

Records of the Auckland Museum

Volume 51 | 2016

Type
Colenso
1838
LABELLED
HEMINGWAY COLL 247



TAMAKI PAENGA HIRA
AUCKLAND WAR MEMORIAL MUSEUM

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Hemideina gigantea !
Deinacrida heteracantha
Trans. N.Z. XXVII p. 144.
Colenso 355/31.

Captured 1838.
Described 1880.



Records of the Auckland Museum

Volume 51 | 2016



TAMAKI PAENGA HIRA
AUCKLAND WAR MEMORIAL MUSEUM

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The Auckland War Memorial Museum has a statutory role to advance and promote cultural and scientific scholarship and research that is met in part by publication of the *Records of the Auckland Museum*. The *Records* have been published continuously since 1930. Issues are annual.

The *Records* contain the results of original research dealing with material in the collections of Auckland Museum, and research carried out by Museum staff members in their particular subjects. All papers are refereed. Instructions for authors are given at the end of this, or recent volumes. The *Records* are distributed, largely by exchange, to libraries at about 250 academic institutions-throughout the world. Proposals for exchange agreements should be addressed to the Auckland Museum Library Manager.

The contents of the *Records* are reported in *Index New Zealand*, *Anthropological Index* (Royal Anthropological Institute, London), *Anthropological Literature* (Harvard University), *Biological Abstracts*, *Kew Record of Taxonomic Literature*, *Zoological Record* and *GeoRef* (American Geological Institute). Vol. 34 contained indexes to the contents of volumes 1-33. Monographs are produced occasionally in the series *Bulletin of the Auckland Museum* (see website: Library Services/Museum Publications).

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Cover image: Holotype of *Hemideina gigantea* Colenso, AMNZ21862. Photo: Peter Quin.

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Foreword: Change and Continuity

Roy Clare CBE Director, Auckland War Memorial Museum

In my Foreword last year I wrote about the impact of digital technology as research advances in Auckland War Memorial Museum. The pace of change has since increased and throughout the past year we have continued to nourish the collections and develop the audiences for them. The collections of this great institution are genuinely reaching out across the globe, presenting with many exciting new possibilities, as foreseen by *Future Museum* (published in 2012).

Academic libraries pioneered new approaches to collection building and retention. Museum collections are more diverse, but they need to follow suit and find new models to better serve their audiences cost-efficiently.

The Museum's Trust Board is committed to strategies that explore these avenues, while renewing galleries and displays, activating 'beyond our walls' and investing in innovative ways to engage people of all ages and backgrounds. Scholarship remains vital, alongside all levels of research, enquiry and participation.

He Korahi Māori and to its Pacific companion Teu Le Vā are woven tightly through the developments and bring indigenous perspectives to the forefront. As the Te Awe and Pacific Collections Access programmes progress, the Museum is strengthening its ties with communities and peoples. We are becoming more respectful kaitiaki and our documentation is being enhanced as we engage and learn.

Amid much that has changed there is continuity of purpose. At the core of all that we do, and all that we aspire to be, are the internationally-significant collections and the skills and capacities of those who care for them. Our curators and professional staff members are of course a crucial and enduring resource, but no museum in the world could achieve its ambitions without the talented and committed support of researchers and specialist volunteers.

In Auckland Museum we are fortunate to have the services of a significant number of subject experts who seek no financial reward. The late Margaret Morley is an outstanding example who has made a substantial contribution to developing and enhancing our marine invertebrates collection. Margaret received a Museum Award in 2015 and we were very sad to learn of her passing earlier this year. Her painstaking work forms the basis of two papers in this volume. Unfortunately Margaret did not live to see the publication of her research, but her legacy will be with us forever.

Fossil and Recent molluscan types in the Auckland War Memorial Museum. Part 1: Bivalvia

Wilma M. Blom Auckland War Memorial Museum

Abstract

The Marine Department of Auckland War Memorial Museum has nearly 1800 primary types and a further 1770 paratypes and paralectotypes types in its collections. The majority are molluscan and this first part of a catalogue of these collections reviews the types for 316 bivalve species. It deals with 222 primary types and 242 secondary types, which are almost evenly split between Recent taxa (159) and fossil taxa (157). Type material is figured for the first time for the following taxa: *Nucula certisinus* Finlay, 1930; *Nucula gallinacea* Finlay, 1930; *Nucula rossiana* Finlay, 1930; *Poroleda pertubata* Iredale, 1924; *Notovola marwicki* Finlay, 1930; *Spissatella acculta* Finlay, 1926; *Spissatella clifdenensis* Finlay, 1926; *Maorimactra acuminella* Finlay, 1930; *Scalpomactra continua* Finlay, 1930; *Amphidesma forsteriana* Finlay, 1927; *Angulus(Peronidia) tumens* Laws, 1933; *Gari oamarutica* Finlay, 1930.

Keywords

Auckland Museum, name-bearing types, Mollusca.

INTRODUCTION

The Marine Department of Auckland War Memorial Museum (AWMM) holds nearly 1800 lots of name-bearing types, in the form of holotypes, neotypes, syntypes and lectotypes, and a further 1770 iconotypes, paratypes and paralectotypes. These are spread across several phyla, but the majority are Mollusca. They include terrestrial as well as marine species, and fossil as well as extant taxa.

Auckland Museum's first list of biological primary types, which included the molluscs, was published by Powell (1941) and he followed this with a supplement in 1949 (Powell, 1949). A catalogue of fossil and Recent molluscan types was started in the 1990s by Glenys Stace and Nick de Carteret, but never finished. The present publication is a much amended and expanded version of the 1990s catalogue, and covers only the Bivalvia as part 1 of a larger catalogue. It deals with 222 primary types and 242 secondary types representing 316 species. They are almost evenly split between Recent (159) and fossil (157) taxa. The majority are from New Zealand (302), but there are also nine from Australia, particularly South Australia but also Enderby Land and Norfolk Island, two from the Falkland Islands, one from Kerguelen Island, one from the Lord Howe Rise, and one from New Caledonia.

Auckland Museum's first organised molluscan collections were started by Thomas Frederic Cheeseman (Fig. 1a), who was appointed Secretary of the Auckland

Institute and Curator of the Auckland Museum in January 1874. Principally a botanist, he also collected and published widely on other areas of natural history. In 1878 he published the descriptions of three new species of opisthobranchiate seaslugs collected in or near Waitemata Harbour (Cheeseman, 1878). Although the species have been synonymised since, the paintings of these specimens are the earliest known marine types (iconotypes) held by Auckland Museum.

In 1929, when Auckland Museum moved to its present site in Auckland Domain, more staff positions became available. A.W.B. (Baden) Powell (Fig. 1b), who as a 15 year-old in 1916 had been made an honorary curator by T.F. Cheeseman (Cernohorsky, 1988), became the Museum's first paid conchology and palaeontology curator at that time and held the position until his retirement in 1968. During his more than half-century's association with the Museum he acquired a large number of shells for the collections from a variety of sources. In 1929, the Rev. W.H. Webster gave his collection of New Zealand and foreign Mollusca, which contained several type specimens. In 1936 the Museum bought the New Zealand Tertiary molluscan collections of C. R. (Charles) Laws, including 250 holotypes. Laws collected extensively, but specialised in micromolluscs (Fleming & Grant-Mackie, 1985), and his work on Pyramidellidae alone contributed more than 100 primary types to the Auckland Museum collections. The H.J. (Harold) Finlay private collection of Recent and fossil Mollusca, comprising 14,000 species lots

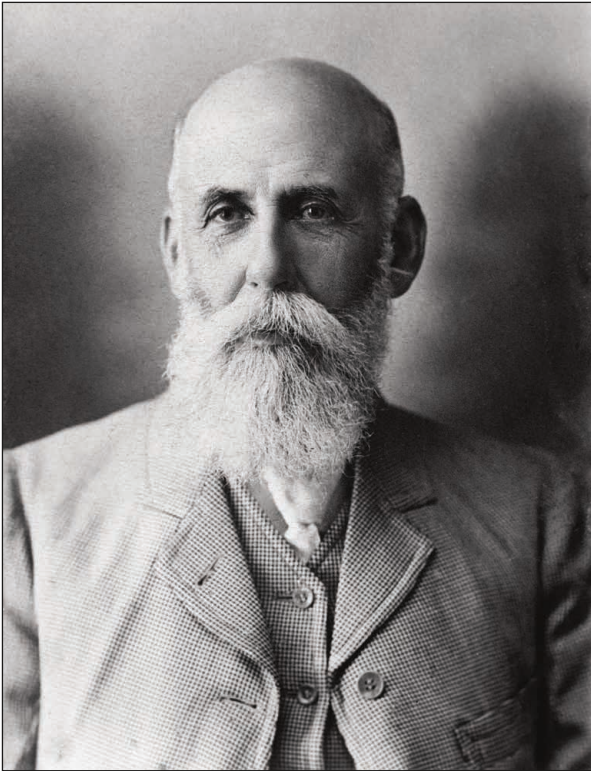


Figure 1a. Thomas Frederic Cheeseman was the sole Curator of Auckland Museum from 1874 until his death in 1923. He collected widely across all areas of natural history.

with 437 primary type specimens, was purchased by the Museum in 1937 (Powell *et al.*, 1967). Finlay, who spent most of his life in a wheelchair after contracting poliomyelitis at the age of 4, undertook all his molluscan work as a private individual. He received a DSc in 1927, but despite this spent much of the next 10 years unemployed and impoverished. He worked off and on for oil companies and at some time in the mid-1930s also received financial support from Auckland Museum to carry out his research (Hornibrook, 1971). When Finlay finally secured employment with the New Zealand Geological Survey in 1937 he switched to foraminiferal research after which Auckland Museum acquired much of his molluscan collections. Another significant section of the fossil types are the 64 primary types contributed through J. (Jack) Marwick's work on the Late Pliocene (Waipipian) Kaawa Formation which was found 25–30m below the surface in the newly dug Waitemata Brewery well, Otahuhu, Auckland. J. Healy of the New Zealand Geological Survey (now GNS Science) heard that the well would be dug and arranged with Morton Coutts, the general manager of the brewery, for collections to be made. Marwick, along with J.A. Bartrum, C.A. Fleming, A.W.B. Powell and C.R. Laws collected from the spoil dumped at the site between November 1945 and January 1946 (Marwick, 1948). The Laws and Finlay collections together with the Marwick types make the most important collection of fossil molluscan types in New Zealand next to that of the GNS Science.



Figure 1b. A.W.B (Baden) Powell amongst the mollusc storage cabinets. He made the wooden trays (Dell, 1987) and used many other cheap and readily available storage containers, such as lingerie and shoe boxes.

Powell himself also contributed a large amount of material from his numerous field trips around New Zealand and its offshore islands. By special arrangement with the Museum Council his private collection of 60,000 specimen lots of New Zealand and foreign Recent and fossil molluscs came to the Museum on his appointment (Powell *et al.*, 1967). These were eventually integrated with the Museum's collections. His material, which was mostly the result of his own fieldwork, contributed fossils from important Tertiary faunas at localities such as Waihi Stream, Cape Runaway, Motutara (the old name for the coast south of Muriwai), and Waiheke (Dell, 1987). He was a member of the "Discovery II" Expedition (1925); Auckland Museum's "Will Watch" Expedition (1934); the Danish "Galathea" Expedition (1950); and the "Gloria Maris" Expedition to New Guinea (1955). He also received molluscan material collected by the British, Australian, and New Zealand Antarctic Research Expedition (BANZARE, 1929-31).

Between 1960 and 1965, the American philanthropist W.B. Dixon Stroud sponsored molluscan research by Powell. This enabled field work to be carried out at the Three Kings and Poor Knights Islands, as well as other off-shore expeditions in Stroud's yacht. Powell named 1190 living and fossil Mollusca and two Crustacea (Cernohorsky, 1988) and the type specimens for most of these are lodged in Auckland Museum's collections.

In 1969 Walter Cernohorsky succeeded Powell as curator of malacology, until his retirement in 1989. He

specialized mostly in Indo-Pacific Mollusca and his taxonomic work contributed 31 primary type specimens deposited with Auckland Museum.

Both Powell and Cernohorsky kept all type specimens integrated taxonomically within the general collections, but in the early 1990s the primary types and paratypes were brought together into a separate types collection and fire-retardant cabinet. Although by now most of these have been located and extracted, even today the occasional type specimen is still rediscovered amongst the general collections.

SPECIMEN REGISTRATION

Although the primary type specimens were stored together with the general collections they appear to have been numbered separately. Powell used two sequential numbering systems, one for the types held within the Museum's collections, and one for the types held within his own private collection. The latter numbers were prefixed with a P. He seems to have started this system after the publication of his 1941 and 1949 catalogues,

as he numbered the types by the alphabetical sequence in which they were listed in these publications. A record of the numbers was kept in both a card file and annotated copies of the catalogues (Fig. 2) and each type specimen also has labels bearing at least some if not all information. The recent rediscovery amongst the Marine Department's archives of a register of acquisitions, which also contains primary data for many of these specimens, has enabled the further verification and augmentation of many of our type records (Fig. 3).

A new alpha-numeric system, using the format AK12345, was introduced in the early 1990s with the first round of digitisation of records in the Marine Department. To keep type records separate from other records a block of numbers from AK70001–AK74999 was set aside for the primary types, paratypes and paralectotypes. Wherever possible, Powell's holotype numbers were retained within the new system. The Museum's specimens were allocated numbers starting from AK70001, i.e. Powell's 1 became AK70001 etc. Type specimens from Powell's own collection were allocated numbers starting with AK72, i.e. Powell's P1 became AK72001 etc.

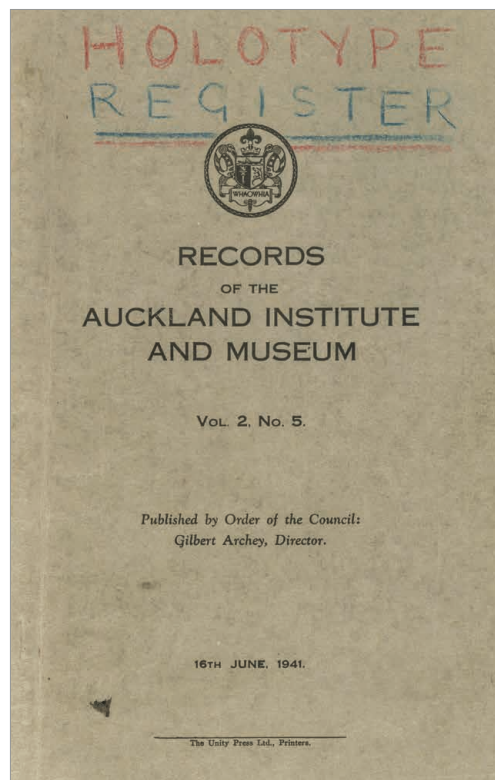
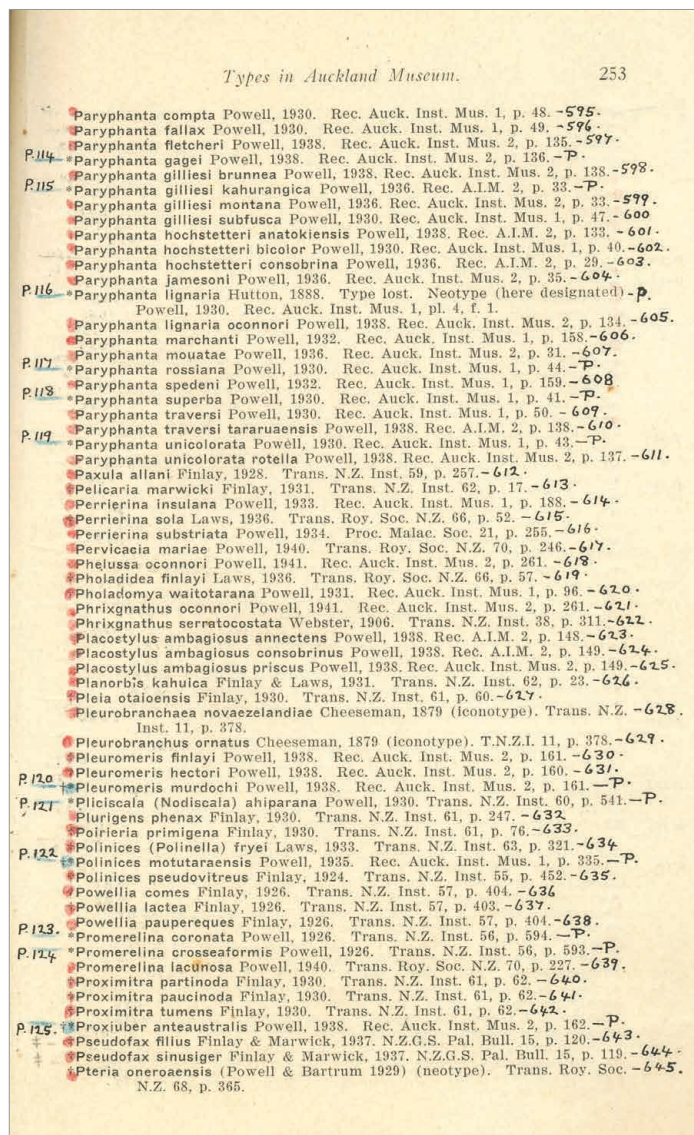


Figure 2. The front cover (above) of an off-print and one of the pages of the catalogue of biological primary types as held by Auckland War Memorial Museum in 1941. This particular one was used by A.W.B. Powell as the Holotype Register. Specimens marked with a red dot (right) were part of the Museum's collections, and those flanked by a number underlined in blue were part of A.W.B. Powell's own personal collection. Eventually both were amalgamated and are now held in the marine department of Auckland War Memorial Museum.



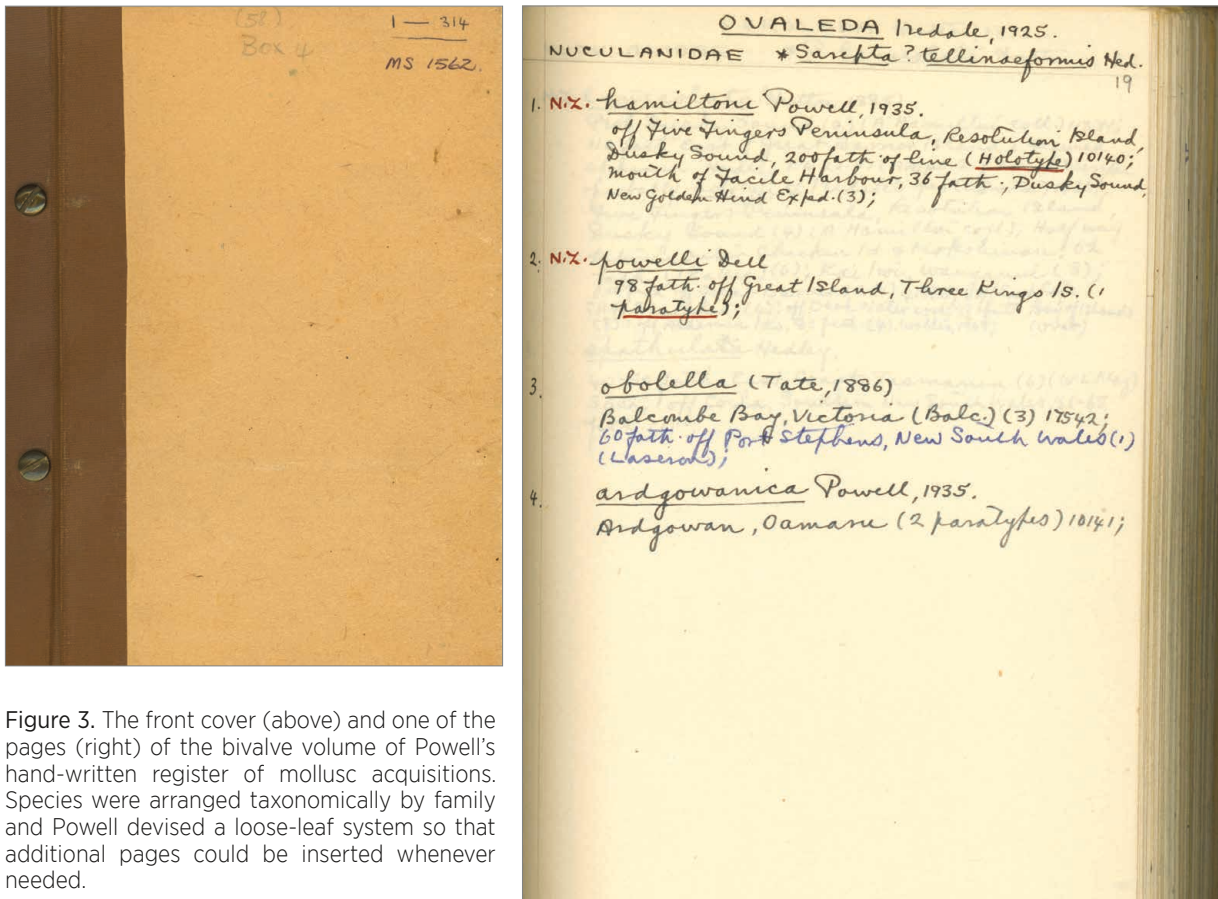


Figure 3. The front cover (above) and one of the pages (right) of the bivalve volume of Powell's hand-written register of mollusc acquisitions. Species were arranged taxonomically by family and Powell devised a loose-leaf system so that additional pages could be inserted whenever needed.

In the late 1990s with a move to the present collections management system and the integration of all departmental databases to a single one, the AK prefix was replaced by the MA prefix, with AK being retained for botanical specimens.

Methods

Within the currently accepted family placement, taxa are here listed alphabetically under their original name first by genus and then by species.

For most of the Recent New Zealand species the *Checklist of the Recent Mollusca recorded from the New Zealand Exclusive Economic Zone* (Spencer *et al.*, 2016) was used for the taxonomic order, family placements and current names. However, for some family placements the World Register of Marine Species (WoRMS Editorial Board, 2015) was preferred. For Recent Australian species the Australian Faunal Directory (ABRS, 2009) was used and for the remaining world species the World Register of Marine Species (WoRMS Editorial Board, 2015) was the major reference. Taxonomic placement, current names and ages for New Zealand Cenozoic fossil taxa are almost exclusively taken from Maxwell (in Spencer *et al.*, 2009), Beu & Maxwell (1990) and Beu & Raine (2009).

All specimens listed here were sighted and cross-checked against original publications, apart from one holotype and three paratype lots, which are missing. In addition, 17 taxa were affected by glass-disease, with

four holotypes being so severely damaged they are no longer useable.

Fossils are indicated by a dagger (†) and for fossil taxa their ages have been included as international periods followed by the equivalent New Zealand stage in parentheses. Geochronological subdivisions used in original papers have in many cases been superseded by new nomenclature and their boundaries revised. For the currently accepted New Zealand timescale see Raine *et al.* (2015). Likewise formatting follows Raine *et al.* (2015).

Type definitions are those used by the International Code of Zoological Nomenclature (ICZN, 2015).

Paratypes and paralectotypes have been included in this catalogue, because in some instances the name-bearing type is not readily available (for example, because it is missing, affected by glass disease, or held outside New Zealand). It is therefore useful to know that some of the type series is available within New Zealand.

Of the bivalve species reviewed here 15 were not originally figured. Of these, the holotype of *Escalima regularis* is missing. Auckland Museum holds the primary types for a further 12 of these unfigured species, and for these high resolution images, created with automontage focus stacking techniques, are provided here. Similarly high resolution images for many of the other primary types are available through the Museum's Collections Online (<http://www.aucklandmuseum.com/collections-research/collections>).

Class BIVALVIA
Subclass PROTOBRANCHIA
Order NUCULIDA
NUCULIDAE

***Austronucula schencki* Powell, 1939**

Powell, A.W.B., 1939. The Mollusca of Stewart Island. *Records of the Auckland Institute and Museum* 2(4): 211–238 [220, 221], pl. 48, fig. 5 (holotype).

Holotype: MA70076, articulated specimen, collected by Mrs R.H. Harrison from shell sand from Rosa Island, Port Pegasus, Stewart Island, New Zealand.

Remarks: Also the type for the genus. Valves show damage from glass-disease.

Current name: *Austronucula schencki* Powell, 1939 – Powell (1979: 358); Spencer *et al.* (2016).

***Nucula certisinus* Finlay, 1930**

Finlay, H.J., 1930. Additions to the Recent molluscan fauna of New Zealand. No. 3. *Transactions and Proceedings of the New Zealand Institute* 61: 222–247 [243], not figured.

Lectotype: MA70551, Figure 4 a, b, left valve, dredged from 22m (12 fathoms), Doubtless Bay, Northland, New Zealand.

Paralectotype: MA73328, left valve from the type locality.

Remarks: Finlay (1930) reported ‘one perfect specimen and a single valve’ for the type material and older labels, presumed to be A.W.B. Powell’s, have ‘Holotype & Paratype’. However, the box contained 2 capsules, each with a left valve. One capsule was labelled ‘L’ and was matched with a hand-written label from Museum of New Zealand, Te Papa Tongarewa, stating: “Lectotype (Dell, 1956). Capsule marked ‘L’. B Marshall, 4/10/2000.” Dell (1956) figured the ‘type specimen’ (figs 5, 7), thus designating it as the name-bearing type. He did not mention whether the right valve of the ‘perfect’ specimen was already lost at that time. The second left valve, here designated a paralectotype, has been removed and given its own registration number, MA73328.

Current name: *Nucula certisinus* Finlay, 1930 – Powell (1979: 355); Spencer *et al.* (2016).

***Nucula dunedinensis* Finlay, 1928**

Finlay, H.J., 1928. The Recent Mollusca of the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 59: 232–286 [262, 263], pl. 38, figs 1, 2 (holotype), pl. 40, figs 43, 44 (paratype).

Holotype: MA70552, 1 articulated specimen dredged from 5.5m from Dunedin Harbour, Otago, New Zealand.

Paratypes: MA72962, 1 articulated specimen and 2 left valves; MA72563, 2 articulated specimens, 3 right valves and 4 unrelated left valves dredged from 5.5m from Dunedin Harbour, Otago, New Zealand.

Remarks: Finlay (1928) did not explicitly state the number of, or localities for, the paratypes, and there are no original labels with these.

Current name: *Nucula (Lamellinucula) dunedinensis* Finlay, 1928 – Powell (1979: 355, 356); Spencer *et al.* (2016).

***Nucula gallinacea* Finlay, 1930**

Finlay, H.J., 1930. Additions to the Recent molluscan fauna of New Zealand. No. 3. *Transactions and Proceedings of the New Zealand Institute* 61: 222–247 [243], not figured.

Syntypes: MA70553, Figure 5 a-h, 2 specimens (valves separate) and 1 left valve, dredged from 46m (25 fathoms), off Hen and Chickens Islands, northern Hauraki Gulf, New Zealand.

Remarks: Finlay (1930) stated that there are ‘4 examples’ from the type locality. However, the AWMM type material contains 5 valves from 3 different individuals. In addition to original labels, there is a small note in A.W.B. Powell’s handwriting, stating ‘In the type-material of *Nucula gallinacea* are a pair of valves which are a new species of *Linucula*. According to P.A. Maxwell in a letter 29–7–1974.’ In Powell (1979: 356) the taxon is named as *Nucula (Linucula) gallinacea*. The original type material needs re-examination.

Current name: *Varinucula gallinacea* (Finlay, 1930) – Maxwell in: Spencer *et al.* (2009: 233); Spencer *et al.* (2016).

†*Nucula ngatutura* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [45], pl. 9, figs 1, 4 (holotype).

Holotype: MA70554, a single right valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Pronucula ngatutura* (Laws, 1936) – Beu & Maxwell (1990: 392).

***Nucula nitidulaformis* Powell, 1971**

Powell, A.W.B., 1971. New Zealand molluscan systematics with descriptions of new species: part 7. *Records of the Auckland Institute and Museum* 8: 209–228 [227, 228], figs 27, 28 (holotype).

Holotype: MA71327, an articulated specimen from east of Aldermen Islands, Coromandel, New Zealand.

Paratypes: MA71467, 4 articulated specimens from the type locality; MA73330, a single articulated specimen, assumed to be from the type locality.

Remarks: MA71467 contained 2 vials, one with 1 articulated specimen, and one with 4 articulated specimens, and a label hand-written by Powell giving type locality details. Powell (1971) mentioned a ‘Holotype and paratype presented to Auckland Museum by Mr C. Wormald’, but made no mention of a further 4 paratype specimens. It is assumed that the 4 specimens are from the type series and were donated at a later date and that the single specimen (now MA73330) is the original Powell (1971) paratype, which, according to the label, was originally kept together with the holotype specimen.

Current name: *Nucula nitidulaformis* Powell, 1971 – Spencer *et al.* (2016).

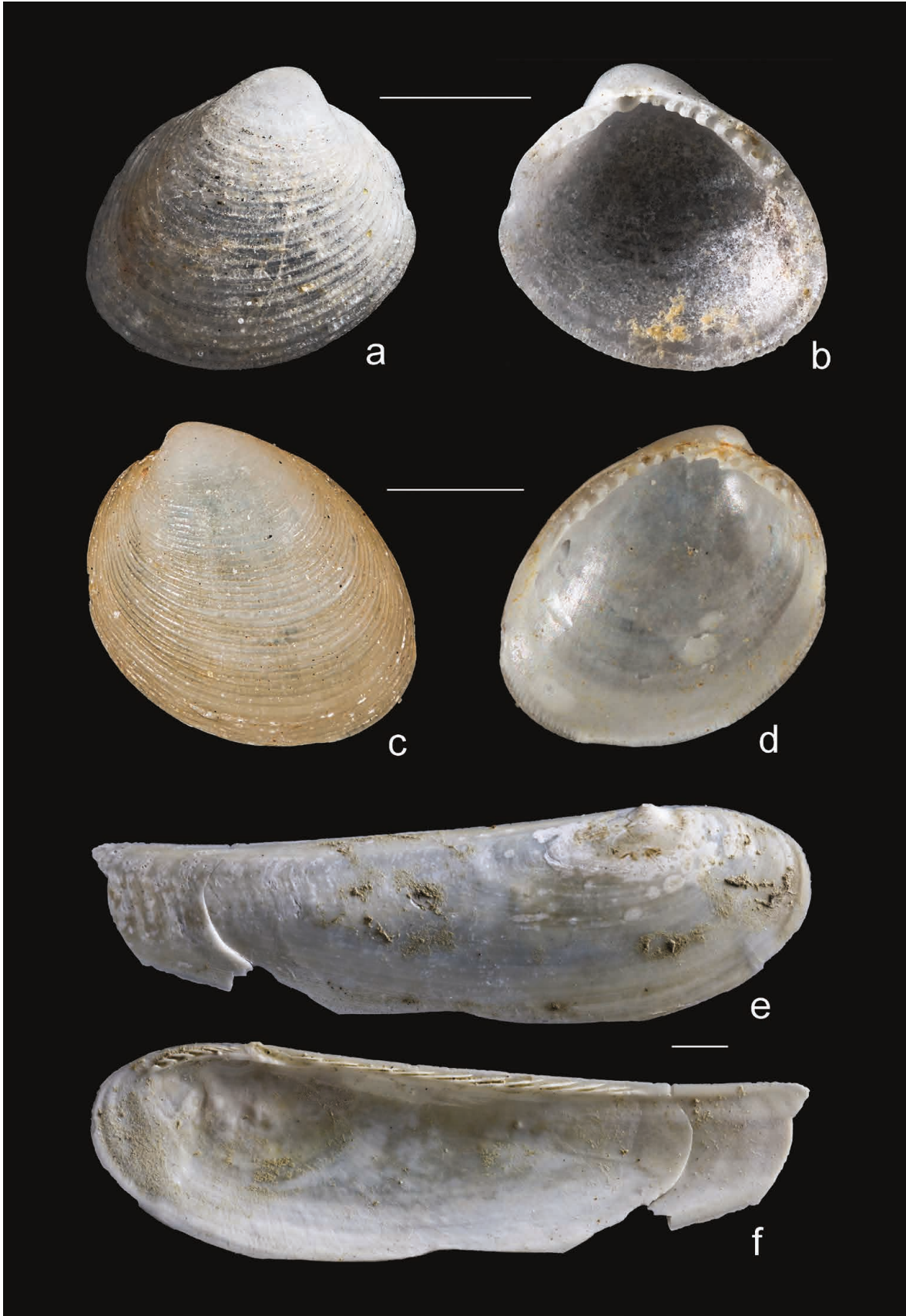


Figure 4. *Nucula certisinus* Finlay, 1930, lectotype, left valve exterior and interior views (a, b); *Nucula rossiana* Finlay, 1930, holotype, right valve exterior and interior views (c, d); *Poroleda pertubata* Iredale, 1924, holotype, right valve exterior and interior views (e, f). Scale bar 1mm.

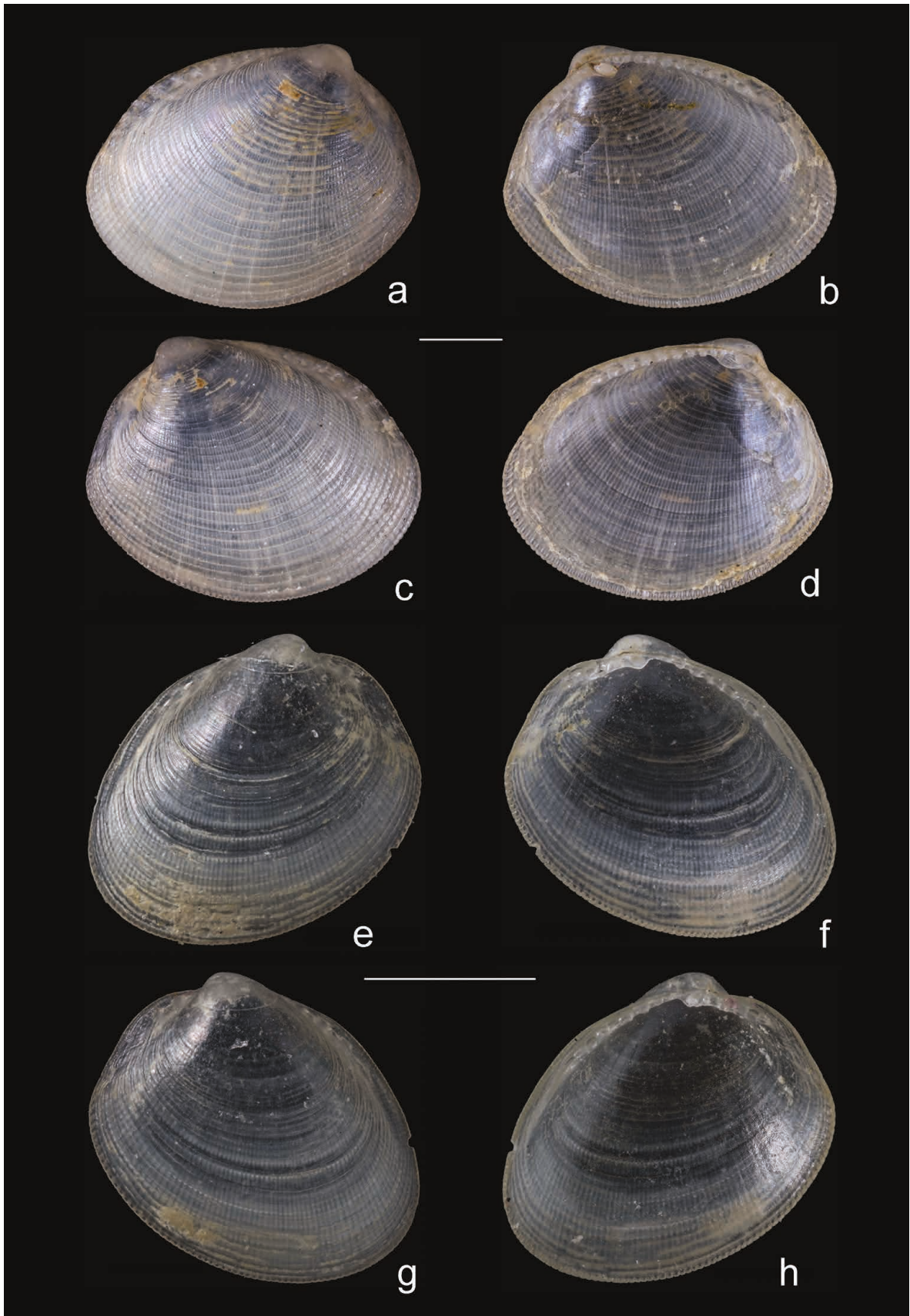


Figure 5. *Nucula gallinacea* Finlay, 1930, syntypes consisting of the exterior and interior views of the left and right valves of 2 specimens (*a-d* and *e-h*). The syntype consisting of the single left valve is not shown. Scale bar 1mm.

***Nucula rossiana* Finlay, 1930**

Finlay, H.J., 1930. Additions to the Recent molluscan fauna of New Zealand. No. 3. *Transactions and Proceedings of the New Zealand Institute* 61: 222–247 [242, 243], not figured.

Holotype: MA70555, Figure 4 c, d, single right valve from shell sand, Faith Harbour, Auckland Islands, New Zealand.

Paratypes: MA72591, 1 articulated specimen and 1 left valve, assumed to be from the type locality; MA73086, unrelated left and right valves from the type locality.

Current name: *Nucula rossiana* Finlay, 1930 – Spencer *et al.* (2016).

***Pronucula bollonsi* Powell, 1955**

Powell, A.W.B., 1955. Mollusca of the southern islands of New Zealand. *Cape Expedition Series Bulletin* 15, DSIR, Wellington, 151 pp. [19], pl. 1, fig. 3 (holotype).

Holotype: MA72203, right valve collected from 174 m (95 fathoms), 22.5 km (14 miles) north of the Auckland Islands, New Zealand.

Paratypes: MA71973, 5 articulated individuals from the type locality.

Current name: *Pronucula bollonsi* Powell, 1955 – Spencer *et al.* (2016).

***Pronucula maoria* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [163], pl. 45, fig. 8 (holotype).

Paratypes: MA72208, 6 left valves, and 2 right valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off Three Kings Islands, New Zealand.

Current name: *Pronucula maoria* Powell, 1937 – Spencer *et al.* (2016).

***Pronucula tenuis* Powell, 1927**

Powell, A.W.B., 1927. Deep-water Mollusca from south-west Otago, with descriptions of 2 new genera and 22 new species. *Records of the Canterbury Museum* 3(2): 113–124 [119, 120], pl. 22, figs 1, 2 (holotype).

Paratype: MA72347, single right valve, dredged by a private scientific party in December 1908, from the steamer 'Rakiura' in 311m (170 fathoms), off Puysegur Point, Southland, New Zealand.

Remarks: In Powell (1927) 2 specimens were mentioned as follows: 'Holotype (1 left valve) from 100 fathoms. A single worn left valve from 170 fathoms.' As the holotype specimen was lodged in the Canterbury Museum, Christchurch (CM M853), the second specimen is here treated as the paratype. Powell (1927) referred to 2 left valves, but the figured specimen, presumed to be the holotype, is a right valve. The paratype specimen is also a right valve. It is likely that at the time of writing it was not recognised that the Nuculidae are opisthogyrate, i.e. the umbo is posteriorly directed, and so the valves were misidentified.

Current name: *Pronucula tenuis* Powell, 1927 – Spencer *et al.* (2016).

**Order NUCULANIDA
NUCULANIDAE****†*Ledella clifdenensis* Powell, 1935**

Powell, A.W.B., 1935. New Recent and Tertiary Nuculanidae from New Zealand. *Proceedings of the Malacological Society* 21(4): 252–255 [254, 255], pl. 27, fig. 7 (holotype).

Holotype: MA70390, 1 articulated specimen collected from Middle Miocene (Clifdenian) Slip Point Siltstone [Finlay's bed 6C (for correlation see Fleming *et al.*, 1969)] at Clifden, Southland, New Zealand.

Paratype: MA72421, 1 right valve and 2 left valves collected from the type locality.

Remarks: The holotype specimen lot consisted of 2 left valves and 1 articulated specimen. As the articulated specimen matched the original holotype illustration the 2 left valves were combined with the existing paratype specimen, MA72421.

Current name: *Ledella clifdenensis* Powell, 1935 – Beu & Maxwell (1990: 393).

***Ledella finlayi* Powell, 1935**

Powell, A.W.B., 1935. New Recent and Tertiary Nuculanidae from New Zealand. *Proceedings of the Malacological Society* 21(4): 252–255 [254], pl. 27, figs 5, 6 (holotype).

Holotype: MA70391, left valve collected from 137m (75 fathoms) water depth off North Cape, Northland, New Zealand.

Paratypes: MA72435, 7 right valves and 4 left valves collected from the type locality.

Current name: *Ledella finlayi* Powell, 1935 – Spencer *et al.* (2016).

***Nuculana (Jupiteria) manawatawhia* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [164], pl. 45, fig. 9 (holotype).

Paratypes: MA71876, 3 worn right valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Jupiteria manawatawhia* (Powell, 1937) – Powell (1979: 359); Spencer *et al.* (2016).

†*Nuculana (Saccella) motutaraensis* Powell, 1935

Powell, A.W.B., 1935. Tertiary Mollusca from Motutara, west coast, Auckland. *Records of the Auckland Institute and Museum* 1(6): 327–340 [330], pl. 76, fig. 1 (holotype).

Holotype: MA72107, left valve collected from large fallen blocks of Early Miocene (Altonian) Nihotupu Formation, southern end of Maori Bay, south of Muriwai Beach, west Auckland, New Zealand.

Paratypes: MA71385, 2 right valves and 1 left valve collected from the type locality.

Current name: *Saccella motutaraensis* (Powell, 1935) – Maxwell in: Spencer *et al.* (2009: 234); Beu & Maxwell (1990: 393).

†*Nuculana (Saccella) waihiana* Powell, 1931

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [91, 92], pl. 11, fig. 15 (holotype).

Holotype: MA70556, right valve with damaged ventral margin collected by A.W.B. Powell in January 1931 from Late Pliocene (Waipipian) Tangahoe Formation, on the coast near the mouth of Waihi Stream, Hawera, New Zealand.

Paratypes: MA71645, 2 damaged left valves from the type locality.

Current name: *Saccella waihiana* (Powell, 1931) – Maxwell in: Spencer *et al.* (2009: 234); Beu & Maxwell (1990: 393).

Poroleda pertubata Iredale, 1924

Iredale, T., 1924. Results from Roy Bell's molluscan collections. *Proceedings of the Linnean Society of New South Wales* 49(3): 179–278 [185, 186], not figured.

Holotype: MA72961, Figure 4 e, f, right valve dredged by C. Hedley from 200m (110 fathoms) east of Great Barrier Island, New Zealand.

Remarks: The label, in A.W.B. Powell's script, states that it is figured in Hedley (1906, p. 71, pl. 2, fig. 7) as *Poroleda lanceolata* (Hutton, 1885). Either the specimen has been damaged along the ventral and posterior margins since the illustration or Hedley's illustration is a composite of a number of specimens. *P. lanceolata* was originally described by Hutton from a fossil specimen.

Current name: *Poroleda lanceolata* (Hutton, 1885) – Powell (1979: 362); Spencer *et al.* (2016).

YOLDIIDAE

†*Nuculana (Jupiteria) taioma* Finlay & Marwick, 1937

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [16, 17], pl. 1, fig. 3 (holotype), figs 1, 6 (paratype).

Paratypes: MA72862, 2 right valves and 1 left valve all embedded in rock from the Early Paleocene (Lower Teurian) at Boulder Hill, near Dunedin, Otago, New Zealand.

Current name: *Ledina taioma* (Finlay & Marwick, 1937) – Maxwell in: Spencer *et al.* (2009: 234); Beu & Maxwell (1990: 393).

†*Ovaleda ardgowanica* Powell, 1935

Powell, A.W.B., 1935. New Recent and Tertiary Nuculanidae from New Zealand. *Proceedings of the Malacological Society* 21(4): 252–255 [253], pl. 27, figs 3, 4 (holotype).

Holotype: MA70580, left valve collected by A.W.B. Powell from the Early Miocene (Altonian) of the Mount Harris Formation at Ardgowan near Oamaru, Otago, New Zealand.

Paratype: MA71398, left valve from the type locality.

Current name: *Yoldiella ardgowanica* (Powell, 1935) – Maxwell in: Spencer *et al.* (2009: 234); Beu & Maxwell (1990: 393).

Ovaleda hamiltoni Powell, 1935

Powell, A.W.B., 1935. New Recent and Tertiary Nuculanidae from New Zealand. *Proceedings of the Malacological Society* 21(4): 252–255 [252, 253] pl. 27, figs 1, 2 (holotype).

Holotype: MA72110, left valve presumed to have been collected by Captain Fairchild from 366m (200 fathoms) off Five Fingers Peninsula, Resolution Island, Fiordland, New Zealand.

Current name: *Yoldiella hamiltoni* (Powell, 1935) – Spencer *et al.* (2016).

MALLETIIDAE (=NEILONELLIDAE)

Austrotindaria benthicola Dell, 1956

Dell, R.K., 1956. *The archibenthal Mollusca of New Zealand*. Dominion Museum Bulletin 18, 235 pp. [13, 14], pl. 2, figs 14, 15 (holotype).

Paratype: MA72743, left valve dredged from the type locality, Station 41, Chatham Islands Expedition 1954, from 600m (330 fathoms) south east of Pitt Island, Chatham Islands, New Zealand.

Current name: *Neilonella benthicola* (Dell, 1956) – Spencer *et al.* (2016).

Austrotindaria flemingi Dell, 1956

Dell, R.K., 1956. *The archibenthal Mollusca of New Zealand*. Dominion Museum Bulletin 18, 235 pp. [14], pl. 2 figs 12, 13 (holotype), fig. 16 (paratype).

Paratype: MA72757, left valve dredged from the type locality, Station 41, Chatham Islands Expedition 1954, from 600m (330 fathoms) south east of Pitt Island, Chatham Islands, New Zealand.

Current name: *Neilonella flemingi* (Dell, 1956) – Spencer *et al.* (2016).

Neilo annectens Powell, 1931

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [92], pl. 12, fig. 25 (holotype).

Holotype: MA70516, left valve embedded in siltstone, collected by A.W.B. Powell from Late Pliocene (Waipipian) Tangahoe Formation, near the mouth of Waihi Stream, Hawera, New Zealand.

Remarks: the species is found from the Early Pliocene (Opoitian) through to the Recent.

Current name: *Neilo annectens* Powell, 1931 – Spencer *et al.* (2016).

†*Neilo awamoana* Finlay, 1926

Finlay, H.J., 1926. New shells from New Zealand Tertiary beds: part 2. *Transactions and Proceedings of the New Zealand Institute* 56: 227–258 [255], pl. 58, fig. 21 (holotype),

fig. 20 (paratype MA73332), fig. 22 (paratype MA71686).

Holotype: MA70517, right valve collected from the Early Miocene (Altonian) of the Mount Harris Formation at Mount Harris, Oamaru district, Otago, New Zealand.

Paratypes: MA71686, left valve collected from the Early Miocene (Altonian) of the Mount Harris Formation at Devils Bridge near Oamaru, Otago, New Zealand; MA73332, right valve collected from the Early Miocene (Altonian) of the Mount Harris Formation at Ardgowan near Oamaru, Otago, New Zealand.

Current name: *Neilo awamoana* Finlay, 1926 – Maxwell in: Spencer *et al.* (2009: 234); Beu & Maxwell (1990: 393).

†*Neilo sinangula* Finlay, 1926

Finlay, H.J., 1926. New shells from New Zealand Tertiary beds: part 2. *Transactions and Proceedings of the New Zealand Institute* 56: 227–258 [256], pl. 58, fig. 19 (holotype).

Holotype: MA70518, right valve from the Late Oligocene (Duntroonian) Wharekuri Greensand at Wharekuri, Otago, New Zealand.

Current name: *Neilo sinangula* Finlay, 1926 – Maxwell in: Spencer *et al.* (2009: 234); Beu & Maxwell (1990: 393).

Subclass AUTOBRANCHIA

Order MYTILIDA

MYTILIDAE

Aulacomya ater regia Powell, 1957

Powell, A.W.B., 1957. Mollusca of Kerguelen and Macquarie Islands. *Reports of the British Australian New Zealand Antarctic Research Expedition 1929-1931, series B, Zoology and Botany* 6: 109–149 [120], pl. 2, figs. 1, 2 (holotype).

Paratypes: MA71952, 2 articulated specimens, from station 52, British Australian New Zealand Antarctic Research Expedition, in 20–30m, Bras Bolinder, near the head of Greenland Harbour, Kerguelen Island, District of the French Southern and Antarctic Lands.

Remarks: In the list of Recorded Species, p. 111 Powell (1957) recorded the name as *Aulacomya magellanica regia* n. subsp. However, on p. 120 Powell used the name *Aulacomya ater regia* n. subsp.

Current name: *Aulacomya regia* Powell, 1957 – Huber (2013a).

Mytilus aoteanus Powell, 1958

Powell, A.W.B., 1958. New Zealand molluscan systematics with descriptions of new species, part 3. *Records of the Auckland Institute and Museum* 5(1 & 2): 87–91 [87, 88], text figs 2, 4, pl. 12, fig. 5 (holotype).

Holotype: MA71237, articulated specimen, collected from Rona Bay, Wellington Harbour, Wellington, New Zealand.

Current name: *Mytilus galloprovincialis* Lamarck, 1819 – Spencer *et al.* (2016).

†*Mytilus tetleyi* Powell & Bartrum, 1929

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [399, 400], pl. 49, fig. 103 (holotype), pl. 40, figs 46, 47 (paratypes).

Holotype: MA72103, 1 largely intact left valve, from the Early Miocene (Otaian) Tipakuri Formation of ‘Double U Bay’, approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Paratypes: MA73335, 2 anterior fragments from right valves, from the type locality.

Remarks: The 2 specimens in MA73335 were found in the box with the holotype and are here assumed to have paratype status. Powell & Bartrum (1929) illustrated two paratypes (figs 46, 47) which were lodged with Auckland University (L2635, fig. 46; L2633, fig. 47), along with a third unfigured paratype (L2635). They discussed the internal ligament area with particular regard to paratypes, consistent with the features shown by one of the fragments of MA73335. Only 1 of the Auckland University specimens shows these features and as there is direct reference in the text to more than 1 paratype with these, it has to be assumed that Auckland Museum’s fragment is a paratype. It is therefore also assumed that the second fragment was part of the type series and is therefore treated as a paratype.

Current name: *Perna tetleyi* (Powell & Bartrum, 1929) – Maxwell in: Spencer *et al.* (2009: 234).

†*Trichomusculus lornensis* Laws, 1932

Laws, C.R., 1932. New Tertiary Mollusca from New Zealand. No. 2. *Transactions and Proceedings of the New Zealand Institute* 62: 183–202 [183], pl. 32, fig. 41 (holotype).

Holotype: MA70770, a left valve collected by C.R. Laws from a fallen block of Late Eocene (Kaiatan-Runangan) Waiareka Volcanics, hillside near the disused Lorne railway station, Waiareka Valley, inland from Oamaru, New Zealand.

Current name: *Trichomusculus lornensis* Laws, 1932 – Maxwell in: Spencer *et al.* (2009: 234).

Order ARCIDA

ARCIDAE

Acar sandersonae Powell, 1933

Powell, A.W.B., 1933. New pelecypod Mollusca from northern New Zealand. *Proceedings of the Malacological Society* 20(4): 199–206 [200], pl. 17, figs 6, 7 (holotype), fig. 8 (paratype).

Holotype: MA70003, articulated specimen collected by Mrs F.W. Sanderson, from west of Taupo Bay, Whangaroa, Northland, New Zealand.

Paratype: MA71435, articulated specimen from the type locality.

Current name: *Acar sandersonae* Powell, 1933 – Spencer *et al.* (2016).

***Arca sociella* Brookes, 1926**

Brookes, A.E., 1926. New Species of Recent Mollusca. *Transactions and Proceedings of the New Zealand Institute* 56: 588–590 [590], pl. 102, figs 4, 4a.

Holotype: MA71290, collected by A.E. Brookes near Russell, Bay of Islands, New Zealand.

Paratypes: MA73329, 5 articulated specimens collected by A.E. Brookes from the Bay of Islands, New Zealand, no further details available.

Current name: *Acar sociella* (Brookes, 1926) – Powell (1979: 364); Spencer *et al.* (2016).

†*Barbatia awamoana* Finlay, 1930

Finlay, H.J., 1930. New shells from New Zealand Tertiary Beds. Part 3. *Transactions and Proceedings of the New Zealand Institute* 61: 49–84 [49], pl. 5, figs. 63 (holotype), 64, 65 (paratypes).

Holotype: MA70093, right valve, collected from the Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Oamaru, Otago, New Zealand.

Paratypes: MA72441, 6 right valves, 12 unrelated left valves, of varying sizes and preservation, from the type locality.

Current name: *Barbatia awamoana* Finlay, 1930 – Maxwell in: Spencer *et al.* (2009: 234).

†*Bentharca waitakerensis* Eagle, 2000

Eagle, M.K., 2000. Six new fossil bivalves from the Early Miocene of Auckland and Northland, New Zealand. *Records of the Auckland Museum* 36: 141–168 [147–150], figs 5, 6 (holotype), figs 7, 8 (paratypes), figs 9, 12.

Paratype: MA72301, left valve collected by M.K. Eagle from Early Miocene (Altonian) Nihotupu Formation, Shaw Road quarry, Oratia, Auckland, New Zealand.

Remarks: In Eagle (2000) the species name is variously spelled *Bentharca waitakarensis* or *Bentharca waitakerensis*. The description states that the species is named after the Waitakere Ranges (p. 148) and therefore the spelling *waitakerensis* is adopted here as the correct one.

Current name: *Bentharca waitakerensis* Eagle, 2000 – Maxwell in: Spencer *et al.* (2009: 234).

CUCULLAEIDAE**†*Cucullaea (Cucullastis) barbara* Finlay & Marwick, 1937**

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [20, 21], pl. 1, figs 15, 16 (holotype), figs 11, 14 (paratype).

Holotype: MA70224, left valve, from the Early Paleocene (Lower Teurian) of Boulder Hill, near Dunedin, Otago, New Zealand.

Paratype: MA73093, left valve from the type locality (illustrated in Beu & Maxwell (1990), p. 78, fig. 1a,c).

Remarks: Also the type for the genus.

Current name: *Cucullaea (Cucullastis) barbara* Finlay & Marwick, 1937 – Beu & Raine (2009).

†*Cucullaea (Cucullona) inarata* Finlay & Marwick, 1937

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [20], pl. 2, figs 2, 5 (holotype), figs 3, 4 (paratype).

Holotype: MA73355, left valve, from the Early Paleocene (Lower Teurian) of Boulder Hill, near Dunedin, Otago, New Zealand.

Paratype: MA73356, right valve from the type locality.

Current name: *Cucullaea (Cucullona) inarata* Finlay & Marwick, 1937 – Beu & Raine (2009).

GLYCYMERIDIDAE**†*Glycymeris marshalli* Laws, 1930**

Laws, C.R., 1930. New Tertiary Mollusca from New Zealand. No. 1. *Transactions and Proceedings of the New Zealand Institute* 61: 547–553 [547], pl. 91, figs 13, 14 (holotype).

Holotype: MA70347, right valve, collected from the Late Oligocene (Duntroonian) Chatton Shellbed, Shell Gully, Chatton, Southland, New Zealand.

Current name: *Glycymeris (Glycymeris) marshalli* Laws, 1930 – Maxwell in: Spencer *et al.* (2009: 234).

†*Glycymeris (Grandaxinea) aucklandica* Powell, 1938

Powell, A.W.B., 1938. Tertiary molluscan faunules from the Waitemata Beds. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 362–379 [364, 365], pl. 38, fig. 9 (holotype).

Holotype: MA70346: left valve with part of the postero-dorsal margin broken away, collected by A.W.B. Powell from the Early Miocene (Otaian) Tipakuri Formation at ‘Fossil Bay’ just south of Church Bay (sometimes known as Squadron Bay), Waiheke Island, Auckland, New Zealand.

Paratypes: MA73113, 2 damaged left (?) valves from the type locality.

Current name: *Tucetona aucklandica* (Powell, 1938) – Maxwell in: Spencer *et al.* (2009: 235).

†*Glycymeris (Grandaxinea) wairarapaensis* Powell, 1938

Powell, A.W.B., 1938. A Pliocene molluscan faunule from Castle Point. *Records of the Auckland Institute and Museum* 2(3): 157–164 [158, 159], pl. 39, fig. 2 (holotype and paratype left valve).

Holotype: MA70348, right valve collected by A.W.B. Powell from the Early Pleistocene (Nukumarian) Castlepoint Formation at the lighthouse reef, Castlepoint, Wairarapa, New Zealand.

Paratypes: MA72418, 1 articulated specimen, 3 right valves, 6 left valves, from the type locality.

Current name: *Tucetona wairarapaensis* (Powell, 1938) – Maxwell in: Spencer *et al.* (2009: 235).

LIMOPSIDAE

†*Limopsis campa* Allan, 1926

Allan, R.S., 1926. Fossil Mollusca from Waihao Greensands. *Transactions and Proceedings of the New Zealand Institute* 56: 338-346 [345, 346], text figure p. 346 (holotype).

Holotype: MA70397, articulated specimen from Middle Eocene (Bortonian) Waihao Greensand, Waihao Downs, Canterbury, New Zealand.

Current name: *Limopsis campa* Allan, 1926 – Maxwell in: Spencer *et al.* (2009: 234).

†*Limopsis lawsi* King, 1933

King, L.C., 1933. Tertiary molluscan faunas from the southern Wairarapa. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 334–354 [353], pl. 37, figs 18, 19 (holotype).

Paratypes: MA73197, 1 articulated specimen and 1 right valve attached to the right valve of the articulated specimen, collected from the Late Miocene (Tongaporutuan) Hurupi Formation, Hurupi Creek, Palliser Bay, New Zealand.

Current name: *Limopsis lawsi* King, 1933 – Maxwell in: Spencer *et al.* (2009: 234).

†*Limopsis marwicki* Powell, 1938

Powell, A.W.B., 1938. A Pliocene molluscan faunule from Castle Point. *Records of the Auckland Institute and Museum* 2(3): 157–164 [159, 160], pl. 39, figs 3, 4, 5.

Holotype: MA70398, right valve, collected by A.W.B. Powell from the Early Pleistocene (Nukumaruian) Castlepoint Formation at the lighthouse reef, Castlepoint, Wairarapa, New Zealand.

Paratypes: MA71442, 3 right valves, 2 unrelated left valves, from the type locality.

Current name: *Limopsis marwicki* Powell, 1938 – Maxwell in: Spencer *et al.* (2009: 234).

†*Limopsis producta* Finlay & McDowall, 1923

Finlay, H.J. and F.H. McDowall, 1923: Fossiliferous Limestone at Dowling Bay. *Transactions and Proceedings of the New Zealand Institute* 54: 106–114 [112, 113], text fig. 1.

Holotype: MA70399, right valve from the Middle Miocene (Waiauian) of the Dowling Bay Limestone, Dunedin, Otago, New Zealand.

Current name: *Limopsis producta* Finlay & McDowall, 1923 – Maxwell in: Spencer *et al.* (2009: 234).

†*Limopsis waihaoensis* Allan, 1926

Allan, R.S., 1926. Fossil Mollusca from Waihao Greensands. *Transactions and Proceedings of the New Zealand Institute* 56: 338-346 [346], pl. 77, figs 8a, 8b (holotype).

Holotype: MA70400, articulated specimen, collected by R.S. Allan from Middle Eocene (Bortonian) Waihao Greensand, McCulloch's Bridge, Waihao, Canterbury, New Zealand.

Paratypes: MA73117, 3 articulated specimens, 12 right valves and 17 left valves, from the type locality.

Remarks: right valve of holotype is articulated, but the left valve has been broken and repaired since the original type illustration.

Current name: *Limopsis waihaoensis* Allan, 1926 – Maxwell in: Spencer *et al.* (2009: 234).

†*Limopsis (Limopsista) microps* Finlay & Marwick, 1937

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [24, 25], pl. 1, fig. 13 (holotype), fig. 12 (paratype).

Paratypes: MA72863, 2 left valves from the Early Paleocene (Lower Teurian) Wangaloa Formation, coast between Mitchells Rocks and Measly Beach, near Wangaloa, Otago, New Zealand.

Current name: *Limopsista microps* (Finlay & Marwick, 1937) – Maxwell in: Spencer *et al.* (2009: 234).

PHILOBRYIDAE

Aupouria parvula Powell, 1937

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [165], pl. 45, fig. 1 (holotype).

Paratypes: MA71877, 6 right valves, 14 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Remarks: Also the type for the genus.

Current name: *Aupouria parvula* Powell, 1937 – Spencer *et al.* (2016).

†*Cosa kaawaensis* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [48], pl. 9, figs 9, 12, 16 (holotype).

Syntypes: MA70207, unrelated right and left valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, Waikato, New Zealand.

Paratypes: MA72687, 10 right valves and 11 left valves from the type locality.

Remarks: Laws (1936) gave the dimensions of the holotype as dorso-ventral, 2.1mm; antero-posterior, 1.6mm, which is correct for the left valve. The right valve is much smaller, but figured as holotype in figs 9 and 12.

Current name: *Cosa kaawaensis* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 235).

Cosa laevicostata Powell, 1933

Powell, A.W.B., 1933. New pelecypod Mollusca from northern New Zealand. *Proceedings of the Malacological Society* 20(4): 199–206 [200, 201], pl. 18, figs 3, 4 (holotype).

Holotype: MA70208, a right valve collected in February 1932 from shell sand by A.W.B. Powell, from Takapaukura, Tom Bowling Bay, Northland, New Zealand.

Paratypes: MA71428, 2 articulated specimens, 27 right valves, 23 left valves, from the type locality.

Current name: *Cosa laevicostata* Powell, 1933 – Spencer *et al.* (2016).

***Cosa serratocostata* Powell, 1933**

Powell, A.W.B., 1933. New pelecypod Mollusca from northern New Zealand. *Proceedings of the Malacological Society* 20(4): 199–206 [201, 202], pl. 18, figs 1, 2 (holotype).

Holotype: MA70209, a left valve collected in February 1932 from shell sand by A.W.B. Powell, from Takapaukura, Tom Bowling Bay, Northland, New Zealand.

Paratypes: (15) MA72419, 10 right valves, 6 left valves, from the type locality.

Current name: *Cosa serratocostata* Powell, 1933 – Spencer *et al.* (2016).

***Cosa serratocostata dispar* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [165, 166], pl. 45, fig. 7 (holotype).

Paratypes: MA71879, 5 right valves, 4 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Cosa dispar* Powell, 1937 – Spencer *et al.* (2016).

†*Cosa wanganuica* Finlay, 1930

Finlay, H.J., 1930. New shells from New Zealand Tertiary Beds. Part 3. *Transactions and Proceedings of the New Zealand Institute* 61: 49–84 [49], pl. 5, fig. 75 (holotype), figs 76, 77 (paratypes MA72453).

Holotype: MA70210, left valve, collected from Pleistocene (Castlecliffian) sediments, Castlecliff, Whanganui, New Zealand.

Paratypes: MA72442, 79 right valves, 97 left valves; MA72453, 2 right valves, from the type locality.

Current name: *Cosa wanganuica* Finlay, 1930 – Maxwell in: Spencer *et al.* (2009: 235).

***Cratis delicatula* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [166, 167], pl. 45, fig. 3 (holotype).

Paratypes: MA71880, 21 right valves, 14 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Cratis delicatula* Powell, 1937 – Spencer *et al.* (2016).

†*Cratis miocenica* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [49], pl. 10, figs 18, 20 (holotype).

Holotype: MA70216, a single right valve, from the Middle Miocene (Waiuan) of the Park Bluff Sandstone,

[Finlay's bed 8 (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Remarks: Finlay's subdivision of Clifden beds 7 and 8 cannot be identified with confidence (Fleming *et al.*, 1969: 77).

Current name: *Cratis miocenica* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 235).

†*Cratis pliocenica* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [48, 49], pl. 9, figs 13, 14, 15 (holotype).

Syntypes: MA70217, unrelated right and left valve from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Remarks: Laws (1936) gave the dimensions of the holotype as height, 2.2mm; length, 2.0mm, which is correct for the right valve. The left valve is smaller, but figured as holotype in figs 13 and 14. A third specimen, a small, worn juvenile left valve, was removed from the vial and put into the general collections (MA119035).

Current name: *Cratis pliocenica* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 235).

***Cratis retiaria* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [166], pl. 45, fig. 4 (holotype).

Paratypes: MA71878, 15 right valves, 8 left valves, collected by A.W.B. Powell from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Cratis retiaria* Powell, 1937 – Spencer *et al.* (2016).

***Hochstetteria acutangula* Powell, 1935**

Powell, A.W.B., 1935. Five new species of pelecypod Mollusca from New Zealand. *Proceedings of the Malacological Society* 21(4): 255–258 [257], pl. 28, fig. 4.

Holotype: MA70358, disarticulated specimen collected from fish stomach in 1924 by Captain J. Bollons, Three Kings Islands, New Zealand.

Paratypes: MA71401, articulated specimen, 3 right valves, 5 left valves, collected as for holotype.

Current name: *Philobrya acutangula* (Powell, 1935) – Spencer *et al.* (2016).

†*Hochstetteria kaawa* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [47], pl. 9, figs 10, 11 (holotype).

Holotype: MA70359, a single right valve collected by C.R. Laws from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Philobrya kaawa* (Laws, 1936) – Maxwell in: Spencer *et al.* (2009: 235).

***Hochstetteria munita* Finlay, 1930**

Finlay, H.J., 1930. Additions to the Recent molluscan fauna of New Zealand. No. 3. *Transactions and Proceedings of the New Zealand Institute* 61: 222–247 [245], pl. 44, figs 29 (holotype), fig. 30 (paratype).

Syntypes: MA70360, unrelated right and left valve, collected by A.W.B. Powell from under small stones in direct contact with sand, half to low tide, Tryphena, Great Barrier Island, New Zealand.

Paratypes: MA72593, 5 articulated specimens, 1 right valve, from the type locality.

Current name: *Philobrya munita* (Finlay, 1930) – Powell (1979: 367); Spencer *et al.* (2016).

***Hochstetteria pinctada* Finlay, 1930**

Finlay, H.J., 1930. Additions to the Recent molluscan fauna of New Zealand. No. 3. *Transactions and Proceedings of the New Zealand Institute* 61: 222–247 [245], pl.44, figs 22, 23 (holotype), fig. 24 (paratype).

Syntypes: MA70361, unrelated right and left valves, collected from 91m (50 fathoms), 16km (10 miles) ENE off Otago Heads, Otago, New Zealand.

Paratypes: MA72592, 1 articulated specimen, 7 right valves, 6 left valves, from the type locality.

Current name: *Philobrya pinctada* (Finlay, 1930) – Powell (1979: 367); Spencer *et al.* (2016).

†*Hochstetteria pinctagrina* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [47], pl. 9, figs 2, 3, 6 (holotype).

Syntypes: MA70362, unrelated right and left valves collected by C.R. Laws from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Philobrya pinctagrina* (Laws, 1936) – Maxwell in: Spencer *et al.* (2009: 235).

***Hochstetteria sculpturalis* Dell, 1956**

Dell, R.K., 1956. *The archibenthal Mollusca of New Zealand*. Dominion Museum Bulletin 18, 235 pp. [17, 18], pl. 3, figs 21, 22 (holotype).

Paratype: MA72742, right valve collected by R.K. Dell from 238m (130 fathoms), east of the Forty Fours, Chatham Rise, New Zealand.

Current name: *Philobrya sculpturalis* (Dell, 1956) – Spencer *et al.* (2016).

†*Hochstetteria tela* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [47], pl. 9, figs 5, 7, 8 (Syntypes).

Syntypes: MA70363, 2 right valves collected by C.R. Laws from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Remarks: Laws (1936) referred to ‘Type in writer’s collection’ on p. 47, and figures 5, 7 and 8 are captioned

holotype, but clearly show 2 different specimens.

Current name: *Philobrya tela* (Laws, 1936) – Maxwell in: Spencer *et al.* (2009: 235).

***Lissarca exilis* Suter, 1913**

Suter, H., 1913. *Manual of the New Zealand Mollusca. With an atlas of quarto plates*. Wellington, John MacKay, Government Printer, 1120 pp. [855], pl. 51, fig. 11.

Paratypes: MA72781, 23 right valves, 17 left valves, collected by Captain Bollons from 91m (50 fathoms), The Snares Islands, ~120km south west of Stewart Island, New Zealand.

Current name: *Lissarca exilis* Suter, 1913 – Spencer *et al.* (2016).

***Lissarca pileopsis* Powell, 1927**

Powell, A.W.B., 1927. Deep-water Mollusca from south-west Otago, with descriptions of 2 new genera and 22 new species. *Records of the Canterbury Museum* 3(2): 113–124 [120], pl. 22, figs 3, 4.

Paratypes: MA72348, 2 articulated specimens, 13 right valves, 5 left valves, dredged by a private scientific party in December 1908, from the steamer ‘Rakiura’ in 311m (170 fathoms) off Puysegur Point, Southland, New Zealand.

Current name: *Adacnarca pileopsis* (Powell, 1927) – Spencer *et al.* (2016).

***Lissarca pisum* Suter, 1913**

Suter, H., 1913. *Manual of the New Zealand Mollusca. With an atlas of quarto plates*. Wellington, John MacKay, Government Printer, 1120 pp. [855, 856], pl. 51, fig. 12.

Paratypes: MA72785, 5 right valves, 8 left valves, collected by Captain Bollons from 91m (50 fathoms), The Bounty Islands, ~650km south south east of Dunedin, New Zealand.

Current name: *Lissarca pisum* Suter, 1913 – Spencer *et al.* (2016).

***Lissarca stewartiana* Powell, 1935**

Powell, A.W.B., 1935. Five new species of pelecypod Mollusca from New Zealand. *Proceedings of the Malacological Society* 21(4): 255–258 [255], pl. 28, fig. 3.

Holotype: MA70414, left valve, collected by Mrs R.H. Harrison from shell sand from Mason Bay, Stewart Island, New Zealand.

Paratype: MA71399, right valve, from the type locality.

Current name: *Lissarca stewartiana* Powell, 1935 – Spencer *et al.* (2016).

†*Verticipronus stirps* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [52], pl. 10, figs 25, 26 (holotype).

Holotype: MA70837, a single left valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Verticipronus stirps* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 235).

Order PTERIIDA
PTERIIDAE

†*Electroma intecta* **Finlay & Marwick, 1937**

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [25], pl. 1, figs 2, 8 (holotype), fig. 7 (paratype).

Holotype: MA73346, left valve, from the Early Paleocene (Lower Teurian) of Boulder Hill, near Dunedin, Otago, New Zealand.

Current name: *Electroma intecta* Finlay & Marwick, 1937 – Maxwell in: Spencer *et al.* (2009: 235).

†*Isognomon oneroaensis* **Powell & Bartrum, 1929**

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [400, 401], pl. 49, fig. 106 (holotype); pl. 44, fig. 69 (paratype).

Holotype: MA72072, a right valve with damaged and eroded hinge collected from the Early Miocene (Otaian) Tipakuri Formation of ‘Double U Bay’, approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Remarks: Powell (1938) wrote that the finding of subsequent material showed that the holotype and paratype of *Isognomon oneroaensis* were in fact not the same species. While the paratype was indeed an *Isognomon*, the holotype was considered to belong to the genus *Pteria* (see *Pteria oneroaensis* below). The figured paratype specimen was indicated as *Isognomon* n.sp. and was considered too fragmentary to name.

Current name: *Pteria oneroaensis* (Powell & Bartrum, 1929) – Maxwell in: Spencer *et al.* (2009: 235).

†*Pteria oneroaensis* (**Powell & Bartrum, 1929**)

Powell, A.W.B., 1938. Tertiary molluscan faunules from the Waitemata Beds. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 362–379 [365, 366], pl. 38, fig. 4 (neotype).

Neotype: MA70645, right valve, collected by C.A. Fleming from the Early Miocene (Otaian) Tipakuri Formation at ‘Fossil Bay’ just south of Church Bay (sometimes known as Squadron Bay), Waiheke Island, Auckland, New Zealand.

Remarks: Specimens found after 1929 showed that the holotype and paratype of *Isognomon oneroaensis* Powell & Bartrum, 1929 were in fact two separate species. While the paratype was indeed an *Isognomon*, the holotype was considered to belong to the genus *Pteria*. Therefore, Powell (1938) selected a better preserved specimen (MA70645) to be the neotype of *Pteria oneroaensis* (Powell & Bartrum, 1929) and included a further description for the species.

Current name: *Pteria oneroaensis* (Powell & Bartrum, 1929) – Maxwell in: Spencer *et al.* (2009: 235).

Order OSTREIDA
GRYPHAEIDAE

†*Ostrea (Gigantostrea) gittosina* **Powell & Bartrum 1929**

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [401, 402], pl. 43, fig. 65 (holotype), fig. 64 (paratype).

Holotype: MA72109, from the Early Miocene (Otaian) Tipakuri Formation of ‘Double U Bay’, approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Paratype: MA71691, right valve from the type locality.

Remarks: The type material was compared with topotype specimens collected by Auckland Museum staff from Te Hara Point (Te Akau), Auckland Museum specimens from basal Waitemata Group sediments (Mathesons Bay and Kawau Island, e.g. Suter, 1915), and the illustrations of specimens, including the holotype, figured in Beu & Maxwell (1990) and Beu *et al.* (2012). Based on this comparison it is likely that *Crenostrea gittosina* is a junior synonym of *Pycnodonte wuellerstorfi* (Zittel 1864) (H. Grenfell pers. comm. 2015).

Current name: *Crenostrea gittosina* (Powell & Bartrum, 1929) – Maxwell in: Spencer *et al.* (2009: 235).

OSTREIDAE

Ostrea charlottae **Finlay, 1928**

Finlay, H.J., 1928. The Recent Mollusca of the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 59: 232–286 [265], pl. 40, figs 25, 26 (holotype).

Holotype: MA70578, articulated specimen, from Queen Charlotte Sound, Marlborough, New Zealand.

Current name: *Ostrea chilensis* Philippi in Küster, 1844 – Spencer *et al.* (2016).

Ostrea hefferdi **Finlay, 1928**

Finlay, H.J., 1928. The Recent Mollusca of the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 59: 232–286 [265].

Syntypes: MA70579, 2 attached specimens collected from Dunedin Harbour, Otago, New Zealand.

Current name: *Ostrea chilensis* Philippi in Küster, 1844 – Spencer *et al.* (2016).

Order PECTINIDA
DIMYIDAE

Dimya maoria **Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [168], pl. 45, fig. 2 (holotype).

Paratypes: MA71881, 15 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Dimya maoria* Powell, 1937 – Spencer *et al.* (2016).

PECTINIDAE

***Aequipecten (Corymbichlamys) iredalei* Powell, 1958**

Powell, A.W.B., 1958. Mollusca of the Kermadec Islands. Part 1. *Records of the Auckland Institute and Museum* 5(1 & 2): 65–85 [68, 69], text fig. 2; pl. 11, fig. 1 (paratype), fig. 2 (holotype).

Paratypes: MA71971, 1 right valve and 2 unrelated left valves collected on 3 March 1952 from station 675, Galathea Cruise, in 58m–64m off Raoul Island, Kermadec Islands, New Zealand.

Current name: *Annachlamys iredalei* (Powell, 1958) – Dijkstra and Marshall (2008: 47); Spencer *et al.* (2016).

†***Ambonychia hailesensis* Eagle, 1999**

Eagle, M.K., 1999. The bivalve *Ambonychia* in the Ordovician of New Zealand. *New Zealand Journal of Geology and Geophysics* 42: 557–564 [557–562], pl. 41, figs 2–7.

Holotype: MA73104, external mould of a right valve, from a float boulder from Dry Stream, Upper Takaka, northwest Nelson, New Zealand.

Paratype: MA73105, internal mould of a right valve; MA73106, external shell fragment, from the type locality.

Remarks: Eagle (1999) described the species from a float boulder which he identified as being Arthur Marble of Late Ordovician (Ashgillian) age. However, Maxwell in Spencer *et al.* (2009), p. 170, stated that ‘Based on the unwhitened specimens he figured, it is difficult to tell if the specimens belong to *Ambonychia*. *Ambonychia* has simplicicostate ribs, and Eagle’s Figure 7 shows multicostate ribs. Matrix from the boulder has subsequently yielded Paleogene foraminifers’. A further comment on p. 253 added that ‘the lithology is that of Takaka Limestone (Waitakian) (pers. comm. C. Jones, R.E. Fordyce, pers. obs.)’. The species seems to be based on a fragment of a pectinid, but the assignment to ‘*Chlamys*’ is purely pragmatic.’

Current name: ‘*Chlamys*’ *hailesensis* (Eagle, 1999) – Maxwell in Spencer *et al.* (2009: 253).

***Chlamys celator* Finlay, 1928**

Finlay, H.J., 1928. The Recent Mollusca of the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 59: 232–286 [268, 269], pl. 42, figs 49, 50 (holotype).

Holotype: MA70166, articulated specimen, Stewart Island, New Zealand.

Current name: *Talochlamys zelandiae* (Gray, 1843) – Powell (1979: 378); Spencer *et al.* (2016).

***Chlamys kiwaensis* Powell, 1933**

Powell, A.W.B., 1933. Two new Molluscs of the Pectinidae from 600 to 700 fathoms, four hundred miles west of New Plymouth. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 370–372 [371, 372], pl. 40, figs 1, 2 (paratype), figs 3–5 (holotype).

Holotype: MA70167, articulated specimen collected by W. Forster in 1931 from deep-sea cable in 1097m–1280m (600–700 fathoms) water depth, on the C.S.

“Recorder”, about 640km (400 miles) west of New Plymouth, Taranaki, New Zealand.

Paratypes: MA71422, 2 articulated specimens and 1 right valve from the type locality.

Current name: *Veprichlamys kiwaensis* (Powell, 1933) – Spencer *et al.* (2016).

***Chlamys suprasilis* Finlay, 1928**

Finlay, H.J., 1928. The Recent Mollusca of the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 59: 232–286 [269], pl. 43, figs 52, 53 (holotype).

Holotype: MA70168, live-collected specimen from ‘rubbish scraped from the bottom of a ship which had been in dock for several years’, Port Chalmers, Otago, New Zealand.

Current name: *Talochlamys zelandiae* (Gray, 1843) – Powell (1979: 378); Spencer *et al.* (2016).

***Chlamys (Mimachlamys) asperrimoides* Powell, 1958**

Powell, A.W.B., 1958. Mollusca of the Kermadec Islands. Part 1. *Records of the Auckland Institute and Museum* 5(1 & 2): 65–85 [70], text fig. 3; pl. 11, fig. 3, (holotype).

Holotype: MA71235, articulated specimen, collected in 1931 from cable in 82m–91m (45–50 fathoms) water depth by W. Forster, on the C.S. “Recorder”, south of Norfolk Island, Australia.

Paratypes: MA71906, 1 articulated specimen and 3 left valves from the type locality.

Current name: *Mimachlamys sanguinea* (Linnaeus, 1758) – Dijkstra, H. (2009).

***Chlamys (Mimachlamys) taiaroa* Powell, 1952**

Powell, A.W.B., 1952. New Zealand molluscan systematics, with descriptions of new species, part 1. *Records of the Auckland Institute and Museum* 4(3): 169–185 [169, 170], pl. 35, fig. 1 (holotype).

Holotype: MA71183, articulated specimen, trawled by Captain J. Black from 91m–128m (50–70 fathoms) off the eastern coast of Otago, New Zealand.

Paratypes: MA71437, 1 articulated specimen, 6 right valves and 3 unrelated left valves from the type locality.

Current name: *Talochlamys dichroa* (Suter, 1909) – Spencer *et al.* (2016).

†***Notovola marwicki* Finlay, 1930**

Finlay, H.J., 1930. New shells from New Zealand Tertiary Beds. Part 3. *Transactions and Proceedings of the New Zealand Institute* 61: 49–84 [52, 53], not figured.

Holotype: MA70546, Figure 6 a-d, disarticulated right and left valves of a specimen from the Pleistocene (Castlecliffian), Castlecliff, Whanganui, New Zealand.

Current name: *Pecten novaezelandiae* Reeve, 1852 – Dijkstra & Marshall (2008: 44).

†***Notovola tainui* Finlay, 1930**

Finlay, H.J., 1930. New shells from New Zealand Tertiary Beds. Part 3. *Transactions and Proceedings of the New Zealand Institute* 61: 49–84 [51, 52], pl. 4, fig. 46 (holotype), fig. 56 (paratype), pl. 6, fig. 81 (holotype).

Holotype: MA70547, articulated specimen from the Pleistocene (Castlecliffian), Castlecliff, Whanganui, New Zealand.

Current name: *Pecten novaezelandiae* Reeve, 1852 – Dijkstra & Marshall (2008: 44).

***Palliolium fosterianum* Powell, 1933**

Powell, A.W.B., 1933. Two new Molluscs of the Pectinidae from 600 to 700 fathoms, four hundred miles west of New Plymouth. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 370–372 [370, 371], pl. 40, fig. 6 (holotype), fig. 7 (paratype).

Holotype: MA70582, articulated specimen collected from deep-sea cable in 1097m–1280m (600–700 fathoms) water depth by W. Foster, off the cable steamer ‘Recorder’, about 640km (400 miles) west of New Plymouth, Taranaki, New Zealand.

Paratype: MA71427, articulated specimen from the type locality.

Current name: *Delectopecten fosterianus* (Powell, 1933) – Powell (1979: 379); Spencer *et al.* (2016).

†***Sectipecten allani* Marwick, 1928**

Marwick, J., 1928. The Tertiary Mollusca of the Chatham Islands including a generic revision of the New Zealand Pectinidae. *Transactions and Proceedings of the New Zealand Institute* 58: 432–494 [459], figs 13, 21 (holotype).

Paratype: MA72598, right valve, collected by J. Marwick in 1924 as member of an Otago Institute party from Early Pliocene (Opotian) Momoe-a-Toa Shellbed, 1.5km south west of Cape Young, Chatham Island, New Zealand.

Current name: *Sectipecten allani* Marwick, 1928 – Maxwell in: Spencer *et al.* (2009: 235).

†***Serripecten tahuiana* Laws, 1935**

Laws, C.R., 1935. New Eocene Mollusca from New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 65: 23–29 [23, 24], pl. 4, fig. 2 (holotype).

Holotype: MA70709, right valve from Middle Eocene (Bortonian) Waihao Greensand at McCulloch’s Bridge, Waihao, Canterbury, New Zealand.

Current name: *Serripecten tahuianus* Laws, 1935 – Maxwell in: Spencer *et al.* (2009: 235).

PROPEAMUSSIIDAE

***Chlamydella favus lemchei* Powell, 1958**

Powell, A.W.B., 1958. Mollusca of the Kermadec Islands. Part 1. *Records of the Auckland Institute and Museum* 5(1 & 2): 65–85 [70, 71], Pl. 9, figs 7, 8 (holotype).

Paratypes: MA71975, 50 right valves and 21 unrelated left valves, collected on 3 March, 1952 from Galathea Station 674, 29° 15’S; 177° 5’W, from 75m–85m depth off Raoul Island, Kermadec Islands, New Zealand.

Current name: *Cycloclamys lemchei* (Powell, 1958) – Dijkstra & Marshall (2008: 29); Spencer *et al.* (2016).

***Cyclopecten hexagonalis* Powell, 1958**

Powell, A.W.B., 1958. Mollusca from the Victoria-Ross Quadrants of Antarctica. *Reports of the British Australian New Zealand Antarctic Research Expedition 1929-1931, series B, Zoology and Botany* 6(9): 167–215 [176], pl. 1, fig. 3 (holotype).

Paratypes: MA71955, 1 damaged, live-collected specimen, 7 left valves, collected from the type locality, station 39, during 1929–1931 British Australian New Zealand Antarctic Research Expedition, in 300m off Enderby Land, Australian Antarctic Territory.

Current name: *Cycloclamys hexagonalis* (Powell, 1958) – Dijkstra (2010).

***Cyclopecten (Cycloclamys) aupouria* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [167], pl. 47, fig. 2 (holotype), fig. 1.

Paratypes: MA72214, 1 articulated specimen, 3 right valves, 3 entire and 3 partial left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Remarks: The specimens are not conspecific and appear to belong to three species. The articulated specimen has 2 smooth valves and belongs to *Cycloclamys mestayerae*. The 3 right valves are similarly smooth but are likely to belong to *Cyclopecten secundus* (pers. comm. B A Marshall, 2/7/15). The left valves are the only specimens that belong to *Cycloclamys aupouria*.

Current name: *Cycloclamys aupouria* (Powell, 1937) – Dijkstra & Marshall (2008: 22); Spencer *et al.* (2016).

**Order LIMIDA
LIMIDAE**

†***Ctenoides gracilissimus* Beu, 1967**

Beu, A.G., 1967. Deep-water Pliocene Mollusca from Palliser Bay, New Zealand. *Transactions of the Royal Society of New Zealand, Geology* 5(3): 89–122 [94, 95], pl. 1, fig. 2 (holotype), figs 1, 3, 4 (paratypes).

Paratype: MA72850, left valve, from an Early Pleistocene (Nukumaruan) *Lophelia* coral thicket in the Onoke Formation, about 800m east of Lake Ferry, Palliser Bay, New Zealand.

Current name: *Ctenoides gracilissimus* Beu, 1967 – Maxwell in: Spencer *et al.* (2009: 235).

***Escalima regularis* Powell, 1955**

Powell, A.W.B., 1955. Mollusca of the southern islands of New Zealand. *Cape Expedition Series Bulletin* 15, DSIR, Wellington, 151 pp. [27], not figured.

Records of the Canterbury Museum 3(1): 48, pl. 6, figs 1, 2.

Holotype: MA72204 (missing), in 180m (100 fathoms) off Lyttelton, New Zealand.

Remarks: The holotype specimen has not been sighted since at least 1993. The holotype was selected by Powell from material given to him in 1926 by Prof. Speight, curator of the Canterbury Museum. It was figured as *Lima (Mantellum) murrayi* in Powell (1926), and redescribed

but not figured by Powell (1955) as *Escalima regularis*. Two further specimen lots from the original Speight material (MA14842 and MA64263) are in the AWMM general collections.

Current name: *Escalima regularis* Powell, 1955 – Spencer *et al.* (2016).

***Lima marwicki* Powell, 1926**

Powell, A.W.B., 1926. Mollusca from 100 fathoms off Lyttelton, with descriptions of four new species, and also a new Pliocene fossil. *Records of the Canterbury Museum* 3(1): 43–50 [48, 49], pl. 6, figs 3, 4.

Paratypes: MA72339, 2 right valves collected by J. Marwick from the Pleistocene (Castlecliffian) at Castlecliff, Whanganui, New Zealand.

Remarks: Powell (1926) stated ‘*Holotype* and 4 paratypes in collection of New Zealand Geological Survey; 1 paratype (27.5 x 19 x 6.5) in writer’s collection, Auckland’. However, 2 specimens were found in the present paratype lot, both of which closely matched the measurements given by Powell for the paratype in his possession.

Current name: *Limaria orientalis* (A. Adams & Reeve, 1850) – Spencer *et al.* (2016).

***Limatula aupouria* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [168, 169], pl. 47, fig. 4 (holotype).

Paratypes: MA71882, 2 right valves, 5 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Limatula aupouria* Powell, 1937 – Spencer *et al.* (2016).

***Limatula maoria* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [454], fig. 106 (holotype), figs 104, 105 (paratypes).

Holotype: MA70396, right valve from Pleistocene (Castlecliffian) sediments, Castlecliff, Whanganui, New Zealand.

Paratypes: MA73241, unrelated right and left valve, from 108m (60 fathoms) off Otago Heads, Otago, New Zealand.

Current name: *Limatula (Stabilima) maoria* Finlay, 1926 – Powell (1979: 382); Spencer *et al.* (2016).

†*Limatula pontis* Fleming, 1978

Fleming, C.A., 1978. The bivalve mollusc Genus *Limatula*: a list of described species and a review of living and fossil species in the southwest Pacific. *Journal of the Royal Society of New Zealand* 8(1): 17–91 [55–57], fig. 27 (holotype).

Holotype: MA71352, left valve, from Late Eocene (Kaiatan) Waihao Greensand, McCulloch’s Bridge, Waihao River, Canterbury, New Zealand.

Remarks: Fleming (1978) labelled the holotype a right

valve, but MA71352, which is heavily pyritised and the same as the specimen in figure 27, is in fact a left valve.

Current name: *Limatula (Limatula) pontis* Fleming, 1978 – Maxwell in: Spencer *et al.* (2009: 235).

***Limatula powelli powelli* Fleming, 1978**

Fleming, C.A., 1978. The bivalve mollusc Genus *Limatula*: a list of described species and a review of living and fossil species in the southwest Pacific. *Journal of the Royal Society of New Zealand* 8(1): 17–91 [54], fig. 32 (holotype), figs 28, 30, 33, 34, 36, 39 (paratypes).

Paratypes: MA72720, unrelated right and left valve, from 132m water depth, Antipodes Islands, New Zealand.

Remarks: Though not labelled as paratypes, Fleming stated that paratypes from subantarctic localities were lodged with AWMM. As these are the only specimens of *L. powelli powelli* in AWMM’s collections they are assumed to be the type material.

Current name: *Limatula powelli* Fleming, 1978 – Spencer *et al.* (2016).

†*Limatula (Limatuleta) japonica waitahana* Fleming, 1978

Fleming, C.A., 1978. The bivalve mollusc Genus *Limatula*: a list of described species and a review of living and fossil species in the southwest Pacific. *Journal of the Royal Society of New Zealand* 8(1): 17–91 [78, 79], fig. 87 (holotype), fig. 86 (paratype).

Paratype: MA73202, right valve, from Late Eocene (Kaiatan-Runangan) Waiareka Volcanics at the type locality near the disused Lorne railway station, Waiareka Valley, inland from Oamaru, New Zealand.

Current name: *Limatula (Limatuleta) waitahana* Fleming, 1978 – Maxwell in: Spencer *et al.* (2009: 235).

Order UNIONIDA HYRIIDAE

***Echyridella onekaka* Fenwick & Marshall, 2006**

Fenwick, M.C., and B.A. Marshall, 2006. A new species of *Echyridella* from New Zealand, and recognition of *Echyridella lucasi* (Suter, 1905) (Mollusca: Bivalvia: Hyriidae). *Molluscan Research* 26: 69–76, figs 1A–D, 2A.

Paratype: MA73307, 2 disarticulated specimens, collected in 2005 from an artificial pond fed from Dogan Creek, a tributary of Onekaka River, south of Collingwood, New Zealand.

Current name: *Echyridella onekaka* Fenwick & Marshall, 2006 – Spencer *et al.* (2016).

Order LUCINIDA LUCINIDAE

†*Anodontia (Anodontia) waharoaensis* Eagle, 1992

Eagle, M.K., 1992. A new Lower Miocene species of *Anodontia* (Mollusca: Bivalvia). *Records of the Auckland Institute and Museum* 29: 103–111 [104–107], figs 2–5, 10 (holotype).

Holotype: MA72308, articulated fossil specimen from Early Miocene (Altonian) Tirikohua Formation, collected by M.K. Eagle in May 1992 from Te Waharoa Bay, south of Muriwai, Auckland, New Zealand.

Paratypes: MA72309, 6 fragments of internal moulds from the type locality.

Current name: *Anodontia waharoaensis* Eagle, 1992 – Maxwell in: Spencer *et al.* (2009: 236).

***Epicodakia neozelanica* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [171], pl. 46, fig. 8 (holotype).

Paratypes: MA72213, 4 right and 4 unrelated left valves, collected by A.W.B. Powell in 1932 from the type locality, station 934, R.R.S. Discovery II cruise, in 92m off the Three Kings Islands, New Zealand.

Remarks: This type material includes 1 right and 2 left valves which belong to *Bathythærus cuneatus*.

Current name: *Epicodakia neozelanica* Powell, 1937 – Spencer *et al.* (2016).

†*Eulopia (Notomyrtea) microlirata* Finlay & Marwick, 1937

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [29], pl.3, fig. 9 (holotype).

Holotype: MA70298, right valve, from the Early Paleocene (Lower Teurian) of Boulder Hill, near Dunedin, Otago, New Zealand.

Current name: *Myrtea microlirata* (Finlay & Marwick, 1937) – Maxwell in: Spencer *et al.* (2009: 236).

†*Miltha (Milthoidea) agilis* Finlay & Marwick, 1937

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [27, 28], pl.3, fig. 10 (holotype), figs 3, 6 (paratype).

Holotype: MA73358, internal mould with shell remnants, from the Early Paleocene (Lower Teurian) of Boulder Hill, near Dunedin, Otago, New Zealand.

Paratype: MA73359, left valve from the type locality.

Current name: *Miltha agilis* Finlay & Marwick, 1937 – Maxwell in: Spencer *et al.* (2009: 236).

†*Myrtea maoria* Powell, 1935

Powell, A.W.B., 1935. Tertiary Mollusca from Motutara, west coast, Auckland. *Records of the Auckland Institute and Museum* 1(6): 327–340 [330, 331], pl. 76, fig. 2 (holotype).

Holotype: MA72101, left valve collected from Early Miocene (Altonian) Nihotupu Formation, between Powell and Bartrum Bays, approximately 2km south of Muriwai Beach, west Auckland, New Zealand.

Current name: *Myrtea maoria* Powell, 1935 – Maxwell in: Spencer *et al.* (2009: 236).

†*Myrtea (Lucinoma) taylori* Powell, 1935

Powell, A.W.B., 1935. Tertiary Mollusca from Motutara, west coast, Auckland. *Records of the Auckland Institute and Museum* 1(6): 327–340 [331], pl. 76, fig. 3 (holotype).

Holotype: MA72102, articulated specimen collected from large fallen blocks of Early Miocene (Altonian) Nihotupu Formation, southern end of Maori Bay, south of Muriwai Beach, New Zealand.

Current name: *Lucinoma taylori* (Powell, 1935) – Maxwell in: Spencer *et al.* (2009: 236).

†*Pteromyrtea motutaraensis* Powell, 1935

Powell, A.W.B., 1935. Tertiary Mollusca from Motutara, west coast, Auckland. *Records of the Auckland Institute and Museum* 1(6): 327–340 [331, 332], pl. 76, fig. 4 (holotype).

Holotype: MA72123, articulated specimen collected from large fallen blocks of Early Miocene (Altonian) Nihotupu Formation, southern end of Maori Bay, south of Muriwai Beach, west Auckland, New Zealand.

Paratypes: MA71382, right valve and associated internal mould from the type locality.

Current name: *Pteromyrtea motutaraensis* Powell, 1935 – Maxwell in: Spencer *et al.* (2009: 236).

†*Pteromyrtea obesa* Finlay & Marwick, 1937

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [28], pl.3, figs 7, 8 (holotype).

Holotype: MA73345, right valve, from the Early Paleocene (Lower Teurian) of Boulder Hill, near Dunedin, Otago, New Zealand.

Current name: *Pteromyrtea obesa* Finlay & Marwick, 1937 – Maxwell in: Spencer *et al.* (2009: 236).

THYASIRIDAE

***Maorithyas flemingi* Powell, 1955**

Powell, A.W.B., 1955. Mollusca of the southern islands of New Zealand. *Cape Expedition Series Bulletin* 15, DSIR, Wellington, 151 pp. [34], pl. 1, fig. 1 (holotype).

Paratypes: MA72376, 8 right valves and 6 left valves, from 16m water depth, Cape Expedition Dredge Station No. 2, Tagua Cove, Carnley Harbour, Auckland Islands, New Zealand.

Current name: *Maorithyas flemingi* Powell, 1955 – Spencer *et al.* (2016).

†*Thyasira (Prothyasira) bartrumi* Powell, 1935

Powell, A.W.B., 1935. Tertiary Mollusca from Motutara, west coast, Auckland. *Records of the Auckland Institute and Museum* 1(6): 327–340 [332, 333], pl. 76, figs 5, 6 (holotype).

Holotype: MA72151, articulated specimen, from Early Miocene (Altonian) Nihotupu Formation, between Powell and Bartrum Bays, approximately 2km south of Muriwai Beach, west Auckland, New Zealand.

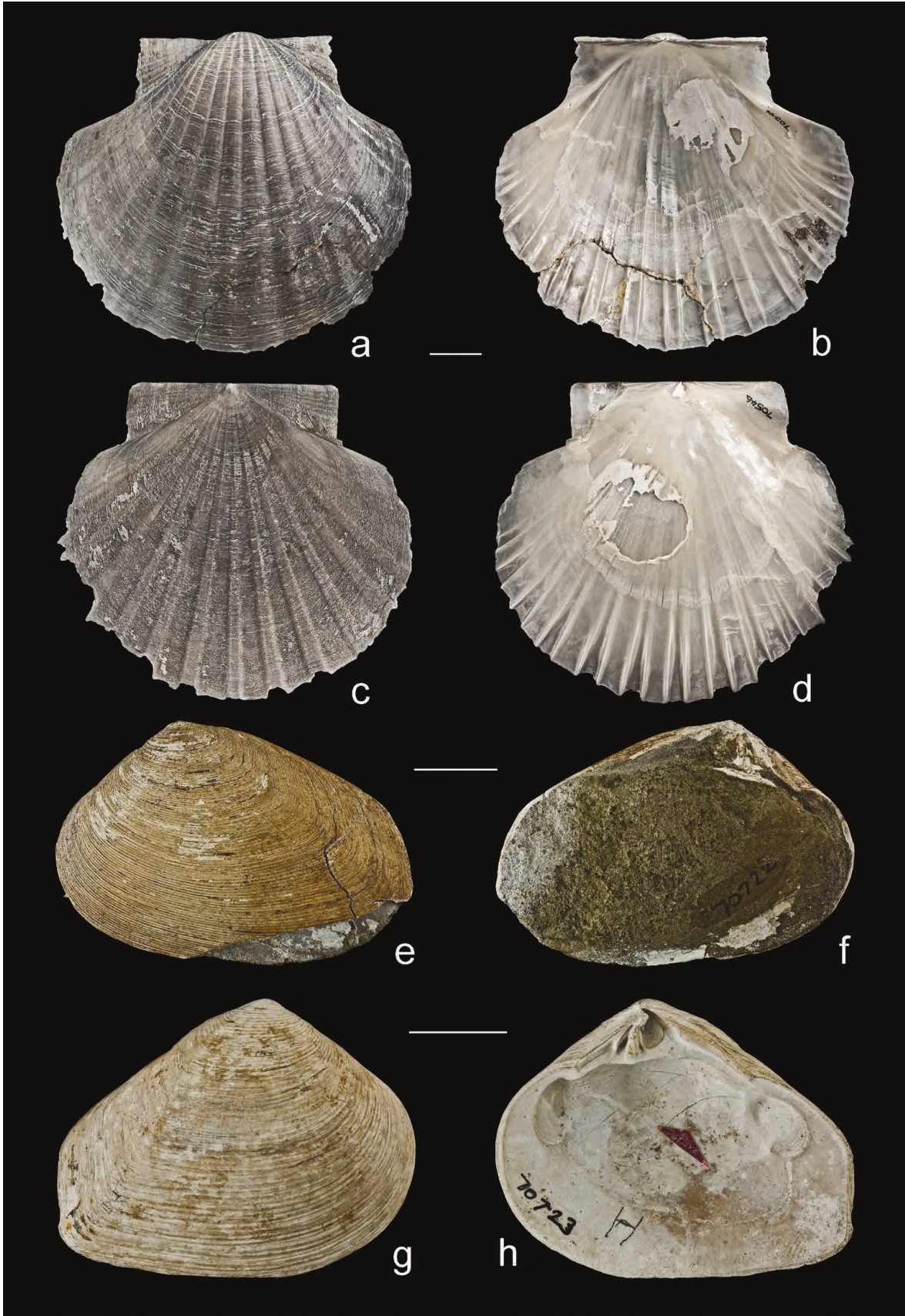


Figure 6. *Notovola marwicki* Finlay, 1930, holotype, right and left valves exterior and interior views (a-d); *Spissatella acculta* Finlay, 1926, holotype, right valve exterior and obverse views (e, f); *Spissatella clifdenensis* Finlay, 1926, holotype, left valve exterior and interior views (g, h). Scale bar 10mm.

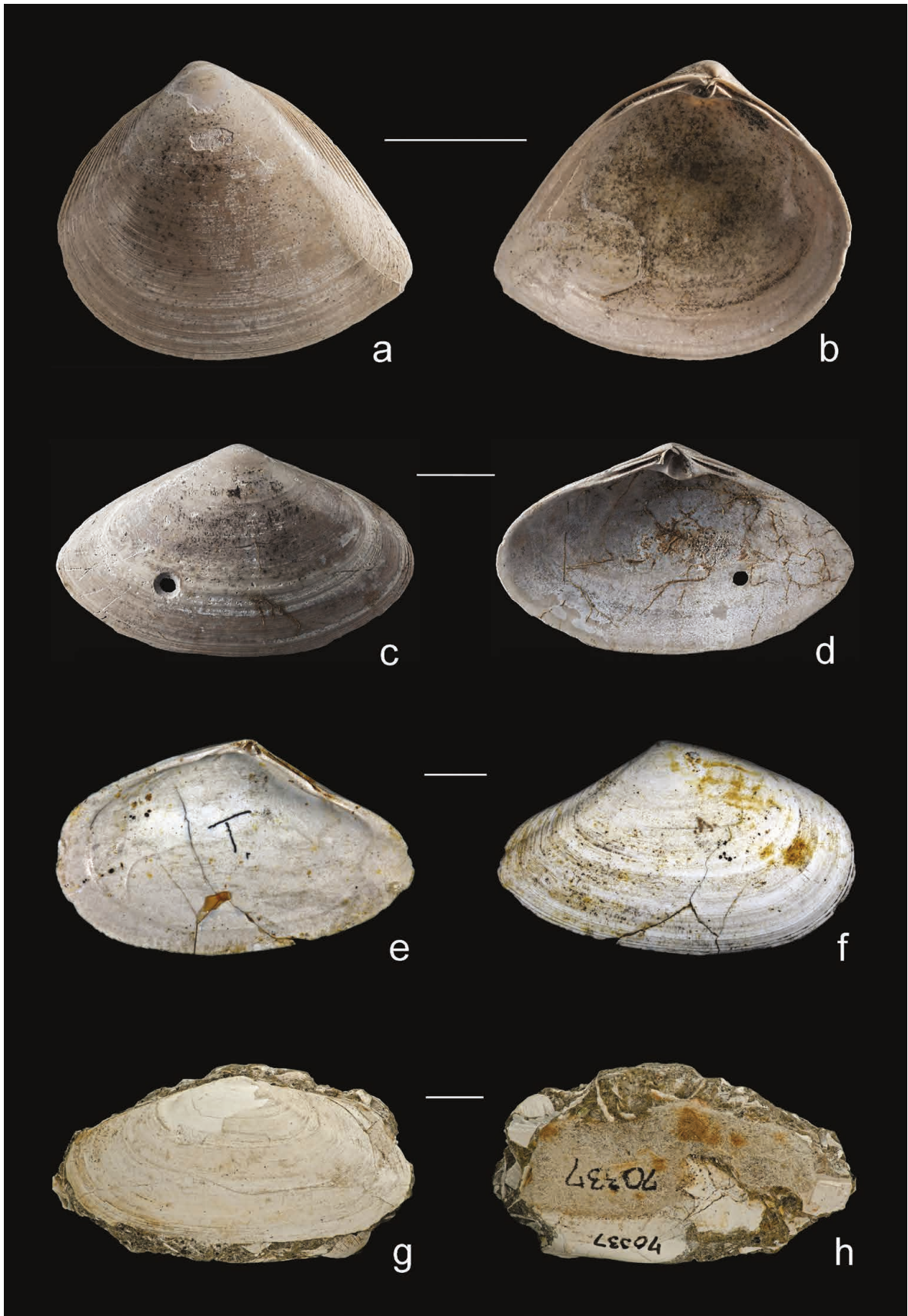


Figure 7. *Maorimactra acuminella* Finlay, 1930, holotype, left valve exterior and interior views (a, b); *Scalpomactra continua* Finlay, 1930, holotype, right valve exterior and interior views (c, d); *Angulus (Peronidia) tumens* Laws, 1933, holotype, right valve exterior and interior views (e, f); *Gari oamarutica* Finlay, 1930, holotype, left valve exterior and obverse views (g, h). Scale bar 5mm.

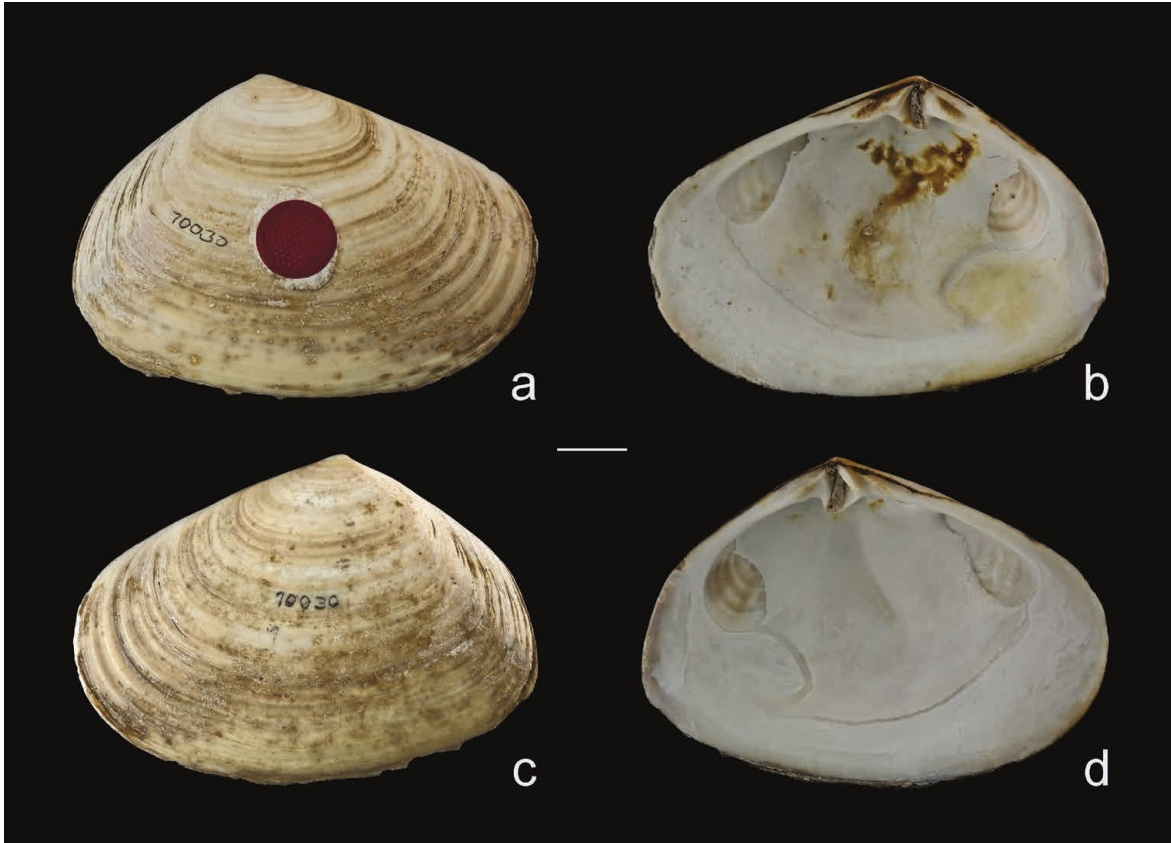


Figure 8. *Amphidesma forsteriana* Finlay, 1926, holotype, right and left valves exterior and interior views (a-d). Scale bar 10mm.

Paratypes: MA71384, 3 articulated specimens from the type locality.

Current name: *Thyasira bartrumi* Powell, 1935 – Maxwell in: Spencer *et al.* (2009: 236).

†*Thyasira (Prothyasira) motutaraensis* Powell, 1935
Powell, A.W.B., 1935. Tertiary Mollusca from Motutara, west coast, Auckland. *Records of the Auckland Institute and Museum* 1(6): 327–340 [332], pl. 76, fig. 7 (holotype).

Holotype: MA72152, articulated specimen, from Early Miocene (Altonian) Nihotupu Formation, between Powell and Bartrum Bays, approximately 2km south of Muriwai Beach, west Auckland, New Zealand.

Paratypes: MA71387, 6 articulated specimens from the type locality.

Current name: *Thyasira motutaraensis* Powell, 1935 – Maxwell in: Spencer *et al.* (2009: 237).

Order CARDITIDA CARDITIDAE

Cardita aoteana Finlay, 1926

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [459, 460], pl. 22, figs 114, 115 (holotype).

Holotype: MA70134, articulated specimen, attached to rocks at low tide level in Otago Harbour, Dunedin, New Zealand.

Paratype: MA72546, articulated specimen from the type locality.

Current name: *Cardita distorta* Reeve, 1843 – Spencer *et al.* (2016).

Cardita brookesi Finlay, 1926

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [459], pl. 22, fig. 116 (holotype), figs 117, 118 (paratype).

Holotype: MA70135, articulated specimen, collected by A.E. Brookes, from Whangaroa Harbour, Northland, New Zealand.

Paratypes: MA72545, 2 articulated specimens from the type locality.

Current name: *Powellina brookesi* (Finlay, 1926) – Huber (2010: 654).

Cuna aupouria Powell, 1937

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [169], pl. 46, figs 1, 2 (holotype).

Paratypes: MA71883, 1 articulated specimen, 11 right and 10 unrelated left valves, collected by A.W.B. Powell

in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Remarks: The unrelated valves include 1 right and 1 left valve of *Hamacuna gibbosa* (Powell, 1937).

Current name: *Hamacuna aupouria* (Powell, 1937) – Spencer *et al.* (2016).

***Cuna gibbosa* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [170], pl. 46, fig.4 (holotype).

Paratypes: MA71886, 1 articulated specimen, 4 right and 10 unrelated left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Hamacuna gibbosa* (Powell, 1937) – Spencer *et al.* (2016).

†***Cuna kaawa* Laws, 1936**

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [51], pl. 10, figs 24, 27 (holotype).

Syntypes: MA70229, unrelated right and left valves, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Paratypes: MA72689, 8 right valves, 5 left valves, from the type locality.

Current name: *Hamacuna kaawa* (Laws, 1936) – Maxwell in: Spencer *et al.* (2009: 236).

***Cuna otagoensis* Powell, 1927**

Powell, A.W.B., 1927. Deep-water Mollusca from south-west Otago, with descriptions of 2 new genera and 22 new species. *Records of the Canterbury Museum* 3(2): 113–124 [120, 121], pl. 23, figs 7, 8.

Paratypes: MA72349, 1 articulated specimen, 4 right and 7 unrelated left valves, dredged by a private scientific party in December 1908, off the steamer ‘Rakiura’ in 183m (100 fathoms) off Puysegur Point, Southland, New Zealand.

Current name: *Hamacuna otagoensis* (Powell, 1927) – Spencer *et al.* (2016).

†***Pleuromeris finlayi* Powell, 1938**

Powell, A.W.B., 1938. A Pliocene molluscan faunule from Castle Point. *Records of the Auckland Institute and Museum* 2(3): 157–164 [161, 162], pl. 39, figs 7, 8.

Holotype: MA70630, right valve, collected from the Early Pleistocene (Nukumaruian) blue clays, inner harbour, Napier, New Zealand.

Paratypes: MA71443, 9 right and 6 unrelated left valves, from the type locality; MA73091, 7 right and 8 unrelated left valves, from the type locality.

Current name: *Pleuromeris finlayi* Powell, 1938 – Maxwell in: Spencer *et al.* (2009: 236).

†***Pleuromeris hectori* Powell, 1938**

Powell, A.W.B., 1938. A Pliocene molluscan faunule from Castle Point. *Records of the Auckland Institute and Museum* 2(3): 157–164 [160, 161], pl. 39, figs 9, 10.

Holotype: MA70631, right valve, collected by A.W.B. Powell, from the Early Pleistocene (Nukumaruian) Castlepoint Formation at the lighthouse reef, Castlepoint, Wairarapa, New Zealand.

Paratypes: MA72424, 5 right and 2 unrelated left valves, from the type locality.

Current name: *Pleuromeris hectori* Powell, 1938 – Maxwell in: Spencer *et al.* (2009: 236).

***Pleuromeris latiuscula* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221, [170, 171], pl. 45, fig. 5 (holotype).

Paratypes: MA71887, 7 articulated specimens, 83 right and 89 unrelated left valves, collected by A.W.B. Powell in 1932 from the type locality, station 930, R.R.S. Discovery II cruise, in 29m off Waikuku Beach, North Cape, New Zealand.

Remarks: The paratype lot consisted of 3 vials. Two vials, one labelled as ‘Paratypes No. 1312’ and the other as ‘Paratypes. R.R.S. Discovery II. Presented’ in what is presumed to be A.W.B. Powell’s handwriting have been retained as paratypes. A third vial showed it was collected during the Discovery II cruise from station 930, but came from C. Barker’s collection in 1963. It is not labelled as paratypes and has been removed to the general collection, as MA119551.

Current name: *Pleuromeris latiuscula* Powell, 1937 – Spencer *et al.* (2016).

***Pleuromeris latiuscula benthicola* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [171], pl. 45, fig. 6 (holotype).

Paratypes: MA71888, 1 articulated specimen, 39 right and 35 unrelated left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Remarks: The paratype lot consisted of 3 vials. Only one vial contained a label marked ‘Paratypes No. 1313’ and has been retained as such. A second vial, also from station 933, was labelled as ‘AM 17345’ and ‘Presented by Discovery Committee’ in what is presumed to be A.W.B. Powell’s handwriting. Although this label lacked the word ‘paratypes’ the specimen lot has been retained with MA71888. A label with the third vial showed it was collected from Discovery II station 931. It has been removed to the general collection, as MA119552.

Current name: *Pleuromeris benthicola* Powell, 1937 – Spencer *et al.* (2016).

†***Pleuromeris murdochi* Powell, 1938**

Powell, A.W.B., 1938. A Pliocene molluscan faunule from Castle Point. *Records of the Auckland Institute and*

Museum 2(3): 157–164 [161], pl. 39, fig. 6.

Holotype: MA72117, left valve, collected by A.W.B. Powell from the Early Pleistocene (Nukumaru) Castlepoint Formation at the lighthouse reef, Castlepoint, Wairarapa, New Zealand.

Current name: *Pleuromeris murdochi* Powell, 1938 – Maxwell in: Spencer *et al.* (2009: 236).

***Pleuromeris ultima* Dell, 1956**

Dell, R.K., 1956. *The archibenthal Mollusca of New Zealand*. Dominion Museum Bulletin 18, 235 pp. [28, 29], pl. 3, figs 23, 24 (paratypes), fig. 25 (holotype).

Paratypes: MA72758, 2 left valves, collected from the type locality, station 34, Chatham Island Expedition, in 234m east of the Forty Fours, New Zealand.

Current name: *Pleuromeris ultima* Dell, 1956 – Spencer *et al.* (2016).

†***Venericardia fyfei* Finlay & Marwick, 1937**

Finlay, H.J. and J. Marwick, 1937. *The Whangaloan and associated molluscan faunas of Kaitangata-Green Island Subdivision*. New Zealand Geological Survey, Palaeontological Bulletin 15, 140 pp. [26, 27], pl. 3, figs 2, 5 (holotype), fig. 4 (paratype).

Holotype: MA70821, left valve, collected from the Early Paleocene (Lower Teurian) of Boulder Hill, near Dunedin, Otago, New Zealand.

Paratypes: MA72858, 1 right and 2 left valves, from the type locality.

Current name: *Purpurocardia* (?) *fyfei* (Finlay & Marwick, 1937) – Maxwell in: Spencer *et al.* (2009: 236, 237).

†***Venericardia lilliei* Fleming, 1943**

Fleming, C.A., 1943. Tertiary Mollusca from Dannevirke Subdivision. *Transactions of the Royal Society of New Zealand* 73: 193–208 [193, 194], pl. 28, figs 1, 2 (holotype).

Paratypes: MA73198, unrelated right and left valves, collected from the Late Pliocene (Waipipian), from NZGS location 2314, east of Takapau, southern Hawke's Bay, New Zealand.

Remarks: The type locality is given as GS2314 which is a NZGS (GNS Science) bulk fossil collection number. This corresponds to fossil record (FRED) number U23/f6362 and the grid reference for this plots on the western slope of a Te Aute Limestone ridge. However, it is not possible to resolve further the lithological unit from which the specimens were collected (Beu pers. comm. 2016).

Current name: *Purpurocardia lilliei* (Fleming, 1943) – Maxwell in: Spencer *et al.* (2009: 237).

***Venericardia reinga* Powell, 1933**

Powell, A.W.B., 1933. New pelecypod Mollusca from northern New Zealand. *Proceedings of the Malacological Society* 20(4): 199–206 [202, 203], pl. 17, figs 1, 2 (holotype), fig. 5 (paratype).

Holotype: MA70822, articulated specimen, collected by the Rev. W. H. Webster from Te Werahi Beach, south of Cape Reinga, Northland, New Zealand.

Remarks: Three paratypes are listed in the original description, but could not be identified from material held in the AWMM collections. Figure 5 is wrongly labelled as Holotype, which it does not match.

Current name: *Purpurocardia reinga* (Powell, 1933) – Spencer *et al.* (2016).

†***Venericardia (Megacardita) squadronensis* Powell, 1938**

Powell, A.W.B., 1938. Tertiary molluscan faunules from the Waitemata Beds. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 362–379 [367], pl. 38, fig. 10 (holotype), fig. 11 (paratype MA71710), fig. 12 (paratype MA71716).

Holotype: MA72162, incomplete left valve, collected by A.W.B. Powell from the Early Miocene (Otaian) Tipakuri Formation at 'Fossil Bay' just south of Church Bay (sometimes known as Squadron Bay), Waiheke Island, Auckland, New Zealand.

Paratypes: MA71709, MA71710, MA71716, all single right valves, from the type locality.

Current name: *Megacardita squadronensis* (Powell, 1938) – Maxwell in: Spencer *et al.* (2009: 236).

CONDYLOCARDIIDAE

***Benthocardiella hamatadens* Powell, 1930**

Powell, A.W.B., 1930. New species of New Zealand Mollusca from shallow-water dredgings. Part 2. *Transactions and Proceedings of the New Zealand Institute* 61: 536–546 [539, 540], text figs 7, 8, 9 (holotype).

Syntypes: MA70097, 1 articulated specimen and a right valve collected by W. La Roche in 1922 from 11–18m (6–10 fathoms), "Mangonui Heads", Doubtless Bay, New Zealand.

Paratypes: MA71458, 7 articulated specimens, 4 right and 8 left valves, from the type locality.

Remarks: All specimens in MA70097 show signs of glass disease. Powell's holotype illustrations included drawings of the interior aspect of a right and left valve, and cannot therefore be solely based on the specimens in MA70097.

Current name: *Benthocardiella hamatadens* Powell, 1930 – Spencer *et al.* (2016).

***Benthocardiella obliquata* Powell, 1930**

Powell, A.W.B., 1930. New species of New Zealand Mollusca from shallow-water dredgings. Part 2. *Transactions and Proceedings of the New Zealand Institute* 61: 536–546 [538], text figs 4, 5, 6 (holotype).

Holotype: MA70098, left valve, collected by W. La Roche in 1922 from 11–18m (6–10 fathoms), Mangonui Heads, Doubtless Bay, New Zealand.

Paratype: MA71457, 19 articulated specimens, 5 right and 3 left valves, from the type locality.

Remarks: Powell's holotype illustrations included drawings of the interior aspect of a right and left valve, and cannot therefore be solely based on the single left valve in MA70098.

Current name: *Benthocardiella obliquata obliquata* Powell, 1930 – Spencer *et al.* (2016).

***Benthocardiella obliquata bountyensis* Powell, 1933**

Powell, A.W.B., 1933. Marine Mollusca from the Bounty Islands. *Records of the Canterbury Museum* 4(1): 29–39 [33], text fig. 1.

Paratypes: MA72368, 2 right and 1 left valve, dredged by Captain J. Farchild on 1 June 1893 from the type locality, from 311m (170 fathoms) off the Bounty Islands, New Zealand.

Remarks: Showing signs of glass disease.

Current name: *Benthocardiella obliquata bountyensis* Powell, 1933 – Spencer *et al.* (2016).

***Benthocardiella obliquata chathamensis* Powell, 1933**

Powell, A.W.B., 1933. The marine Mollusca of the Chatham Islands. *Records of the Auckland Institute and Museum*, 1(4), 181–208 [190, 191], pl. 34, fig. 2 (holotype).

Holotype: MA70100, articulated specimen, collected from shell sand, Waitangi, Chatham Islands, New Zealand.

Paratype: MA71991, 2 articulated specimens and 1 right valve, from the type locality.

Remarks: Both valves of the holotype are badly damaged by glass disease, and the paratypes also show signs of this.

Current name: *Benthocardiella obliquata chathamensis* Powell, 1933 – Spencer *et al.* (2016).

***Benthocardiella orbicula* Powell, 1930**

Powell, A.W.B., 1930. New species of New Zealand Mollusca from shallow-water dredgings. Part 2. *Transactions and Proceedings of the New Zealand Institute* 61: 536–546 [538, 539], text figs 1, 2, 3 (holotype).

Holotype: MA70099, right and left valves, collected by W. La Roche in 1922 from 11–18m (6–10 fathoms) depth, Mangonui Heads, Doubtless Bay, New Zealand.

Paratype: MA71421, articulated specimen, from the type locality.

Remarks: Both valves of the holotype are damaged by glass disease.

Current name: *Benthocardiella orbicula* Powell, 1930 – Spencer *et al.* (2016).

***Benthocardiella pusilla* Powell, 1930**

Powell, A.W.B., 1930. New species of New Zealand Mollusca from shallow-water dredgings. *Transactions and Proceedings of the New Zealand Institute* 60: 532–543 [533, 534], pl. 60, fig. 4 (holotype), fig. 5 (paratypes).

Holotype: MA70101, collected by W. La Roche in 1927 from 18–22m (10–12 fathoms), off Whanganui, New Zealand.

Paratypes: MA71391, 43 articulated specimens, 3 right and 4 left valves, from the type locality.

Remarks: The holotype has been almost completely

destroyed by glass disease, and the paratypes also show some signs. Type for the genus.

Current name: *Benthocardiella pusilla* Powell, 1930 – Spencer *et al.* (2016).

***Benthocardiella rakiura* Powell, 1939**

Powell, A.W.B., 1939. The Mollusca of Stewart Island. *Records of the Auckland Institute and Museum* 2(4): 211–238 [223, 224], pl. 48, fig. 6 (holotype).

Holotype: MA70102, right and left valve, collected by A.W.B. Powell in November 1934 from beach drift, “Old Neck Beach”, presumed here to be The Neck, Paterson Inlet, Stewart Island, New Zealand.

Paratypes: MA71543, 6 articulated specimens, 13 right and 12 left valves, from the type locality.

Remarks: The holotype has been severely damaged by glass disease.

Current name: *Benthocardiella rakiura* Powell, 1939 – Spencer *et al.* (2016).

***Condylocardia mernoo* Dell, 1952**

Dell, R.K., 1952. New Marine Mollusca from the Cook Strait area and southern New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 79: 412–418 [412, 413], pl. 84, fig. 1 (holotype).

Paratypes: MA72766, 2 left valves, collected from the type locality, by the NZGS *Matai* in 1936 from 95m (52 fathoms) on the Mernoo Bank (43°21’S, 175°E), approx. 144km north east of Godley Head, Canterbury, New Zealand.

Remarks: Both valves damaged by glass disease.

Current name: *Condylocuna mernoo* (Dell, 1952) – Spencer *et al.* (2016).

***Condylocardia pectinata chathamensis* Powell, 1933**

Powell, A.W.B., 1933. The marine Mollusca of the Chatham Islands. *Records of the Auckland Institute and Museum*, 1(4), 181–208 [189, 190], pl. 33, fig. 8 (holotype).

Holotype: MA70197, right and left valve, collected by A.W.B. Powell in 1933 from shell sand, Waitangi, Chatham Islands, New Zealand.

Paratypes: MA72799, 2 articulated specimens, from the type locality.

Remarks: Both valves of the holotype are damaged by glass disease.

Current name: *Condylocardia pectinata chathamensis* Powell, 1933 – Spencer *et al.* (2016).

***Cuna compressidens* Powell, 1933**

Powell, A.W.B., 1933. On five new species of Recent New Zealand Mollusca. *Proceedings of the Malacological Society* 20(4): 194–198 [194, 195], pl. 16, fig. 1 (holotype).

Holotype: MA70226, right and left valve, collected by W. La Roche in 1922 from 11m (6 fathoms) off Mangonui, Doubtless Bay, Northland, New Zealand.

Paratypes: MA72433, 3 articulated specimens, 10 right and 10 left valves, from the type locality.

Current name: *Cuna compressidens* Powell, 1933 – Spencer *et al.* (2016).

†***Cuna crassicardo* Laws, 1936**

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [51], pl. 10, figs 21, 22 (holotype).

Holotype: MA70227, a single right valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Cuna crassicardo* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 237).

†***Cuna fictilia* Laws, 1936**

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [50, 51], pl. 10, figs 19, 23 (holotype).

Holotype: MA70228, right and left valve, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Paratypes: MA72688, 2 articulated individuals, 21 right valves, 25 left valves, from the type locality.

Current name: *Volupicuna fictilia* Laws, 1936 – Beu & Raine (2009).

***Cuna laqueus* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [459], pl. 21, fig. 92 (holotype), figs 90, 91 (paratypes).

Holotype: MA70230, right valve, collected from 91m (50 fathoms) off the Snares Islands, New Zealand.

Paratypes: MA72544, right and left valve, from the type locality.

Current name: *Cuna laqueus* Finlay, 1926 – Spencer *et al.* (2016).

***Cuna manawatawhia* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [169, 170], pl. 46, fig. 5 (holotype).

Paratypes: MA71885, 4 right and 1 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 934, R.R.S. Discovery II cruise, in 92m off the Three Kings Islands, New Zealand.

Current name: *Cuna manawatawhia* Powell, 1937 – Spencer *et al.* (2016).

***Cuna mayi* Powell, 1930**

Powell, A.W.B., 1930. New species of New Zealand Mollusca from shallow-water dredgings. *Transactions and Proceedings of the New Zealand Institute* 60: 532–543 [532, 533], pl. 60, fig. 1 (holotype), fig. 2 (paratype).

Holotype: MA70231, disarticulated right and left valves of the same specimen, collected by W. La Roche in 1927 from 18–22m (10–12 fathoms), off Whanganui, New Zealand.

Paratypes: MA71390, 9 articulated specimens, 8 right and 9 left valves; MA73390, right valve, from the type locality.

Remarks: The figured paratype was stored with the holotype, but has been removed and given a separate registration number, MA73390. The holotype was originally figured as an articulated specimen.

Current name: *Cuna mayi* Powell, 1930 – Spencer *et al.* (2016).

***Cuna mendica* Dell, 1952**

Dell, R.K., 1952. A deep water molluscan fauna from the Tasman Sea. *Dominion Museum Records in Zoology* 10: 99–107 [103], figs 8, 9 (holotype).

Paratypes: MA72768, 4 right valves, collected from *Globigerina* ooze from the type locality, Discovery II cruise, in 536m on the Lord Howe Rise, Tasman Sea.

Current name: *Cuna mendica* Dell, 1952 – Spencer *et al.* (2016).

***Cuna waikukuensis* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [169], pl. 46, fig.3 (holotype).

Paratypes: MA71884, 3 right and 2 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 930, R.R.S. Discovery II cruise, in 29m off Waikuku Beach, North Cape, New Zealand.

Remarks: Some of the valves are showing signs of glass disease.

Current name: *Cuna waikukuensis* Powell, 1937 – Spencer *et al.* (2016).

CRASSATELLIDAE

†***Crassatellites tripliciter* Laws, 1935**

Laws, C.R., 1935. New Eocene Mollusca from New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 65: 23–29 [23], pl. 4, figs 1, 1a (syntypes).

Syntypes: MA70215, articulated but damaged specimen, MA72672, slightly damaged left valve, collected from the Middle Eocene (Bortonian) Waihao Greensand at Waihao Downs, South Canterbury, New Zealand.

Remarks: MA70215 was labelled as the holotype, and lots MA72672 and MA72670 were labelled as paratypes. However, in the original description Laws wrote that ‘this species is represented by two fragmentary specimens’ which are both figured as holotype in plate 4, (MA70215 as fig.1 and MA72672 as fig. 1a). As there is no further mention of the holotype, MA70215 and MA72672 should be treated as syntypes. The additional 2 specimens in MA72670 cannot be paratypes.

Current name: *Triplicitella australis* (Hutton, 1873) – Collins *et al.* (2015: 16 – 18).

†***Eucrassatella marshalli* Powell, 1931**

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of*

the *Auckland Institute and Museum* 1(2): 85–112 [93, 94], pl. 12, figs 21, 22 (syntypes).

Syntypes: MA70287, unrelated right and left valves of very similar size, collected by A.W.B. Powell in January 1931 from Late Pliocene (Waipipian) Lower Waipipi Shellbed, Waipipi coast near Waverley, about 1.2km west of the mouth of the Wairoa Stream, New Zealand.

Current name: *Eucrassatella marshalli* Powell, 1931 – Collins *et al.* (2015: 9 – 11).

†***Spissatella acculta* Finlay, 1926**

Finlay, H.J., 1926. New shells from New Zealand Tertiary beds: part 2. *Transactions and Proceedings of the New Zealand Institute* 56: 227–258 [257], not figured.

Holotype: MA70722, Figure 6 e, f, right valve, collected from the Late Oligocene (Duntroonian) Wharekuri Greensand, Waitaki River, head of Lake Waitaki, north Otago, New Zealand.

Current name: *Spissatella acculta* Finlay, 1926 – Collins *et al.* (2015: 12, 13).

†***Spissatella clifdenensis* Finlay, 1926**

Finlay, H.J., 1926. New shells from New Zealand Tertiary beds: part 2. *Transactions and Proceedings of the New Zealand Institute* 56: 227–258 [258], not figured.

Holotype: MA70723, Figure 6 g, h, left valve, from Early Miocene (Altonian) Fouraye Siltstone, [Finlay's bed 4B (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Current name: *Spissatella clifdenensis* Finlay, 1926 – Collins *et al.* (2015: 13, 14).

†***Spissatella discrepans* Finlay, 1926**

Finlay, H.J., 1926. New shells from New Zealand Tertiary beds: part 2. *Transactions and Proceedings of the New Zealand Institute* 56: 227–258 [256, 257], pl. 59, fig. 10 (holotype).

Holotype: MA70724, left valve probably collected by J. Park from Late Oligocene – Early Miocene (Duntroonian) Bob's Cove Beds, Bob's Cove, Lake Wakatipu, South Island, New Zealand.

Current name: *Spissatella acculta* Finlay, 1926 – Collins *et al.* (2015: 12, 13).

†***Spissatella poroleda* Finlay, 1926**

Finlay, H.J., 1926. New shells from New Zealand Tertiary beds: part 2. *Transactions and Proceedings of the New Zealand Institute* 56: 227–258 [257], pl. 59, fig. 11 (holotype).

Holotype: MA70725, right valve, from Late Oligocene (Duntroonian) Chatton Formation, Chatton, Southland, New Zealand.

Current name: *Spissatella poroleda* Finlay, 1926 – Collins *et al.* (2015: 15).

†***Spissatella scopalveus* Finlay, 1926**

Finlay, H.J., 1926. New shells from New Zealand Tertiary beds: part 2. *Transactions and Proceedings of the New Zealand Institute* 56: 227–258 [258], pl. 60, fig.7 (holotype), fig.8 (paratype).

Holotype: MA70726, left valve, from the Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Mount Harris Formation, Oamaru, New Zealand.

Paratype: MA71687, right valve, from the type locality.

Current name: *Eucrassatella scopalveus* (Finlay, 1926) – Collins *et al.* (2015: 11, 12).

†***Spissatella scopalveus concisus* Finlay, 1926**

Finlay, H.J., 1926. New shells from New Zealand Tertiary beds: part 2. *Transactions and Proceedings of the New Zealand Institute* 56: 227–258 [258], pl. 59, fig. 12 (holotype).

Holotype: MA70727, right valve, from the Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Oamaru, New Zealand.

Current name: *Eucrassatella scopalveus* (Finlay, 1926) – Collins *et al.* (2015: 11, 12).

†***Talabrica nummaria* Powell, 1931**

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [109, 110], pl. 12, figs 19, 20 (holotype).

Holotype: MA70754, disarticulated specimen collected by A.W.B. Powell in January 1931 from Early Pleistocene (Nukumaruan) uppermost lens of Nukumaruan Limestone, Nukumaruan Beach, Whanganui, New Zealand.

Paratype: MA71646, disarticulated specimen from the type locality.

Current name: *Talabrica nummaria* Powell, 1931 – Maxwell in: Spencer *et al.* (2009: 237).

†***Talabrica senecta* Powell, 1931**

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [109], pl. 12, fig. 24 (holotype), fig. 23 (paratype).

Holotype: MA70755, left valve collected by A.W.B. Powell from the Early Pleistocene (Nukumaruan) Castlepoint Formation at the lighthouse reef, Castlepoint, Wairarapa, New Zealand.

Paratypes: MA71903, 5right valves, 1 left valve, from the type locality.

Current name: *Talabrica senecta* Powell, 1931 – Maxwell in: Spencer *et al.* (2009: 237).

Order VENERIDA

CARDIIDAE

†***Cardium gudexi* Laws, 1933**

Laws, C.R., 1933. New Tertiary Mollusca from Timaru District, South Canterbury, New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 315–329 [316], pl. 30, figs 7, 14 (holotype).

Holotype: MA70137, right valve, collected by Laws from the Early Miocene (Altonian) Southburn Sand, Sutherlands, Tengawai River, South Canterbury, New Zealand.

Current name: *Maoricardium gudexi* (Laws, 1933) – Maxwell in: Spencer *et al.* (2009: 237).

†***Cardium oneroaensis* Powell, 1938**

Powell, A.W.B., 1938. Tertiary molluscan faunules from the Waitemata Beds. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 362–379 [367], pl. 38, figs 7, 8 (holotype).

Holotype: MA72039, left valve, collected by A.W.B. Powell from Early Miocene (Otaian) Tipakuri Formation at ‘Fossil Bay’ just south of Church Bay (sometimes known as Squadron Bay), Waiheke, Auckland, New Zealand.

Current name: *Maoricardium oneroaense* (Powell, 1938) – Maxwell in: Spencer *et al.* (2009: 237).

†***Cardium (Trachycardium) cantuariense* Laws, 1933**

Laws, C.R., 1933. New Tertiary Mollusca from Timaru District, South Canterbury, New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 315–329 [317], pl. 29, figs 1, 4, 5 (holotype).

Holotype: MA70136, right valve collected by Laws from the Early Miocene (Altonian) Southburn Sand, Sutherlands, Tengawai River, South Canterbury, New Zealand.

Paratypes: MA72659, right valve; MA72660, left valve from the type locality.

Current name: *Hedecardium (Titanocardium) cantuariense* (Laws, 1933) – Maxwell in: Spencer *et al.* (2009: 237).

***Trachycardium (Vasticardium) sorenseni* Powell, 1958**

Powell, A.W.B., 1958. Mollusca of the Kermadec Islands. Part 1. *Records of the Auckland Institute and Museum* 5(1 & 2): 65–85 [76], pl. 11, figs 6, 7 (holotype).

Holotype: MA71236, right valve, collected during the Galathea Expedition by J. H. Sorensen, from Denham Bay, Raoul Island, Kermadec Islands, New Zealand.

Current name: *Acrosterigma sorenseni* (Powell, 1958) – Spencer *et al.* (2016).

CHAMIDAE

†***Chama (Chama) hunua* Eagle, 2000**

Eagle, M.K., 2000. Six new fossil bivalves from the Early Miocene of Auckland and Northland, New Zealand. *Records of the Auckland Museum* 36: 141–168 [154–157]: figs 20, 21 (holotype), figs 22, 23 (Paratypes).

Holotype: MA72655, right valve collected by M.K. Eagle, from the Early Miocene (Otaian) Tipakuri Formation, Hunua Road cutting, Hays Stream, Hunua Ranges, south-east Auckland, New Zealand.

Paratype: MA72656, left valve from the type locality.

Remarks: In Eagle (2000) the paratype registration is incorrectly given as MA72657.

Current name: *Chama hunua* Eagle, 2000 – Maxwell in: Spencer *et al.* (2009: 236).

CYAMIIDAE

***Costokidderia lyallensis* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [457], pl. 21, fig. 95 (holotype), figs 93, 94 (paratype).

Holotype: MA70211, a right valve, from shell sand from Lyall Bay, Wellington, New Zealand.

Paratypes: MA72543, 2 left valves, from the type locality.

Remarks: The species was not actually mentioned on p. 457 in the original Finlay (1926) paper, as a typesetting error reproduced the heading for the preceding species, *Costokidderia pedica*. *C. lyallensis* was mentioned only in the figure captions.

Current name: *Kidderia (Costokidderia) costata* Odhner, 1924 – Powell (1979: 401); Spencer *et al.* (2016).

***Costokidderia pedica* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [457], pl. 21, fig. 96 (holotype), figs 97, 98 (paratype).

Holotype: MA70212, a worn left valve, collected from 91m (50 fathoms), Snares Island, New Zealand.

Paratype: MA72542, a worn left valve, from the type locality.

Current name: *Kidderia (Costokidderia) costata* Odhner, 1924 – Powell (1979: 401); Spencer *et al.* (2016).

***Cyamium iridescens* Cooper & Preston, 1910**

Cooper, J.E. and H.B. Preston, 1910. Diagnosis of new species of marine and freshwater shells from the Falkland Islands, including descriptions of two new genera of marine Pelecypoda. *The Annals and Magazine of Natural History* (ser. 8) 5: 110–114 [112, 113], pl. 4, fig. 6.

Paratypes: MA73215, 2 articulated specimens, 1 disarticulated specimen, 1 right valve from Falkland Islands, British Overseas Territory.

Current name: *Cyamium falklandicum* Melvill & Standen, 1898 – Huber (2013b).

***Kidderia aupouria* Powell, 1933**

Powell, A.W.B., 1933. New pelecypod Mollusca from northern New Zealand. *Proceedings of the Malacological Society* 20(4): 199–206 [204, 205], pl. 18, fig. 5 (holotype).

Holotype: MA70378, a right valve collected in February 1932 from shell sand by A.W.B. Powell, from Takapaukura, Tom Bowling Bay, Northland, New Zealand.

Paratypes: MA71430, 2 articulated specimens, 9 right and 11 left valves; MA73391, right valve; from the type locality.

Remarks: MA70378 contained 2 specimens, both of which have been badly affected by glass disease. However, as one was distinctly larger than the other and approximated the length given by Powell for the holotype this is assumed to be the original holotype specimen. The second specimen has been removed and

given paratype status as MA73391. The 11 left valves in MA71430 include a left valve of *Cosa serratocostata*.

Current name: *Kidderia aupouria* Powell, 1933 – Spencer *et al.* (2016).

***Kidderia aupouria fiordlandica* Fleming, 1948**

Fleming, C.A., 1948. New species and genera of marine Mollusca from the Southland Fiords. *Transactions of the Royal Society of New Zealand* 77: 72–92 [78], pl. 6, fig. 6 (holotype).

Paratype: MA73327, 2 articulated specimens, 2 right and 6 left valves, collected in 1935 by the New Zealand Government steamer *Matai*, from 62m of water from the entrance to George Sound, Fiordland, New Zealand.

Remarks: The specimen lot was found in a separate, labelled container with MA71430, which is the paratype lot of *K. aupouria*. Both lots were labelled as subspecies (*K. aupouria fiordlandica* and *K. aupouria aupouria*). As they have since been elevated to species level, a new paratype record has been created for *K. aupouria fiordlandica*.

Current name: *Kidderia fiordlandica* Fleming, 1948 – Spencer *et al.* (2016).

***Kidderia rakiura* Powell, 1939**

Powell, A.W.B., 1939. The Mollusca of Stewart Island. *Records of the Auckland Institute and Museum* 2(4): 211–238 [223], pl. 48, fig. 1 (holotype).

Syntypes: MA70379, unrelated left and right valve, collected by Mrs R.H. Harrison, after a storm, from Ringaringa Beach, Stewart Island, New Zealand.

Current name: *Kidderia rakiura* Powell, 1939 – Spencer *et al.* (2016).

***Legrandina aucklandica* Powell, 1933**

Powell, A.W.B., 1933. New species of marine Mollusca from the subantarctic islands of New Zealand. *Proceedings of the Malacological Society* 20(5): 232–236 [233], text fig. 1 (holotype).

Paratypes: MA72363, 17 articulated specimens, 36 right valves and 19 left valves collected from beach drift by Captain J. Bollons, from Faith Harbour, Auckland Islands, New Zealand.

Current name: *Legrandina aucklandica* Powell, 1933 – Spencer *et al.* (2016).

***Legrandina harrisonae* Powell, 1935**

Powell, A.W.B., 1935. Five new species of pelecypod Mollusca from New Zealand. *Proceedings of the Malacological Society* 21(4): 255–258 [256, 257], pl. 28, fig. 2.

Holotype: MA70392, a right and left valve, collected in 1934 by Mrs R.H. Harrison from shell sand from Mason Bay, Stewart Island, New Zealand.

Paratypes: MA71409, 3 right valves and 1 unrelated left valve, from the type locality.

Remarks: Both valves of the holotype show effects of glass-disease.

Current name: *Legrandina harrisonae* Powell, 1935 – Spencer *et al.* (2016).

***Legrandina turneri* Powell, 1939**

Powell, A.W.B., 1939. The Mollusca of Stewart Island. *Records of the Auckland Institute and Museum* 2(4): 211–238 [221], pl. 48, fig. 7 (holotype).

Holotype: MA70393, left valve, collected by A.W.B. Powell in November, 1934 from “Old Neck Beach”, presumed here to be The Neck, Paterson Inlet, Stewart Island, New Zealand.

Paratypes: MA71542, 6 articulated specimens, 10 right valves and 11 unrelated left valves, from the type locality.

Remarks: The holotype shows effects of glass-disease.

Current name: *Legrandina turneri* Powell, 1939 – Spencer *et al.* (2016).

***Perrierina insulana* Powell, 1933**

Powell, A.W.B., 1933. The marine Mollusca of the Chatham Islands. *Records of the Auckland Institute and Museum*, 1(4), 181–208 [188, 189], pl. 34, fig. 1 (holotype).

Holotype: MA70614, a right and left valve, collected from clean shell sand from 18m depth off Owenga Beach, Chatham Islands, New Zealand.

Paratypes: MA71529, 5 right valves and 6 unrelated left valves, from the type locality.

Remarks: Both valves of the holotype and some of the paratypes show effects of glass-disease.

Current name: *Perrierina insulana* Powell, 1933 – Spencer *et al.* (2016).

***Perrierina matai* Fleming, 1948**

Fleming, C.A., 1948. New species and genera of marine Mollusca from the Southland Fiords. *Transactions of the Royal Society of New Zealand* 77: 72–92 [76, 77], pl. 5, fig. 5 (holotype and paratypes).

Paratypes: MA72948, 4 right valves and 2 unrelated left valves, collected by the N.Z. Government steamer *Matai* for Dr. P. Marshall, from 62m (34 fathoms) at the entrance to George Sound, Fiordland, New Zealand.

Current name: *Perrierina matai* Fleming, 1948 – Spencer *et al.* (2016).

***Perrierina mestayerae* Powell, 1933**

Powell, A.W.B., 1933. New species of marine Mollusca from the subantarctic islands of New Zealand. *Proceedings of the Malacological Society* 20(5): 232–236 [232], text fig. 2 (holotype).

Paratype: MA72362, dredged by Captain J. Bollons from 91m (50 fathoms), from the Snares Islands, New Zealand.

Current name: *Perrierina mestayerae* Powell, 1933 – Spencer *et al.* (2016).

†*Perrierina ovata* Marwick, 1928

Marwick, J., 1928. The Tertiary Mollusca of the Chatham Islands including a generic revision of the New Zealand Pectinidae. *Transactions and Proceedings of the New Zealand Institute* 58: 432–494 [444], figs 8, 9 (holotype).

Paratypes: MA72931, 10 right valves, 5 left valves and several fragmented specimens, collected in January

and February, 1924 by J. Marwick as the geologist with an Otago Institute party, from the Early Pleistocene (Nukumaru) Titirangi Sand, Titirangi, Chatham Island, New Zealand.

Current name: *Perrierina ovata* Marwick, 1928 – Maxwell in: Spencer *et al.* (2009: 236).

***Perrierina perstriata* Fleming, 1948**

Fleming, C.A., 1948. New species and genera of marine Mollusca from the Southland Fiords. *Transactions of the Royal Society of New Zealand* 77: 72–92 [75, 76], pl. 5, fig. 6 (holotype and paratype).

Paratypes: MA72947, 5 left valves, collected by the New Golden Hind from rock with patches of shell grit, from 27–46 m (15–25 fathoms), Gilbert Islands, Breaksea Sound, Fiordland, New Zealand.

Current name: *Perrierina perstriata* Fleming, 1948 – Spencer *et al.* (2016).

†***Perrierina sola* Laws, 1936**

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [52], pl. 10, fig. 29.

Holotype: MA70615, incomplete right valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Perrierina sola* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 236).

***Perrierina substriata* Powell, 1935**

Powell, A.W.B., 1935. Five new species of pelecypod Mollusca from New Zealand. *Proceedings of the Malacological Society* 21(4): 255–258 [255, 256], pl. 28, fig. 1.

Holotype: MA70616, disarticulated specimen, collected from fish stomach in 1924 by Captain J. Bollons, Three Kings Islands, New Zealand.

Paratypes: MA71400, 2 articulated specimens, 5 right and 3 left valves.

Current name: *Perrierina substriata* Powell, 1935 – Spencer *et al.* (2016).

GAIMARDIIDAE

***Gaimardia aucklandica* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [456], pl. 22, fig. 124 (holotype), figs 122, 123 (paratype).

Holotype: MA70335, left valve, collected off Auckland Islands, New Zealand.

Paratypes: MA72541, 151 articulated specimens, 17 right valves of which 2 are illustrated, 15 left valves, from the type locality.

Current name: *Gaimardia fosteriana aucklandica* Finlay, 1926 – Spencer *et al.* (2016).

***Gaimardia fosteriana* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand

molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [456].

Holotype: MA70336, disarticulated right and left valves, collected from seaweed at half-tide from Taieri Beach, Otago, New Zealand.

Paratypes: MA72540, 21 articulated specimens, 20 right valves and 23 left valves, from the type locality.

Current name: *Gaimardia fosteriana fosteriana* Finlay, 1926 – Spencer *et al.* (2016).

***Neogaimardia finlayi* Powell, 1933**

Powell, A.W.B., 1933. New pelecypod Mollusca from northern New Zealand. *Proceedings of the Malacological Society* 20(4): 199–206 [203, 204], text fig. 16 (holotype).

Holotype: MA70519, disarticulated right and left valves, collected from shell sand by A.W.B. Powell in February 1932 from Takapaukura, Tom Bowling Bay, Northland, New Zealand.

Paratypes: MA71429, 6 articulated specimens and 5 left valves, from the type locality.

Current name: *Gaimardia* (*Neogaimardia*) *finlayi* (Powell, 1933) – Spencer *et al.* (2016).

GALEOMMATIDAE

***Arthritica crassiformis* Powell, 1933**

Powell, A.W.B., 1933. On five new species of Recent New Zealand Mollusca. *Proceedings of the Malacological Society* 20(4): 194–198 [195], pl. 16, fig. 2, 3 (holotype).

Paratypes: MA72361, 28 articulated specimens, 15 right valves and 14 left valves, collected by Miss M. K. Mestayer on 24 March, 1920, from the type locality at Mahina Bay, Wellington, New Zealand.

Current name: *Arthritica crassiformis* Powell, 1933 – Spencer *et al.* (2016).

†***Arthritica elongata* Laws, 1936**

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [53], pl. 10, fig. 28 (holotype).

Holotype: MA70048, left valve, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Remarks: In the original description Laws refers to ‘odd right and left valves’, and he has figured the right valve. However, this valve appears to have been lost as only the left valve remains in Auckland Museum’s collections.

Current name: *Arthritica elongata* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 236).

***Arthritica hulmei* Ponder, 1965**

Ponder, W.F., 1965. The biology of the Genus *Arthritica*. *Transactions of the Royal Society of New Zealand, Zoology* 6(8): 75–86 [83–85], fig. 4(d) (holotype and paratype).

Paratypes: MA72964, 3 articulated specimens, dredged by S.G. Hulme from the type locality in Cook Strait off Island Bay, Wellington, New Zealand.

Remarks: The specimens were removed from the polychaete *Aphrodita australis* on which it is commensal. Although the collection date is unknown, it is presumably sometime in the early 1960s as the species is named after S. G. Hulme, who was a technician at the New Zealand Geological Survey (now GNS Science) and who died in October, 1962 (Hornibrook, 1963).

Current name: *Arthritica hulmei* Ponder, 1965 – Spencer *et al.* (2016).

***Borniola neozelanica* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [173, 174], pl. 47, fig. 8 (holotype).

Paratypes: MA72211, unrelated right and left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Borniola neozelanica* Powell, 1937 – Spencer *et al.* (2016).

***Divariscintilla maoria* Powell, 1932**

Powell, A.W.B., 1932. On some New Zealand pelecypods. *Proceedings of the Malacological Society* 20(1): 65–72 [66, 67], pl. 6, fig. 1 (holotype).

Holotype: MA70240, disarticulated right and left valves, collected by W. La Roche in 1922 from beach wash-up near Rangaunu Harbour, Northland, New Zealand.

Paratypes: MA71994, 3 right and 6 left valves, possibly from 3 individuals, from the type locality.

Remarks: Type for the genus. The type description for the species stated it was collected from Awanui Heads. This is not a currently recognised geographic location but is here presumed to mean the entrance to Rangaunu Harbour. However, as *Divariscintilla maoria* is commensal with the mantis shrimp, *Heterosquilla tricarinata*, it could equally be the intertidal flats near the Awanui River mouth, inside Rangaunu Harbour.

Current name: *Divariscintilla maoria* Powell, 1932 – Spencer *et al.* (2016).

***Kellia bifurca* Webster, 1908**

Webster, W.H., 1908. Additions to the New Zealand molluscan fauna. *Transactions and Proceedings of the New Zealand Institute* 40: 254–259 [257, 258], pl. 21, figs 24–29.

Holotype: MA70374, disarticulated right and left valves, collected by the Reverend W.H. Webster from the type locality at Orua Bay, Manukau Harbour, Auckland, New Zealand.

Paratypes: MA71807, 4 right and 3 unrelated left valves from the type locality.

Current name: *Arthritica bifurca* (Webster, 1908) – Spencer *et al.* (2016).

†*Kellia effossa* Hutton, 1885

Hutton, F.W., 1885. Descriptions of new Tertiary shells. Part 1. *Transactions and Proceedings of the New Zealand Institute* 17: 313–332 [323] (not figured).

Paratypes: MA72941, 3 right valves and 5 unrelated left

valves, from the Early Pleistocene (Nukumaruan) type locality, Petane, Hawke's Bay, New Zealand.

Current name: *Melliteryx effosa* (Hutton, 1885) – Maxwell in: Spencer *et al.* (2009: 236).

***Kellia maoria* Powell, 1933**

Powell, A.W.B., 1933. The high tidal Mollusca of Rangitoto Island, Auckland, with descriptions of a new genus and two new species. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 144–152 [151, 152], fig. 2 (holotype).

Holotype: MA70375, disarticulated right and left valves, collected by A.W.B. Powell from the underside of stones in the upper intertidal, Rangitoto Island, Auckland, New Zealand.

Current name: *Lasaea maoria* (Powell, 1933) – Spencer *et al.* (2016).

***Kellia (Kaneoha) minima* Ponder, 1971**

Ponder, W.F., 1971. Some New Zealand and subantarctic bivalves of the Cyamiacea and Leptonacea with descriptions of new taxa. *Records of the Dominion Museum* 7: 119–141 [132, 133], text figure 42 (holotype).

Paratypes: MA72974, 2 left valves and a right valve, dredged from 68m (35 fathoms) by J. Graham in 1963 from the type locality, off Oamaru, New Zealand.

Remarks: Some damage from probably glass disease is evident, especially to the right valve.

Current name: '*Kaneoha*' *minima* (Ponder, 1971) – Spencer *et al.* (2016).

***Lasaea hinemoa* Finlay, 1928**

Finlay, H.J., 1928. The Recent Mollusca of the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 59: 232–286 [274, 275], pl. 40, figs 27, 28 (holotype).

Holotype: MA70387, disarticulated right and left valves collected probably by F.H. MacDowall from seaweeds at mid-tide, Riverton, Southland, New Zealand.

Paratypes: MA72564, 11 articulated specimens, 6 right and 3 left valves, from the type locality.

Current name: *Lasaea hinemoa* Finlay, 1928 – Spencer *et al.* (2016).

***Lasaea parengaensis* Powell, 1935**

Powell, A.W.B., 1935. Five new species of pelecypod Mollusca from New Zealand. *Proceedings of the Malacological Society* 21(4): 255–258 [257, 258], pl. 28, fig. 5.

Holotype: MA70388, disarticulated right and left valves, dredged from 13m (7 fathoms) by A.W.B. Powell in February 1932, off Otehe Point, near the entrance to Parengarenga Harbour, Northland, New Zealand.

Remarks: Powell (1932) mentioned paratypes, but these have either been lost or are not identifiable within our collections. There is one lot, MA11483, which consists of 1 articulated specimen, 4 right and 3 left valves, and has the same primary data as the holotype.

Current name: *Lasaea parengaensis* Powell, 1935 – Spencer *et al.* (2016).

***Lasaea rossiana tutanekai* Fleming, 1948**

Fleming, C.A., 1948. New species and genera of marine Mollusca from the Southland Fiords. *Transactions of the Royal Society of New Zealand* 77: 72–92 [78, 79], pl. 6, fig. 5 (holotype and paratype).

Paratypes: MA72946, 9 right and 10 left valves, collected from the type locality, New Golden Hind Station 80, in 106m (58 fathoms) waterdepth, ‘inside the rock bar’ in Dagg Sound, Fiordland, New Zealand.

Current name: *Lasaea hinemoa* Finlay, 1928 – Powell (1979: 389).

***Lasaea rossiana vexata* Finlay, 1928**

Finlay, H.J., 1928. The Recent Mollusca of the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 59: 232–286 [275], pl. 41, figs 41, 42.

Holotype: MA70389, disarticulated right and left valves, from the Chatham Islands, New Zealand.

Paratypes: MA72565, 2 right and 3 left valves, from the type locality.

Current name: *Lasaea hinemoa* Finlay, 1928 – Powell (1979: 389).

***Malvinasia arthuri* Cooper & Preston, 1910**

Cooper, J.E. and H.B. Preston, 1910. Diagnosis of new species of marine and freshwater shells from the Falkland Islands, including descriptions of two new genera of marine Pelecypoda. *The Annals and Magazine of Natural History* (ser. 8) 5: 110–114 [113], pl. 4, figs 7, 8.

Paratypes: MA73236, 1 articulated specimen, disarticulated right and left valves, from the type locality, Falkland Islands, British Overseas Territory.

Remarks: In a hand-written catalogue kept by A.W.B. Powell he noted that the specimens are ex-Preston.

Current name: *Mysella arthuri* (Cooper & Preston, 1910) – Rosenberg, G. (2013).

†*Melliteryx angulata* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [53, 54], pl.11, figs 32, 33 (holotype).

Syntypes: MA70458, unrelated right and left valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Melliteryx angulata* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 236).

†*Melliteryx mirificus* Powell & Bartrum, 1929

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [403, 404], pl. 39, fig. 41 (holotype).

Holotype: MA72091, right? valve embedded in rock, from the Early Miocene (Otaian) Tipakuri Formation of ‘Double U Bay’, approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Paratypes: MA71692, 1 right? valve and 2 left? valves embedded in rock, from the type locality.

Current name: *Melliteryx mirifica* Powell & Bartrum, 1929 – Maxwell in: Spencer *et al.* (2009: 236).

†*Myllitella fragilis* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [54], pl.11, figs 34, 35, 37 (holotype).

Syntypes: MA70510, unrelated right and left valves, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Myllitella fragilis* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 236).

***Myllitella vivens* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [464], pl. 22, fig. 119 (holotype), figs 120, 121 (paratype).

Holotype: MA70511, left valve, collected from 46m off Hen and Chickens Islands, northern Hauraki Gulf, New Zealand.

Paratypes: MA73088, unrelated right and left valves, from the type locality.

Remarks: The type for the genus.

Current name: *Myllitella (Myllitella) vivens vivens* (Finlay, 1926) – Spencer *et al.* (2016).

***Mysella alpha* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [173], pl. 46, fig. 6 (holotype).

Paratypes: MA72209, 3 right and 5 left valves, collected by A.W.B. Powell in 1932, from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Mysella alpha* Powell, 1937 – Spencer *et al.* (2016).

***Mysella beta* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [173], pl. 46, fig.7 (holotype).

Paratypes: MA72210, 1 articulated specimen, 7 right and 10 left valves, collected by A.W.B. Powell in 1932, from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Remarks: the majority of the specimens are tiny and it is likely that several are not conspecific and that they belong to *Mysella alpha* rather than *Mysella beta*.

Current name: *Mysella beta* Powell, 1937 – Spencer *et al.* (2016).

***Mysella bidentifera* Powell, 1933**

Powell, A.W.B., 1933. New pelecypod Mollusca from northern New Zealand. *Proceedings of the Malacological Society* 20(4): 199–206 [205, 206], pl. 18, fig. 6.

Holotype: MA70512, a right valve collected in February 1932 from shell sand by A.W.B. Powell, from Takapaukura, Tom Bowling Bay, Northland, New Zealand.

Remarks: valve severely affected by glass disease.

Current name: *Borniola bidentifera* (Powell, 1933) – Powell (1979: 390); Spencer *et al.* (2016).

***Mysella larochei* Powell, 1940**

Powell, A.W.B., 1940. The marine Mollusca of the Aupourian Province, New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 70: 205–248 [218], Text fig. 1a (holotype; p. 219).

Holotype: MA72100, disarticulated right and left valves, collected by Mr W. La Roche, from Taupo Bay, Whangaroa Bay, New Zealand.

Current name: *Mysella larochei* Powell, 1940 – Spencer *et al.* (2016).

***Rochefortula decapitata* Powell, 1939**

Powell, A.W.B., 1939. The Mollusca of Stewart Island. *Records of the Auckland Institute and Museum* 2(4): 211–238 [226], pl. 48, fig. 4 (holotype).

Holotype: MA70682, disarticulated right and left valves, collected by Mrs R.H. Harrison from shell sand, Rosa Island, Port Pegasus, Stewart Island, New Zealand.

Current name: *Borniola decapitata* (Powell, 1939) – Powell (1979: 390); Spencer *et al.* (2016).

***Rochefortula taieriensis* Powell, 1939**

Powell, A.W.B., 1939. The Mollusca of Stewart Island. *Records of the Auckland Institute and Museum* 2(4): 211–238 [226], pl. 48, fig. 3 (holotype).

Holotype: MA70683, disarticulated right and left valves, collected from shell sand and seaweed washings, Taieri Beach, Otago, New Zealand.

Paratypes: MA71545, 1 articulated specimen, and disarticulated right and left valves, from the type locality.

Remarks: the left valve of the disarticulated pair is broken.

Current name: *Borniola taieriensis* (Powell, 1939) – Powell (1979: 391); Spencer *et al.* (2016).

***Scintilla stevensoni* Powell, 1932**

Powell, A.W.B., 1932. On some New Zealand pelecypods. *Proceedings of the Malacological Society* 20(1): 65–72 [65, 66], pl. 6, fig. 2 (holotype).

Holotype: MA70699, disarticulated right and left valves, collected in February 1931 from the underside of a stone at low water, at Oruawharo Bay, Great Barrier Island, New Zealand.

Remarks: There are two Oruawharo Bays on Great Barrier Island. The one in Powell (1932) is presumed to be the larger bay at Medlands.

Current name: *Scintilla stevensoni* Powell, 1932 – Spencer *et al.* (2016).

†*Semeloidea miocenica* Laws, 1932

Laws, C.R., 1932. New Tertiary Mollusca from New Zealand. No. 2. *Transactions and Proceedings of the New Zealand Institute* 62: 183–202 [184], pl. 32, fig. 46 (holotype).

Holotype: MA70708, single right valve from the Early Miocene (Altonian) of the Mount Harris Formation, ‘Old Rifle Butts’, coast south of Cape Wanbrow, Oamaru, Otago, New Zealand.

Current name: *Semeloidea miocenica* Laws, 1932 – Maxwell in: Spencer *et al.* (2009: 236).

***Tahunanuia alata* Powell, 1952**

Powell, A.W.B., 1952. New Zealand molluscan systematics, with descriptions of new species, part 1. *Records of the Auckland Institute and Museum* 4(3): 169–185 [170, 171], text fig. 1, 1a (holotype).

Holotype: MA71184, right valve, collected from Tahunanuia Beach, Nelson, New Zealand.

Paratypes: MA71438, 9 right valves and 7 left valves, from the type locality.

Current name: *Anisodonta (Tahunanuia) alata alata* (Powell, 1952) – Spencer *et al.* (2016).

***Tahunanuia trigonia* Powell, 1952**

Powell, A.W.B., 1952. New Zealand molluscan systematics, with descriptions of new species, part 1. *Records of the Auckland Institute and Museum* 4(3): 169–185 [171], text fig. 2 (holotype).

Holotype: MA72202, a right valve collected by Captain J. Bollons from 33m (18 fathoms), from Perseverance Harbour, Campbell Island, New Zealand.

Current name: *Anisodonta (Tahunanuia) alata trigonia* (Powell, 1952) – Spencer *et al.* (2016).

***Virmysella hounseli* Powell, 1931**

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [111], pl. 11, fig. 13 (holotype), fig. 14 (paratype).

Holotype: MA70838, left valve collected from the Pleistocene (Castlecliffian) at Castlecliff, Whanganui, New Zealand.

Paratype: MA73474, right valve, from the type locality.

Current name: *Mysella hounseli* (Powell, 1931) – Maxwell in: Spencer *et al.* (2009: 199); Spencer *et al.* (2016).

GLAUCONOMIDAE

***Hemidonax arafurensis* Ponder, Colman, Yonge & Colman, 1981**

Ponder, W.F., Colman, P.H., Yonge, C.M. and M.H. Colman, 1981. The taxonomic position of *Hemidonax* Mörch, 1871 with a review of the genus (Bivalvia: Cardiacea). *Journal of the Malacological Society of Australia* 5: 41–64 [51], Figs 1–5, 11, 12, pl. 2, figs 6–8 (holotype).

Paratype: MA73217, 1 articulated specimen, collected by P. H. Colman on 26 October, 1969 from a sandbar off Emery Point, Darwin, Northern Territories, Australia.

Current name: *Hemidonax arafurensis* Ponder, Colman, Yonge & Colman, 1981 – Huber (2015a).

MACTRIDAE

†*Eumarcia altilunula* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [627, 628], pl. 51, fig. 196.

Holotype: MA70299, incomplete left valve from Middle Miocene (Lillburnian) Lima Sand, [Finlay's bed 7C (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Remarks: Finlay's subdivision of Clifden beds 7 and 8 cannot be identified with confidence and specimens from Finlay's 7C can probably be matched to their source horizon only by comparing their preservation with that of later collections (Fleming *et al.*, 1969: 77, 93). On the basis of preservation the Lima Sand is the likely source of the type of *Eumarcia altilunula*.

Current name: *Cyclomactra* (?) *altilunula* (Marwick, 1927) – Maxwell in: Spencer *et al.* (2009: 237).

Lutraria bruuni Powell, 1967

Powell, A.W.B., 1967. Mollusca of the Kermadec Islands part 2. *Records of the Auckland Institute and Museum* 6(3): 197–199 [198, 199], pl. 38, figs 1, 2 (holotype).

Paratypes: MA72551, 2 right valves, collected on 3 March, 1952 from Galathea Station 674, 29° 15'S; 177° 5'W, from 15m–75m depth off Raoul Island, Kermadec Islands, New Zealand.

Current name: *Lutraria* (*Psammophila*) *bruuni* Powell, 1967 – Spencer *et al.* (2016).

†*Mactra* (*Cyclomactra*) *williamsi* Marwick, 1948

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [22], pl. 3, figs 6, 8 (holotype), fig. 7 (paratype).

Holotype: MA71014, left valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Paratype: MA72939, incomplete right valve, from the type locality.

Current name: *Cyclomactra williamsi* (Marwick, 1948) – Maxwell in: Spencer *et al.* (2009: 237).

†*Maorimactra acuminella* Finlay, 1930

Finlay, H.J., 1930. New shells from New Zealand Tertiary Beds. Part 3. *Transactions and Proceedings of the New Zealand Institute* 61: 49–84 [53], not figured.

Holotype: MA70438, Figure 7 a, b, left valve, collected from Early Miocene (Altonian) Southburn Sand, White Rock River, Canterbury, New Zealand.

Paratypes: MA73555, 2 right and 4 left valves, from the type locality.

Remarks: The holotype and paratypes for this species were found together as a single lot of 7 specimens. As none was labeled or marked the holotype was not obvious. However, in many instances Finlay published measurements in his original descriptions, including for a number of other species for which we hold the

holotype. Although Finlay did not relate measurements to specific specimens, where checked, in each case they were found to match the dimensions of a holotype. Based on this it is assumed that the measurements published for *Maorimactra acuminella* also applied to the holotype specimen for this species. Therefore, the specimen which exactly matched Finlay's measurements in his description for *Maorimactra acuminella* has been separated out as the holotype, and the remaining 6 are deemed to be paratypes.

Current name: *Maorimactra acuminella* Finlay, 1930 – Maxwell in: Spencer *et al.* (2009: 237).

†*Scalpomactra biconvexa* Powell & Bartrum 1929

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [405, 406], pl. 50, figs 108 (holotype).

Holotype: MA72132, right valve, from the Early Miocene (Otaian) Tipakuri Formation of 'Double U Bay', approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Current name: *Scalpomactra biconvexa* Powell & Bartrum 1929 – Maxwell in: Spencer *et al.* (2009: 237).

†*Scalpomactra continua* Finlay, 1930

Finlay, H.J., 1930. New shells from New Zealand Tertiary Beds. Part 3. *Transactions and Proceedings of the New Zealand Institute* 61: 49–84 [53, 54], not figured.

Holotype: MA70687, Figure 7 c, d, right valve, from the Early Miocene (Altonian) Southburn Sand at White Rock River, Canterbury, New Zealand.

Paratypes: MA72443, 43 right and 42 left valves, from the type locality.

Current name: *Scalpomactra continua* Finlay, 1930 – Maxwell in: Spencer *et al.* (2009: 237).

†*Spisula* (*Spisulona*) *couttsi* Marwick, 1948

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [23], pl. 3, figs 3, 4 (holotype), fig. 5 (paratype), figs 9, 10 (paratype)

Holotype: MA71117, left valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Paratypes: MA72998, 2 right valves, from the type locality.

Remarks: also the type for the subgenus.

Current name: *Spisula* (*Spisulona*) *couttsi* Marwick, 1948 – Maxwell in: Spencer *et al.* (2009: 237).

Standella aequalis Webster, 1905

Webster, W. H., 1905. Some new species of New Zealand marine shells, together with remarks on some non-marine species, and some additions to the "Index Faunæ." *Transactions and Proceedings of the New Zealand Institute* 37: 276–280 [280], fig. 13a.

Holotype: MA70728, right valve, from Kauri Point,

Manukau Harbour, Auckland, New Zealand.

Current name: *Cyclomactra ovata* (Gray, 1843) – Powell (1979: 413).

MESODESMATIDAE

Amphidesma forsteriana Finlay, 1926

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [468], not figured.

Holotype: MA70030, Figure 8 a-d, disarticulated right and left valves, from Warrington, near Dunedin, Otago, New Zealand.

Current name: *Paphies (Taria) donacina* (Spengler, 1793) – Powell (1979: 416); Spencer *et al.* (2016).

†*Paphies otaiana* Eagle, 2000

Eagle, M.K., 2000. Six new fossil bivalves from the Early Miocene of Auckland and Northland, New Zealand. *Records of the Auckland Museum* 36: 141–168 [151–153], fig. 15 (holotype).

Holotype: MA72652, left valve, collected by M.K. Eagle from Early Miocene (Otaian) Tipakuri Formation, Hunua Road cutting, Hays Stream, Hunua Ranges, south-east Auckland, New Zealand.

Current name: *Paphies otaiana* Eagle, 2000 – Maxwell in: Spencer *et al.* (2009: 237).

TELLINIDAE

†*Angulus (Peronidia) artus* Laws, 1933

Laws, C.R., 1933. New Tertiary Mollusca from Timaru District, South Canterbury, New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 315–329 [318], pl. 30, figs 11, 12, 13.

Holotype: MA70035, right valve, collected by C.R. Laws from the Early Miocene (Altonian) Southburn Sand at Sutherlands, Tengawai River, South Canterbury, New Zealand.

Paratype: MA110823, right valve, from the type locality.

Current name: *Tellinota arta* (Laws, 1933) – Maxwell in: Spencer *et al.* (2009: 238).

†*Angulus (Peronidia) tumens* Laws, 1933

Laws, C.R., 1933. New Tertiary Mollusca from Timaru District, South Canterbury, New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 315–329 [318], not figured.

Holotype: MA70036, Figure 7 e, f, right valve, from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Oamaru, Otago, New Zealand.

Paratypes: MA72661, 1 partial right valve, 2 partial left valves, 1 entire left valve 3; MA72662, right and 1 left valves, from the type locality.

Current name: *Tellinota tumens* (Laws, 1933) – Maxwell in: Spencer *et al.* (2009: 238).

†*Ascitellina protensa* Powell, 1935

Powell, A.W.B., 1935. Tertiary Mollusca from Motutara, west coast, Auckland. *Records of the Auckland Institute*

and Museum 1(6): 327–340 [333], pl. 76 fig. 8 (holotype).

Holotype: MA72009, left valve, from Early Miocene (Altonian) Nihotupu Formation, north end of Pillow Lava Bay, south of Muriwai Beach, west Auckland, New Zealand.

Current name: *Elliptotellina protensa* (Powell, 1935) – Maxwell in: Spencer *et al.* (2009: 237).

†*Barytellina anomalodonta* Finlay, 1924

Finlay, H.J., 1924. New shells from New Zealand Tertiary beds. *Transactions and Proceedings of the New Zealand Institute* 55: 450–479 [473, 474], pl. 50, figs 7a–c.

Syntypes: MA70095, unrelated right and left valves, from the Early Pleistocene (Nukumaru) at Rissington, Hawke's Bay, New Zealand.

Remarks: These were referred to by Finlay (1924) in the original description as 'types' and therefore treated here collectively as the name-bearing type.

Current name: *Barytellina crassidens* Marwick, 1924 – Beu and Raine (2009).

†*Eurytellina solitaria* Powell, 1931

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [95], pl. 14, fig. 40 (holotype).

Holotype: MA70302, right valve, collected by A.W.B. Powell in January 1931 from Late Pliocene (Waipiian) Tangahoe Formation, near the mouth of Waihi Stream, Hawera, New Zealand.

Current name: *Eurytellina (?) solitaria* Powell, 1931 – Maxwell in: Spencer *et al.* (2009: 237).

†*Finlayella sinuaris* Laws, 1933

Laws, C.R., 1933. New Tertiary Mollusca from Timaru District, South Canterbury, New Zealand. *Transactions and Proceedings of the Royal Society of New Zealand* 63: 315–329 [319, 320], pl. 29, figs 2, 3, 6.

Holotype: MA70327, right valve collected by C.R. Laws from the Early Miocene (Altonian) Southburn Sand at Sutherlands, Tengawai River, South Canterbury, New Zealand.

Paratypes: MA72663, right and left valves from the type locality.

Remarks: Type for the genus.

Current name: *Finlayella sinuaris* Laws, 1933 – Maxwell in: Spencer *et al.* (2009: 238).

†*Macoma hesterna* Powell & Bartrum 1929

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [404], pl. 44, fig. 76 (holotype).

Paratypes: MA71693, left valve collected from the Early Miocene (Otaian) Tipakuri Formation of 'Double U Bay', approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Remarks: MA71693 contained a right and left valve, but as Powell (1929) specifically mentioned a left valve as the only paratype it is here assumed that the right valve is not a paratype.

Current name: *Tellina hesterna* (Powell & Bartrum, 1929) – Maxwell in: Spencer *et al.* (2009: 238).

† ***Macoma oneroensis* Powell & Bartrum 1929**

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [404, 405], pl. 42, fig. 62 (holotype).

Holotype: MA72085, left valve, from the Early Miocene (Otaian) Tipakuri Formation of ‘Double U Bay’, approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Current name: *Bartruria oneroensis* (Powell & Bartrum, 1929) – Maxwell in: Spencer *et al.* (2009: 237).

† ***Macoma robini* Finlay, 1924**

Finlay, H.J., 1924. New shells from New Zealand Tertiary beds. *Transactions and Proceedings of the New Zealand Institute* 55: 450–479 [474, 475], pl. 51, fig. 6a (holotype); figs 6b, 6c (paratype).

Holotype: MA70425, articulated specimen, collected by R.S. Allan from the Early Miocene (Waitakian) Otekaike Limestone, ‘Trig Z’ (Fossil Record File I40/f9519), Otiake, Waitaki Valley Otago, New Zealand.

Paratypes: MA72490, articulated specimen, partial right valve; MA73240, 1 right valve, 2 left valves (1 figured as 6c), from the type locality.

Current name: *Peronaea robini* (Finlay, 1924) – Maxwell in: Spencer *et al.* (2009: 237).

***Tellina urinaria* Suter, 1913**

Suter, H., 1913. *Manual of the New Zealand Mollusca. With an atlas of quarto plates.* Wellington, John MacKay, Government Printer, 1120 pp. [950], pl. 54, fig. 13.

Paratype: MA72784, collected by E.R. Waite from 219m (120 fathoms) water depth, from 38km (24 miles) south east of Long Point, Fiordland, Southland, New Zealand.

Current name: *Elliptotellina urinaria* (Suter, 1913) – Spencer *et al.* (2016).

DONACIDAE

† ***Donax (Paradonax) parengarengaensis* Eagle, 2000**

Eagle, M.K., 2000. Six new fossil bivalves from the Early Miocene of Auckland and Northland, New Zealand. *Records of the Auckland Museum* 36: 141–168 [157–159], figs 29, 30 (holotype and Paratypes).

Holotype: MA72653, left valve, collected by M.K. Eagle from the Early Miocene (Altonian) Paratoetoe Formation, north shore, Parengarenga Harbour, New Zealand.

Paratype: MA72654, left valve from the type locality.

Current name: *Donax (Paradonax) parengarengaensis* Eagle, 2000 – Maxwell in: Spencer *et al.* (2009: 237).

PSAMMOBIIDAE

† ***Gari aucklandica* Marwick, 1948**

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland.* New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [26], pl. 1, figs 8, 9 (holotype), fig. 12 (paratype).

Holotype: MA70989, right valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Paratype: MA73000, left valve, from the type locality.

Current name: *Gari (Psammobia) aucklandica* Marwick, 1948 – Maxwell in: Spencer *et al.* (2009: 237).

† ***Gari hodgei* Willan, 1980**

Willan, R.C., 1980. A re-evaluation of *Gari lineolata* (Gray in Yate, 1835) (Bivalvia: Psammobiidae). *Journal of the Royal Society of New Zealand* 10: 173–183 [174–176], fig. 1A, figs 2A, B, figs 3I–K, L (holotype), M, N.

Holotype: MA71360, articulated specimen, collected by A.W.B. Powell in 1936 from Owenga, Chatham Islands, New Zealand.

Paratypes: MA14290, 9 articulated specimens and 2 left valves, from the type locality.

Current name: *Gari (Psammobia) convexa* Reeve, 1857 – Spencer *et al.* (2016).

† ***Gari oamarutica* Finlay, 1930**

Finlay, H.J., 1930. New shells from New Zealand Tertiary Beds. Part 3. *Transactions and Proceedings of the New Zealand Institute* 61: 49–84 [53], not figured.

Holotype: MA70337, Figure 7 g, h, left valve, collected from Early Miocene (Altonian) of the Mount Harris Formation, Awamoia Beach boulders, Otago, New Zealand.

Paratypes: MA73116, 11 fragments of partial right and left valves, from the type locality.

Current name: *Gari (Psammobia) oamarutica* Finlay, 1930 – Maxwell in: Spencer *et al.* (2009: 237).

† ***Kermadysmea galathea* Powell, 1958**

Powell, A.W.B., 1958. Mollusca of the Kermadec Islands. Part 1. *Records of the Auckland Institute and Museum* 5(1 & 2): 65–85 [74], text fig. A, 1, 4, pl. 10, fig. 4 (holotype).

Paratypes: MA72300, articulated specimen and 2 left valves, collected on 3 March 1952 from the type locality, station 676, Danish Galathea Expedition, from 83m off Raoul Island, Kermadec Islands, New Zealand.

Current name: *Gari (Kermadysmea) galathea* (Powell, 1958) – Spencer *et al.* (2016).

† ***Solecurtus bensoni* Finlay, 1924**

Finlay, H.J., 1924. New shells from New Zealand Tertiary beds. *Transactions and Proceedings of the New Zealand Institute* 55: 450–479 [471, 472], pl. 50, figs 8a, 8b (holotype).

Holotype: MA70714, articulated specimen, collected from Early Miocene (Altonian) Calamity Point Sandstone, [Finlay's bed 6A (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Paratypes: MA73056, 10 fragments from 9 partial right and left valves, from the type locality.

Current name: *Solecortus bensoni* Finlay, 1924 – Maxwell in: Spencer *et al.* (2009: 237).

†***Solecortus chattonensis* Finlay, 1924**

Finlay, H.J., 1924. New shells from New Zealand Tertiary beds. *Transactions and Proceedings of the New Zealand Institute* 55: 450–479 [472, 473], pl. 50, fig. 10 (holotype).

Holotype: MA70715, left valve, collected from Late Oligocene (Duntroonian) Chatton Formation, Chatton, Southland, New Zealand.

Current name: *Solecortus chattonensis* Finlay, 1924 – Maxwell in: Spencer *et al.* (2009: 237).

†***Solecortus evolutus* Finlay, 1924**

Finlay, H.J., 1924. New shells from New Zealand Tertiary beds. *Transactions and Proceedings of the New Zealand Institute* 55: 450–479 [472], pl. 50, fig. 9 (holotype).

Holotype: MA70716, right valve, collected from Early Miocene (Altonian) of the Mount Harris Formation, Awamoia Beach boulders, Otago New Zealand.

Current name: *Solecortus evolutus* Finlay, 1924 – Maxwell in: Spencer *et al.* (2009: 237).

***Soletellina siliquens* Willan, 1993**

Willan, R.C., 1993. Taxonomic revision of the family Psammobiidae (Bivalvia: Tellinoidea) in the Australian and New Zealand region. *Records of the Australian Museum, Supplement* 18, 132 pp. [85, 86], fig. 344 (holotype), 345–348, 413.

Holotype: MA71377, articulated specimen, collected from Beachlands Beach, Auckland, New Zealand.

Current name: *Hiatula siliquens* (Willan, 1993) – Spencer *et al.* (2016).

†***Soletellina waitemata* Marwick, 1948**

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [26, 27], pl. 1, figs 3, 4 (holotype).

Holotype: MA71116, left valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Current name: *Hiatula waitemata* (Maxwell, 1948) – Maxwell in: Spencer *et al.* (2009: 237).

SEMELIDAE

***Leptomya retiaria aucklandica* Powell, 1955**

Powell, A.W.B., 1955. Mollusca of the southern islands of New Zealand. *Cape Expedition Series Bulletin* 15, DSIR, Wellington, 151 pp. [38], pl. 1, fig. 2 (holotype).

Paratype: MA72377, right valve, collected by C.A. Fleming in 1942 during the 'Cape Expedition' from 7–9m (4–5 fathoms), Musgrave Harbour, Auckland Islands, New Zealand.

Current name: *Leptomya retiaria aucklandica* Powell, 1955 – Spencer *et al.* (2016).

†***Leptomya waitemataensis* Powell & Bartrum, 1929**

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [405], pl. 50, fig. 109 (holotype).

Holotype: MA72079, right valve, from the Early Miocene (Otaian) Tipakuri Formation of 'Double U Bay', approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Current name: *Leptomya waitemataensis* Powell & Bartrum, 1929 – Maxwell in: Spencer *et al.* (2009: 237).

***Semele brambleyae* Powell, 1967**

Powell, A.W.B., 1967. New Zealand molluscan systematics with descriptions of new species; part 6. *Records of the Auckland Institute and Museum* 6(3): 185–196 [196], pl. 37, figs 7–9 (holotype).

Holotype: MA71299, right and left valves of a disarticulated specimen, found as fresh specimen on mud flats by Miss D. Brambley at the east end of Orua Bay, Manukau Harbour, New Zealand.

Remarks: This is the only specimen ever recorded from New Zealand and is considered adventive, possibly having arrived in ballast water from a ship (Marshall & Spencer, 2013).

Current name: *Semele vestalis* (A. Adams in Reeve, 1853) – Bouchet (2015).

UNGULINIDAE

***Zemysia rakiura* Powell, 1939**

Powell, A.W.B., 1939. The Mollusca of Stewart Island. *Records of the Auckland Institute and Museum* 2(4): 211–238 [224, 225], text figs d, e.

Holotype: MA70890, disarticulated right and left valves, collected by Mrs R.H. Harrison from Ringaringa Beach, Stewart Island, New Zealand.

Current name: *Zemysia rakiura* Powell, 1939 – Spencer *et al.* (2016).

***Zemysia (Zemysina) globus* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [462], pl. 22, fig. 109 (holotype), figs 110, 111 (paratype).

Holotype: MA70889, left valve, from Stewart Island, New Zealand.

Paratypes: MA72547, articulated specimen and 1 right valve, from the type locality.

Current name: *Zemysina globus* (Finlay, 1926) – Spencer *et al.* (2016).

***Zemysia (Zemysina) striatula* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [462, 463], pl. 22, figs 113 (holotype), 112 (paratype).

Holotype: MA70891, right valve, from Waitemata Harbour, Auckland, New Zealand.

Paratype: MA72548, articulated specimen from the type locality.

Current name: *Zemysina striatula* (Finlay, 1926) – Spencer *et al.* (2016).

VENERIDAE

†***Austrovenus northlandica* Eagle, 2000**

Eagle, M.K., 2000. Six new fossil bivalves from the Early Miocene of Auckland and Northland, New Zealand. *Records of the Auckland Museum* 36: 141–168 [160–162], fig. 36 (holotype), figs 37–39 (paratypes).

Holotype: MA72649, partial right valve, collected by M.K. Eagle in 1992 from Early Miocene (Otaian) Tipakuri Formation, Hunua Road cutting, Hays Stream, Hunua Ranges, New Zealand.

Paratypes: MA72650, partial left valve; MA76821, probable partial right valve and other fragments; MA76823, 1 partial right valve and 1 indeterminate fragment; all from the type locality.

Remarks: In Eagle (2000) the holotype is described as a left valve, but the figured specimen, MA72649 is a right valve; the paratype, MA72650, is described as a right valve, whereas it is a left valve.

Current name: *Austrovenus northlandica* Eagle, 2000 – Maxwell in: Spencer *et al.* (2009: 238).

†***Bassina katherinae* Marwick, 1948**

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [24], pl. 4, figs 5, 6 (holotype), fig. 8 (paratype).

Holotype: MA70938, right valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Paratype: MA72997, left valve, from the type locality.

Current name: *Bassina (Callanaitis) katherinae* Marwick, 1948 – Maxwell in: Spencer *et al.* (2009: 238).

†***Chione crassitesta* Finlay, 1924**

Finlay, H.J., 1924. New shells from New Zealand Tertiary beds. *Transactions and Proceedings of the New Zealand Institute* 55: 450–479 [478, 479], pl. 50, figs 1a, 1b, 1c (holotype).

Holotype: MA70165, disarticulated right and left valves, collected by Dr Benson from the Pleistocene (Castlecliffian) at Clifton [Clifden sic] near Cape Kidnappers, Hawke's Bay, New Zealand.

Current name: *Austrovenus stutchburyi* (Wood, 1828) – Beu (2006: 278).

***Chione (Austrovenus) aucklandica* Powell, 1932**

Powell, A.W.B., 1932. On some New Zealand pelecypods. *Proceedings of the Malacological Society* 20(1): 65–72 [68], pl. 6, figs 3,4 (holotype).

Holotype: MA72048, disarticulated specimen, collected by Captain J. Bollons in 1922, from the Auckland Islands, New Zealand.

Current name: *Austrovenus stutchburyi* (Wood, 1828) – Beu (2006: 278).

†***Chione (Austrovenus) tamakiensis* Marwick, 1948**

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [24, 25], pl. 4, figs 2, 3 (holotype), fig. 1 (paratype).

Holotype: MA70944, right valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Paratype: MA72996, left valve, from the type locality.

Current name: *Austrovenus tamakiensis* (Marwick, 1948) – Maxwell in: Spencer *et al.* (2009: 238).

***Dosinia maoriana* Oliver, 1923**

Oliver, W.R.B., 1923. Notes on New Zealand pelecypods. *Proceedings of the Malacological Society* 15: 179–188 [188], not figured.

Paratypes: MA72889, disarticulated specimen, from Elmslie Bay, French Pass, South Island, New Zealand.

Current name: *Dosinia (Pectunculus) maoriana* Oliver, 1923 – Spencer *et al.* (2016).

†***Dosinia (Austrodosinia) waitakiensis* Marwick, 1927**

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [585], pl. 35 figs 20, 22.

Holotype: MA70251, partial left valve, from the Late Oligocene/Early Miocene (Waitakian) Otekaike Limestone, 'Trig Z' (Fossil Record File I40/f9519), Otiake, Waitaki Valley Otago, New Zealand.

Current name: *Austrodosinia waitakiensis* (Marwick, 1927) – Maxwell in: Spencer *et al.* (2009: 238).

†***Dosinia (Kereia) cottoni* Marwick, 1927**

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [590, 591], pl. 38, figs 42, 47 (holotype).

Paratypes: MA73196, 2 articulated specimens, from Late Miocene (Tongaporutuan) at Hurupi Creek, Palliser Bay, New Zealand.

Current name: *Dosinia (Kereia) cottoni* Marwick, 1927 – Beu & Raine (2009).

†***Dosinia (Kereia) densicosta* Marwick, 1927**

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [590], pl. 35, figs 16, 17.

Holotype: MA70250, partial left valve, from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Oamaru, Otago, New Zealand.

Current name: *Dosinia (Kereia) densicosta* (Marwick, 1927) – Beu & Maxwell (1990): 400.

†*Dosinia (Kereia) ongleyi* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [588, 589], pl. 40, figs 58, 59 (holotype), pl. 37, figs 37, 39 (paratypes).

Paratype: MA71541, left valve, from the Early Paleocene (Lower Teurian) Wangaloa Formation, coast between Mitchells Rocks and Measly Beach, near Wangaloa, Otago, New Zealand.

Current name: *Dosinia (Dosinobia) ongleyi* Marwick, 1927 – Beu & Maxwell (1990): 400.

†*Dosinia (Raina) bartrumi* Laws, 1930

Laws, C.R., 1930. New Tertiary Mollusca from New Zealand. No. 1. *Transactions and Proceedings of the New Zealand Institute* 61: 547–553 [548], pl. 89, fig. 5, pl. 90, fig. 7 (holotype).

Holotype: MA70248, left valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Dosinia (Raina) bartrumi* Laws, 1930 – Beu & Maxwell (1990): 400.

†*Dosinia (Raina) benereparata* Laws, 1930

Laws, C.R., 1930. New Tertiary Mollusca from New Zealand. No. 1. *Transactions and Proceedings of the New Zealand Institute* 61: 547–553 [547, 548], pl. 89, figs 2, 3 (holotype).

Holotype: MA70249: left valve collected from the Late Oligocene (Duntroonian) Chatton Formation, Chatton, Southland, New Zealand.

Current name: *Dosinia (Raina) benereparata* Laws, 1930 – Beu & Maxwell (1990): 400.

†*Dosinia (Raina) powelli* Marwick, 1948

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [24], pl. 4, figs 9, 10 (holotype), 7 (paratype).

Holotype: MA70962: left valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Paratype: MA72995: partial right valve, from the type locality.

Current name: *Dosinia (Raina) powelli* Marwick, 1948 – Beu & Maxwell (1990): 400.

†*Dosinula firmocosta* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [610, 611], pl. 44, figs 122, 123 (holotype).

Holotype: MA70252, right valve from Early Miocene (Altonian) Long Beach Shellbed, [Finlay's bed 6B (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Paratypes: MA73124, 2 right and 1 left valves, from Middle Miocene (Lillburnian) Lill Sand, [Finlay's bed 7A (for correlation see Fleming *et al.*, 1969)], at the type locality.

Current name: *Dosina firmocosta* (Marwick, 1927) – Maxwell in: Spencer *et al.* (2009: 238).

†*Dosinula suboblunga* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [609, 610], pl. 45, fig. 124, 127 (holotype), 130 (paratype).

Paratype: MA71968, right valve, from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Oamaru, Otago, New Zealand.

Current name: *Dosina suboblunga* (Marwick, 1927) – Maxwell in: Spencer *et al.* (2009: 238).

†*Dosinula uttlei* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [610], pl. 45, figs 128, 129 (holotype).

Paratype: MA73126, partial right valve from Middle Miocene (Lillburnian) Lima Sand, [Finlay's bed 7C (for correlation see Fleming *et al.*, 1969)] at Clifden, Southland, New Zealand.

Paratypes: MA73127, 1 complete and 2 partial right valves, 1 repaired and 1 partial left valve, from the Early Miocene (Waitakian) Otekaike Limestone, 'Trig Z' (Fossil Record File I40/f9519), Otiake, Waitaki Valley Otago, New Zealand.

Remarks: Finlay's subdivision of Clifden beds 7 and 8 cannot be identified with confidence and specimens from Finlay's 7C can probably be matched to their source horizon only by comparing their preservation with that of later collections (Fleming *et al.*, 1969: 77, 93).

Current name: *Dosina uttlei* (Marwick, 1927) – Maxwell in: Spencer *et al.* (2009: 238).

†*Eumarcia (Atamarcia) crassatelliformis* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [628], pl. 50, figs 191, 192.

Holotype: MA70300, damaged left valve from Late Miocene (Kapitean) Mussel Beach, Te Waewae Bay, Southland, New Zealand.

Current name: *Atamarcia (Atamarcia) crassatelliformis* (Marwick, 1927) – Maxwell in: Spencer *et al.* (2009: 238).

†*Eumarcia (Atamarcia) sulcifera* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [629], pl. 52, fig. 203.

Holotype: MA70301, left valve from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Oamaru, Otago, New Zealand.

Current name: *Atamarcia (Atamarcia) sulcifera* (Marwick, 1927) – Maxwell in: Spencer *et al.* (2009: 238).

†*Eumarcia (Opimarcia) healyi* Marwick, 1948

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [26], pl. 5, figs 1, 4 (holotype), fig. 2 (paratype).

Holotype: MA70983, left valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Paratype: MA72978, dorsal fragment of right valve, collected from the type locality.

Current name: *Atamarcia (Opimarcia) healyi* (Marwick, 1948) – Maxwell in: Spencer *et al.* (2009: 238).

†*Finlaya parthiana* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [596], pl. 40, fig. 60 (paratype), figs 61, 62 (holotype).

Holotype: MA70323, left valve, collected from the Early Paleocene (Lower Teurian) of Boulder Hill, near Dunedin, Otago, New Zealand.

Remarks: Type for the genus.

Current name: *Marwickia parthiana* (Marwick, 1927) – Maxwell in: Spencer *et al.* (2009: 238).

†*Kuia macdowalli* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [601], pl. 42, figs 98, 100 (Paratypes); fig. 99 (holotype).

Holotype: MA70380, left valve, from Middle Miocene (Waiauan) Third Bay Sandstone, [Finlay's bed 6D (for correlation see Fleming *et al.*, 1969)] Clifden, Southland, New Zealand.

Paratypes: MA73121, 4 articulated specimens and 1 left valve; MA73136, 1 right and 1 left valve, all from Middle Miocene (Lillburnian) Lima Sand, [Finlay's bed 7C (for correlation see Fleming *et al.*, 1969)] Clifden, north west of the type locality;

Paratypes: MA73122, 1 articulated specimen and 2 left valves, from Middle Miocene (Waiauan) [Finlay's bed 8B (for correlation see Fleming *et al.*, 1969)] at Clifden, precise location unknown;

Paratypes: MA73123, 1 articulated specimen and 1 right valve, from the type locality.

Remarks: Finlay's subdivision of Clifden Beds 7 and 8 cannot be identified with confidence and specimens from Finlay's 7C can probably be matched to their source horizon only by comparing their preservation with that of later collections (Fleming *et al.*, 1969: 77, 93).

Current name: *Kuia macdowalli* Marwick, 1927 – Maxwell in Spencer *et al.* (2009: 238).

†*Kuia singularis* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [601], pl. 42, figs 96, 97 (holotype).

Holotype: MA70381, damaged left valve, collected from the Late Miocene (Kapitean) at Mussel Beach, Te

Waewae Bay, Southland, New Zealand.

Current name: *Marama (Hina) singularis* (Marwick, 1927) – Maxwell in Spencer *et al.* (2009: 238).

†*Marama hurupiensis* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [604], pl. 45, figs 125, 126 (holotype).

Paratype: MA73125, articulated specimen, from Late Miocene (Tongaporutuan), Hurupi Formation, Hurupi Stream, north east Palliser Bay, New Zealand.

Current name: *Marama (Marama) hurupiensis* Marwick, 1927 – Maxwell in: Spencer *et al.* (2009: 238).

†*Marama (Hina) hendersoni* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [607], pl. 43, figs 107, 108 (holotype).

Paratype: MA71999, articulated right and left valve, from Middle Miocene (Lilburnian) Mokau Sandstone, Tongaporutu River, Taranaki, New Zealand.

Current name: *Marama (Hina) hendersoni* Marwick, 1927 – Maxwell in: Spencer *et al.* (2009: 238).

†*Notirus caudex* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [57], pl. 11, fig. 39 (holotype).

Holotype: MA70526, a single left valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Irus (Notirus) caudex* (Laws, 1936) – Maxwell in Spencer *et al.* (2009: 238).

†*Notocallista (Fossacallista) exigua* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [77], Pl 13, figs 10,11 (holotype).

Holotype: MA70529, left valve, collected from the Eocene (Aldingan) at Port Willunga, South Australia, Australia.

Remarks: Marwick published the age as Oligocene–Miocene (Janjukian) and gave the location as Aldinga, South Australia. However, the labels with the specimen, including H.J. Finlay's original labels, give two conflicting locations (Aldinga and Adelaide bore gnds [sic]) and ages (Aldingan and Janjukian) for the specimen. Based on an image of the specimen sent to him, T. Darragh (pers com) suggests that from the little matrix still adhering to the interior of the specimen it appears to be from the Blanche Point Marl outcropping in the cliffs at Port Willunga. The age of the Blanche Point Marls at Port Willunga is Late Eocene. Darragh also suggests that Marwick's species could be a junior synonym of *N. (F.) tatei*, but further revision is required.

Current name: *Notocallista (Fossacallista) exigua* Marwick, 1938 – Darragh (1970: 137).

†*Notocallista (Fossacallista) opima* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [76, 77], pl. 13, figs 14, 15 (holotype), fig. 13 (paratype).

Paratypes: MA73209, 6 right and 2 left valves, collected from the Middle Miocene (Balcombian) at Balcombe Bay, Victoria, Australia.

Current name: *Notocallista (Fossacallista) opima* Marwick, 1938 – Darragh (1970: 143).

†*Notocallista (Fossacallista) singletoni* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [78], Pl 14, figs. 15,16 (holotype).

Holotype: MA70532, right valve, collected from Early Miocene (Longfordian) Fossil Bluff Sandstone at Fossil Bluff, near Wynyard, Tasmania, Australia.

Current name: *Notocallista (Fossacallista) singletoni* Marwick, 1938 – Darragh (1970: 147).

†*Notocallista (Fossacallista) tecta* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [75], Pl 14, fig 5,6 (holotype).

Holotype: MA70533, right valve, collected from Late Oligocene (Duntroonian) Chatton Shellbed, Shell Gully, Chatton, Southland, New Zealand.

Paratypes: MA72935, partial right and complete left valves, from the type locality.

Current name: *Notocallista (Fossacallista) tecta* Marwick, 1938 – Maxwell in Spencer *et al.* (2009: 238).

†*Notocallista (Fossacallista) tersa* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [75, 76], Pl 14, figs 4,7 (holotype).

Holotype: MA70534, right valve, collected from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Oamaru, Otago, New Zealand.

Paratypes: MA73110, 3 right and 3 unrelated left valves, from the type locality.

Current name: *Notocallista (Fossacallista) tersa* Marwick, 1938 – Maxwell in Spencer *et al.* (2009: 238).

†*Notocallista (Fossacallista) watti* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [75], pl. 14, figs 12, 13 (holotype).

Paratype: MA72938, right valve, collected from Early Miocene (Waitakian) Otekaike Limestone, ‘Trig Z’ (Fossil Record File I40/f9519), Otiake, Waitaki Valley, New Zealand.

Current name: *Notocallista (Fossacallista) watti* Marwick, 1938 – Maxwell in Spencer *et al.* (2009: 238).

†*Notocallista (Striacallista) lutea* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [72], Pl 13, figs. 5, 6 (holotype).

Holotype: MA70530, left valve, collected by H.J. Finlay from Middle Miocene (Balcombian) Muddy Creek Marl, Muddy Creek, Hamilton, Victoria, Australia.

Paratypes: MA73111, unrelated right and left valves, from the type locality.

Current name: *Notocallista (Striacallista) lutea* Marwick, 1938 – Darragh (1970: 141).

†*Notocallista (Striacallista) mollesta* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [73], pl. 13, figs 7–9 (holotype and paratype).

Paratype: MA73210, left valve, collected from Pliocene sediments at 133–166m (400–500 ft) depth, Abattoirs Bore, Adelaide, South Australia, Australia.

Current name: *Notocallista (Striacallista) mollesta* Marwick, 1938 – Darragh (1970: 142).

†*Notocallista (Striacallista) pestis* Marwick, 1938

Marwick, J., 1938. *Notocallista* and its allies. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 60–81 [73, 74], Pl 13, figs. 3,4 (holotype).

Holotype: MA70531, right valve, collected from Pliocene sediments at 133–166m (400–500 ft) depth, Abattoirs Bore, Adelaide, South Australia, Australia.

Current name: *Notocallista (Striacallista) pestis* Marwick, 1938 – Darragh (1970: 144).

†*Paphia (Callistotapes) finlayi* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [633], figs 208 (holotype), 209 (paratype).

Holotype: MA70583, right valve, collected from Middle Miocene (Lillburnian) Lill Sand, [Finlay’s bed 7A (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Paratype: MA71986, partially intact articulated specimen, from the type locality.

Remarks: Left valve missing the anterior and hinge.

Current name: *Paphia (Callistotapes) finlayi* Marwick, 1927 – Maxwell in Spencer *et al.* (2009: 238).

†*Paradione (Notocallista) trigonalis* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [593, 594], fig. 73 (holotype).

Holotype: MA70585, articulated specimen, collected from Early Miocene (Altonian) Long Beach Shellbed, [Finlay’s bed 6B (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Paratypes: MA73112, 1 right and 2 left valves, from the type locality.

Current name: *Rohea trigonalis* (Marwick, 1927) – Maxwell in Spencer *et al.* (2009: 238).

***Plurigens phenax* Finlay, 1930**

Finlay, H.J., 1930. Additions to the Recent molluscan fauna of New Zealand. No. 3. *Transactions and Proceedings of the New Zealand Institute* 61: 222–247 [246, 247], pl. 42, fig. 11 (holotype), figs 3 (paratype MA72919), 4 (paratypes).

Holotype: MA70632, left valve, collected from 110m (60 fathoms), off Otago Heads, Otago, New Zealand.

Paratype: MA72594, right valve; MA72919, right valve; MA73087, 3 right and 5 unrelated left valves, all from the type locality.

Remarks: Type for the genus.

Current name: *Tawera phenax* (Finlay, 1930) – Spencer *et al.* (2016).

***Tawera bollonsi* Powell, 1932**

Powell, A.W.B., 1932. On some New Zealand pelecypods. *Proceedings of the Malacological Society* 20(1): 65–72 [68–70], pl. 6, fig. 5 (holotype), fig. 6 (paratype).

Holotype: MA70758, right valve, collected by Captain J. Bollons in 1922 from the Auckland Islands, New Zealand.

Paratype: MA71425, left valve, from the type locality.

Current name: *Tawera sphaericula* (Deshayes, 1853) – Spencer *et al.* (2016).

†*Tawera duobrunnea* Marwick, 1948

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [25], pl. 2, figs 2, 3 (holotype), figs 5, 6 (paratypes).

Holotype: MA71133, right valve, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Paratypes: MA72999, unrelated right and left valves, from the type locality.

Current name: *Tawera duobrunnea* Marwick, 1948 – Maxwell in Spencer *et al.* (2009: 238).

***Tawera marionae* Finlay, 1928**

Finlay, H.J., 1928. The Recent Mollusca of the Chatham Islands. *Transactions and Proceedings of the New Zealand Institute* 59: 232–286 [277, 278], pl. 40, figs 21–24 (holotype).

Holotype: MA70759, right and left valves, from 110m (60 fathoms), off Otago Heads, Otago, New Zealand.

Paratypes: MA72963, 1 articulated specimen, 5 right and 5 related left valves, from the type locality.

Current name: *Tawera marionae* Finlay, 1928 – Spencer *et al.* (2016).

†*Tawera marthae* Marwick, 1928

Marwick, J., 1928. The Tertiary Mollusca of the Chatham Islands including a generic revision of the New Zealand Pectinidae. *Transactions and Proceedings of the New Zealand Institute* 58: 432–494 [471], figs 72, 76 (holotype), fig. 75 (paratype).

Paratypes: MA73200, 4 right and 5 left valves, collected

from Early Pleistocene (Nukumaruan) Titirangi Sand, Titirangi, Chatham Islands, New Zealand.

Current name: *Tawera marthae* Marwick, 1928 – Maxwell in Spencer *et al.* (2009: 238).

***Tawera rosa* Powell, 1955**

Powell, A.W.B., 1955. Mollusca of the southern islands of New Zealand. *Cape Expedition Series Bulletin* 15, DSIR, Wellington, 151 pp. [41], pl. 5, figs 41, 42 (holotype).

Paratypes: MA72378, 3 left valves, collected by C.A. Fleming during the Cape Expedition, from the outer coast of the main island opposite Rose Island, Auckland Islands, New Zealand.

Current name: *Tawera rosa* Powell, 1955 – Spencer *et al.* (2016).

†*Turia chattonensis* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [611, 612], pl. 41, figs 85, 86 (holotype), fig. 87 (paratype).

Holotype: MA70805, right valve, from Late Oligocene (Duntroonian) Chatton Formation, Chatton, Southland, New Zealand.

Paratypes: MA72375, 8 right and 17 left valves, from the type locality.

Remarks: Also the type for the genus.

Current name: *Turia chattonensis* Marwick, 1927 – Maxwell in Spencer *et al.* (2009: 238).

†*Turia pukeuriensis* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [612], pl. 41, figs 79–81 (holotype).

Paratypes: MA72975, 1 articulated specimen, 16 right and 22 left valves, and various fragments, from Early Miocene (Altonian) Calamity Point Sandstone, [Finlay's bed 6A (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Current name: *Turia pukeuriensis* Marwick, 1927 – Maxwell in Spencer *et al.* (2009: 238).

†*Turia waiiauensis* Marwick, 1927

Marwick, J., 1927. The Veneridae of New Zealand. *Transactions and Proceedings of the New Zealand Institute* 57: 567–635 [612, 613], pl. 41, figs 82, 84 (holotype) fig. 83 (paratype).

Holotype: MA70806, left valve from Middle Miocene (Waiauan) Nissen Shellbeds 2–6, [Finlay's bed 8A (for correlation see Fleming *et al.*, 1969)], Clifden, Southland, New Zealand.

Paratype: MA71976, 64 right and 50 left valves; MA73476, figured right valve, collected from the type locality.

Remarks: Finlay's subdivision of Clifden beds 7 and 8 cannot be identified with confidence (Fleming *et al.*, 1969: 77).

Current name: *Turia waiiauensis* Marwick, 1927 – Maxwell in Spencer *et al.* (2009: 238).

NEOLEPTONIDAE

***Neolepton caledonicum* Salas & Gofas, 1998**

Salas, C., and S. Gofas, 1998. Description of four new species of *Neolepton* Monterosato, 1875 (Mollusca: Bivalvia: Neoleptonidae), with comments on the genus and on its affinity with the Veneracea. *Ophelia* 48(1): 35–79 [47–49], figs 48–57 (48–55 paratypes).

Paratypes: MA73120, 9 articulated and disarticulated right and left valves, collected in September 1993 from the type locality, station 1240, Montrouzier Expedition, Touho Bay, New Caledonia.

Current name: *Neolepton caledonicum* Salas & Gofas, 1998 – Huber (2015b).

***Notolepton sublaevigatum* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [171, 172], pl. 47, fig. 7 (holotype).

Paratypes: MA71889, 1 articulated specimen, 15 right and 17 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Remarks: In 1994 these specimens were examined by S. Gofas, then of the Museum National D'Histoire Naturelle and 2 specimens were set apart as these are probably not conspecific with the others.

Current name: *Neolepton sublaevigatum* (Powell, 1937) – Spencer *et al.* (2016).

***Notolepton subobliquum* Powell, 1937**

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [172], pl. 47, fig. 6 (holotype).

Paratypes: MA72212, 10 right and 5 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Neolepton subobliquum* (Powell, 1937) – Spencer *et al.* (2016).

***Notolepton triangulare* Dell, 1956**

Dell, R.K., 1956. *The archibenthal Mollusca of New Zealand*. Dominion Museum Bulletin 18, 235 pp. [30, 31], pl. 5, fig. 41 (holotype).

Paratype: MA72759, unrelated right and left valves, from the type locality, collected by R. K. Dell on 7 February, 1954, from C.I.E. station 44, north east of Kaingaroa, Chatham Islands, New Zealand.

Current name: *Neolepton triangulare* (Dell, 1956) – Spencer *et al.* (2016).

***Pachykellya bernardi* Powell, 1927**

Powell, A.W.B., 1927. Deep-water Mollusca from south-west Otago, with descriptions of 2 new genera and 22 new species. *Records of the Canterbury Museum* 3(2): 113–124 [121], pl. 23, fig. 3.

Paratype: MA72350 (missing), dredged by a private scientific party in December 1908, from the steamer 'Rakiura' in 311m (170 fathoms) off Puysegur Point,

Southland, New Zealand.

Remarks: In the type paper (Powell, 1927) Powell listed only a single specimen found at 170 fathoms and none found at 100 fathoms. In addition, at the end of each new species description he listed the holotype as well as the number of paratypes. For *P. bernardi* he only lists a holotype. It is assumed therefore that there were no paratypes for this species and that the Auckland Museum paratype record was created in error.

Current name: *Pachykellya bernardi* Powell, 1927 – Spencer *et al.* (2016).

***Pachykellya concentrica* Powell, 1927**

Powell, A.W.B., 1927. Deep-water Mollusca from south-west Otago, with descriptions of 2 new genera and 22 new species. *Records of the Canterbury Museum* 3(2): 113–124 [121], pl. 23, fig. 2.

Paratypes: MA72352 (missing), 6 specimens, dredged by a private scientific party in December 1908, from the steamer 'Rakiura' in from 311m (170 fathoms) off Puysegur Point, Southland, New Zealand.

Remarks: These specimens have not been found since 1993.

Current name: *Pachykellya concentrica* Powell, 1927 – Spencer *et al.* (2016).

***Pachykellya minima* Powell, 1931**

Powell, A.W.B., 1931. Descriptions of some new species of Recent Mollusca, mainly from the sub-Antarctic Islands of New Zealand. *Records of the Canterbury Museum* 3(6): 371–376 [372], text fig. on p. 372.

Paratypes: MA72355, 1 articulated, 3 right and 1 left valves, from 155m (85 fathoms) 16km (10 miles) north of Enderby Island, Auckland Islands, New Zealand.

Remarks: All valves, except one right valve, are affected by glass disease.

Current name: *Pachykellya minima* Powell, 1931 – Spencer *et al.* (2016).

***Pachykellya rotunda* Powell, 1927**

Powell, A.W.B., 1927. Deep-water Mollusca from south-west Otago, with descriptions of 2 new genera and 22 new species. *Records of the Canterbury Museum* 3(2): 113–124 [121], pl. 23, fig. 4.

Paratypes: MA72351, 2 right and 2 left valves, dredged by a private scientific party in December 1908, from the steamer 'Rakiura' in 183m (100 fathoms) off Puysegur Point, Southland, New Zealand.

Current name: *Pachykellya rotunda* Powell, 1927 – Spencer *et al.* (2016).

***Puysegeria cuneata* Powell, 1927**

Powell, A.W.B., 1927. Deep-water Mollusca from south-west Otago, with descriptions of 2 new genera and 22 new species. *Records of the Canterbury Museum* 3(2): 113–124 [122], pl. 23, fig. 5.

Paratypes: MA72353 (missing), 2 specimens dredged by a private scientific party in December 1908, from the steamer 'Rakiura' in 311m (170 fathoms) off Puysegur Point, Southland, New Zealand.

Remarks: These specimens have not been found since 1993. This is the type species for the genus. In Powell (1927) the genus was consistently spelled as *Puysegeria*, as was the geographical location, Puyseger Point, after which it is presumably named. In Powell (1931, p. 110) the original spelling is retained, but in Powell (1939, p. 225) the spelling is changed to the more etymologically correct *Puyseguria* with specific reference to the emendation. Powell (1941) has both spellings in his list of ‘Biological primary types in the Auckland Museum’, but subsequent authors have used the 1939 emended spelling of *Puyseguria*.

Current name: *Puyseguria cuneata* Powell, 1927 – Spencer *et al.* (2016).

†*Puysegeria wanganuica* Powell, 1931

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [110, 111], pl. 14, fig. 39 (holotype, left valve; figured paratype).

Holotype: MA70654, left valve, collected by A.W.B. Powell in January 1931 from the Pleistocene (Castlecliffian) at Castlecliff, Whanganui, New Zealand.

Paratypes: MA71670, 2 articulated specimens, 2 right and 1 left valves, from the type locality.

Remarks: See above remarks for *Puysegeria cuneata* for the correct spelling of the genus.

Current name: *Puyseguria wanganuica* Powell, 1931 – Maxwell in: Spencer *et al.* (2009: 236).

Puyseguria tani Powell, 1939

Powell, A.W.B., 1939. The Mollusca of Stewart Island. *Records of the Auckland Institute and Museum* 2(4): 211–238 [225], pl. 48, fig. 2 (holotype).

Holotype: MA70653, left valve, collected by A.W.B. Powell in November 1934 from “Old Neck Beach”, presumed here to be The Neck, Paterson Inlet, Stewart Island, New Zealand.

Paratypes: MA71544, 4 articulated, 31 right and 28 left valves, from the type locality.

Remarks: See above remarks for *Puysegeria cuneata* for the correct spelling of the genus.

Current name: *Puyseguria tani* Powell, 1939 – Spencer *et al.* (2016).

Order MYIDA CORBULIDAE

Corbula pura Webster, 1905

Webster, W. H., 1905. Some new species of New Zealand marine shells, together with remarks on some non-marine species, and some additions to the “Index Faunce.” *Transactions and Proceedings of the New Zealand Institute* 37: 276–280 [279], pl. 10, figs 12, 12a.

Holotype: MA70203, articulated specimen, dredged from Rangitoto Channel, Waitemata Harbour, Auckland, New Zealand.

Paratypes: MA71984, right and left valves of a disarticulated specimen, from the type locality.

Current name: *Corbula (Anisocorbula) zelandica* Quoy & Gaimard, 1835 – Spencer *et al.* (2016).

PHOLADIDAE

†*Parapholas aucklandica* Powell, 1938

Powell, A.W.B., 1938. Tertiary molluscan faunules from the Waitemata Beds. *Transactions and Proceedings of the Royal Society of New Zealand* 68: 362–379 [368], pl. 38, fig. 5 (holotype), fig. 6 (paratype).

Holotype: MA70586, articulated specimen, collected by A.W.B. Powell from Early Miocene (Otaian) Tipakuri Formation at ‘Fossil Bay’ just south of Church Bay (sometimes known as Squadron Bay), Waiheke Island, Auckland, New Zealand.

Paratypes: MA71711, 5 articulated specimens, from the type locality.

Current name: *Parapholas aucklandica* Powell, 1938 – Maxwell in: Spencer *et al.* (2009: 238).

Pholadidea acherontea Beu & Climo, 1974

Beu, A.G., and F.M. Climo, 1974. Mollusca from a recent coral community in Palliser Bay, Cook Strait. *New Zealand Journal of Marine and Freshwater Research* 8: 307–332 [310–312], figs 5–7 (holotype), figs 8, 9 (paratypes).

Paratypes: MA72876, articulated whole specimen, disarticulated whole specimen, and three fragments of the siphonoplax of the disarticulated (largest) specimen. Dried animals inside both specimens, collected off the RV Acheron on 11 May 1972, from boulders at 448–512m depth, from the type locality, Turakirae Trench, Palliser Bay, New Zealand.

Current name: *Pholadidea acherontea* Beu & Climo, 1974 – Spencer *et al.* (2016).

†*Pholadidea finlayi* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [57, 58], pl.11, figs 41, 42 (holotype).

Holotype: MA70619, right and left valve which are closely matched in size, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Paratype: MA72690, hinge section with partial left and right valves, from type locality.

Remarks: MA70619 consists of a closely matched right and left valve which may have belonged to the same individual. However, Laws (1936) figured only the right valve in plate 11. He also stated that ‘Type in writer’s collection’ and that ‘There are 2 sets of valves, and odd adult left valve and a very young left valve.’

Current name: *Pholadidea finlayi* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 238).

TEREDINIDAE

***Bankia neztalia* Turner & McKoy, 1979**

Turner, R.D., and J.L. McKoy, 1979. *Bankia neztalia* n. sp. (Mollusca: Bivalvia: Teredinidae) from Australia and New Zealand, and its relationships. *Journal of the Royal Society of New Zealand* 9: 465–473, figs 2, 3, 4 (holotype), 5–9, 17.

Paratype: MA73382, 9 whole organisms in 70% ethanol, from Mahanga Bay, Wellington, New Zealand.

Current name: *Bankia neztalia* Turner & McKoy, 1979 – Spencer *et al.* (2016).

†***Bankia turneri* Powell & Bartrum 1929**

Powell, A.W.B., and J.A. Bartrum, 1929. The Tertiary (Waitematan) molluscan fauna of Oneroa, Waiheke Island. *Transactions and Proceedings of the New Zealand Institute* 60: 395–447 [410–412], pl. 44, fig. 74 (holotype), fig. 75 (paratype).

Holotype: MA72016, left valve, from Early Miocene (Otaian) Tipakuri Formation of ‘Double U Bay’, approximately 800m north of Oneroa Beach, Waiheke Island, Auckland, New Zealand.

Paratypes: MA71694, partial right valve, 2 partial left valves, hinge fragment (?), from the type locality.

Current name: *Bankia turneri* Powell & Bartrum 1929 – Maxwell in: Spencer *et al.* (2009: 238).

Order UNCERTAIN
HIATELLIDAE***Panopea smithae* Powell, 1950**

Powell, A.W.B., 1950. Mollusca from the continental shelf, eastern Otago. *Records of the Auckland Institute and Museum* 4(1): 73–81 [78, 79], pl. 7, fig. 5 (holotype), text figs 4–6 (p. 79).

Holotype: MA71166, disarticulated right and left valves, collected by Captain A. Black from 128m (70 fathoms), off eastern Otago, New Zealand.

Current name: *Panopea smithae* Powell, 1950: Spencer *et al.* (2016).

†***Panopea wanganuica* Powell, 1950**

Powell, A.W.B., 1950. Mollusca from the continental shelf, eastern Otago. *Records of the Auckland Institute and Museum* 4(1): 73–81 [80], pl. 7, fig. 6 (holotype), text figs 7 (holotype), 8 (p. 79).

Holotype: MA71167, right and left valves, from Pleistocene (Castlecliffian) Kupe Formation, (bed CL10 of Fleming, 1947; 1953), Kai Iwi Beach, Whanganui, New Zealand.

Current name: *Panopea smithae* Powell, 1950 – Beu (2006: 292).

Order PHOLADOMYIDA
MYOCHAMIDAE†***Myadora kaiwiensis* Powell, 1931**

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of*

the Auckland Institute and Museum 1(2): 85–112 [111, 112], pl. 14, figs 37, 38 (holotype).

Holotype: MA70508, disarticulated right and left valves possibly from same individual, collected by A.W.B. Powell in 1931 from the Pleistocene (Castlecliffian) 800m (half a mile) north-west of Kai Iwi Stream, Whanganui, New Zealand.

Remarks: Beu (2006: 308) suggested that Lower Kai-Iwi Siltstone is likely to be the provenance of the type, as the species is particularly common and well preserved in this formation. However, it occurs in all siltstone units in the Castlecliff section between Lower Okehu Siltstone and Kupe Formation (Beu pers. comm. 2016).

Current name: *Myadora kaiwiensis* Powell, 1931 – Maxwell in: Spencer *et al.* (2009: 238).

†***Myadora waitotarana* Powell, 1931**

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [95], pl. 12, figs 26, 27 (holotype).

Holotype: MA70509, articulated right and left valves, collected by A.W.B. Powell in 1931 from Late Pliocene (Waipipian) Tangahoe Formation near the mouth of Waihi Stream, Hawera, New Zealand.

Current name: *Myadora waitotarana* Powell, 1931 – Maxwell in: Spencer *et al.* (2009: 239).

CLEIDOTHAERIDAE

***Cleidotherus maorianus* Finlay, 1926**

Finlay, H.J., 1926. A further commentary on New Zealand molluscan systematics. *Transactions and Proceedings of the New Zealand Institute* 57: 320–485 [474, 475], pl. 22, figs 125, 126.

Holotype: MA70176, disarticulated specimen from Kawhia Harbour, Waikato, New Zealand.

Paratype: MA72549, disarticulated specimen from the type locality.

Remarks: no collection date available.

Current name: *Cleidotherus albidus* (Lamarck, 1819) – Beu and Maxwell (1990): 154; Spencer *et al.* (2016).

PARILIMYIDAE

†***Pholadomya waitotarana* Powell, 1931**

Powell, A.W.B., 1931. Waitotaran faunules of the Wanganui System: and descriptions of new species of Mollusca from the New Zealand Pliocene. *Records of the Auckland Institute and Museum* 1(2): 85–112 [96], pl. 11, fig. 16 (holotype).

Holotype: MA70620, distorted but articulated right and left valves, collected by A.W.B. Powell in January 1931, from Late Pliocene (Waipipian) Waipipi Formation, near the mouth of the Wairoa Stream, on the coast near Waverley, New Zealand.

Current name: ‘*Parilimya*’ *waitotarana* (Powell, 1931) – Maxwell in: Spencer *et al.* (2009: 238).

THRACIIDAE

†*Eximiothracia pusillior* Laws, 1936

Laws, C.R., 1936. The Waitotaran Faunule at Kaawa Creek –Part 1. *Transactions and Proceedings of the Royal Society of New Zealand* 66: 38–59 [58], fig. 40 (holotype).

Paratype: MA72691, right valve, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.

Current name: *Asthenothaerus pusillior* (Laws, 1936) – Maxwell in: Spencer *et al.* (2009: 239).

Myadora biconvexa Powell, 1927

Powell, A.W.B., 1927. Deep-water Mollusca from south-west Otago, with descriptions of 2 new genera and 22 new species. *Records of the Canterbury Museum* 3(2): 113–124 [123], pl. 23, fig. 9.

Paratype: MA72354, 2 right and 4 unrelated left valves, dredged by a private scientific party in December 1908, from the steamer ‘Rakiura’ in 311m (170 fathoms) off Puysegur Point, Southland, New Zealand.

Current name: *Barythaerus biconvexus* (Powell, 1927) – Spencer *et al.* (2016).

Parvithracia cuneata Powell, 1937

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [174], pl. 46, fig. 9 (holotype).

Paratype: MA72215, right valve, collected by A.W.B. Powell in 1932 from the type locality, station 934, R.R.S. Discovery II cruise, in 92m off the Three Kings Islands, New Zealand.

Current name: *Batrythaerus cuneatus* (Powell, 1937) – Spencer *et al.* (2016).

LATERNULIDAE

†*Laternula synthetica* Marwick, 1948

Marwick, J., 1948. *Lower Pliocene Mollusca from Otahuhu, Auckland*. New Zealand Geological Survey, Palaeontological Bulletin 16, 38 pp. [27], pl. 6, figs 14 (holotype), 13 (paratype), 15 (reconstruction using fragments including holotype).

Holotype: MA71006, right valve hinge fragment, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.

Remarks: MA71006 consists of 7 fragments figured in Marwick’s (1948) reconstruction (pl. 6, fig. 15), but only the hinge fragment is named as the holotype. The remaining fragments do not appear to have any type status.

Current name: *Laternula laterna* (Lamarck, 1818) – Beu (2004: 184).

CUSPIDARIIDAE

Austroneaera brevirostris Powell, 1937

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [174, 175], pl. 48, fig. 11 (holotype).

Paratypes: MA72216, articulated individual, 3 right valves and 3 unrelated left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Austroneaera brevirostris* Powell, 1937 – Spencer *et al.* (2016).

Austroneaera finlayi Powell, 1937

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [175], pl. 48, fig. 12 (holotype).

Holotype: MA70071, disarticulated valves of single individual, collected in 110m off the Poor Knights Islands, New Zealand.

Paratypes: MA71893, disarticulated right and left valves of 1 individual and 1 left valve, from the type locality.

Remarks: Although the species was published in the Discovery Cruise II report, the type material came from the collection of H.J. Finlay and no further collecting data are available.

Current name: *Austroneaera finlayi* Powell, 1937 – Spencer *et al.* (2016).

SPHENIOPSISIDAE

Mysella aupouria Powell, 1937

Powell, A.W.B., 1937. New species of marine Mollusca from New Zealand. *Discovery Reports* 15: 153–221 [172, 173], pl. 47, fig. 5 (holotype).

Paratypes: MA71890, 2 left valves, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260m off the Three Kings Islands, New Zealand.

Current name: *Grippina aupouria* (Powell, 1937) – Spencer *et al.* (2016).

EUCIROIDAE

†*Euciroa (Euciroa) maoriana* Eagle, 2000

Eagle, M.K., 2000. Six new fossil bivalves from the Early Miocene of Auckland and Northland, New Zealand. *Records of the Auckland Museum* 36: 141–168 [163–165], figs 43, 44 (holotype).

Holotype: MA72657, right valve, collected by M.K. Eagle from Early Miocene (Altonian) Nihotupu Formation, south end of Maori Bay, Muriwai, west Auckland, New Zealand.

Current name: *Euciroa maoriana* Eagle, 2000 – Maxwell in: Spencer *et al.* (2009: 239).

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Provenance of the type specimen of William Colenso's giant weta *Hemideina gigantea*

John W. Early Auckland War Memorial Museum

Abstract

A specimen of a giant weta in Auckland Museum's collections (AMNZ21862) is confirmed to be the holotype of *Hemideina gigantea* Colenso, 1882 and its provenance is established. Its current name is *Deinacrida heteracantha* White, 1842 (Orthoptera: Anostostomatidae). It was collected in 1839 and is the oldest specimen of a New Zealand insect (or perhaps of any NZ land animal) in any New Zealand collection.

Keywords

William Colenso, *Hemideina gigantea*, *Deinacrida heteracantha*, Orthoptera, Anostostomatidae.

INTRODUCTION

William Colenso (1811-1899) was a significant figure in 19th Century New Zealand in all of his various capacities as missionary, printer, correspondent, trader, politician, linguist and first resident naturalist. The biographies by Bagnall and Petersen (1948), Mackay (2012) and Wells (2011) give good insights into this complex man and his very colourful life. His interest in natural history, although primarily botanical, was broad and he published a number of zoological papers including several on insects. A bibliography of his publications can be found in The Colenso Project (2013).

In 1882 William Colenso described a new species of giant weta under the name *Hemideina gigantea*. (Giant weta is the common name now applied to New Zealand's large flightless crickets of the genus *Deinacrida*, Orthoptera: Anostostomatidae). The description was based on a single specimen he had captured in 1839 near Paihia in the Bay of Islands (Colenso 1882) and so it automatically becomes the holotype specimen. A giant weta (Fig. 1) acquired in 1931 by the Auckland Museum (and now registered as AMNZ21862) purports to be this specimen but there is no label with it which links it directly back to Colenso. The brief entry from the museum's accession register, dated 6 August 1931, simply records

355/31 Large collection of zoological and botanical specimens in alcohol.¹
Purchased: Mr W. Hill. Napier.²

1 The weta is the only specimen from this accession that can be currently located in Auckland Museum's collections.

2 Archival correspondence from W.H. Hill gives addresses in Hamilton and Taupo rather than Napier which is where H.T. Hill lived.

St George (2013) published a note on this specimen. At that time the identity of the Mr W. Hill who sold the specimen to the Auckland Museum was uncertain but more information has since come to light. A folder of correspondence between W. Hill and Gilbert Archey, then Director of the museum, has been located in the museum's archives (General Museum Correspondence 1926-1940, MUS-95-43-8). This reveals that he is Mr W.H. Hill, known as Harry, and son of H. T. Hill (Henry) who was one of Colenso's friends, a trustee of his estate³ and also a scientist largely mentored by Colenso (Morris Matthews 1993, 2012). This established a direct link back to Colenso.

THE SPECIMEN AND ITS LABELS

Colenso (1882) stated that his type specimen was preserved in spirits in a clear glass bottle with a ground glass stopper. It has since been removed from alcohol and is now stored dry and held in position in a unit tray by bracing pins. It is covered with a whitish bloom as is often the case with old specimens that have been stored in alcohol for a lengthy period, and is no longer in good condition. The head and right antenna are detached, the head is pierced by an entomological pin, and the left foreleg is broken at the joint between the femur and tibia. There is a large hole in abdominal tergite 3 as though it may have once been pinned in that position. Its body length of approximately 100 mm agrees with published information (four inches).

The labels alongside the specimen are shown in Fig. 1. None is in Colenso's hand so there is no type designation by him. They also contain a number of errors.

3 W.H. Hill stated that his father H.T. Hill was one of Colenso's five trustees (*in litt*, Hill to Archey, 22 June 1931) but Wells (2011: 390) implies that he was not.



Figure 1. Holotype of *Hemideina gigantea* Colenso, AMNZ21862. Photo: Peter Quin.

The large label in pencil reads “Type Colenso 1838” and is in an unknown hand, possibly Hemingway’s. This label is annotated “Labelled thus in Hemingway Coll.” and initialled by E.G. Turbott, the museum’s Ornithologist and Entomologist, probably in 1943 when the Hemingway collection was acquired by the museum. Wilfrid Hemingway was the museum’s Honorary Entomologist from 1937 until his death in 1943. He was a well-off businessman who had his own personal collection of mostly exotic insects which were used in both museum displays and his own exhibitions which he used to raise money for the New Zealand Crippled Children’s Society. He also employed an assistant to pin and prepare the insects at the museum. It seems that he took a liking to Colenso’s giant weta and took it home, unbeknown to anyone at the museum and only

realised after his death in 1943 when his collection was presented to the museum by his widow. It was probably he who removed it from alcohol. Hill implied that there were labels with the specimen (Hill to Archey, 22 June 1931), clearly not Colenso originals but perhaps prepared following deliberate breaking of its glass jar for photography and subsequent re-housing in a new container. The date 1838 is in error, probably for the collection date of 1839.

The two labels in an antique style were written by John Salmon (pers. comm.) when he borrowed the specimen for his taxonomic revision of the New Zealand wetas (Salmon 1950). The reference on the larger of these labels is to a paper by Buller (1895) which mentions Colenso’s species. Both dates on the smaller label are erroneous.

ACQUISITION AND PROVENANCE

Hill initially wrote to Archey on 22 March 1931:

Dear Mr Archey

I have a number of "rare"⁴ specimens" collected by the late Rev Colenso & now in my possession which are certainly valuable enough to be included in the exhibits of your museum. These [?][?][?] 15-20 collecting bottles – made up of botanical specimens in spirits e.g. orchids etc – also including that remarkable specimen of weta *Deinacrida gigantea* which he (W. Colenso) writes of in the *Trans*⁵. Owing to being indirectly⁶ affected⁶ by the Napier 'quake⁶ I feel⁶ [?] to part with them - but given a satisfactory offer - am prepared to let the museum have them – particularly since the collections named[?] were collected in the early '40's. The weta alone⁶ is over 90 years old - & is now as good as when first placed in the spirit. The Dominion Museum in 1914 were keen to collect the specimen from me.

Yours faithfully

W.H. Hill

Hill proposed a sale price of £25 for the lot, noting that he had already been offered £5 in 1913 by the Dominion Museum (now Te Papa Tongarewa, Wellington) for the weta alone, but he preferred not to part with it at that time. He later expressed to Archey that he preferred these specimens come to Auckland Museum rather than Wellington but did not give reasons. Archey's counter-offer was £10, being £5 for the weta and £5 for the other specimens, and he expressed regret that he could not offer more because that would prejudice the Museum's ability to acquire other items for its collections. Hill accepted (but hoped that the Museum might increase its offer to £12), packed and dispatched the specimens which were received by the museum by 15 June 1931.

On 17 June Hill wrote to Archey requesting that he send a cheque for £10 as soon as convenient as he was experiencing some financial hardship. Archey responded that he could not pay immediately

...because it is not perfectly clear as to whether the large weta is actually Colenso's type of *Deinacrida gigantea*. The references in the literature are not particularly clear and there is a possibility from

4 Hill's handwriting is difficult to decipher. A ? following a word indicates my best attempt. [?] indicates a complete word is missing.

5 *Transactions and Proceedings of the New Zealand Institute*.

6 It is not clear what he is referring to, but his father H.T. Hill was badly affected by the Napier earthquake of 7 February 1931. H.T. Hill had recently mortgaged his property on Napier's Bluff Hill to fund a trip back to England, only to have a large part of his section subside and be lost in the earthquake (Morris Mathews 1993).

what Captain Hutton has written that all Colenso's types may be in the Canterbury Museum⁷, and I am awaiting particulars which should reach me on Saturday or Monday. Can you, in the meantime, give me anything that will lead to a more certain identification of the specimen as Colenso's actual type? (Archey to Hill, 18 June 1931)

Hill's response indicates that he was upset, if not more than a little offended, by this but it did elicit the necessary information to establish the weta's status and provenance.

With reference to the *Deinacrida gigantea* of Colenso (type) I am not only satisfied that it is Colenso's type, but perfectly and conscientiously sure of this even taking into account whatever statements to the contrary may be stated by Hutton. Father was a Trustee of Colenso's estate (one of 5) and all his (Colenso's) dry specimens (botanical) were to be deposited in the then Colonial Museum, no mention being made of those that came into my hands very many years ago. The label on the bottle was stated by Colenso as the type specimen but as a photograph was taken of the specimen it was necessary to break the bottle, hence this label was destroyed. I can positively assert that the above specimen as stated to you on divers occasions is the type specimen as mentioned in the *Trans*. or which appears on the label as such.

Revising the matter from any position, I cannot understand why there is the slightest cause of doubt.

I do so trust you appreciate the spirit in which I write, but I feel sure you will understand that your letter has come somewhat as a surprise. (Hill to Archey, 22 June 1931)

In the meantime Archey received a telegram from the Canterbury Museum confirming that they did not have Colenso's type in their collection and he was happy to accept Hill's statement. Hill subsequently wrote

With respect to the *Deinacrida* I felt a little hurt in the belief you did not credit me with the knowledge I possessed so far as Colenso's specimens were concerned, for I feel sure there is but little I do not know respecting this remarkable man; and I am therefore pleased that you are adopting the method you suggest knowing as I do the specimen is as advised. (Hill to Archey, 26 June 1931)

7 I do not know the basis for this. I have read all of Hutton's insect papers and cannot find any statement which would support this. Hutton died in 1905 so it cannot refer to any recent correspondence.

TAXONOMY AND THE NAMING OF THE SPECIES

Colenso collected the weta in 1839, some 4-5 years after he arrived in New Zealand as a young man from England on 30 December 1834 (Wells, 2011). He was aware that Adam White had described *Deinacrida heteracantha* in 1842 (through Dieffenbach's (1843) book) and supposed that his own specimen was identical to it. The specimen was packed away in 1843 before he moved from Paihia in the Bay of Islands to found a mission station at Waitangi, just south of Napier. It wasn't until 1864 that he re-examined it and stated that this showed "their respective and great differences" (Colenso, 1882). Although he stated that it had a close affinity with *D. heteracantha* he chose to place it in the genus *Hemideina* but gave no reasons as to why. In later papers he commented that he doubted that the two genera were naturally distinct (Colenso 1885, 1887).

Hutton, Curator of the Canterbury Museum, borrowed the type from Colenso and after examination decided that their differences were not great and so placed the name *Hemideina gigantea* as a junior synonym of *Deinacrida heteracantha* White (Hutton 1897) which is the name that it is now known by. A similar fate befell many of Colenso's other new species of insects. As a taxonomist Colenso was a 'splitter' - minor differences that would be regarded as intraspecific variation were magnified in his mind so that he saw many new species that did not really exist. This has been well documented for his botanical work (St George, 2009).

A CHEQUERED HISTORY

Although now known by a different name, this weta retains scientific significance as the holotype specimen for the name *Hemideina gigantea*. Should some taxonomist in the future decide that Colenso was correct after all and that it is a distinct species (no matter how improbable) this specimen will be the holotype. However, unlike most specimens in scientific collections, this weta has had quite a history and achieved fame so that its scientific value and importance are enhanced from this historical perspective. Details of its history prior to 1880 are taken from Colenso (1882).

1839: Captured in a small low wood behind Paihia.

1839-43: Examined by luminaries in Paihia – Ernst Dieffenbach, Sir Joseph Hooker, Dr Andrew Sinclair, Lady Franklin and various visiting American and French naturalists.

1843-1864: Packed away in a box.

1865: Exhibited at the New Zealand Exhibition, Dunedin.

1880: Colenso decides it is a new species and presents a paper to the Hawkes Bay Philosophical Institute.

1882: Colenso's description and name are published in the *Transactions of the New Zealand Institute*.

1896: Capt. F.W. Hutton borrows it from Colenso and synonymizes the name with *Deinacrida*

heteracantha White, 1842. The name change is published in 1897.

1899: Came into the possession of H.T. Hill's family, Napier, following Colenso's death, probably bought by H.T. Hill from the estate. Wells (2011: 393) mentions "1 Lot of Preserved Insects etc & 1 Lot of Specimens of all sorts (£5)".

1931: Purchased by Auckland Museum from W.H. Hill for £5 after due diligence by Gilbert Archey.

1937-43: Found its way into the private collection of Wilfrid Hemingway, Honorary Entomologist, Auckland Museum.

1943: 'Discovered' in Hemingway's collection when it came to Auckland Museum after his death.

2002: Poster girl for *More than a Mummy*, Auckland Museum's 150th birthday exhibition.

THE OLDEST NEW ZEALAND INSECT?

In one of his letters, Hill wrote

...and I believe that if the truth were known, that specimen is one of the oldest in N.Z. today. (Hill to Archey, 26 June 1931)

Enquiries to fellow curators of museums and other collections in New Zealand show that Hill's prediction was correct and that it is indeed the oldest specimen of a New Zealand insect in a New Zealand collection. There are older N.Z. specimens in European collections obtained during the early voyages of discovery (e.g. Captain James Cook in the Natural History Museum, London), and there may well be exotic insects older than 1839 in New Zealand collections e.g. Auckland Museum holds a small collection of European insects, mostly Hemiptera, Orthoptera and Hymenoptera, made by the Swiss entomologist Henri de Saussure and acquired 1877-1880.

The weta may also be the oldest N.Z. land animal collected alive that survives in any New Zealand collection. The oldest New Zealand bird in a New Zealand collection is probably a takahe (*Porphyrio hochstetteri*) at Te Papa collected in 1851 (Gill 2007) but the oldest land vertebrate is a shore skink (*Oligosoma smithi*) taken from Bay of Islands in 1841 and now in the Auckland Museum's collection. It was collected by naturalists of the *Erebus* and *Terror* Antarctic Expedition under the command of James Clark Ross (1839-1943) (Gill 2000). The visit of the HMS *Erebus* to the Bay of Islands occasioned the meeting of Colenso and Joseph Dalton Hooker, the expedition's botanist. The two young men had an instant rapport and thus began a lifelong friendship and collaboration as their frequent correspondence demonstrates (St George 2009). Colenso certainly showed Hooker his giant weta (Colenso 1882) and it seems probable that he (Colenso) may have seen the freshly-collected shore skink, another link between these two pioneering naturalists who contributed so much to the early scientific knowledge of the flora and fauna of Aotearoa New Zealand.

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Biogeography and biodiversity of intertidal micromollusca of northern New Zealand

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Abstract

Three hundred and sixty-seven species (91% endemic to New Zealand) of micromollusc (greatest dimension of adult shell <10 mm) are recorded from the intertidal zone of northern New Zealand. Many of these shells have been washed up dead from deeper water and thus the total diversity is more representative of the inner shelf (0-50 m), but at least 154 species have been found living in our intertidal surveys. Eleven of our species' records are provincial range extensions, two for the Aupourian Province (northeast coast) and nine for the Cookian Province (west coast). More than twice the number of micromolluscs live in the warmer Aupourian Province (361 spp.) than the west coast Cookian Province (157 spp.). Cluster analysis of 162 spring low-tidal survey localities based on presence/absence data (Jaccard coefficient) of 257 micromollusc species allows the recognition of nine associations that reflect increasing diversity from sheltered inner harbour localities (0-10 species per locality) out to partly sheltered-fully exposed localities around the entrance to the Hauraki Gulf (61-140 species per locality). The cluster subdivision also reflects the lower biodiversity on the open west coast shores compared to the east coast, partly a result of the greater range of habitats present on open east coast shores. The two inner and middle harbour associations occur in both the Waitemata and Manukau harbours on each coast. Two other associations that occur around the entrance to the Manukau Harbour also occur on the coast around the middle reaches of the Hauraki Gulf. One association is restricted to the exposed west coast of the Waitakere Ranges and Awhitu Peninsula and the remaining four associations are restricted to the coast of the inner, middle and outer Hauraki Gulf and Whangarei Harbour on the east coast..

Keywords

Auckland; Hauraki Gulf; intertidal micromolluscs; biogeography; biodiversity.

INTRODUCTION

Most ecological and conchological marine studies restrict their attention to the larger, more easily seen organisms, many of which belong to the phylum Mollusca. There is, however, a sizeable group of smaller molluscs (micromolluscs) that receive far less attention, largely because they require a hand lens or microscope to view them in sufficient detail to identify. Micromolluscs are defined as molluscs with the greatest dimension of their shell being less than 10 mm (Beu and Maxwell 1990). In fact many are considerably smaller than 5 mm. They are aesthetically rewarding as they include some of the most elegant and most beautifully sculptured shells of all molluscs. Although some micromolluscs belong to families in which large species predominate, the majority occur in relatively few families that are composed more or less exclusively of small species (Beu and Maxwell 1990). In most cases micromolluscs and juveniles of larger adult species can

be distinguished by differences such as the relative size or orientation of the protoconch (Morley 2000).

In this paper we provide results from the most extensive study so far undertaken in New Zealand of the geographic distribution of micromolluscs that either live intertidally or that get washed up intertidally as dead shells. We provide an assessment of the biodiversity of intertidal micromolluscs of northern New Zealand and the factors that influence the faunal differences between the east and west coasts and the sheltered to exposed parts of the Hauraki Gulf.

Previous Work

Suter (1913, 1915) was the first to provide a summary of the state of knowledge of the New Zealand molluscan fauna giving both descriptions and illustrations of over 1000 shells, many of them micromolluscs. Laws (1937-1940) published extensively on the Pyramidellidae. Ponder (1965a-c, 1968) was the next to make a major contribution to our knowledge of New Zealand

micromolluscs by providing illustrations, localities and comprehensive descriptions of both the shell and live animal. He mainly documented the micromollusc families Cingulopsidae, Eatonellidae, Rastodontidae, Rissoellidae and Anabathridae (as Rissoidae). Morton and Miller (1968: 205-209) described the habitats and life style of intertidal micromolluscs both on seaweeds and under stones mostly from northern New Zealand. In Powell's monumental work (1979) micromollusc descriptions were expanded, some based on Suter, Ponder and other earlier records. Beu and Maxwell (1990) dedicated a whole chapter to micromolluscs in their monograph on New Zealand fossil Cenozoic Mollusca.

Members of the Auckland Museum Conchology Section have made numerous small studies on micromolluscs of northern New Zealand. Among these were: Norman Gardner (1966, 1968, 1977); Ken Hipkins (1950, 1951, 1955, 1956, 1958, 1959) who published on micromolluscs of the families Columbelloidea and Rissoidae and of seaweed and stones. First author, Margaret Morley (2000, 2009) published observations on *Turbonilla*, *Evalea* and those inhabiting shipworm tubes (Morley and Bain 2007). She also documented the distribution of micromolluscs in Whangapoua Estuary, Coromandel Peninsula (Morley and Hayward 2006) and compared the micromollusc faunas and their tidal zonation in intertidal *Corallina* pools of Auckland's east and west coast harbours (Morley and Hayward 2010). Conchology Section members surveyed the intertidal shores of the Manukau Harbour including micromolluscs (Morley *et al.* 2011).

METHODS

This study has two parts: the first presents a species list of the intertidal micromolluscs and their locality records from northern New Zealand; the second is the quantitative biogeographic and diversity analyses of micromolluscs around Auckland and the Hauraki Gulf.

Study area and sources of species records

For the purposes of the first part of this study we have defined northern New Zealand as extending northwards from the Manukau Harbour, Firth of Thames and Coromandel Peninsula and including Great Barrier Island, but not the Three Kings or Kermadec islands.

The majority of the species records reported here have been made by the authors since 1995 while undertaking the semi-quantitative intertidal surveys described below for the second part of the study. These have been supplemented with the records from major surveys where the total biota has already been documented and published by us. These are, from north to south: Parengarenga Harbour (Hayward *et al.* 2001), Ahipara (Hayward *et al.* 2004), Kawerua (Hayward *et al.* 1995), Bay of Islands (Morley and Hayward 1999), Whananaki (Hayward *et al.* 2012), Great Barrier Island (Morley and Hayward 2009), Whangapoua, Coromandel Peninsula (Hayward *et al.* 2014), Waitemata Harbour (Hayward *et al.* 1999), Tamaki Estuary (Hayward and Morley 2008), Bucklands Beach (Morley 2002), Howick

Beach (Morley *et al.* 2001), Te Matuku Bay, Waiheke Island (Hayward *et al.* 1997), and the Waitakere Ranges and northern Manukau Harbour (Hayward and Morley 2004). Ad-hoc historical locality records dating back to 1980 made by one of us (MSM, Appendix 1) have also been included, together with observations of species made during snorkelling at shallow subtidal depths down to 1-3 m. These unpublished records consist of drawings, photographs and notes. A number of additional locality records have been added from Ponder (1965a-c) and Powell (1979).

Field

The second part of this study, around Auckland and the Hauraki Gulf, is based on the results of 162 extensive intertidal surveys undertaken by the authors over the past 15 years. Each survey aimed to provide a qualitative assessment of the abundance and occurrence of the live macrobiota and micromolluscs of a 0.5-2 km stretch of coast that was typically surveyed over a 2-4 hr period either side of a spring low tide. Each survey also recorded all the species of washed-up dead molluscan shells. Only some of the larger microscopic molluscs can be seen in the field, so the micromollusc data for this study was acquired by collecting samples of shelly sediment from all likely habitats (low tidal sediment, shell wash-ups, intertidal pools and gullies, under moveable rocks), collecting clumps of oysters or tube worms to break apart, shaking samples of seaweed into large plastic bags, and washing clinging micromolluscs off the undersides of intertidal cobbles.

Identifications

The shell sand and other samples were taken back to the laboratory, examined under a microscope and the micromollusc species identified by MSM. Often with microscopic gastropod shells it is difficult to determine whether the animal is alive and withdrawn deeply into the shell or the shell is empty. Although qualitative assessments of abundance of live micromolluscs were attempted (Appendix 1), it was decided that these determinations were unlikely to be reliable enough to use in our analyses. We used therefore only data on the presence or absence of micromollusc species (live and dead) at each survey site in our analyses. Identifying micromollusc shells under the microscope was more reliable for live taken specimens as they usually retained all the features useful for positive identification, whereas dead shells were often abraded and faded making identification less certain. The seminal taxonomic works of Ponder (1965a-c) and Powell (1979) were the main tools used for identifications. These have been updated using Spencer *et al.* (2014). Illustrations in the figures in this paper are the work of the first author (MSM) unless stated otherwise.

While we were undertaking this study, DNA sequencing was used by Nakano *et al.* (2009) to study the limpets of the genus *Notoacmea*. This molecular work was used to clarify the taxonomy of the common tiny intertidal limpets, that up until then had been lumped by us into the species *N. elongata* and *N. helmsi*. Unfortunately some of the genetically-distinguished

species (e.g. *N. elongata*, *N. daedala*) are impossible or very difficult to distinguish on shell characters alone. Thus we have retained the taxon *N. elongata* s.l. for our pre-2009 identifications and many of those shells subsequently found to be indistinguishable. Wherever identifications were possible from shell and soft part morphologies we have subsequently recorded *N. daedala*, *N. elongata*, *N. potae*, *N. rapida* and *N. turbatrix* (Table 1 – over page).

Voucher specimens of the majority of the micromollusc species recorded here have been placed in the collections of the Marine Department of the Auckland War Memorial Museum (catalogue numbers prefixed by MA).

Statistical analysis

To investigate the geographic distribution of micromolluscs around northern New Zealand, we undertook a Q-mode cluster analysis (Jaccard similarity coefficient) on our 162 survey sites based on the presence or absence of 257 micromollusc species in each. The analysis was undertaken using the MVSP statistical package (Kovach 1993) and a dendrogram classification produced using the unweighted pair group method with arithmetic mean. From the dendrogram we recognise nine locality cluster associations with nine samples unclustered. To identify the most characterising species of each association we calculated the persistence and fidelity of each species with respect to each association, where:

Persistence (P) = percentage of sites within the association in which the species occurs;

Fidelity (F) = degree to which a species is restricted to an association expressed as the percentage of sites within the association in which the species occurs less its mean percentage in the other associations.

ECOLOGICAL DISTRIBUTION

In this study we have records of at least 154 micromollusc species as living in intertidal habitats (Table 1). The remainder have only been recorded dead, washed up by storms and concentrated in shell lines on beaches or trapped in the sediment on the bottom of intertidal pools or under cobbles. Intertidal micromolluscs have been found living in a wide variety of habitats. Characteristic and more abundant species of these various habitats are cited here:

Living in low tidal fine sediment in sheltered harbours and estuaries: *Theora lubrica*, *Linucula hartvigiana*, *Arthritica bifurca*, *Odostomia* spp., *Turbonilla errabunda*;

In trails in low tidal sandy sediment: *Turbonilla* spp.;

Living in sediment under stable cobbles: *Anabathron* spp., *Merelina* spp., *Pisinna* spp., *Rissoina* spp. and *Turbonilla* spp.;

Grazing microalgae on high tidal rocks: *Austrolittorina antipodum*;

Attached to underside of high tidal rocks resting on mud: *Caecum digitulum*;

Attached to underside of low tidal rocks: *Anabathron hedleyi*, *Austromitra rubiginosa*, *Borniola reniformis*,

Sinezona brevis, *Zemitrella choava*;

Living in high tidal crevices, feeding on wave-tossed detritus: *Lasaea hinemoa*, *Leuconopsis obsoleta*;

Attached to underside of dead shells: *Notoacmea* spp.;

Inside clumps and dead shells of rock oysters

(*Saccostrea glomerata* and *Crassostrea gigas*):

Leuconopsis obsoleta, *Risellopsis varia*, *Fossarina rimata*, *Notoacmea* spp.;

Inside clumps of the oyster *Ostrea stentina*: *Evalea sabulosa* (Morley 2009);

Inside clumps of the tube worm *Spirobranchus*

cariniferus: *Leuconopsis obsoleta*, *Risellopsis varia*;

Living among the branchlets of coralline turf: *Lasaea*

hinemoa, *L. maoria* (Morley and Hayward 2010);

Living in sediment in the bottoms of coralline turf-lined pools and low-tidal gullies: *Anabathron*

hedleyi, *Eatonina* spp., *Eatoniella olivacea*, *Neolepton*

antipodum, *Tubbreva exigua*, *Zalipais lissa* (Morley

and Hayward 2010);

Attached to the red seaweed *Vidalia colensoi*:

Gaimardia fnlayi;

Clinging to other larger seaweeds: *Eatoniella* spp.,

Rissoella spp.

Attached inside the holdfasts of larger seaweed:

Hiatella arctica;

Inside rotting wood and the empty tunnels of the

shipworm, *Bankia australis*: *Leuconopsis obsoleta*

(Morley and Bain 2007);

Inside the mantle of the rock borer, *Barnea similis*:

Arthritica crassiformis;

Parasitic or commensal on the holothurian *Trochodota*:

Scintillona zelandica;

Parasitic on polychaete worms: *Odostomia incidata*.

Commensal and attached by byssal threads to the anal

spines of the heart urchin *Echinocardium cordatum*:

Montacuta semiradiata.

SPECIES DIVERSITY

A total of 367 species of micromolluscs have been recorded here from the intertidal zone of northern New Zealand. Of these 154 have been found definitely alive in the intertidal. Of the remainder, some may live intertidally but probably the majority live subtidally and have been washed up dead. These dead washed-up shells are more diverse on more open coasts than inside harbours and the inner Hauraki Gulf.

To more objectively document geographic trends in species diversity, this section only uses diversity data derived from our study sites that were surveyed by consistent methods. There is a clear trend in increasing species diversity moving from the inner lower salinity parts (0-10 spp.) of harbours and estuaries (Manukau and Waitemata Harbours, Tamaki Estuary, Firth of Thames) out towards the more normal salinity outer parts (11-40 spp.) with more diverse habitats (particularly rocky shore habitats) (Fig. 1). On the east coast there is a clear trend of increasing micromollusc diversity from the more sheltered inner Hauraki Gulf and Firth of Thames (11-30 spp.) through the middle reaches (31-60 spp.) to the outer (50-140 spp.). On the west coast there is a

Table 1. List of intertidal micromolluscs (<10 mm greatest dimension) from northern New Zealand giving their distribution in terms of five subregions and in terms of New Zealand provinces (Powell, 1955). Province abbreviations are: A = Aupourian, C = Cookian, F = Forsterian, K = Kermadecian, M = Moriorian, An = Antipodian, with E = endemic to New Zealand. x = present. Species names have been updated to Spencer *et al.* (2014).

| | Regions | NE coast Cape Maria - Whangarei 313 spp. | Hauraki Gulf Whangarei- Miranda 234 spp. | Great Barrier and Coromandel 258 spp. | NW coast Ahipara- Hokianga 108 spp. | W coast Kaipara- Awhitu 115 spp. | 73 spp. | Live 154 |
|---|--------------|---|---|--|--|---|---------|-------------|
| Gastropoda | | | | | | | | |
| <i>Aequispirella finlayi</i> (Powell, 1933) | A,C,M,E | x | | x | | x | | x |
| <i>Agatha georgiana</i> (Hutton, 1885) | A,C,F,M,E | x | x | x | | | | |
| <i>Alvania gallinacea</i> (Finlay, 1930) | A,E | | | x | | | | |
| <i>Alvania pinguoides</i> (Powell, 1940) | A,E | x | | | | | | |
| <i>Ammonicera</i> sp. 4 (Marshall sp. 2000) | | x | x | x | | | | x |
| <i>Ammonicera</i> spp. | | x | x | x | | x | | x |
| <i>Amphithalamus falsestea</i> (Ponder, 1968) | A,C,E | x | x | x | x | x | | x |
| <i>Amphithalamus incidatus maoria</i> (Ponder, 1968) | A,C,E | x | x | | | | | x |
| <i>Amphithalamus ornatus</i> (Powell, 1927) | A,E | x | | x | | | | |
| <i>Amphithalamus semen</i> (Odhner, 1924) | A,C,M,E | x | x | x | | x | | x |
| <i>Anabathron angulatum</i> (Powell, 1927) | A,E | | x | | | | | |
| <i>Anabathron elongatum</i> (Powell, 1927) | A,E | x | x | x | | | | x |
| <i>Anabathron excelsum</i> (Powell, 1933) | A,E | x | x | x | | | | x |
| <i>Anabathron hedleyi</i> (Suter, 1908) | A,C,F,M,E | x | x | x | x | x | | x |
| <i>Anabathron ovatum</i> (Powell, 1927) | A,C,E | x | x | x | x | x | | x |
| <i>Anabathron rugulosum</i> (Powell, 1930) | A,E | x | x | x | x | | | x |
| <i>Anatoma</i> cf. <i>regia</i> (Mestayer, 1916) | A,C,F | | | x | | | | |
| <i>Aoteadrillia wanganuiensis</i> (Hutton, 1873) | A,C,F,E | | | x | | | | |
| <i>Argalista fluctuata</i> (Hutton, 1883) | A,C,F,M,An,E | x | x | x | | | | x |
| <i>Argalista imperforata</i> Powell, 1940 | A,C,F,E | x | | | | | | |
| <i>Assimineia vulgaris</i> (Webster, 1905) | K,A,C | x | x | x | | x | | x |
| <i>Asteracmea suteri</i> (Iredale, 1915) | A,C,F,An,E | x | x | x | x | x | | |
| <i>Ataxocerthium huttoni</i> (Cossmann, 1895) | A,C,F,E | | x | | | | | |
| <i>Attenuata bollonsi</i> (Powell, 1930) | A,E | x | | x | | | | |
| <i>Attenuata manawatawhia</i> (Powell, 1937) | A,E | x | | x | | | | |
| <i>Austrodrillia rawitensis</i> Hedley, 1922 | A,C,E | x | x | x | | | | |
| <i>Austrodrillia secunda</i> Powell, 1965 | A,E | x | | x | | | | |
| <i>Austrolittorina antipodum</i> (Philippi, 1847) | K,A,C,F,M,E | x | x | x | x | x | | x |
| <i>Austromitra rubiginosa</i> (Hutton, 1873) | A,C,F,M,E | x | x | x | x | x | | x |
| <i>Awanuia dilatata</i> Powell, 1927 | A,E | x | | | | | | |
| <i>Awanuia porcellana</i> Ponder, 1967 | A,C,E | x | | | | | | |
| <i>Bouchettriphora pallida</i> (Pease, 1870) | K,A,C | x | x | x | x | | | x |
| <i>Caecum digitulum</i> Hedley, 1904 | A,C,F,M,An,E | x | x | x | x | x | | x |
| <i>Cantharidus dilatatus</i> (G.B. Sowerby II, 1870) | A,C,F,M,E | x | x | x | | x | | x |
| <i>Cavolinia inflexa</i> (Lesueur, 1813) | A,C | x | | | | | | |
| <i>Cerithiella stiria</i> (Webster, 1906) | A,E | x | | x | x | | | |
| Cerithiopsidae indet. | | | x | x | | | | |
| <i>Cerithiopsis powelli</i> B.A. Marshall, 1978 | K,A,C,E | | | x | | | | |
| <i>Cirsonella</i> aff. <i>consobrina</i> Powell, 1930 | A,E | | | x | | | | |
| <i>Cirsonella</i> aff. <i>laxa</i> Powell, 1937 | A,C,An,E | | x | | x | | | x |
| <i>Cirsonella paradoxa</i> Powell, 1937 | A,E | x | x | | | | | |
| <i>Cirsonella variegata</i> Powell, 1940 | A,F,E | | x | x | | | | |
| <i>Crassitiella carinata</i> Ponder, 1965 | A,E | x | x | x | x | | | x |
| <i>Crosseola cuvieriana</i> (Mestayer, 1919) | A,E | x | | x | | | | |
| <i>Curveulima aupouria</i> (Powell, 1937) | A,C,E | x | | | | | | |
| <i>Curveulima bollonsi?</i> (Powell, 1937) | A,E | x | | | | | | |
| <i>Curveulima titahica</i> (Suter, 1908) | A,C,E | x | x | | | | | |
| <i>Cylichna thetidis</i> Hedley, 1903 | K,A | x | x | x | | | | x |
| <i>Cylichna zealandica</i> Kirk, 1880 | A,C,E | x | | | | | | |
| <i>Cystiscus vidae</i> (Dell, 1956) | A,C,E | x | | x | | | | |
| <i>Dentimargo amoena</i> (Suter, 1908) | A,An,E | x | | | x | | | |
| <i>Dentimargo cairoma</i> (Brookes, 1924) | A,C,M,E | x | x | x | x | x | | x |
| <i>Diaphana brazieri</i> Angas, 1877 | A,F,An | x | | x | | | | |
| <i>Dolicrossea vesca</i> Finlay, 1926 | A,C,M,E | x | | x | x | | | |
| <i>Eatoniella albocolumella</i> Ponder, 1965 | A,C,M,E | x | x | x | x | x | | x |

| | Regions | NE coast Cape Maria - Whangarei | Hauraki Gulf Whangarei- Miranda | Great Barrier and Coromandel | NW coast Ahipara- Hokianga | W coast Kaipara- Awhitu | Live |
|--|--------------|---------------------------------------|---------------------------------------|------------------------------------|----------------------------------|-------------------------------|------|
| <i>Eatoniella atervisceralis</i> Ponder, 1965 | A,C,F,M,E | x | x | | x | x | x |
| <i>Eatoniella atropurpurea</i> (Frauenfeld, 1867) | A,C,F,M | x | x | x | | | x |
| <i>Eatoniella delli</i> Ponder, 1965 | A,C,E | x | x | x | | x | x |
| <i>Eatoniella dilatata</i> (Powell, 1955) | A,C,F,M,An,E | x | x | x | | x | x |
| <i>Eatoniella flammulata</i> (Hutton, 1878) | A,C,E | x | x | x | x | | x |
| <i>Eatoniella globosa</i> Ponder, 1965 | A,E | | x | x | | x | x |
| <i>Eatoniella latebricola</i> Ponder, 1965 | A,C,E | | x | x | | x | |
| <i>Eatoniella limbata</i> (Hutton, 1883) | A,C,F,M,E | x | x | x | x | x | x |
| <i>Eatoniella lutea</i> (Suter, 1908) | A,C,E | x | x | x | | | x |
| <i>Eatoniella mortoni</i> Ponder, 1965 | A,C,M,E | x | x | x | x | x | x |
| <i>Eatoniella notalabia</i> Ponder, 1965 | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Eatoniella notata</i> Ponder & Yoo, 1978 | A,C,E | x | x | x | | x | x |
| <i>Eatoniella olivacea</i> (Hutton, 1882) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Eatoniella perforata</i> Ponder, 1965 | A,E | | x | x | | | x |
| <i>Eatoniella pfefferi</i> (Suter, 1909) | A,C,F,M,An,E | | x | x | x | x | x |
| <i>Eatoniella pullmitra</i> Ponder, 1965 | A,C,F,M,E | x | x | | | | x |
| <i>Eatoniella puniceomacer</i> Ponder, 1965 | A,E | x | x | x | | | |
| <i>Eatoniella roseocincta</i> (Suter, 1908) | A,C,E | x | x | x | | x | |
| <i>Eatoniella roseola</i> (Iredale, 1915) | A,C,F,M,An,E | x | x | x | | x | |
| <i>Eatoniella roseospira</i> (Powell, 1937) | A,C,E | x | x | x | x | x | x |
| <i>Eatoniella tenella</i> (Powell, 1937) | A,E | x | x | x | | | x |
| <i>Eatoniella varicolor</i> Ponder, 1965 | A,C,F,E | x | x | x | | x | x |
| <i>Eatonina atomaria</i> (Powell, 1933) | A,C,F,M,An,E | x | x | x | | x | x |
| <i>Eatonina crassicarinata?</i> (Powell, 1937) | A,E | | | | x | | |
| <i>Eatonina maculosa</i> Ponder, 1965 | A,E | | | x | | | |
| <i>Eatonina micans</i> (Webster, 1905) | A,C,An,E | x | x | x | | x | x |
| <i>Eatonina subflavescens</i> (Iredale, 1915) | A,C,An,E | x | x | x | x | x | x |
| <i>Elachorbis sublatei</i> (Suter, 1907) | A,C,F,An,E | x | x | x | | | |
| <i>Eulima perspicua</i> (Oliver, 1915) | K,A,C,E | x | x | x | | x | x |
| <i>Eulimella coena</i> Webster, 1905 | A,E | | x | | | | |
| <i>Eulimella levilirata</i> Murdoch & Suter, 1906 | A,C,F,M,E | x | x | x | | x | x |
| <i>Evalea sabulosa</i> (Suter, 1908) | A,C,F,M,An,E | | x | x | | | x |
| <i>Fictonoba carnosus carnosus</i> (Webster, 1905) | A,C,E | x | x | x | | | x |
| <i>Fictonoba rufolactea</i> (Suter, 1908) | A,C,E | x | x | x | | x | x |
| <i>Fossarina rimata</i> (Hutton, 1884) | A,C,E | x | x | x | x | x | x |
| <i>Fusculima mangonui</i> (Powell, 1940) | A,E | x | x | x | | | x |
| <i>Gibberula ficula</i> (Murdoch & Suter, 1906) | A,C,F,E | x | | x | | | |
| <i>Graphis blanda</i> (Finlay, 1924) | A,F,E | | x | x | | | x |
| <i>Gumina dolichostoma</i> (Suter, 1908) | A,C,F,M,E | x | x | x | | | |
| <i>Gumina minor</i> Laws, 1940 | A,E | x | x | | | | |
| <i>Halopyrgus pupoides</i> (Hutton, 1882) | FW:N,S,E | x | x | x | | | x |
| <i>Heliconoides inflata</i> (d'Orbigny, 1836) | A,C | x | | x | | | |
| <i>Herpetopoma bellum</i> (Hutton, 1873) | A,C,M,E | x | x | x | x | x | |
| <i>Herpetopoma larochei</i> (Powell, 1926) | A,C,E | x | | x | x | | |
| <i>Heterocithara medicris</i> Odhner, 1924 | A,E | x | | x | | | |
| <i>Horologica dirempta</i> (Odhner, 1924) | A,E | | | x | | | |
| <i>Hypermastus bulbula</i> (Murdoch & Suter, 1906) | A,E | x | | x | x | | |
| <i>Incisura lytteltonensis</i> (E.A. Smith, 1894) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Incisura rosea</i> (Hedley, 1904) | A,C,F,M,An,E | x | x | x | | x | x |
| <i>Iravadia inflata</i> (Ponder, 1967) | A,E | x | | x | | | |
| <i>Ividella maoria</i> Powell, 1940 | A,E | x | | | | | |
| <i>Laevilitorina alta</i> (Powell, 1940) | A,E | | x | x | | | x |
| <i>Larochia miranda</i> Finlay, 1927 | A,E | x | | | | | |
| <i>Larochella alta</i> Powell, 1927 | A,C,F,M,E | x | x | x | x | | x |
| <i>Leuconopsis obsoleta</i> (Hutton, 1878) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Leucosyrinx eremita</i> (Murdoch & Suter, 1906) | A,E | x | | x | | | |
| <i>Linopyrga rugata rugata</i> (Hutton, 1886) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Liotella indigens</i> Finlay, 1926 | A,E | x | | | | | |
| <i>Liotella polypleura</i> (Hedley, 1904) | A,C,F,M,An,E | x | x | x | | x | x |
| <i>Liratilia compta</i> Powell, 1930 | A,C,E | x | | | | | |
| <i>Liratilia conquisita conquisita</i> (Suter, 1907) | A,C,F,An,E | x | | x | | | |
| <i>Liratilia elegantula</i> Powell, 1937 | A,E | x | | | | | |
| <i>Liratilia sinuata</i> Powell, 1937 | A,E | x | | | | | |

– Table 1 continued over page

| | Regions | NE coast Cape Maria Whangarei | Hauraki Gulf Whangarei- Miranda | Great Barrier and Coromandel | NW coast Ahipara- Hokianga | W coast Kaipara- Awhitu | Live |
|---|------------|-------------------------------------|---------------------------------------|------------------------------------|----------------------------------|-------------------------------|------|
| <i>Liratilia subnodosa</i> Powell, 1934 | A,E | x | | | | | |
| <i>Lissotestella tryphenensis</i> (Powell, 1931) | A,E | | | x | | | |
| <i>Lodderena formosa</i> Powell, 1930 | A,FE | x | x | x | x | | |
| <i>Lodderia iota</i> Powell, 1940 | A,C,E | x | x | x | | x | x |
| <i>Lodderia waitemata</i> Powell, 1940 | A,E | x | x | x | | | x |
| <i>Macrazafra enwrighti</i> Powell, 1940 | A,E | x | | | | | |
| <i>Macrazafra mariae</i> Powell, 1940 | A,E | x | | | | | |
| <i>Macrazafra nodicincta</i> (Suter, 1899) | A,C,FE | x | | x | | | |
| <i>Macrazafra subabnormis</i> (Suter, 1899) | A,C,M,E | x | x | x | x | | |
| <i>Manzonia gemmata</i> (Powell, 1927) | A,E | x | x | | | | |
| <i>Maoritomella albula</i> (Hutton, 1873) | A,C,FE | x | x | x | | | x |
| <i>Melanella</i> sp. | | x | x | x | | | |
| <i>Mendax ?trizonalis trizonalis</i> (Odhner, 1924) | A,E | x | | | | | |
| <i>Merelina compacta</i> Powell, 1927 | A,E | x | x | x | x | | |
| <i>Merelina coronata</i> (Powell, 1926) | A,E | x | | | | | |
| <i>Merelina crassissima</i> Powell, 1937 | A,E | x | | | | | |
| <i>Merelina crosseiformis</i> (Powell, 1926) | A,E | x | x | x | | | |
| <i>Merelina foliata</i> (Suter, 1908) | A,F,M,An,E | x | | | | | |
| <i>Merelina lacunosa</i> (Powell, 1940) | A,E | x | x | x | | | |
| <i>Merelina lyalliana</i> (Suter, 1898) | A,C,E | x | x | x | x | x | x |
| <i>Merelina manawatawhia</i> Powell, 1937 | A,E | x | | | | | |
| <i>Merelina superba</i> Powell, 1927 | A,C,E | x | x | x | | | |
| <i>Merelina taupoensis</i> Powell, 1939 | A,C,E | x | x | x | x | | x |
| <i>Merelina tricarinata</i> (Powell, 1937) | A,E | | x | | | | |
| <i>Mesoginella koma</i> B.A. Marshall, 2004 | A,C,E | x | x | x | x | | x |
| <i>Mesoginella larochei</i> (Powell, 1932) | A,C,E | x | | | x | | |
| <i>Mesoginella tryphenensis</i> (Powell, 1932) | A,E | x | | | x | | |
| <i>Mesoginella vailei</i> (Powell, 1932) | A,E | x | x | x | | | |
| <i>Metaxia duplicarinata</i> (Powell, 1940) | A,E | x | x | | | | |
| <i>Metaxia exaltata</i> (Powell, 1930) | K,A,C,E | x | x | x | | | |
| <i>Micrelenchus huttonii</i> (E.A. Smith, 1876) | A,C,FE | x | x | | x | x | x |
| <i>Micrelenchus sanguineus</i> (Gray, 1843) | A,C,FE | x | x | x | x | x | x |
| <i>Micrelenchus tenebrosus</i> (A. Adams, 1853) | A,C,FE | | | | x | x | |
| <i>Micrelenchus tessellatus</i> (A. Adams, 1853) | A,C,FE | x | x | x | x | x | x |
| <i>Microcarina crenulata</i> (Powell, 1937) | A,E | x | x | | | | |
| <i>Microdryas striatus</i> (Powell, 1927) | A,E | x | | | | | |
| <i>Microtralia insularis</i> (Powell, 1933) | A,C,E | x | x | x | | x | |
| <i>Microvoluta marginata</i> (Hutton, 1885) | A,C,F,An,E | x | | x | | | |
| <i>Monodilepas diemenensis</i> Finlay, 1930 | A,E | x | x | x | | | |
| <i>Monophorus fascelinus</i> (Suter, 1908) | A,C,F,An,E | x | x | x | | | |
| <i>Munditia delicatula</i> Powell, 1940 | A,E | x | | | | | |
| <i>Munditia serrata</i> (Suter, 1908) | A,E | x | | | | | |
| <i>Munditia tryphenensis</i> (Powell, 1926) | A,E | x | | x | | | |
| <i>Naricava neozelanica</i> Powell, 1940 | A,E | x | x | | | | |
| <i>Nepotilla nitidula</i> Powell, 1940 | A,E | x | x | x | | | |
| <i>Notoacmea daedala</i> (Suter, 1907) | A,C,FE | x | x | x | x | x | |
| <i>Notoacmea elongata</i> (Quoy & Gaimard, 1834) s.l. | A,C,FE | x | x | x | x | x | x |
| <i>Notoacmea parviconoidea</i> (Suter, 1907) | A,C,F,M,E | x | x | x | x | x | x |
| <i>Notoacmea potae</i> Nakano et al., 2009 | A,C,FE | x | | | | x | x |
| <i>Notoacmea rapida</i> Nakano et al., 2009 | A,C,FE | x | x | | | x | x |
| <i>Notoacmea scapha</i> (Suter, 1907) | A,C,FE | x | x | x | | x | |
| <i>Notoacmea scopulina</i> Oliver, 1926 | A,C,E | x | x | x | x | x | x |
| <i>Notoacmea subtilis</i> (Suter, 1907) | A,C,FE | x | x | x | x | x | x |
| <i>Notoacmea turbatrix</i> Nakano et al., 2009 | A,C,FE | x | | | x | | x |
| <i>Nototriphora aupouria</i> (Powell, 1937) | K,A,C,E | x | x | | | | |
| <i>Nozeba emarginata</i> (Hutton, 1885) | A,C,FE | x | x | x | x | x | x |
| <i>Odostomia chordata</i> Suter, 1908 | A,E | x | x | | | | |
| <i>Odostomia geoffreyi</i> ? Laws, 1939 | A,C,E | | | | | x | |
| <i>Odostomia haurakiensis</i> Laws, 1939 | A,E | x | x | | | | |
| <i>Odostomia incidata</i> Suter, 1908 | A,C,F,An,E | x | x | x | x | x | x |
| <i>Odostomia pudica</i> Suter, 1908 | A,E | x | x | | | | |
| <i>Odostomia takapunaensis</i> Suter, 1908 | A,C,E | | x | x | x | x | x |
| <i>Odostomia vaga</i> Laws, 1939 | A,C,F,An,E | | | x | | | |

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|---|--------------|---------------------------------------|---------------------------------------|------------------------------------|----------------------------------|-------------------------------|------|
| <i>Odostomia vestalis</i> Murdoch, 1905 | A,E | x | x | x | | | |
| <i>Omalogyra ammonitoides</i> (Powell, 1940) | A,C | x | x | | | x | x |
| <i>Omalogyra fusca</i> Suter, 1908 | A,C,E | | x | | | | x |
| <i>Onoba aupouria</i> (Powell 1940) | A,E | x | | | | | |
| <i>Onoba candidissima</i> (Webster, 1905) | A,C,E | x | x | x | | | x |
| <i>Onoba elegans</i> (Ponder, 1965) | A,E | x | | | | | |
| <i>Onoba fumata</i> (Suter, 1898) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Onoba iredalei</i> (Powell, 1937) | A,E | x | x | x | | | |
| <i>Onoba obliquata</i> (Powell, 1940) | A,E | x | | | | | |
| <i>Orbitestella parva</i> (Finlay, 1924) | A,C,F,M,An,E | x | x | x | | x | x |
| <i>Orbitestella toreuma</i> Powell, 1930 | A,M,E | x | x | x | | | |
| <i>Paxula paxillus</i> (Murdoch, 1905) | A,C,F,E | x | x | x | x | | x |
| <i>Peculator hedleyi</i> (Murdoch, 1905) | A,E | x | | x | | | |
| <i>Philine powelli</i> Rudman, 1970 | A,C,F,E | x | x | x | | | |
| <i>Pisinna rekohuana</i> (Powell, 1933) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Pisinna manawatawhia</i> (Powell, 1937) | A,E | x | x | x | | | x |
| <i>Pisinna olivacea impressa</i> (Hutton, 1885) | A,C,M,E | x | x | x | x | x | x |
| <i>Pisinna praecidecostata</i> (Ponder, 1965) | A,E | x | | | | | |
| <i>Pisinna simplicata</i> (Powell, 1927) | A,E | x | x | x | x | | x |
| <i>Pisinna semisulcata</i> (Hutton, 1885) | A,E | x | | x | | | x |
| <i>Pisinna subrufa</i> (Powell, 1937) | A,E | x | | | | | |
| <i>Pisinna zosterophila</i> (Webster, 1905) | A,C,E | x | x | x | x | x | x |
| <i>Potamopyrgus estuarinus</i> Winterbourn, 1971 | FW:N,S,E | x | x | x | x | x | x |
| <i>Powellisetia bilirata</i> Ponder, 1965 | A,E | | | x | | | |
| <i>Powellisetia crassilabrum</i> (Powell, 1940) | A,E | x | | x | | | |
| <i>Powellisetia subgradata</i> (Powell, 1937) | A,E | | | x | | | |
| <i>Powellisetia subtenuis</i> (Powell, 1937) | A,C,F,M,An,E | x | x | x | | | |
| <i>Powellisetia unicarinata</i> (Powell, 1930) | A,E | x | | x | | | |
| <i>Proxiuber australe</i> (Hutton, 1878) | A,E | x | x | x | | | |
| <i>Pseudestea crassiconus</i> (Powell, 1933) | A,E | | x | x | | | x |
| <i>Pseudotorinia amoena</i> (Murdoch & Suter, 1906) | A,C | x | | x | | | |
| <i>Pseudovermis hancocki</i> Challis, 1969 | A,E | x | | | | | |
| <i>Pusillina aupouria</i> (Powell, 1937) | A,E | | | x | | | |
| <i>Pusillina finlayi</i> (Powell, 1937) | A,E | x | | | | | |
| <i>Pusillina hamiltoni</i> (Suter, 1898) | A,C,F,M,E | x | x | x | x | | x |
| <i>Pusillina infecta</i> (Suter, 1908) | A,C,F,M,E | x | x | x | | x | x |
| <i>Pusillina latiambita</i> (Ponder, 1967) | A,E | | | x | | x | x |
| <i>Pusillina mobilicosta</i> (Ponder, 1967) | A,C,E | x | x | x | | | x |
| <i>Pusillina semireticulata</i> (Murdoch & Suter, 1906) | A,E | x | x | x | | | |
| <i>Pusillina sinuastoma</i> (Ponder, 1967) | A,E | | x | x | | | |
| Pyramidellidae indet. | | | | | | x | |
| <i>Pyramidelloides pagoda</i> (Powell, 1926) | A,E | x | | x | | | |
| <i>Radinista scalarina</i> Powell, 1940 | A,E | | | x | | | |
| <i>Rastodens puerilis</i> Ponder, 1966 | A,C,F,E | x | x | | | | |
| <i>Retusa opima</i> (Finlay, 1926) | A,C,E | x | | | | | |
| <i>Retusa oruaensis</i> (Webster, 1908) | A,C,F,M,E | x | x | x | x | x | x |
| <i>Risellopsis varia</i> (Hutton, 1873) | A,C,F,M,E | x | x | x | x | x | x |
| <i>Rissoella cystophora</i> (Finlay, 1924) | A,C,F,M,E | x | x | x | x | x | x |
| <i>Rissoella elongatospira</i> Ponder, 1966 | A,C,F,M,An,E | x | x | x | x | | x |
| <i>Rissoella flemingi</i> Ponder, 1968 | A,C,F,M,An,E | x | x | x | | x | x |
| <i>Rissoella micra</i> (Finlay, 1924) | A,C,F,M,An,E | x | x | x | | x | x |
| <i>Rissoella</i> n.sp. | | x | x | x | | | x |
| <i>Rissoella rissoaformis</i> (Powell, 1939) | A,C,F,An,E | x | x | x | x | x | x |
| <i>Rissoina achatina</i> Odhner, 1924 | A,E | x | | x | | | x |
| <i>Rissoina achatinoides</i> Powell, 1937 | A,E | x | x | | | | |
| <i>Rissoina anguina</i> Finlay, 1926 | A,C,E | x | x | x | x | | x |
| <i>Rissoina chathamensis</i> (Hutton, 1873) | A,C,F,M,E | x | x | x | x | x | x |
| <i>Rissoina ficator</i> Finlay, 1930 | A,E | x | x | x | | | |
| <i>Rissoina fucosa</i> Finlay, 1930 | A,C,E | x | x | x | | x | x |
| <i>Rissoina zonata</i> Suter, 1909 | A,E | x | | x | x | | x |
| <i>Roseaplagis rufozona</i> (A. Adams, 1853) | A,C,E | x | x | x | | | |
| <i>Sagenotriphora ampulla</i> (Hedley, 1903) | K,A,C | x | x | x | x | x | x |

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|---|--------------|-------------------------------------|---------------------------------------|------------------------------------|----------------------------------|-------------------------------|------|
| <i>Scissurellidae</i> indet. | | | x | | | | |
| <i>Scrinium neozelanicum</i> (Suter, 1908) | A,E | x | | x | | | |
| <i>Scrupus hyalinus</i> (Odhner, 1924) | A,M,E | x | x | | | | |
| <i>Seila cincta</i> (Hutton, 1885) | A,C,M,E | x | x | x | x | | x |
| <i>Seila terebelloides</i> (Hutton, 1873) | A,C,F,An,E | x | x | x | | | x |
| <i>Serrata fasciata</i> (G.B. Sowerby II, 1846) | A,C,E | x | x | x | x | | |
| <i>Sinezona brevis</i> (Hedley, 1904) | A,C,F,M,An,E | x | x | x | | x | x |
| <i>Sinezona laqueus</i> (Finlay, 1926) | A,C,F,M,An,E | | | x | | | |
| <i>Skenella spadix</i> (Ponder, 1965) | A,E | | x | x | | | x |
| <i>Solariella tryphenense</i> (Powell, 1930) | A,E | x | | x | | | |
| <i>Striarcana cryptolina</i> Laws, 1937 | A,C,M,E | x | | | | | |
| <i>Striodostomia orewa</i> Laws, 1940 | A,E | x | x | | x | | |
| <i>Suterilla neozelanicum</i> (Murdoch, 1899) | A,C,M,E | x | x | x | | x | |
| <i>Synthopsis acuminata</i> B.A. Marshall, 1978 | A,C,E | | x | | | | |
| <i>Synthopsis caelata</i> (Powell, 1930) | A,C,E | x | x | x | | | x |
| <i>Syrnola crawfordi</i> Powell, 1927 | A,E | x | x | | x | | |
| <i>Syrnola lurida</i> (Suter, 1908) | A,E | x | x | x | x | | |
| <i>Syrnola menda</i> Finlay, 1926 | A,E | x | | x | | | |
| <i>Terelimella aupouria</i> (Powell, 1937) | A,E | x | | | x | | |
| <i>Terelimella larochei</i> (Powell, 1930) | A,M,E | x | x | x | | | x |
| <i>Trichosirius inornatus</i> (Hutton, 1873) | A,C,F,M,E | x | x | x | | x | |
| <i>Trimusculus conicus</i> (Angas, 1867) | K,A,C,F,M | x | | | x | x | |
| <i>Tubbreva exigua</i> (Ponder, 1965) | A,C,F,E | x | x | x | | x | x |
| <i>Tubbreva minutula</i> (Powell, 1937) | A,E | x | | | | | |
| <i>Turbonilla aoteana</i> (Powell, 1930) | A,E | | x | x | | | |
| <i>Turbonilla barrierensis</i> (Laws, 1937) | A,E | | x | | | | x |
| <i>Turbonilla bucknilli</i> (Laws, 1937) | A,C,E | x | x | x | | x | x |
| <i>Turbonilla cookiana</i> (Laws, 1937) | A,E | | x | x | | | |
| <i>Turbonilla finlayi</i> Powell, 1926 | A,C,E | x | | | | | |
| <i>Turbonilla kingi</i> (Laws, 1937) | A,E | x | x | x | | | |
| <i>Turbonilla</i> spp. | | x | x | x | x | x | x |
| <i>Turbonilla verecunda</i> (Laws, 1937) | A,E | | | x | | | |
| <i>Turbonilla vigilia</i> (Laws, 1937) | A,E | | | x | | | |
| <i>Uberella</i> cf. <i>vitrea</i> (Hutton, 1873) | A,E | x | x | x | | | |
| <i>Uttleya ahiparana</i> (Powell, 1927) | A,E | | | | x | | |
| <i>Volvulella nesentus</i> (Finlay, 1926) | A,C,E | x | | x | x | x | |
| <i>Williamia radiata nutata</i> (Hedley, 1908) | K,A | x | | | | | |
| <i>Xymenella pusilla</i> (Suter, 1907) | A,C,F,E | x | x | x | | x | x |
| <i>Zaclys murdochi</i> B.A. Marshall, 1978 | A,C,F,E | x | x | x | | | x |
| <i>Zaclys sarissa</i> (Murdoch, 1905) | A,F,An,E | x | x | | x | | x |
| <i>Zalipais lissa</i> (Suter, 1908) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Zebittium editum</i> Powell, 1930 | A,E | | x | | | | |
| <i>Zebittium exile</i> (Hutton, 1873) | A,C,F,E | x | x | x | x | | x |
| <i>Zebittium laevicordatum</i> Powell, 1937 | A,E | x | | | | | |
| <i>Zelippistes benhami</i> (Suter, 1902) | A,E | x | | x | | | |
| <i>Zemitrella choava</i> (Reeve, 1859) | A,C,F,An,E | x | x | x | x | x | x |
| <i>Zemitrella daemon</i> (Webster, 1906) | A,E | x | | x | | | |
| <i>Zemitrella fallax</i> Powell, 1940 | A,C,E | x | x | x | x | x | x |
| <i>Zemitrella laevigata curvirostris</i> Powell, 1937 | A,E | x | | | | | |
| <i>Zemitrella laevigata laevigata</i> Powell, 1937 | A,E | x | | | x | | |
| <i>Zemitrella pseudomarginata</i> (Suter, 1908) | A,C,E | x | x | x | | x | x |
| <i>Zemitrella stephanophora</i> (Suter, 1908) | A,C,E | x | x | x | x | x | x |
| <i>Zemitrella turgida</i> Powell, 1937 | A,E | x | | | | | |
| <i>Zeradina odhneri</i> Powell, 1927 | A,E | x | | | x | | |
| <i>Zeradina ovata</i> (Odhner, 1924) | A,C,E | x | | | | x | |
| <i>Zerotula</i> sp. | | | x | | | | x |
| <i>Zetela textilis</i> (Murdoch & Suter, 1906) | A,C,E | | | x | | | |
| Bivalves | | | | | | | |
| <i>Acar sandersonae</i> Powell, 1933 | A,C,F,M,E | x | | x | x | x | |
| <i>Acar sociella</i> (Brookes, 1926) | A,C,F,M,E | x | x | x | x | x | |
| <i>Arthritica bifurca</i> (Webster, 1908) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Arthritica crassiformis</i> Powell, 1933 | A,C,E | | x | | | x | x |

| | Regions | NE coast Cape Maria - Whangarei | Hauraki Gulf - Whangarei- Miranda | Great Barrier and Coromandel | NW coast Ahipara- Hokianga | W coast Kaipara- Awhitu | Live |
|---|--------------|---------------------------------------|--|------------------------------------|----------------------------------|-------------------------------|------|
| <i>Austroneaera finlayi</i> Powell, 1937 | A,E | x | | | | | |
| <i>Benthocardiella hamatadens</i> Powell, 1930 | A,E | | | x | | | |
| <i>Benthocardiella obliquata</i> Powell, 1930 | A,E | x | x | x | x | | |
| <i>Benthocardiella orbicula</i> Powell, 1930 | A,E | x | | | | | |
| <i>Borniola bidentifera</i> (Powell, 1933) | A,E | x | | | | | |
| <i>Borniola reniformis</i> (Suter, 1908) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Condylocardia crassicosta</i> Bernard, 1897 | A,C,F,M,An,E | x | x | | | | |
| <i>Condylocuna concentrica</i> (Bernard, 1897) | A,C,F,M,An,E | x | x | x | | | |
| <i>Cosa filholi</i> (Bernard, 1897) | A,C,F,M,An,E | x | | x | | | |
| <i>Cosa laevicostata</i> Powell, 1933 | A,E | x | | | | | |
| <i>Cosa serratocostata?</i> Powell, 1933 | A,E | x | x | x | | | |
| <i>Cratis delicatula</i> Powell, 1937 | A,E | x | | | | | |
| <i>Cuna manawatawhia</i> Powell, 1937 | A,E | x | | | | | |
| <i>Cuna waikukuensis</i> Powell, 1937 | A,E | x | x | x | | | x |
| <i>Cycloclamys mestayerae</i> (Dell, 1956) | A,C,E | x | x | x | | | |
| <i>Divariscintilla maoria</i> Powell, 1932 | A,C,E | x | x | x | | | |
| <i>Ennucula strangei</i> (A. Adams, 1856) | A,C,F,M,E | x | | x | | | |
| <i>Epicodakia neozelanica</i> Powell, 1937 | A,E | x | | | | | |
| <i>Gaimardia finlayi</i> (Powell, 1933) | A,C,E | x | x | | | x | x |
| <i>Gonimyrtea concinna</i> (Hutton, 1885) | A,C,E | x | | x | | | |
| <i>Haliris setosa</i> (Hedley, 1907) | A,C,F,M | x | | x | | | |
| <i>Hamacuna gibbosa</i> (Powell, 1937) | A,E | x | x | | | | |
| <i>Kidderia aupouria</i> Powell, 1933 | A,E | x | x | x | | | |
| <i>Kidderia costata</i> Odhner, 1924 | A,C,F,M,An,E | x | x | x | | | x |
| <i>Lasaea hinemoa</i> Finlay, 1928 | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Lasaea maoria</i> (Powell, 1933) | A,C,F,E | x | x | x | | x | x |
| <i>Lasaea parengaensis</i> Powell, 1935 | A,C,E | x | x | | | x | |
| <i>Linucula hartvigiana</i> (Dohrn, 1864) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Lissarca</i> sp. | | | x | | | | |
| <i>Lyrodon medilobatus</i> (Edmonson, 1942) | A | x | x | x | | | |
| <i>Melliteryx parva</i> (Deshayes, 1856) | A,C,F,M,An,E | x | x | x | x | | x |
| <i>Montacuta semiradiata</i> Tate, 1889 | A,M,E | x | x | x | x | | x |
| <i>Montacuta semiradiata neozelanica</i> (Dell, 1956) | A,M,E | x | x | | | | |
| <i>Myadora antipodum</i> E.A. Smith, 1881 | A,C,F,M,E | x | x | x | | x | |
| <i>Myadora boltoni</i> E.A. Smith, 1881 | A,C,E | x | x | x | x | x | x |
| <i>Myadora novaezelandiae</i> E.A. Smith, 1881 | A,C,F,M,An,E | x | | x | | | |
| <i>Myllita stowei</i> (Hutton, 1873) | A,C,F,E | x | x | x | x | | x |
| <i>Myllitella vivens vivens</i> Finlay, 1926 | A,C,F,E | x | x | x | x | x | |
| <i>Mysella larochei</i> Powell, 1940 | A,E | x | x | | | | x |
| <i>Mysella tellinula?</i> (Odhner, 1924) | A,E | x | | x | | | |
| <i>Neolepton antipodum</i> (Filhol, 1880) | K,A,C,F,M,An | x | x | x | x | x | x |
| <i>Nucinella maoriana</i> (Hedley, 1904) | A,C,F,M,E | x | | x | | | |
| <i>Nucula certisinus</i> Finlay, 1930 | A,E | x | x | x | | | |
| <i>Nucula nitidula</i> A. Adams, 1856 | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Parilimya neozelanica</i> (Suter, 1914) | A,C,F,E | | | | | x | |
| <i>Parvithracia suteri</i> Finlay, 1927 | A,C,F,E | x | | | | | |
| <i>Philobrya acutangula</i> (Powell, 1935) | A,C,E | x | x | | | | |
| <i>Philobrya cf. modiolus</i> Suter, 1913 | M,An,E | x | x | x | | | x |
| <i>Philobrya munita</i> (Finlay, 1930) | A,C,F,M,An,E | x | x | x | x | x | x |
| <i>Pleuromeris benthicola</i> Powell, 1937 | A,E | x | | | | | |
| <i>Pleuromeris latiuscula</i> Powell, 1937 | A,E | x | | x | | | |
| <i>Pleuromeris paucicostata</i> Laws, 1940 | A,E | x | x | x | | | |
| <i>Pleuromeris zelandica</i> (Deshayes, 1854) | A,C,F,E | x | x | x | | | |
| <i>Poromya laevis</i> E.A. Smith, 1885 | A | x | | | | | |
| <i>Powellina brookesi</i> (Finlay, 1926) | A,E | x | x | x | | | x |
| <i>Rhomboidella radians</i> Monterosato, 1884 | A,E | x | | x | | | |
| <i>Saccella hedleyi</i> (Fleming, 1951) | A,C,M,E | | | x | | | |
| <i>Saccella maxwelli</i> Beu, 2006 | A,C,F,M,E | x | | x | x | | |
| <i>Scintilla stevensoni</i> Powell, 1932 | K,A | x | x | x | | | |
| <i>Scintillona zelandica</i> (Odhner, 1924) | A,C,F,An,E | x | x | x | | | x |
| <i>Theora lubrica</i> Gould, 1861 | A,C | x | x | x | x | x | x |
| <i>Trichomusculus barbatus</i> (Reeve, 1858) | A,C,M | x | x | x | x | x | x |
| <i>Varinucula gallinacea</i> (Finlay, 1930) | A,C,M,E | x | | x | | | |

different pattern with increasing diversity from the inner Manukau Harbour (1-10 spp.) to a maximum just inside the entrance (20-40 spp.). Outside the harbour on the exposed west coast of the Waitakere Ranges and Awhitu Peninsula diversity is as low as inside the inner and middle reaches of the harbour (5-30 spp.).

BIOGEOGRAPHIC DISTRIBUTION ANALYSIS

On the cluster analysis dendrogram based on presence/absence data we recognise nine sample site cluster associations with nine samples unclustered (Fig. 2). The geographic distribution of these nine associations is shown in Fig. 3. To identify the species which most

characterise each association we used a combination of their persistence and fidelity values with respect to each association (Table 2). The characterising species are not always the most commonly occurring in an association, as some species (e.g. *Austrolittorina antipodum*, *Linucula hartvigiana*, *Theora lubrica*) are widespread (persistent) through many of the associations without having a high fidelity to just one (Table 2).

Assoc 1: *Linucula hartvigiana* – *Arthritica bifurca* – *Theora lubrica*

The 35 sites in this association have the lowest mean species diversity (6 species per site) of all nine associations. The three most characterising species

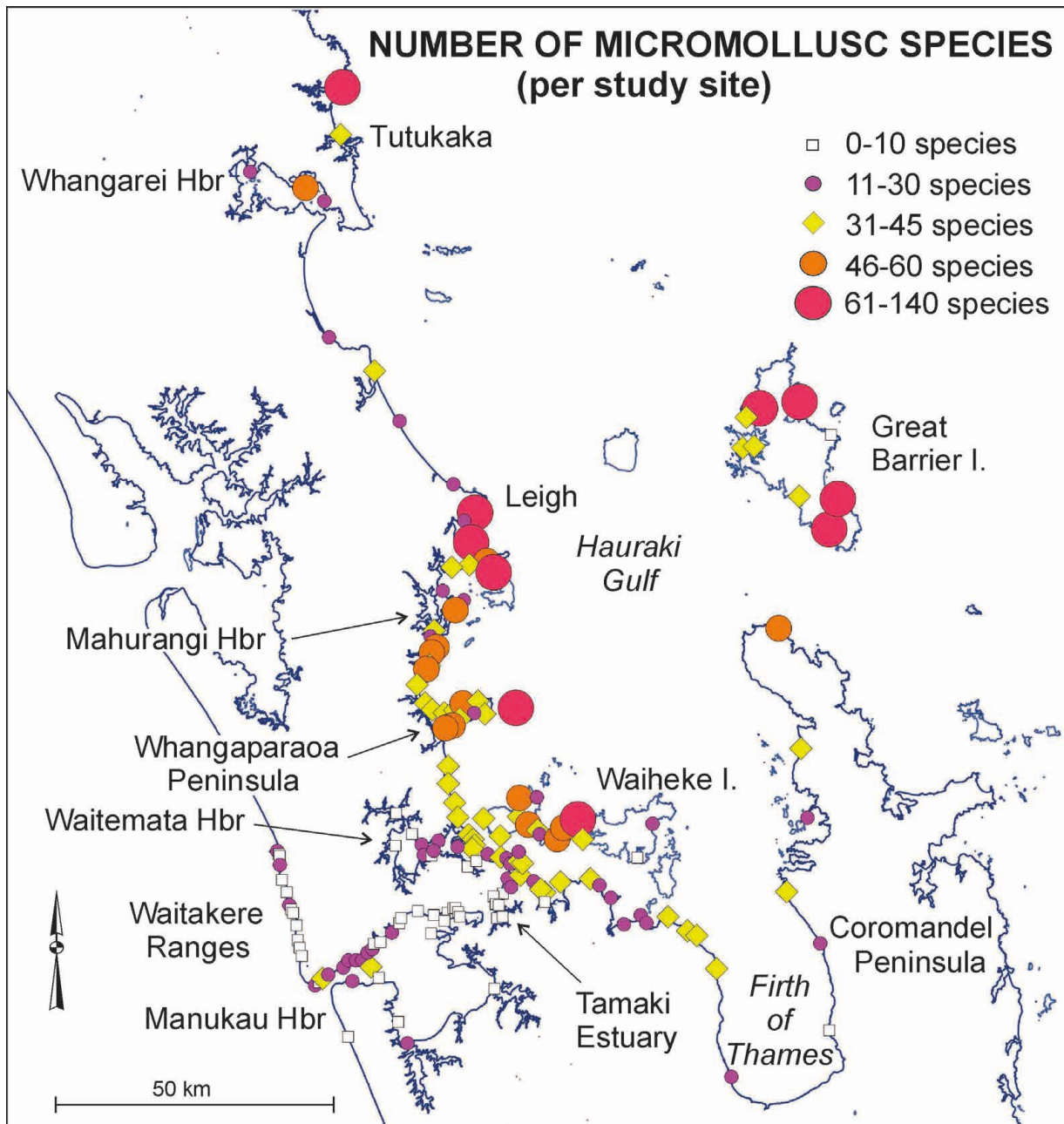


Figure 1. Number of species of micromolluscs (live and dead) in each of the 162 study locations in northern New Zealand.



Figure 2 (above and continued on adjacent page). Cluster analysis dendrogram of 162 localities produced using Jaccard coefficient of similarity based on the presence/absence of 257 micromollusc species. Nine associations have been recognised (1-9) with 9 unclustered sites (NC).

(Fig. 4) are all infaunal microbivalves that live in low tidal mud or fine sand. This association mostly occurs along the muddy shores of the Manukau Harbour, Tamaki Estuary and upper Waitemata Harbour with three sites in the muddier more sheltered inlets along the edge of the Tamaki Strait and one near the head of the Firth of Thames at Miranda.

Assoc 2: *Notoacmea parviconoidea* – *Micrelenchus tessellatus* – *Gaimardia finlayi*

This association of 13 sites has the second lowest mean species diversity (7 species per site).

This low diversity reflects the harsh environment at these sites, all of which occur on the exposed west coast of Auckland. The pounding waves mean that few micromollusc shells survive abrasion sufficiently long to be washed up on the exposed sand beaches. At these sites there are few suitable habitats for diverse micromolluscs. The intertidal pools are mostly scoured out by the waves and there are virtually no stable intertidal cobbles or boulders for micromolluscs to seek shelter under. The three most characterising species (Fig. 4) live in a mix of rocky shore habitats where micromolluscs can shelter. *N. parviconoidea* finds protection from surf among barnacles and in mid tidal crevices. *M. tessellatus* clings to low tidal rocks and *G. finlayi* attaches to *Vidalia colensoi* by hairs.

Assoc 3: *Amphithalamus semen* – *Notoacmea parviconoidea* – *Philobrya munita*

The nine sites in this association have moderately high micromollusc diversity (mean 26 species per site) reflecting their location in or close to relatively clear oceanic water with sufficient stable intertidal cobbles or boulders for microgastropods to shelter under. All occur on or around rocky coastlines mostly just inside the entrance to the Manukau Harbour on the northern side (Whatipu to Puponga Pt) but including the most protected section of shoreline just south of Muriwai on the west coast and around two rocky headlands on the more exposed section of the east coast at Te Arai Pt and Mangawhai Heads. Of the three most characterising species (Fig. 5), *A. semen* shelters in coralline algae or beneath stones; *N. parviconoidea* shelters in crevices and among barnacles, and *P. munita* attaches by byssal threads to the undersides of low tidal rocks.

Assoc 4: *Eatoniella limbata* – *Theora lubrica* – *Tubbreva exigua* – *Linucula hartvigiana*

The ten sites in this association have a moderately low mean diversity (18 species per site). This is a reflection of their locations around the sheltered fringes of the middle reaches of the Manukau and Waitemata Harbours. Of the characterising species (Fig. 5), *Eatoniella limbata* grazes on algae, *Tubbreva exigua* shelters in intertidal pools or under stable cobbles; and the infaunal bivalves *Theora lubrica* and *Linucula hartvigiana* burrow in low tidal fine sediment.

Assoc 5: *Merelina taupoensis* – *Fictonoba rufolactea* – *Merelina lyalliana* – *Herpetopoma bellum* – *Eatonina subflavescens* – *Austromitra rubiginosa* – *Trichomusculus barbatus*

The eleven sites in this association have the second highest mean species diversity (59 species per site) of all the associations. This reflects the similarity of the suite of habitats at each site and their similar locations around the edges of the outer Hauraki Gulf (Fig. 3). Much of this high diversity (such as *M. taupoensis*, *M. lyalliana*, *H. bellum*, *A. rubiginosa*, *T. barbatus*) lives on the undersides of stable low tidal cobbles in slightly more sheltered localities inside the entrances to harbours or bays or on the lee side of an island or headland. *Fictonoba rufolactea* and *E. subflavescens* (Fig. 6) live on algae.

Assoc 6: *Theora lubrica* – *Neolepton antipodum* – *Pisinna olivacea impressa*

This association of 19 sites has moderate mean diversity (29 species per site). It is restricted to the east coast around the relatively sheltered shores of the inner Hauraki Gulf from the outer parts of the Firth of Thames north to Motutapu Island and Coromandel Harbour and into the entrance of the Waitemata Harbour as far as the harbour bridge. Most sites occur along the southern side of Tamaki Strait from Kawakawa Bay to Musick Pt. The characterising species (Fig. 7) reflect the diversity of habitats present at most sites – low tidal muddy sediment (*Theora lubrica*), coralline turf (*Neolepton antipodum*) and sediment beneath stable cobbles (*Pisinna olivacea impressa*).

Assoc 7: *Merelina taupoensis* – *Herpetopoma bellum* – *Anabathron hedleyi* – *Pisinna olivacea impressa*

This association has the largest number of sites (40) and relatively high mean diversity (48 species per site). It is restricted in its occurrence to the east coast, mostly around the fringes of the middle Hauraki Gulf (east and west sides) with two sites on the northern shores of the outer Whangarei Harbour. Once again the characterising species (Fig. 7) mostly live in sediment in sheltered locations in mid-low tidal pools or under stable cobbles.

Assoc 8: *Uberella cf. vitrea* – *Philobrya cf. modiolus* – *Eatoniella roseospira* – *Myadora antipodum* – *Asteracmea suteri*

This small association of just three sites has by far the highest mean species diversity (115 species per site) which may partly reflect the extended level of study undertaken at Oneroa, Waiheke Island. The extreme diversity at Medlands and Whangapoua on the east side of Great Barrier Island compared with all other sites is believed to be true. There is a long list of species with high fidelity scores for this association, probably because they include many that are from beach wash-ups of micromolluscs that live subtidally offshore. The characterising species (Fig. 8) are a mix of infaunal sediment-inhabiting bivalves and gastropods and rocky-shore grazers.

Table 2. Characterising species (bolded) of each of the Jaccard site associations (1-9) based on their percentage scores for persistence (P) within each association and fidelity (F) to each association compared with all other associations. Class abbreviations are B = Bivalvia, G = Gastropoda.

| Association | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | | |
|----------------------------------|-------|-----------|-----------|-----------|-----------|-----------|------------|-----------|------------|-----------|------------|-----------|-----------|------------|-----------|-----|-----------|------------|-----------|----|
| | Class | P | F | P | F | P | F | P | F | P | F | P | F | P | F | P | F | P | F | |
| Number of sites in assoc | | 35 | | 13 | | 9 | | 10 | | 11 | | 19 | | 48 | | 3 | | 9 | | 9 |
| Mean no of spp per site | | 6 | | 7 | | 26 | | 18 | | 59 | | 29 | | 40 | | 115 | | 16 | | 16 |
| <i>Lincolia harvigiana</i> | B | 74 | -1 | 15 | -60 | 56 | 100 | 25 | 91 | 16 | 100 | 94 | 19 | 67 | -8 | 78 | 3 | 78 | 3 | |
| <i>Arthrica bifurca</i> | B | 54 | 2 | 0 | -52 | 22 | 60 | 8 | 27 | -25 | 84 | 32 | 15 | 100 | 48 | 56 | 4 | 100 | 4 | |
| <i>Notoacmea parviconoidea</i> | G | 0 | -48 | 52 | 89 | 41 | 0 | -48 | 18 | -30 | 11 | -37 | -27 | 100 | 52 | 44 | -3 | 100 | -3 | |
| <i>Micrelenclaus tessellatus</i> | G | 0 | -32 | 30 | 30 | 56 | 0 | -32 | 27 | -5 | 0 | -32 | 0 | 100 | 68 | 11 | -21 | 100 | -21 | |
| <i>Gaimardia finlayi</i> | B | 0 | -9 | 37 | 46 | 22 | 0 | -9 | 0 | -9 | 0 | -9 | -7 | 0 | -9 | 0 | -9 | 0 | -9 | |
| <i>Amphihalimulus semen</i> | G | 0 | -25 | 0 | -25 | 63 | 0 | -25 | 18 | -7 | 21 | -4 | 8 | 67 | 41 | 0 | 0 | 0 | -25 | |
| <i>Philobrya munita</i> | B | 0 | -34 | 46 | 12 | 67 | 0 | -34 | 45 | 12 | 11 | -23 | -32 | 100 | 66 | 0 | 0 | 0 | -34 | |
| <i>Theora lubrica</i> | B | 40 | 13 | 0 | -27 | 0 | 70 | 43 | 0 | -27 | 79 | 52 | 19 | 33 | 7 | 11 | -15 | 33 | 7 | |
| <i>Eatoniella limbata</i> | G | 3 | -44 | 0 | -47 | 33 | 80 | 33 | 18 | -28 | 74 | 27 | 33 | 67 | 20 | 22 | -24 | 67 | 20 | |
| <i>Tubbreva exigua</i> | G | 6 | -35 | 8 | -33 | 33 | 70 | 30 | 64 | 23 | 42 | 2 | 63 | 33 | 15 | 11 | -29 | 33 | 15 | |
| <i>Fictonoba rufolactea</i> | G | 0 | -18 | 0 | -18 | 0 | 10 | -8 | 91 | 73 | 0 | -18 | -8 | 33 | 15 | 0 | -18 | 33 | 15 | |
| <i>Merelina lyalliana</i> | G | 0 | -31 | 0 | -31 | 0 | 0 | -31 | 91 | 60 | 0 | -31 | 17 | 100 | 69 | 11 | -20 | 100 | 69 | |
| <i>Herpetopoma bellum</i> | G | 0 | -31 | 8 | -23 | 0 | 0 | -31 | 91 | 60 | 5 | -26 | 46 | 67 | 36 | 0 | -31 | 67 | 36 | |
| <i>Trichomusculus barbatus</i> | B | 0 | -33 | 0 | -33 | 11 | 0 | -33 | 91 | 57 | 0 | -33 | 10 | 100 | 67 | 22 | -11 | 100 | 67 | |
| <i>Merelina taupoensis</i> | G | 0 | -28 | 0 | -28 | 0 | 0 | -28 | 100 | 72 | 5 | -23 | 59 | 33 | 5 | 0 | -28 | 33 | 5 | |
| <i>Eatonina subflavescens</i> | G | 0 | -45 | 8 | -37 | 67 | 20 | -25 | 100 | 55 | 53 | 8 | -11 | 67 | 22 | 11 | -34 | 67 | 22 | |
| <i>Austronitira rubiginosa</i> | G | 0 | -46 | 0 | -46 | 56 | 0 | -46 | 100 | 54 | 63 | 17 | 16 | 67 | 20 | 22 | -24 | 67 | 20 | |
| <i>Neolepton antipodum</i> | B | 3 | -66 | 0 | -68 | 11 | 70 | 2 | 91 | 22 | 100 | 32 | 29 | 100 | 32 | 78 | 9 | 100 | 32 | |
| <i>Pistina olivacea impressa</i> | G | 0 | -49 | 0 | -49 | 0 | 30 | -19 | 91 | 42 | 84 | 35 | 37 | 67 | 18 | 33 | -15 | 67 | 18 | |
| <i>Rastodens puerilis</i> | G | 0 | -2 | 0 | -2 | 0 | 0 | -2 | 0 | -2 | 16 | 14 | -2 | 0 | -2 | 0 | -2 | 0 | -2 | |
| <i>Mesogniella vaiilei</i> | G | 0 | -1 | 0 | -1 | 0 | 0 | -1 | 0 | -1 | 11 | 9 | 0 | 0 | -1 | 0 | -1 | 0 | -1 | |
| <i>Anabathron hedleyi</i> | G | 0 | -54 | 0 | -54 | 11 | 40 | -14 | 100 | 46 | 79 | 25 | 39 | 100 | 46 | 11 | -43 | 100 | 46 | |
| <i>Eatoniella lutea</i> | G | 0 | -45 | 0 | -45 | 11 | 30 | -15 | 73 | 27 | 68 | 23 | 36 | 100 | 55 | 0 | -45 | 100 | 55 | |
| <i>Uberella cf. vitrea</i> | G | 0 | -14 | 0 | -14 | 0 | 0 | -14 | 9 | -5 | 0 | -14 | -14 | 100 | 86 | 0 | -14 | 100 | 86 | |
| <i>Philobrya cf. modiolus</i> | B | 0 | -14 | 0 | -14 | 0 | 0 | -14 | 9 | -5 | 0 | -14 | -12 | 100 | 86 | 0 | -14 | 100 | 86 | |
| <i>Eatoniella roseospira</i> | G | 0 | -15 | 0 | -15 | 0 | 10 | -5 | 9 | -6 | 0 | -15 | -11 | 100 | 85 | 0 | -15 | 100 | 85 | |
| <i>Myadora antipodum</i> | B | 0 | -16 | 0 | -16 | 11 | 0 | -16 | 0 | -16 | 5 | -11 | -16 | 100 | 84 | 11 | -5 | 100 | 84 | |
| <i>Asteracmea suteri</i> | G | 0 | -16 | 0 | -16 | 0 | 0 | -16 | 27 | 11 | 0 | -16 | -14 | 100 | 84 | 0 | -16 | 100 | 84 | |
| <i>Argalista fluctuata</i> | G | 0 | -8 | 0 | -8 | 0 | 0 | -8 | 0 | -8 | 0 | -8 | -8 | 67 | 58 | 0 | -8 | 67 | 58 | |
| <i>Incisura rosea</i> | G | 0 | -8 | 0 | -8 | 0 | 0 | -8 | 0 | -8 | 0 | -8 | -8 | 67 | 58 | 0 | -8 | 67 | 58 | |
| <i>Melanella sp.</i> | G | 0 | -8 | 0 | -8 | 0 | 0 | -8 | 0 | -8 | 0 | -8 | -8 | 67 | 58 | 0 | -8 | 67 | 58 | |
| <i>Metaxia exaltata</i> | G | 0 | -8 | 0 | -8 | 0 | 0 | -8 | 0 | -8 | 0 | -8 | -8 | 67 | 58 | 0 | -8 | 67 | 58 | |
| <i>Leuconopsis obsoleta</i> | G | 6 | -49 | 8 | -47 | 33 | 20 | -35 | 64 | 9 | 42 | -13 | 30 | 100 | 45 | 0 | 89 | 34 | 45 | |
| <i>Pistina zosterophila</i> | G | 6 | -78 | 15 | -68 | 78 | 80 | -3 | 100 | 17 | 95 | 12 | 15 | 100 | 17 | 100 | 17 | 100 | 17 | |
| <i>Notoacmea elongata</i> | G | 60 | -18 | 15 | -62 | 78 | 40 | -38 | 91 | 13 | 100 | 22 | 20 | 100 | 22 | 100 | 22 | 100 | 22 | |
| <i>Risellopsis varia</i> | G | 29 | -44 | 31 | -42 | 89 | 10 | -63 | 100 | 27 | 95 | 22 | 19 | 100 | 27 | 67 | -6 | 100 | 27 | |
| <i>Turbonilla spp.</i> | G | 40 | -33 | 15 | -57 | 67 | 90 | 17 | 82 | 9 | 100 | 27 | 23 | 100 | 27 | 33 | -40 | 100 | 27 | |
| <i>Rissoina chathamensis</i> | G | 0 | -55 | 0 | -55 | 78 | 20 | -35 | 91 | 36 | 47 | -8 | 26 | 67 | 12 | 56 | 1 | 67 | 12 | |
| <i>Austrolitorina antipodum</i> | G | 71 | -24 | 100 | 4 | 100 | 70 | -26 | 100 | 4 | 100 | 4 | 0 | 100 | 4 | 100 | 4 | 100 | 4 | |

Assoc 9: *Leuconopsis obsoleta* – *Pisinna zosterophila* – *Notoacmea elongata*

The nine sites in this association have relatively low mean species diversity (16 species per site). This association is more widespread than others, occurring around the middle and outer reaches of the Hauraki Gulf on the east coast and the Manukau Harbour on the west coast. The characterising species (Fig. 9) come from a wide range of habitats – inside crevices or oyster clumps (*Leuconopsis obsoleta*); grazing the microalgae on the insides of dead shells (*Notoacmea elongata*); in sediment under stable cobbles (*Pisinna zosterophila*); infaunal in low-tidal sediment (*Linucula hartvigiana*, *Arthritica*

bifurca). It is debatable whether this is a real association or not. Maybe it has brought together sites that were less intensely searched for micromolluscs or where for some reason some sites had lower diversities of micromolluscs, particularly in wash ups and under stable cobbles.

Unclassified

Nine sites were not clustered with others in the Jaccard dendrogram. Two of these (Herald Island, upper Waitemata; Tararu, Firth of Thames) had no micromolluscs at all, but the others ranged in diversity from 6 to 35 species. Most of the other sites are relatively sheltered bays, each with their own unique suite of habitats and species (listed with

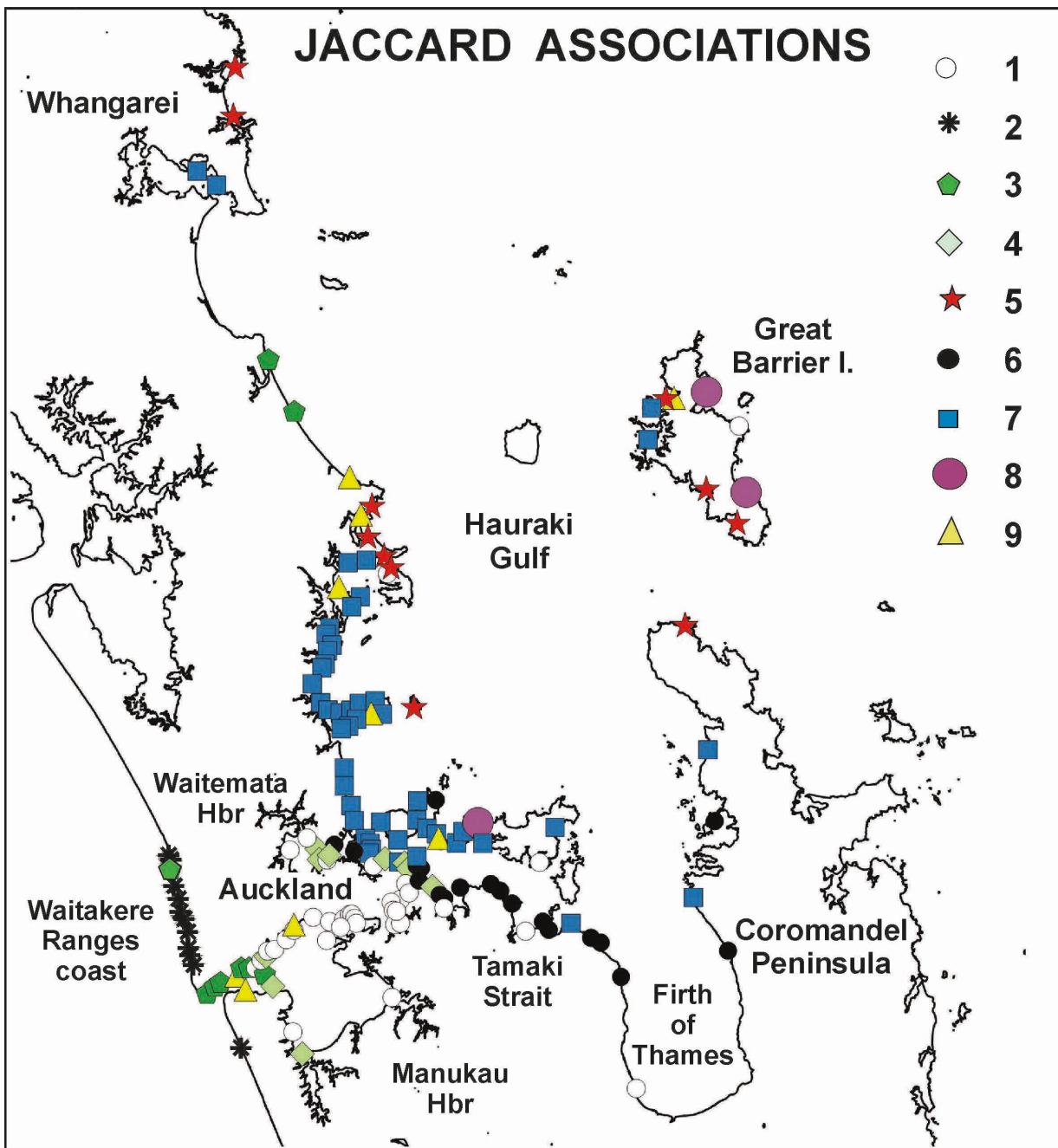


Figure 3. Distribution of study site clusters based on the presence/absence (Jaccard coefficient) of micromollusc species (live and dead) at each site.

increasing diversity): Hobson Bay, middle Waitemata; east side Paratutae, Manukau Hbr; Kaiwaka Pt, middle Whangarei Hbr; Waipu Cove; North Cove, Kawau Is; Rocky Bay, Kawau Is; Port Fitzroy, Great Barrier Is.

REGIONAL BIOGEOGRAPHY AND RANGE EXTENSIONS

In this section we include all the intertidal records in our database (Appendix 1). We have divided the northern New Zealand study area into five regions (one from the Cookian Province, three from the Aupourian Province and one spanning the boundary between the two (Powell 1955):

- west coast region, on the west coast from Hokianga to Awhitu correlates with the northernmost part of the Cookian Province (Powell 1955);
- northwest region, from Hokianga to Ahipara on the west coast, on the boundary between the Aupourian and Cookian provinces;
- northeast coast region, between Cape Maria van Diemen and Whangarei Heads;
- west Hauraki Gulf region, from Whangarei Harbour to Miranda;
- east Hauraki Gulf region, on the coasts of Great Barrier Island and Coromandel Peninsula.

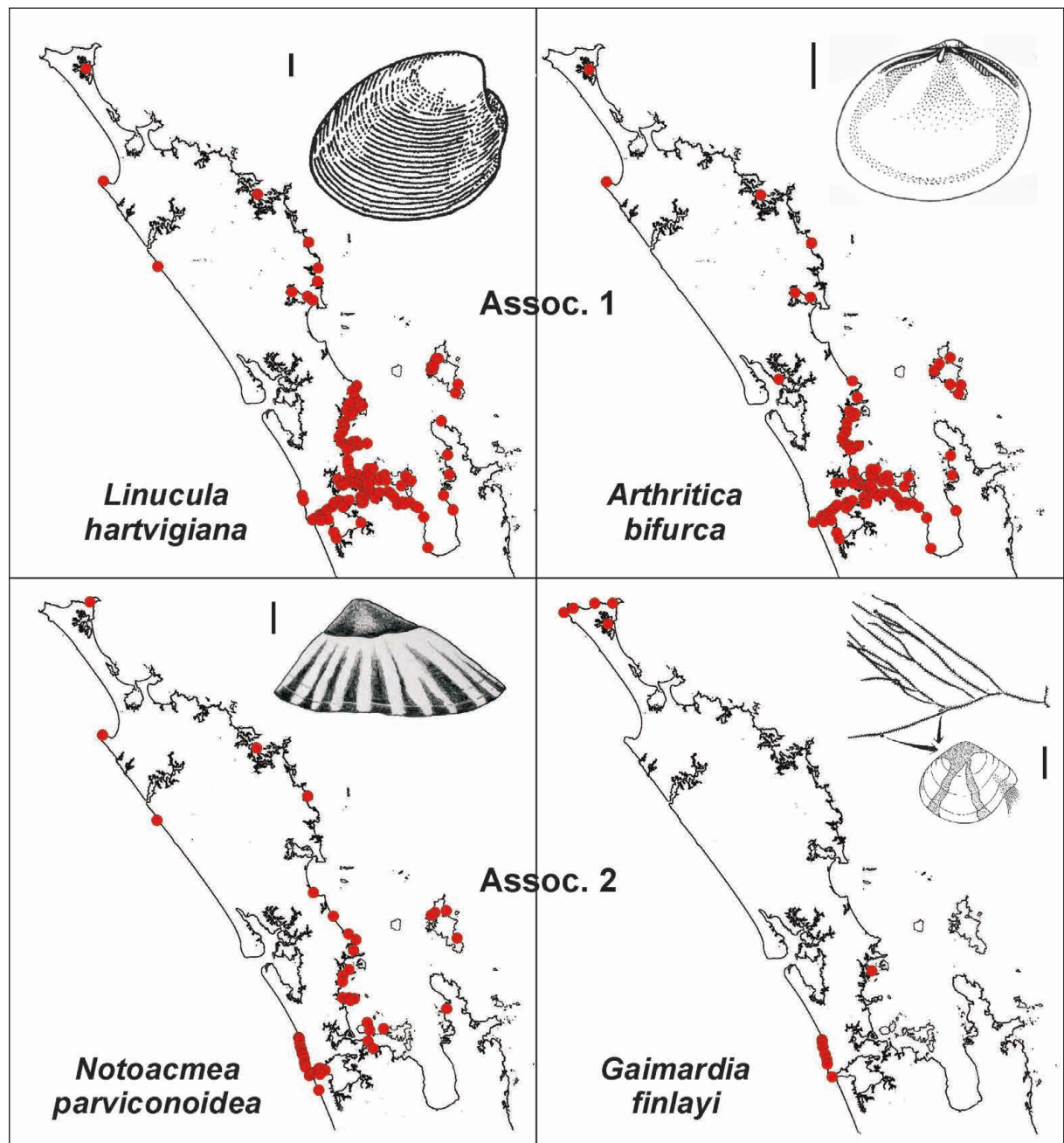


Figure 4. Characteristic micromollusc species of Associations 1 and 2 and our distribution records of them from northern New Zealand: *Linucula hartvigiana* (Dohrn, 1864) from Musick Point, Waitemata Harbour; *Arthritica bifurca* (Webster, 1908) from Orua Bay, Manukau Harbour (drawing by Powell 1979); *Notoacmea parviconoidea* (Suter, 1907) from Hamiltons Gap, Awhitu Peninsula (MA121572); *Gaimardia finlayi* (Powell, 1933) from Lion Rock, Piha, Waitakere coast. Scale bars 1 mm.

The greatest number of intertidal micromollusc records come from the warmest regions in the Aupourian Province (northeast – 313 spp., east Hauraki Gulf – 258 spp.) followed by the west Hauraki Gulf (234 spp.). The two western regions have much lower diversities – west coast (115 spp.) and northwest (108 spp.). A total of 157 species are recorded from the west coast and 361 species are recorded from the east coast, with just five species recorded intertidally only on the west coast, all of them as shells only: the gastropods *Eatonina crassicarinata*, *Odostomia geoffreyi*?, *Uttleya ahiparana*

and Pyramellidae indet and the bivalve *Parilimya neozelanica*. All have been recorded previously from the East Coast, Aupourian Province.

The percentage of endemic species overall in the study is 91% and varies little between the regions, ranging between 89 and 91%. Spencer et al. (2014) has summarised the geographic distributions of all New Zealand marine molluscs in terms of the biogeographic provinces proposed by Powell (1955). In this study we extend the provincial range of ten micromollusc species. With west coast records, 8 species are extended to the

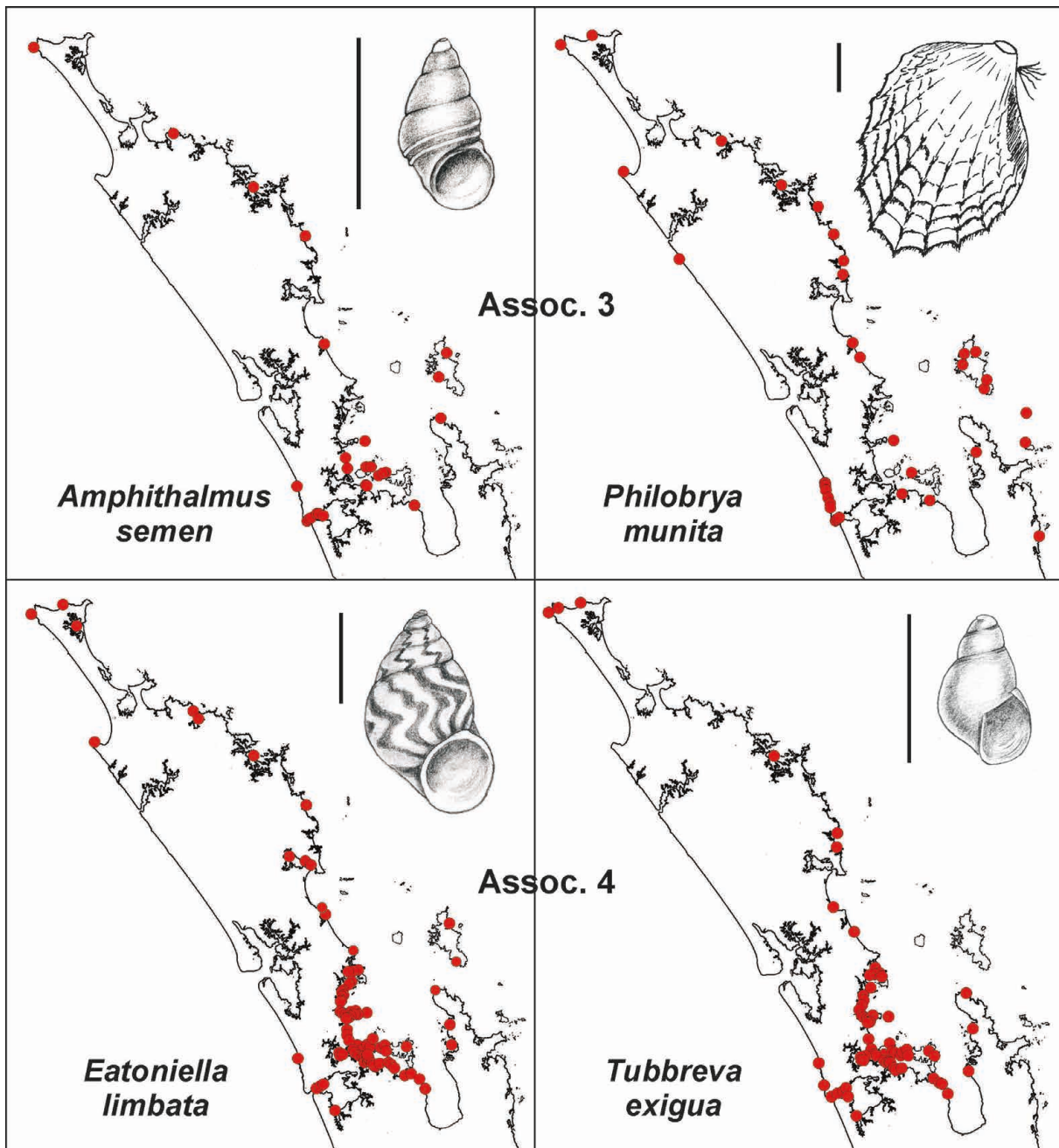


Figure 5. Characteristic micromollusc species of Associations 3 and 4 and our distribution records of them from northern New Zealand: *Amphithalamus semen* (Odhner, 1924) from Whatipu, Waitakere coast (MA121567); *Philobrya munita* (Finlay, 1930) from Motuarohia Island, Bay of Islands; *Eatoniella limbata* (Hutton, 1883) from Waiwera, Hauraki Gulf (MA121569); *Tubbreva exigua* (Ponder, 1965) from Bucklands Beach, Tamaki Estuary. Scale bars 1 mm.

Cookian Province from the Aupourian Province. Two species ranges are extended to the Aupourian Province – one (*Merelina foliata*) from the far south Forsterian and Antipodian provinces, and the other (*Cylichna zealandica*) from the Cookian Province.

Range extensions to the Aupourian Province (east coast northern New Zealand):

Cylichna zealandica Kirk, 1880 is recorded here from a washup on Tom Bowling Bay, North Cape (MA120890) (Fig. 10).

Merelina foliata (Suter, 1908) is recorded here from a

washup on Spirits Bay, Far North (MA120890) (Fig. 10). MSM also has a specimen collected from Waitangi, Chatham Island which also extends this species range to the Moriorian Province.

Range extensions to the Cookian Province (west coast northern New Zealand):

Aequispirella finlayi (Powell, 1933) recorded here from Boulder Bay, north side of Manukau Harbour entrance.

Eatoniella notata Ponder & Yoo, 1978 recorded here from Mercer Bay on the Waitakere west coast and Mill Bay in Manukau Harbour.

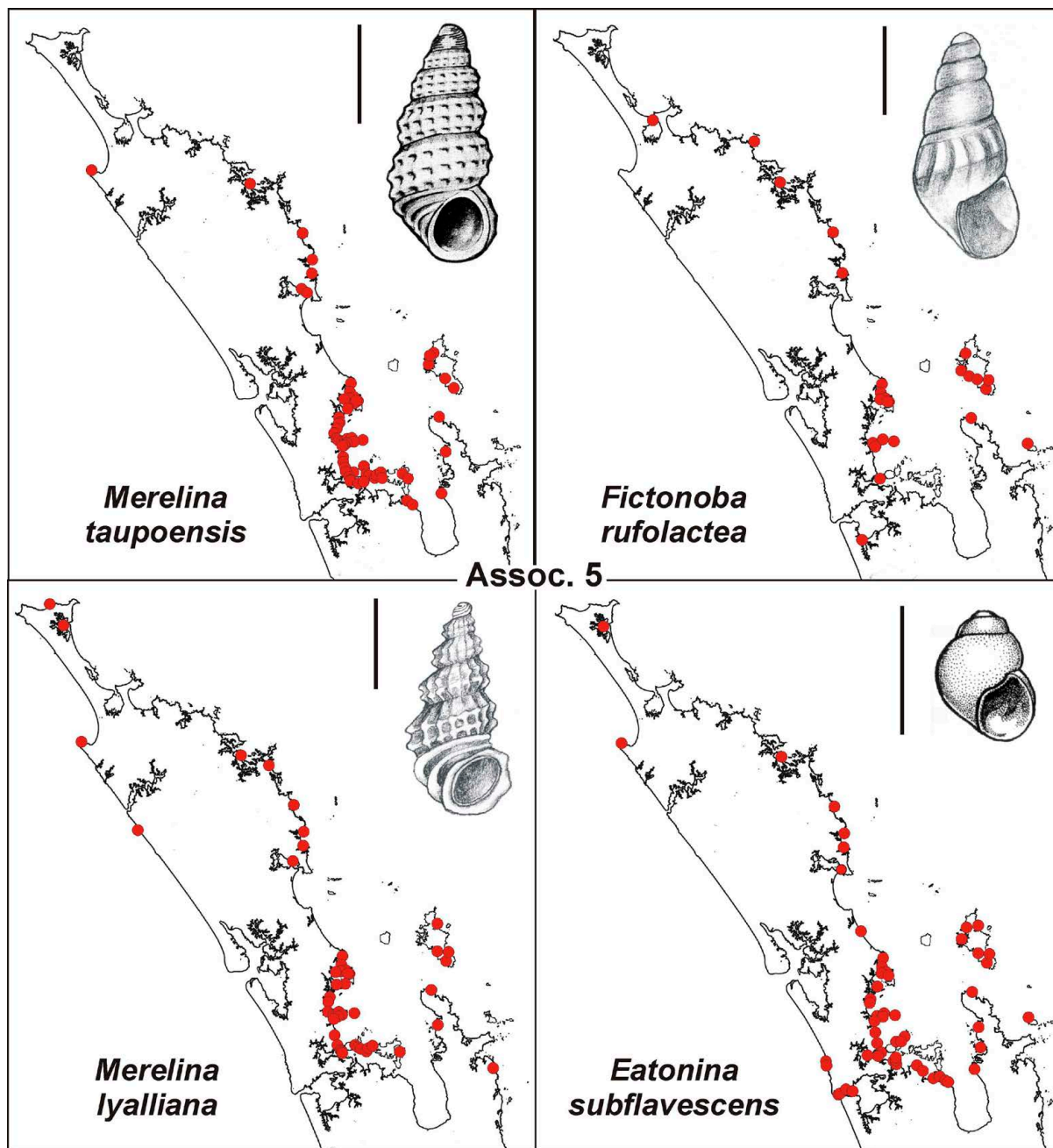


Figure 6. Characteristic micromollusc species of Association 5 and our distribution records of them from northern New Zealand: *Merelina taupoensis* Powell, 1939 from Taupo Bay, Whangaroa (drawing by Powell 1979); *Fictonoba rufolactea* (Suter, 1908) from Whangaruru Harbour (MA121571); *Merelina lyalliana* (Suter, 1898) from Taupo Bay, Whangaroa (MA121570); *Eatonina subflavescens* (Iredale, 1915) from Cornwallis, Manukau Harbour. Scale bars 1 mm.

Eatonina micans (Webster, 1905) recorded here from Puponga Pt and Mill Bay on the north coast of the Manukau Harbour.

Lodderia iota Powell, 1940 recorded here from Boulder Bay, north side of Manukau Harbour entrance (Fig. 10).

Odostomia geoffreyi? Laws, 1939 recorded here from Destruction Gully, north side of Manukau Harbour entrance.

Rissoina fucosa Finlay, 1930 recorded here from Kakamatua Inlet, north side of Manukau Harbour.

Turbonilla bucknilli (Laws, 1937) recorded here from Huia Bay, north side of Manukau Harbour.

Lasaea parengaensis Powell, 1935 recorded here from

Mill Bay, north side of Manukau Harbour.

The rare microgastropod *Eatoniella tenella* (Powell, 1937) (Fig. 10) has only been recorded previously from the Three Kings Islands (Powell, 1979), but here we extend its range south within the Aupourian Province to intertidal sites at the Bay of Islands, Poor Knights Islands, Orewa, Motutapu Island and Fletchers Bay, Coromandel Peninsula. The parasitic gastropod *Odostomia incidata* Suter, 1908 was sieved alive in low-tidal mud at Matakawau, Awhitu Peninsula. This appears to be the first live record of this species. Its prey is probably polychaete worms (W. Blom pers. comm.).

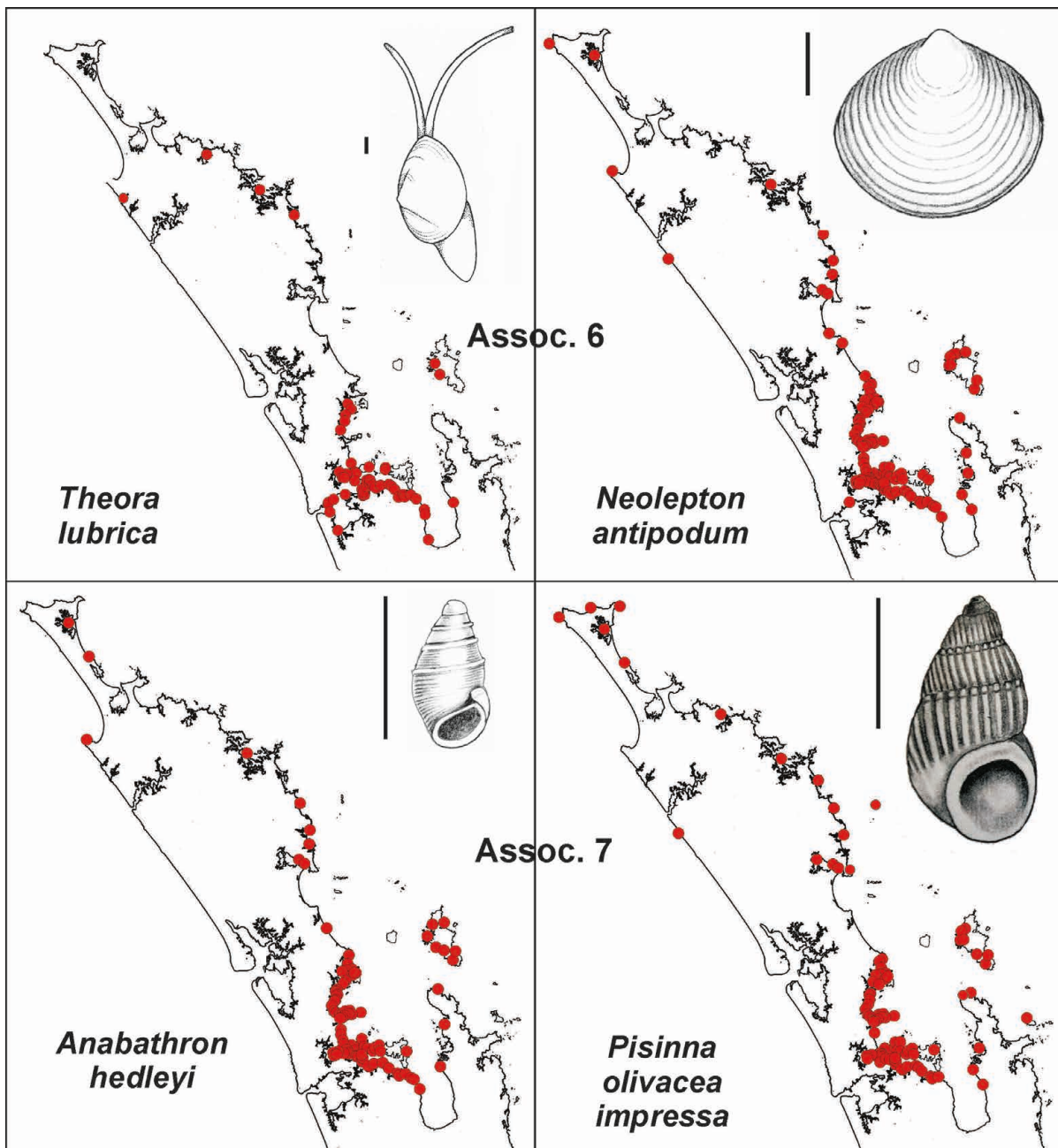


Figure 7. Characteristic micromollusc species of Associations 6 and 7 and our distribution records of them from northern New Zealand: *Theora lubrica* Gould, 1861 from Waitemata Harbour; *Neolepton antipodum* (Filhol, 1880) from Musick Point, Waitemata Harbour; *Anabathron hedleyi* (Suter, 1908) from Musick Point, Waitemata Harbour; *Pisinna olivacea impressa* (Hutton, 1885) from Great Mercury Island, east Coromandel Peninsula (MA121573). Scale bars 1 mm.

DISCUSSION

Biogeographic associations

Eight of the nine biogeographic associations recognised occur in distinct coastal areas (Fig. 3) characterised by their degree of exposure or whether they occur on the east or west coast of northern New Zealand. There appears to be no east-west difference between the two inner and middle harbour associations (Assocs 1 and 4) as both occur in the Waitemata and Manukau harbours. Two other, partly sheltered associations (Assocs 3 and 9) occur on both the east and west coasts – in the west

around the entrance to the Manukau Harbour and in the east on the coast around the middle reaches of the Hauraki Gulf. Just one association (Assoc. 2) is restricted to the west coast (Cookian Province) occurring along the exposed west coast of the Waitakere Ranges and Awhitu Peninsula (Fig. 3). The remaining four associations are restricted to the coast of the inner (Assoc. 6), middle (Assoc. 7) and outer (Assocs 5 and 8) Hauraki Gulf and Whangarei Harbour on the east coast.

Two of the four associations with the lowest diversity (Assocs 1 and 4) are restricted to the most sheltered locations, in the Waitemata and Manukau harbours. Here

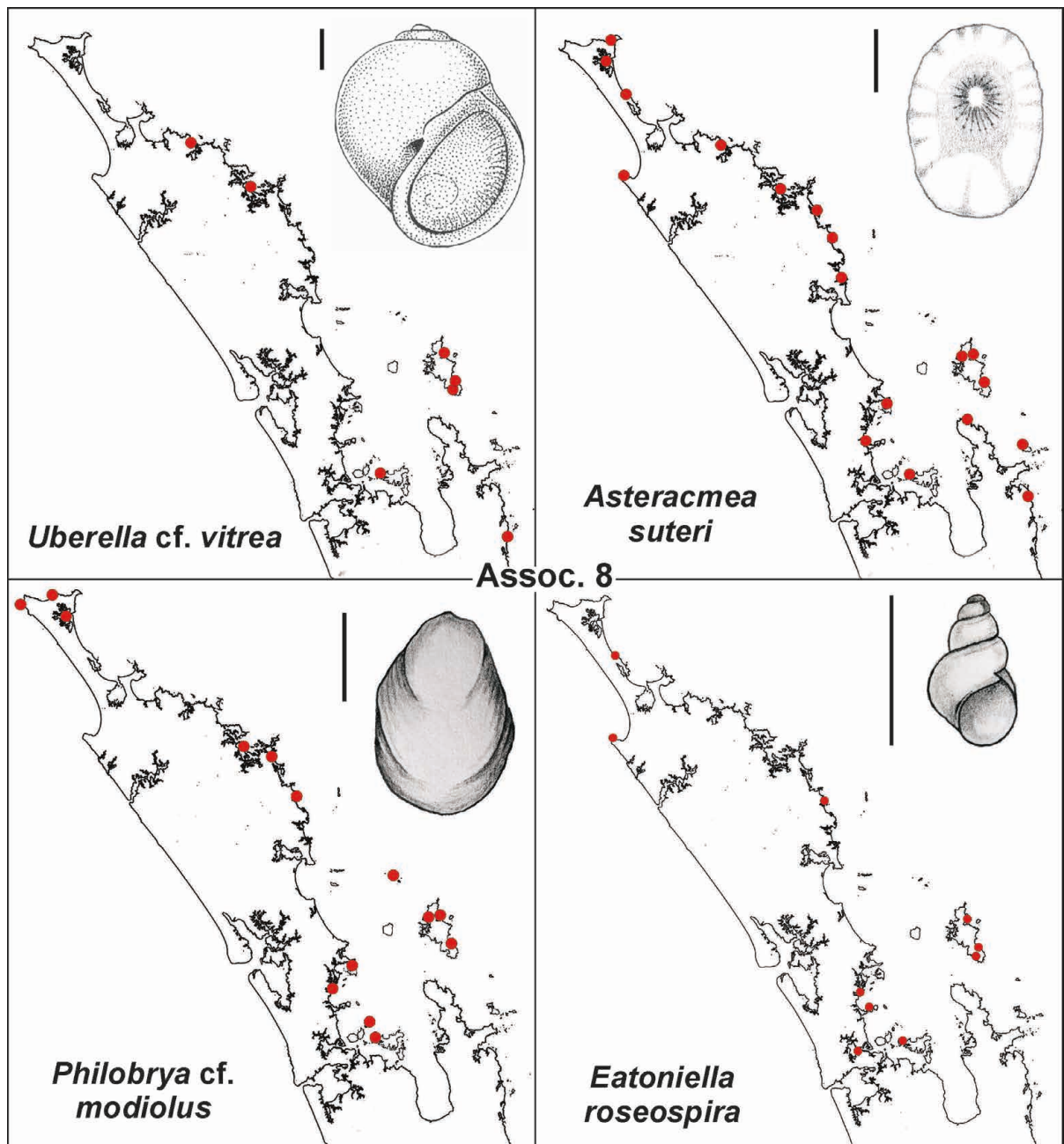


Figure 8. Characteristic micromollusc species of Association 8 and our distribution records of them from northern New Zealand: *Uberella cf. vitrea* (Hutton, 1873) from Bay of Islands (drawing after Powell 1979)(MA121565); *Asteracmea suteri* (Iredale, 1915) from Whananaki coast, east Northland; *Philobrya cf. modiolus* Suter, 1913 from Cape Maria van Diemen (MA121568); *Eatoniella roseospira* (Powell, 1937) from Poor Knights Islands. Scale bars 1 mm.

there is a low variety of habitats, mostly mid-low-tidal fine sediment and sometimes a few areas of mud-covered intertidal sandstone, hence the predominance of infaunal bivalves as the characterising species. The low diversity Assoc. 2 is the one exception to the general trend of increasing diversity with increasing exposure. It is restricted to the most exposed localities in the region along the west coast of the Waitakere Ranges and Awhitu Peninsula. Here there are no micromolluscs that can live intertidally in the surf-pounded beach sands. Similarly there are few places that are sheltered enough

for micromolluscs to live under stable cobbles or for fine sediment to accumulate in tidal pools.

The mapped occurrence of the fourth low diversity association (9) in a wide range of settings on both coasts (Fig. 3) strongly suggests that it is an artificial clustering perhaps of localities where the collection of micromollusc sand samples was less comprehensive than usual. The associations with moderate micromollusc diversity (26 and 29 species per location) mostly occur in the outer parts of the Manukau (Assoc. 3) and Waitemata (Assoc. 6) harbours, where there is an increasing diversity of available habitats

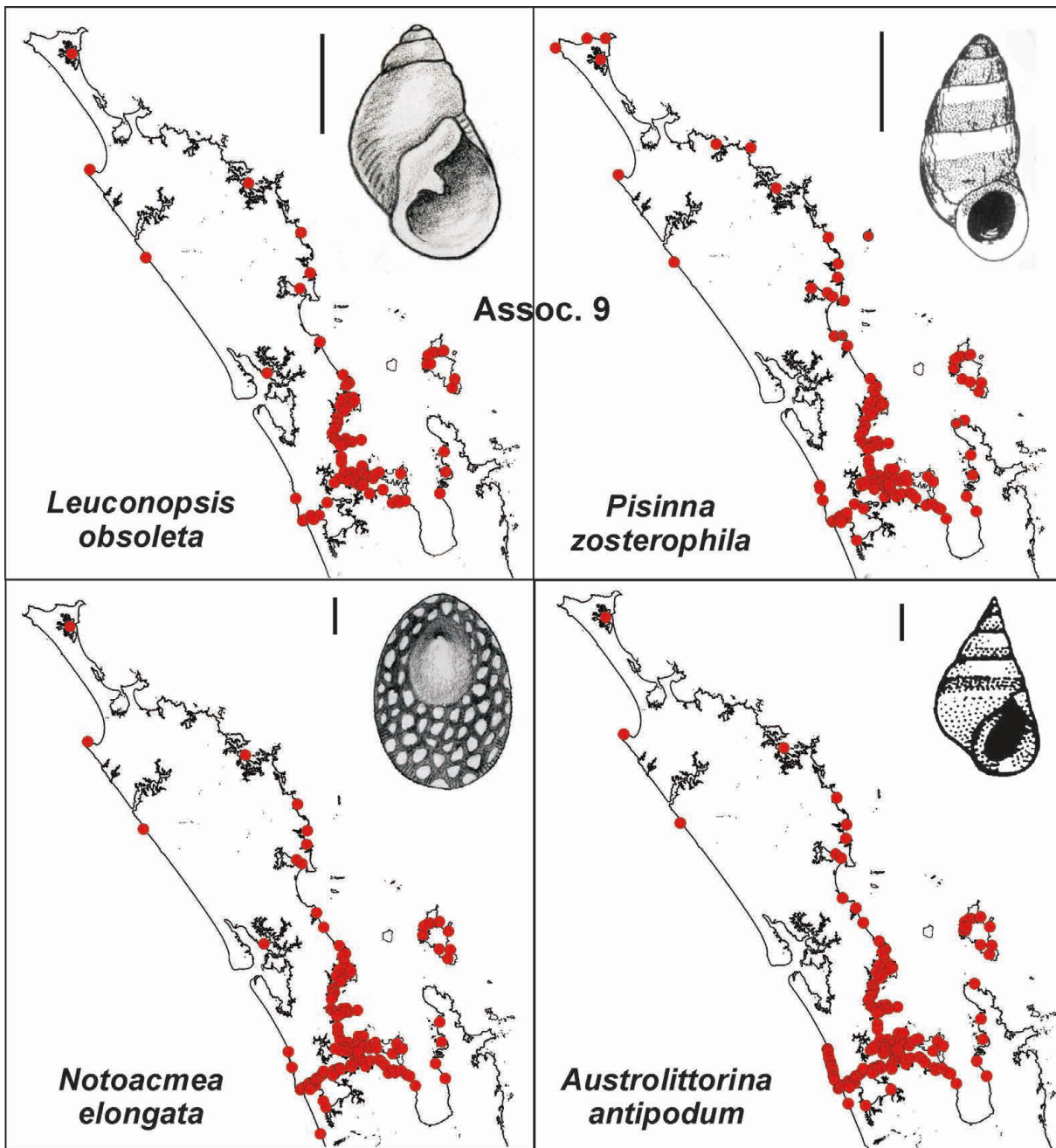


Figure 9. Characteristic micromollusc species of Association 9 and our distribution records of them from northern New Zealand: *Leuconopsis obsoleta* (Hutton, 1878) from Torbay, Hauraki Gulf (MA121566); *Pisinna zosterophila* (Webster, 1905) from Devonport, Waitemata Harbour (drawing from Powell 1979); *Notoacmea elongata* (Quoy & Gaimard, 1834) from Shoal Bay, Waitemata Harbour (MA121564); *Austrolittorina antipodum* (Philippi, 1847) from Te Werahi, Far North. Scale bars 1 mm.

compared with the sheltered inner harbours. The three associations with highest diversity (7, 5 and 8) all occur on the east coast in the warmer-water Aupourian Province with increasing diversity with increasing exposure, in part reflecting the increased washup of dead subtidal shells.

Human-influenced changes in micromollusc faunas

Because of the small size of micromolluscs, historical data on their occurrence and abundance is sparse, subjective and difficult to use in assessing the impacts of human-induced changes and degradation of the New

Zealand coastal environment. There is one obvious and well-known introduced micromollusc - the small, thin-shelled bivalve *Theora lubrica*, from Asia. It arrived in the Waitemata Harbour in 1979 and is now one of the dominant bivalves of infaunal fine sediment in sheltered harbours and estuaries and is widespread around the inner Hauraki Gulf. It has now spread to many of the other harbours around northern New Zealand (Fig. 7).

Morton and Miller (1968: 546) described "teeming" numbers of the microgastropods *Pisinna zosterophila* and *Eatoniella limbata* on *Zostera* seagrass leaves, reporting

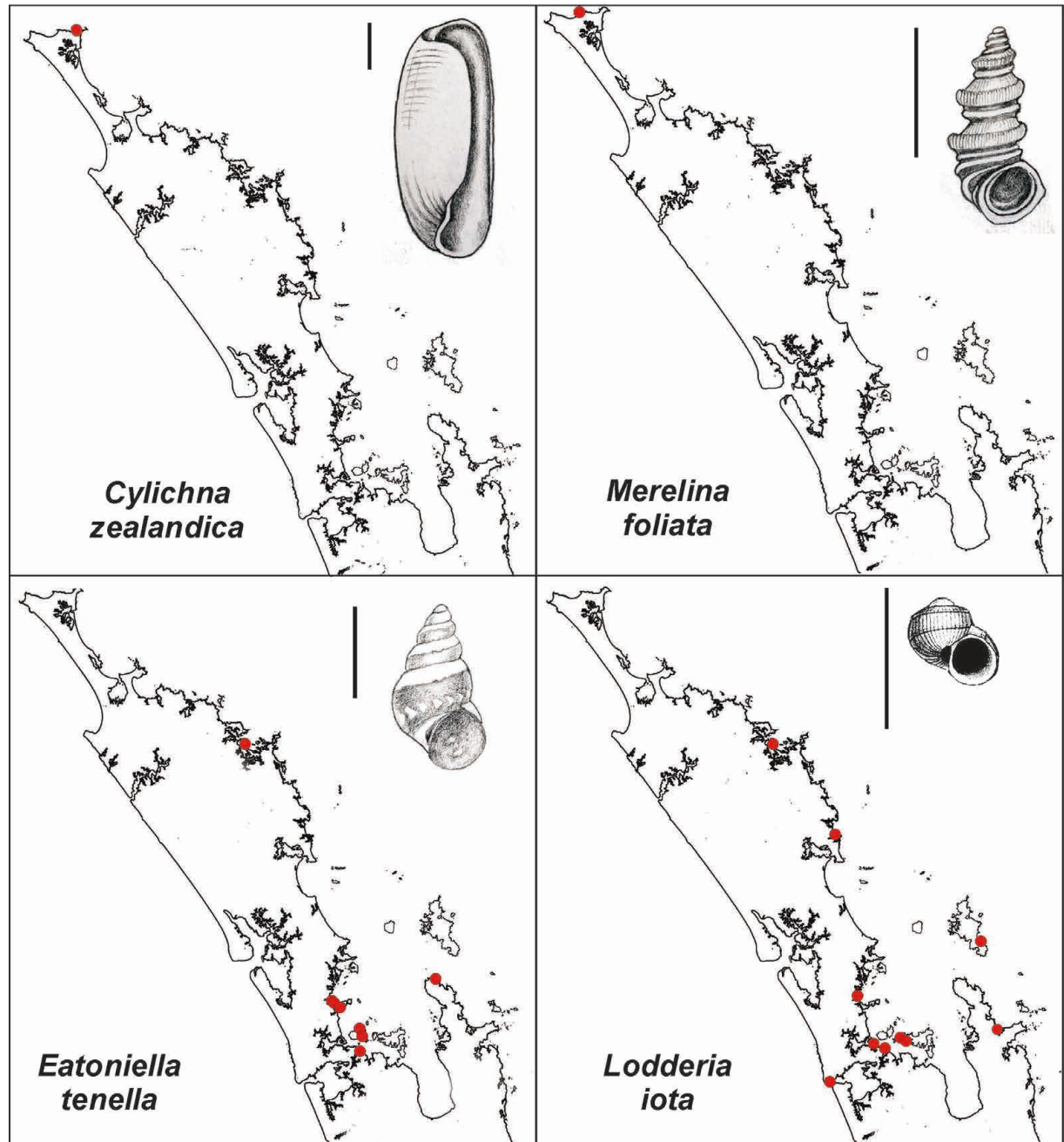


Figure 10. Some of the micromolluscs for which we record an extension of geographic range in this study. *Cylichna zealandica* Kirk, 1880 from Tom Bowling Bay, Far North; *Merelina foliata* (Suter, 1908) from Spirits Bay, Far North; *Eatoniella tenella* (Powell, 1937) from Hatfields Beach, Orewa; *Lodderia iota* Powell, 1940 from Boulder Bay, Manukau Harbour. Scale bars 1 mm.

1200–5000 of each species per m² of *Zostera* flat. In our studies we have found few if any micromolluscs in intertidal seagrass around the inner Hauraki Gulf. We are unsure of why the major difference between now and the 1960s. Since Morton and Miller do not specify the location of their counts we cannot exactly repeat them. Could it be that the micromollusc faunas of seagrass were decimated during the sea-grass demise due to the fungal slime *Labyrinthula* in the 1950–60s (Armiger 1964), and have not returned with the dramatic recovery of *Zostera* in the Waitemata Harbour in recent decades? Another possible cause of decline in the abundance and perhaps diversity of living micromolluscs in northern harbours could be the increased silt from land runoff and marina dredge dumping which now often chokes the seagrass and coralline turf (pers. obs.) that are favoured micromollusc habitats.

ACKNOWLEDGEMENTS

The first author (MSM) is indebted to: the late Anne Randall who fired her enthusiasm for micromolluscs by showing her collection housed in gelatine capsules; Richard Willan and the late Norman Gardner who both, patiently over many years, identified troublesome specimens for her; and members of the Conchology Section of the Auckland Museum, who documented the molluscs of the Manukau Harbour (Morley *et al.* 2010). We both thank our many colleagues who have accompanied us in the field on one or many trips and contributed records and observations to our studies. We thank Wilma Blom, John Early and Hamish Spencer for their reviews of the manuscript and suggested improvements.

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APPENDIX 1: Micromollusc species records from northern New Zealand and species occurrence data in study sites used for cluster analysis and diversity trends analysis. Available on-line at www.aucklandmuseum.com/research/pub/records/51/sup/morley-hayward-micromollusca

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Ostracoda of the Cavalli Islands, Northland, New Zealand

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Abstract

One hundred and twelve species of marine ostracod are recorded from 0-29 m depth around the Cavalli Islands, northeast Northland – the most diverse ostracod fauna from a relatively small area (10 km²) documented so far from New Zealand. Thirty of these species are additions to the known Recent (living) ostracod fauna of this country, although only ten have been identified to named species – the Recent Australian species *Callistocythere dorsotuberculata paucicostata*, *Callistocythere keiji*, *Callistocythere ventroalata*, *Lankacythere coralloides*, *Neohornibrookella lactea*, *Papillatabairdia elongata*, *Tasmanocypris dietmarkeyseri*, *Xestoleberis posidonicola*, *Yassinicythere bassiounii* and the fossil (early Miocene) New Zealand species *Hemicythere tarakohensis*. This brings the total marine ostracod fauna in the New Zealand EEZ to 496 species, of which 229 (46%) are recorded from shelf depths (0-200 m) in the Aupourian Province, east of northern New Zealand.

Cluster analysis of 113 quantitative ostracod samples from inner-mid shelf depths east of Northland and Auckland resulted in the recognition of 14 subassociations in 4 associations. The majority of the Cavalli faunas cluster together in three subassociations with the most diverse faunas and lowest species dominance, characterised by common *Loxoconcha punctata*. Subdominant in the shallowest subassociation is *Xestoleberis olivacea*, whereas *Neonesidea amygdaloides*, *Quadracythere biruga* and *Ambostracon pumilum* are subdominant in the other two subassociations in coarser sediment in the current-swept Cavalli Passage. One distinctly different unclustered Cavalli Islands ostracod fauna occurs in strong current-swept, shell gravel between rocky islets at 9 m depth and is strongly dominated (48%) by *Xestoleberis chilensis austrocontinentalis* with subdominant *Polycope* sp. and *Parapolycope* cf. *loscobanosi*.

KEYWORDS

New Zealand; Ostracoda; Biodiversity; Cavalli Islands; Aupourian Province.

INTRODUCTION

The highest diversity (267 species) of benthic foraminifera in any small area of New Zealand (Hayward et al. 1999) has been recorded from inner shelf (0-40 m depth) seafloor sediment from around the Cavalli Islands, Northland, New Zealand (Hayward 1982a). The reasons for this are probably a combination of the diversity of sheltered to exposed habitats and their location on the fringes of the warm East Auckland Current (Aupourian Province). Most shallow-marine biotic groups occur in greater diversity in the warm waters of the Aupourian Province than elsewhere in New Zealand. During most of the Holocene (last 10,000 years) the East Auckland Current has originated from the subtropical Tasman Front and surface current eddies from east Australia, Lord Howe, Norfolk or the Kermadec Islands. This current periodically transports subtropical shallow-marine

organisms or their juveniles across the ocean barrier and introduces them to New Zealand.

We were encouraged to study the ostracods from around the Cavalli Islands by the existence of picked ostracod faunal slides, made by one of us (BWH) while studying the foraminiferal faunas ~1980 (Hayward 1979, 1982a), and by the expectation that these might contain further species additions to the known New Zealand fauna. The biodiversity of New Zealand marine ostracods is still incompletely documented and their biogeography and ecological distribution is even less well known.

Previous work

The biodiversity and ecological distribution of 124 species of benthic ostracods has been summarised and illustrated for the Hauraki Gulf (Morley and Hayward 2012), with the nearest faunas to the present study coming

from off Whangarei Heads and the Mokohinau Islands, ~100 km southeast of the Cavalli Islands (Fig. 1). Study of a smaller and closer area in similar water depths was recently undertaken on 16 faunal samples at Matai Bay, 50 km to the west and yielded 75 species of ostracods – 22 of them additional to those recorded from the Hauraki Gulf. The only other significant study that has included ostracods from the Aupourian Province was the pioneering work of Hornibrook (1952). He recorded 9 species from 25 m depth in Rangaunu Bay and 52 species, including the description of 24 new species, in four samples from 150–300 m water depth off North Cape and the Three Kings Islands, 70 km and 120–200 km northwest of the Cavalli Islands respectively (Fig. 1). Dr Kerry Swanson briefly examined the picked faunas used in the present study in the 1980s and recognised the presence of rare living punciid ostracods. Following additional targeted collecting by Swanson around the Cavalli Islands, he recorded five punciid species (genera *Manawa* and *Puncia*) from 8–17 m depth and described one as new (*Manawa staceyi*) (Swanson, 1989, 1991).

Study area

The Cavalli Islands group (Latitude 35°00'S, longitude 173°57'E) lies approximately 2.5 km from the Northland mainland in the vicinity of Matauri Bay (Fig. 1). The sediment samples used in this study come from the Cavalli Passage between the island group and the mainland. The centre of the passage is underlain by shelly coarse sand (stns 11, 12) to the west of Motukawanui Island. This grades southwards into shelly medium sand (stns 35, 37, 39, 47) to the east of Matauri Bay. Clean shell gravel occupies the floor of the current-swept channel between rocky islets south of Motukawanui (stn. 42). An area of fine and very fine sand occupies the shallows (<5 m) in and around the sheltered bays of southeastern Motukawanui (stns 16, 17, 23, 24, 26, 28). The southern part of Cavalli Passage is only 5–10 m deep between southern Motukawanui and the mainland, but it deepens northwards to >40 m where the seafloor is mantled by fine and very fine sand.

METHODS

Field sampling

Samples were collected during an Offshore Islands Research Group expedition to the Cavalli Islands, by Dr Roger Grace and BWH in the summer of 1978–79 using a small dredge (described by Grace and Whitten 1974) hand-hauled from a dinghy powered by a small outboard motor. Under ideal conditions the dredge sampled approximately 0.075 m² of seafloor to a sediment depth of 2–6 cm, and held 4500 cm³. A sample, comprising approximately 200 cm³ of sediment, was taken from each dredge haul and preserved in 10% ethanol; the remainder was processed for macrofaunal analysis (Grace and Hayward, 1980). Water depths sampled were from intertidal down to 41 m. Data on dredge stations used in this study are given in Table 1 and locations shown in Figure 1.

Laboratory

On return to the laboratory, approximately 50 ml of the sediment sample from each station was washed over a 63 µm sieve to remove the mud. The sand and fine gravel was dried and divided up using a microsplits until the quantity of material left contained approximately 100 ostracod valves (in the >125 µm fraction). The ostracods were picked and mounted on slides. In some instances fewer than this number were present in the entire sample (Table 1).

In 2015 the ostracod slides that were picked, but never worked on in the 1980s, were examined. The 15 slides with the most abundant ostracod faunas (Table 1) were selected for study by MSM, who identified and counted the ostracod valves. The samples ranged in depth from 0.5 to 29 m below MLW. Single and double valved ostracods were recorded separately in these census counts and double valved specimens counted as two valves when being converted to relative abundance (%) for data analysis.

Species diversity measures

Four measures of species diversity have been calculated for individual samples using the PAST statistical package (Hammer *et al.* 2001) for each ostracod fauna (Table 1): Number of species, S = the number of species in each sample, which is strongly dependent on the number of valves counted.

Shannon Diversity Index, $H = -\sum p_i \ln p_i$, where p_i is the proportion of the i^{th} species (Hayek and Buzas 1997).

Evenness, $E = eH/S$ where e is the base of the natural logarithms (Buzas and Gibson 1969).

This is solely a measure of species evenness irrespective of the number of species present. For most species abundance distributions E , like S , is a function of the number of specimens counted and thus care must be exercised when comparing between faunas.

Berger-Parker index, $BP = \max p_i$ (Berger and Parker 1970).

STATISTICAL ANALYSES

It was decided that more robust and meaningful results would be obtained if our Cavalli ostracod census count data (15 samples) were combined with census data previously obtained by the same methodology from Matai Bay (16 samples; Morley and Hayward 2014) and the Hauraki Gulf (82 samples, Morley and Hayward 2012). Raw census counts were standardised by converting counts to proportions of sample totals (= relative abundances). The faunal data analysed consisted of the relative abundance of 189 ostracod species in 113 samples. Unweighted pair group Q-mode cluster analysis using arithmetic averages of Bray Curtis Similarity Coefficient distance matrices were used to produce a dendrogram classification. Sample associations and subassociations were subjectively selected from the dendrogram so that they replicated as nearly as possible the previous subassociation

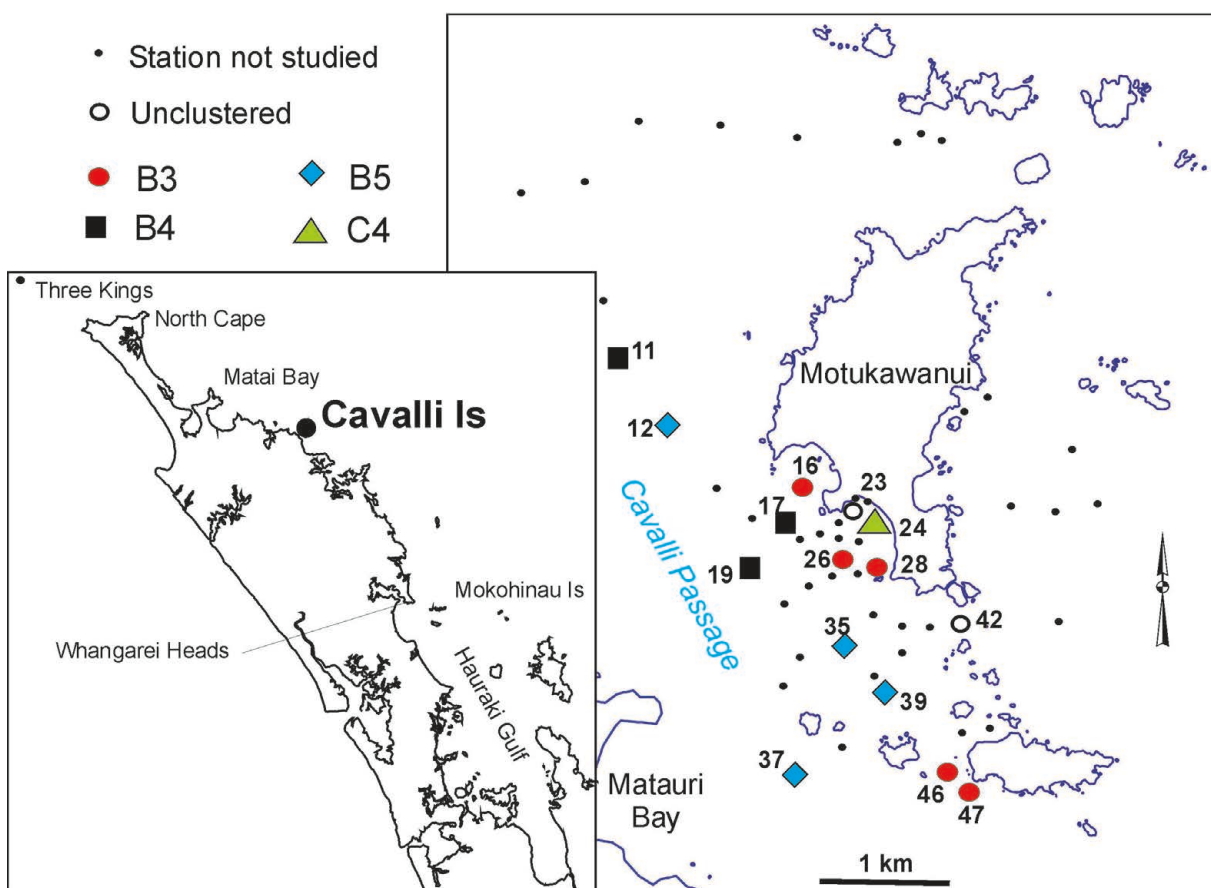


Figure 1. The Cavalli Islands are located off the northeast coast of Northland. Map of the Cavalli Islands shows location of the 15 studied samples and the cluster analysis subassociations of their ostracod faunas.

Table 1. Physical and biological attributes of the seafloor sediment samples used in this study. S, H, E and BP are species diversity measures. Ass = ostracod association (Table 2), f = fine, m = medium, nc = not clustered, vf = very fine, vc = very coarse

| Stn | Depth | Cat No. | Lat °S | Long °E | Sediment | S | H | E | BP | Ass |
|-----|-------|---------|--------|---------|-------------------|----|-----|------|------|-----|
| 16 | 0.5 m | F201727 | 35.008 | 173.936 | fine sand | 34 | 3.1 | 0.64 | 0.15 | B3 |
| 23 | 1 m | F201734 | 35.010 | 173.939 | sl muddy vf sand | 11 | 2.3 | 0.88 | 0.17 | nc |
| 28 | 1.5 m | F201739 | 35.015 | 173.942 | sl muddy vf sand | 29 | 3.0 | 0.71 | 0.12 | B3 |
| 24 | 1.8 m | F201735 | 35.013 | 173.940 | fine sand | 18 | 2.2 | 0.48 | 0.31 | C4 |
| 26 | 3 m | F291737 | 35.014 | 173.937 | fine sand | 29 | 3.0 | 0.71 | 0.11 | B3 |
| 47 | 3 m | F201758 | 35.034 | 173.951 | m sand | 25 | 2.6 | 0.53 | 0.19 | B3 |
| 35 | 5.5 m | F201746 | 35.023 | 173.937 | shelly m-f sand | 24 | 2.6 | 0.54 | 0.28 | B5 |
| 17 | 6 m | F201728 | 35.013 | 173.933 | fine sand | 35 | 3.3 | 0.76 | 0.08 | B4 |
| 37 | 6 m | F201748 | 35.033 | 173.933 | m sand | 16 | 2.4 | 0.66 | 0.19 | B5 |
| 19 | 8 m | F201730 | 35.014 | 173.930 | fine sand | 24 | 2.6 | 0.57 | 0.21 | B4 |
| 39 | 8 m | F201750 | 35.028 | 173.943 | shelly m sand | 16 | 2.2 | 0.56 | 0.32 | B5 |
| 46 | 9 m | F201757 | 35.034 | 173.949 | fine sand | 27 | 2.8 | 0.62 | 0.20 | B3 |
| 42 | 9 m | F201753 | 35.020 | 173.950 | fine shell gravel | 10 | 1.6 | 0.51 | 0.48 | nc |
| 12 | 22 m | F201723 | 35.005 | 173.918 | shelly vc sand | 27 | 2.8 | 0.60 | 0.17 | B5 |
| 11 | 29 m | F201722 | 34.997 | 173.914 | shelly vc sand | 25 | 2.8 | 0.69 | 0.14 | B4 |

clusters derived from the Hauraki Gulf samples on their own (Morley and Hayward 2012) with additional subassociations where needed for the Matai Bay and Cavalli Island samples. The cluster analysis was computed using the “MVSP” statistical package (Kovach 1993).

Specimens and data

All washed sediment residues and ostracod faunas from the Cavalli Islands are housed in the national paleontology collections at GNS Science, Lower Hutt, with catalogue numbers prefixed by F201 (Appendix 1). All figured ostracods are mounted on single-hole slides (prefixed by MA; Figs 2-3) and lodged in the marine collections of Auckland War Memorial Museum. The full Cavalli Islands and Aupourian Province species list is given in Appendix 1. Raw census, relative abundance and species diversity data are available online at: www.aucklandmuseum.com/research/pub/records/51/sup/morley-hayward-ostracoda

The taxonomy used here largely follows that in the most recently updated New Zealand checklists for Ostracoda (Webber *et al.* 2010; Eagar 2013) and the World Register of Marine Species (<http://www.marinespecies.org/>).

BIODIVERSITY

Of the 107 species of benthic marine Ostracoda recorded in this study from the Cavalli Islands, 50 are identified to named species previously recorded from the Recent fauna of New Zealand and nine to named species previously recorded only from Australia. We have assigned a further fifteen to unnamed species (sp. 1 etc.) that have been previously recorded from New Zealand. Eighteen species have been left in open nomenclature, because they are different from but have affinities (aff.) to named species or are possibly the same as a named species (cf.). Six of these have not previously been recorded from New Zealand – *Bradleya* aff. *praemckenziei* (Fig. 2), *Hemicythere* aff. *brunnea*, *Hemicytherura* aff. *lakeillawarraensis* (Fig. 2), *Paradoxostoma* aff. *geraldtonense* (Fig. 2), *Paradoxostoma* aff. *romei*, and *Propontocypris* aff. *subreniformis*. We have only been able to identify to genus level a further twelve unnamed species; one to family level (Trachyleberididae) and one indeterminate.

A further species, *Hemicythere tarakohensis*, has previously been recorded fossil from the early Miocene of New Zealand (Hornibrook 1952), but its presence in Cavalli Passage sediment, which has no nearby outcropping Cenozoic sedimentary rocks, indicates that this is a Recent species. Thus thirty of our Cavalli Islands species appear to be new living records for New Zealand, of which only the fossil species and nine Australian species are named – *Callistocythere dorsotuberculata paucicostata* (Fig. 2), *C. keiji*, *C. ventroalata*, *Lankacythere coralloides* (Fig. 2), *Neohornibrookella lactea*, *Papillatabairdia elongata* (Fig. 2), *Tasmanocypris dietmarkeyseri*, *Xestoleberis posidonicola* and *Yassinicythere bassionii* (Fig. 3).

Twenty of the species identified are illustrated in Figs 2-3 and the majority of the remainder have previously been illustrated from the Hauraki Gulf and Matai Bay in Morley and Hayward (2012, 2014). None of the five punciid species recorded from the Cavalli Islands by Swanson (1991) was found in our quantitative faunas and thus the total ostracod species from the Cavalli Islands is 112. The additional species recorded here from the Cavalli Islands brings the total known marine ostracod fauna in the New Zealand EEZ to 496 species (updated from Webber *et al.* 2010).

BIOGEOGRAPHY

Thirty of the Cavalli Islands ostracod species are new records for the east coast of Northland, additional to the 151 species previously recorded from the Hauraki Gulf and Matai Bay (Morley and Hayward 2012, 2014). Combined there are now 181 species of Ostracoda recorded from the continental shelf and coast (<130 m water depth) off the east coast of Northland-Auckland. This compares with 63 species recorded from shelf and upper bathyal depths (3-520 m) east of Otago (Swanson 1979a). The diversity difference between eastern northern New Zealand and the Otago shelf probably reflects the greater range of habitats present and sampled off Northland-Auckland, but also the greater biodiversity that occurs beneath the warm East Auckland Current (Aupourian Province) than under the cool Southland Current off Otago (Forsterian Province). The full extent of the Aupourian Province includes ostracod faunas studied by Hornibrook (1952) from Rangaunu Bay, North Cape and Three Kings Islands. When the additional species from these faunas are added, the Aupourian Province currently has a diversity of 229 species (Appendix 1) or 46% of the total recorded New Zealand marine ostracod fauna. Eighty-seven of the 112 ostracod species (78%) from the Cavalli Islands are considered to be endemic to New Zealand. The remainder are mostly shared with southeast Australia.

ECOLOGICAL DISTRIBUTION

In the cluster analysis dendrogram of all 113 Aupourian ostracod faunas four major associations (A-D) and 14 subassociations are recognised (Fig. 4, Table 2). The ten subassociations recognised by Morley and Hayward (2012) based on the same dataset without the Matai Bay and Cavalli faunas are largely replicated. The four additional subassociations (B1-4) mostly cluster Cavalli (B3-5) and Matai Bay (B1) faunas. Twelve of the fifteen Cavalli ostracod faunas cluster together in subassociations B3, B4 and B5, all of which are dominated by *Loxoconcha punctata* (Fig. 5). The shallower subassociation in more sheltered conditions (B3) is co-dominated by *Xestoleberis olivacea*. The other two subassociations occur in coarser sediment further out in the current-swept Cavalli Passage (Fig. 1) with B4 co-dominated by *Neonesidea amygdaloides* and B5 by *Quadracythere biruga* and *Ambostracon pumilum* (Fig. 5).

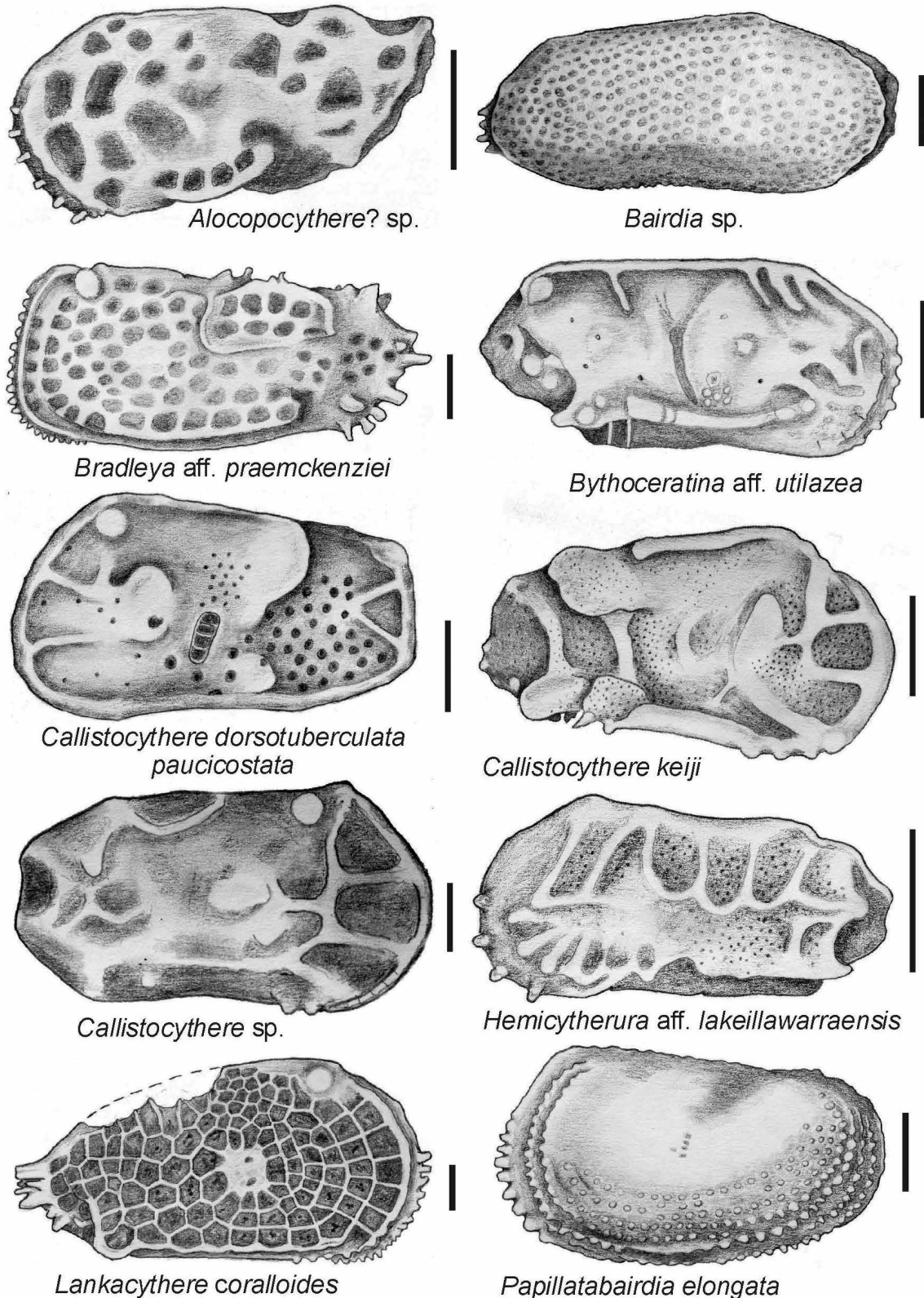


Figure 2. Ostracod taxa from the Cavalli Islands that have not previously been illustrated and recorded from northeast New Zealand (Morley and Hayward, 2012, 2014). *Alocopocythere?* sp., F201730, 8 m depth, MA121776; *Bairdia?* sp., F201757, 9 m depth, MA121804; *Bradleya* aff. *praemckenziei* Whatley and Downing, 1983, F201723, 22 m depth, MA121805; *Bythoceratina* aff. *utilazea* Hornibrook, 1952, F201727, 0.5 m depth, MA121806; *Callistocythere dorsotuberculata paucicostata* Yassini and Jones, 1987, F201730, 8 m depth, MA121807; *Callistocythere keiji* (Hartmann, 1978), F201737, 3 m depth, MA121808; *Callistocythere* sp., F201750, 8 m depth, MA121810; *Hemicytherura* aff. *lakeillawarraensis* Yassini and Jones, 1995, F201723, 22 m depth, MA121811; *Lankacythere coralloides* (Brady, 1886), F201750, 8 m depth, MA121812; *Papillatabairdia elongata* McKenzie, Reymont and Reymont, 1990, F201723, 22 m depth, MA121813. Scale bars 0.1 mm long.

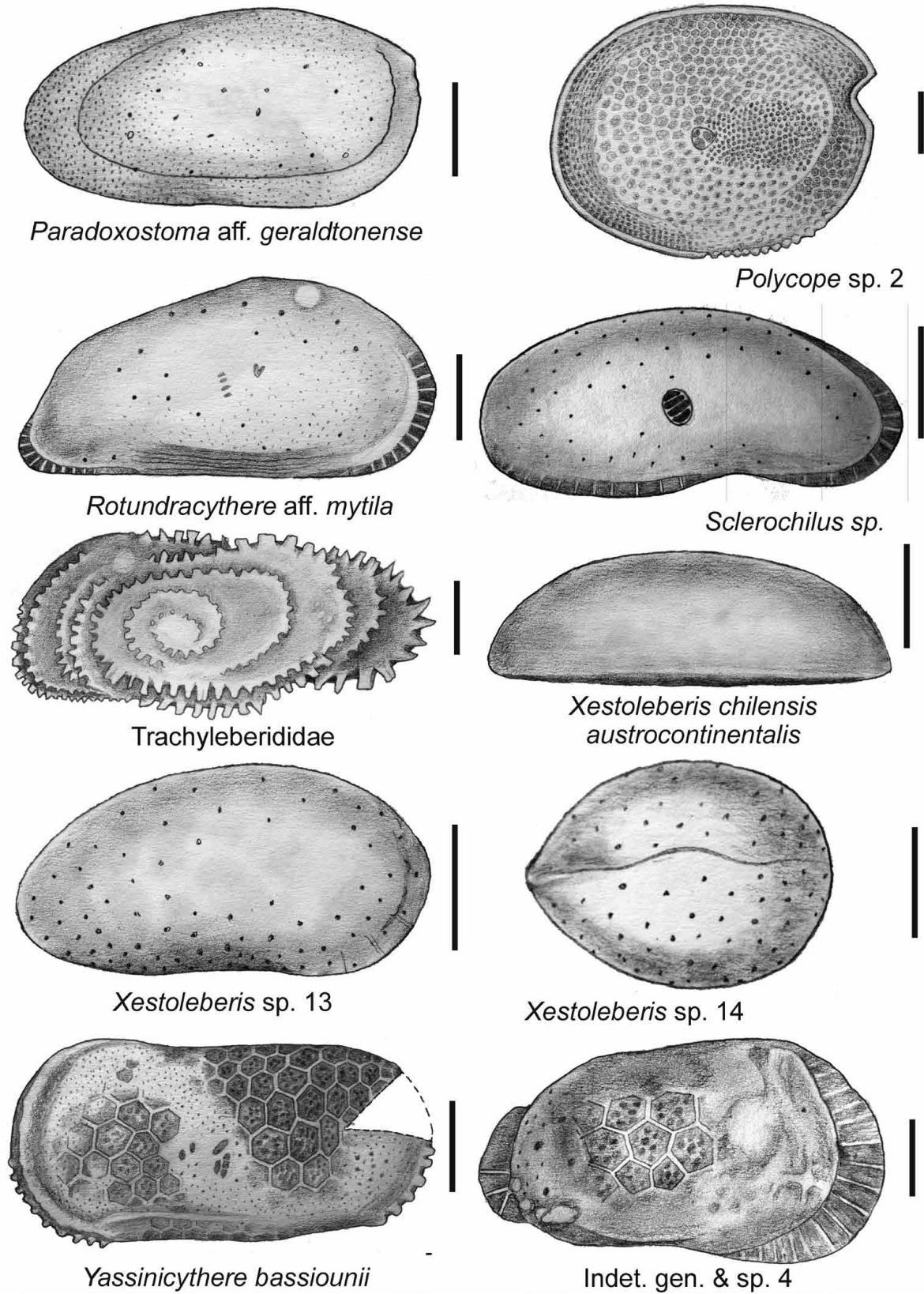


Figure 3. Ostracod taxa from the Cavalli Islands that have not previously been illustrated and recorded from northeast New Zealand (Morley and Hayward, 2012, 2014). *Paradoxostoma* aff. *geraldtonense* Hartmann, 1978, F201727, 0.5 m depth, MA121814. *Polycope* sp. 2, F201753, 9 m depth, MA121835; *Rotundracythere* aff. *mytila* (Hornibrook, 1952), F201727, 0.5 m depth, MA121836; *Sclerochilus* sp., F201753, 9 m depth, MA121837; *Trachyleberididae*, F201722, 29 m depth, MA121838; *Xestoleberis chilensis austrocontinentalis* Hartmann, 1987, F201730, 8 m depth, MA121839; *Xestoleberis* sp. 13, F201727, 0.5 m depth, MA121840; *Xestoleberis* sp. 14, F201753, 9 m depth, MA121841; *Yassinicythere bassounii* Hartmann, 1978, F201727, 0.5 m depth, MA121845. Indeterminate Gen. and sp. 4, F201748, 6 m depth, MA121848. Scale bars 0.1 mm long.

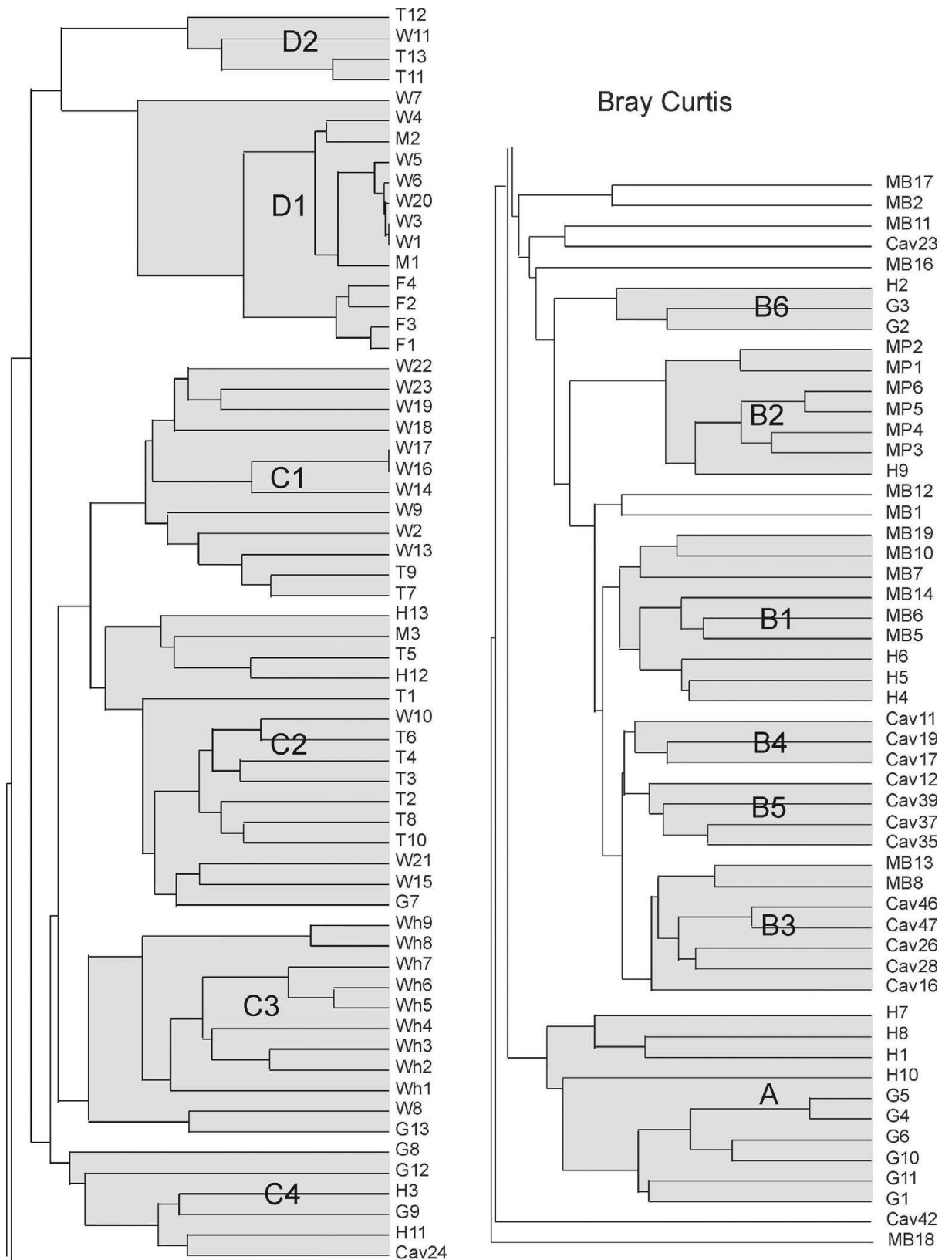


Figure 4. Dendrogram classification of 113 Aupourian ostracod faunas, including the 15 Cavalli faunas, produced by cluster analysis using Bray Curtis Similarity Coefficient (as in Morley and Hayward, 2012). The recognition of associations and subassociations (A1-D2) is based on subjective examination of the dendrogram.

Cav24 fauna (1.8 m depth) clusters in subassociation C4 with five sheltered, nearshore (0-14 m) samples from around the middle and outer Hauraki Gulf because of their dominance by *Paracypris zealandica* and *Swansonites tumida*. One of the unclustered Cavalli samples (Cav23) occurs in the sheltered shallows of the southeastern bay of Motukawanui and is distinguished because of its unusual co-dominance of *Loxocythere crassa* and *Copytus novaezealandiae* (Fig. 5). The other unclustered sample (Cav42) occurs in current-swept shell gravel between rocky islets at 9 m depth (Fig. 1). Its fauna is strongly dominated (48%) by *Xestoleberis chilensis austrocontinentalis* (both live and dead specimens) with unusually subdominant *Polycope* sp. 2 and *Parapolycope* cf. *loscobanosi* (mostly live specimens).

SPECIES DIVERSITY

The three Cavalli Islands subassociations (B3-5), in the shallow inner shelf Cavalli Passage, have the lowest dominance (BP = 0.14-0.24) and B3 and B4 have the highest diversity (S = 28, 30; H = 2.86, 2.92) and most evenly distributed (E) ostracod faunas in the Hauraki Gulf dataset (Fig. 6). In contrast, the lowest diversity (S = 4, 5; H = 0.61, 0.74) ostracod faunas with greatest dominance (BP = 0.70, 0.80) cluster in association D (Fig. 6) which is largely restricted to sheltered intertidal habitats of the inner Hauraki Gulf harbours, especially the Waitemata Harbour. Unclustered Cav23 from the shallows of the sheltered southeastern bay of Motukawanui has moderate diversity (S = 11, H = 2.27) but the most even (E = 0.88)

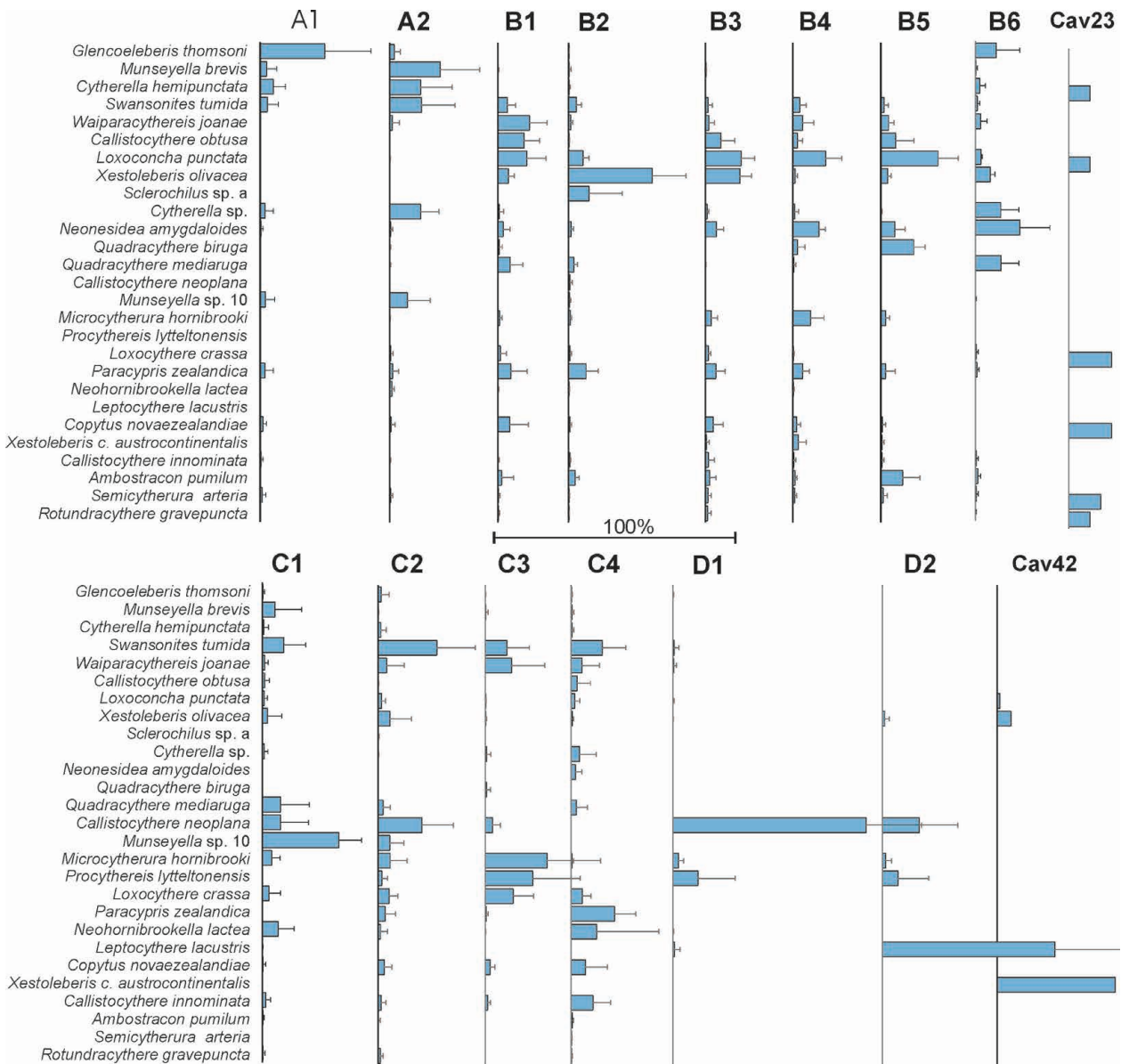


Figure 5. Histograms showing the mean relative abundance with standard deviation of the more common ostracod species in each of the Aupourian subassociations (A1-D2) plus the two unclustered Cavalli samples (Cav23, Cav42).

Table 2. Attributes of the Aupourian ostracod associations recognised on the cluster analysis dendrogram (Fig. 4), plus the two unclustered Cavalli samples. Bolded association codes contain Cavalli Islands faunas.

| Ost Ass | No. Stns | Dominant species | Depth Range | Geographic Range |
|--------------|----------|--|-------------|------------------------------|
| A1 | 3 | <i>Glencoleberis thomsoni</i> | 46-130 m | mid-outer Hauraki Gulf |
| A2 | 7 | <i>Munseyella brevis</i> - <i>Cytherella hemipuncta</i> | 17-50 m | Great Barrier I, Motutapu I. |
| B1 | 9 | <i>Waiparacythereis joanae</i> - <i>Callistocythere obtusa</i> | 1-18 m | Matai Bay, Little Barrier I. |
| B2 | 7 | <i>Xestoleberis olivacea</i> | 0 m | Hauraki Gulf rock pools |
| B3 | 7 | <i>Loxococoncha punctata</i> - <i>Xestoleberis olivacea</i> | 0.5-9 m | Cavalli Is, Matai Bay |
| B4 | 3 | <i>Loxococoncha punctata</i> - <i>Neonesidea amygdaloides</i> | 6-29 m | Cavalli Is |
| B5 | 4 | <i>Loxococoncha punctata</i> - <i>Quadracythere biruga</i> | 5.5-22 m | Cavalli Is |
| B6 | 3 | <i>Neonesidea amygdaloides</i> - <i>Quadracythere mediaruga</i> | 30-50 m | outer Hauraki Gulf |
| C1 | 12 | <i>Munseyella</i> sp.10 | 0-15 m | Waitemata Harbour |
| C2 | 15 | <i>Swansonites tumida</i> - <i>Callistocythere neoplana</i> | 0-30 m | inner Hauraki Gulf |
| C3 | 11 | <i>Microcytherura hornibrooki</i> - <i>Procythereis lytteltonensis</i> | 0-3 m | N Coromandel Peninsula |
| C4 | 6 | <i>Paracypris zealandica</i> - <i>Swansonites tumida</i> | 0-14 m | mid-outer Hauraki Gulf |
| D1 | 13 | <i>Callistocythere neoplana</i> | 0-1.5 m | inner Hauraki Gulf harbours |
| D2 | 4 | <i>Leptocythere lacustris</i> | 0 m | Waitemata Harbour |
| Cav23 | 1 | <i>Loxocythere crassa</i> - <i>Copytus novaezealandiae</i> | 1 m | Cavalli Is |
| Cav42 | 1 | <i>Xestoleberis chilensis austrocontinentalis</i> | 9 m | Cavalli Is |

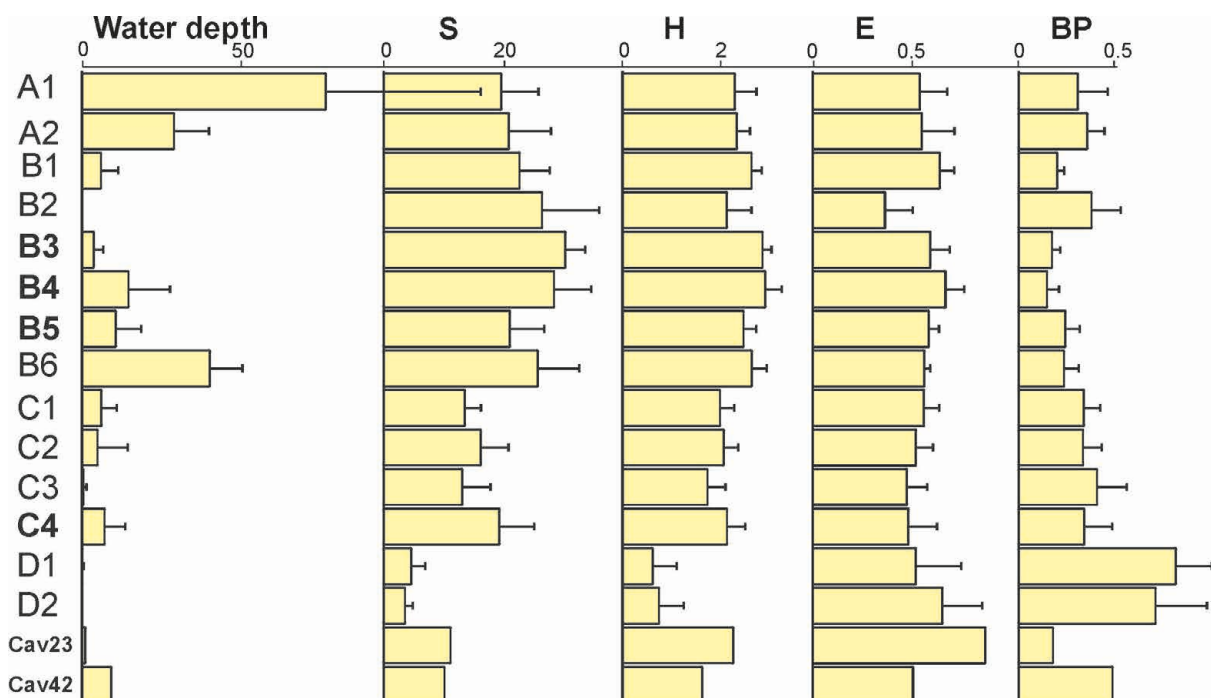


Figure 6. Mean values and standard deviation for water depth and diversity measures for each Aupourian Association plus the two unclustered Cavalli samples (Cav23, Cav42).

and near-lowest dominance (BP = 0.17). Unclustered Cav42 from the channel shell gravel has more average diversity, dominance and evenness values (Table 1, Fig. 6).

DISCUSSION

The Cavalli Islands ostracod faunas were studied because of the expectation that they would be diverse and may include species not previously recorded from New Zealand. As predicted we have documented the most diverse ostracod faunas (in individual samples) and greatest biodiversity (in a small area) so far found in New Zealand. We consider that this is a result of the greater diversity present in the warm Aupourian Province compared with cooler provinces further south around New Zealand and the greater diversity of habitat (sheltered fine sediment to current-swept gravel, proximity to rocks, brown seaweed forest and sea grass meadows) around the Cavalli Islands compared with other studied areas (e.g. Swanson 1979a, b; Hayward 1981, 1982b; Eagar 1995, 1999; Morley et al. 2006; Morley and Hayward 2007, 2010, 2012, 2014).

The relatively large number of species (30) recorded as new to New Zealand in this study reflects the neglected nature of taxonomic research on this country's marine ostracods, as does the large number of species recorded here that we have been unable to assign to a definite species name (47; 42% of taxa). There is clearly a need for a great deal of further research on the taxonomy of New Zealand's Recent ostracods with at least 201 undetermined and undescribed taxa known (out of 496; updated from number in Webber *et al.* 2010). Our studies indicate that most of the more common ostracods have been described and not surprisingly it is the less common that have so far been overlooked.

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APPENDIX 1: Ostracoda species list for New Zealand’s Aupourian Province (0-300 m depth), with references to figured New Zealand specimens that illustrate each taxon’s features. Bolded species are recorded here from the Cavalli Islands.

* = New Zealand endemic species

+ = additional species records from New Zealand in this study at the Cavalli Islands

-
- Actinocythereis tétrica* (Brady, 1880)
- Aglaiella setigera* (Brady, 1880)
- Agrenocythere reticlava* (Hornibrook, 1952). Morley and Hayward, 2012, Fig. 7a.
- Alocopocythere?* sp.**+ This paper Fig. 2.
- Ambolus pumilus* (Brady, 1866)*
- Ambolus* aff. *pumilus* (Brady, 1866)* Morley and Hayward, 2014, Fig. 2.
- Ambostracon pumilum*** (Brady, 1866). Morley and Hayward, 2012, Fig. 11c.
- Ancohenia* sp. Eagar, 1999. Morley and Hayward, 2012, Fig. 7b.
- Apatihowella probesiooides* (Hornibrook, 1952)* Morley and Hayward, 2014, Fig. 2.
- Argilloecia clavata* (Brady, 1880)*
- Argilloecia eburnea* Brady, 1880*
- Argilloecia* aff. *pusilla*** (Brady, 1880)* Morley and Hayward, 2012, Fig. 7c.
- Argilloecia tumida* (Brady, 1880)
- Aversovalva aurea*** (Hornibrook, 1952)* Morley and Hayward, 2012, Fig. 7d.
- Aysegulina quadrazea* (Hornibrook, 1952)* Morley and Hayward, 2012, Fig. 7e.
- Bairdia* sp.**+ This paper Fig. 2.
- Bradleya arata* (Brady, 1880), Hornibrook, 1952, Figs 80, 83, 86.
- Bradleya dictyon* (Brady, 1880). Hornibrook, 1952, Figs 81-82, 84-85.
- Bradleya* aff. *praemckenziei*** Whatley and Downing, 1984+ This paper Fig. 2.
- Bradleya* sp. 1. Morley and Hayward, 2012, Fig. 7f.
- Bradleya?* sp. 3. Morley and Hayward, 2012, Fig. 7g.
- Bythoceratina decepta* Hornibrook, 1952*, Figs 260-262.
- Bythoceratina edwardsoni* Hornibrook, 1952 . Morley and Hayward, 2012, Fig. 7h.
- Bythoceratina fragilis* Hornibrook, 1952*, Figs 263, 264, 266.
- Bythoceratina maoria* Hornibrook, 1952*, Figs 265, 267, 268.
- Bythoceratina mestayerae* Hornibrook, 1952*, Figs 257-259, 269.
- Bythoceratina powelli* Hornibrook, 1952*, Figs 270-272.
- Bythoceratina* aff. *utilazea*** Hornibrook, 1952+ This paper Fig. 2.
- Bythocypris* aff. *reniformis*** Brady, 1880* Morley and Hayward, 2012, Fig. 7i; Morley and Hayward, 2014, Fig. 2.
- Callistocythere dedeckeri* Yassini and Jones, 1995. Morley and Hayward, 2012, Fig. 7j.
- Callistocythere dorsotuberculata* Hartmann, 1979+ Morley et al., 2006, Fig. 6.
- Callistocythere dorsotuberculata paucicostata*** Yassini and Jones, 1987+ This paper Fig. 2.
- Callistocythere innominata*** (Brady, 1898)* Morley and Hayward, 2012, Fig. 7k.
- Callistocythere keiji*** (Hartmann, 1978)+ This paper Fig. 2
- Callistocythere murrayana* (Brady, 1880)
- Callistocythere neoplana* Swanson, 1979. Morley and Hayward, 2012, Fig. 7l.
- Callistocythere obtusa*** Swanson, 1979* Morley and Hayward, 2012, Fig. 7m.
- Callistocythere* aff. *obtusa* Swanson, 1979. Morley and Hayward, 2012, Fig. 7n.
- Callistocythere* aff. *puri*** McKenzie, 1967. Morley and Hayward, 2012, Fig. 7o.
- Callistocythere ventroalata*** Yassini and Jones, 1995+. Morley and Hayward, 2012, Fig. 8a.
- Callistocythere* aff. *ventroalata*** Yassini and Jones, 1995. Morley and Hayward, 2012, Fig. 8a.

- Callistocythere* sp.+ This paper Fig. 2.
- Caudites* sp. Morley and Hayward, 2012.
- Cletocythereis rastromarginata* (Brady, 1880)
- Cobanocythere navicularis* Yassini and Jones, 1995. Morley and Hayward, 2012, Fig. 8b.
- Copytus novaezealandiae*** (Brady, 1898)* Morley and Hayward, 2012, Fig. 8c.
- Copytus* aff. *novaezealandiae* (Brady, 1898)* Morley and Hayward, 2012, Fig. 8d.
- ?*Cypris* sp. 1* Morley and Hayward, 2014, Fig. 2.
- Cytheralison cosmetica* Yassini and Jones, 1987. Morley and Hayward, 2014, Fig. 2.
- Cytheralison fava* Hornibrook, 1952. Morley and Hayward, 2012, Fig. 8e.
- Cytheralison* sp.1*** Morley and Hayward, 2014, Fig. 2.
- Cythere melobesioides* Brady, 1869
- Cythereis finlayi*** Hornibrook, 1952* Morley and Hayward, 2012, Fig. 8f.
- Cythereis* aff. *finlayi*** Hornibrook, 1952*. Morley and Hayward, 2014, Fig. 2.
- Cythereis "incerta"*** Swanson, 1979, Fig. 37*
- Cytherella eburnea* Brady, 1898*
- Cytherella hemipuncta*** Swanson, 1969. Morley and Hayward, 2012, Fig. 8g.
- Cytherella lata* Brady, 1880
- Cytherella polita* Brady, 1868
- Cytherella punctata* Brady, 1866
- ?*Cytherella* sp. 2. Morley and Hayward, 2012, Fig. 8i.
- Cytherella* sp.** Swanson, 1979* Morley and Hayward, 2012, Fig. 8h.
- Cytherelloidea willetti*** Swanson, 1969* Morley and Hayward, 2012, Fig. 8j.
- Cytheridea aoteana*** Hornibrook, 1952* Morley and Hayward, 2012, Fig. 8k.
- Cytheromorpha robusta* Yassini and Jones, 1995. Morley and Hayward, 2014, Fig. 2.
- Cytheropteron laticalpum* Hornibrook, 1952* Morley and Hayward, 2012, Fig. 8l.
- Cytheropteron obtusulum*** Hornibrook, 1952* Morley and Hayward, 2012, Fig. 8o (as *Cytheropteron* sp. 1).
- Cytheropteron wellmani* Hornibrook, 1952*, Figs 154-156.
- Cytheropteron willetti*** Hornibrook, 1952* Morley and Hayward, 2012, Fig. 8n.
- Cytherura laticauda* Hornibrook, 1952*, Figs 237-239.
- Cytherura* aff. *taylori* (McKenzie, 1967)* Morley and Hayward, 2012, Fig. 9a.
- Debissonia* aff. *pravacauda*** Hornibrook, 1952*+, Figs 285, 286, 288.
- Diasterope grisea* (Brady, 1898). Morley and Hayward, 2012, Fig. 9b.
- Eucythere inaequa* Hornibrook, 1952*, Figs 13-17.
- Eucythere rotunda* Hornibrook, 1952*, Figs 22, 23, 25
- Eucythere subovalis* Hornibrook, 1952*, Figs 6-9.
- Foveoleberis foveolata* (Brady, 1880)
- Glencoeleberis thomsoni* (Hornibrook, 1952). Morley and Hayward, 2012, Fig. 9d.
- Hanaiceratina arenacea* (Brady, 1880)
- Harbansus* sp. 1. Morley and Hayward, 2012.
- Harbansus* sp. Eagar, 1999. Morley and Hayward, 2012, Fig. 9e.
- Hemicythere brunnea*** (Brady, 1898)* Morley and Hayward, 2012, Fig. 9f; Morley and Hayward, 2014, Fig. 3.
- Hemicythere* aff. *brunnea*** (Brady, 1898)*+
- Hemicythere fulvotincta* (Brady, 1880)
- Hemicythere munida*** Swanson, 1979* Morley and Hayward, 2012, Fig. 9g.
- Hemicythere tarakohensis***? Hornibrook, 1952+ Hornibrook, 1952, Figs 141-143.
- Hemicythere?* sp. 1+**
- Hemicytheridea mosaica* (Hornibrook, 1952)*, Figs 1, 2, 19.
- Hemicytherura delicatula* Hornibrook, 1952, Figs 213-216.
- Hemicytherura fereplana* Hornibrook, 1952. Morley and Hayward, 2012, Fig. 9h.
- Hemicytherura gravis*** Hornibrook, 1952* Morley and Hayward, 2012, Fig. 9i.
- Hemicytherura* aff. *lakeillawarraensis*** Yassini and Jones, 1995 This paper Fig. 2.
- Hemicytherura pandorae* Hornibrook, 1952*, Figs 195-197.
- Hemicytherura pentagona*** Hornibrook, 1952* Morley and Hayward, 2012, Fig. 9k.
- Henryhowella rugibrevis* (Hornibrook, 1952). Morley and Hayward, 2012, Fig. 13k.
- Hermanites andrewsi* Swanson, 1978* Morley and Hayward, 2014, Fig. 3.
- Hermanites* aff. *andrewsi* Swanson, 1979. Morley and Hayward, 2012, Fig. 9m.
- Hermanites* sp. 1.** Morley and Hayward, 2012, Fig. 9n.

- Jacobella papanuiensis* Swanson, 1979*. Morley and Hayward, 2012, Fig. 9o.
Kangarina radiata (Hornibrook, 1952). Morley and Hayward, 2012, Fig. 9l.
Kangarina? sp. 1. Morley and Hayward, 2012, Fig. 10a.
Keijia demissa (Brady, 1868)
Kotoracythere formosa Swanson, 1979. Morley and Hayward, 2012, Fig. 10b.
Lankacythere coralloides (Brady, 1886)+ This paper Fig. 2.
Leptocythere lacustris McKenzie, Reyment and Reyment, 1990. Morley and Hayward, 2012, Fig. 10c.
Leptocythere sp. 2 Morley and Hayward, 2012
Loxoconcha aff. *abditocostata* Hartmann, 1981. Morley and Hayward, 2012, Fig. 10d.
Loxoconcha punctata Thomson, 1879* Morley and Hayward, 2012, Fig. 10e.
Loxocythere kingi Hornibrook, 1952+ Hornibrook, 1952, Figs 32, 36-37.
Macrocyprina sp. Swanson, 1979* Morley and Hayward, 2012, Fig. 10g.
Macrocyprina sp. 1+
Macrocypris sp. Swanson, 1979. Morley and Hayward, 2012, Fig. 10.h
Macrocypris sp. 1+
Manawa staceyi Swanson, 1989*
Manawa tryphena Hornibrook, 1949*. Hornibrook, 1963, Figs 6-9.
Microceratina cf. *quadrata* Swanson, 1980. Morley and Hayward, 2014, Fig. 3.
Microcytherura crassa (Hornibrook, 1952)* Morley and Hayward, 2012, Fig. 10f.
Microcytherura hornibrooki (McKenzie, 1967)* Morley and Hayward, 2012, Fig. 10i.
Microcytherura sp. 1 Mckenzie, 1967. Morley and Hayward, 2012, Fig. 10j.
Microcytherura sp. 2. Morley and Hayward, 2012, Fig. 10k.
Miracythere novaspecta Hornibrook, 1952*, Figs 248-256.
Munseyella brevis Swanson, 1979* Morley and Hayward, 2012, Fig. 10l.
Munseyella modesta Swanson, 1979, Fig. 23c-d+
Munseyella punctata Whatley and Downing, 1983. Morley and Hayward, 2012, Fig. 10m.
Munseyella? sp. 1. Morley and Hayward, 2012, Fig. 10o.
Munseyella sp. 2. Morley and Hayward, 2012, Fig. 11a.
Munseyella sp. 10 Hartmann, 1982. Morley and Hayward, 2012, Fig. 11b.
Neocytherideis anneclarkeae Yassini and Jones, 1987. Morley and Hayward, 2012, Fig. 11d.
Neohornibrookella lactea (Brady, 1866)
Neonesidea amygdaloides (Brady, 1880)* Morley and Hayward, 2012, Fig. 11e.
Neonesidea fusca (Brady, 1866)
Oculocytheropteron acutangulum (Hornibrook, 1952)* Morley and Hayward, 2012, Fig. 11f.
Oculocytheropteron confusum (Hornibrook, 1952)* Morley and Hayward, 2012, Fig. 11g.
Oculocytheropteron curvicaudum (Hornibrook, 1952)* Morley and Hayward, 2014, Fig. 2.
Oculocytheropteron dividendum (Hornibrook, 1952)* Morley and Hayward, 2014, Fig. 2.
Oculocytheropteron fornix (Hornibrook, 1952)*+ Hornibrook, 1952, Figs 159-161.
Oculocytheropteron improbum (Hornibrook, 1952)* Morley and Hayward, 2014, Fig. 3.
Oculocytheropteron terecaudum (Hornibrook, 1952)*, Morley and Hayward, 2012, Fig. 8m.
Oculocytheropteron vertex (Hornibrook, 1952)*, Figs 177, 179, 180.
Orlovibairdia arcaforma (Swanson, 1979). Morley and Hayward, 2012, Fig. 11h.
Papillatabairdia elongata McKenzie, Reyment and Reyment, 1990+ This paper Fig. 2.
Paracypris zealandica (Brady, 1880)* Morley and Hayward, 2012, Fig. 11i.
Paradoxostoma albanianse Hartmann, 1979* Morley and Hayward, 2012, Fig. 11j.
Paradoxostoma augustense Hartmann, 1979* Morley and Hayward, 2012, Fig. 11k.
Paradoxostoma brevicaudata Yassini and Jones, 1995. Morley and Hayward, 2014, Fig. 3.
Paradoxostoma crustaecola Hartmann, 1980. Morley and Hayward, 2014, Fig. 3.
Paradoxostoma aff. *geraldtonense* Hartmann, 1978+ This paper Fig. 2.
Paradoxostoma posterotruncatum? Yassini and Jones, 1995. Morley and Hayward, 2012, Fig. 11l.
Paradoxostoma romei Mckenzie, 1967* Morley and Hayward, 2012, Fig. 11m.
Paradoxostoma aff. *romei* Mckenzie, 1967*
Paradoxostoma aff. *schornikovi* Yassini and Jones, 1995* Morley and Hayward, 2014, Fig. 3.
Paradoxostoma sp. 1 Morley and Hayward, 2012
Paradoxostoma sp. 2* Morley and Hayward, 2014, Fig. 3.
Paradoxostoma sp. 3. Morley and Hayward, 2014, Fig. 3.
Paradoxostoma sp. 4+

- Parapolycope?* aff. *loscobanosi*** (Hartmann, 1959). Morley and Hayward, 2012, Fig. 12a.
- Parasterope quadrata* (Brady, 1898). Morley and Hayward, 2012, Fig. 11n.
- Patagonacythere wyvillethomsoni* (Brady, 1880)
- Philoneptunus gravizea* (Hornibrook, 1952)*, Figs 68, 19, 76.
- Pleoschisma agilis* (Thomson, 1879). Morley and Hayward, 2012, Fig. 9c.
- Polycope* sp. 2+** This paper Fig. 3.
- Polycope* sp. 3. Morley and Hayward, 2012, Fig. 11o.
- Ponticocythereis* aff. *decora* Swanson, 1979* Morley and Hayward, 2014, Fig. 4.
- Ponticocythereis militaris* (Brady, 1866)* Morley and Hayward, 2012, Fig. 12b.
- Ponticocythereis* aff. *militaris*** (Brady, 1866)* Morley and Hayward, 2014, Fig. 4.
- Pontocythere hedleyi*** (Chapman, 1906)+
- Pontocythere* aff. *hedleyi* (Chapman, 1906)* Morley and Hayward, 2012, Fig. 12c.
- Pontocythere* sp. 1. Morley and Hayward, 2012, Fig. 12d.
- Procythereis kerguelenensis* (Brady, 1880). Morley and Hayward, 2012, Fig. 12e.
- Procythereis lytteltonensis* Hartmann, 1982*. Morley and Hayward, 2012, Fig. 12f.
- Propontocypris* aff. *subreniformis*** (Brady, 1880)+
- Propontocypris* sp. 2. Morley and Hayward, 2014, Fig. 4.
- Propontocypris* sp. 3. Morley and Hayward, 2012, Fig. 12h.
- Propontocypris* sp. 4 Swanson, 1979. Morley and Hayward, 2012, Fig. 12i.
- Pseudocythere* sp. 1 Eagar, 1999. Morley and Hayward, 2012, Fig. 12j.
- Puncia novozealandica*** Hornibrook, 1949. Hornibrook, 1963, Figs 3-4.
- Puncia* sp. A.** Swanson 1991, Fig. 2A-E
- Puncia* sp. B.** Swanson, 1991, Fig. 2G
- Quadracythere biruga*** Hornibrook, 1952* Morley and Hayward, 2014, Fig. 4.
- Quadracythere* aff. *chattonensis* Hornibrook, 1952. Morley and Hayward, 2012, Fig. 12k.
- Quadracythere mediaruga*** Hornibrook, 1952* Morley and Hayward, 2012, Fig. 12l.
- Quadracythere truncula*** (Brady, 1898)* Morley and Hayward, 2014, Fig. 4.
- Quadracythere* sp.** Eagar, 1999* Morley and Hayward, 2012, Fig. 12m.
- Quadracythere* sp.1*** Morley and Hayward, 2014, Fig. 4.
- Quasibradleya cuneazea* (Hornibrook, 1952)*, Figs 87-89.
- Rotundacythere gravepuncta*** (Hornibrook, 1952)* Morley and Hayward, 2012, Fig. 12n.
- Rotundacythere* aff. *mytila*** (Hornibrook, 1952)+ This paper Fig. 3.
- Saida truncula* Hornibrook, 1952*, Figs 290-292.
- Sclerochilus* sp. a Swanson, 1979. Morley and Hayward, 2012, Fig. 12o.
- Sclerochilus* sp. +** This paper Fig. 3.
- Scleroconcha* aff. *sculpta* (Brady, 1898). Morley and Hayward, 2012, Fig. 13a.
- Semicytherura arteria*** Swanson, 1979* Morley and Hayward, 2012, Fig. 13b.
- Semicytherura* aff. *arteria*** Swanson, 1979* Morley and Hayward, 2012, Fig. 13c.
- Semicytherura clausi*** (Brady, 1880)+
- Semicytherura* aff. *clausi* (Brady, 1880)* Morley and Hayward, 2014, Fig. 3.
- Semicytherura costellata*** (Brady, 1880)* Morley and Hayward, 2014, Fig. 4.
- Semicytherura hexagona* (Hornibrook, 1952). Morley and Hayward, 2012, Fig. 13d.
- Semicytherura sericava*** (Hornibrook, 1952)* Morley and Hayward, 2012, Fig. 13e.
- Semicytherura* sp. 3. Morley and Hayward, 2012, Fig. 13f.
- Streptoleberis arcuata* (Poulsen, 1962).
- Swansonella novaezealandica*** (Hartmann, 1982). Morley and Hayward, 2012, Fig. 13g.
- Swansonites aequa* (Swanson, 1979)* Morley and Hayward, 2012, Fig. 13h.
- Swansonites tumida*** (Swanson, 1979)* Morley and Hayward, 2012, Fig. 10n.
- Tasmanocypris dietmarkeyseri*** (Hartmann, 1979)
- Trachyleberis lytteltonensis* Harding and Sylvester-Bradley, 1953. Morley and Hayward, 2012, Fig. 13i.
- Trachyleberis* aff. *militaris* (Brady, 1866)
- Trachyleberis scabrocuneata* (Brady, 1880). Morley and Hayward, 2012, Fig. 13l.
- Trachyleberis zeacristata* Hornibrook, 1952. Morley and Hayward, 2012, Fig. 13m.
- Trachyleberis* sp. 2**
- Trachyleberididae***+ This paper Fig. 3.
- Vargula ascensus* Kornicker, 1979. Morley and Hayward, 2012, Fig. 13n.
- Waiparacythereis joanae*** Swanson, 1969* Morley and Hayward, 2012, Fig. 13o.

Xestoleberis atra (Thomson, 1879)

Xestoleberis chilensis austrocontinentalis Hartmann, 1978+ This paper Fig. 3.

Xestoleberis olivacea Brady, 1898* Morley and Hayward, 2012, Fig. 14a.

Xestoleberis posidonicola Hartmann, 1979+

Xestoleberis sp. 2 Morley and Hayward, 2012* Morley and Hayward, 2012, Fig. 14b.

Xestoleberis? sp. 5 Morley and Hayward, 2012* Morley and Hayward, 2012, Fig. 14c.

Xestoleberis? sp. 6 Morley and Hayward, 2012* Morley and Hayward, 2012, Fig. 14d.

Xestoleberis sp. 8 Morley and Hayward, 2012* Morley and Hayward, 2012, Fig. 14e.

Xestoleberis sp. 9* Morley and Hayward, 2014, Fig. 4.

Xestoleberis sp. 11* Morley and Hayward, 2014, Fig. 4.

Xestoleberis sp. 12* Morley and Hayward, 2014, Fig. 4.

Xestoleberis sp. 13+ This paper Fig. 3.

Xestoleberis sp. 14+ This paper Fig. 3.

Yassinicythere bassiounii (Hartmann, 1978)+ This paper Fig. 3.

Indet. gen. and sp. 1. Morley and Hayward, 2012, Fig. 14f.

Indet. gen. and sp. 3. Morley and Hayward, 2012, Fig. 14h.

Indet. gen. and sp. 4. This paper Fig. 3.

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