure, and article 4 of pereopod 5 is larger.

Coxa 7 is bilobed on this species, and it is distinctly free of pereonite 7. Pereopod 3 is similar to figured pereopod 4, but article 2 is slightly larger and article 6 smaller. Pleonal epimeron 1 is nearly vertically oriented, whereas epimeron 3 is nearly horizontally extended, epimeron 2 being intermediate between the extremes.

From lateral view the pereonites exhibit strong dorsolateral bulges (Fig. 107*b*). The peduncle of pleopod 3 is slightly more attenuate, and that of pleopod 1 slightly less attenuate than that shown for pleopod 2 in Fig. 108*c*. Each peduncle has four umbrella-shaped coupling hooks.

Uropod 3 appears vaguely from a distance to be composed of a peduncle and ramus, and this circumstance is especially strong while the uropod remains attached obliquely to the urosome but magnification under oil immersion shows no distinct separation between the articles (Fig. 108*h*). Urosomite 3 is free only ventrally. Gnathopod 2 does not have the medial spine row on the hand seen in gnathopod 1.

Mouthparts occur almost fully on the posterior margin of the head indicating that the head has been remoulded so as to hang beneath pereonite 1, with the antennae really pointing dorsally in the primitive sense, though they point anteriorly to the body axis. The remoulding of the head has resulted in amalgamation of articles 1 and 2 of antenna 2 into the head, with the gland cones occurring far posterior to the juncture of the antennae (*see* lateral and ventral views of head, Figs. 107*j* and 108*a*).

If *Iphinotus typicus* is to be considered as having only three palp articles on the maxilliped, it would then be keyed closely to *Palinnotus* Stebbing and *Pereionotus* Bate and Westwood. *Iphinotus* differs from male and female *Palinnotus* and from female *Pereionotus* in the biramous uropod 2, and from both *Palinnotus* and *Pereionotus* in the flattened, alate urosomite 1 with the attachment of uropod 1 concealed from dorsal view.

MATERIAL: NZOI, Sta. E967 (1), Sta. E970 (9), Sta. E973 (5), Sta. E979 (1), Sta. E982 (1).

DISTRIBUTION: Auckland Islands, rocky coast, with *Melobesia*. Dunedin; Lyttelton Harbour; Kaikoura; Wellington; Gisborne; Whangaparaoa Peninsula.

Taxa Excluded from Talitroidea

DEXAMINIDAE

PROPHLIANTINAE

DIAGNOSIS: Body laterally compressed, weakly rugose, skin unknown; head laterally compressed; antennae small; accessory flagellum absent; upper lip entire; mandibles lacking palps, bearing small lacinia mobilis, possibly no spines, molars evanescent, nontriturative, possibly absent; lower lip with inner lobes; inner plate of maxilla 1 short, bearing one or no long apical seta, palp long and uniarticulate; maxilla 2 of normal gammaridean structure though inner plate may be small; inner plates of maxilliped small, outer plates very large and extending far beyond inner plates, palp 4-articulate and otherwise normal for gammarideans, article 4 mostly rectoconical and apically setose or bearing apical spine; gnathopods small, thin, with relatively short or long fifth articles, slightly parachelate or normally subchelate palms but distinct from gnathopods of Kuriidae and Eophliantidae and resembling those of Ceinidae; coxae 1–4 of normal gammaridean dimensions or slender but coxa 4 not broader than 3, thin, posteriorly and weakly excavate; coxa 5 much larger and longer than other coxae; pereopods 1–2 normal; pereopods 3–5 diverse, pereopods 3 with especially inflated and enlarged article 2; biramous pleopods with moderately thin peduncles; all urosomites coalesced together; all uropods normally biramous; telson narrow and deeply cleft.

TYPE GENUS *Prophlias* Nicholls (1939).

REMARKS: The biramous uropod 3 is the first clue demonstrating that prophliantids lie outside the talitroidean complex despite similar mandibles, upper lip, head, and antennae. The gnathopods could be included in the talitroidean complex and though *Taihape* in the Ceinidae has inner lobes on the lower lip, it is exceptional, like *Prophlias*. The latter also has a large first maxillary palp, a condition occurring in only a few members of the Talitridae (*sensu lato*). The enlarged outer plates of the maxillipeds also deny talitroidean relationship; these and uropod 3 definitely exclude prophliantids from the Talitroidea, and the lower lip and maxilla 1 would be highly aberrant together in that superfamily. Prophliantids appear to be derivatives of Dexaminidae.

KEY TO THE GENERA OF PROPHLIANTINAE

1. Antenna 2 with flagellum ..... *Haustoriopsis*
   Antenna 2 without flagellum ..... *Prophlias*

Haustoriopsis Schellenberg

Haustoriopsis Schellenberg, 1938: 12.

Haustoriopsis reticulatus Schellenberg

Haustoriopsis reticulatus Schellenberg, 1938: 12–15, figs. 5–7.

Bismarck Archipelago.

Prophlias Nicholls

Prophlias Nicholls, 1939: 312–313.

Prophlias anomalus Nicholls

Prophlias anomalus Nicholls, 1939: 314–316, figs. 1, 2.

Western Australia.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

BIANCOLINIDAE, new family

DIAGNOSIS: Cylindrical body of medium thickness; head depressed, cylindrioid; coxae medium to large, coxa 1 narrow and not bilobed but occasionally excavate ventrally; pereonite 1 lacking ventral flange and elongate or not; pleonites 5–6 free; head apparently not incised for reception of antenna 2; gland cone of antenna 2 apparently absent but requiring study; upper lip rounded or slightly emarginate; mandibles stout, each side with broad serrate lacinia mobilis but spines present or absent in different species; lower lip with large inner lobes; inner plate of maxilla 1 tumid and bearing weak seta; inner plate of maxilla 2 extremely thin and normally setose; *inner plates of maxillipeds not reaching extent of outer plates, bearing long thick or thin setae, no short stout cuspidorial spines;* maxillipedal palp exceeding outer plate by two articles, article 2 swollen and mediodistally produced, article 4 variable, short and tumid or long and subunguiform; *article 5 of parachelate gnathopods short*; article 2 of pereopods 1–2 inflated as broadly as those on pereopods 3–5; *distal portions of pereopods 3–5 very thin; peduncle of pleopods not differentially expanded because rami relatively tumid; uropod 3 large, distinctly biramous, rami long, articulate*; telson varying from slightly incised to distinctly cleft about one-third its length but lacking dorsal raphus; eyes red, lacking black pigment.

TYPE GENUS: *Biancolina* Della Valle (1893).

REMARKS: The diagnosis derives its strength from *B. australis* Nicholls and *B. mauihina* J. L. Barnard (1970), as several points are not clear in the type species of *Biancolina*.

Biancolina is one morphological grade more specialised than *Amphitholina* Ruffo, a genus removed from Eophliantidae to the Ampithoidae. The retention of inner lobes on the lower lip matches the condition in *Amphitholina*, but they are also retained in the eophliantid genus *Wandelia* (or at least in one of its species). The relatively large coxae are also shared with *Wandelia* as are the lacinia mobili of the mandibles. *Biancolina* differs from *Amphitholina* in the slender rami of uropod 3 and the non-fleshy telson.

Statements in italics in the diagnosis distinguish Biancolinidae from Eophliantidae. Uropod 3 is the most significant point, but the maxillipedal plates are also important.

Biancolina Della Valle

Biancolina Della Valle, 1893: 562; Stebbing, 1906: 646 (in part, not *Amphitholina cuniculus* (Stebbing)); Nicholls, 1939: 318–320.

DIAGNOSIS: With the characters of the family.

TYPE SPECIES: *Biancolina algicola* Della Valle.

KEY TO THE SPECIES OF *Biancolina*

1. Pereopods 3–5 simple, setae of uropods 1–2 sparse..... *algicola*
   Pereopods 3–5 prehensile, setae of uropods 1–2 numerous....2
2. Telson cleft one third its length..... *australis*
   Telson with weak emargination..... *mauihina*

Biancolina algicola Della Valle

Biancolina algicola Della Valle, 1893: 562, pl. 3, fig. 11; pl. 32, figs. 38–53; Stebbing, 1906: 647 (in part, not *Amphitholina cuniculus* (Stebbing)): Nicholls, 1939: 320.

Mediterranean Sea, Bay of Naples.

Biancolina australis Nicholls

Biancolina australis Nicholls, 1939: 321–322, figs. 3–4.

Western Australia, Rottnest.

Biancolina mauihina J. L. Barnard

Biancolina mauihina J. L. Barnard, 1970: 103, figs. 57, 58.

Hawaii, Oahu.

AMPITHOIDAE

Amphitholina Ruffo

Amphitholina Ruffo, 1953: 1–9, figs. 1–2.

DIAGNOSIS: Ampithoidae with subcylindrical body and medium-sized coxae; coxa 1 narrow, subtriangular; pereonite 1 not elongate and presumably not bearing ventral flange; pleonites all free; accessory flagellum absent; head not incised for reception of antenna 2; gland cone of antenna 2 well developed; upper lip rounded below and setulose; mandibles stout, each lacking palp, incisors deeply serrate, large serrate lacinia mobilis on each member, spine row with two or three spines, molar presumably absent; lower lip with large ampithoid inner lobes but outer not incised or bilobed as in typical ampithoid; inner plate of maxilla 1 short, broad, bearing one seta, outer plate with nine or more spines, palp absent; maxilla 2 with thin inner plate medially setose, outer plate of normal dimensions; inner plate of maxilliped not reaching outer, possibly lacking cuspidiform spines and bearing setae, outer plate with normal marginal cuspidiform spines, palp exceeding outer plate by 1.5 articles, article 4 short, rectoconical, armed apically with long spine; gnathopod 1 slender, parachelate, article 5 long; gnathopod 2 apparently enlarged in both sexes, subchelate; article 2 of pereopods 1–2? thin; distal portions of pereopods 3–5 of normal dimensions; pleopods not analysed; uropod 3 well developed, peduncle thick, cylindrical, slightly elongate, rami short, tumid, outer apparently with small hook; telson solid, fleshy, ovatotriangular, apically bifid; eye pigment colour unknown.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

TYPE SPECIES: *Amphithoe cuniculus* Stebbing (1874).

REMARKS: This genus is returned from the Eophliantidae to the Ampithoidae, where a subfamily based on cylindrical body, absence of palp and molar on mandible, non-incised outer lobes of lower lip, and absence of palp on maxilla 1, might be erected for it.

The diagnosis is composed as if *Amphitholina* were included with the Eophliantidae to elucidate comparisons. But the biramous ampithoid uropod 3 and general ampithoid appearance of the lower lip, and the normally ampithoid pereopods 3–5 with large coxa 5 all point to its ampithoid affinities.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

APPENDIX I

A. BIOGEOGRAPHIC SUMMARY OF NEW ZEALAND GAMMARIDEA

EXCLUDING SATELLITE SPECIES AND SUBLITTORAL INFAUNAL MEMBERS

Legend:

A = Species has distributional category cited in heading.
B = Genus has distributional category cited in heading.
C = Species complex has distributional category cited in heading.
D = Nearest cognate has distributional category cited in heading.
E = Family has distributional category cited in heading.
F-1 = Genus primarily in Northern Hemisphere cold waters.
F-2 = Genus equally present in Northern Hemisphere cold waters.
F-3 = Cognate occurs in Northern Hemisphere cold waters.
G = Genus confined to New Zealand (and relationship obscure).
H = Unique member of genus or family.
I = Relationship obscure because of lack of study of group in adjacent regions or monography required to sort out relationships.
J = Negative information: no relationship of genus or species to cold-temperate or antarctic waters.
* = Species endemic to New Zealand.

I. Cosmopolites: species of cosmopolitan distribution or belonging to racial complexes with such distribution

**Aora maculata* C
**Aora* sp. C
Corophium acherusicum A
Corophium acutum A
Corophium sextonae A
Eusiroides monoculoides C
Hyale grandicornis A (especially subantarctic)
Hyale media A (especially subantarctic)
Hyale rubra A
Isehyrocerus longimanus (subantarctic and F-3)
Jassa falcata A
**Leucothoe trailli* C
Polycheria antarctica A but possibly C only
**Seba typica* C

II. Circum-subantarctic distribution

Acontiostoma marionis A
Ensirus antarcticus A
Gitanopsis squamosa A
Haplocheira barbimana A
Hyale hirtipalma A
Liljeborgia dubia A
Parapherusa crassipes A
Parathaumatelson nasicum A, B
**Parawaldeckia* spp. B
Probolisca ovata A

III. Antarctic or subantarctic affinities

**Atylloella meke* B
**Ceradocopsis peke* D
**Cylindrylloides kaikoura* D, B
**Gondogeneia danai* C
**Gondogeneia rotorua* C
**Haplocheira lendenfeldi* C, B
**Maera tepuni* D
**Maoriphimedia hinemoa* (generic) D
**Melita inaequistylis* D but also in warm-temperate
**Oradarea novaezealandiae* B but F-3
**Paramoera chevreuxi* B but F-2
**Paramoera fasciculata* B but F-2
**Paramoera rangatira* B but F-2
**Pontogeneiella levis* C but possibly warm-temperate also
**Raumahara rongo* E, but F-2, F-3
**Stenothoe moe* C
**Wandelia wairarapa* D, B

IV. Affinities with tropical, warm-temperate regimes

T = tropical; WT = warm-temperate; NH = Northern Hemisphere

**Amphilochus filidactylus* F-1
**Amphilochus opunake* J, F-2
**Ampithoe hinetore* D in NH-WT
**Atylus reductus* F-3
**Elasmopus bollonsi* D in T
**Elasmopus neglectus* J
**Elasmopus wahine* C in WT
Ericthonius pugnax T
**Gitanopsis desmondi* D in NH-WT
**Gitanopsis kupe* C, D
**Guernea (?) timaru* B in WT
Maera ?inaequipes
**Maera* sp.
**Melita awa* C in T
**Neocyproidea otakensis* Generic D is H
**Neocyproidea pilgrimi* Generic D is H
**Paracalliope novaezealandiae* C is T
**Paraphoxus australis* J
**Peltopes peninsulae* Generic D is H
**Podocerus karu* C is WT
**Podocerus manawatu* C is WT
**Podocerus wanganui* C is T
**Ventojassa frequens* B, C, D in NH-WT

V. Australian warm-temperate affinities

**Atylus taupo* D
**Bircenna fulva* B, C, D
**Ceradocus chiltoni* D
Ceradocus rubromaculatus haumuri A
Gammaropsis crassipes A
Gammaropsis haswelli A
**Gammaropsis tawahi* C
Gammaropsis thomsoni A
**Gammaropsis typica* D
Hyale maroubrae A
**Iphimedia haurakiensis* D
Liljeborgia aequabilis A
**Maera incerta* D

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Maera mastersi A
Mallacoota subcarinata A
Melita festiva A
**Metaceradocus whakatane* D
**Microdeutopus apopo* D, F-1
Paracorophium excavatum A
**Paradexamine barnardi* C, D
**Paradexamine houtete* C, D
**Paradexamine muriwai* D
**Paradexamine pacifica* B, C, D
**Paraphoxus waipiro* D
Photis sp. (? = *brevicaudata*) A
Podocerus cristatus A

VI. Special New Zealand endemics. Most of these species appear to have non-antarctic affinities.

**Apherusa translucens* H, I, J
**Calliopius didactylus* H, I, J
**Iphinotus typicus* H, I, J
**Nihotunga noa* H, I, J
**Syndexamine carinata* H, I
**Tainape kanoni* H
**Tetradeion crassum* H
**Ceina egregia*, subendemic genus found only in Indonesia and Juan Fernandez Islands

VII. Affinities unknown

**Allorchestes novizealandiae* F-1
**Ampithoe aorangi* D = South America-North Pacific
**Ampithoe lessoniae* D = South America-North Pacific
**Ampithoe* sp. I
**Colomastix magnirama* I
**Colomastix subcastellata* I
**Gammaropsis chiltoni* I
**Gammaropsis longimana* I
**Gammaropsis* sp. I
**Hyale grenfelli* I
**Lembos* sp. 1 I
**Liljeborgia akaroica* I
**Liljeborgia barhami* I
**Liljeborgia hansoni* I
**Panoploea spinosa* H

B. SATELLITE SPECIES

CONFINED TO ISLANDS SOUTH AND EAST OF NEW ZEALAND

* = endemic; ? = endemism unclear; Island groups cited without "islands" appended

**Allorchestes compressa* Auckland, ?Campbell
?Carolobatea sp. dubious in New Zealand region
**Colomastix simplicauda* Macquarie
**Cylindryllioides mawsoni* Macquarie
**Gondogeneia bidentata* Campbell
**Gondogeneia chosroides* and var. *denticulatus* Macquarie
**Gondogeneia subantarctica* Auckland, Campbell
?Gondogeneia sp. Auckland, Campbell, Antipodes
**Heteroceressa monodi* Macquarie
?Hyale campbellica Campbell
?Lembos sp. 2 Campbell
?Lembos sp. 3 Macquarie
?Lembos sp. 4 Chatham
**Maera carnleyi* Auckland
**Parambasia* (?) *rossi* Auckland
**Paramoera aucklandica* Auckland
Paramoera fissicauda Campbell, Auckland, Macquarie (generally subantarctic)
**Paramoera hamiltoni* Macquarie
**Paramoera macquariae* Macquarie
**Paramoera schellenbergi* Macquarie
?Paramoera sp. Macquarie
?Paramoera sp. Enderby
**Podocerus capillimanus* Macquarie
Pontogeneiella brevicornis Macquarie (generally antarctic)
**Proboloides aurorae* Macquarie
**Pseudambasia bipartita* Auckland
Schraderia serraticauda Auckland, ?Macquarie (Australian warm-temperate)
**Stenothoe aucklandicus* Auckland

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

APPENDIX II

LIST OF NON-LITTORAL GAMMARIDEAN AMPHIPODA OF NEW ZEALAND

(NORTH, SOUTH, AND STEWART ISLANDS ONLY) WITH MAJOR REFERENCES

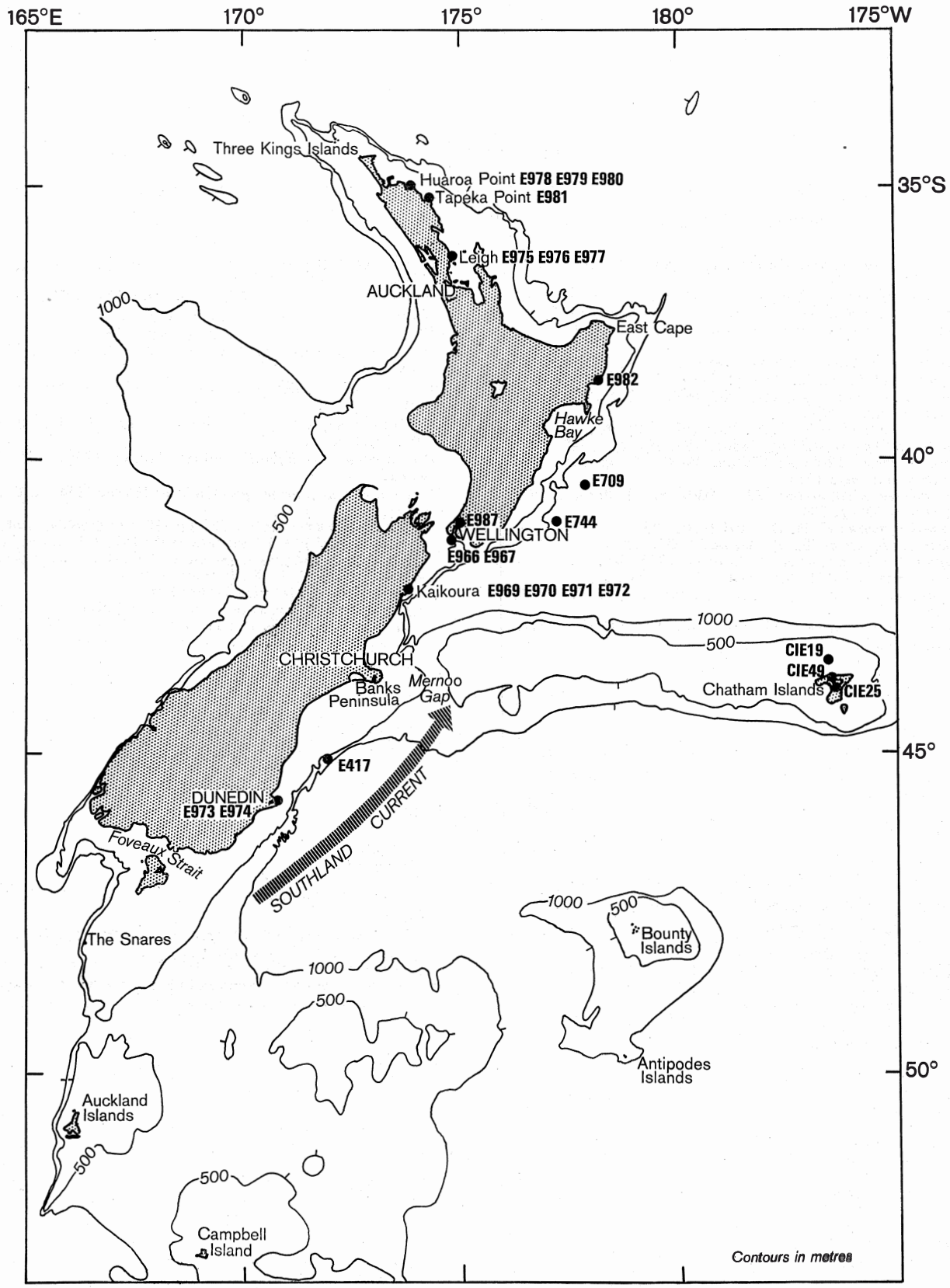
Amaryllis macrophthalma Haswell; Thomson 1902: 463; Chilton 1906a: 267.
Ampelisca acinaces Stebbing 1888: 1036; Stebbing 1906: 108.
Ampelisca chiltoni Stebbing 1888: 1042; Stebbing 1906: 102; (Chilton's later synonymies on these species of *Ampelisca* to be ignored).
Andaniotes corpulentus (Thomson 1882: 231); Hurley, 1955: 196.
Andaniotes simplex K. H. Barnard 1930: 328.
Anonyx exiguus Stimpson; Thomson 1882: 232; Stebbing 1906: 87; species inquirendus.
Bathymedon noezelanicus K. H. Barnard 1930: 365.
Camacho bathyplous Stebbing 1888: 1179; Hurley 1954f: 459.
Chelura terebrans Philippi; Chilton 1919b: 6; *see* Sars 1895; Chevreux and Fage 1925.
Hallce macronyx (Stebbing 1888: 1000); K. H. Barnard 1930: 363; Hurley 1954g: 784.
Hippomedon incisus K. H. Barnard 1930: 325.
Lepidepecreella bidens (K. H. Barnard 1930: 321).
Oediceroides microcarpus K. H. Barnard 1930: 366.
Paracorophium lucasi Hurley 1954f: 455. Freshwater.
Paraerangonyx compactus (Chilton 1882b: 177), Hurley 1954c: 602. Freshwater.
Paraleptamphopus caeruleus (Thomson 1885: 576; Chilton 1924a: 273. Freshwater.
Paraleptamphopus subterraneus (Chilton 1882b: 177); Chilton 1924a: 275. Freshwater.
Paraphoxus capillimanus (K. H. Barnard 1930: 336).
Paraphoxus pymipes (K. H. Barnard 1930: 332).
Pelltopes productus K. H. Barnard 1930: 338.
Phoxocephalus bassi (Stebbing 1888: 811); K. H. Barnard 1930: 330.
Phoxocephalus regium K. H. Barnard 1930: 331; Hurley 1954b: 594.
Phreatogammarus fragilis (Chilton 1882b: 179); Hurley 1954c: 605. Freshwater.
Phreatogammarus helmsii Chilton; Hurley 1954c: 613. Freshwater.
Phreatogammarus propinquus Chilton; Hurley 1954c: 610. Freshwater.
Platyischnopus neozelanicus Chilton 1897: 1; Stebbing 1906: 123.
Proharpinia hurleyi J. L. Barnard 1958: 149; J. L. Barnard 1960: 315. (= *Heterophoxus stephenseni* of Hurley 1954b: 589).
Regalia fascicularis K. H. Barnard 1930: 371.
Stilipes sanguineus (Hurley 1954h: 804).
Tryphosella kergueleni (Miers 1875: 74); Chilton 1909a: 617.
Uristes stebbingi (Walker 1903); Chilton 1909a: 618.
Urothoides lachneessa Stebbing 1888: 825; Chilton 1920a: 6.

APPENDIX III

FLOATING REFERENCES

Allorchestes brevicornis Dana, 1852: 206; 1853: 893–894; Miers, 1876: 125–126, pl. 60, fig. 8; Thomson and Chilton, 1886: 145; Stebbing, 1906: 584; Bay of Islands. Perhaps the juvenile male of *Hyale* (fide Stebbing, 1906).
Allorchestes novae-zealandiae. Chilton, 1909a: 645. Ewing Island, Enderby Island.
Allorchestes novizealandiae. Walker, 1908: 38.
Atyloides australis Miers. Thomson, 1895: 211. Macquarie Island.
Atyloides magellanica Stebbing. Chilton, 1909a: 627–628. Carnley Harbour, Auckland Islands.
Hyale fimbriata. Thomson, 1895: 211.
Leucothoe tridens Stebbing. Chilton, 1906b: 286. Chatham Islands, 25 fm, 2 imperfect specimens.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/



Locality Map

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

APPENDIX IV

STATION LIST

Data from an aliquot (*ca.* 5–10 percent) of each sample:

NEW ZEALAND OCEANOGRAPHIC INSTITUTE STATIONS

Sta. E 417, off Oamaru, 45° 12′ S, 171° 49′ E, 860 m, 13 October 1965, Menzies, Trawl, shelly sandy mud, *Hyalinoecia,* small ophiuroid, small mollusca, forams, isopod, 1 small pebble.

Waitomo manene 2

Sta. E 709, off Cape Turnagain, 40° 28′ S, 177° 43′ E, 1642–1683 m, 21 March 1967, Hikurangi Benthos Cruise, sloppy grey mud, scarlet prawn, gastropod, gorgonid, elasmobranch egg case, *Porcellanaster, Pectinaster, Ophiomusium* (dominant), holothurian, many *Pyrosoma,* 1 live pteropod, decapods, copepods, euphausids.

Waitomo manene 1

Sta. F 744, ESE of Castlepoint, 41° 10′ S, 176° 58′ E, 1609 m, 3 April 1966, echinoids, asteroids, small prawns, forams.

Waitomo manene 1

Sta. E 966 [JLB NZ-1] Eve Bay, off Strathmore Park, Wellington, 5 November 1967, intertidal wash of algae and their rhizomes.

Ampithoe aorangi 3
Aora maculata 21
Bircenna fulva 19
Ceina egregia 6
Ceradocus r. haumuri 1
Gammaropsis typica 67
G. tawahi 11
Gitanopsis squamosa 5
Hyale rubra 57
Ischyrocerus longimanus 4
Maera incerta 3
Metaceradocus whakatane 1
Oradarea novaezealandiae 1
Paramoera chevreuxi 22
Parapherusa crassipes 14
Parawaldeckia sp. B 1
Parawaldeckia sp. C 1
Podocerus manawatu 11
Pontogeneiella levis 2
Probolisca ovata 1
Stenothoe moe 2
Tetradeion crassum 1
Ventojassa frequens 2

Sta. E 967 [JLB NZ-2] Eve Bay, Wellington, 5 November 1967, wash of numerous rocks and gravel covered with algae.

Amphilochus opunake 7
Ampithoe aorangi 1
Aora maculata 270
Aora sp. 1
Bircenna fulva 2
Ceina egregia 2
Gammaropsis typica 275
Gitanopsis squamosa 48
Gondogeneia danai 23
Hyale grenfelli 117
H. maroubrae 31
H. rubra 28
Iphinotus typicus 1
Ischyrocerus longimanus 373
Maera incerta 5
Melita inaequistylis 50
Metaceradocus whakatane 3
Oradarea novaezealandiae 13
Paracalliope novizealandiae 23
Paramoera chevreuxi 95
Parapherusa crassipes 17
Paraphoxus waipiro 42
Parawaldeckia sp. A 8
Parawaldeckia sp. B 21
Parawaldeckia sp. C 7
Podocerus karu 24
P. manawatu 16
Pontogeneiella levis 25
Seba typica 3
Stenothoe moe 41
Taihape karori 3
Tetradeion crassum 6
Wandelia wairarapa 4
unknown or damaged 12

Sta. E 969 [JLB NZ-4] Kaikoura, 22 January 1968, intertidal wash of kelp holdfasts (*Lessonia, Macrocystis, Laminaria, Cystophora*), heavy turf of *Gelidium* and *Bostrychia, Hormosira,* and halopterins and echinothamnions.

Ampithoe aorangi 1
A. lessoniae 1
Aora maculata 11
Bircenna fulva 13
Ceina egregia 1
Ceradocopsis peke 4
Ceradocus r. haumuri 1
Elasmopus neglectus 4
Gammaropsis tawahi 50
G. typica 51
Gondogeneia danai 34
Hyale rubra 318
Ischyrocerus longimanus 67
Maera incerta 1
Paramoera chevreuxi 1
Parapherusa crassipes 79
Parawaldeckia sp. A 14

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Parawaldeckia sp. B 1
Podocerus manawatu 5
Stenothoe moe 14
Ventojassa frequens 10

Sta. E 970 [JLB NZ-5] Kaikoura, 22 January 1968, wash of phyciferous rocks on broad protected platform in depths of 0.3 m to 1.0 m below low water, amphipods especially abundant in *Caulerpa brownii*.

Ampithoe hinatore 3
Aora maculata 35
Aora sp. 3
Amphilochus filidactylus 4
A. opunake 1
Ceina egregia 23
Colomastix subcastellata 1
Elasmopus neglectus 37
eophliantid 1
Eusiroides monoculoides 24
Gammaropsis ?tawahi 11
G. typica 211
Gitanopsis desmondi 1
G. squamosa 10
Gitanopsis sp. 5
Gondogeneia rotorua 8
Hyale grenfelli 101
H. rubra 49
Iphinotus typicus 9
Ischyrocerus longimanus 7
Liljeborgia akaroica akaroica 1
lysianassid 1
Maera incerta 2
Mallacoota subcarinata 13
Melita inaequistylis 8
Metaceradocus whakatane 11
Nihotunga noa 91
Oradarea novizealandiae 1
Paradexamine houtete 29
Paradexamine muriwai 5
Paradexamine sp. 1
Parapherusa crassipes 87
Paraphoxus waipiro 26
Parawaldeckia sp. A 14
Parawaldeckia sp. B 12
Parawaldeckia sp. C 1
Photis sp. 1
Podocerus karu 19
Pontogeneiella levis 4
Raumahara rongo 89
Seba typica 2
Stenothoe moe 45
Tetradeion crassum 17
Ventojassa frequens 4
new genus of gammarid 1

Sta. E971 [JLB NZ–6] Kaikoura, 23 January 1968, wash of rocks in broad shallow channel in mid intertidal, sparse corallines, *Hormosira* and halopterins algae.

Aora maculata 131
Bircenna fulva 1
Ceina egregia 1
Gammaropsis typica 234
Gitanopsis ?desmondi 1
G. squamosa 10
Gondogeneia danai 38
Hyale grenfelli 19
H. rubra 357
Ischyrocerus longimanus 69
Melita inaequistylis 11
Metaceradocus whakatane 1
Nihotunga noa 1
Oradarea novizealandiae 1
Paradexamine houtete 1
Parapherusa crassipes 17
Paraphoxus waipiro 1
Parawaldeckia sp. A 3
Podocerus karu 3
P. manawatu 1
Pontogeneiella levis 16
Raumahara rongo 1
Stenothoe moe 14
Tetradeion crassum 1

Sta. E972 [JLB NZ–7] Kaikoura, 23 January 1968, washings of rocks covered with corallines, some *Hormosira*, other algae (? *Halopteris* especially), or bare rocks in middle intertidal above low water in shallow drain channels.

Aora maculata 38
Hyale maroubrae 76
H. rubra 2
Hyale sp. 2
Paracalliope novizealandiae 1
Paradexamine houtete 2
Paramoera chevreuxi 42
Parawaldeckia sp. A 20
unknown genus 1

Sta. E973 [JLB NZ–8] St. Clair, Dunedin, 25 January 1968, intertidal algae, especially pterocladians or streblocladians, heavy turf of *Gelidium-Bostrychia* and several specimens of *Pyura* sp.

Aora maculata 19
Eusiroides monoculoides 1
Gammaropsis ?tawahi 3
G. typica 81
Gitanopsis desmondi 7
G. squamosa 2
Gondogeneia danai 1
G. rotorua 1
Hyale hirtipalma 7
H. rubra 246
Iphinotus typicus 5
Ischyrocerus longimanus 176
Jassa falcata 30
juveniles of *I. longimanus* and *J. falcata* 179
Melita inaequistylis 2
Nihotunga noa 3
oedicerotid juvenile 1
Paramoera chevreuxi 6
Parapherusa crassipes 1
Paraphoxus waipiro 9
Parathaumatelson nasicum 8
Parawaldeckia sp. A 2
Parawaldeckia sp. B 16
Parawaldeckia sp. C 12
Parawaldeckia sp. D 1
Parawaldeckia sp. E 4
Podocerus karu 6
P. manawatu 7
P. wanganui 2
Pontogeneiella levis 1
Probolisca ovata 77
Stenothoe moe 12
juveniles of *S. moe* and *P. ovata* 56
Tetradeion crassum 9
Ventojassa frequens 5

Sta. E974 [JLB NZ–9] St. Clair, Dunedin, 25 January 1968, three holdfasts of giant kelp *Durvillea antarctica*, one with compound tunicate in middle. Entire sample quoted.

Gammaropsis typica 1
Gondogeneia danai 5
Hyale hirtipalma 13
Ischyrocerus longimanus 1
Jassa falcata 3
Paramoera rangatira 7

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Parawaldeckia sp. A 1
Parawaldeckia sp. B 3
Parawaldeckia sp. C 7
Probolisca ovata 9

Sta. E975 [JLB NZ–10] Leigh (Auckland Marine Station), 15 February 1968, generalised wash of algae, especially *Carpophyllum, Cystophora, Hormosira*, halopterins in tide pool.

Ampithoe aorangi 1
A. lessoniae 1
Amphilochus opunake 2
Aora maculata 187
Bircenna fulva 8
Gammaropsis typica 50
Gitanopsis desmondi 3
G. squamosa 5
Gondogeneia danai 13
Hyale ?grenfelli 5
H. rubra 100
Melita inaequistylis 2
Metaceradocus whakatane 1
Paracallope novizealandiae 21
Paradexamine houtete 10
Parapherusa crassipes 3
Paraphoxus waipiro 1
Parawaldeckia sp. B 1
Podocerus karu 5
P. manawatu 55
Pontogeneiella levis 1
Raumahara rongo 2
Seba typica 1
Stenothoe moe 16
Taihape karori 2
Ventojassa frequens 1

Sta. E976 [JLB NZ–11] Leigh (Auckland Marine Station), 15 February 1968, wash of intertidal algae, especially *Carpophyllum, Cystophora, Hormosira*, halopterins in tide pool.

Aora maculata 83
Corophium acutum 45
Hyale grandicornis 1
H. rubra 3
Melita inaequistylis 1
Paracalliope novizealandiae 57
Paraphoxus waipiro 5
Parawaldeckia sp. B 1
Seba typica 6

Sta. E977 [JLB NZ–12] Leigh (Auckland Marine Station), 15 February 1968, wash of *Liagora harveyana* on upper rock platform.

Ampithoe sp. (unknown) 1
Aora maculata 131
Ceina egregia 2
Corophium acutum 3
Gammaropsis typica 65
Gammaropsis sp. 1
Gitanopsis squamosa 9
Gondogeneia danai 18
Hyale grenfelli 172
H. rubra 67
Melita inaequistylis 5
Metaceradocus whakatane 40
Microdeutopus apopo 1
Paracalliope novizealandiae 1
Paradexamine houtete 2
Parapherusa crassipes 51
Paraphoxus waipiro 2
Parawaldeckia sp. C 2
Podocerus karu 19
Seba typica 1
Stenothoe moe 3
Taihape karori 1
Ventojassa frequens 1

Sta. E978 [JLB NZ–13] Huaroa Point, Whangaparaoa Peninsula (Auckland Province), 16 February 1968, small high rock pools, in surf splash zone, lined with filamentous brown alga, large amphipods in copula.

Ampithoe aorangi 7
A. lessoniae 1
Aora maculata 81
Apherusa translucens 2
Bircenna fulva 8
Gammaropsis typica 2
Gitanopsis squamosa 1
Gondogeneia danai 13
Hyale grandicornis 20 (largest species)
Hyale rubra 6
Ischyrocerus longimanus 51
Paracalliope novizealandiae 43
Podocerus karu 2
P. manawatu 5
Taihape karori 1

Sta. E 979 [JLB NZ–14] Huaroa Point, Whangaparaoa Peninsula (Auckland Province), 16 February 1968, heavy stand of algae at low water, including *Cystophora torulosa* and bases of dying *Codium* sp.

Ampithoe aorangi 1
Ampithoe sp. 1
Aora maculata 5
Aora sp. 108
Apherusa translucens 8
Bircenna fulva 8
Gammaropsis typica 129
Gitanopsis squamosa 1
Gondogeneia danai 35 (+ 3 aberrations)
Hyale rubra 61
Iphinotus typicus 1
Ischyrocerus longimanus 104
Neocyproidea pilgrimi 1
Paracalliope novizealandiae 1
Paradexamine houtete 12
Parapherusa crassipes 1
Podocerus karu 7
P. manawatu 80
Raumahara rongo 13
Stenothoe moe 5
Tetradeion crassum 1

Sta. E 980 [JLB NZ–15] Huaroa Point, Whangaparaoa Peninsula (Auckland Province), 16 February 1968, wash of rocks in shallow channels 25 m from low water.

Ampithoe aorangi 1
Aora maculata 25
Aora sp. 2
Bircenna fulva 5
Ericthonius pugnax 5
Gammaropsis typica 6
Guernea (?) timaru 1
Hyale grandicornis 1
Melita inaequistylis 9
Paracalliope novizealandiae 127
Paradexamine houtete 1
Parapherusa crassipes 1
Paraphoxus waipiro 46
Parawaldeckia sp. A 1
Podocerus manawatu 1
Seba typica 4
Stenothoe sp. juvenile 1
Taihape karori 1

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Sta. E 981 [JLB NZ–16] Tapeka Point, near Russell, 17 February 1968, intertidal wash of sparse algae, mostly *Hormosira*, plus short-cropped *Carpophyllum* and *Cystophora* and others.

Aora maculata 67
Bircenna fulva 1
Corophium acutum 1
Gondogeneia danai 6
Hyale grandicornis 1
H. rubra 28 (all juveniles)
Ischyrocerus longimanus 57
Melita inaequistylis 2
Paracalliope novizealandiae 83
Paramoera rangatira 3
Paraphoxus australis 1
P. waipiro 1
Pontogeneiella levis 1
Seba typica 3

Sta. E 982 [JLB NZ–17] Makorori Beach, 8.3 miles on road north-east of Gisborne town cenotaph, 20 February 1968, wash of dense stands of *Cystophora*, *Carpophyllum*, and marine grasses (? *Zostera*) on broad open sea platform, plus sphaeromatid bored siltstone, surf grasses occurring on small mesas about 1–5 sq. m in extent, many filamentous brown epiphytes on kelps.

Aora maculata 54
Corophium acutum 1
Gammaropsis typica 129
Gitanopsis squamosa 1
Hyale rubra 40
Iphinotus typicus 1
Ischyrocerus longimanus 40
Melita inaequistylis 4
Metaceradocus whakatane 1
Paracalliope novizealandiae 12
Paradexamine houtete 2
Paraphoxus waipiro 4
Parawaldeckia sp. B 1
Podocerus manawatu 3
Raumahura rongo 4
Stenothoe moe 8
Taihape karori 1
Tetradelon crassum 1

Sta. E 987 [JLB NZ–18] Hutt River at Lower Hutt on levee near Mudie Street in roots of dead submerged tussock grass, 30 March 1968, coll. R. W. Lewis, J. Lewis and J. L. Barnard, water saline.

Melita awa 30+

CHATHAM ISLANDS 1954 EXPEDITION STATIONS

Sta. 19 43° 38.2′ S, 176° 38′ W, off Cape Young, 28 January 1954.

Elasmopus wahine n. sp.

Sta. 25 Waitangi Wharf, 29 January 1954.

Atylus taupo n. sp.

Sta. 49 Port Hutt, 8 February 1954.

Maera tepuni n. sp.

All K Stations are from the collections of the Geology Department, Canterbury University, and unless otherwise stated are from the vicinity of the Edward Percival Marine Station at Kaikoura.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

SELECTED BIBLIOGRAPHY

BARNARD, J. L. 1954: Marine Amphipoda of Oregon. *Ore. Monogr. Zool. 8*: 1–103, 1 fig., pls. 1–33.

———1955: Gammaridean Amphipoda (Crustacea) in the collections of Bishop Museum. *Bull. Bernice P. Bishop Mus. 215*: 1–46, figs. 1–20.

———1958: Revisionary notes on the Phoxocephalidae (Amphipoda), with a key to the genera. *Pacif. Sci. 12*: 146–51.

———1959: Estuarine Amphipoda. *In* J. L. Barnard and D. J. Reish, "Ecology of Amphipoda and Polychaeta of Newport Bay, California". *Allan Hancock Fdn Publs., Occ. Pap. 21*: 13–69, figs. 1–14.

———1960: The amphipod family Phoxocephalidae in the eastern Pacific Ocean, with analyses of other species and notes for a revision of the family. *Allan Hancock Pacif. Exped. 18*: 175–368, pls 1–75, 1 chart.

———1961: Gammaridean Amphipoda from depths of 400 to 6000 meters. *Galathea Rep. 5*: 23–128, figs. 1–83.

———1962a: Benthic marine Amphipoda of Southern California: families Aoridae, Photidae, Ischyroceridae, Corophiidae, Podoceridae. *Pacif. Nat. 3*: 1–72, figs. 1–32.

———1962b: Benthic marine Amphipoda of Southern California: families Tironidae to Gammaridae. *Pacif. Nat. 3*: 73–115, figs. 1–23.

———1962c: Benthic marine Amphipoda of Southern California: families Amphilochidae, Leucothoidae, Stenothoidae, Argissidae, Hyalidae. *Pacif. Nat. 3*: 116–63, figs. 1–23.

———1964: Revision of some families, genera and species of gammaridean Amphipoda. *Crustaceana 7*: 49–74, 2 tables.

———1965a: Marine Amphipoda of atolls in Micronesia. *Proc. U.S. natn. Mus. 117*: 459–552, figs. 1–35.

———1965b: Marine Amphipoda of the family Ampithoidae from Southern California. *Proc. U.S. natn. Mus. 118 (3522)*: 1–46, figs. 1–28.

———1967: New and old dogielinotid marine Amphipoda. *Crustaceana 13*: 281–91, figs. 1–6.

———1969a: The families and genera of marine gammaridean Amphipoda. *Bull. U.S. natn. Mus. 271*: 1–535, figs. 1–173.

———1969b: Gammaridean Amphipoda of the rocky intertidal of California: Monterey Bay to La Jolla. *Bull. U.S. natn. Mus. 258*: 1–230, figs. 1–65.

———1969c: A biological survey of Bahia de Los Angeles, Gulf of California, Mexico, IV. Benthic Amphipoda (Crustacea). *Trans. San Diego Soc. Nat. Hist. 15*: 175–228, figs. 1–30.

———1970: Sublittoral Gammaridea (Amphipoda) of the Hawaiian Islands. *Smithson. Contr. Zool. 37*: 1–286, figs. 1–180.

———1972: Gammaridean Amphipoda of Australia, part I. *Smithson. Contr. Zool. 103*: 1–333, figs. 1–194.

BARNARD, K. H. 1916: Contributions to the crustacean fauna of South Africa. 5. The Amphipoda. *Ann. S. Afr. Mus. 15 (3)*: 105–302, pls. 26–28.

———1930: Amphipoda. *Nat. Hist. Rep. Br. Antarct. Terra Nova Exped. Zool. 8 (4)*: 307–454, text-figs. 1–63.

———1932: Amphipoda. "*Discovery*" *Rep. 5*: 1–326, figs. 1–174, pl. 1.

———1935: Report on some Amphipoda, Isopoda, and Tanaidacea in the collections of the Indian Museum. *Rec. Indian Mus. 37 (3)*: 279–319, figs. 1–21.

———1940: Contributions to the crustacean fauna of South Africa. XII. Further additions to the Tanaidacea, Isopoda and Amphipoda, together with keys for the identification of hitherto recorded marine and fresh-water species. *Ann. S. Afr. Mus. 32*: 381–543, text-figs. 1–35.

BATE, C. S. 1862: Catalogue of the specimens of amphipodous Crustacea in the collection of the British Museum, London. iv + 399p., pls. 1, 1a, 2–58. British Museum (Natural History) London.

BOECK, A. 1871: Crustacea Amphipoda borealia et arctica. *Forh. VidenskSelsk. Krist. 1870*: 83–280.

BRODIE, J. W. 1959: Coastal surface currents around New Zealand. *N.Z. Jl Geol. Geophys 3*: 235–52, figs. 1–7.

BULYCHEA, A. I. 1957: Morskie bloxi morej SSSR i sopredel'nyx vod (Amphipoda-Talitroidea). *Opred. Faune SSSR 65*: 1–185, figs. 1–66 (in Russian).

CAUGHLEY, G. 1964: Does the New Zealand vertebrate fauna conform to zoogeographic principles? *Tuatara 12*: 49–56.

CHEVREUX, E. 1900: Amphipodes provenant des campagnes de l'*Hirondelle* (1885–1888). *Result. Camp. scient. Prince Albert I 16*: i–iv, 1–195, pls. 1–18.

———1906: Crustacés amphipodes. *Expéd. Antarct. Fr.*: 1–100, figs. 1–56.

———1908a: Diagnoses d'amphipodes nouveaux provenant des campagnes de la *Princesse-Alice* dans l'Atlantique Nord. *Bull. Inst. océanogr. Monaco 122*: 1–8, figs. 1–4.

———1908b: Amphipodes recueillis dans les possessions francaises de l'Océanie par M. le Dr Seurat, Directeur du Laboratorie de Recherches Biologiques de Rikitea (îles Gambier), 1902–1904. *Mém. Soc. zool. Fr. 20*: 470–527, figs. 1–35.

———1911: Sur quelques amphipodes des Isles Sandwich du Sud. *An. Mus. nac. Hist. nat. B. Aires 3 (14)*: 403–7, figs. 1–3.

———1912: Amphipodes. *Deuxième Expéd. Antarct. Fr.*: 79–186, figs. 1–62.

———1925: Amphipodes I.—Gammariens. Voyage de la Goélette *Melita* aux Canaries et au Sénégal (1889–1890). *Bull. Soc. zool. Fr. 50 (4)*: 278–311, figs. 1–12.

———1927: Crustacés Amphipodes. Malacostracés. *Exped. scient. Travailleux Talisman 9*: 41–152.

CHEVREUX, E., FAGE, L. 1925: Amphipodes. *Faune Fr. 9*: 1–488. figs. 1–438.

CHILTON, C. 1882a: Additions to the New Zealand Crustacea. *Trans. Proc. N.Z. Inst. 14*: 171–4, pl. 8.

———1882b: On some subterranean Crustacea. *Trans. Proc. N.Z. Inst. 14*: 174–80, pls. 9, 10.

———1883: Further additions to our knowledge of the New Zealand Crustacea. *Trans. Proc. N.Z. Inst. 15*: 69–86, pls. 1–3.

———1884a: Additions to the sessile-eyed Crustacea of New Zealand. *Trans. Proc. N.Z. Inst. 16*: 249–65, pls. 17–21.

———1884b: Notes on a few Australian Edriophthalmata. *Proc. Linn. Soc. N.S.W. 9*: 1035–44, pls. 46, 47.

———1884c: *Moera Petriei* (G. M. Thomson). *N.Z. Jl Sci. 2*: 230–1.

———1892: Notes on some New Zealand Amphipoda and Isopoda. *Trans. Proc. N.Z. Inst. 24*: 258–69.

———1897: A new amphipod from New Zealand (Family Pontoporeiidae). *Ann. Mag. nat. Hist. 6 (19)*: 1–6, pl. 5.

———1900: A New Zealand species of the amphipodan genus *Cyproidia*. *Ann. Mat. nat. Hist. 7 (5)*: 241–6, pl. 5.

———1906a: Report of some Crustacea dredged off the coast of Auckland. *Trans. Proc. N.Z. Inst. 38*: 265–9.

———1906b: List of Crustacea from the Chatham Islands. *Trans. Proc. N.Z. Inst. 38*: 269–73.

———1906c: Note on a New Zealand amphipod belonging to the genus *Seba*. *Ann. Mag. nat. Hist. 7 (17)*: 569–73, 1 fig.

———1906d: Note on some Crustacea from the freshwater lakes of New Zealand. *Proc. zool. Soc. Lond. 1906*: 702–5.

———1909a: The Crustacea of the subantarctic islands of New Zealand. *Subantarctic Islands of N.Z. 2*: 601–71, figs. 1–19.

———1909b: Note on the amphipodan genera *Bircenna, Kuria* and *Wandelia*. *Trans. Proc. N.Z. Inst. 41*: 59–63, figs. 1–3.

———1909c: The freshwater Amphipoda of New Zealand. *Trans. Proc. N.Z. Inst. 41*: 53–9.

———1911a: The Crustacea of the Kermadec Islands. *Trans. Proc. N.Z. Inst. 43*: 544–73, figs. 1–4.

———1911b: Crustacea. Scient. Results New Zealand Government Trawling Exped., 1907. *Rec. Canterbury Mus. 1*: 285–312, fig. 1, pl. 58.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

———1912a: The Amphipoda of the Scottish National Antarctic Expedition. *Trans. R. Soc. Edinb. 48 (2) No. 23*: 455–520, pls. 1, 2.
———1912b: Miscellaneous notes on some New Zealand Crustacea. *Trans. Proc. N.Z. Inst. 44*: 128–35.
———1914: A new amphipodan genus and species (family Dexaminidae) from New Zealand. *J. Linn. Soc. 32*: 331–6, pls. 26, 27.
———1915: The New Zealand species of the amphipodan genus *Elasmopus*. *Trans. Proc. N.Z. Inst. 47*: 320–30, figs. 1–12.
———1916a: A new species of the amphipodan genus *Hyale* from New Zealand. *Ann. Mag. nat. Hist. 8 (17)*: 362–6, figs. 1–5.
———1916b: Some Australian and New Zealand Gammaridae. *Trans. Proc. N.Z. Inst. 48*: 359–70, figs. 1–6.
———1916c: *Parapherusa crassipes* (Haswell), an amphipod of Australasian seas. *Ann. Mag. nat. Hist. 8 (18)*: 199–207, pls. 8–10.
———1917a: Further notes on the New Zealand amphipod *Hyale grenfelli*, Chilton. *Ann. Mag. nat. Hist. 8 (19)*: 273–6, figs. 1–3.
———1917b: Notes on the distribution of the amphipods *Elasmopus rapax*, A. Costa, and *Maera inaequipes* (A. Costa). *J. zool. Res. 2 (1)*: 17–9.
———1919a: *Ceina*, an aberrant genus of the amphipodan family Talitridae. *Trans. Proc. N.Z. Inst. 51*: 118–29, figs. 1–25.
———1919b: Destructive boring Crustacea in New Zealand. *N.Z. Jl Sci. Technol. 2*: 3–15, figs. 1–12.
———1920a: Some New Zealand Amphipoda. No. 1. *Trans. Proc. N.Z. Inst. 52*: 1–8, figs. 1–5.
———1920b: The occurrence in Brisbane River of the New Zealand amphipod, *Paracorophium excavatum* (G. M. Thomson). *Mem. Qd. Mus. 7 (1)*: 44–51, text-figs. 1–19.
———1920c: The occurrence in the Philippine Islands of the fresh-water amphipod *Paracalliope fluviatilis* (G. M. Thomson). *Philipp. J. Sci. 17 (5)*: 513–4.
———1921a: Some New Zealand Amphipoda. No. 2. *Trans. Proc. N.Z. Inst. 53*: 220–34, figs. 1–5.
———1921b: Report on the Amphipoda obtained by the F.I.S. "Endeavour" in Australian seas. *Biol. Results Fish. Exp. "Endeavour" 5 (2)*: 33–92, figs. 1–16.
———1921c: Amphipoda. Fauna of the Chilka Lake. *Mem. Indian Mus. 5 (8)*: 521–58, figs. 1–12.
———1922: The flora and fauna of Nuyt's Archipelago and the Investigator Group. No. 1. The Amphipoda and Isopoda. *Trans. R. Soc. S. Aust. 46*: 34–8.
———1923a: Occasional notes on Australian Amphipoda. *Rec. Aust. Mus. 14 (2)*: 79–100, figs. 1–5.
———1923b: Some New Zealand Amphipoda. No. 3. *Trans. Proc. N.Z. Inst. 54*: 240–5, figs. 1–5.
———1924a: Some New Zealand Amphipoda. No. 4. *Trans. Proc. N.Z. Inst. 55*: 269–80, figs. 1–9.
———1924b: Some New Zealand Amphipoda. No. 5. *Trans. Proc. N.Z. Inst. 55*: 631–7, figs. 1–20.
———1925a: Some Amphipoda and Isopoda from the Chatham Islands. *Rec. Canterbury Mus. 2*: 317–20.
———1925b: Some Amphipoda from the South Orkney Islands in the Buenos Aires National Museum. *Comun. Mus. nac. nat. Hist. "Bernardina Rivadavia", Buenos Aires, 2*: 175–80.
———1926: New Zealand Amphipoda. No. 6. *Trans. Proc. N.Z. Inst. 56*: 512–8, figs. 1–4.
DANA, J. D. 1852: Conspectus Crustaceorum quae in Orbis Terrarum circumnavigatione, *Carolo Wilkes* e Classe Reipublicae Faederatae Duce, lexit et descripsit Jacobus D. Dana. Pars III. Amphipoda. No. 1. *Proc. Am. Acad. Arts Sci. 2*: 201–20.
———1853–55: Crustacea. Part II. *U.S. explor. Exped. 13*: 689–1618, atlas of 96 pls.
DELL, R. K. 1962: New Zealand marine provinces—Do they exist? *Tuatara 10*: 43–52.
DELLA VALLE, A. 1893: Gammarini del Golfo di Napoli. *Fauna Flora Golfo Napoli 20*: i–xi + 1–948, atlas of 61 pls.
DERZHAVIN, A. N. 1930: The fresh water Malacostraca of the Russian Far East. *Gidrobiol. Zh. 9 (1–3)*: 1–8.
———1937: Talitridae of the Soviet coast of the Japan Sea. *Issled. Morei SSSR, 23*: 87–112, pls. 1–6.
EKMAN, S. J. 1953: Zoogeography of the Sea. Sidgwick and Jackson, London. 417 pp.
FEARN-WARRAN, H. J. 1968a: Littoral Amphipoda of Victoria. Part I. *Proc. R. Soc. Vict. 81*: 31–58, figs. 1–18.
———1968b: Littoral Amphipoda of Victoria. Part II. *Proc. R Soc. Vict. 81*: 127–35, figs. 1–2.
GURJANOVA, E. 1938: Amphipoda Gammaridea of Siaukhu Bay and Sudzukhe Bay (Japan Sea). *Rep. Japan Sea Hydrobiol. Exped. 1934 (1)*: 241–404, figs. 1–59.
———1948: Amphipoda Tixogo Okeana II. Stenothoidae dal'nevostochnyx morye. *Pamjati Akademika Sergeija Alekseevicha Zernova, Akad. Nauk. SSSR*: 287–325, figs. 1–21.
———1951: Bokoplavy morej SSSR i sopredel'nykh vod (Amphipoda–Gammaridea). *Opred. Faune SSSR 41*: 1–1029, figs. 1–705 (in Russian).
———1953: Novye dopolnenija k dal'nevostochnoi fauna morskikh bokoplavov. *Trudy Zool. Inst. Akad. Nauk SSSR 13*: 216–41, figs. 1–19 (in Russian).
———1958: K faune amfipod (Amphipoda) ostrova Makkuori. *Byull. Sovet. Antarkt. Exped. 3*: 55–6.
———1962: Bokoplavy severnoi chasti Tixogo Okeana (Amphipoda–Gammaridea) chast' 1. *Opred. Faune SSSR 74*: 1–440, figs. 1–143 (in Russian).
HASWELL, W. A. 1880a: On Australian Amphipoda. *Proc. Linn. Soc. N.S.W. 4 (3)*: 245–79, pls. 7–12.
———1880b: On some additional new genera and species of amphipodous crustaceans. *Proc. Linn. Soc. N.S.W. 4 (3)*: 319–50, pls. 18–24.
———1881: On some new amphipods from Australia and Tasmania. *Proc. Linn. Soc. N.S.W. 5 (11)*: 97–105, pls. 5–7.
———1882: Catalogue of the Australian stalk- and sessile-eyed Crustacea. Australian Museum, Sydney, xxiii + 327p., 4 pls.
———1885: Notes on the Australian Amphipoda. *Proc. Linn. Soc. N.S.W. 10*: 95–114, pls. 10–18.
HIRSCH, A. 1958: Biological evaluation of organic pollution of New Zealand streams. *N.Z. Jl Sci. 1*: 500–53, figs. 1–11, tables 1–13.
HURLEY, D. E. 1954a: Studies on the New Zealand amphipodan fauna. No. 2. The family Talitridae: The fresh-water genus *Chiltonia* Stebbing. *Trans. R. Soc. N.Z. 81*: 563–77, text-figs. 1–3.
———1954b: Studies on the New Zealand amphipodan fauna. No. 3. The Family Phoxocephalidae. *Trans. R. Soc. N.Z. 81*: 579–99, text-figs. 1–5.
———1954c: Studies on the New Zealand amphipodan fauna. No. 4. The family Gammaridae, including a revision of the freshwater genus *Phreatogammarus* Stebbing. *Trans. R. Soc. N.Z. 81*: 601–18, text-figs. 1–4.
———1954d: Studies on the New Zealand amphipodan fauna. No. 5. *Pleonexes lessoniae*, a new species of the family Amphithoidae. *Trans. R. Soc. N.Z. 81*: 619–26, text-figs. 1–2.
———1954e: Studies on the New Zealand amphipodan fauna. No. 6. Family Colomastigidae, with descriptions of two new species of *Colomastix*. *Trans. R. Soc. N.Z. 82*: 419–29, text-figs. 1–3.
———1954f: Studies on the New Zealand amphipodan fauna. No. 7. The family Corophiidae, including a new species of *Paracorophium*. *Trans. R. Soc. N.Z. 82*: 431–60, text-figs. 1–7.
———1954g: Studies on the New Zealand amphipodan fauna. No. 9. The family Acanthonotozomatidae, Pardaliscidae and Liljeborgiidae. *Trans. R. Soc. N.Z. 82*: 763–802, text-figs. 1–14.
———1954h: Studies on the New Zealand amphipodan fauna. No. 10. A new species of *Cacao*. *Trans. R. Soc. N.Z. 82*: 803–11, text-figs. 1–3.
———1955: Studies on the New Zealand amphipodan fauna. No. 12. The marine families Stegocephalidae and Amphilochidae. *Trans. R. Soc. N.Z. 83*: 195–221, text-figs. 1–9.
———1957a: Studies on the New Zealand amphipodan fauna. No. 14. The genera *Hyale* and *Allorchestes* (Family Talitridae). *Trans. R. Soc. N.Z. 84*: 903–33, text-figs. 1–9.
———1957b: Some Amphipoda, Isopoda and Tanaidacea from Cook Strait. *Zool. Publs Vict. Univ. Wellington 21*: 1–20, figs. 1–117.
———1958: A key to the families of New Zealand amphipods. *Tuatara 7*: 71–83, pls. 1–3.
———1960: Pelagic Amphipoda of the N.Z.O.I. Pacific cruise, March 1958. *N.Z. Jl Sci. 3*: 274–89, figs. 1–2.
KIRK, T. W. 1879: Notes on some New Zealand crustaceans. *Trans. Proc. N.Z. Inst. 11*: 401–2.
KNOX, G. A. 1953: The intertidal ecology of Taylor's Mistake, Banks Peninsula. *Trans. R. Soc. N.Z. 81*: 189–220, text-figs. 1–8, pls. 15–16.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

———1960: Littoral ecology and biogeography of the southern oceans. *Proc. R. Soc. ser. B, 152*: 577–624, figs. 54–73.
———1963a: The biogeography and intertidal ecology of the Australasian coasts. *Oceanog. mar. Biol. Ann. Rev. 1963 1*: 341–404.
———1963b: Problems of speciation in intertidal animals with special reference to New Zealand shores. *Systematics Assoc. Publ. 5*: 7–29, figs. 1–10.
KUNKEL, B. W. 1910: The Amphipoda of Bermuda. *Trans. Connecticut Acad. Arts Sci. 16*: 1–116, figs. 1–43.
MARGALEF, R. 1963: On certain unifying principles in ecology. *Am. Nat. 97*: 357–64.
MCLINTOCK, A. H. (Ed.) 1966: "An Encyclopaedia of New Zealand". Govt. Printer, Wellington 3 vols.
MIERS, E. J. 1875: Descriptions of new species of Crustacea collected at Kerguelen's Island by the Rev. A. E. Eaton. *Ann. Mag. nat. Hist. 4 (16)*: 73–6, 115–8.
———1876: Catalogue of the stalk- and sessile-eyed Crustacea of New Zealand. Colonial Museum and Geological Survey Dept., London. 1–136p., 1–3 pls.
———1884: Crustacea. Collections from Melanesia. Part 1. *Report on the zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S. "Alert" 1881–2*: 178–322, pls. 18–34, Brit. Mus. (Nat. Hist.) London.
MORTON, J., MILLER, M. 1968: "The New Zealand Sea Shore". Collins, London. 638p., 1–32 pls.
NAGATA, K. 1960: Preliminary notes on benthic gammaridean Amphipoda from the *Zostera* region of Mihara Bay, Seto Inland Sea, Japan. *Publs Seto mar. biol. Lab. 8*: 163–91, figs. 1–2, pls. 13–7, text-figs. 3.
NICHOLLS, G. E. 1938: Amphipoda Gammaridea. *Australas. Antarct. Exped. 1911–14, Sci. Repts., ser. C—Zool. and Bot. 2 (4)*: 1–145, figs. 1–67.
———1939: The Prophliantidae. A proposed new family of Amphipoda, with description of a new genus and four new species. *Rec. S. Aust. Mus. 6 (3)*: 309–34, figs. 1–10.
NICOLET, H. 1849: Historia fisica y politica de Chile. *Zoologia 3*: 115–318.
OLDEVIG, H. 1958: On a new aberrant talitrid from the Island of Sachalin. *Ark. Zool. 11*: 343–7, figs. 1–16.
PFEFFER, G. 1888: Die Krebse von Süd-Georgien nach der Ausbeute der deutschen Station 1882–83. 2 Teil. Die Amphipoden. *Jb. hamb. wiss. Anst. 5*: 75–142, pls. 1–3.
PIRLOT, J. M. 1934: Les amphipodes de l'expédition du Siboga. Deuxième partie . . . II . . . 2 Hyperiopsidae, . . . Jassidae. *Siboga-Exped. 33d*: 167–235, figs. 61–100.
———1936: Les amphipodes de l'expédition du Siboga. Deuxième partie . . . II . . . 3 . . . III . . . 1. Lysianassidae . . . Gammaridae. *Siboga Exped. 33e*: 237–328, figs. 101–46.
———1938: Les amphipodes de l'expédition du Siboga. Deuxième partie . . . III . . . 2 . . . Dexaminidae. *Siboga Exped. 33f*: 329–88, figs. 147–63.
RASMUSSEN, R. A. 1965: The intertidal ecology of the rocky shores of the Kaikoura Peninsula. *Ph.D. thesis lodged in library of University of Canterbury, Christchurch, New Zealand.*
RUFFO, S. 1953: Studi sui crostacei anfipodi XXXVI. Nota critica su *Biancolina algicola* D. Val. (Amphipoda Prophliantidae) *Atti. Accad. Verona. 6 (3)*: 1–9, figs. 1–2.
SARS, G. O. 1890–95: Amphipoda. *An account of the Crustacea of Norway with short descriptions and figures of all the species, 1*: i–viii and 1–711, pls. 1–240, suppl. pls. 1–8.
SAYCE, O. A. 1901: Description of some New Victorian freshwater Amphipoda. *Proc. R. Soc. Vict. 8*: 225–42.
SCHELLENBERG, A. 1926: Die Gammariden der deutschen Südpolar-Expedition 1901–1903. *Dt. Südpol. Exped. 18*: 235–414, figs. 1–68.
———1929: Revision der Amphipoden—Familie Pontogeneiidae. *Zool. Anz. 85*: 273–82.
———1931: Gammariden und Caprelliden des Magellangebietes, Südgeorgiens und der Westantarktis. *Further zool. Results Swed. Antarct. Exped. 2 (6)*: 1–290, figs. 1–136, pl. 1.
———1935: Amphipoden von Chile und Juan Fernandez, gesammelt von Prof. W. Goetsch. *Zool. Jb. Syst. 67 (4)*: 225–34, figs. 1–3.
———1938: Litorale Amphipoden des tropischen Pazifiks. *K. svenska VetenskAkad. Handl. 3 (16) 6:* 1–105, figs. 1–48.
SEXTON, E. W., REID, D. M. 1951: The life-history of the multiform species *Jassa falcata* (Montagu) (Crustacea Amphipoda) with a review of the bibliography of the species. *J. Linn. Soc. (zool.) 42*: 29–91, pls. 4–30.
SHEARD, K 1936a: Amphipods of the phliantid group in the south Australian Museum with a suggested division of the family. *Rec. S. Aust. Mus. 5 (4)*: 456–68, figs. 1–6.
———1936b: A catalogue of Australian Gammaridea. *Trans. R. Soc. S. Aust. 61*: 17–29.
———1936c: Amphipods from a South Australian reef. Part 2. *Trans. R. Soc. S. Aust. 60*: 173–79, figs. 1–4, pl. 17.
———1937: A catalogue of Australian Gammaridea. *Trans. R. Soc. S. Aust. 61*: 17–29.
———1938: The amphipod genera *Euonyx*, *Syndexamine* and *Paradexamine. Rec. S. Aust. Mus. 6 (2)*: 169–86, figs. 1–9.
———1939: Studies in Australian Gammaridea (1) The genus *Ceradocus. Rec. S. Aust. Mus. 6 (2)*: 275–95, figs. 1–8.
SHOEMAKER, C. R. 1914: Amphipods of the South Georgia Expedition. *Sci. Bull. Mus. Brooklyn Inst. Arts Science 2 (4)*: 73–7.
———1930: The Amphipoda of the Cheticamp Expedition of 1917. *Contr. Can. Biol. Fish. 5 (10)*: 1–141, figs. 1–54.
———1933: Two new genera and six new species of Amphipoda from Tortugas. *Pap. Tortugas Lab. 28 (15)*: 245–56, figs. 1–8.
———1942: Amphipod crustaceans collected on the presidential cruise of 1938. *Smithson. misc. Collns 101 (11)*: 1–52, figs. 1–17.
———1955: Amphipoda collected by the Arctic Laboratory, Office of Naval Research, Point Barrow, Alaska, by G. E. MacGinitie. *Smithson. misc. Collns 128 (1)*: 1–78, figs. 1–20.
STEBBING, T. R. R. 1874: On some species of *Amphithoë* and *Sunamphithoë. Ann. Mag. nat. Hist. 4 (14)*: 111–8, pls. 11, 12.
———1875: On some new exotic sessile-eyed crustaceans. *Ann. Mag. nat. Hist. 4 (15)*: 184–8, pl. 15A.
———1887: On some new exotic Amphipoda from Singapore and New Zealand. *Trans. zool. Soc. Lond. 12 (6)*: 199–210, pls. 38–9.
———1888: Report on the Amphipods collected by H.M.S. "Challenger" during the years 1873–76. *Rep. scient. Results explor. Voyage Challenger 29*: i–xxiv, 1–1737, pls. 1–210 (in 3 vols.).
———1897: Amphipoda from the Copenhagen Museum and other sources. *Trans. Linn. Soc. Lond. zool. 2* (7) *2*: 25–45, pls. 6–14.
———1899a: Amphipoda from the Copenhagen Museum and other sources. Part II. *Trans. Linn. Soc. Lond. 2 (7) 8*: 395–432, pls. 30–5.
———1899b: On the true *Podocerus* and some new genera of amphipods. *Ann. Mag. nat. Hist. 7 (3)*: 237–41.
———1899c: Revision of Amphipoda. *Ann. Mag. nat. Hist. 7 (3)*. 350.
———1899d: Revision of Amphipoda (continued). *Ann. Mag. nat. Hist. 7 (4)*: 205–11.
———1904: Gregarious Crustacea from Ceylon. *Spolia zeylan. 2 (5)*: 1–29, pls. 1–6.
———1906: Amphipoda I. Gammaridea. *Tierreich 21*: 1–806, figs. 1–127.
———1910: Crustacea. Part 5. Amphipoda. *Scientific Results of the Trawling Expeditions of H.M.C.S. "Thetis". Mem. Aust. Mus. 4 (2)*: 565–658, pls. 47–60.
———1914: Crustacea from the Falkland Islands collected by Mr Rupert Vallentin, F.L.S.—Part II. *Proc. zool. Soc. Lond. 1914*: 341–78, pls. 1–9.
STEPHENSEN, K. 1927: Crustacea from the Auckland and Campbell Islands. *Vidensk. Meddr. dansk naturh. Foren. 83*: 289–390, figs. 1–33.
———1931: Crustacea Malacostraca. VII. (Amphipoda. III.) *Dan. Ingolf-Exped. 3 (11)*: 179–292, figs. 54–81, charts 32–51.
———1933: *Ceinina japonica* (n. gen., n. sp.), a new aberrant species of the amphipodan family Talitridae from Japan. *Trans. Sapporo nat. Hist. Soc. 13 (2)*: 63–8, figs. 1–5.
———1938: Amphipoda. Tanaidacea und Pycnogonida. Zoologische Ergebnisse der Reisen von Dr. Kohl-Larsen nach den Subantarktischen Inseln bei Neu-Seeland und nach Süd-Georgien. 11. *Senckenbergiana 20 (3/4)*: 236–64, figs. 1–5.
———1947: Tanaidacea, Isopoda, Amphipoda and Pycnogonida. *Scient. Results Norw. Antarct. Exped. 2 (27)*: 1–90, figs. 1–26.
———1949: The Amphipoda of Tristan da Cunha. *Results Norw. Scient. Exped. Tristan da Cunha 19*: 1–61, figs. 1–23.
STIMPSON, W. 1855: Description of some of the new marine invertebrata. *Proc. Acad. nat. Sci. Philad. 7*: 385–94.
SVERDRUP, H. V.; JOHNSON, M. W.; FLEMING, R. H. 1942: "The Oceans", Prentice Hall, New York. 1087p.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

TATTERSALL, W. M. 1922: Amphipoda and Isopoda. The Percy Sladen Trust Expeditions to the Abrolhos Islands (Indian Ocean). *J. Linn. Soc. (Zool.) 35*: 1–19, pls. 1–3.

THOMSON, G. M. 1879a: New Zealand Crustacea, with descriptions of new species. *Trans. Proc. N.Z. Inst. 11*: 230–48, pl. 10.

———1879b: Additions to the amphipodous Crustacea of New Zealand. *Ann. Mag. nat. Hist. 5 (4)*: 329–33, pl. 16.

———1880a: New species of Crustacea from New Zealand. *Ann. Mag. nat. Hist. 5 (6)*: 1–6, pl. 1.

———1880b: Recent additions to and notes on New Zealand Crustacea. *Trans. Proc. N.Z. Inst. 13*: 204–21, pls. 7, 8.

———1882: Additions to the crustacean fauna of New Zealand. *Trans. Proc. N.Z. Inst. 14*: 230–8, pls. 17, 18.

———1884: Descriptions of new crustaceans. *Trans. Proc. N.Z. Inst. 16*: 234–40, pls. 12, 13.

———1885: New Crustacea. *N.Z. Jl Sci. 2*: 576–7.

———1889: Notes on, and recent additions to, the New Zealand crustacean fauna. *Trans. Proc. N.Z. Inst. 21*: 259–68, pls. 13, 14.

———1895: Notes on some Crustacea from Macquarie Island. *Trans. Proc. N.Z. Inst. 27*: 210–4, pl. 14.

———1897: On two new gammarids from New Zealand. *Ann. Mag. nat. Hist. 6 (20)*: 446–51, pl. 10.

———1899: Synonymy of the New Zealand Orchestidae. *Trans. Proc. N.Z. Inst. 31*: 197–207.

———1902: Some recent additions to and notes on the crustacean fauna of New Zealand. *Ann. Mag. nat. Hist. 7 (10)*: 462–5.

———1913: The natural history of Otago Harbour and the adjacent sea, together with a record of the researches carried on at the Portobello Marine Fish-Hatchery. *Trans. Proc. N.Z. Inst. 45*: 225–51, pl. 10.

THOMSON, G. M.; CHILTON, C. 1886: Critical list of the Crustacea Malacostraca of New Zealand. *Trans. Proc. N.Z. Inst. 18*: 141–59.

VANHOFFEN, E. 1897: Die Fauna und Flora Grönlands. *Grönland-Expedition der Gesellschaft fur Erdkunde zu Berlin 1891–1893, 2 (1)*: 1–383, pls. 1–8.

WALKER, A. O. 1903: Amphipoda of the "Southern Cross' Antarctic Expedition. *J. Linn. Soc. (zool). 29 (187)*: 38–64, pls. 7–11.

———1904: Report on the Amphipoda collected by Professor Herdman, at Ceylon, in 1902. *In* Herdman, W. A.: *Report on the Pearl Oyster Fisheries of the Gulf of Manaar, &c. Suppl. Reports No. 17*: 229–300, pls. 1–8. Royal Society, London.

———1905: Marine Crustaceans. VI. Amphipoda. *In* Gardiner, J. S. *The Fauna and Geography of the Maldive and Laccadive Archipelagoes, &c. X (22)*: 923–32, pl. 88. Cambridge University Press.

———1907: Crustacea. III. Amphipoda. *Natn. Antaret. Exped. 1901–1904, 3*: 1–39, pls. 1–13.

———1908: Amphipoda from the Auckland Islands. *Ann. Mag. nat. Hist. 8 (2)*: 33–9, pl. 5.

———1909: Amphipoda Gammaridea from the Indian Ocean, British East Africa, and the Red Sea. *Trans. Linn. Soc. Lond. (Zool.) 12 (4)*: 323–44, pl. 43.

WALKER, A. O.; SCOTT, A. 1903: Decapod and sessile-eyed crustaceans from Abd-el-Kuri. *In* Forbes, H. O. (ed.) "The Natural History of Sokotra and Abd-el-Kuri". Pp. 216–32, pls. 14a, 14b. Free Public Museums, Liverpool.

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

INDEX

This index is restricted to names of taxa in the text; names in tables and appendices are omitted. Variant spellings are noted in parentheses; hyphens, question marks, and diacritical marks are often eliminated; capital letters of certain species names are ignored for the sake of brevity; floral and faunal genera of substrates are ignored except in the text of introductory sections. Important subspecies or formae are treated as full species but most subspecific names are ignored.

Acanthonotozomatidae, 22 key, 24 key, 31
Acanthonotozomella, 18
Acanthonotozomoides, 18
acherusicum, Corophium, 27 key, 48
Acontiostoma magellanicum, 138
  marionis, 138
Acuminodeutopus, 20
acutum, Corophium, 27 key, 48
adhaerans, Stenothoe, 158
aequabilis, Liljeborgia, 29 key, 138
afer, Eurystheus, 130
affinis, Eusirus, 138
Afrochiltonia, 166, 168, 170
akaroica, Liljeborgia, 29 key, 138
algicola, Biancolina, 165, 195
Allorchestes, 30 key, 164, 165, 174
  carinatus, 165
  compressa, 167
  hirtipalma, 167
  intrepida, 167
  moskvitini, 178
  neo-zelanica, 167
  novizealandiae, 30 key, 167
Ampelisciphotis, 15
Amphilochella, 18, 34
Amphilochidae, 24 key, 31 key
Amphilochus, 31 key, 34
  filidactylus, 31 key, 33, 34
  manudens, 34
  marionis, 31 key, 34
  neapolitanus, 34
  opunake, 31 key, 33, 34, 36
  squamosus, 36
Amphithoe cuniculus, 196
Amphitholina, 21, 165, 178, 180, 195, 196
  cuniculus, 195
Amphithonotus levis, 93
Amphithopsis, 71
Amphitoe gayi, 117
  inaequistylis, 117
  tenuicornis, 117
Ampithoe, 18, 27 key, 37, 44
  aorangi, 27 key, 37, 42
  hinatore, 27 key, 37, 42, 45
  lessoniae, 20, 27 key, 37, 44, 45
  lindbergi, 37
  plea, 37
  ramondi, 45
  sp., 27 key, 45
  tea, 37
  waialua, 38, 42
Ampithoidae, 37, 48, 195
Anamixis, 20
Anchiphimedia, 18
anguipes, Ischyrocerus, 133
anomalus, Prophlias, 194
antarctica, Durvillea, 85
  Gitanopsis, 36
  Gondogeneia, 89, 91
  Polycheria, 62
  Pontogeneia, 91
  Seba, 154
antarcticus, Eusirus, 28 key, 64, 68
Aora, 14, 19, 130
  atlantidea, 124
  gracilis, 124
  kergueleni, 124
  maculata, 27 key, 64, 124, 133
  sp., 27 key, 124, 125
  trichobostrychus, 124
  typica, 19, 124, 125
aorangi, Ampithoe, 27 key, 37, 42
Aoridae, 48, 124
Aoroides, 124
  columbiae, 124
Apherusa, 20, 71
  bispinosa, 64, 66
  borealis, 64
  cirrus, 64
  dentata, 66
  levis, 93
  translucens, 20, 28 key, 64
apopo, Microdeutopus, 7, 20, 27 key, 131
armata, Seba, 154, 155
atlantidea, Aora, 124
Atylidae, 24 key, 25 key, 47
Atyloella, 22, 66
  magellanica, 66
  moke, 19, 28 key, 66
  quadridens, 66
Atyloides aucklandicus, 82, 87
  brevicornis, 93
  Chevreuxi, 82
  magellanicus, 82
  serraticauda, 95
Atylopsis, 18, 71
Atylus, 25 key
  danai, 87
  homochir, 48
  lippus, 87
  megalophthalmus, 93
  microdeuteropus, 87
  minikoi, 48
  monoculoides, 66
  reductus, 25 key, 47, 48
  swammerdami, 47, 48
  taupo, 25 key, 47, 48
Aucklandia enderbyi, 82
aucklandica, Paramoera, 82
aucklandicus, Atyloides, 82, 87
  Stenothoe, 157, 158
aurorae, Metopoides, 157
  Proboloides, 157
australis, Biancolina, 195
  Paracalliope, 74
  Paraphoxus, 24 key, 143
  Pherusa, 74
  Podocerus, 135
  Pontharpinia, 143
  Protophoxus, 143
austrina, Paramoera, 82, 84, 91, 93
Austrochiltonia, 166, 168

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Autonoe kergueleni, 130
philacantha, 131
awa, *Melita*, 29 key, 114, 116

banksii, *Hormosira*, 16
barbimana, *Haplocheira*, 25 key, 130
barbimanum, *Corophium*, 130
barbimanus, *Gammarus*, 130
barhami, *Liljeborgia*, 29 key, 138
barnardi, *Paradexamine*, 25 key, 51, 57, 60
Batea, 20
batei, *Phoxus*, 143
Bathyporeiapus, 71, 72
Biancolina, 19, 20, 165, 178, 195 key
algicola, 165, 195
australis, 195
cuniculus, 165
mauihina, 195
Biancolinidae, 195
bidentata, *Gondogeneia*, 87, 89
bipartita, *Pseudambasia*, 140
Bircenna, 17, 20, 178, 180 key, 184, 187
crassipes, 187
fulva, 17, 30 key, 180, 183, 184
ignea, 180, 183
nichollsi, 180, 183
bispinosa, *Apherusa*, 64, 66
bollonsi, *Elasmopus*, 30, key, 98, 101
Boltenia, 146
borealis, *Apherusa*, 64
Bouvierella, 71
Bouvieri, *Eusirus*, 68
Bovallia, 18
gigantea, 68
monoculoides, 66, 68
brasiliensis, *Ericthonius*, 49
Podocerus, 152
brazieri, *Colomastix*, 48
brevicaudata, *Photis*, 26 key, 131
brevicornis, *Liljeborgia*, 138
Atyloides, 93
Pontogeneiella, 93
brownii, *Caulerpa*, 9

caeruleus, *Paraleptamphopus*, 74
caesaris, *Eusiroides*, 66, 68
calcaratus, *Paraphoxus*, 145
callliactis, *Elasmopus*, 105
Callliope didactyla, 66
fluviatilis, 71, 74
Calliopiella, 19, 71
Callliopiidae, 63, 71
Callliopius, 71
didactylus, 20, 66
campbellica, *Hyale*, 167
capensis, *Paramoera*, 84, 91, 93
capillimanus, *Podocerus*, 146
carinata, *Ceina*, 170
Syndexamine, 25 key, 63
carinatum, *Protharmattelson*, 160
Raumahara, 160, 162
carinatus, *Allorchestes*, 165
Perrieria, 164, 170
camileyi, *Elasmopus*, 105
Maera, 105
Carolobatea, 72, 78
novaezealandiae, 74, 78, 143
schneideri, 72, 78, 143
sp., 143
Carpophyllum, 9
Caulerpa brownii, 9
Ceina, 111, 19, 20, 163, 164, 165, 168, 170, 174
carinata, 170
egregia, 19, 30 key, 170
platei, 170
Ceinidae, 30 key, 164, 165 key, 166 key, 168
Ceininae, 168
Ceinina, 178, 180, 183
japonica, 183, 190
Ceradocopsis, 18, 95
kergueleni, 95, 98
peke, 30 key, 95, 98
Ceradocus, 111, 122
chiltoni, 29 key, 98
rubromaculatus, 98
r. haumuri, 29 key, 98
Cerapopsis, 15, 20
Cerapus, 19, 20
Cheiriphotis, 19, 20
chelifer, *Microdeuteropus*, 131
Chelura, 178
Cheluridae, 48
Chevalia, 19, 20
Chevreuxi, *Atyloides*, 82
chevreuxi, *Paramoera*, 16, 29 key, 82, 85
chiltoni, *Ceradocus*, 29 key, 98
Eurystheus, 125
Gammaropsis, 28 key, 125
Hyale, 167
Chiltoni, *Iphinotus*, 193
Maera, 125
Chiltonia, 163, 164, 165, 166, 168, 170, 172
mihiwaka, 168
Chiltoniinae, 168
chosroides, *Gondogeneia*, 87
cirrus, *Apherusa*, 64
Colomastigidae, 22 key, 31 key, 48
Colomastix, 18
brazieri, 48
magnirama, 31 key, 48
simplicauda, 48
subcastellata, 31 key, 48
Colpomenia sp., 9
columbiae, *Aoroides*, 124
compressa, *Allorchestes*, 167
consilliorum, *Najna*, 190
Coremapus, 20
Corophiidae, 24 key, 25, 27 key, 48
Corophioidea, 24 key, 25, 29 key, 48
Corophium 18, 21, 25 key, 27 key
acherusicum, 27 key, 48
acutum, 27 key, 48
barbimanum, 130
excavatum, 49
lemdenfelldi, 130
sextonae, 27 key, 48
crassa, *Cyproidea*, 155
crassipes, *Bircenna*, 187
Eurystheus, 126
Gammaropsis, 28 key, 126, 137
Harmonia, 122
Maera, 126
Parapherusa, 26 key, 29 key, 63, 122
Wandelia, 187
crassum, *Tetradeion*, 24 key, 155
Cressa, 20
crisstatum, *Cyrtophium*, 146
crisstatus, *Podocerus*, 27 key, 146, 152
cuniculus, *Amphithoe*, 196
Amphithoina, 195
Biancolina, 165
cuspidatus, *Eusirus*, 68
Cyclotelson, 34
cylindricus, *Podocerus*, 133
Cylindrylloides, 20, 178, 180, 183
kaiikoura, 30, key, 184
mawsonii, 183, 184
Cymadusa, 18, 19, 20
Cyproidea, 19
crassa, 155
Cyproidia attakensis, 37
Cyrtophium, 19
crisstatum, 146
dentatum, 152
Cystophora tenuifrons, 9

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

dianae, Magra, 107
dianii, Atylus, 87
Gondogeneia, 29 key, 64, 82, 87, 89, 91
Pontogeneia, 87
debilis, Panoploea, 68
dentata, Atylella, 66
Dexiocerella, 152
dentatum, Cymophium, 152
dentatus, Eurystheus, 19, 130
dentifer, Eurystheus, 126
dentifera, Gammaropsis, 126
Moera, 126
Paramoera, 126
dertoo, Kaumahara, 160, 162
desmondi, Gitanopsis, 31 key, 34, 36
Dexamine, 19, 20
pacifica, 60
Dexaminidae, 24 key, 25 key, 46, 49, 194
Dexaminoides, 57
Dexamoniea, 51
Dexiocerella dentata, 152
didactyla, Calliope, 66
didactylus, Calliopius, 20, 66
diplonyx, Eusiroides, 68
Djerboa, 18, 70
Dogielinotus, 178
loquax, 178
Dogielinotidae, 163, 165 key, 178
dubia, Liljeborgia, 29 key, 138
Seba, 154
dubius, Eusirus, 138

eblanae, Panoploea, 31
Echiniphimedia, 18
edentata, Oradarea, 69
edouardi, Paramoera, 91
egregia, Ceina, 19, 30 key, 170
Nicea, 164, 170
ekepuu, Seba, 155
Elasmopus, 18, 29 key, 95, 98, 122
bollonsi, 30 key, 98, 101
calliaetis, 105
earnleyi, 105
hooheno, 105
mutatus, 104, 105
negleetus, 29 key, 98, 101, 105, 114
persetosus, 114
piikoi, 105
pseudaffinis, 105
rapax, 104
spinidaetylus, 98
subcarinata, 114
viridis, 105
wahine, 30 key, 103, 104, 105
enderbyi, Aucklandia, 82
Ephliantidae, 24 key, 30 key, 163, 165, 166 key, 178
Ephliantis, 178, 184
tindalei, 184, 187
Erichthonius, 21
brasiliensis, 49
pugnax, 16, 26 key, 27 key, 49
Eriopisella, 20
Eurymera, 18
Eurystheus afer, 130
chiltoni, 125
crassipes, 126
dentifer, 126
dentatus, 19, 130
haswelli, 126
longicornis, 125
longimanus, 126
thomsoni, 130
ventosa, 135
Eusiridae, 24 key, 25 key, 63, 711
Eusiroides, 19, 64, 68
caesaris, 66, 68
crassi, 68
diplonyx, 68
monoculoides, 28 key, 64, 66, 68, 87
pompeii, 66, 68
Eusirus, 119, 64, 700
affinis, 1138
antarcticus, 28 key, 64, 68
Bouvieri, 68
cuspidatus, 68
dubius, 1138
latieaudus, 68
longipes, 68
propinquus, 68
Exampithoe, 119
excavatum, Corophium, 49
Paracorophium, 26 key, 49
Exoediceropsis, 711, 712
Exoediceros, 119, 711, 712

falcata, Jassa, 111, 27 key, 133, 135
falcatus, Podocerus, 135
fasciculata, Megamoera, 82, 84
Moera, 82
Paramoera, 82, 84, 85
festiva, Melita, 29 key, 117
Moera, 117
filidactylus, Amphilocus, 31 key, 33, 34
fimbriata, Hyale, 168
Nicea, 167
fissicauda, Paradexamine, 60
Paramoera, 82, 84
fluviatilis, Calliope, 71, 74
Paracalliope, 74, 78
frequens, Jassa, 19, 135
Podocerus, 135
Ventojassa, 19, 27 key, 126, 133, 135, 137
frinsdorfi, Paradexamine, 51
fuegiensis, Lembos, 19
fulva, Bircenna, 17, 30 key, 180, 183, 184

gabrieli, Pseudomoera, 66
Gammaridae, 24 key, 26, key, 29 key, 63, 74, 163
Gammaropsis, 19, 26 key, 27 key, 28 key
chiltoni, 28 key, 125
crassipes, 28 key, 126, 137
dentifera, 126
haswelli, 28 key, 126
longimanus (*a*), 28 key, 126
sp., 28 key, 130
tawahi, 16, 28 key, 126
thomsoni, 28 key, 130
typica, 19, 28 key, 126
Gammarus, 111, 20
barbimanus, 130
Gaviota, 15
gayi, Amphitoe, 117
Melita, 19, 117
georgiana, Gondogeneia, 91
georgiensis, Parajassa, 135, 137
gigantea, Bovallia, 68
Gitanogeiton, 19
Gitanopsis, 31 key
antarctica, 36
desmondi, 31 key, 34, 36
kupe, 31 key, 34, 36
pele, 36
pusilla, 31, 36
pusilloides, 34
squamosa, 31 key, 36
willowdens, 36
Glycaemina, 19
Gnathiphimedia, 18
Gondogeneia, 14, 19, 20, 28 key, 64, 68, 82, 87
antarctica, 89, 91
bidentata, 87, 89
chiltonioides, 87
dianii, 29 key, 64, 82, 87, 89, 91
georgiana, 91
nottonia, 29 key, 64, 91
simplex, 87, 91
subantarctica, 89, 91, 93
gracilis, Atoma, 1124

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

grandicornis, Hyale, 30 key, 167
gregaria, Paramoera, 85
grenfelli, Hyale, 30 key, 167
Guernea, 51
  petalocera, 51
  timaru, 20, 25 key, 49, 51

Halimedon schneideri, 143
Halirages, 69
hamiltoni, Paramoera, 84
hansoni, Liljeborgia, 29 key, 138
Haplocheira, 19
  barbimana, 25 key, 130
  lendenfeldi, 19, 25 key, 130
  plumosa, 130
  typica, 130
Harmonia crassipes, 122
Harpinioidella, 18
harveyana, Liagora, 9
haswelli, Eurystheus, 126
  Gammaropsis, 28 key, 126
  Liljeborgia, 138
  Microdeutopus, 131
Haswelli, Maera, 126
haumuri, Ceradocus r., 29 key, 98
haurakiensis, Iphimedia, 25 key, 31
Haustorioides, 178
  munsterhjelmi, 178
Haustoriopsis, 164, 194
  reticulatus, 194
Heteroceressa monodi, 143
Heterophlias, 20, 193
Heterophoxus stephenseni, 19
hinatore, Ampithoe, 27 key, 37, 42, 45
hinemoa, Maoriphimedia, 24 key, 31
hirondellei, Maera, 112
hirtipalma, Allorchestes, 167
  Hyale, 16, 19, 20 key, 167, 168
homochir, Atylus, 48
hooheno, Elasmopus, 105
Hoplopleon, 19
Hormosira, 9
  banksii, 16
houtete, Paradexamine, 25 key, 51, 53, 57, 60, 61
Hyale, 18, 19, 30 key, 164, 165, 166, 180
  campbellica, 167
  chiltoni, 167
  fimbriata, 168
  grandicornis, 30 key, 167
  grenfelli, 30 key, 167
  hirtipalma, 16, 19, 30 key, 167, 168
  lubbocklana, 168
  maroubrae, 30 key, 168
  media, 30 key, 168
  novaezealandiae, 167
  pontica, 168
  prevostii, 167
  rubra, 30 key, 168
  sp., 168
  g. thomsoni, 30 key
  trigonochir, 168
Hyalellidae, 163
Hyalella, 166, 170
Hyalidae, 30 key, 163

Icilius, 19
ignea, Bircenna, 180, 183
iluka, Nihotunga, 142
inaequipes, Maera, 107, 112, 113
inaequistylis, Amphitoe, 117
  Melita, 19, 29 key, 114, 117, 119
incerta, Maera, 16, 30 key, 105, 107, 113
  Moera, 105
indica, Paracalliope, 74
insignis, Mallacoota, 114
Insula, 163, 166, 172
intrepida, Allonchastes, 167
Iphigeneia typica, 193
Iphimedia, 31
  hauraikiensis, 25 key, 31
  obesa, 31
Iphimediella, 18
Iphimotus, 19, 20, 193, 194
  Chiltonii, 193
  typicus (a), 24 key, 193, 194
Iphiplateia, 19, 193
Isaeidae, 48, 124
Isaeopsis, 19
Ischyroceridae, 27 key, 48, 133
Ischyrocerus, 133
  anguipes, 133
  longimanus (a), 27 key, 133

japonensis, Wandelia, 183
japonica, Ceinina, 183, 190
Jassa, 133, 135
  falcata, 11, 27 key, 133, 135
  frequens, 19, 135
  pulchella, 135

kaikoura, Cylindryllioides, 30 key, 184
kaiullani, Maera, 107
karitane, Paracalliope, 74, 78
karori, Tailhape, 16, 30 key, 172
karu, Podocerus, 27 key, 146
kergueleni, Aora, 124
  Autonoe, 130
  Ceradocopsis, 95, 98
  Lembos, 130, 131
  Polycheria, 63
kidderi, Lysianassa, 140
  Nannonyx, 140
  Parawaldeckia, 140
kroyeri, Lysianassa, 140
kupe, Gitanopsis, 31 key, 34, 36
Kuria, 164, 190
  longimanus, 190
Kuriidae, 165 key, 190

Labriphimedia, 18
Laetmatophilus, 19
laeve, Platophium, 152
laevis, Paradexamine, 93
  Podocerus, 152, 153
laticarpus, Eusirus, 68
latipes, Podocerus, 135
Leipsuropus, 19
Lembos fuegiensis, 19
  kergueleni, 130, 131
  philacanthus (a), 131
  sp. no. 1, 103
  sp. no. 2, 103
  sp. no. 3, 131
  sp. no. 4, 131
  spp., 26 key
lendenfeldi, Corophium, 130
  Haplocheira, 19, 25 key, 130
Leptamphopus, 64, 69, 70
  litoralis, 69
  longimana, 69
  novae-zealandiae, 68
  paripes, 69
  sarsi, 69
lessoniae, Ampithoe, 20, 27 key, 37, 44, 45
  Pleonexes, 37, 42
Leucothoe, 19
  spinicarpa, 137
  trailli, 24 key, 137, 138
  tridens, 137, 138
Leucothoidae, 25 key, 137
Leucothoides, 20
levis, Amphithonotus, 93
  Apherusa, 93
  Pontogeneiella, 16, 28 key, 64, 68, 93
Liagora harveyana, 9

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Lignophliantis, 178
Liljeborgia, 17, 18, 19, 64
aequabilis, 29 key, 138
akaroica, 29 key, 138
barhami, 29 key, 138
brevicornis, 138
dubia, 29 key, 138
hansoni, 29 key, 138
haswelli, 138
Liljeborgiidae, 24 key, 29 key, 138
lindbergi, *Ampithoe*, 37
Liouvillea, 66, 71
lippus, *Atylus*, 87
litoralis, *Leptamphopus*, 69
lobatus, *Podocerus*, 153
longicornis, *Eurystheus*, 125
Pontogeneiella, 93
longimana, *Leptamphopus*, 69
Oradarea, 68, 69, 70
Paranaenia, 126
longimanus, *Eurystheus*, 126
longimanus (*a*), *Gammaropsis*, 28 key, 126
Ischyrocerus, 27 key, 133
longimanus, *Kuria*, 190
Paranaenia, 126
Podocerus, 133
Wyvillea, 133
longipes, *Eusirus*, 68
longleyi, *Pontogeneia*, 93
loquax, *Dogielinotus*, 178
loveni, *Maera*, 107
lubbockiana, *Hyale*, 168
lucasi, *Paracorophium*, 49
Lysianassa kidderi, 140
kroyeri, 140
sp., 140
Lysianassidae, 22 key, 24 key, 138

macquariae, *Paramoera*, 85
Macropisthopus, 19
maculata, *Aora*, 27 key, 64, 124, 133
maculatus, *Microdentopus* (sic), 124
Microdeutopus, 124
Maera, 18, 22, 28 key, 98, 107, 122
carnleyi, 105
Chiltoni, 125
danae, 107
Haswelli, 126
hirondellei, 112
incerta, 16, 30 key, 105, 107, 113
inaequipes, 107, 112, 113
kaiulani, 107
loveni, 107
mastersi ((*i*) cf.), 30 key, 98, 101, 105, 109, 110, 112, 113
pacifica, 107
pfefferi, 112
quadrimana, 107, 112, 113
rathbunae, 107
serrata, 107
simile, 112
spp., 30 key, 112
subcarinata, 98, 101, 110
tenuicornis, 117
tepuni, 30 key, 111, 112, 113
viridis, 105, 107
magellanica, *Atyloella*, 66
Pontogeneia, 91
magellanicum, *Acontiostoma*, 138
magellanicus, *Atyloides*, 82
magnirama, *Colomastix*, 31 key, 48
Mallacoota, 98, 113
insignis, 114
subcarinata, 11, 30 key, 114
manawatu, *Podocerus*, 27 key, 146, 150, 152
manene, *Waitomo*, 174, 177
manudens, *Amphilochus*, 34
Maoriphimedia, 20
hinemoa, 24 key, 31
marina, *Stenothoe*, 158
marionis, *Acontiostoma*, 138
Amphilochus, 31 key, 34
Gitanopsis, 31, 34
maroubrae, *Hyale*, 30 key, 168
mastersi ((*i*) cf.), *Maera*, 30 key, 98, 101, 105, 109, 110, 112, 113
Mastersii, *Megamoera*, 109
mauihina, *Biancolina*, 195
mawsoni, *Cylindryllioides*, 183, 184
Maxilliphimedia, 18
media, *Hyale*, 30 key, 168
megalophthalmus, *Atylus*, 93
Megaluropus, 19, 20
Megamoera fasciculata, 82, 84
Mastersii, 109
sub-carinata, 114
thomsoni, 109
Melita, 21, 22, 29 key
awa, 29 key, 114, 116
festiva, 29 key, 117
gayi, 19, 117
inaequistylis, 19, 29 key, 114, 117, 119
oregonensis, 119
pahuwai, 116
palmata, 119
sp., 119
tenuicornis, 117
zeylanica, 116, 117, 119
Metaceradocus, 22, 122
micramphopus, 122
occidentalis, 122
perdentatus, 122
whakatane, 16, 29 key, 119, 122
Metaleptamphopus, 71
Methalimedon, 71, 72
Metopa ovata, 155
Metopella nasica, 158
ovata, 155
Metopoides aurorae, 157
micramphopus, *Metaceradocus*, 122
Paraceradocus, 122
Microdentopus (sic) *maculatus*, 124
microdeuteropus, *Atylus*, 87
Microdeuteropus chelifer, 131
mortoni, 124
tenuipes, 124
Microdeutopus apopo, 7, 20, 27 key, 131
haswelli, 131
maculatus, 124
Microprotopus, 20
miersii, *Montagua*, 158
Montaguana, 158
Probolium, 158
Stenothoe, 158
mihiwaka, *Chiltonia*, 168
minikoi, *Atylus*, 48
Nototropis, 47
minuta, *Pontogeneia*, 93
moe, *Stenothoe*, 157, 158
Moera crassipes, 126
dentifera, 126
fasciculata, 82
festiva, 117
incerta, 105
petriei, 114
quadrimanus, 111, 112
spinosa, 98
subcarinata, 114
moke, *Atyloella*, 19, 28 key, 66
Mokuoloe, 140
monoculoides, *Atylus*, 66
Bovallia, 66, 68
Eusiroides, 28 key, 64, 66, 68, 87
Stenothoe, 158
monodi, *Heterocressa*, 143
Montagua miersii, 158
Montaguana, 158
miersii, 158
moorhousei, *Paradexamine*, 51
mortoni, *Microdeuteropus*, 124
moskvitini, *Allorchestes*, 178
munsterhjelmi, *Haustorioides*, 178

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

muriwai, Paradexamine, 25 key, 51, 57, 60, 61
mutatus, Elasmopus, 104, 105

Najna, 163, 164
  consiliorum, 190
  sp., 190
Najnidae, 163, 165 key, 190
Nannonyx kidderi, 140
nasica, Metopella, 158
  Parathaumatelson, 158
  Pseudothaumatelson, 158
nasicum, Parathaumatelson, 16, 19, 30 key, 158, 160
neapolitanus, Amphilochus, 34
neglectus, Elasmopus, 29 key, 98, 101, 105, 114
Neocyproidea, 19, 20
  otakensis, 31 key, 37
  peninsulae, 37
  pilgrimi, 31 key, 37
Neomegamphopus, 20
neo-zelanica, Allorchestes, 167
  Nicea, 167
  Pherusa, 68
neo-zelanicus, Oedicerus, 78
Nicea egregia, 164, 170
  fimbriata, 167
  neo-zelanica, 167
  novae-zealandiae, 167
  rubra, 168
nichollsi, Bircenna, 180, 183
Nihotunga, 20, 104
  iluka, 142
  noa, 24 key, 142
Nihotungidae, 24 key, 140
noa, Nihotunga, 24 key, 142
Nototropis minikoi, 47
  reductus, 47
nowaezealandiae, Carolobatea, 74, 78, 143
  Hyale, 167
  Leptamphopus, 68
  Nicea, 167
  Oedicerus, 143
  Oradarea, 19, 28 key, 64, 68, 69, 70
  Pherusa, 68
novizealandiae, Allorchestes, 30 key, 167
  Oedicerus, 78
  Paracalliope, 16, 28 key, 63, 74, 78

obesa, Panoploea, 31
obtusa, Polycheria, 25 key, 62, 63
occidentalis, Metaceradocus, 122
Ochlesis, 19
odontonyx, Podocerus, 135
Oediceroides, 71
Oedicerotidae, 24 key, 71, 143
Oedicerus neozellanicus, 78
  novizealandiae, 78, 143
opunake, Amphilochus, 31 key, 33, 34, 36
Oradarea, 63, 64, 68, 69, 70
  edentata, 69
  longimana, 68, 69, 70
  novaezealandiae, 19, 28 key, 68, 69, 70
  shoemakeri, 69
  walkeri, 69, 70
oregonensis, Melita, 119
ornata, Stenothoe, 158
otakensis, Cyproidia, 37
  Neocyproidea, 31 key, 37
ovata, Metopa, 155
  Metopella, 155
  Probollisca, 16, 19, 30 key, 155, 160

pacifica, Dexaminе, 60
  Maera, 107
  Paradexamine, 25 key, 51, 53, 57, 60, 61
Pagetiinidae, 143
pahuwai, Melita, 116
Pallinnotus, 19, 165, 193, 194
palmata, Melita, 119
Panoploea, 31
  debilis, 68
  eblanae, 31
  spinosa, 20, 25 key, 31
  translucens, 64
panoplus, Pleustes, 146
Paracalliope, 20, 24 key, 25 key, 28 key, 63, 70, 71, 72, 74, 78, 170
  australis, 74
  fluviatilis, 74, 78
  indica, 74
  karitane, 74, 78
  novizealandiae, 16, 28 key, 63, 74, 78
Paraceradocus, 122
  micramphopus, 122
Paracorophium, 21, 24 key, 27 key, 170
  excavatum, 26 key, 49
  lucasi, 49
Paracrangonyx, 170
Paracyproidea, 19
Paradexamine, 17, 19, 51, 57
  barnardi, 25 key, 51, 57, 60
  fissicauda, 60
  frinsdorfi, 51
  houtete, 25 key, 51, 53, 57, 60, 61
  laevis, 93
  moorhousei, 51
  muriwai, 25 key, 51, 57, 60, 61
  pacifica, 25 key, 51, 53, 57, 60, 61
  sp., 51, 60
Parajassa georgiensis, 135, 137
Paraleptamphopus, 72, 170
  caeruleus, 74
Paraleucothoe, 19
Parallorchestes, 166, 178
Parambasia Rossii, 140
Paramoera, 14, 19, 20, 28 key, 63, 64, 68, 71, 82, 91
  aucklandica, 82
  australina, 82, 84, 91, 93
  capensiis, 84, 91, 93
  chevreuxi, 16, 29 key, 68, 82, 85
  edouardi, 91
  fasciculata, 82, 84, 85
  fissicauda, 82, 84
  gregaria, 85
  hamiltoni, 84
  macquariae, 85
  rangatira, 29 key, 85
  schellenbergi, 85
  serraticauda, 95
  sp., 85, 87
  tenuicornis, 117
Paranaemia dentifera, 126
  longimana, 126
  longimanus, 126
  typica, 126
Paranchiphimedia, 18
Paraoroides, 19
Parapanoploea, 18
Parapherusa, 24 key, 25 key, 63, 122
  crassipes, 26 key, 29 key, 63, 122
Paraphoxus, 19, 21
  australis, 24 key, 143
  calcaratus, 145
  rostratus, 143
  simplex, 145
  sinuatus, 145
  stebbingi, 145
  tattersalli, 145
  villosus, 119
  waipiro, 24 key, 143, 145
Parapleustes, 20
Parathaumatelson, 160
  nasica, 158
  nasicum, 16, 19, 30 key, 158, 160
Parawaldeckia, 19, 138
  kiddi, 140
  spp., 140
Parhallimedon, 71, 72
Parhargpinia, 19
  villosa, 145
Parhyale, 19, 20, 166, 178

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Parhyalella, 19, 166, 168, 170
paripes, Leptamphopus, 69
Pariphimedia, 18
Pariphimediella, 18
Pariphinotus, 193
patagonicum, Pseudothaumatelson, 158, 160
peke, Ceradocopsis, 30 key, 95, 98
pele, Gitanopsis, 36
Peltopes, 20
  peninsulae, 31 key, 37
peninsulae, Neocyproidea, 37
  Peltopes, 31 key, 37
perdentatus, Metaceradocus, 122
Pereionotus, 193, 194
Periphlias, 170
  carinatus, 164, 170
persetosus, Elasmopus, 114
petalocera, Guernea, 51
petriei, Moera, 114
pfefferi, Maera, 112
Pherusa, 20
  australis, 74
  neozelanica, 68
  novae-zealandiae, 68
philacantha, Autonoe, 131
philacanthus (a), Lembos, 131
Phliantidae, 24 key, 163, 165, 166 key, 193
Phlias, 193
Photidae, 48, 124
Photis, 21, 24 key, 25 key
  brevicaudata, 26 key, 131
  sp., 26 key, 131
Phoxocephalidae, 24 key, 143
Phoxus batei, 143
Phreatogammarus, 170
piikoi, Elasmopus, 105
pilgrimi, Neocyproidea, 31 key, 37
pinguis, Pontharpinia, 145
platei, Ceina, 170
Platophium laeve, 152
plea, Ampithoe, 37
Pleonexes, 44
  lessoniae, 37, 44
Pleustes, 20
  panoplus, 146
Pleustidae, 146
Plioplateia, 19, 193
plumosa, Haplocheira, 130
Podoceridae, 24 key, 27 key, 48, 146
Podocerus, 18, 22
  australis, 135
  brasiliensis, 152
  capillimanus, 146
  cristatus, 27 key, 146, 152
  cylindricus, 133
  falcatus, 135
  frequens, 135
  karu, 27 key, 146
  laevis, 152, 153
  latipes, 135
  lobatus, 153
  longimanus, 133
  manawatu, 27 key, 146, 150, 152
  odontonyx, 135
  validus, 135
  variegatus, 146, 152
  wanganui, 27 key, 152, 153
Polycheria, 19, 62, 63
  antarctica, 62
  kergueleni, 63
  obtusa, 25 key, 62, 63
pompeii, Eusiroides, 66, 68
Pontharpinia australis, 143
  pinguis, 145
pontica, Hyale, 168
Pontogeneia, 82, 93
  antarctica, 91
  danai, 87
  longleyi, 93
  magellanica, 91
  minuta, 93
  rostrata, 93
  sp., 93
  subantarctica, 91
Pontogeneiella, 64, 71, 93
  brevicornis, 93
  levis, 16, 28 key, 64, 68, 93
  longicornis, 93
Pontogeneiidae, 63, 71
Pontogeneoides, 18
prevostii, Hyale, 167
Probolisca ovata, 16, 19, 30 key, 155, 160
Probolium miersii, 158
Proboloides aurorae, 157
Prophliantinae, 194 key
Prophlias, 19, 164, 194
  anomalous, 194
propinquus, Eusirus, 68
Prostebbingia, 18, 71
Prothaumatelson carinatum, 160
Protophoxus australis, 143
pseudaffinis, Elasmopus, 105
Pseudambasia bipartita, 140
Pseudamphilochus, 18
Pseudericthonius, 18
Pseudiphimediella, 18
Pseudischyrocerus, 18
Pseudomoera gabrieli, 66
Pseudothaumatelson, 160
  nasica, 158
  patagonicum, 158, 160
pugnax, Ericthonius, 16, 26 key, 27 key, 49
  Pyctilus, 49
pulchella, Jassa, 135
pusilla, Gitanopsis, 31, 36
pusilloides, Gitanopsis, 34
Pyctilus pugnax, 49

quadridens, Atyloella, 66
quadrimana, Maera, 107, 112, 113
quadrimanus, Moera, 111, 112
Quasimodia, 19, 193

ramondi, Ampithoe, 45
rangatira, Paramoera, 29 key, 85
rapax, Elasmopus, 104
rathbunae, Maera, 107
Raumahara, 160
  carinatum, 160, 162
  dertoo, 160, 162
  rongo, 30 key, 160
reductus, Atylus, 25 key, 47, 48
  Nototropis, 47
reticulatus, Haustoriopsis, 194
rongo, Raumahara, 30 key, 160
Rossii, Parambasia, 140
rostrata, Pontogeneia, 93
rostratus, Paraphoxus, 143
rotorua, Gondogeneia, 29 key, 64, 91
rubra, Hyale, 30 key, 168
  Nicea, 168
rubromaculatus, Ceradocus, 98

Sancho, 19, 71
sarsi, Leptamphopus, 69
saundersii, Seba, 154
schellenbergi, Paramoera, 85
schneideri, Carolobatea, 72, 78, 143
  Halimedon, 143
Schraderia, 70
  serraticauda, 95
Seba, 19, 154
  antarctica, 154
  armata, 154, 155
  dubia, 154
  ekepuu, 155
  saundersii, 154
  subantarctica, 154
  typica, 24 key, 154, 155

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/

Sebidae, 24 key
serrata, Maera, 107
serraticauda, Atyloides, 95
Paramoera, 95
Schraderia, 95
sextonae, Corophium, 27 key, 48
shoemakeri, Oradarea, 69
simile, Maera, 112
simplex, Gondogenia, 87, 91
Paraphoxus, 145
simplicauda, Colomastix, 48
sinuatus, Paraphoxus, 145
sp., Ampithoe, 27 key, 45
Aora, 27 key, 124, 125
Carolobatea, 143
Colpomenia, 9
Gammaropsis, 28 key, 130
Hyale, 168
no. 1, *Lembos*, 130
no. 2, *Lembos*, 130
no. 3, *Lembos* 131
no. 4, *Lembos*, 131
Lysianassa, 140
Melita, 119
Najna, 190
Paradexamine, 51, 60
Paramoera, 85, 87
Photis, 26 key, 131
Pontogeneia, 93
spp., Lembos, 26 key
Maera, 30 key, 112
Parawaldeckia, 140
Stenothoe, 30 key
spinicarpa, Leucothoe, 137
spinidactylus, Elasmopus, 98
spinosa, Moera, 98
Panoploea, 20, 25 key, 31
squamosa, Gitanopsis, 31 key, 36
squamosus, Amphilochus, 36
stebbingi, Paraphoxus, 145
Stegocephalidae, 24 key, 155
Stenopleuroides, 71
Stenothoe, 19, 153
adhaerens, 158
aucklandicus, 157, 158
marina, 158
miersii, 158
moe, 157, 158
monoculoides, 158
ornata, 158
spp., 30 key
valida, 158
Stenothoidae, 24 key, 30 key, 155
Stenothoinae, 155
stephenseni, Heterophoxus, 19
subantarctica, Gondogeneia, 89, 91, 93
Pontogeneia, 91
Seba, 154
subcarinata, Elasmopus, 114
Maera, 98, 101, 110
Mallacoota, 11, 30 key, 114
Moera, 114
sub-carinata, Megamoera, 114
subcastellata, Colomastix, 31 key, 48
swammerdami, Atylus, 47, 48
Syndexamine, 20, 51
carinata, 25 key, 63
Sympleustes, 20

Taihape, 20, 164, 165, 168, 172, 174, 194
karori, 16, 30 key, 172
Talitridae, 163, 165 key, 166, 194
Talitroidea, 21, 24 key, 30 key, 163, 165 key, 194
tattersalli, Paraphoxus, 145
taupo, Atylus, 25 key, 47, 48
tawahi, Gammaropsis, 16, 28 key, 126
tea, Ampithoe, 37
Temnophlias, 19, 193
temuicornis, Amphitoe, 117
Maera, 117
Melita, 117
Paramoera, 117
tenuipes, Microdeuteropus, 124
tepuni, Maera, 30 key, 111, 112, 113
Teraticum typicum, 154
Tetradeion, 11, 20, 155
crassum, 24 key, 155
Thaumatelson, 18, 160
Thaumatelsoninae, 24 key, 158
thomsoni, Eurystheus, 130
Gammaropsis, 28 key, 130
Hyale g., 30 key
Megamoera, 109
timaru, Guernea, 20, 25 key, 49, 51
tindalei, Eophliantis, 184, 187
torulosa, Cystophora, 9
traillii, Leucothoe, 24 key, 137, 138
translucens, Apherusa, 20, 28 key, 64
Panoploea, 64
trichobostrychus, Aora, 124
tridens, Leucothoe, 137, 138
trigonochir, Hyale, 168
Tritaeta, 20
typica, Aora, 19, 124, 125
Gammaropsis, 19, 28 key, 126
Haplocheira, 130
Iphigeneia, 193
Paranaenia, 126
Seba, 24 key, 154, 155
typicum, Teraticum, 154
typicus (a), Iphinotus, 24 key, 193, 194

valida, Stenothoe, 158
validus, Podocerus, 135
variegatus, Podocerus, 146, 152
Ventojassa, 135, 137
frequens, 19, 27 key, 126, 133, 135, 137
ventosa, 135
ventosa, Eurystheus, 135
Ventojassa, 135
villosa, Parharpinia, 145
villosus, Paraphoxus, 19
vilordes, Gitanopsis, 36
viridis, Elasmopus, 105
Maera, 105, 107

wahine, Elasmopus, 30 key, 103, 104, 105
waialua, Ampithoe, 38, 42
waipiro, Paraphoxus, 24 key, 143, 145
wairarapa, Wandelia, 30 key, 180, 183, 184, 187,
Waitomo, 20, 165, 168, 172
manene, 174, 177
walkeri, Oradarea, 69, 70
Wandelia, 178, 180, 187, 190, 195
crassipes, 187
japonensis, 183
wairarapa, 30 key, 180, 183, 184, 187, 190
wanganui, Podocerus, 27 key, 152, 153
whakatane, Metaceradocus, 16, 29 key, 119, 122
Wyvilllea longimanus, 133

Zaramilla, 18, 71
zeylanica, Melita, 116, 117, 119

A. R. SHEARER, GOVERNMENT PRINTER, WELLINGTON, NEW ZEALAND—1972

1,500/3/71—2782 A

This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License.
To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/