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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: Blaschka glass model of the octopus *Ocythoe tuberculata* Rafinesque, 1814 (*Philonexis* (*Octopus*) *catenulatus* Philippi, 1844; Blaschka #585; MA124293). From the Auckland Museum collection.

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Abstract
The botanist Thomas Frederick Cheeseman F.L.S., F.Z.S., F.N.Z.I. (1845–1923) ran Auckland Museum for 49 years and presided over its development from an amateurish small-town museum to a professional organisation appropriate to a growing city. He was a careful and meticulous administrator who kept a detailed record of his activities by saving incoming letters and making contact copies of his outgoing letters. In this report we summarise the extent and organisation of the Cheeseman papers held at Auckland Museum. There are at least 3500 pages of outgoing correspondence, addressed to around 800 different people and organisations, and we provide a preliminary alphabetical index to these correspondents. The Cheeseman papers form a rich and useful legacy for an understanding of museology and the history of science—and social history in general—both for Auckland and for New Zealand. We hope that this background document will assist further research on T.F. Cheeseman and the history of Auckland Museum.

Keywords
Thomas Frederick Cheeseman; manuscripts; archives; written correspondence; inward letters; outward letters; index to correspondents.

INTRODUCTION

Auckland Museum was founded in 1852 (Phillips 1949; Powell 1967; Park 1998). Its first home was rooms in a farm cottage on the hill at the top of Grafton Road, a site now within the University of Auckland's city campus. In 1867 the Museum moved to a large room in the Northern Club, a building still standing at 19 Princes Street. From 1869, Auckland Museum occupied the 'old Post Office', a modest wooden structure at the corner of Princes Street and Eden Crescent. The Museum's collections during its earliest years were under the care of a succession of local citizens, most notably John Alexander Smith (c.1814–1889). These honorary curators were mostly amateurs. However, one of them, Capt. Frederick Wollaston Hutton (1836–1905), went on to prominence as a professional zoologist and had charge of the collection in 1867, arranging it after the move to the Northern Club. He was succeeded in 1868 by the botanist Thomas Kirk (1828–1898) who served until the start of 1874.

In January 1874, the Museum appointed an energetic 29-year-old as Curator—Thomas Frederick Cheeseman (1845–1923; Figs 1, 2)—'who had already given assistance to the Museum' (Powell 1967: 12). He lobbied for funds from local and national government. Just two years after his appointment (1876) the museum collections, library and Institute (see below) moved to a new purpose-made building in Princes Street, next to the 'old Post Office' (the building has not survived). Cheeseman served the Museum until his death in office, and his long working life coincided almost completely with the Museum's occupancy of the Princes Street building. Cheeseman and the Museum's governing committee developed and professionalised Auckland Museum so that it became a major public institution. Extensions were added in succession to the small original building (Wolfe 2001). Cheeseman promoted collections, exhibits, research and public lectures with vigour and the Museum thrived under his steady, energetic and meticulous guidance.

Born on 8 June 1845 in Hull (Yorkshire, England), Cheeseman came to New Zealand with his parents at eight years old and was educated in Auckland (Cockayne 1923; Powell 1966; Goulding 1996). He was the eldest of five children. University training was not then available in New Zealand and Cheeseman of necessity was a self-taught scientist. He was primarily a botanist, and conducted botanical field work throughout the country from the Kermadec Islands to Otago, and also on Rarotonga. He also published on zoology and ethnology. Cheeseman served as President of the New

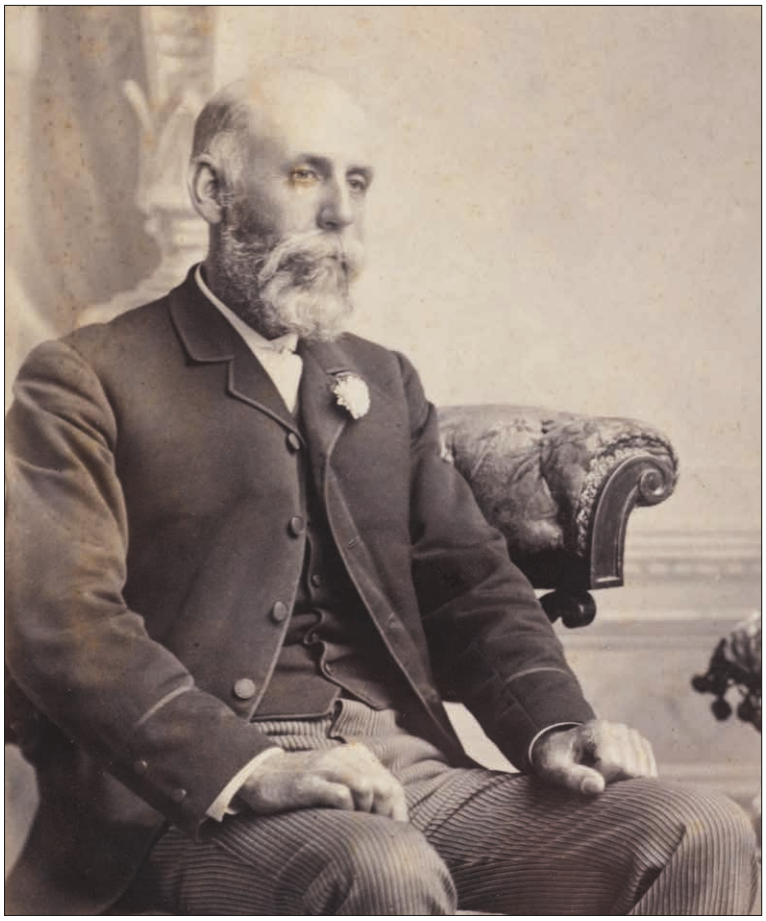


Figure 1. Studio photograph of T.F. Cheeseman, 1891. Photographer not known.

Zealand Institute between 1911 and 1913 (Fleming 1987). Among many honours he was elected a Fellow of the New Zealand Institute, and of the Linnean and Zoological Societies of London. For much of his working life Cheeseman lived in the suburb of Remuera, a few kilometres from the museum, and in the early years he rode a horse to work. He married Rose Keesing in 1889, and had a daughter (Dorothy, later Mrs Grant-Taylor) and son (Guy). Cheeseman died on 15 October 1923 and was cremated.

Auckland Museum is fortunate that in Thomas Cheeseman it appointed such a talented and capable curator. The continuity of his solid contribution for nearly 50 formative years was a blessing indeed for the organisation. Cheeseman was a careful administrator who kept an organised record of the museum's activity by saving his inward letters and making contact copies of his outward correspondence. The Cheeseman papers, held in Auckland Museum's manuscripts and archives collections, are an important documentary record at both the local and national level, shedding light on Auckland Museum's history, the history of science in New Zealand and the country's social history generally. The purpose of this paper is to summarise the scope and organisation of the Cheeseman papers as an aid to further historical research.

MUSEUM STAFFING

For his first three decades in office, Cheeseman was the Museum's only staff member apart from a janitor. There were also three taxidermists employed in succession for short periods in the 1880s. During this time, Cheeseman's brother William shot birds for the Museum and his sister Emma prepared them as study-skins for the Museum collection and for use in exchanges (Gill 2008a). Another sister, Clara, served as Cheeseman's voluntary secretary for many years (Phillips 1949) and his father stood in when Cheeseman was away (Gill 2014). Bather (1895) reported that Cheeseman 'has one man to clean up and do odd jobs', and that Auckland Museum was an 'admirable instance of how greatly the value of a museum depends on the energy of its curator'. From the end of 1908, Louis Thomas Griffin (1871–1935) was employed as assistant to Cheeseman and preparator of specimens.

A two-page memo 'Duties of Caretaker and Janitor' written in 1909 (Letter-book 5: 8) indicates indirectly how Cheeseman ran the Museum. Seven duties of the Caretaker were listed, summarised as follows:

1. Holding keys and opening the building to the public at 10 am on week-days, and 2 pm on Sunday, with closing at 5 pm.

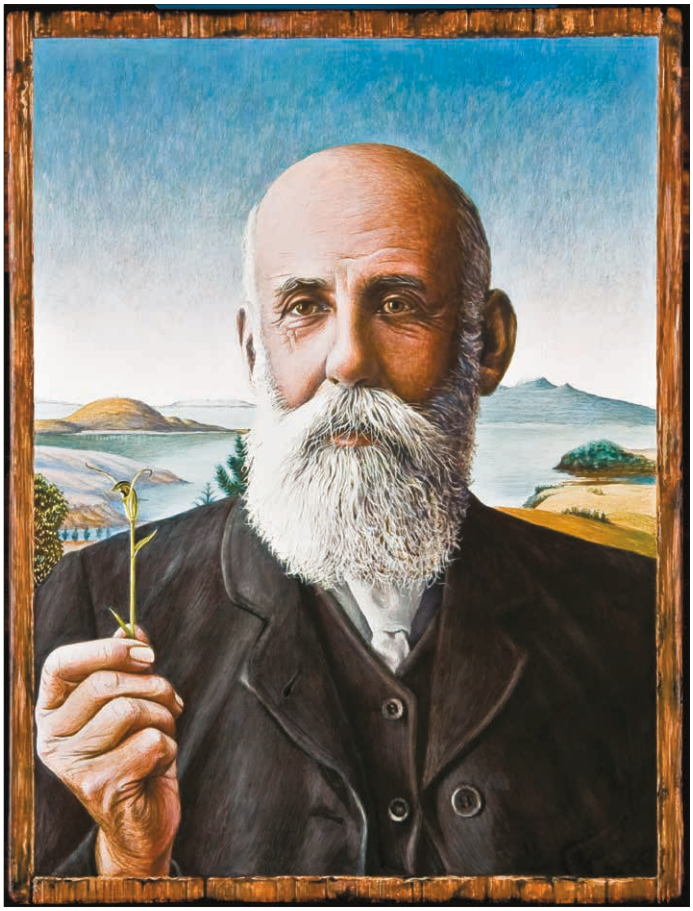


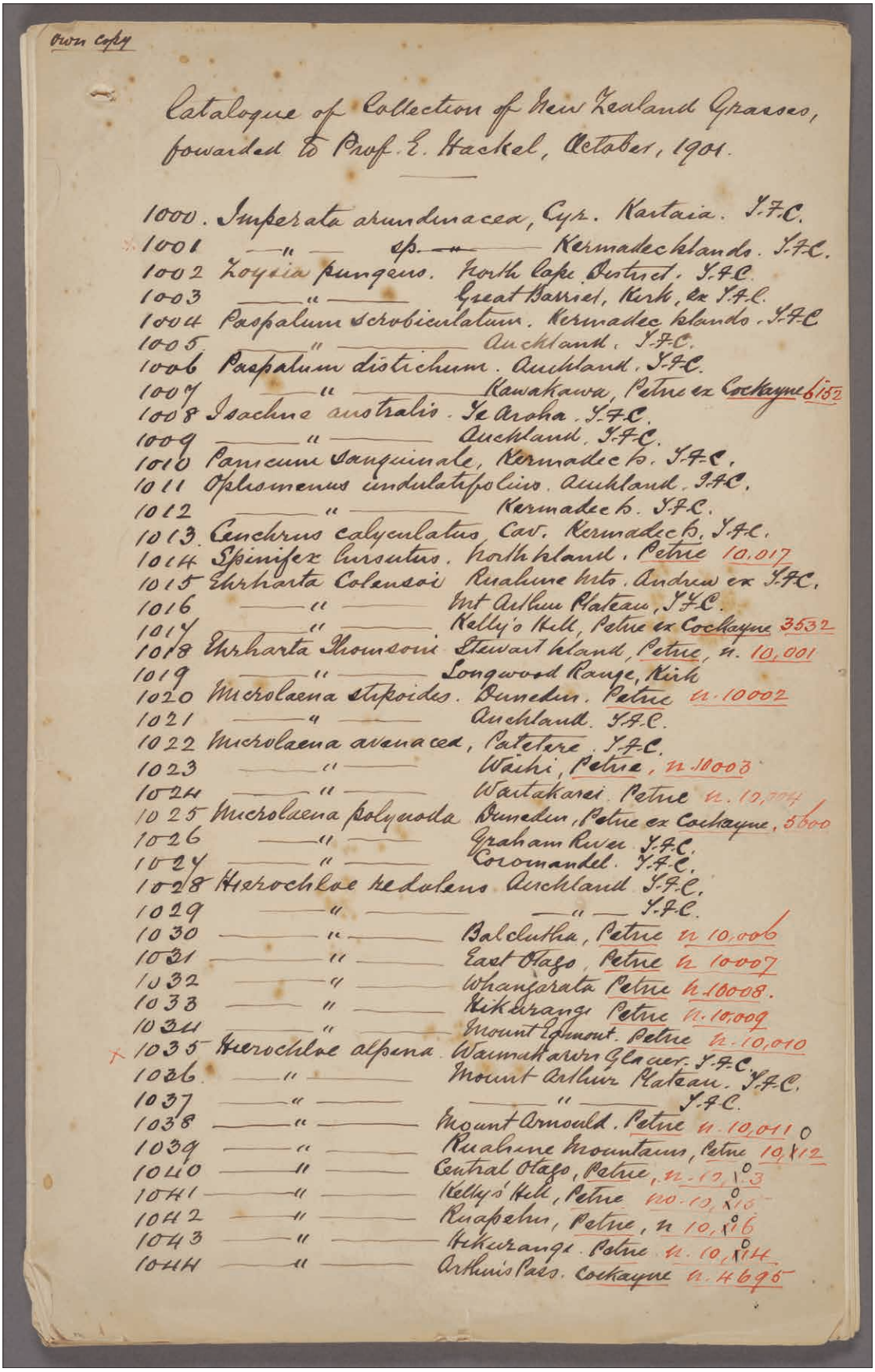
Figure 2. 'Thomas Cheeseman and the Orchid *Pterostylis*' by Hamish Foote, 2007. Egg tempera on gessoed panel, 252 mm x 334 mm.

2. Interior cleaning, sweeping and dusting ('to the satisfaction of the Curator or his assistant') of the galleries, library, offices and work-rooms, including 'woodwork and glass of all show-cases'.
3. Performing outside errands, including delivering letters and attending to packages sent by rail or steamer.
4. Being in attendance within the museum during opening hours to watch the building and its contents to prevent 'articles' being removed or damaged. Ensuring that visitors perform no 'objectionable practices' and that 'unseemly noises' are 'firmly but tactfully checked', always with a 'uniformly courteous and respectful demeanour'. General enquiries to be promptly answered; special or detailed queries directed to the curator or taxidermist.
5. Packing and unpacking cases, undertaking small repair jobs, stamping library items, and keeping the grounds tidy.
6. Preparing the room for evening meetings of the Institute, being in attendance during meetings and extinguishing gas lights and locking up at the close.
7. Following the instructions of the curator, reporting misconduct and damage, and handing in lost property.

An eighth clause gave the Caretaker's salary as £90 per annum with a free house (adjacent to the museum; water and sanitary charges included) to make a total value of at least £135 per annum. Hours of work were 8 am to 5 pm on week-days with half an hour for lunch. The caretaker/janitor took charge of the Museum on Sunday afternoons (when Cheeseman and assistant were off) but Saturday afternoons were covered by a 'special attendant'.

CHEESEMAN'S HAND-WRITING

Thomas Cheeseman wrote neatly, clearly and legibly (Figs 3, 6) in the copper-plate style prevalent at the time. Some of his capital letters were slightly variable (e.g. A, F, G). Some capitals were fairly similar and easily confused one with another (especially C, one form of G, L, S and T). A problem arises from Cheeseman's I and J being identical. This was perhaps a characteristic of the time because the pre-printed indexes for Letter-books 2, 3 and 4 (see below) lack an alphabetical tab for I, and the I-surnames are on the J-tab (e.g. Inglis and Jacobs together). The index for Letter-book 5 has separate tabs for I and J.



own copy

Catalogue of Collection of New Zealand Grasses, fowarded to Prof. E. Hackel, October, 1901.

1000. Imperata arundinacea, Cyr. Kartaia. T.F.C.
1001 —"— sp. —"— Kermadec Islands. T.F.C.
1002 Zoysia pungens. North Cape District. T.F.C.
1003 —"— Great Barrier, Kirk, ex T.F.C.
1004 Paspalum scrobiculatum. Kermadec Islands. T.F.C.
1005 —"— Auckland. T.F.C.
1006 Paspalum distichum. Auckland. T.F.C.
1007 —"— Kawakawa, Petrie ex Cockayne 6152
1008 Isachne australis. Te Aroha. T.F.C.
1009 —"— Auckland. T.F.C.
1010 Panicum sanguinale, Kermadec Is. T.F.C.
1011 Oplismenus undulatifolius. Auckland. T.F.C.
1012 —"— Kermadec Is. T.F.C.
1013 Cenchrus calyculatus Cav. Kermadec Is. T.F.C.
1014 Spinifex hirsutus. North Island. Petrie 10,017
1015 Ehrharta Colensoi Ruahine Mts. Andrew ex T.F.C.
1016 —"— Mt Arthur Plateau, T.F.C.
1017 —"— Kelly's Hill, Petrie ex Cockayne 3532
1018 Ehrharta Thomsoni Stewart Island, Petrie, n. 10,001
1019 —"— Longwood Range, Kirk
1020 Microlaena stipoides. Dunedin. Petrie n. 10002
1021 —"— Auckland. T.F.C.
1022 Microlaena avenacea, Patetere. T.F.C.
1023 —"— Waihi, Petrie, n 10003
1024 —"— Wantakarei Petrie n. 10,004
1025 Microlaena polynoda Dunedin, Petrie ex Cockayne, 5600
1026 —"— Graham River T.F.C.
1027 —"— Coromandel. T.F.C.
1028 Hierochloe redolens Auckland T.F.C.
1029 —"— —"— T.F.C.
1030 —"— Balclutha, Petrie n 10,006
1031 —"— East Otago, Petrie n 10007
1032 —"— Whangarata Petrie n 10008.
1033 —"— Kirikirangi Petrie n. 10,009
1034 —"— Mount Ighmont. Petrie n. 10,010
1035 Hierochloe alpina Waimakariri Glacier T.F.C.
1036 —"— Mount Arthur Plateau. T.F.C.
1037 —"— —"— T.F.C.
1038 —"— Mount Arnould. Petrie n. 10,011
1039 —"— Ruahine Mountains, Petrie 10,112
1040 —"— Central Otago, Petrie, n. 10,113
1041 —"— Kelly's Hill, Petrie no. 10,116
1042 —"— Ruapehu, Petrie, n 10,116
1043 —"— Kirikirangi Petrie n. 10,114
1044 —"— Arthur's Pass. Cockayne n. 4695

Figure 3. Example of T.F. Cheeseman's hand-writing showing numerous upper-case letters. From a list of herbarium specimens of New Zealand grasses sent to Prof. Hackel in 1901. MS-58-8-1.

PUBLICATIONS BY THOMAS CHEESEMAN

Cheeseman's booklet (1917) for the jubilee of the Auckland Institute and Museum outlined the Museum's history, the contributions of its major benefactors, and set out the case for moving to a larger building. It was followed by a booklet (Cheeseman 1920) proposing a financial target for the new building and calling for donations. Cheeseman's 1906 *Manual of the New Zealand Flora* (2nd ed. 1925, edited by W.R.B. Oliver), and 1914 *Illustrations of the New Zealand Flora* (2 vols), were seminal works for local botany. The second edition of Cheeseman's manual (pp. xli–xliv) lists his published works. Most of his approximately 100 published research papers were botanical, but there are two articles on Maori burial chests and 20 papers on zoology. Cheeseman described and named four genera, around 154 species and 87 varieties of plants (Cameron 2007). In zoology he named a genus and 10 species of marine molluscs and two marine flatworms. Cheeseman wrote a short description of the Auckland Museum exhibitions for a handbook for conference delegates (Cheeseman 1922; this being a repeat, apparently, of a version published in 1914).

PUBLISHED PAPERS ABOUT THOMAS CHEESEMAN

On 16 October 1923, the two main Auckland newspapers carried lengthy obituaries of Cheeseman (Anon. 1923a, 1923b). Two obituaries by professional colleagues were published at the time of Cheeseman's death (Cockayne 1923; Thomas 1924). Subsequently, Powell (1966) wrote an entry on Cheeseman for *An Encyclopaedia of New Zealand*, and Goulding (1996) for the *Dictionary of New Zealand Biography*. Cameron (2007) and Braund (2017) published brief overviews of Cheeseman's scientific career. Auckland Museum holds an unpublished manuscript by W.R.B. Oliver on the life of T.F. Cheeseman (MS-581), and Cheeseman family papers from Dorothy Grant-Taylor (MS-1994-45).

General accounts of Auckland Museum with commentary on Cheeseman's activities and achievements include Bather (1895), Markham *et al*. (1933: 75–76), Markham & Richards (1934: 89–94), Phillips (1949), Powell (1967, 1979), Stead (2001) and MacKenzie (2009). Since the 1970s, several writers have studied more specific aspects of Auckland Museum's history that include the Cheeseman period. Goulding (1974, 1975, 1976) covered the exchanges of plant specimens that Cheeseman made. Blackley (1988) discussed the Museum's plaster casts of classical statuary. Mason (1999) wrote about the early years of geology at the Museum. Gill (1999, 2008b) wrote histories of the land vertebrates collection, and marked the centenary of a group of stuffed Arctic mammals (Gill 2006). Wolfe (2001) documented the Princes Street museum building.

Of the three taxidermists who worked for Cheeseman in the 1880s, Andreas Reischek was the subject of a book by King (1981), and Charles De Kempeneer and Charles Adams were studied by Gill (2004, 2014, 2018). Detailed analyses have been made of Cheeseman's correspondence and exchanges of specimens with Enrico Giglioli of the Florence Museum (Italy; Gill 2010), and with the Dunedin taxidermist William Smyth (Crane & Gill 2018). Assistance Cheeseman received from his brother William in shooting birds, and his sister Emma in preparing them for the Museum collection, was documented by Gill (2008a). Cheeseman's activities are detailed in several of Gill's museum stories (2012, 2016).

COMMEMORATIONS OF CHEESEMAN

Cheeseman was awarded the Galileian Silver Medal of Merit (Fig. 4) by the Florence Faculty of Sciences in 1887 (Gill 2010), the Hector Medal by the New Zealand Institute in 1918 (Thomas 1924) and the Linnean Gold Medal (Linnean Society of London) in 1923 (Anon. 2006). Botanists have named, in honour of T.F. Cheeseman, a genus and 32 species of plants from New Zealand and the Cook Islands (Cameron 2007). Four New Zealand molluscs were named after him.

In 1923, shortly before Cheeseman's death, Auckland Museum's governing council presented him with a purse of sovereigns and an illuminated address (in two panels; MS-2014-3) to mark his 50 years of service (Anon. 1923b; Phillips 1949). A photograph of the first page of the address, and a transcription of the whole address, appeared in Auckland Museum's magazine, *MQ* (Anon. 2007). The address acknowledged Cheeseman's service to the Auckland Institute and Museum 'and to the cause of science in New Zealand'. The citizens of Auckland appreciated 'the creation of a Museum which possesses the most complete representation of Maori Art that has ever been gathered together in one collection'. Cheeseman was praised for his 'uniform courtesy' and for 'the readiness with which [he had] at all times placed [his] knowledge at the disposal of the public'.

The Cheeseman Hall, which (since the 1960 building extension to the rear) is the central gallery on the east side of the Museum's first (middle) floor, was named in a 1946 ceremony to mark Cheeseman's life-time achievements. Lady Freyberg, wife of the Governor-General, unveiled a wall plaque (Fig. 5) at chest height on the east side of the northern entrance to this gallery (where the change in direction of the wall formed a projecting corner). The Cheeseman plaque—bronze with inlaid paua shell—was designed by Auckland sculptor Richard Oliver Gross (1882–1964) who produced several of the city's major monuments. In about 1998 the plaque was moved to a higher position about 5 m away on the gallery's northern wall. At this time the Cheeseman Hall was reconfigured from a general natural history gallery (with display cases from the original 1929 fit-out) to a newly-developed 'Origins' natural history exhibition. In the absence of a grave and tombstone, the Cheeseman Hall plaque is his most tangible memorial. That is to say, besides the splendour of Auckland Museum itself, a notion that recalls to mind the simple grave of Sir Christopher Wren in St Paul's Cathedral with its inscription *Lector si monumentum requiris circumspice* (Reader, if you seek a monument look around you).

Figure 4. The Galileian Silver Medal of Merit (Auckland Museum numismatic collection, N288) conferred on Cheeseman by the Florence Faculty of Sciences in November 1887 for his exchanges with E.H. Giglioli. Diameter 50 mm.

Figure 5. The Cheeseman commemorative plaque by R.O. Gross, 1946, in Auckland Museum's Cheeseman Hall.

The centenary of the publication of Cheeseman's *Manual of the New Zealand Flora* was celebrated in 2006. Auckland Museum held a special exhibition (*Cheeseman's 1906 Flora*) from 17 November 2006 until 4 March 2007 (Anon. 2006). In November 2006 a T.F. Cheeseman Symposium of botanical research presentations was held at the University of Auckland, joint with the New Zealand Plant Conservation Network annual conference. The Auckland artist Hamish Foote completed two paintings of Cheeseman (one of them shown as Fig. 2) as part of a series of portraits of New Zealand scientists exhibited in Auckland in 2008 (Anon. 2007). T.F. Cheeseman is also remembered in the street-name Cheeseman Place, in Remuera.

INWARD CORRESPONDENCE: CHEESEMAN PAPERS (MS-58)

The letters that Cheeseman received during his curatorship of Auckland Museum, and other Cheeseman papers, are held in two collections at separate filing locations, depending on whether they were kept by Cheeseman in his personal files (at his home) and acquired by the Museum in 1946 (MS-58), or kept in the Museum's general correspondence files (MUS-1995-38, -41).

MS-58 was gifted to the Museum in 1946 by Phyllis Cheeseman, the widow of T.F. Cheeseman's son Guy, who died in 1928. The next year, in October 1947, a further nine notebooks belonging to T.F. Cheeseman

(Volumes 32–36, 39, 41, 46 and 47) were presented by the former Director of the Dominion Museum and National Art Gallery, Dr Walter R.B. Oliver, of Wellington. MS-58 comprises 96 folders of mostly inward correspondence to Cheeseman, covering a period from 1867 to 1923, and 73 Volumes (see below), the majority of which are Cheeseman's field notebooks, covering a period from 1869 to 1895. A detailed inventory of the collection is available from the online catalogue record for MS-58.

The 431 inward correspondents include many well-known international scientific figures such as the British naturalists Charles Darwin and Alfred Russel Wallace; the botanists John Hutton Balfour, Friedrich Ludwig Emil Diels, William Botting Hemsley, Sir Joseph Hooker, Baron Sir Ferdinand Jacob Heinrich von Mueller, Sir William Turner Thiselton-Dyer and Sydney Howard Vines; and the Italian zoologist and anthropologist Enrico Hillyer Giglioli (Gill 2010). The New Zealand correspondents fall into two groupings: trained professionals and scientists such as F.W. Hutton, George Malcolm Thomson, Sir Johann Franz Julius von Haast and Leonard Cockayne, and amateur collectors and naturalists such as Harry Carse, father-and-son team Richard and Henry Matthews and collectors like Robert Shakespear and his daughter Frances.

Overseas institutions represented in the correspondence include the Royal Botanic Gardens (Kew, London), the Linnaean Society of London, the Institut Pasteur (France) and the Bernice Pauahi Bishop Museum (Hawai'i). There are also letters from New Zealand institutions: museums (e.g., Otago Museum, Dominion Museum), legal/accountancy firms and commercial businesses (e.g., Jackson Russell, Price Waterhouse & Co., Arthur Yates & Co. Ltd.), and government departments (e.g., Agriculture, Education, Marine).

INWARD CORRESPONDENCE: MUSEUM GENERAL CORRESPONDENCE (MUS-1995-38, MUS-1995-41)

Cheeseman's tenure years (1874–1923) coincide with two series of general correspondence: MUS-1995-38 (Correspondence 1869–1899, 167 folders) and MUS-1995-41 (Correspondence 1900–1925, some 150 folders). The inward correspondence is arranged alphabetically by correspondent, and comprises letters that are mostly to Cheeseman in his roles as Secretary of the Auckland Institute and Museum, and as Librarian and Curator.

The writers were mostly male and pākehā who were curious and enquiring, and included citizen scientists, members of museums and universities, farmers, artists, ethnologists and (Auckland) Institute members. Notable correspondents include the ethnologists Elsdon Best and S. Percy Smith; the ornithologist Sir Walter Buller; museum directors James Hector and F.W. Hutton; collectors of taonga George Graham, Gilbert Mair and F.D. Fenton; and churchmen such as Rev. Arthur Guyon Purchas, and Henry and William Williams. There is correspondence with other museums and government departments in New Zealand, and with European and American museums, as well as booksellers, shipping agents, and suppliers of museum equipment such as Henry Ward.

The general correspondence includes the petitions for Sunday opening of the Museum from citizens of Auckland (1881 and 1884) and one against Sunday opening (1884). Cheeseman sent questionnaires to the members of the Institute to make sure there was wide response on this issue. There are many letters offering articles for sale, including Māori artefacts, birds and insects, which Cheeseman often purchased. Exchanges of objects between museums were common at the time, as New Zealand's Māori material cultural items and flora and fauna were unique and highly sought after.

OUTWARD CORRESPONDENCE

Auckland Museum has five 'Letter-books' (MUS-1996-6; Table 1) containing copies of at least 3500 pages of Cheeseman's outgoing correspondence. However, research on particular letter exchanges has shown that some of Cheeseman's letters escaped copying in the letter-books. The copies are contact impressions on thin paper. Copied hand-writing is black or a dark sepia colour, while copied type-writing (in the later years) is dark blue. The letter-books are bound (290 mm x 250 mm external size) and feature blue or grey book cloth on the covers, brown leather on the spines and corners and marbled endpapers. The contact impressions are on right-hand pages only (with nothing on the back), and these pages have pre-printed consecutive numbers at the top right corner. Legibility of the letter-book pages varies; much text can be read easily, but some letters are difficult and a few are impossible to read.

The volumes are well worn and many pages are in a fragile state at risk of crumbling and tearing. Also, some of the lettering has bled or blurred (perhaps a consequence of contact with iron gall ink in the original letters). The whole collection was scanned in 2011 with each numbered page scanned as a separate image file. Copies of the scans are kept on a portable hard-drive for viewing in the Museum's Library Reading Room.

The letters that Cheeseman copied into the Letter-books are in broad chronological order with occasional lapses in the strict order of letters. Letter-book 1 was started by Cheeseman's immediate predecessor, Thomas Kirk, and begins in May 1872. Cheeseman continued the letter-book system after his appointment in January 1874, and the first of his letters seems to be for 28 January 1874 on page 63. Letter-book 5 ends at January 1920. Type-written letters replaced hand-written letters in the Letter-books from about 1905 (two-thirds of the way through Letter-book 4). For the years from 1920, carbon copies of Cheeseman's outward letters are filed with the inward correspondence (letters and replies together in the same folders).

Letter-books 2–5 have an index at the front. The index pages have pre-printed alphabetical tabs and Cheeseman formed the index by writing the surname of each correspondent on the appropriate page with the page numbers of their letters in columns to the right. The hand-writing styles indicate that at least two people other than Cheeseman compiled the index for Letter-book 4. The index for Letter-book 5 was compiled by Cheeseman

Table 1. Details of the record of Cheeseman's outgoing correspondence preserved in the five volumes of letter-books. Copied letters are sometimes out of their strict chronological sequence and so some of the dates given here are approximate. The numbers of pages given are approximate because occasional pages are blank or missing.

Volume	Earliest letter	Latest letter	No. of pages
Letter-book 1 (MUS-1996-6-1)	May 1872	Feb 1882	485
Letter-book 2 (MUS-1996-6-2)	Feb 1882	Jun 1890	737
Letter-book 3 (MUS-1996-6-3)	Jul 1890	Jul 1897	758
Letter-book 4 (MUS-1996-6-4)	Jul 1897	Jun 1909	994
Letter-book 5 (MUS-1996-6-5)	Jun 1909	Jan 1920	770
Total			3744

and one of the other contributors to Letter-book 4. One of these other writers was presumably Cheeseman's youngest sibling Clara. Letter-book 1 was indexed by EL for this report. The indexing shows that Cheeseman had about 800 different correspondents during his museum career.

In Appendix 1 we provide a preliminary index to the correspondents in the Letter-books as a tool for further research. We used the names that Cheeseman and his assistants themselves indexed for Letter-books 2–5. The first 63 pages of Letter-book 1 are correspondents of Thomas Kirk's but we have included these for completeness. This appendix shows in which letter-books Cheeseman's (and Kirk's) letters to the correspondents appear. Using this information, a researcher can then check the index for the relevant letter-book to find the page numbers concerned.

Scanned copies of Cheeseman's letters to H.A. Ward of Rochester (New York State, U.S.A.) can be viewed on the website of the University of Rochester's 'Ward Project' (https://wardproject.org/search?query=cheeseman&submit_search=Search).

OTHER CHEESEMAN PAPERS (MS-58)

Besides inward correspondence (see above), MS-58 contains notebooks that Cheeseman kept during travels and miscellaneous items both general and personal. The latter include a scrapbook (MS-58-29-1) with 'T.F. Cheeseman' tooled in gold lettering on the cover containing press cuttings and tipped-in congratulatory letters from botanists and others relating to the publication of Cheeseman's 'Flora'.

Botany field notebooks

Notebooks 1–71 cover a productive period of Cheeseman's botanical collecting and research in both the North and South Islands as well as offshore islands (Kermadec Islands, Little Barrier Island) and further into the Pacific (Rarotonga). Some notebooks feature several collecting areas and cover multiple periods of time. Cheeseman himself appears to have affixed his own title labels to many of the covers. Each volume is numbered on the spine with white ink, but these numbers were probably assigned later by Museum staff rather than by Cheeseman himself.

The earliest field notebook relates to Cheeseman's plant collecting in the Auckland area from 1869 to 1873. The remainder concern field collecting trips conducted by Cheeseman from 1872 to 1899. The trips lasted from several days to nearly several months. The following New Zealand notebooks contain specific geographical entries, usually dated:

Vol. 2. Kermadec Islands, Cuvier Island (1887; MS-58-20-2).

Vol. 5. Plant list for North Island; Howick to Mangaroa, Titirangi Ranges, Mangonui, Lake Pupuke, St. John's Lake (1872–73; MS-58-20-5).

Vol. 12. Taranaki and Mt. Egmont, Taupo (MS-58-20-12).

Vol. 13. Nelson Province (1878; MS-58-20-13).

Vol. 14. Mt. Owen, Wangapeka, Wairau Valley, Gordon's Knob, Foxhill, Taupo (MS-58-20-14).

Vol. 15. Mt. Arthur, Buller Valley, Wairau Valley, Cuvier Island (1881; MS-58-20-15).

Vol. 17. Canterbury Alps, Mt. Torlesse, Broken River to Arthur's Pass (1880; MS-58-20-17).

Vol. 18. Canterbury Alps, Lake Tekapo, Arthur's Pass, Broken River (1883; MS-58-20-18).

Vol. 20. North Cape District (MS-58-21-20).

Vol. 21. Mt. Wellington (1874); Rangitoto Island (1874); Kaipara and northern Wairoa (1875); Whangarei Heads (1875); Buckland station (between Pukekohe and Mercer); Onehunga and Mangere (1875); Barrack Hill (1875); Whangarei Heads and Pataua (1875); Penrose, Hunua and southern Wairoa, Coromandel (1876); upper Kaueranga Valley, Waikato, Raglan, Otara Creek (1877); Waitakerei (Waitakere) Falls (1877). (MS-58-21-21).

Vol. 22. Hunua (1878); Lake Pupuke towards the Wade (1878); Waikato and upper Thames (1879); Lake Whangape, Mt. Pirongia, Ohaupo, Thames Valley and Matamata, west-coast mouth of Manukau, Southern Alps (1880); Mt. Torlesse, Arthur's Pass, South Whau (1878). (MS-58-21-22).

Vol. 32. Mt. Cook district (MS-58-22-32).

Vol. 41. North Cape (MS-58-22-41).

Rarotonga diary

Cheeseman's only departure from New Zealand and its offshore islands was an 1899 trip with his wife to Rarotonga, Cook Islands, to study the botany (Cheeseman 1903) and collect plants. His narrative diary of this expedition is Vol. 23 (MS-58-21-23). Details of this diary and a transcript of it, with botanical notes, were published by Gill and Sykes (1996). This paper also reproduced nine photographs that Cheeseman took on Rarotonga. These are from a series of 33 Rarotonga prints (Auckland Museum pictorial collection PH-1993-8) that Auckland Museum received in 1993 from Cheeseman's grand-daughter (Patricia Grant-Taylor).

DOCUMENTATION OF COLLECTION ITEMS

Specimen labels

Cheeseman hand-wrote labels for museum specimens and objects, and many of these original labels survive in the Auckland Museum collections with the items concerned. In the Land Vertebrates Department, many bird study-skins have Cheeseman labels. In the Botany Department there are about 21,000 specimens in Cheeseman's original herbarium, nearly a third of which were collected by Cheeseman himself (Cameron 2007). Cheeseman labels also survive on bird-skins and herbarium sheets that Cheeseman sent on exchange to museums or researchers in New Zealand and overseas.

Collection registers

During the earlier years of Cheeseman's curatorship, museum specimens were individually labelled but there does not seem to have been a numbering system. As the collection grew, Cheeseman must have seen the need to number and register individual specimens and he established large bound collection registers with pre-printed columns and column-headings. An example is the 'Blue Book' (Fig. 6) in the Land Vertebrates Department which numbers and lists the New Zealand and foreign vertebrates except fish (Gill 1984). The entries are in Cheeseman's hand. He recorded the pre-existing specimens retrospectively; there are also entries for specimens 'In museum 1874 [the year Cheeseman started] – no history'.

The oldest registers in the Ethnology Department (numbers 1, 3 and 5) are identical to the land vertebrates Blue Book and many of the entries are by Cheeseman. These four registers are large (folio in size; around 380 mm x 245 mm), with blue covers with leather corners, and a leather-bound spine. There is a fawn-coloured leather label on the front lettered in gold 'CATALOGUE / OF THE / AUCKLAND MUSEUM / VOL.' with space for volume details to be added (Fig. 6). These four registers have a book-plate on the inside front cover showing they were manufactured by J.F. Leighton & Son of 6 & 8 High St., Auckland (Fig. 6). They all have the order number 363 and are dated '20/12/98'. Cheeseman must have begun these registers in 1899 or subsequently.

Accessioning system

In January 1914, Cheeseman started a general accessioning system so that new acquisitions could be numbered and their details recorded in one central register as they were received. This system was additional to any departmental numbering systems. Accession numbers were of the form 'number/year' (e.g. 125/21 for the 125th object accessioned in 1921). Numbers were entered, in their numerical order, in hard-back accession registers. The registers are approximately 260 mm x 205 mm in external size with dark red covers, pale brown leather corners and leather spinal binding. Nearly all entries are in Cheeseman's hand until 1919. From 1920, the entries are by L.T. Griffin or by Cheeseman. The last Cheeseman entry seems to be 34/23 in 1923. There is an alphabetical card index of donors' names cross-referenced to accession numbers in the registers.

ADMINISTRATIVE RECORDS

Council minutes

Besides serving as Curator of the Auckland Institute and Museum, Cheeseman was Secretary to the Museum's administrative committee (Council). Cheeseman therefore took the minutes of the Council meetings and the minute-books are held at MUS-1995-1. There are eleven minute books covering the years of Cheeseman's tenure which begin at Minute-book 2 (in January 1873) and end in Minute-book 12, with Cheeseman's last entry in August 1923. The volumes are small (230 mm x 190 mm external size), bound in black, dark green or burgundy leather, and written in Cheeseman's hand, with the writing becoming shakier in the 1920s, but still legible. The meeting of 25 October 1923 recorded the text of a condolence letter sent to Cheeseman's family after his death, and the President and members of the Council paid tribute to his memory '… after which the motion was carried, the whole council standing in silence'.

Annual reports

Auckland Museum's published annual reports began with the year 1868–1869, and all are available as electronic scanned pages (or pdf documents for the most recent years) on the museum's website (http://annualreportarchive.aucklandmuseum.com/). Cheeseman presumably wrote and compiled the report throughout his career and during this period the reporting year ended in mid-to-late February. The annual reports contain much detail on the Museum's history, development and collections. During the Cheeseman years, the annual reports listed notable accessions of objects for that year.

Figure 6. The collection register for land vertebrate specimens (the 'Blue Book') set up by Cheeseman after 1898, showing the front cover (top, left), the manufacturer's book-plate (top, right) and a sample of text in T.F. Cheeseman's hand (above).

Finance records

MUS-1995-6 includes receipt books and accounts relating to the finances of the Museum. The receipt books from 1874 to 1899 contain originals of all receipts and invoices for payments by Cheeseman, mostly to Auckland businesses.

DISCUSSION

Thomas Cheeseman was a leading botanist of the late 19th and early 20th Centuries, and made a notable contribution to local botany and science at a time when New Zealand had few professional scientists. During five decades at Auckland Museum, Cheeseman tirelessly increased and developed the collections. The progress he made was continued under subsequent directors and this has ensured that Auckland Museum today has collections that befit a city the size of Auckland. The Museum's world-class herbarium, and Māori and Pacific Islands ethnographic collections, were all initiated by Cheeseman. Furthermore, he made a social impact by developing Auckland Museum into a prominent and admired public organisation. Despite this solid contribution to colonial New Zealand, Cheeseman has not received the attention from biographers that might have been expected (Braund 2017).

Cheeseman built up a detailed and organised archival record of Auckland Museum's development and this is a legacy for research into New Zealand's scientific and social history. The Cheeseman papers are one of the most detailed and complete collections in Auckland Museum's archives. The Cheeseman letter-books provide copies of his outgoing correspondence, which, otherwise, would have to be sought in archives across New Zealand and around the world. Of course, the originals of many of Cheeseman's letters will not have survived, and this makes the letter-books so important. In the era before typewriters and carbon paper, many institutions did not keep copies of their outgoing letters, so the Cheeseman papers are exemplary in this regard. The Cheeseman papers rank in importance alongside those of the other great museum directors and science administrators in colonial New Zealand, such as Hector (Wellington), Haast (Christchurch) and Hutton (Dunedin).

Cheeseman's memo 'Duties of Caretaker and Janitor' (1909) shows daily tasks in the running of the Museum that Cheeseman was able to delegate, such as unlocking and locking the main door according to the hours of public admission, and collecting and unpacking incoming crates and packages. It was a situation that was probably typical for the larger museums in New Zealand's main centres. Help from the caretaker, from the taxidermists that Cheeseman was able to employ occasionally, and from his family members, freed up Cheeseman's time to undertake the wide-ranging correspondence and botanical research that marked his career.

In this paper we have attempted to summarise the resources, especially inward and outward correspondence, that are available at Auckland Museum for research into Cheeseman's activities during the late colonial period. We hope that this will encourage and facilitate further research on Cheeseman and the history of Auckland Museum. The field is open for specific studies of Cheeseman's professional interactions with any number of his correspondents, for more general investigations of Cheeseman's role in broader issues (e.g. museum funding and governance, the Museum's public lectures and other public-good initiatives), and for a definitive and detailed biography of the man.

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APPENDIX 1

Preliminary index to outward correspondents in Auckland Museum's Letter-books 1–5 for the period 1872 to 1920. The numbers given refer to the letter-books in which one or more letters to the respective correspondents are copied. These names are taken from Cheeseman's own indexes for Letter-books 2–5 (and perpetuate any indexing errors or omissions in the originals) and from an index of Letter-book 1 compiled by EL for this report. Cheeseman wrote the letters I and J the same way. The letter J is given here where known to be correct; J* indicates either the letter J (more likely, because more common) or I.

Adams, C – 3
Adams, CE – 5
Adams, Master Thos. – 4
Adler, Cyrus (Smithsonian Institution) – 4
Aickin, G – 2
Aitken, W – 2, 3
Alaska Commercial Co. – 3, 4
Aldrich, TH – 2, 3
Alexander, LW – 4
Allen, Hon. J* – 5
Allen, R – 5
Allport, G (Marine Department) – 5
American Ethnology – 4
American Museum of Natural History – 4
Anderson, Dr T – 5
Anderson, G – 4
Anderson, W – 2
Andrew, H & B, Ltd – 4
Angus & Robertson – 5
Ansley, RFT – 5
Arnheim – 4
Arnold, C – 4
Art Society, Secretary – 1
Arthur, H – 1
Asplund, IC – 4
Assessment Court (Auckland) – 1
Aston, BC – 4, 5
Atkin, E Nicholas – 4
Atkinson, HN – 5
Auckland Savings Bank, Accountant – 1
Auckland, Mayor of – 5
Australian Journal of Science, Manager – 4

Baber, J* – 2
Baigent – 1
Bailey, WL – 2
Bain, AR – 1
Baird, Prof. Spencer – 1, 2
Baker, TS – 1
Bakewell, Dr – 3, 4
Balfour & Co. – 4
Ball, T – 1, 2
Bank of New South Wales – 3
Bank of New Zealand – 1, 3, 4, 5
Bankart, AS – 5
Barlow, BH – 4
Barlow, HF – 4
Barlow, Hon. – 5
Barr, J (Public Library) – 5
Barron – 4
Bartel, J*G – 3
Bartley – 4
Bartley, E – 3
Bateman, G – 2
Bates, Rev. DC – 5
Bates, TL – 2, 4
Batger, J* (New Zealand Shipping Co.) – 2
Baucke, W – 4
Bauer – 4
Baxter, Dr – 1
Bednall, WT – 3
Beere – 1
Beeson, GH – 4
Bell, Dr. JM (Geological Survey) – 5
Bell, Hon. FD – 5
Bell, Jeffrey – 4
Bell, Roy – 5
Benham, Dr (Otago Institute) – 4
Benn, HR – 4
Bennett, Dr G – 2
Bentley – 4
Berridge – 4
Berthel, A – 5
Best, Elsdon (Dominion Museum) – 4, 5
Bickerton, Prof. AW – 3
Birks, L – 4, 5
Blackey – 4
Blake, VE – 5
Blake, Vincent J – 4
Blomfield, GC – 4
Blomfield, Messrs Geddis & – 4
Bloomfield, C – 2
Blundell, P – 5
Blundell, Percy – 4
Board of Education – 1
Bollard – 3
Bond, Dr – 5
Boucard, Potter & Co. – 3
Bourne, FJ – 2
Boyle – 4
Brabant, HN – 1
Brassey TJ* – 3
Bregmen, AE – 5
Bresart, AJ – 1
Brigham, Dr WJ (Bishop Museum, Hawai'i) – 4, 5
Brigham, JM – 4
Brodie, JA – 4
Broham, T – 3

Davy, Dr – 3
Day, ER – 5
Deane, H – 4
Debreceny, W – 5
Defence Minister (Wellington) – 4
Denning, J* – 3
Devereux, HB – 4, 5
Dewey, Prof. FP – 2
Dewing, Colonel EJ* – 5
Dickie, A – 5
Dickson, EB – 1, 2
Dickson, R – 1
Diescrund, J* (Field Columbian Museum) – 4
Dieseldorff – 4
Dilworth, James – 1
Dinnisson, Jas – 3
Direct Supply Co. – 4
Director Excavations, Beni Hasan (Egypt) – 4
Director, American Museum of Natural History – 4
Director, National Museum, Washington – 4
Directors, (?) Gold Company – 1
Dobbie, H – 5
Donat, J – 4
Donne, TE (Tourist Department) – 4
Douglas, C – 2
Douglas, Lady – 1, 2
Drew, SH – 2
Dulan & Co – 5
Dumerque, EP – 3
Dunedin Town Clerk – 4
Dunn, EJ – 4
Durden, HS – 3
Dyer, Miss – 5
Dymock, W – 5

Eady, A – 5
Earl, W – 1
Easterfield, Prof. – 5
Eastman, H – 2
Edgar, Rev. S – 1
Edmonstone, CW – 1
Edward – 1
Edwards, Dr A – 5
Edwards, Mrs – 2
Edwin, Capt. (Meteorological Office, Wellington) – 4
Ellis – 2
Elmsly, J*G – 3
Etheridge, AT – 3
Etheridge, R (Australian Museum) – 4, 5
Ewington & Baker – 3, 4

Faber, Gordon – 1
Fairchild – 4
Farmer, James – 1
Farr, C Coleridge – 4
Feist, AM – 5
Fenton, FD – 1
Fenton, RE – 4
Ferguson – 4
Ferguson, HA – 1
Findlay, J* – 5
Finsch, Dr Otto – 1, 2, 4
Fischer, CF – 1
Fletcher, JJ (Linnean Society, New South Wales) – 4, 5
Florance, RS – 4
Flower, Prof. – 1, 2
Forbes – 1
Ford, SH – 1
Fox, Rev. CE – 4, 5
Foyle, Willen & Co. – 4
French – 4
French Consul (London) – 1
Frood, A – 4
Frowde, R – 5
Fuller – 4
Fulton, RV – 5

Gandoger – 4
Garland, GJ* – 5
Garnier, Dr J*H – 1, 2
Garton, WA – 5
Gates – 4
Gatland, CG – 4
George, George (Technical School) – 4
George, Mrs – 1
George, ST – 1
Gerrard & Sons – 4
Gibbes, Sir EO – 4
Gifford, A – 5
Gifford, B – 1
Giglioli, HH – 1, 2, 3, 4
Gilbey, CH – 5
Giles, Capt. (Salvation Army) – 4
Gilfillan – 2
Gill, Rev. Wyatt – 2
Gill, TH – 4
Gillies, Mr Justice – 2
Gillmer, J*B – 3
Given, G – 2
Given, WA (Thames School of Mines) – 4
Glasgow – 4
Gleeson, P – 2
Godfrey, FR – 1
Goffe, DL – 5
Goldie, D – 4
Goldsmith, EC – 3
Goldsworthy – 4
Good Shepherd Mission – 4
Goodall, J – 1
Gordall, J* – 2
Gordon, HA – 4
Gordon, HT – 4
Gore, AB – 4
Gore, RB – 3
Gorrie – 4
Gorrie, W – 5

Government (Wellington) – 1
Government Printer (Wellington) – 5
Gowing, J – 1
Grace, LW – 3
Graham, G (Norwich Union) – 1
Graham, George – 1, 2, 4, 5
Graham, WK, & Co. – 1, 2, 3
Grant, R (Australian Museum) – 5
Gray, G – 2
Gray, S – 5
Gray-Dixon, Rev. W – 4
Greenaway, JH – 1
Gregory, James – 1
Grey, Sir George – 1
Grierson, HR – 5
Griffin, CT – 4
Grigg – 4
Grosvenor, CH – 4
Gunson, JH – 5

Haast, Dr – 1, 2
Habens – 4
Hadfield, Rev. E – 5
Halcombe, E – 3
Hall, E (Agricultural Association) – 5
Hall, Edwin – 5
Hall, Prof. TS – 5
Halliday, George – 4
Hamilton, A (Colonial/Dominion Museum) – 4, 5
Hamilton, Borough of – 4
Hammersley, Dr – 5
Hammond, WJ (Society of Architects) – 1
Hanby, Mrs – 5
Hannan, RM – 4
Harker, T – 1
Harper – 4
Harris, HGL – 2
Haszard, HDM – 4, 5
Hauesler, Dr – 5
Haughton, CV (N.Z. Shipping Co.) – 4
Hawkins – 3
Hawkins, HH – 4
Hawkins, WH – 5
Hay, C – 4
Hay, Carlton – 5
Hay, D – 4
Hay, J* – 2
Hay, Mrs IB – 4
Hayson, BW – 4
Heather, Robertson & Co. – 4
Hector, Sir James – 1, 2, 3, 4
Heke, Kapua – 4
Helens – 1
Henry, Prof. Joseph – 1
Herapath, P – 1, 2
Herbert, T – 4
Hesketh & Richmond – 2, 3
Heywood, Jas. B (Secretary of the Treasury, Wellington) – 4
Higgins, J – 4
Higginson, HA – 1
Higginson, Mrs JH – 4
Hilgendorf – 4
Hill – 4
Hill, WJ* – 2
Hocken, Dr – 3
Hodge – 4
Hodgkinson – 1
Hogg, A – 1
Hogg, EC (Philosophical Institute, Christchurch) – 4
Hokianga Sawmill Co. – 2
Holland, S?L – 2
Holloway, Rev. J – 5
Holmes, EM – 2
Holmes, WH – 4
Holmes, WR – 5
Holten, CP – 4
Howarth, E – 4
Howarth, LO – 3
Hudson, C – 2
Hull, F – 5
Hulse, RM – 4
Hume, WA – 1
Humphries, T – 3
Hunt, RR – 4
Hutchison, WE – 5
Hutt, G – 5
Hutton, Capt. FW – 1
Hutton, Mrs FW – 4

Ihering, Dr H – 3
Illidge – 4
Inglis Dr – 2
Institute, New Zealand – 4
Insurance Co., NZ – 2
Ivens, Rev. W – 4

Jack, E – 4
Jackson & Russell – 2, 3
Jackson, SW – 4
Jacobs, AS – 4
Jacobs, J* – 2
Jarman, Prof. – 5
Jewell, WH – 1
Johns Hopkins Press – 5
Johnson, HD – 3
Johnstone, G – 1, 2
Jones, DW – 4
Jones, GW – 1
Jones, J Mansell – 5
Joseph, EF – 5
Judge, MH – 2
Junk, W – 5

Karr, Colonel – 4
Kay, R – 1
Keesing – 4

Kemp, HT – 1
Kemp, Robin – 5
Kempeneer, C de – 2
Kenney, N – 1
Kensington, Secretary of Crown Lands – 4
Kent – 4
Keogh – 1
Kernick [or Kennick], T – 4
Kerr, J – 4
Kerr, W – 4
Keys, J*J* – 2
Keys, S – 5
Kidd, A (M.H.R.) – 4
Kidd, A (Mayor) – 4
Kidd, Dr – 2
Kinder, Mrs – 5
King, HS – 5
King, J* – 3
King, T – 4
King-Lewis, H – 1
Kingsley – 4
Kirk – 4
Kirk, HB (Victoria College, Wellington) – 4
Kirk, Thomas – 1
Kirker, J* – 3
Kitt – 4
Koch, Max – 4
Kreift, H – 4

Laby, Prof. – 5
Lands & Survey (Wellington) – 4
Lands, Minister of (Wellington) – 4
Lankester, Prof. – 1
Larkworthy, F – 1, 2, 3
Law, MK – 4
Lawlor, GJ – 4
Lawson, CM – 2
Leaf, CJ* – 1, 2, 3
Leighton, J*F, & Co. – 5
Leish, J – 1
Lewis, HK – 1
Lewis, Mrs – 2
Lewis, WK – 1
Leyland, CJ* – 3
Librarian, Geological Survey of Canada – 4
Librarian, Naturforschende Gesellschaft – 4
Library Supply Co. – 4
Lincoln – 1
Linnean Society of New South Wales – 1, 4, 5
Liversidge – 1, 4
Lloyd, CJ* – 3
Lockhart, N – 1
Lough, F – 4
Ludbrook, HS – 5
Lusk, Major – 5

Macfarlane, JT – 1
Mackechnie & Nicholson – 3
MacKechnie, Mrs – 4
Mackelvie, J*T – 1, 2
MacKenzie, Sir T – 5
Mackenzie, T – 3
Mackesy, Colonel – 5
MacLaren, JM – 4
Maclean, Murdoch – 5
Macleod – 4
Macmillan & Co. – 5
Madden, R – 1
Maiden, JH – 4, 5
Main, Jos – 4
Mair, Capt. G – 3, 4
Mair, R – 2
Mair, SAR – 4
Malacological Society of Belgium – 2
Manager, Bank of New Zealand – 4, 5
Manly-Hopwood – 1
Manning, F – 4
Mantell, WB – 1
March, Mrs – 3
Marine Department (Wellington) – 4, 5
Marriage, AW – 5
Marshall, P (Otago Institute) – 4
Martin, FW – 5
Martin, J (Society of Arts) – 1
Martin, Josiah – 2
Mason Bros – 1
Massey, Hon. WF – 5
Masters, G – 2
Mataura Paper Mill – 3
Matthews Baxter & Co. – 3
Mauser – 1
Maxwell, D – 2
Mayor & Councillors (Auckland) – 4
McCormick & Mackenzie – 1
McCullough, W – 2
McDonald – 1
McDowell, Dr – 4
McFadyen, HL – 4
McFarlane, JT – 1
McKenna, KG – 5
McKenzie, Norman – 3
McLennan, A – 5
McMahon, Miss K – 4
McNab, Hon. Mr (Minister for Lands) – 4
Meinertzhagen – 1
Menzies, E – 2
Menzies, J* – 3
Menzies, T – 4
Meyer – 4
Millar – 4
Miller, Christy – 4
Miller, R – 4
Minchin, RE – 2
Mines, Department of (New South Wales) – 3
Minister for Internal Affairs – 5
Mitchelson, Hon. E – 4, 5

Mitford, GM – 2
Monk, C – 4
Monkbretton, Lord – 4
Moody, TP – 3
Moosley – 4
Morgan, JDF – 4
Morris, CB – 2
Morrison, Miss – 4
Morrison, Secretary of D.S.C.[?] – 4
Mueller, Gerhard – 3
Mulgan – 4
Müller, Commissioner of Lands – 4
Munro, CB – 4
Munro, GC – 3, 4
Munro, H – 1, 3
Murdoch, DL – 2, 4
Museum, Director of (Washington, U.S.A.) – 4
Museums Association (Leicester, U.K.) – 5
Myer, AJ, Brigadier-General – 1
Myers – 4
Myers, Hon. AM – 5

Nairn – 4
Napier, WJ* – 5
Nathan, LD, & Co. – 4
Naturforschende Gesellschaft (Zurich) – 4
Naylor, CJ* – 3
Neil, Capt. – 4
Neil, CO – 1
Nelson, CE – 4
New Zealand Institute, Manager – 1, 4
New Zealand Institute, Secretary (Wellington) – 4
New Zealand Insurance Co. – 3, 4
Newcombe, CP – 3
Newton, R – 2
Nicholson & Gribben – 4, 5
Nicholson, A – 4
Nicholson, Mrs – 5
Nixon, JH – 4
Norris, Colin – 5
Nutt, D – 4, 5

O'Connor, M – 2
Ogden, Mrs Mary – 4
Ogilvie, AH – 4
O'Neill, C – 1
O'Rorke, GM – 1
Osborne, GJ – 4
Otago Institute – 4, 5
Owen & Graham – 1
Owen, ET – 2
Owen, Prof. – 1

Palacky – 4
Palethorpe – 4
Palmer – 4
Paris, Rev. PR – 4
Park, J* – 3
Parker, Prof. – 2
Parkinson – 4
Parr, CJ* – 5
Parsons, John – 1
Partridge, HE – 5
Paterson, J* – 3
Patterson – 4
Paymaster-General (Wellington) – 4
Payton, EW – 2
Peace, R, & Sons – 4
Peacock, Mayor of Auckland – 1
Peacock, T – 2
Petersen, Dr Esben – 4
Petrie, D – 5
Phillipps, PA (Town Clerk, Auckland) – 1, 2, 3
Phillips, CM – 5
Photographic Society – 3
Pierce, GP – 2
Pilkington, AG – 4
Pilkington, Henry – 4
Plummer, FG – 5
Poata, Kuri – 4
Pollen, Hugh – 4
Polynesian Society – 4, 5
Post Office Savings Bank, Manager – 1
Postmaster (Auckland) – 4
Pound – 1
Powell, FH – 4
Pratt, T – 5
Prendergast, J – 3
Price, TG – 5
Prickett [or Prickitt], WA (American Consulate) – 4, 5
Private Secretary – 3
Provincial Secretary – 1
Provincial Treasurer – 1
Purchas, AG – 1
Purchas, GH (Hauraki Plains Drainage) – 5

Quaritch, Bernard – 1, 2, 3, 4, 5
Quartley, AG – 5
Quatrefages – 1
Quibell, Dr – 5
Quintal, HC – 5

Rakena, Rev. P – 3
Rawson, GA – 5
Reade, GS – 5
Reid – 1
Reynolds, WH – 1
Rice – 4
Rich, FD – 3
Richardson, GF – 4
Richie – 1
Ridgway & Sons – 1, 2
Rigoreau, M (Consul for France) – 5
Riley, Prof. CV – 3
Ritchie, HP – 5
Roberton, Dr – 5

Roberts, S Raymond – 4, 5
Roberts, WC – 1
Robieson, CR – 4
Robinson, C – 1
Robinson, WJ* – 3
Roche – 4
Rogers – 4
Rolleston, Hon. W – 2
Roper, EW – 3
Rose, R – 1
Rosenberg, HF – 5
Ross, CM – 4
Ross, D – 4
Ross, J – 1
Rough, D – 4
Rowe, C – 4
Royal Society of New South Wales – 1, 3
Royal Society of Victoria – 3
Runciman, Rev. DW – 1, 2
Runciman, WM – 4
Russell, J*B – 2
Russell, Jas. – 4
Russell, Thomas – 1, 3
Rust, HN – 2, 3, 4
Rutherford, Prof. – 4
Rutherfurd, J*P – 2
Ryan, Capt. T – 4

Sadler, GN – 5
Salmon – 4
Sanders, AH – 5
Sanderson, F – 3
Saussure, H de – 1, 2
Sawmillers' Association – 4
Scantlebury, FG – 5
Scharff – 4
Scheidel – 4
Schinz – 4
Scott, CE – 5
Scott, J*W – 5
Scott, W – 1
Secretaries, Polynesian Society – 4
Secretary of (?) – 1
Secretary of Crown Lands – 2
Secretary to the Treasury – 2
Seddon – 4
Seed, W (Secretary of Customs) – 2
Selwyn, Dr – 2
Semadeni, CA – 5
Seton Karr, Colonel (London) – 4
Severin (?) – 1
Severn, GA – 1
Seymour – 4
Shackleton, Sir Ernest – 5
Shakespeare, Major – 4
Shand, A – 1
Sharp, HE – 3
Shaw, H – 4, 5
Sherson & Radcliffe – 1
Shillington, E (Auckland Public Library) – 4
Simmonds, Rev. J*H – 5
Sinclair, John – 5
Sitchell, Prof. – 4
Skeates, Prof. – 5
Skelton, HE – 5
Skinner, HD – 5
Skinner, WH – 4, 5
Smale, FD – 4
Smallfield, Rev. PJ* – 5
Smith & Brown – 4
Smith, F – 4
Smith, Mrs EC – 5
Smith, S Percy – 3, 4
Smith, TE – 5
Smithsonian Institution (& National Museum) – 3, 4
Smyth, W – 2, 3, 4
Snow, Prof. FH – 2
Société Royale Malacologique de la Belgique – 2, 4
Society of Artists, Secretary – 1
South British Insurance Co. – 3
Speight, R – 5
Spencer, Prof. – 4
Spencer, Sir Baldwin – 5
Spencer, WE (Education Department) – 5
Spencer, WJ* – 2
Spenser, W – 1
Sperrey, J* – 2
Spreckels, JD, & Bros – 3
Squires, HL – 4
Squires, WM – 4
St Clair, George (Caretaker) – 1, 3
Stafford, WS – 2
Stanton, J* – 5
Stead, DG – 4
Steel, T – 4
Steele, LJ* – 5
Steer & Steer – 5
Steinmann – 4
Stephens, Ingham – 4
Stevenson JM – 4
Stewart, Mrs Jas. – 5
Stewart, WF (Auckland Gas Co.) – 5
Stott, L – 4
Stuart, S – 2
Superintendant – 1
Surveyor, Chief (Auckland) – 4
Surveyor-General (Wellington) – 4
Suter, H – 4
Sutherland – 4
Sutton & Sons – 1

Talmage, WC – 4
Taupopoki, Mita – 4
Taylor, CJ – 1
Taylor, J*M – 3
Tennant, RC – 3

Thilenius, Dr G – 4, 5
Thistelton-Dyer – 4
Thompson, JB (Engineer, Hauraki Plains Drainage) – 5
Thomson, Dr. J*L – 5
Thomson, GM – 4, 5
Tibbs, JW – 4
Tinne, HW – 2, 3, 4
Tobin, CE – 4
Tod, C Douglas – 5
Tole, DA (Commissioner of Crown Lands) – 1, 2
Tonson Garlick Co. – 5
Toohill, Charles – 1
Tooley, AG – 4
Tothill, C – 2
Tourist Department (Wellington) – 4
Town Clerk, Auckland – 1
Townson, W – 5
Travers, HH – 4, 5
Treasurer, Colonial (Wellington) – 4, 5
Trelease – 4
Trubner & Co. – 2
Turnbull & Jones – 5
Turner, FH – 5
Turner, WK – 5
Tutchen, Josiah – 4

Ulrich, R – 2
Upton, J*H – 3
Urquhart, Mrs – 5

Vaile & Sons – 5
Vaile, S – 3
Vallot – 4
Van Beneden, Prof. – 3
Vandy, PA – 5
Vogel, J – 1
von Kobelt, Dr – 1
von Rochester – 1
Voy, CO – 1

Waite, ER (Canterbury Museum) – 4
Waite, TW – 5
Waitere, Te Tene – 4
Wakefield, C – 1
Waldegrave, T (Department of Justice) – 4
Walker, E – 4
Walsh – 4
Walters, EJ – 5
Ward, CH – 4
Ward, Prof. HA (Rochester, U.S.A.) – 1, 2, 4
Ward, Sir Joseph G – 4, 5
Wark, JK – 1
Warner, Col. – 1
Waterhouse, GC – 5
Waters, Capt. Alf – 4
Watkin, J* – 3
Watkins & Doncaster – 2
Watkins, K – 1, 2
Watson & Co – 4
Webb, A – 5
Webb, T – 4, 5
Webber, A – 3
Webster, J – 5
Webster, Miss – 5
Webster, Rev. – 4
Webster, WH – 5
Weetman, S – 1, 4
Wellington Philosophical Society – 5
Wellington Town Clerk – 5
Westwood, Miss – 4
Whangarei County Council – 3
Wheatland, H – 2
Wheeler & Son – 4
Whitaker, F – 1
Whitten, R – 4
Wight, R Allan – 3
Wigmore, Mrs – 4
Wilkie & Co. – 2
Wilkie, Mrs GC – 4
Wilkinson, GT – 2
Williams, AJ* – 4
Williams, FJ – 4
Williams, GW – 2
Williams, NT – 5
Williams, T – 1
Williamson, AJ – 4
Williamson, WL – 4
Wilson Mrs S – 5
Wilson, Capt. CJ – 4
Wilson, H (Town Clerk, Auckland) – 4, 5
Wilson, J*J* – 2
Wilson, Major – 1
Wilton & Co. – 4
Wintle, W – 4
Witton, W – 5
Wood, Bishop – 5
Wood, FE – 4
Woodward – 4
Worley – 4
Wragge – 4
Wragge, CS – 5
Wyllie, A – 5

Young, F – 1
Young, J* – 2
Young, W – 3
Young, WJ* – 2

The Cheeseman-Ward correspondence (1878–1905) and exchanges of natural history specimens between Auckland Museum and H.A. Ward of Rochester, N.Y.

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Abstract
Henry Ward, of Ward's Natural Science Establishment, Rochester, N.Y., U.S.A., visited Auckland in March 1881 (and again in November 1896) where he met Thomas Cheeseman, curator of Auckland Museum. The two men formed a professional friendship and corresponded for 27 years. During this time they arranged a series of exchanges of natural history specimens, despite Auckland Museum being only a minor customer of Ward's because it had little material to exchange and small budgets for purchase. From Cheeseman, Ward obtained bird specimens (especially kiwi *Apteryx*), ethnographic items, kauri gum and volumes of *Transactions of the New Zealand Institute*. Ward sent Cheeseman casts of 'celebrated fossils' and of the Rosetta Stone, articulated skeletons of a human and an ostrich, Blaschka glass models, mineral specimens, a lungfish and a giant salamander. After his first visit, Ward sent in succession two preparators from his establishment who worked for Auckland Museum preparing specimens for display. This and the supply of glass eyes (for taxidermy) and display labels were important ways in which Ward's gave logistical support to a small colonial museum. The correspondence between Cheeseman and Ward, archived in Auckland Museum's manuscripts collections and the Rush Rhees Library (University of Rochester), was studied to develop this account of how the two men interacted and what they were able to achieve.

Keywords
T.F. Cheeseman; H.A. Ward; Auckland Museum; Ward's Natural Science Establishment; fossil casts; Blaschka glass models

INTRODUCTION

Thomas Frederick Cheeseman (1845–1923) was curator of Auckland Institute and Museum from 1874 until his death, during which time he greatly developed and professionalised the organisation (Goulding 1996). From 1876, and for the rest of Cheeseman's working life, Auckland Museum occupied a small building in Princes Street to which successive small extensions were made (Wolfe 2001). Cheeseman was primarily a botanist, but published more generally in natural history and ethnology reflecting the broad interests and expertise that were necessary in a sole-charge curatorial position. For much of the time, Cheeseman was assisted by only a caretaker-janitor, and occasionally a taxidermist, as the museum could not afford to employ other staff. As part of his large workload Cheeseman was a prolific correspondent with biologists, curators and dealers throughout the world, and arranged many exchanges of natural history and ethnographic specimens with local and foreign individuals and organisations (Goulding 1975; Gill 1999, 2008).

H.A. (Henry Augustus) Ward (1834–1906; Fig. 1), was a natural history collector and dealer from Rochester, New York State, well known at the time for advising and helping to enrich museums during the period of rapid development of popular museums in the 1870s and 1880s (Kohlstedt 1980, 1985). He ran a large business (Ward's Natural Science Establishment) that employed and trained preparators and provided natural history specimens and replicas for sale or exchange around the world (Bodry-Sanders 1998). The company published sales catalogues (and its successor does so to this day), and for several years issued a periodical (*Ward's Natural Science Bulletin*) with articles of interest to natural history museums. H.A. Ward visited Auckland in March 1881, where he met Cheeseman, and again in November 1896.

During the second half of the 19th century, it was common for museum curators around the world to organise exchanges of objects and specimens for the

Figure 1. H.A. Ward (left) with William F. Cody ('Buffalo Bill'), U.S.A., late 1800s. Photo courtesy of Rush Rhees Library, University of Rochester.

mutual enrichment of their museums (Sheets-Pyenson 1988; Kohlstedt 1991). Exchanges could also be arranged with commercial dealers like H.A. Ward. Cheeseman used his relationship with Ward to try to enrich the collections and public exhibits of a growing museum in a small and remote colonial town. With limited funds to purchase specimens outright, he sought to negotiate exchanges using specimens and objects he had at hand or could acquire locally. Ward was attempting to enhance his business and at the same time assisting museums in their collection development. Although Cheeseman was a minor client for Ward, the correspondence between the two men gives a rich account of some specimen exchanges during 30 years. This paper summarises the Cheeseman–Ward correspondence and lists surviving specimens currently in the Auckland Museum collections that are known to have been received from H.A. Ward's establishment.

MATERIALS

We found 43 letters sent by T.F. Cheeseman (22) or H.A. Ward (21) to the other between 1878 and 1905. Both men wrote neatly with hand-writing that is easy to read. Ward had the custom of using the 'long s', giving the appearance of '-fs-' rather than '-ss-'. Some of the letters after 1896 are type-written. The letters often began by acknowledging receipt of a dated letter from the other party and some of these letters are missing.

For letters from Ward to Cheeseman, the Auckland Museum manuscripts collection has four letters in MS-58-18-2 (written February 1878 to April 1879) and 17 letters in MUS-1995-38-158 (written July 1881 to May 1897). Another letter dated 24 October 1905 is missing. There is also a memo from Ward to Cheeseman (28 March 1881) in the Land Vertebrates departmental files (Auckland Museum) and two letters

in MUS-1995-38-158 from Ward to Hugh Craig, Cheeseman's agent in San Francisco.

For letters from Cheeseman to Ward, the Ward Project (wardproject.org; accessed 2018) of the University of Rochester (N.Y., U.S.A.) has six (March 1879 to March 1883). Auckland Museum has 'Letter-books' (MUS-1996-6) containing contact copies of Cheeseman's outgoing correspondence. In these we found 20 letters to Ward (written March 1879 to December 1905): three in Letter-book 1 (MUS-1996-6-1), 15 in Letter-book 2 (MUS-1996-6-2) and two in Letter-book 4 (MUS-1996-6-4). Four of these are represented by originals in the Ward Project, but the two other originals in this repository have not been found in the Letter-books. Another three Cheeseman letters are missing (28 May 1878, 10 September 1878, 2 May 1884). Cheeseman also wrote to others at Ward's company (MUS-1996-6-4): a letter to F.A. Ward (a cousin to H.A. Ward) in June 1898, and a letter to C.H. Ward (one of H.A. Ward's sons) in May 1908 after H.A. Ward had died.

The frequency of correspondence, and enthusiasm for exchanges of specimens, were greater in the earlier years. No letters were sent (or survive) from 1880, 1888–89, 1891–96 and 1899–1904.

Ward's catalogues of his fossil casts (Ward 1866, 1870) give descriptions of the material and a selection of illustrations. We located Ward specimens in the following collecting departments of Auckland Museum: Land Vertebrates (birds—registration numbers prefixed with LB; mammals—prefix LM; amphibians and reptiles—prefix LH), Palaeontology and Marine (fish and invertebrates—prefix MA; geology—prefix GE), Archaeology (prefix 'Ethnology').

THE CHEESEMAN-WARD CORRESPONDENCE, 1878–1905

The exchanges of specimens that Cheeseman (TFC) and Ward (HAW) achieved during 27 years of correspondence are summarised in Table 1. The majority of specimens were exchanged during the early years of the men's relationship, mainly in the period 1881–1884. Delays in getting or despatching specimens, and the men's busy lives, meant that they sometimes lost track of what was owed. In the letters there are complex retrospective reconciliations of specimens and monetary values.

Ward asked other collectors in New Zealand to send small packages to Cheeseman that could be added to Cheeseman's larger consignments to Ward. For example, 'A box of Penguins – skins and skeletons – was sent to my [Cheeseman's] care for you [Ward] this week' (9 September 1882, TFC to HAW, MUS-1996-6-2: 44). One of the third parties was a Mr John Macpherson of Tauranga (31 March 1883, HAW to TFC, MUS-1995-38-158); another was Mr Elders, a 'druggist' at Port Chalmers (26 June 1885 and 16 October 1885, HAW to TFC, MUS-1995-38-158).

Until 1884 Cheeseman was on a very limited budget and could pay outright for very little from Ward's catalogues, relying instead on exchanges. The Auckland Province lacks large Late Holocene deposits of moa bones that could have provided Auckland Museum with surplus moa bones for exchange, as was the case for Otago Museum (Dunedin) and Canterbury Museum (Christchurch). Instead, Cheeseman relied heavily on supplying local North Island kiwi skins, skeletons and eggs (*Apteryx mantelli*) at an exchange value of £1 each. On 26 May 1884 (MUS-1996-6-2: 211–212), Cheeseman noted: 'Financial matters in reference to the support of the Museum are about squared up, at last. After this year we shall have a very fair income coming in. This is in great measure due to Mr Costley's handsome bequest, which gives us a sum of about £12,000 for investment.' But there were many calls on that income. On 26 February 1887 (MUS-1996-6-2: 480), Cheeseman wrote that he would 'try to induce our Museum Committee to obtain some things from your establishment shortly' but 'we are reserving our funds for an enlargement of the Museum Building'.

Table 1. Summary of consignments of specimens and objects exchanged between H.A. Ward (Rochester, N.Y.) and T.F. Cheeseman (Auckland Museum).

Year	Received by Ward	Received by Cheeseman
1881–1882	birds, ethnographic items (1881)	casts of fossils (1882)
1882–1883	4 kiwi skins (1883)	Queensland lungfish (1882), giant salamander (1882)
1883–1884	18 kiwi skins/skeletons/eggs, specimens of kauri gum, 13 vols of *Trans. NZ Inst.* (1884)	articulated human skeleton (1883)
1885–1886		Blaschka glass models (1885), glass eyes (1885), geology labels & minerals (1885–1886)
1896–1897	kiwi skins & ? (1896)	articulated ostrich skeleton, cast of Rosetta Stone (1897)

Initial plans, 1878–1879

The start of the correspondence seems to have been 7 February 1878 with a letter from Ward to Cheeseman (MS-58-18-2) occasioned by a newspaper notice. 'I noticed this morning in an old number (Nov. 77) of a San Francisco paper your call for a stuffed specimen of a Grizzly Bear.' Ward said that he could furnish a skin or stuffed specimen and enclosed a price list (missing) of American mammals. A mounted grizzly at Canterbury Museum had been sold to them as a skin by Ward.

Cheeseman's reply (28 May 1878) is missing, but Ward wrote again on 30 June 1878 (MS-58-18-2) saying that he was happy to make exchanges with Cheeseman and regretted that Cheeseman did not enumerate the 'New Zealand rarities' on offer. Regarding logistics, he asked if Cheeseman had 'frequent opportunity by sailing ship to New York?' Ward had sent boxes to Julius von Haast (Canterbury Museum) and James Hector (Colonial Museum, Wellington) by sailing vessels from New York. An alternative was the steamer between Auckland and San Francisco, where Ward had an agent.

Ward invited Cheeseman to set prices for his items as Ward had done in his catalogues (20 October 1878, MS-58-18-2). He asked Cheeseman 'to kindly remember that I carry on my business to make gain, not to merely increase my varieties in stock by making a simple even exchange'. Cheeseman charged £1 a piece for kiwi skins, skeletons or eggs. Cheeseman was asked to send a box to New York or San Francisco, followed by a list of contents and a list of what Cheeseman wanted in return.

By 3 March 1879 (MUS-1996-6-1: 310), Cheeseman was preparing a case of specimens Ward had selected. He intended to send it directly to New York by the next vessel, as forwarding by mail from San Francisco was too expensive. Ward replied (22 April 1879, MS-58-18-2) with much detail regarding paperwork for the shipment. Cheeseman was to avoid using the terms 'Minerals' or 'Bird skins' in favour of 'Snakes, Lizards, skeletons etc.' which would give 'a far less attractive sound to our [U.S.] Customs House Officers'. On 11 November 1879 (dated letter, H.A. Ward Papers, wardproject.org), Cheeseman advised that the promised exchange had not yet been sent. Instead, '... we received most advantageous offers of exchange from the Florence Museum – in fact too advantageous to neglect'. Nearly all Auckland Museum's duplicate specimens had been sent to Florence (see Gill 2010). With the austral summer coming on (1879–1880) Cheeseman hoped to obtain most of the articles on Ward's list of desiderata. However, any letters for 1880 have not survived and it is unclear if any specimens were exchanged before 1881.

Desiderata

Ward's initial list of desiderata (30 June 1878, MS-58-18-2) was kiwi eggs (*Apteryx* spp.), skins and skeletons of tuatara (*Sphenodon*), birds eggs '(blown on side with one smooth hole)', seal material (Pinnipedia) and Maori jade implements. Cheeseman wrote back with lists of available items (10 September 1878; missing) and Ward restated his desiderata (20 October 1878, MS-58-18-2) which now included Maori stone implements in general, New Zealand reptiles in spirits generally, 'Hatteria [*Sphenodon*] in alcohol. Six or more full-grown specimens', 'Apteryx Mantelli [North Island kiwi]. 3 skins, 3 skeletons, and 3 eggs', one good bird skin for each of a list of 14 species of New Zealand birds, and 'Stenorhynchus leptonyx [leopard seal, now *Hydrurga leptonyx*]. A skin, skeleton, or skull. (I have just stuffed and sold one, and I would like another)'.

In later years, Ward asked often for skins, skeletons and eggs of the kiwi. Cheeseman could oblige, but for eggs 'it is an uncertain business, and at all times they are very difficult to obtain' (9 September 1882, MUS-1996-6-2: 44). Ward asked for Pacific Islands shells on 15 December 1886 (MUS-1995-38-158). On 3 March 1890 (MUS-1995-38-158), he requested 'well-preserved Marine Invertebrates (notably Sponges or Echinoderms)' and skulls and skeletons of cetaceans.

Ward's visit to New Zealand, 1881

In 1881 H.A. Ward set out on a year-long collecting tour to Australasia and South-east Asia (Anon. 1881), sailing from San Francisco on 14 February and intending to spend about a month in New Zealand before proceeding to Australia. He reached Auckland on 9 March 1881 aboard *City of Sydney* (*New Zealand Herald* 10 March 1881: 4) the newspaper noting that he '... will probably give some lectures on physiology, of which science he is an ardent student ...'. 'Since his arrival in the colony [Ward] has visited most of the places of interest in the neighbourhood of Auckland, and paid a flying visit to the Lake district [i.e., Rotorua] and the active volcano of White Island' (*New Zealand Herald* 31 March 1881: 5). He particularly admired the Pink Terraces at Rotomahana. Ward's visit to the Bay of Plenty also included trips to Whale, Karewa and Mayor Islands and the Rurima Rocks (*Bay of Plenty Times*, 16 April 1881: 2) and after New Zealand he intended to travel to Australia, New Guinea and South-east Asia.

The opportunity for Ward and Cheeseman to meet in Auckland would have intensified their commitment to exchange specimens. It established a personal connection between them, and years later (6 January 1886, MUS-1995-38-158) Ward wrote: 'I much wish that you could spend a forenoon with me here [in Rochester] and then I spend the afternoon with you there [in Auckland]'. On 3 March 1890 (MUS-1995-38-158) Ward wrote in similar vein: 'It seems to me a very long time since we have corresponded. I often think of you and our friendly visits together in 1881, together with our transactions in years immediately subsequent'. Cheeseman expressed a wish that he could look in person through Ward's establishment (1 March 1886, MUS-1996-6-2: 374–5).

Ward was able to inspect Auckland Museum for himself and see the strengths and weaknesses of its collections. In 1881 he was also able to take away a consignment of specimens he was receiving on exchange. Cheeseman would have been able to get advice from Ward on many aspects of current museum practices. Cheeseman lacked access to a competent taxidermist to prepare specimens and after the 1881 trip Ward was able to recommend young men trained at his

own establishment who were keen to travel. The first was Charles De Kempeneer (c. 1852–1884) who came to Auckland for just over two months in 1882, the museum lacking the funds to employ him for longer (Gill 2018). Later, after the museum received the Costley Bequest of 1884, Ward sent Charles Francis Adams (1857–1893) who worked at Auckland Museum from January 1885 until February 1887 (Gill 2004, 2014).

Casts of 'celebrated fossils': the 1881–1882 exchange

An exchange is itemised in a four-page foolscap document in Cheeseman's writing ('List of Exchanges with Prof Ward, with values'; Auckland Museum Land Vertebrates Department, folder 'Ward Exchange'). It has a memo attached that was written and signed by Ward and dated 28 March 1881 at Auckland. The first two pages give the items that Auckland Museum provided. From New Zealand there were birds (40 skins and skeletons, a kiwi egg and a moa footprint), four lizards, a seal skull, a whale skull, 47 Maori stone implements and a specimen of nickel. There were also 15 bird specimens and seven Pacific ethnographic items that were 'Duplicates from Mr [Andrew] Goldie's New Guinea Collections'.

The last two pages list casts of fossils 'to be forwarded by Prof. Ward'. There were six skulls or framed slabs (showing exposed fossils *in situ*) of mammals (Figs 2, 3); a tarsometatarsus and egg of the elephant bird (*Aepyornis*)[1]; seven framed slabs of Mesozoic marine reptiles (Figs 4, 5); six framed slabs of fishes; nine invertebrate specimens (Fig. 6); and a set of 96 large scale models of foraminiferal species. The framed casts have descriptions, perhaps copied out in advance from Ward's catalogue, like 'Skeleton on slab' and dimensions of the slabs are given. Ward annotated the list 'List of Casts to be sent by me'. Table 2 lists the fossil casts that Ward sent to Auckland Museum for the 1881–1882 exchange.

Ward's memo reads:

> 'I have this day received from Mr. T.F. Cheesman [*sic*] various specimens of Natural History valued at £55.10.0 (including 12 skins of Apteryx still to be sent me.) In exchange for these specimens I hereby agree to send to the Auckland Institute and Museum a certain series of Casts of Celebrated Fossils ammounting [*sic*] at my catalogue prices to

Figure 2. Plaster cast of Neanderthal skull cap (*Homo neanderthalensis*; Ethnology 23203.1; Ward's 1866 catalogue #1; plastotype). Received from H.A. Ward, 1882. Original fossil, from the Neander Valley near Düsseldorf (Germany), held in Rheinisches Landesmuseum, Bonn.

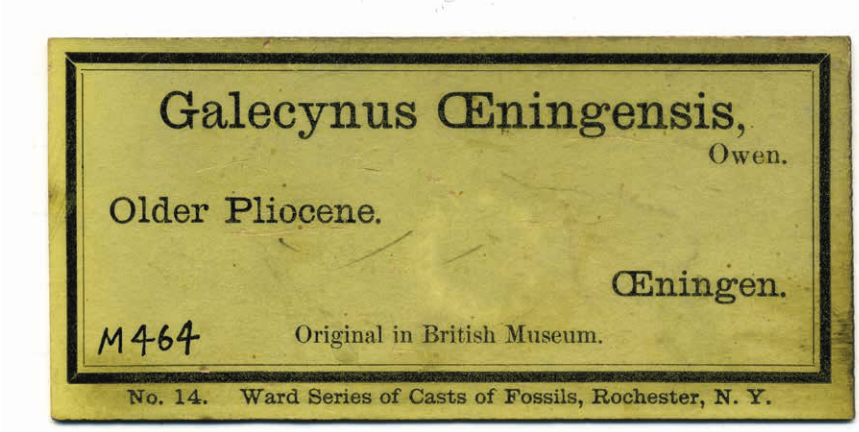

Figure 3. Original display label for the framed plaster cast (LM464; Ward's 1866 catalogue #14) of the fossil skeleton of the carnivorous mammal *Canis palustris* (formerly *Galecynus oeningensis*). Received from H.A. Ward, 1882.

Table 2. Casts of vertebrate and invertebrate fossils, and protozoan models, received by Auckland Museum in 1882 on exchange from H.A. Ward. Specimens marked 'lost' have not survived in the collection. Those with registration numbers marked by an asterisk (*) are plastotypes of the original species.

Species as listed in original documentation	Current species name for specimens that have survived	Specimen category	Ward Cat. No. (1866)	AIM Reg. No.
Mammals				
'Engis skull' [early man]	*Homo sapiens*	skull	2	Ethnology 23203.2
Neanderthal skull	*Homo neanderthalensis*	skull	1	Ethnology 23203.1*; Fig. 2
Galecynus oeningensis	*Canis palustris*	framed slab	14	LM464; Fig. 3
Sivatherium giganteum	–	skull	48	lost
Mastodon giganteus	–	skull & mandibles	146	lost
Diprotodon australis	–	skull & mandibles	181	lost
Birds				
Aepyornis maximus	*Aepyornis maximus*	tarsometatarsus	186	LB3896
Aepyornis maximus	*Aepyornis maximus*	egg & mounting	186	LB4002
Reptiles				
Ichthyosaurus intermedius	*Ichthyosaurus communis*	framed slab	207	LH1630; Fig. 4
Ichthyosaurus tenuirostris	*Leptonectes tenuirostris*	framed slab	220	LH1176
Plesiosaurus dolichodeirus	*Thalassiodracon hawkinsi*	framed slab	225	LH1629*; Fig. 5
Plesiosaurus macrocephalus	*Plesiosaurus macrocephalus*	framed slab	227	LH1047*
Pliosaurus brachydeirus	*Pliosaurus brachydeirus*	framed slab	231	LH1365
Pterodactylus crassirostris	*Scaphognathus crassirostris*	slab	241	LH1635*
Crocodileimus robustus	–	slab	249	lost
Fishes				
Holoptychius nobilissimus	–	slab	300	lost
Cephalaspis lyellii	*Cephalaspis lyellii*	slab	313	MA40717
Lepidotus maximus	*Scheenstias maximus*	slab	Not in this catalogue	Seen but probably not accessioned
Aspidorhynchus speciosus	*Aspidorhynchus ornatissimus*	slab	319	MA40708
Microdon elegans	*Proscinetes elegans*	slab	320	MA40706
Squatina acanthoderma	–	slab	330	lost
Crustaceans				
Asaphus gigas	–	slab	373	lost
Limulus giganteus	–	slab	364	lost
Insects				
Aeschna eximia	*Aeschna eximia*	slab	451	MA40630
Molluscs				
Ammonites cornucopia	–	slab	488	lost
Ammonites bisulcatus	–	slab	473	lost
Crinoids				
Pentacrinus briareus	–	slab	945	lost
Pentacrinus subangularis	*Seirocrinus subangularis*	slab	942	MA39521
Eucrinus liliiformis	*Encrinus liliiformis*	slab	919	MA40714; Fig. 6
Apiocrinus parkinsoni	*Apiocrinus parkinsoni*	slab	899	MA40705
Protozoans				
Set of 100 foraminiferal specimens of 96 species	–	models on brass stands & blocks	pp. 186–260	lost

> $US268.25 = £55.10.0. (List signed by me.) These casts I will if practicable send from Melbourne (Australia) about one month hence. Otherwise they will be sent from New York as soon after June 1st '81 as a ship may be leaving for Auckland. In either event the entire series of specimens will be carefully packed at my expense and delivered to the ship which is to bring them.'

A local newspaper itemised the exchange and concluded: 'The specimens and casts that are to be obtained from Professor Ward are expected to cover a large portion of the available wall space in the Museum Hall, and thus add very much to the attractiveness of the Museum' (*New Zealand Herald* 31 March 1881: 5). From Sydney (13 July 1881, MUS-1995-38-158), Ward wrote: 'When I reached Melbourne I found that Prof. McCoy of the University had taken a large lot of my casts of celebrated fossils and among them many of the nos. which you had on your list. So I at once wrote home with [a] copy of your list, and requested them prepare them and ship to you by first vessel to N.Z.' He hoped Cheeseman would have them within a few months. Cheeseman's only concern was 'that a vessel direct to Auckland will be selected, as the transhipment from the Southern Provinces would double the risk of breakage' (3 August 1881, MUS-1996-6-1: 453). They were sent on the barque *Beatrice Havener* (8 November 1881, TFC to HAW, MUS-1996-6-1: 472).

In February 1882, Cheeseman acknowledged safe receipt of the fossil casts (MUS-1996-6-2: 3). 'They came to hand in splendid condition, and we are very well pleased with them. I only wish we were in a position to order an additional number of them but until we get a regular income for the Museum we cannot purchase much. One of your complete series would be of great educational value here.' The museum's annual report for 1881–82 noted (Anon. 1882a: 7): 'Advantage was taken of the recent visit to Auckland of Professor H.A. Ward, of Rochester, to obtain for the Museum a set of the more valuable of his instructive casts of fossils. The casts have lately arrived from New York, and the greater portion have just been placed in the Museum.'

Ward's Natural Science Bulletin (e.g. Anon. 1882b) periodically repeated background details about the fossil casts. They were moulded from original fossils in European and American museums in the late 1860s and were available in named series of 76, 170 or 330 specimens. Sets had been sold to many museums around the world with some institutions taking orders worth $US1000–3000. Auckland Museum was a minor player, taking some 30 casts (plus foraminiferal models).

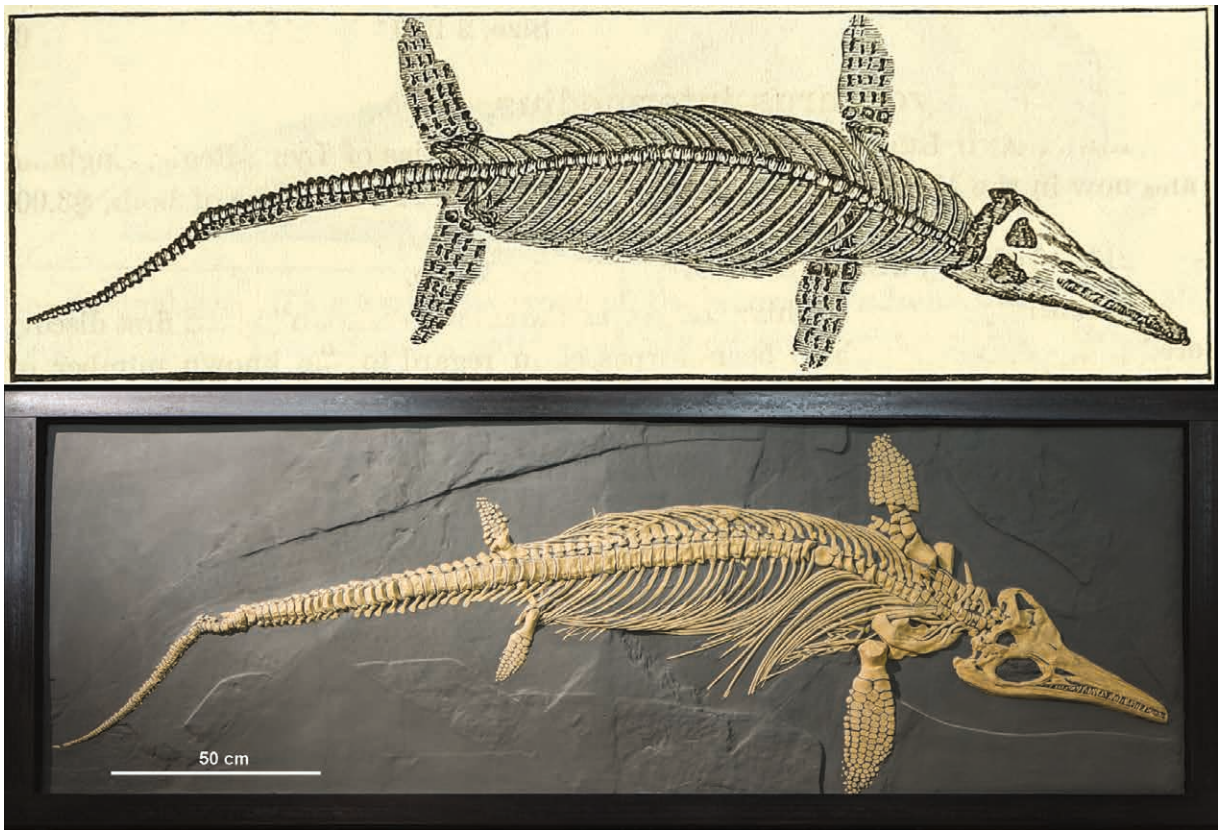

Figure 4. Fossil skeleton *in situ* of the ichthyosaur *Ichthyosaurus communis* (formerly *I. intermedius*). Original fossil, from near Glastonbury (England), held in The Natural History Museum, London. ***Above:*** Sketch from Ward's 1866 catalogue (#207; note poor illustration). ***Below:*** Framed plaster cast (LH1630; c. 2.76 m x 0.92 m) as displayed currently in Auckland Museum's Origins Gallery (Cheeseman Hall). Received from H.A. Ward, 1882.

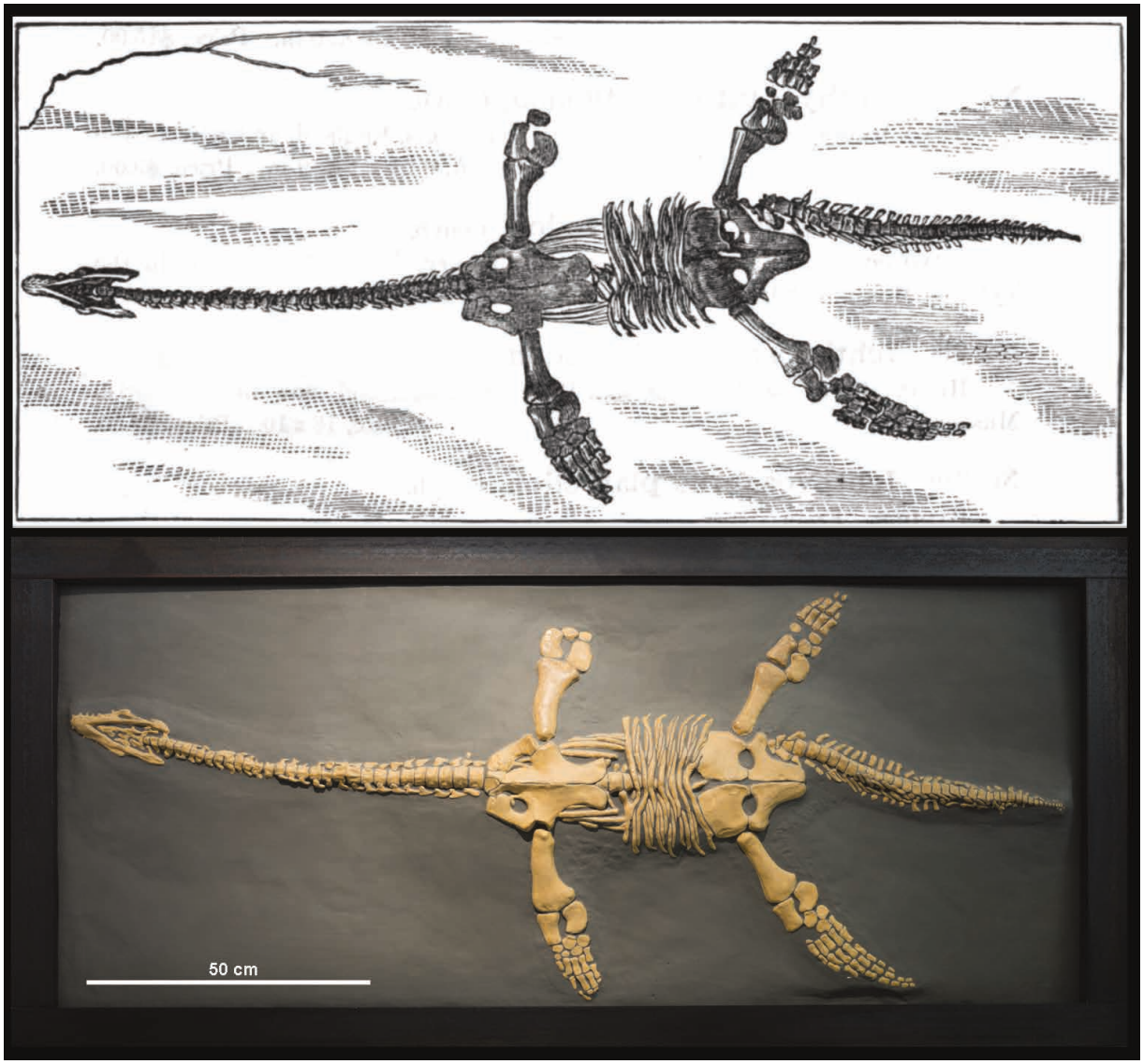

Figure 5. Fossil skeleton *in situ* of the plesiosaur *Thalassiodracon hawkinsi* (formerly *Plesiosaurus dolichodeirus*). Original fossil, from near Glastonbury (England), held in The Natural History Museum, London. ***Above:*** Sketch from Ward's 1866 catalogue (#225). ***Below:*** Framed plaster cast (LH1629; c. 1.84 m x 0.78 m; plastotype) as displayed currently in Auckland Museum's Origins Gallery (Cheeseman Hall). Received from H.A. Ward, 1882.

Figure 6. Plaster cast of the fossil crinoid *Encrinus liliiformis* (MA40714; Ward's 1866 catalogue #919). Original fossil from the Muschelkalk, Braunschweig (Germany); said to have been in Ward's personal collection. Received from H.A. Ward, 1882.

The outstanding kiwi specimens in this exchange 'went by mail steamer last month to San Francisco, and would be placed in the hands of your agent there, Mr Clements. ... You will find one more than the number, two of the skeletons counting as one' (8 November 1881, TFC to HAW, MUS-1996-6-1: 472). At the bottom of Cheeseman's original letter (dated letter, H.A. Ward Papers, wardproject.org), Ward noted that nine skins and four skeletons of *Apteryx mantelli* were received, the 'Skeletons indifferent'. Yet Ward reported diplomatically to Cheeseman (24 May 1882, HAW to TFC, MUS-1995-38-158) that the kiwis were 'very acceptable'.

Unusual fish, 1882

After Ward left Auckland, Cheeseman wrote (3 August 1881, MUS-1996-6-1: 453):

> 'Seeing that you are passing through Queensland, it has occurred to me that you may get specimens of Ceratodus [the Queensland lungfish, now *Neoceratodus*]. If so I should much like to have a specimen for our Museum. I could arrange to let you have its value in Apteryx [kiwi] skeletons or other birdskins if you prefer.'

Ward replied from Darwin (1 September 1881, MUS-1995-38-158) offering one or two of the fish in alcohol at £4 each, or each exchanged for four kiwi skeletons. Cheeseman wanted one (8 November 1881, MUS-1996-6-1: 472) and the fish was brought to Auckland Museum from Rochester by Charles De Kempeneer (9 September 1882, MUS-1996-6-2: 44) in July 1882 when he began a short stint as preparator (Gill 2018). The *New Zealand Herald* (20 February 1883: 6) noted 'a fine specimen of ceratodus received [by the museum] in exchange from Professor H. A. Ward'. It has not survived in the collection (T. Trnski, pers. comm. to BJG July 2018).

Though not mentioned in any surviving letters, Auckland Museum has a mounted specimen (real, not a cast; LH108) of the giant salamander *Cryptobranchus japonicus* from Japan, received from Ward in 1882.

Human skeleton: the 1883–1884 exchange

On 4 December 1882 (MUS-1996-6-2: 66), Cheeseman wrote: 'I want to obtain a good and well-mounted human skeleton – adult and perfect, and if possible, a male. Can you supply me with one in exchange for Apteryx skeletons and eggs? If so, you might send it at any time to my San Francisco Agent, Mr Hugh Craig, 412 California St. I should prefer one of the North American Indians. Please mount it in the manner you think most suitable for Museum purposes.' Early next year it 'arrived quite safely' from San Francisco (27 March 1883, MUS-1996-6-2: 88). LM131 is an articulated human skeleton in a standing position with original mounting and base (see Gill 2016: 7–9). In 1898, or soon after, Cheeseman created the museum's first register of vertebrate specimens (the 'Blue Book'; see Gill 1984). The first specimen Cheeseman entered in the Blue Book was the Ward human skeleton. Its original number was therefore V1 ('V' for vertebrates) and this is marked on the black wooden base of the skeleton in original lettering. In the Blue Book printed column headed 'Locality', Cheeseman wrote against the entry for V1 'Locality not known'. This indicates it is a general medical and teaching skeleton, and not identifiable as from one particular ethnic group.

Ward's Natural Science Bulletin periodically detailed the human skeletons available to buy (e.g. Anon. 1882c). Some were imported from Paris but most were prepared 'by Parisian workmen in my own establishment'. LM131 matches the description of the mid-priced of the three categories of Ward's general articulated human skeletons: 'Mounted with Bronzed Standard on Black Walnut pedestal'. These were priced at $US50–55. A mounted American Indian skeleton would have cost $US100 (Anon. 1882d) and Auckland Museum's small budget alone explains the sending of a cheaper generic skeleton.

In 1882, Cheeseman had sent an extra four North Island kiwi specimens (two skeletons and two eggs) in addition to the four kiwi skins owed for the Queensland lungfish (4 December 1882, MUS-1996-6-2: 66). Cheeseman was putting aside further kiwi specimens and 'I have also numerous specimens of Ambrite ready [fossilised gum of the kauri *Agathis australis*] – but you must not expect to have them so fine as the two you carried off when in Auckland. I have never been able to replace them' (27 March 1883, MUS-1996-6-2: 88). Cheeseman could also supply volumes 2–14 of *Transactions of the New Zealand Institute* at 10/- per volume. To minimise problems with the U.S. Customs, as in his previous correspondence (22 April 1879, MS-58-18-2), Ward advised Cheeseman to label consignments as 'Skeletons, Skulls, Eggs and other objects of Natural History' without using the words 'Mineral or Bird skin' (26 May 1883, MUS-1995-38-158). Publications were to be put at the bottom of the box 'and probably our Customs House people will not molest' (8 February 1884, MUS-1995-38-158).

In April 1884 (MUS-1996-6-2: 198–201) Cheeseman sent to Ward's agent in San Francisco five eggs, five skeletons and four skins of the North Island kiwi, specimens of kauri gum to the value of 10/- and a full set of *Transactions* (13 volumes). Ward was travelling overseas for much of 1884 but reported on 3 April 1885 (MUS-1995-38-158): 'Your box came duly. But, two of the five Apteryx Eggs were badly cracked on the way.'

Blaschka's 'Glass Models of Invertebrata', 1885

Auckland Museum has seven Blaschka glass models of invertebrates (Table 3; Fig. 7). Although none has specific documentation, all are likely to have been acquired in 1885 from Ward. On 9 September 1882 Cheeseman wrote to Ward (MUS-1996-6-2: 44): 'I am anxious to obtain a few of Blaschka's glass models of invertebrates. I think you told me you had been appointed his agent in America. Could you send me a priced catalogue of his specimens? I would either buy a few, or which suits us better, exchange for them if there is anything I can supply you with.' Barely a month later Ward replied (14 October

1882, MUS-1995-38-158) that 'I send you my Catalogue of Blaschka's Glass Models. I shall willingly exchange some of them for what you can spare that I want.'

Cheeseman, always short of funds and exchange material, appears not to have been in a position to order until 1884 and even then he asked Ward (28 April 1884, MUS-1996-6-2: 198–201) to send him a few specimens before committing to a larger order: 'If you happen to have one or two of Blaschka's glass models of invertebrate animals by you, please send also. I have thought several times of ordering them, but should like to see an example before actually doing so.'

Some models arrived nearly a year to the day later, but which ones and how many are not clear. Cheeseman's 'Many thanks for the samples of Blascka's [*sic*] Glass-models, which Mr Adams safely delivered' as well as his earlier 'If you happen to have one or two of Blaschka's glass models' suggest that only a few were received. Correspondence between Ward and Cheeseman suggests (3 April 1885, MUS-95-38-11-3) the shipment of goods brought by Adams had a value of £20. Ward, who was at that time in debt to a party in Australia, wrote 'I am asking Mr Adams to send £20 which he owes me to a party whom I owe in Australia'. He then reminds Cheeseman that 'your museum are owing me somewhat for some glass models of Invertebrates and some Minerals' and asks Cheeseman to pay the equivalent to Adams 'whose receipt for it will be the same as mine' and who can then send it on to the creditors in Australia. An invoice from Ward to Auckland Museum (Fig. 9) shows that purchase of the minerals came to $86.43. As per Ward's catalogue (Ward 1878) the total cost of Auckland Museum's seven glass models came to US$14.64 (Table 3). After the adoption of the gold standard in 1816, for most of the late 19th C and early 20th C the British Pound Sterling equivalent of the US dollar was £1 to US$4.85 (Wikipedia 2019). The cost of the minerals ($86.43) and glass models ($14.65) came to $101.08 which converts to an equivalent 1885 value of £20. This suggests that all seven models were brought by Adams.

However, it was always Cheeseman's intention to order more as on 29 April 1885 (MUS-1996-6-2: 278) he wrote to Ward in reference to further models: 'Before long, I think that we shall send you a considerable order for them – but in the meantime I should be obliged if you could let me know whether notice is required before an order can be fulfilled – I see something in his catalogue to that effect, and if so, how long one would have to wait for an order say to the extent of £50.'

Ward replied (MUS-1995-38-158) that the Blaschka models took a long time to produce and that for any order over £10 the wait was 6–10 months. Furthermore, that Leopold Blaschka expected to be paid 'in full with the order (he expects that from every one)'. There was also a note of urgency to Ward's tone: 'Blaschka and his son alone in the world do this work. He is old and [seems?] in poor health. Order now whatever you want. I will advance the money and see them delivered, splendidly packed, to your London Ag[en]t, or to Steamer. Cost as per my catalogue – nothing later.'

Sadly, despite Ward's generous terms, Cheeseman yet again had to delay. On 17 August 1885 he wrote to Ward (MUS-1996-6-2: 324): 'Many thanks for your information re Blaschka's Glass Models. I shall have to defer ordering some until next year, as the money that I was counting upon for the purpose will be required for another object. I hope then to go in for £40 or £50 worth.' On 26 February 1887 (MUS-1996-6-2: 480) he again wrote of deferring purchases as 'in fact we are reserving funds for an enlargement of the Museum Building, which is now very urgently required.' Unbeknown to Cheeseman, he was running out of time as by 1890 the Blaschkas had signed a contract with Harvard University to make only flowers. After this, Cheeseman would not have been able to purchase more of their invertebrate models.

Table 3. Blaschka glass models of marine invertebrates supplied to Auckland Museum in 1885 by H.A. Ward.

Currently accepted name	Ward Catalogue name	Ward Catalogue No.	Purchase price US$	AIM Reg. No.
Anemonia sulcata	*Anthea cereus* var. *alabastrina*	Blaschka #37*	$0.80	MA125474
Bolocera tuediae	*Bolocera tuediae*	Blaschka #42	$3.00	MA125475
Antholoba achates	*Sagartia fuegiensis*	Blaschka #90	$2.00	MA125476
Sarsia frutescens	*Syncoryne frutescens*	Blaschka #183	$3.00	MA125477
Coryphella verrucosa	*Aeolis rufibranchialis*	Blaschka #370	$0.60	MA125478
Platydoris striata	*Doris striata*	Blaschka #428	$1.25	MA125479
Ocythoe tuberculata	*Philonexis* [*Octopus*] *catenulatus*	Blaschka #585	$4.00	MA124293; Fig. 7

* There is no name with the specimen, but it looks similar to *Anthea cereus* var. *smaragdina*, a named specimen in the Corning Museum of Glass collection (Ruggiero 2016), except that it is almost colourless.

Figure 7. Blaschka glass model of the octopus *Ocythoe tuberculata* Rafinesque, 1814 (*Philonexis* (*Octopus*) *catenulatus* Philippi, 1844; Blaschka #585; MA124293). Though typically fragile, this cold-painted specimen is the largest and most handsome of the Blaschka models in Auckland Museum's collections.

Glass eyes, 1885

Besides specimens, Cheeseman sought materials and supplies unavailable locally that Ward could provide from America. These included glass eyes for stuffed animals and printed geology labels.

On 22 June 1885 (MUS-1996-6-2: 291), Cheeseman explained a problem. 'I write this month to ask a favour of you. Some time ago, as our stock of birds' eyes was getting low, I wrote to our agents in London ordering a fresh supply.' The agent was bankrupt and the order was returned. 'As we are in a hurry for the eyes – being almost cleaned out – and as it will save at least six weeks to get them from America, perhaps you would not object to get the enclosed order fulfilled for us, packed and sent fully addressed to me to the care of [my agent] Mr Hugh Craig, 482 California Street, San Francisco.' Cheeseman wanted 'a good quality of eyes'. 'As I don't know how you size them, I have enclosed a [British] trade list with illustrations of the sizes wanted which I have marked in red ink.'

Auckland Museum has a letter from Ward to Craig (21 August 1885, MUS-1995-38-158) with a three-page estimate of cost of many sizes of glass eyes from the maker Demuth Brothers of 89 Walker Street, N.Y. – 'Manufacturers of scientific glassware, buttons, beads, fruits and drops for artificial flowers, Christmas balls and frostings, artificial eyes, jet goods, physical instruments, etc.'. Unfortunately, the prices Cheeseman had from the British dealer (in Birmingham) were much lower than what Ward could get discounted from his 'best Eye-Maker in New York'. A later letter from Ward (16 October 1885, MUS-1995-38-158) made clear that at Craig's suggestion Ward sent half the order immediately.

Cheeseman was grateful (8 December 1885, MUS-1996-6-2: 361–2):

> 'I ought to have written before this to acknowledge the safe arrival of the birds' eyes, but have been unusually busy lately. Many thanks for your

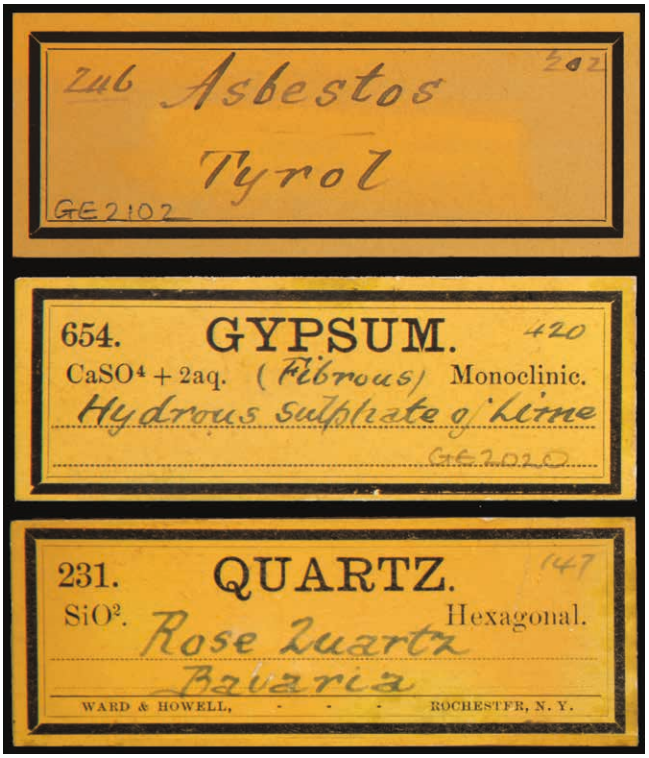

Figure 8. Three examples of display labels for minerals in the James R. Gregory Collection (1873) as used in the Princes Street Museum. *Top to bottom:* Asbestos (GE2102), blank Ward label; Gypsum (GE2020), pre-printed Ward & Howell label; Quartz (GE2046), Ward & Howell label. Labels received from H.A. Ward, 1886.

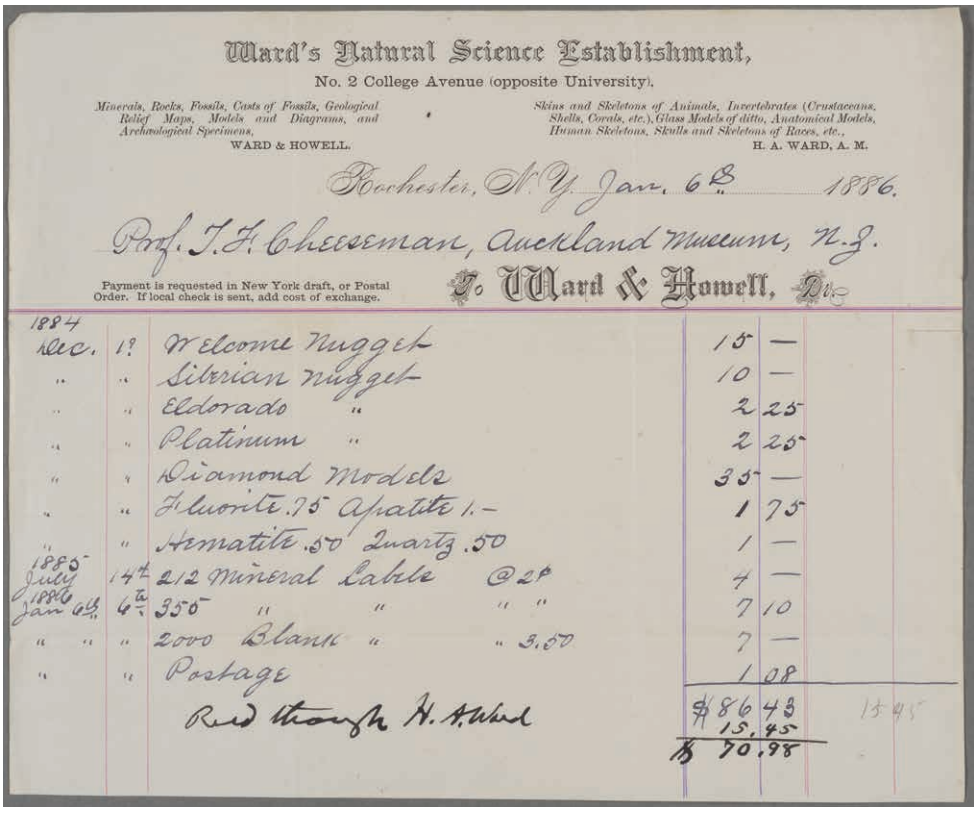

Figure 9. An invoice (dated 6 January 1886) to Auckland Museum from Ward & Howell for replica gold and platinum nuggets, replica diamonds, minerals and specimen labels supplied in 1884–1886. MUS-1995-38-158; scanned by Susan Tolich.

> kindness in attending to the matter. As you mentioned in your letter to Mr Craig, which he sent on to me, I did not expect that there would be such a great difference between the price in England and the price in America, and my object was to save time in getting them out. I hope Mr Craig has paid you all the charges on the consignment.'

Geology labels, 1885–1886

Because of the difficulty in getting suitable labels made in New Zealand and wanting high-quality labels for display, Cheeseman was interested in Ward labels and Ward & Howell labels (the latter from a joint venture of Ward's and marked 'Ward & Howell'). Specimens which form part of the James R. Gregory Collection acquired in 1873 are good examples (Fig. 8). In Auckland Museum's Geology Collection many minerals that were displayed at the Princes Street Museum still have Ward blank or pre-printed labels.

Cheeseman wrote to Ward about labels on 29 April 1885 (MUS-1996-6-2: 278): 'I notice that you supply printed labels for your minerals. It has occurred to me that you probably have these struck off in considerable numbers, and that possibly you might not object to sell me some sets – say a dozen or more. They are so much better for collections than written ones to say nothing of the time saved. I return one of the labels so that you may see what is meant. Judging from the [printed label] numbers, I suppose the sets correspond to Dana's Mineralogy [e.g. Dana c. 1880].' In reply (26 June 1885, MUS-1995-38-158) Ward stated that he had mineral labels of '400 to 500 Kinds or species' at a cost of 1c each and that he would send a sample set.

On 8 December 1885 (MUS-1996-6-2: 361–2) Cheeseman acknowledged receipt of a parcel of about 220 mineral labels and listed the additional labels he required. 'Also if you have, or could get struck off for me, some blank ones of similar size and colour, with only the black line round the margin, it would be a favour. I should like a good parcel of them – say a couple of thousand or so. I have failed in getting them made here, as our printers have not the right kind of cardboard.'

Ward wrote on 6 January 1886 (MUS-1995-38-158) with a separate invoice listing geological specimens and labels supplied and a tally of costs (Fig. 9). As per Cheeseman's order, two packages of labels went by post (to San Francisco for steamer to Auckland). Two or three types were out-of-stock but would follow in a letter. Ward requested payment for the full amount of the invoice ($70.98) so that (Ward quotes) 'old things shall have passed away and all (future) things shall become [new or now]'.

Mineral specimens, 1885

Cheeseman sought help from Ward in developing Auckland Museum's mineral collection (28 April 1884, MUS-1996-6-2: 198–201):

> 'Looking over your catalogue of minerals, of date 1878, I see you advertise a set of 15 models in cut glass of celebrated diamonds. This I should like to have; also the facsimile nuggets mentioned (the Welcome nugget from Australia, the Siberian nugget, one from Oregon Canon [Cañon], California, and the Platinum nugget from the Ural Mts.). We are thinking of adding to our type collection of minerals in a short time, so that if you could send with the above two or three specimens (with mountings, labels, etc) showing the sort of specimens you supply for Museum sets, I should be much obliged.'

The arrival of these replica specimens at the Museum was reported in the Annual Report (Anon. 1885) but none has been found in the collections to date. The catalogue referred to is probably Ward and Howell's *Catalogue of Minerals* published in 1878. We have not seen a copy of this catalogue but the same replica specimens of gold and platinum are also listed in the Ward Catalogue (1866: 209) under 'Miscellaneous'.

In the same 1884 letter, Cheeseman asked Ward to send 'two or three really good rhombs of Iceland Spar and crystals of Tourmaline'. The Iceland Spar (well formed rhombic crystals of calcite) and the tourmaline may well be in the collections since Auckland Museum has specimens which fit this description but they have lost their original data and any linkage to Ward. The Ward replica diamonds, said to be of 'all the noted Crown Diamonds' including the Great Mogul, Orlow, Koh-i-Noor, Nassack, the Hope Diamond etc., have not been found.[2] In the Applied Arts collections (1932.233) Auckland Museum has a collection of imitation diamonds made in the Netherlands and said to be pre-1885. But this is a much larger set than the Ward one and relates to a later acquisition by the Mackelvie Trust Board Collection in 1932.

The early 1890s

There was a gap in correspondence for three years before 1890. Ward wrote on 3 March 1890 (MUS-1995-38-158) 'It seems to me a very long time since we have corresponded'. He would be glad to fill any order and requested from Cheeseman 'well-preserved Marine Invertebrates (notably Sponges or Echinoderms)' and skulls and skeletons of cetaceans. Cheeseman's reply (13 June 1890, MUS-1996-6-2: 728–9) is only partly legible but the things he could provide included skins and skeletons of New Zealand birds (including two species of kiwis) and New Zealand shells (marine molluscs) 'say a named collection of 100 species'. The next letters we have seen are 1897, so it is not clear if an exchange took place in the early 1890s.

Rosetta Stone: the 1897 exchange

Ward must have visited Auckland Museum a second time, in November 1896. On 27 May 1897 (MUS-1995-38-158), he signed off his letter 'With heartiest recollections of our most pleasant visit together last November.' An exchange must have been negotiated during this visit, for Ward wrote on 27 May 1897 (MUS-1995-38-158) 'The specimens which I got from your Museum as well as others from New Zealand have safely arrived in good condition. I believe that I was owing you the sum of £18.6.6.' Ward had shipped to Cheeseman (in two boxes

by railway freight to San Francisco shippers who would redirect by steamer) 'a mounted skeleton of an Ostrich [now numbered LB3885] and a cast of the Rosseta [*sic*] Stone [now Ethnology 11131; first mentioned in the 1866 Ward Catalogue as #1237, p. 210]'. On 26 November 1897 (MUS-1996-6-4: 58) Cheeseman apologised for his late reply but acknowledged safe receipt of these items which were 'in exchange for the Apteryx skins etc. from this Museum'.

Later in the year (26 November 1897, MUS-1996-6-4: 58) Cheeseman asked for the price of mounted groups of mammals, for example 'containing a Lion, Lioness, Tiger, Leopard, and perhaps Panther'. On 10 June 1898, he wrote to F.A. Ward (MUS-1996-6-4: 131) thanking him for sending prices of stuffed mammals but Cheeseman was 'not in a position to forward you an order just at present'. He had also received prices for 'coloured casts of fish and reptiles' and offered to send 'specimens of New Zealand things in exchange'. However, there is no evidence that Auckland Museum received any of these items. The museum instead purchased mammal groups from the London firm Gerrard & Sons in 1904–1907 (Gill 1999, 2006).

Comments on the tuatara

The Cheeseman-Ward correspondence contains references to the tuatara (*Sphenodon*), the reptile group unique to New Zealand. There is no indication Cheeseman sent any to Ward, but Ward collected his own specimens in March 1881 at the Rurima Rocks in the Bay of Plenty (*Bay of Plenty Times* 16 April 1881). Ward added a postscript to a letter of 6 January 1886 (MUS-1995-38-158): 'I lately had offered to me in New York by a party named Bills from Dunedin a cask containing 160 adult Tuataras for £50. I did not have money to spare for all of 3 or 4 things then offering me as bargains; so I did not buy.' Cheeseman replied (1 March 1886, MUS-1996-6-2: 374–5): 'You ought to have accepted Bell's [*sic*] offer of the Tuataras. I don't think that it is at all likely that such a chance will occur again, for it is probable that our Government – on the representations of some scientific men – will prohibit such wholesale exportations in the future. Otherwise the Tuatara will soon be a thing of the past.'

On 8 December 1905 (MUS-1996-6-4: 635), just seven months before Ward died, Cheeseman, in response to a letter of 24 October 1905 (missing) and referring to tuatara specimens in alcohol, said that he 'could spare say half a dozen'. These were sound but had been 'on hand for some time'. 'They should make good skeletons – but the bones would probably be a little brown, as you say. Possibly there are ways of bleaching such skeletons with which your son will doubtless be familiar. As to their value, I usually expect to get from £1 to £1-10-0 each for such specimens, according to size.' Not receiving any reply, Cheeseman exchanged the specimens with another party (9 May 1908, TFC to C.H. Ward, MUS-1996-6-4: 857–8).

DISCUSSION

Thomas Cheeseman kept up a prolific correspondence over nearly five decades and arranged many exchanges of specimens with natural history dealers and natural history museums both in New Zealand (e.g. William Smyth; Crane and Gill 2018) and overseas (e.g. Florence Museum; Gill 2010). In this context, Cheeseman became a long-term friend and correspondent of H.A. Ward despite Auckland Museum, with limited budgets, remaining a minor customer of Ward's establishment. Large moa skeletons were worth £50 in the late 1800s (Berentson 2012: 151). Cheeseman had none of these to exchange and had to fall back on kiwi specimens at £1 apiece. Canterbury Museum had extensive moa collections and exchanged surplus moa bones with H.A. Ward. In return the museum received the large Canyon Diablo meteorite (*Christchurch Press*, 15 December 1900: 19) which now has a very high monetary value; Auckland Museum, for its small exchanges, got plaster casts. However, the casts of 'celebrated' fossils, many of them large and spectacular, were welcome at Auckland Museum which had galleries to fill. Many of the fossil casts have been displayed continuously in the museum since their receipt in 1882, first in the Princes Street museum, and then from 1929 in the current museum building.

Purchasing an articulated human skeleton from Ward's was just another routine transaction as Cheeseman developed his encyclopaedic museum. It is of display quality and was presumably shown in the public galleries, although we have no confirmation of this from any surviving photographs or documents. In requesting specifically (though unsuccessfully) a skeleton of an indigenous North American, Cheeseman perhaps thought that material from a Pacific-Rim population would have best relevance for New Zealand from among the geographically localised skeletons offered in Ward's catalogue. In 1885 Cheeseman asked E.H. Giglioli in Florence for skulls of 'European or Asiatic races' (Gill 2010). Clearly, like many museums at the time, he was trying to build a world-wide comparative collection of human osteology.

Besides specimens and museum requisites like geology labels and glass eyes for taxidermy, Ward also supplied Auckland Museum with important assistance and advice. He facilitated the employment of the preparators Charles De Kempeneer (Gill 2018) and Charles Adams (Gill 2004, 2014). It was probably Charles Adams' influence that led Auckland Museum to produce its first natural history 'habitat groups' showing tuataras, keas and wekas in realistic and naturalistic display contexts (Gill 2004).

Much has already been written about the history of the famous Blaschka glass models and the father-and-son team, Leopold and Rudolf Blaschka (1822–1895 and 1857–1939 respectively), who made them (e.g. van Giffen et al. 2010; Miller and Lowe 2008; Whitehouse 2007). The Blaschkas made as many as 10,000 glass marine invertebrate models covering some 700 species (Whitehouse 2007) from 1863 until 1890, when they

signed an exclusive contract with Harvard University to make glass flowers for that institution. At the time of Cheeseman's first enquiry in September 1882, the Blaschkas were already well-known for the excellence of their work and their models had been distributed all over the world (Whitehouse 2007), including New Zealand. When the Otago Museum opened in 1877 it did so with a display of Blaschka models as part of its new galleries (Crane 2015). Julius von Haast, Cheeseman's counterpart at the Canterbury Museum, ordered a substantial set for that Museum in 1882 (Shaw et al. 2017). The invertebrate models were sold either directly or through an agent, such as H.A. Ward, and mainly to museums, universities, colleges and other institutions for the teaching and display of natural history. While F.W. Hutton (curator at Otago Museum) and Haast, dealt directly with Leopold Blaschka, Cheeseman placed his order via Ward.

Ward's promise to Cheeseman to 'advance the money' and his 'Cost as per my catalogue – nothing later' seem very generous, given that this may well have met with resistance from his uncle, Levi Alfred Ward, who was one of his underwriters (Dyer 2008). After years of travel and study Ward set up his company, Ward's Natural Science Establishment, in 1860, with the financial help of Levi Alfred, and possibly his grandfather Levi Ward (Kohlstedt 1985). However, it seems that all through the 1800s the company experienced cash flow problems (Dyer 2008). Ward was said to have been more interested in collecting than the business-end of things, treating the company he founded as 'more a vehicle for roaming the world for collecting the natural specimens he loved' (Gamble 1962 in Dyer 2008). In fact he went bankrupt twice, once in 1874 and again in 1884 (Kohlstedt 1985), and in 1884 his cousin Frank Addison Ward (Levi Alfred Ward's son) was appointed as treasurer to the business. Blaschka glass models first appeared in Ward's catalogue of 1878 and he seems to have reached his business arrangement with the Blaschkas without his uncle's knowledge or approval (Dyer 2008). As a consequence the latter was unwilling to send money to Blaschka in prepayment of models.

In general, the letters between T.F. Cheeseman and H.A. Ward show the effort both men put into correspondence and exchanges. Theirs was an interaction in which a small colonial museum supplied 'exotic' local material and a powerful metropolitan enterprise supplied 'classic' specimens, museum consumables and trained young men to be engaged as preparators. Our study makes a case history of how museum men in the Victorian era used their personal efforts and exchanges of specimens for mutual enrichment of their respective organisations.

ACKNOWLEDGEMENTS

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END NOTES

1. Cheeseman's 1881 listing of items to be received from Ward states 'Aepyornis maximus. Metatarsus and one egg with mounting.' Ward's catalogue (Ward 1866) shows that he sold the elephant bird tarsometatarsus with either one or two eggs (lengths and widths given) with mountings. Auckland Museum has two brass and wood (black walnut?) egg mountings of the type shown in Ward's catalogue and several large plaster eggs. The single egg that Cheeseman received in the 1882 consignment is assumed to be the one now numbered LB4002 (not previously registered) because at 330 x 233 mm it matches one of the sizes given in Ward's catalogue (13 x 9 inches). Two old catalogue cards, made out by Cheeseman's assistant L.T. Griffin after 1924, list *Aepyornis* specimens—AV1128.1 (cast of egg) and AV1128.2 (cast of lower portion of metatarsus)—but without further details. AV1128.1, now renumbered LB4000, is 244 x 178 mm and therefore too small to be one of the eggs in Ward's 1866 catalogue. To explain the presence of two Ward-style egg mountings it is possible that Ward in fact sent two eggs in 1882, or sent a second egg subsequently, or that the museum at some stage received a second Ward egg from a third party.
2. In 2015 a set of 15 Ward & Howell 'Imitations of Noted Diamonds' sold at auction in the U.S.A. for US$1,750 (https://www.cottoneauctions.com/lots/33346/ward-howell-imitations-of-noted-diamonds; accessed 2019).

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Fossil and Recent molluscan types in the Auckland War Memorial Museum. Part 3: Gastropoda (Patellogastropoda and Vetigastropoda)

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Abstract
The Marine Department of Auckland War Memorial Museum has an actively growing type collection with over 1770 primary types and a further 1836 paratypes and paralectotypes. The majority are molluscan, and this third part of a catalogue of these collections reviews the types for 12 Patellogastropoda and 184 Vetigastropoda species and subspecies. It deals with 130 primary types and 142 secondary type lots, which are split between 140 Recent taxa and 56 fossil taxa. Eleven of the holotypes reviewed here are illustrated for the first time.

Keywords
Auckland Museum; name-bearing types; Mollusca; Patellogastropoda; Vetigastopoda.

INTRODUCTION

The Marine Department of Auckland War Memorial Museum (Auckland Museum) holds over 1770 lots of name-bearing types, in the form of holotypes, neotypes, syntypes and lectotypes, and a further 1836 paratypes and paralectotypes. These are spread across several Phyla, but the great majority are Mollusca. They include terrestrial Mollusca 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). The present publication is Part 3 of an updated and expanded catalogue and covers the Patellogastropoda and Vetigastopoda. See Blom (2016) for Part 1, which deals with the Bivalvia, and Blom (2017) for Part 2, which deals with the Polyplacophora and Scaphopoda. Part 3 deals with 130 primary types and 142 secondary type lots representing 12 limpet species and 184 vetigastropod species. These are split between Recent (140) and fossil (56) taxa. The majority are from New Zealand (182), but there are also species from Bouvet Island (1), Falkland Islands (2), Fiji (1), Marion Island (1), Solomon Islands (1), South Georgia (3), Tasman Sea (1), Ukraine (1), Unites States of America (2) and Western Samoa (1).

COMPLEXITIES

As with any museum collection there are inherent limitations to records relating to data quality and data gaps. Record-keeping systems and standards change over time, and those used by early curators are often vastly different from modern systems and methodologies. For example, many early collectors, curators included, did not record collection dates. So, many early specimens lack this information and the only way to get indicative collecting dates is if it is known when – and where – their respective collectors were active.

The bulk of early marine-related specimens were recorded in a register of acquisitions started by T.F. Cheeseman (1874–1923). However, in 1929, when Auckland Museum moved to its present site in Auckland Domain, more specialised curatorial positions became available and with this the pace of collecting stepped up (Powell *et al.* 1967). After that, the responsibility of registering scientific specimens devolved to each of the separate departments, which all appear to have had slightly different systems in place.

A.W.B. Powell, appointed in 1929 as Auckland Museum's first Conchologist and Palaeontologist, maintained a register of acquisitions (Blom 2016). He also had a series of card-files, amongst which were separate files for the type collections, the general molluscan collections, his personal scientific library, reference literature, taxonomic information for molluscan taxa, as well as one for his beloved Turridae.

Much of this legacy data has now been digitised as part of Auckland Museum's relational database management system, but this process may have generated errors. Errors in transcription of handwriting, confusions about old place names and collectors' names are but a few.

Early specimen lots often have a series of labels, which can show their progression from field collecting to incorporation into the Museum's collections. However,

Figure 1. *a.* labels with the holotype of *Arthritica bifurca* (Webster, 1908). It was donated by the Rev. Webster in 1929 as shown by the middle label, written by A.W.B. Powell, which records the registration number followed by the year (326/29); ***b.*** labels with the holotype of *Lissotesta oblata* Powell, 1940. The third label, written by Powell, has 'coll.' as postscript indicating that the specimen originally came from the *collection* of H.J. Finlay; ***c.*** the second label has 'coll.' preceding the proper noun, denoting that the specimen came directly from the collector; ***d.*** labels with the holotype of *Scutellastra tucopiana*, with Powell's label recording the Rev. J.L.A. Kayll as its collector in 1922

as lots were frequently gifted, swapped, or traded amongst both professional and amateur shell collectors, labels may have been kept, replaced or lost at any point and so any remaining labels may or may not be a flawed record of these activities.

Another problem is in the attribution of specimens to collectors. Particularly with the move in 1929 to the new building in The Domain, Auckland Museum was the recipient of private conchology collections from people, such as the Rev. W.H. Webster (Fig. 1a), who were keen to help grow its holdings. Original labels were transcribed by A.W.B. Powell, who usually annotated them with the name of the original donor and/or collector. His format was to use 'coll.' ahead of the name to indicate the collector of the specimen, and to use 'coll,' after the name to indicate when he/she was the donor of the collection (Figs 1b, c). This has led to subsequent transcription errors when the collector was conflated with the donor. Transcription of information onto non-standardised printed labels prior to digitization in the 1990s sometimes led to further confusion between the classifier of the specimen, the field collector, owner of a collection, or transcriber of the information.

There are a number of specimen lots throughout Auckland Museum's Marine Collections (including type lots in this paper: MA70417; MA71554; MA70112; MA71555; MA72083; MA70106; MA71565), which were all collected from either 98 fathoms or 100 fathoms 'off Great Island, Three Kings Islands'. None has a collection date, but they most likely came from material dredged in 1914 by Captain John Bollons, from 98 fathoms, 15'S of Big King, Three Kings Group. Bollons gave the material to Marjorie Mestayer and her father Richard (Mestayer 1916), and while the latter used it to extract Foraminifera (Hayward 2012), the former identified many of the molluscs, including a figured one as *Brookula* sp. This was later selected by Finlay (1926a) as the type specimen of *Brookula prognatha* (holotype M.001748 at MONZ). Auckland Museum bought Finlay's collection in 1937, and many of the presumed Bollons specimens are accompanied by labels in Finlay's hand-writing – it appears that he changed the figure of 98 fathoms to a rounded 100 fathoms. Mestayer gave both specimens (>100) and bulk lots of shell sand (46) to A.W.B. Powell (Hayward & Morley 2011) all of which are still housed in Auckland Museum's Marine Department.

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 a combination of Spencer *et al.* (2016) and MolluscaBase (2019) was used for the taxonomic order, family placements and current names. This was also the major reference for foreign species. MolluscaBase records were accessed through World Register of Marine Species (WORMS 2019) for the relevant species entries. Taxonomic placement, current names and ages for New Zealand Cenozoic fossil taxa are taken from a combination of Maxwell (in Spencer *et al.* 2009), Beu & Maxwell (1990), Beu & Raine (2009) and MolluscaBase (2019).

All specimens listed here were sighted and cross-checked against original publications, apart from one holotype and five paratypes, which appear to be missing. These are marked with an asterisk (*). Fossil taxa are indicated by a dagger (†) and 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 and formats see Raine *et al.* (2015).

Type definitions are those used by the International Code of Zoological Nomenclature (ICZN 2019).

Paratypes have been included in this catalogue, because in some instances the name-bearing type is not readily available (e.g. 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 gastropod species reviewed here 11 were not originally figured, and for these, high-resolution images created with automontage focus stacking techniques are provided. High-resolution images for many of the other primary types may be accessed through Auckland Museum's Collections Online (http://www.aucklandmuseum.com/collections-research/collections).

Additional data not shown here may be held with each accession record (e.g. precise site details).

ABBREVIATIONS

NMNH	Muséum National d'Histoire Naturelle, Paris, France
MONZ	Museum of New Zealand, Te Papa Tongarewa, Wellington, New Zealand
GNS	GNS Science, Wellington, New Zealand
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington (D.C.) USA
NHM	Natural History Museum, London, United Kingdom
CM	Canterbury Museum, Christchurch, New Zealand
AUG	Auckland University Geological Collections, Auckland University, Auckland, New Zealand

Class GASTROPODA
Subclass PATELLOGASTROPODA
PATELLIDAE

†*Scutellastra cooperi* Powell, 1938

Powell, A.W.B., 1938a, p. 379, pl. 39, fig. 14 (holotype), fig. 13 (paratype).

Holotype: MA70706, incomplete specimen, collected by C. Cooper from Early Miocene (Otaian) Cape Rodney Formation, 200 m east of Nga Taikorapa, Motuihe Island, Auckland, New Zealand.

Paratype: MA72420, from the type locality.

Current name: *Scutellastra cooperi* Powell, 1938 – **Maxwell in:** Spencer *et al.* (2009: 239).

***Scutellastra tucopiana* Powell, 1925**
Powell, A.W.B., 1925, pp. 169–170 (figured, no plate number).
Holotype: MA72139, here accepted to have been collected by the Rev. J.L.A. Kayll in 1922, from a reef on Tikopia Island, Temotu Province, Solomon Islands.
Paratype: MA71405, from the type locality.
Remarks: The holotype and paratype are the only specimens known of the species and there is a suspicion they are wrongly labelled. The specific name is taken from Tikopia, (spelled by Powell as Tucopia), which is the southernmost island in the Temotu Province of the Solomon Islands. Culturally its people are Polynesian (Wikipedia 2019) while geographically it is in Melanesia, and it has had a long association with New Zealand through the activities of the Melanesian Mission. Powell (1925) recorded the collector as J.L.A. Kayll 1922 (Fig. 1d) and in his type description stated that 'During a recent visit to Tucopia Island, Melanesia, the Rev. J.L.A. Kayll, of the Melanesian Mission, obtained from a native two specimens of a large, handsome limpet, of the genus *Scutellastra*, which were stated to have been found alive on an adjacent reef.'

In 2012 Dr Philippe Bouchet (NMNH) indicated that the species was on his radar of 'possibly extinct' marine species as it has not been collected since Powell's (1925) original description (Bouchet pers. comm. 2012). As the types are the only two specimens and there are no records of giant limpets from archaeological excavations in Tikopia he also suggested they did not originate from there. If so, then *Scutellastra tucopiana* could be synonymous with a giant limpet from elsewhere in the world.

From comparisons with specimens held in the Auckland Museum collections the taxon appears to be closest to the south west Australian *Scutellastra laticostata*. However, a comparison of the paratype with specimens held at Museum of Western Australia, Perth, proved inconclusive.

From 1896 until his death in 1944, the Rev. J.L.A. Kayll was a Diocesan Chaplain of the Anglican Church in parishes all over New Zealand (Derbyshire 2006). Apart from being an Anglican minister, criminologist and prison reformer (Te Ara 2019), records show that the Rev. Kayll was also directly involved with the Church's Melanesian Mission as its Organising Secretary, probably for several years from 1919 (Steward 1919). While those same records fail to mention him ever having travelled to Melanesia himself, he was involved in the commissioning of a promotional film of the region for the Melanesian Mission (Ramage 2015). A letterbook (MS-187) of the period, held in Auckland Museum Archives on behalf of the Mission, contains dozens of copies of letters signed by Kayll, some of which reference his having contracted malaria (letters 9 and 12 June 1922), and watercolours painted by him of 'the islands' (letter 12 June 1922).

In addition, there are a further eight specimens, almost all *Placostylus* species, in Auckland Museum's collections which are attributed to the Rev. Kayll as the collector. They are all from the Solomon Islands, and where collection dates are recorded, these are 1922 and 1924. It therefore seems quite plausible that J.L.A. Kayll did visit the Solomon Islands, and that he obtained the specimens of *Scutellastra tucopiana* while in Tikopia.
Current name: *Scutellastra tucopiana* Powell, 1925 – MolluscaBase (2019).

NACELLIDAE

***Cellana pricei* Powell, 1973**
Powell, A.W.B., 1973, p. 155, pl. 128 (holotype, paratype).
Holotype: MA71337, collected by L. Price in 1964, from black volcanic rocks at half-tide, Upolo, near Apia, Western Samoa.
Current name: *Cellana pricei* Powell, 1973 – MolluscaBase (2019).

***Cellana strigilis bollonsi* Powell, 1955**
Powell, A.W.B., 1955, p. 73, pl. 5, fig. 51 (holotype), figs 52, 53 (paratypes).
Holotype: MONZ M.008560
Paratypes: MA72381, two specimens, collected by W.R.B. Oliver in April 1927, from the Antipodes Islands, New Zealand.
Remarks: In Powell (1955) the figure numbers given at the start of the description are incorrect and relate to *Cellana strigilis oliveri* and *vice versa.*
Current name: *Cellana oliveri* Powell, 1955 – Spencer *et al.* (2016).

***Cellana strigilis flemingi* Powell, 1955**
Powell, A.W.B., 1955, pp. 72, 73, pl. 5, fig. 45 (holotype), figs 46, 47 (paratypes).
Holotype: GNS TM600
Paratypes: MA72380, eight specimens, collected by C.A. Fleming on 27 November 1947 from the high intertidal at the 'boat harbour', The Snares, New Zealand.
Current name: *Cellana strigilis* (Hombron & Jacquinot, 1841) – Spencer *et al.* (2016).

***Cellana strigilis oliveri* Powell, 1955**
Powell, A.W.B., 1955, pp. 73, 74, pl. 5, fig. 48 (holotype), figs 49, 50 (paratypes).
Holotype: MONZ M.008565
Paratype: MA72382*, collected by W.R.B. Oliver in April 1927, from the Bounty Islands, New Zealand.
Remarks: In Powell (1955) the figure numbers given at the start of the description are incorrect and relate to *Cellana strigilis bollonsi* and *vice versa.*
* this specimen has not been sighted since at least 1993.
Current name: *Cellana oliveri* Powell, 1955 – Spencer *et al.* (2016).

***Cellana vitiensis* Powell, 1973**
Powell, A. W. B., 1973, pp. 158, 159, pl. 129, figs 1, 2; pl. 132, fig. 2.
Holotype: USNM 5839
Paratypes: MA71898, three shells and two dried animals,

collected by W. Cernohorsky on 4 October 1963 from under rocks at high tide level, Viti Levu Bay, north eastern Viti Levu, Fiji.
Current name: *Cellana vitiensis* Powell, 1973 – MolluscaBase (2019).

LOTTIIDAE

***Actinoleuca campbelli bountyensis* Powell, 1955**
Powell, A.W.B., 1955, p. 65, pl. 1, fig. 9.
Holotype: MA71208, collected from 91 m (50 fathoms), Bounty Islands, New Zealand.
Remarks: The only information with this specimen is that it came from Bounty Islands, was collected at 50 fathoms, and came to Auckland Museum in 1937 as part of the H.J. Finlay Collection. In his introduction, Powell (1955) gave an inventory of material examined, which included a reference to dredgings made off the Bounty Islands at 50 fathoms by Captains J. Fairchild and J. Bollons in the period 1890–1907. Powell stated that this material was "distributed in collections in Auckland and Canterbury Museums, New Zealand Geological Survey, Wellington (Suter collection), and the Powell collection, Auckland". Given the connections between early collectors, it seems plausible that Finlay was also the recipient of some of this material and that therefore his specimen was collected by either Fairchild or Bollons during this period.
Current name: *Actinoleuca campbelli bountyensis* Powell, 1955 – Spencer *et al.* (2016).

***Atalacmea multilinea* Powell, 1934**
Powell, A.W.B., 1934a, p. 154, pl. 21, figs 1, 3 (holotype).
Holotype: MA70051, collected by A.W.B. Powell in January 1928 at low tide from the underside of stones, Katiki Beach, Otago, New Zealand.
Paratypes: MA71647, three specimens, from the type locality.
Remarks: Powell (1934) stated that it was collected by him in January 1928, but a label in his hand, before the species was named, has *Atalacmea* n.sp. A.W.B.P. 1927.
Current name: *Atalacmea multilinea* Powell, 1934 – Spencer *et al.* (2016).

†*Notoacmea* (*Parvacmea*) *chattonensis* Laws, 1932
Laws, C.R., 1932, p. 187, pl. 32, fig. 47 (holotype).
Holotype: MA70527, collected by C.R. Laws in 1930 from the Late Oligocene (Duntroonian) Chatton Shellbed, Shell Gully, Chatton, Southland, New Zealand.
Paratypes: MA72818, two specimens, from the type locality.
Current name: *Notoacmea chattonensis* Laws, 1932 – Maxwell in: Spencer *et al.* (2009: 239).

†*Notoacmea* (*Parvacmea*) *nukumaruensis* Oliver, 1926
Oliver, W.R.B., 1926, pp. 575, 576, pl. 99, fig. 3.
Holotype: MA70528, collected from the Early Pleistocene (Nukumaruan) Nukumaru Brown Sand, 7 km south east of Waiinu Beach, near the site of the former 'Nukumaru boat-landing', Manawatu-Whanganui, New Zealand.
Current name: *Notoacmea nukumaruensis* Oliver, 1926 – Maxwell in: Spencer *et al.* (2009: 239).

***Acmaea intermedia* Suter, 1907**
Suter, H., 1907, p. 316, 317, pl. 27, figs 6–8.
Paratypes: MA27663, three specimens collected by Captain J. Bollons, from 91 m (50 fathoms), off Bounty Islands, New Zealand.
Current name: *Radiacmea intermedia* (Suter, 1907) – MolluscaBase (2019).

Subclass VETIGASTROPODA
LEPETELLIDAE

***Tectisumen finlayi* Powell, 1937**
Powell, A.W.B., 1937, p. 189, pl. 49, figs 6, 7 (holotype).
Holotype: NHM 1962991
Paratype: MA72282, a single specimen, collected by A.W.B. Powell in 1932 from the type locality, station 934, R.R.S. Discovery II cruise, in 92 m off Manawatāwhi/ Three Kings Islands, New Zealand.
Current name: *Tecticrater finlayi* (Powell, 1937) – Spencer *et al.* (2016).

***Tectisumen subcompressa* Powell, 1937**
Powell, A.W.B., 1937, pp. 188, 189, pl. 49, figs 4, 5 (holotype).
Holotype: NHM 1962990
Paratypes: MA72281, three specimens, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/ Three Kings Islands, New Zealand.
Remarks: All specimens affected by glass disease.
Current name: *Tecticrater subcompressus* (Powell, 1937) – Spencer *et al.* (2016).

SCISSURELLIDAE

***Schismope iota* Finlay, 1926**
Finlay, H.J., 1926a, pp. 340, 341, not figured.
Holotype: MA70693, **Figures 2a**, **b**, collected from 91 m (50 fathoms) from The Snares, New Zealand.
Paratypes: MA72519, seven specimens, from the type locality.
Remarks: All specimens affected by glass disease.
Current name: *Sinezona iota* (Finlay, 1926) – Spencer *et al.* (2016).

†*Schismope koruahina* Laws, 1936
Laws, C.R., 1936, pp. 100, 101, pl. 15, figs 45–47 (holotype).
Holotype: MA70694, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Remarks: The holotype is badly affected by glass disease.
Current name: *Sinezona koruahina* (Laws, 1936) – Maxwell in: Spencer *et al.* (2009: 239).

***Schismope laqueus* Finlay, 1926**
Finlay, H.J., 1926a, p. 340, pl. 19, figs 30, 31 (holotype).
Holotype: MA70695, collected from 91 m (50 fathoms) from The Snares, New Zealand.
Remarks: The holotype is affected by glass disease.
Current name: Sinezona laqueus (Finlay, 1926) – Spencer et al. (2016).

Figure 2. ***a, b.*** *Schismope iota* Finlay, 1926, holotype, apertural and oblique views, the latter showing the slit; ***c, d.*** *Schismope lyallensis* Finlay, 1926, holotype, apertural and oblique views, the latter showing the slit; ***e, f.*** *Argalista impervia* Finlay, 1930, holotype, apertural and abapertural views; ***g.*** *Argalista kaiparaensis* Finlay, 1930, holotype, apertural view; ***h, i.*** *Argalista leniumbilicata* Laws, 1935, holotype, apertural and abapertural views; ***j, k.*** *Argalista nana* Finlay, 1930, holotype, apertural and abapertural views; ***l, m.*** *Herpetopoma mariae* Finlay, 1930, holotype, apertural and abapertural views. Unless otherwise stated, scale bars 0.4 mm.

***Schismope lyallensis* Finlay, 1926**
Finlay, H.J., 1926a, p. 340, not figured.
Holotype: MA70696, **Figures 2c, d**, from shell sand, Lyall Bay, Wellington, New Zealand.
Paratype: MA73331, a single specimen, from the type locality.
Remarks: Both specimens affected by glass disease.
Current name: *Sukashitrochus lyallensis* (Finlay, 1926) – Spencer *et al.* (2016).

†*Schismope ngatutura* Laws, 1936
Laws, C.R., 1936, p. 100, pl. 15, figs 43, 44 (holotype).
Holotype: MA70697, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Remarks: The holotype is badly affected by glass disease.
Current name: *Sukashitrochus ngatutura* (Laws, 1936) – Maxwell in: Spencer *et al.* (2009: 239).

†*Scissurella apudornata* Laws, 1935
Laws, C.R., 1935, p. 30, pl. 5, fig. 1 (holotype).
Holotype: MA70700, collected from the Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Glen Creek, Oamaru, Otago, New Zealand.
Remarks: In March 2009 only a jumble of amorphous white crystals, along with small salt-like grains, were found inside the cut-glass tube in which the specimen had been stored. As the sole known specimen of this species appears to have been destroyed by glass disease, the figure of the type in Laws (1935, fig. 1) must now stand as the iconotype.
Current name: *Scissurella apudornata* Laws, 1935 – Maxwell in: Spencer *et al.* (2009: 239).

***Scissurella bountyensis* Powell, 1933**
Powell, A.W.B., 1933a, pp. 34, 35, pl. 6, figs 1, 2 (holotype).
Holotype: CM M5318
Paratypes: MA72370, four specimens, collected by Captain J. Fairchild in 1893, from 310 m (170 fathoms), from Bounty Islands, New Zealand.
Remarks: All specimens have been affected by glass disease.
Current name: *Scissurella bountyensis* Powell, 1933 – Spencer *et al.* (2016).

***Scissurella fairchildi* Powell, 1933**
Powell, A.W.B., 1933a, p. 34, pl. 6, figs 3, 4 (holotype).
Holotype: CM M5316
Paratype: MA72369, 12 specimens, collected by Captain J. Fairchild in 1893, from 310 m (170 fathoms), from Bounty Islands, New Zealand.
Remarks: All specimens have been affected by glass disease.
Current name: *Scissurella prendrevillei* Powell, 1933 – Spencer *et al.* (2016).

***Scissurella manawatawhia* Powell, 1937**
Powell, A.W.B., 1937, pp. 175, 176, pl. 49, fig. 1 (holotype).
Holotype: NHM 1962951
Paratypes: MA72217, four specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Remarks: All specimens have been affected by glass disease.
Current name: *Scissurella manawatawhia* Powell, 1937 – Spencer *et al.* (2016).

***Scissurella prendrevillei* Powell, 1933**
Powell, A.W.B., 1933b, p. 193, pl. 33, fig. 6 (holotype).
Holotype: MA70701, collected by A.W.B. Powell and/or C.A. Fleming in February 1933, from 18 m (10 fathoms) off Owenga Beach, Rēkohu/Chatham Islands, New Zealand.
Paratype: MA71530, a single specimen, from the type locality.
Remarks: Both specimens have been affected by glass disease.
Current name: *Scissurella prendrevillei* Powell, 1933 – Spencer *et al.* (2016).

***Sinezona pauperata* Powell, 1933**
Powell, A.W.B., 1933b, p. 193, pl. 33, fig. 4 (holotype), fig. 5 (paratype).
Holotype: MA70710, collected by A.W.B. Powell and/or C.A. Fleming in February 1933, from 18 m (10 fathoms) off Owenga Beach, Rēkohu/Chatham Islands, New Zealand.
Remarks: According to an original label with the specimens both the holotype and the figured paratype were stored together in the same cut-glass tube. In March 2009 only two amber-coloured grains, along with small salt-like grains, were found inside the tube. No other remains were visible and it is assumed that both the holotype and paratype were destroyed by glass disease. No other specimens of this species are held in Auckland Museum's collections.
Current name: *Sinezona pauperata* Powell, 1933 – Spencer *et al.* (2016).

LAROCHEIDAE

***Larochea miranda* Finlay, 1927**
Finlay, H.J., 1927, p. 486, pl. 24, figs 6–8 (holotype).
Holotype: MA70386, dredged by W. La Roche from 22 m (12 fathoms) in Rangaunu [Awanui] Bay, Northland, New Zealand.
Paratypes: MA72305, 15 specimens, from the type locality.
Current name: *Larochea miranda* Finlay, 1927 – Spencer *et al.* (2016).

***Larochea secunda* Powell, 1937**
Powell, A.W.B., 1937, pp. 207, 208, pl. 50, fig. 7 (holotype).
Holotype: NHM 19621044
Paratypes: MA72286, six specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Larochea secunda* Powell, 1937 – Spencer *et al.* (2016).

ANATOMIDAE

***Schizotrochus aupouria* Powell, 1937**
Powell, A.W.B., 1937, p. 176, pl. 49, fig. 3 (holotype).
Holotype: NHM 1962952
Paratype: MA72218, a single specimen, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Remarks: The specimen has been affected by glass disease.
Current name: *Anatoma aupouria* (Powell, 1937) – Spencer *et al.* (2016).

***Schizotrochus finlayi* Powell, 1937**
Powell, A.W.B., 1937, p. 176, pl. 49, fig. 2 (holotype).
Holotype: NHM 1962953
Paratype: MA72219, a single specimen, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 934, R.R.S. Discovery II cruise, in 92 m off Manawatāwhi/Three Kings Islands, New Zealand.
Remarks: The specimen has been affected by glass disease.
Current name: *Anatoma finlayi* (Powell, 1937) – Spencer *et al.* (2016).

HALIOTIDAE

†*Haliotis flemingi* Powell, 1938
Powell, A.W.B., 1938a, pp. 377, 378, pl. 39, fig. 18 (holotype).
Holotype: MA70349, collected by C.A. Fleming in 1934 from the Early Miocene (Otaian) Bostaquet Member of the Cape Rodney Formation on the east side of Bostaquet Bay, Kawau Island, New Zealand.
Current name: *Haliotis flemingi* Powell, 1938 – MolluscaBase (2019).

***Haliotis sorenseni* Bartsch, 1940**
Bartsch, P., 1940, pp. 50, 51, pl. 6.
Holotype: USNM 535688
Paratype: MA73099, a single specimen, collected by an abalone diver in September 1939, from 18 m (10 fathoms), slightly south of Point Conception, California USA.
Current name: *Haliotis sorenseni* Bartsch, 1940 – MolluscaBase (2019).

***Haliotis virginea morioria* Powell, 1938**
Powell, A.W.B., 1938b, pp. 165, 166, pl. 40 fig. 1 (holotype), fig. 2 (paratype).
Holotype: MA70350, collected from Owenga, Rēkohu/Chatham Islands, New Zealand.
Remarks: Powell (1938) also allocated two paratype specimens, but these are no longer identifiable within Auckland Museum collections.
Current name: *Haliotis virginea morioria* Powell, 1938 – MolluscaBase (2019).

†*Haliotis* (*Euhaliotis*) *mathesonensis* Eagle, 1996
Eagle, M.K., 1996, pp. 161–163, figs 2–6 (holotype).
Holotype: MA72925, collected by M.K. Eagle on 15 February 1996, from the Early Miocene (Otaian) Cape Rodney Formation at Mathesons Bay, Auckland, New Zealand.
Current name: *Haliotis mathesonensis* Eagle, 1996 – MolluscaBase (2019).

†*Haliotis* (*Marinauris*) *hokiangaensis* Eagle, 2002
Eagle, M.K., 2002, pp. 25–30, figs 7–10 (holotype).
Holotype: MA73252, collected from the Early Miocene (Otaian) Waitiiti Formation, Otaua Group, Matihetihe Hill, Mitimiti, Northland, New Zealand.
Current name: *Haliotis hokiangaensis* Eagle, 2002 – Maxwell in: Spencer *et al.* (2009: 239).

†*Haliotis* (*Marinauris*) *matihetihensis* Eagle, 1999
Eagle, M.K., 1999, pp. 47–51, figs 2–5 (holotype).
Holotype: MA73135, collected by M.K. Eagle on 29 September 1996, from the Early Miocene (Otaian) Waitiiti Formation, Otaua Group, Matihetihe, Mitimiti, Northland, New Zealand.
Current name: *Haliotis matihetihensis* Eagle, 1999 – MolluscaBase (2019).

†*Haliotis* (*Notohaliotis*) *waitemataensis* Powell, 1938
Powell, A.W.B., 1938a, p. 377, pl. 39, fig. 19 (holotype).
Holotype: MA72068, collected by A.W.B. Powell from the Early Miocene (Otaian) Bostaquet Member of the Cape Rodney Formation on the east side of Bostaquet Bay, Kawau Island, New Zealand.
Current name: *Haliotis waitemataensis* Powell, 1938 – MolluscaBase (2019).

FISSURELLIDAE

†*Emarginula haweraensis* Powell, 1931
Powell, A.W.B., 1931a, pp. 96, 97, pl. 11, fig. 17 (holotype).
Holotype: MA72055, collected by A.W.B. Powell in January 1927, from Late Pliocene (Waipipian) Tangahoe Formation near the mouth of Waihi Stream, Hawera, New Zealand.
Paratypes: MA12290, two specimens, collected by A.W.B. Powell in January 1931 from the type locality.
Remarks: Based on Powell's (1931) type description where he referred to 'Two paratypes, one damaged and one half grown, in Auckland Museum' the paratype lot was rediscovered in the general fossil collection where it was stored as MA12290.
Current name: *Emarginula haweraensis* Powell, 1931 – Maxwell in: Spencer *et al.* (2009: 239).

†*Emarginula paucicostata* Laws, 1936
Laws, C.R., 1936, p. 101, pl. 15, fig. 48 (holotype).
Holotype: MA70260, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Paratype: MA72692, a single specimen, from the type locality.
Current name: *Emarginula paucicostata* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 239).

***Emarginula striatula valentior* Finlay, 1928**
Finlay, H.J., 1928, pp. 235, 236, pl. 42, figs 56, 57 (holotype).
Holotype: MA70261, a beach-worn shell presumed to have been collected in 1924 by a member of the Otago Institute Expedition, from Rēkohu/Chatham Islands, New Zealand.
Current name: *Emarginula striatula* Quoy & Gaimard, 1834 – Spencer *et al.* (2016).

***Monodilepas carnleyensis* Powell, 1955**
Powell, A.W.B., 1955, pp. 48–50, pl. 5, fig. 43 (holotype), text fig. A1.
Holotype: GNS TM431
Paratype: MA72379, three specimens, dredged by C.A. Fleming sometime during 1941–1945 from 11 m (6 fathoms) at Cape Expedition Dredge Station 1, from Emergency Bay, Carnley Harbour, Auckland Islands, New Zealand.
Current name: *Monodilepas monilifera carnleyensis* Powell, 1955 – Spencer *et al.* (2016).

***Monodilepas diemenensis* Finlay, 1930**
Finlay, H.J., 1930a, p. 222, not figured.
Holotype: MA70484, **Figures 3a-c**, collected from Cape Maria van Diemen, Northland, New Zealand.
Paratypes: MA73114, six specimens, from the type locality.
Current name: *Monodilepas diemenensis* Finlay, 1930 – Spencer *et al.* (2016).

***Monodilepas otagoensis* Finlay, 1930**
Finlay, H.J., 1930a, p. 222, pl. 42, fig. 6 (holotype).
Holotype: MA70485, collected from 91 m (50 fathoms), 16 km (10 miles) ENE of Taiaroa Head [Otago Heads], Dunedin, New Zealand.
Paratypes: MA73589, three specimens, from the type locality.
Current name: *Monodilepas otagoensis* Finlay, 1930 – Spencer *et al.* (2016).

***Monodilepas skinneri* Finlay, 1928**
Finlay, H.J., 1928, p. 236, pl. 43, fig. 59 (holotype).
Holotype: MA70486, a nearly fresh specimen collected by R.S. Allan in 1924 from the stomach of a cod, Rēkohu/Chatham Islands, New Zealand.
Current name: *Monodilepas skinneri* Finlay, 1928 – Spencer *et al.* (2016).

***Montfortula chathamensis* Finlay, 1928**
Finlay, H.J., 1928, p. 235, pl. 41, figs 34, 35 (holotype).
Holotype: MA70487, presumed to have been collected in 1924 by a member of the Otago Institute Expedition to Rēkohu/Chatham Islands, New Zealand.
Paratypes: MA72571, two specimens, from the type locality.
Current name: *Montfortula chathamensis* Finlay, 1928 – Spencer *et al.* (2016).

***Puncturella manawatawhia* Powell, 1937**
Powell, A.W.B., 1937, pp. 177, 178, pl. 48, figs 7, 8 (holotype).
Holotype: NHM 1962955
Paratypes: MA72221, five specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Fissurisepta manawatawhia* (Powell, 1937) – Spencer *et al.* (2016).

†*Scutus petrafixus* Finlay, 1930
Finlay, H.J., 1930b, p. 54, pl. 2, fig. 23 (holotype).
Holotype: MA70707, exact location unknown, except that the specimen came from Late Eocene/Early Oligocene Ototara [Oamaru] Limestone, Otago, New Zealand.
Current name: *Scutus* (?) *petrafixus* Finlay, 1930 – Maxwell in: Spencer *et al.* (2009: 239).

***Tugali colvillensis* Finlay, 1926**
Finlay, H.J., 1926a, p. 345, not figured.
Holotype: MA70781, **Figures 3d-f,** collected from 37–46 m (20–25 fathoms) off Cape Colville, Coromandel, New Zealand.
Paratypes: MA72520, four specimens, from the type locality.
Current name: *Tugali colvillensis* Finlay, 1926 – Spencer *et al.* (2016).

†*Tugali navicula* Finlay, 1926
Finlay, H. J., 1926b, p. 227, pl. 59, figs 6, 7 (holotype), figs 8, 9 (paratypes).
Holotype: MA70782, Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Glen Creek, Oamaru, Otago, New Zealand.
Paratypes: MA71656, two specimens, from the type locality.
Current name: *Tugali navicula* Finlay, 1926 – Maxwell in: Spencer *et al.* (2009: 239).

†*Tugali pliocenica* Finlay, 1926
Finlay, H. J., 1926b, p. 227, pl. 59, figs 1, 2 (holotype), figs 3–5 (paratypes).
Holotype: MA70783, collected from the Pleistocene (Castlecliffian) at Castlecliff, Whanganui, New Zealand.
Paratypes: MA71655, two specimens, from the type locality.
Current name: *Tugali pliocenica* Finlay, 1926 – Maxwell in: Spencer *et al.* (2009: 239).

***Tugali stewartiana* Powell, 1939**
Powell, A.W.B., 1939, p. 227, pl. 50, fig. 7 (holotype), figs 8, 9 (paratypes).
Holotype: MA72154, collected by Mrs R.H. Harrison from Ringaringa Beach, Rakiura/Stewart Island, New Zealand.
Paratypes: MA71546, three specimens, from the type locality.
Remarks: Holotype and paratypes were stored together by A.W.B. Powell, and later separated on the basis of

published measurements and given different registration numbers. The material described by Powell (1939) came from Mrs R.H. Harrison, Augustus Hamilton and a field trip that Powell undertook in Oct/Nov 1934, which was hosted by Captain G.M. Turner. Often provenance cannot be determined from the labels or Powell (1939), including these type specimens, which were originally attributed to Powell as the collector. However, given that in his species description Powell specifically mentions Mrs Harrison – '*Localities:* Ringaringa (type) and Horse Shoe Bay, Stewart Island (Mrs R.H. Harrison)' – it is here assumed that they were collected by Mrs Harrison and not Powell.

Current name: *Tugali stewartiana* Powell, 1939 – Spencer *et al.* (2016).

†*Tugali superba* Powell, 1934

Powell, A.W.B., 1934b, p. 265, pl. 58, figs 10, 11 (holotype).

Holotype: MA70784, collected by A.W.B. Powell in August 1933 from the Late Pleistocene (Haweran) Te Piki Member, Waipaoa Formation, from a road cutting approximately 6 km east of Whangaparaoa (Cape Runaway), East Coast, New Zealand.

Current name: *Tugali superba* Powell, 1934 – Maxwell in: Spencer *et al.* (2009: 240).

Figure 3. *a-c. Monodilepas diemenensis* Finlay, 1930, holotype, dorsal, lateral and ventral views; *d-f. Tugali colvillensis* Finlay, 1926, holotype, dorsal, lateral and ventral views; *g, h. Anisodiloma lugubris lenior* Finlay, 1926, holotype, apertural and abapertural views; *i, j. Zediloma arida* Finlay, 1926, holotype, apertural and abapertural views. Scale bars 5 mm.

***Zeidora maoria* Powell, 1937**
Powell, A.W.B., 1937, p. 177, pl. 48, figs 9, 10 (holotype).
Holotype: NHM 1962954
Paratype: MA72220, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Zeidora maoria* Powell, 1937 – Spencer *et al.* (2016).

TROCHIDAE

***Anisodiloma lugubris lenior* Finlay, 1926**
Finlay, H.J., 1926a, pp. 353, 354, not figured.
Holotype: MA70034, **Figures 3g, h**, 4 km (2.5 miles) south of Taieri River, Taieri Beach, Otago, New Zealand.
Remarks: The original locality description by Finlay (1926) was given as 'Taieri Beach, 5 miles [11 km] south of Taieri River'. However, the distance is more like 2.5 miles [4 km].
Current name: *Diloma bicanaliculatum* (Dunker *in* Philippi, 1844) – Spencer *et al.* (2016).

†*Antisolarium conominolium* Laws, 1936
Laws, C.R., 1936, p. 102, pl. 15, fig. 50 (holotype).
Holotype: AUG G5835
Paratypes: MA72693, five specimens, from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Current name: *Antisolarium conominolium* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 240.

***Cantharidus opalus cannoni* Powell, 1933**
Powell, A.W.B., 1933b, p. 194, pl. 36, fig. 15 (holotype), fig. 16 (paratype).
Holotype: MA70133, from Kaingaroa Beach, Rēkohu/Chatham Islands, New Zealand.
Paratype: MA71963, collected by A.W.B. Powell and/or C.A. Fleming in February 1933, from Waitangi, Rēkohu/Chatham Islands, New Zealand.
Remarks: For the holotype, MA70133, Powell selected a specimen from the 'Old Museum coll[ection] ex Miss Shand', i.e. a specimen dating to before 1929 when Auckland Museum was located at Princes Street, Auckland.
Current name: *Cantharidus opalus* (Martyn, 1784) – Spencer *et al.* (2016).

†*Conominolia woodsi* Laws, 1933
Laws, C.R., 1933, pp. 320, 321, pl. 32, fig. 31 (holotype), pl. 33, fig. 39 (holotype).
Holotype: MA70198, collected from the Miocene (Altonian) of the Southburn Sandstone, Tengawai River, Sutherlands, South Canterbury, New Zealand.
Current name: *Conominolia woodsi* Laws, 1933 – Maxwell in: Spencer *et al.* (2009: 240).

†*Gibbula sytovae* Amitrov, 1961
Amitrov, O.V., 1961, pp. 37-49, figs 1–4.
Paratype: MA73226, from the Miocene, Ukraine.
Remarks: References are in Russian and taxonomic, geologic and locality data have not been verified for the paratype. The holotype is from the Middle Miocene of Sataniv, Khmelnitsky Region, western Ukraine.
Current name: *Gibbula sytovae* Amitrov, 1961 – unverified.

***Margarella hinemoa* Powell, 1955**
Powell, A.W.B., 1955, pp. 57, 58, pl. 1, fig. 5 (holotype).
Holotype: MA72205, collected by Captain J. Bollons from Antipodes Islands, New Zealand.
Current name: *Cantharidus antipodum* (Hombron & Jacquinot, 1848) – MolluscaBase (2019).

***Margarella puysegurensis* Powell, 1939**
Powell, A.W.B., 1939, p. 228, pl. 49, fig. 13 (holotype).
Holotype: MA70441, collected by A.W.B. Powell, November 1934, from seaweed in rock pools near low water, 'Sealer's Beach', directly east of Puysegur Point, Fiordland, New Zealand.
Paratypes: MA71547, 50 specimens; MA70132, four specimens, all from the type locality.
Current name: *Cantharidus puysegurensis* (Powell, 1939) – MolluscaBase (2019).

***Margarella turneri* Powell, 1939**
Powell, A.W.B., 1939, pp. 227, 228, pl. 49, fig. 12 (holotype).
Holotype: MA70442, collected by A.W.B. Powell in October and November 1934, from seaweed-covered rocks at low tide, Ulva Island, Paterson Inlet, Rakiura/Stewart Island, New Zealand.
Remarks: Powell (1939) mentioned two paratypes, but these are either missing or part of lot MA11271, which consists of 19 specimens collected by Powell at the same time and from the same locality as the holotype specimen.
Current name: *Cantharidus turneri* (Powell, 1939) – MolluscaBase (2019).

***Micrelenchus oliveri* (Iredale, 1915)**
Powell, A.W.B., 1946, pp. 138, 139, pl. 11, fig. 8 (neotype).
Neotype: MA71319, collected from Takapuna Reef, Auckland, New Zealand.
Remarks: Powell (1946) stated that Iredale (1915) proposed the new name *Cantharidus oliveri* for the New Zealand taxon previously referred to as *Cantharidus pupillus*. The latter was a combination created by Hutton (1884, p. 362). He borrowed the species name from an unrelated North American taxon, but did not describe it as a new species. Iredale (1915, p. 438) referred to an interpretation by Suter (1913, p.), but did not nominate a type or type locality. As Powell wished to erect a subspecies of *Micrelenchus oliveri* (Iredale, 1915) he first chose to fix the species name to a unique name-bearing type by selecting a neotype.
Current name: *Micrelenchus sanguineus* (Gray, 1843) – Powell (1979: 57).

***Micrelenchus oliveri cryptus* Powell, 1946**
Powell, A.W.B., 1946, pp. 139, 140, pl. 11, fig. 7 (holotype).
Holotype: MA71040, collected by A.W.B. Powell on 22 January 1928 from beneath *Durvillea* kelp holdfasts, 6 km (4 miles) south of Clarence River, Marlborough, New Zealand.
Paratypes: MA63520, 23 specimens from the type locality.
Current name: *Micrelenchus sanguineus* (Gray, 1843) – Spencer *et al.* (2016).

***Micrelenchus parcipictus* Powell, 1946**
Powell, A.W.B., 1946, p. 138, pl. 11, fig. 1 (holotype).
Holotype: MA71041, collected by A.W.B. Powell, November 1934, from the underside of stones near low water, Sealer's Beach [*sic*], between Otago Retreat and Puysegur Point, Fiordland, New Zealand.
Paratypes: MA71450, nine specimens, from the type locality.
Current name: *Micrelenchus tenebrosus* (A. Adams, 1853) – Spencer *et al.* (2016).

***Micrelenchus sanguineus morioria* Powell, 1933**
Powell, A.W.B., 1933b, p. 194, pl. 36, fig. 10 (holotype), fig. 11 (paratype).
Holotype: MA70471, collected by A.W.B. Powell and/or C.A. Fleming in February 1933 from 18 m (10 fathoms) off Owenga, Rēkohu/Chatham Islands, New Zealand.
Paratypes: MA71531, three specimens, from the type locality.
Current name: *Roseaplagis mortenseni* (Odhner, 1924) – Spencer *et al.* (2016).

†*Pachydontella etiampicta* Marwick, 1948
Marwick, J., 1948, p. 28, pl. 6, figs 1, 6 (holotype).
Holotype: MA71075, collected from the Late Pliocene (Waipipian) of the Kaawa Formation 25–30 m (84–98 ft) below the surface in the Waitemata Brewery well, Otahuhu, Auckland, New Zealand.
Current name: *Pachydontella etiampicta* Marwick, 1948 – Maxwell in: Spencer *et al.* (2009: 240).

***Paraclanculus peccatus* Finlay, 1926**
Finlay, H.J., 1926a, p. 351, pl. 18, fig. 17 (holotype).
Holotype: MA70584, collected by W. La Roche from Tryphena, Aotea/Great Barrier Island, New Zealand.
Current name: *Clanculus* (*Paraclanculus*) *peccatus* (Finlay, 1926) – Spencer *et al.* (2016).

***Photinula decepta* Iredale, 1908**
Finlay, H.J., 1926a, pp. 357, 358, pl. 18, figs 3, 4 (neotype).
Neotype: MA70440, two specimens, from 'kelp roots', Otago Peninsula, New Zealand.
Remarks: This was originally described as *Photinula decepta* Iredale, 1908, and reassigned to *Margarella* Thiele, 1891 by Iredale (1915). Iredale did not figure the species and by 1924 the type appears to have been lost. Finlay (1926) stated that 'since the type of *decepta* has been lost, I here select this figured topotype as neotype of the species'. However, there are two quite different specimens in MA70440, one of which appears to match Finlay's figure 3 and the other his figure 4. As the most conclusive match is with Finlay's figure 4 this specimen is accepted as Finlay's neotype. The other has been registered as MA125877 and integrated into the general Marine Collections.
Current name: *Cantharidus antipodum* (Hombron & Jacquinot, 1848) – Powell (1979: 51); MolluscaBase (2019).

***Talopena sublaevis* Finlay, 1924**
Finlay, H.J., 1924a, p. 520, fig. 3 (holotype).
Holotype: MA70756, from oyster scrapings, Bluff, Southland, New Zealand.
Current name: *Micrelenchus tesselatus* (A. Adams, 1853) – Powell (1979: 57); MolluscaBase (2019).

***Thoristella chathamensis benthicola* Finlay, 1926**
Finlay, H.J., 1926a, p. 350, pl. 18, figs 7–10 (holotype).
Holotype: MA70764, dredged from 110 m (60 fathoms) off Taiaroa Head [Otago Heads], Otago, New Zealand.
Paratype: MA72521, a single specimen, from the type locality.
Current name: *Coelotrochus chathamensis* (Hutton, 1873) – Powell (1979: 59); Spencer *et al.* (2016).

***Thoristella chathamensis cookiana* Powell, 1934**
Powell, A.W.B., 1934a, pp. 154, 155, pl. 2, figs 10, 11 (holotype).
Holotype: MA70765, collected by A.W.B Powell from beneath stones at low tide, on 26 January 1927 from Island Bay, Wellington, New Zealand.
Current name: *Coelotrochus chathamensis* (Hutton, 1873) – Spencer *et al.* (2016).

†*Thoristella chathamensis fossilis* Finlay, 1926
Finlay, H.J., 1926a, pp. 350, 351, pl. 18, figs 11–14 (holotype).
Holotype: MA70766, collected from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Glen Creek, Oamaru, Otago, New Zealand.
Paratypes: MA72522, one specimen; MA72523, nine specimens, all from the type locality.
Current name: *Coelotrochus fossilis* (Finlay, 1926) – Maxwell in: Spencer *et al.* (2009: 240).

***Trochus camelophorus* Webster, 1906**
Webster, W.H., 1906, p. 309, figs 1, 1a.
Holotype: MA70776, collected from Cape Maria van Diemen, Northland, New Zealand.
Paratype: MA72916, from the type locality.
Current name: *Trochus* (*Camelotrochus*) *camelophorus* Webster, 1906 – Spencer *et al.* (2016).

***Trochus carmesinus* Webster, 1908**
Webster, W.H., 1908, p. 256, pl. 10, figs 16–18.
Holotype: MA70777*, Russell, Bay of Islands, New Zealand.

* this specimen has not been sighted since at least 1993, and there is an older note in A.W.B. Powell's hand that the holotype specimen was lost.
Current name: *Coelotrochus carmesinus* (Webster, 1908) – Spencer *et al.* (2016).

***Trochus* (*Clanculus*) *takapunaensis* Webster, 1906**
Webster, W.H., 1906, pp. 309, 310, figs 2, 2a.
Holotype: MA70778, from shell sand, from Takapuna Beach, Auckland, New Zealand.
Current name: *Clanculus* (*Paraclanculus*) *peccatus* (Finlay, 1926) – Powell (1979: 60).

***Zediloma arida* Finlay, 1926**
Finlay, H.J., 1926a, p. 353, not figured.
Holotype: MA70869, **Figure 3**, collected from Lyttelton, Banks Peninsula, New Zealand.
Remarks: Suter (1913, p.114) described and figured a specimen from Lyttelton as *Monodonta coracina* (Troschel, 1851). Finlay disagreed with the identification and erected the new species *Zediloma arida* for "the species described and figured by Suter". He did not provide a new type description, refering to Suter's instead. As Finlay had been informed by several people, including J. Marwick, that the original figured specimen was no longer recognisable within Suter's collection, he chose as name-bearing type for *Zediloma arida* a specimen from his own collection. He called this a neotype, but as Suter's specimen was never a designated name-bearing type in the first place, Finlay's specimen must stand as the holotype of *Zediloma arida* rather than the neotype.
Current name: *Diloma aridum* (Finlay, 1926) – Spencer *et al.* (2016).

***Zediloma digna* Finlay, 1926**
Finlay, H.J., 1926a, p. 352, figs 24, 25 (holotype).
Holotype: MA70870, collected from St Clair, Dunedin, New Zealand.
Paratype: MA73089, from the type locality.
Current name: *Diloma nigerrimum* (Gmelin, 1791) – Powell (1979: 53); Spencer *et al.* (2016).

***Zediloma* (*Fractermilla*) *corrosa zebrina* Powell, 1946**
Powell, A.W.B., 1946, p. 137, pl. 11, fig. 4 (paratype), fig. 5 (holotype).
Holotype: MA71156, collected by A.W.B. Powell in November 1934 from rocks scattered on an intertidal mud-flat, Beach Harbour, Breaksea Sound, Fiordland, New Zealand.
Paratype: MA71449, from the type locality.
Current name: *Diloma subrostratum* (Gray, 1835) – Spencer *et al.* (2016).

SOLARIELLIDAE

***Solariella kempi* Powell, 1951**
Powell, A.W.B., 1951, pp. 102, 103, pl. 5, fig. 6 (holotype); fig. G 11.
Holotype: NHM 1961367
Paratypes: MA71930, four specimens, collected by the crew of the R.R.S. William Scoresby on 18 October 1931, from the type locality, station WS766, in 545 m west of the Falkland Islands, British Overseas Territory.
Current name: *Solariella kempi* Powell, 1951 – MolluscaBase (2019).

***Zeminolia benthicola* Powell, 1937**
Powell, A.W.B., 1937, p. 180, pl. 51, fig. 4 (holotype).
Holotype: NHM 1962963
Paratype: MA72224, collected by A.W.B. Powell on 17 August 1932 from station 934, R.R.S. Discovery II cruise, in 92 m off Manawatāwhi/Three Kings Islands, New Zealand.
Remarks: The holotype was collected from station 933.
Current name: *Solariella benthicola* (Powell, 1937) – Spencer *et al.* (2016).

†*Zeminolia carinata* Laws, 1935
Laws, C.R., 1935, p. 31, pl. 5, fig. 3 (holotype).
Holotype: MA70880, collected from the Early Miocene (Altonian), Mount Harris Formation, Awamoa Creek, Oamaru, Otago, New Zealand.
Current name: *Solariella carinata* (Laws, 1935) – Maxwell in: Spencer *et al.* (2009: 240).

†*Zeminolia fossa* Laws, 1932
Laws, C.R., 1932, pp. 185, 186, pl. 26, figs 1–3 (holotype).
Holotype: MA70881, collected by C.R. Laws from Late Oligocene (Duntroonian) Wharekuri Greensand on the true left bank Waitaki River about 1.6 km (1 mile) below Wharekuri, Otago, New Zealand.
Paratype: MA72735, juvenile specimen from the type locality.
Remarks: The type locality is now submerged below Lake Waitaki.
Current name: *Solariella fossa* (Laws, 1932) – Maxwell in: Spencer *et al.* (2009: 240).

***Zeminolia luteola* Powell, 1937**
Powell, A.W.B., 1937, p. 179, pl. 51, figs 1, 2 (holotype).
Holotype: NHM 1962961
Paratypes: MA72222, two specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Solariella luteola* (Powell, 1937) – Spencer *et al.* (2016).

***Zeminolia tryphenensis* Powell, 1930**
Powell, A.W.B., 1930a, pp. 534–536, pl. 62, figs 16–18 (holotype).
Holotype: MA72175, dredged by W. La Roche in 1924 from 11 m (6 fathoms) at Tryphena, Aotea/Great Barrier Island, New Zealand.
Paratype: MA71393, from the type locality.
Current name: *Solariella tryphenensis* (Powell, 1930) – Spencer *et al.* (2016).

***Zeminolia vera* Powell, 1937**
Powell, A.W.B., 1937, pp. 179, 180, pl. 51, fig. 3 (holotype).

Holotype: NHM 1962962
Paratypes: MA72223, three specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Solariella vera* (Powell, 1937) – Spencer *et al.* (2016).

TROCHACLIDIDAE

***Cirsonella simplex* Powell, 1937**
Powell, A.W.B., 1937, p. 185, pl. 50, fig. 12 (holotype).
Holotype: NHM 1962977
Paratype: MA72235, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Acremodontina simplex* (Powell, 1937) – Spencer *et al.* (2016).

***Conjectura atypica* Powell, 1937**
Powell, A.W.B., 1937, p. 187, pl. 51, figs 10, 11 (holotype).
Holotype: NHM 1962985
Paratypes: MA72241, nine specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Acremodontina atypica* (Powell, 1937) – Spencer *et al.* (2016).

***Conjectura carinata* Powell, 1940**
Powell, A.W.B., 1940, p. 223, pl. 28, fig. 8.
Holotype: MA72052, collected from 91 m (50 fathoms), between Spirits Bay and Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Acremodontina carinata* (Powell, 1940) – Spencer *et al.* (2016).

***Conjectura poutama* Smith, 1962**
Smith, E.C., 1962, p. 50, figs 1, 1a (holotype).
Holotype: MONZ M.020251
Paratypes: MA72960, 21 specimens, collected by E. C. Smith from 55 m (30 fathoms), off Poutama Island, Rakiura/Stewart Island, New Zealand.
Current name: *Acremodontina poutama* (Smith, 1962) – Spencer *et al.* (2016).

***Thoristella crassicosta* Powell, 1937**
Powell, A.W.B., 1937, pp. 178, 179, pl. 49, figs 14, 15 (holotype).
Holotype: NHM 1961659
Paratypes: MA71895, four specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Acremodonta crassicosta* (Powell, 1937) – Spencer *et al.* (2016).

CALLIOSTOMATIDAE

†*Calliostoma cancellatum* Finlay, 1923
Finlay, H.J., 1923, pp. 102, 103, pl. 10, fig. 3.
Holotype: MA70128, presumed to have been collected from the Early Miocene (Altonian) of the Mount Harris Formation, near Ardgowan, northwest of Oamaru, New Zealand.
Current name: *Fautor temporemutatus* (Finlay, 1924) – MolluscaBase (2019).

***Calliostoma osbornei* Powell, 1926**
Powell, A.W.B., 1926a, pp. 591, 592, pl. 103, fig. 1 (paratype), fig. 2 (holotype).
Holotype: MA72037, collected by Mr C. Osborne in 1923–1924 from 49 m (27 fathoms) off Cape Barrier, Aotea/Great Barrier Island, New Zealand.
Paratypes: MA71406; MA73092, may have been collected from the stomachs of snapper, from the type locality.
Current name: *Maurea osbornei* (Powell, 1926) – Spencer *et al.* (2016).

†*Calliostoma suteri* Finlay, 1923
Finlay, H.J., 1923, pp. 101, 102, pl. 10, figs 1 a–c.
Holotype: MA70129, from the Early Miocene (Altonian) of the Mount Harris Formation near Ardgowan, northwest of Oamaru, New Zealand.
Paratypes: MA72517, three partial specimens, collected from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Glen Creek, Oamaru, Otago, New Zealand.
Current name: *Maurea suteri* Finlay, 1923 – Maxwell in: Spencer *et al.* (2009: 240).

†*Calliostoma suteri fragile* Finlay, 1923
Finlay, H.J., 1923, p. 101, pl. 10, figs 2 a–c.
Holotype: MA70130, from the Early Miocene (Altonian) of the Mount Harris Formation near Ardgowan, northwest of Oamaru, New Zealand.
Paratypes: MA72439, 18 specimens and fragments; MA72518, two specimens, all from the type locality.
Current name: *Maurea fragilis* Finlay, 1923 – Maxwell in: Spencer *et al.* (2009: 240).

***Margarella bouvetia* Powell, 1951**
Powell, A.W.B., 1951, pp. 97, 98, pl. 5, fig. 3 (holotype).
Holotype: NHM 1961349
Paratypes: MA73186, 15 specimens, collected on 18 October 1930, from the type locality, station 456, R.R.S. Discovery II Investigations, in 40–45 m, 1.6 km (1 mile) east of Bouvet Island, South Atlantic Ocean, Norway.
Current name: *Margarella bouvetia* Powell, 1951 – MolluscaBase (2019).

***Margarella jason* Powell, 1951**
Powell, A.W.B., 1951, p. 97, pl. 5, fig. 1 (holotype).
Holotype: NHM 1961348
Paratypes: MA72387, two specimens, collected on 6

April 1926, from the type locality, station 45, R.R.S. Discovery Investigation, in 238–270 m, off Cumberland Bay, South Georgia, British Overseas Territory.
Current name: *Margarella jason* Powell, 1951 – MolluscaBase (2019).

***Margarella porcellana* Powell, 1951**
Powell, A.W.B., 1951, p. 98, pl. 5, fig. 2 (holotype).
Holotype: NHM 1961352
Paratype: MA71928, specimen collected in April 1935, from the type locality, station 1562, R.R.S. Discovery Investigation, in 97–104 m, off Marion Island, Prince Edward Islands, South Africa.
Current name: *Margarella porcellana* Powell, 1951 – MolluscaBase (2019).

***Maurea pellucida morioria* Powell, 1946**
Powell, A.W.B., 1946, p. 140, pl. 11, fig. 3 (holotype).
Holotype: MA71037, collected by A.W.B. Powell in 1937(?) from Owenga Beach, Rēkohu/Chatham Islands, New Zealand.
Remarks: According to Powell (1946) there are paratypes at AM, but the only other Rēkohu/Chatham Island specimens in the AM Collections which belong to this taxon have no collector and date recorded. There is doubt about the collecting date of the holotype specimen. Powell (1946) has it as 1937 in the type description, but his only known Rēkohu/Chatham Island trip was for three weeks in February 1933.
Current name: *Maurea waikanae* (Oliver, 1926) – Spencer *et al.* (2016).

***Maurea turnerarum* Powell, 1964**
Powell, A.W.B., 1964, pp. 11, 12, pl. 3, figs 1–3 (holotype).
Holotype: MA71239, collected from 366 m (299 fathoms), off Tuhua/Mayor Island, New Zealand.
Current name: *Maurea turnerarum* Powell, 1964 – Spencer *et al.* (2016).

†*Maurea* (*Mucrinops*) *granti* Powell, 1931
Powell, A.W.B., 1931a, pp. 97, 98, pl. 13, figs 34, 35 (holoype).
Holotype: MA70449, collected by A.W.B. Powell during an Auckland Museum fieldtrip in January 1931 from Late Pliocene (Waipipian) Tangahoe Formation near the mouth of Waihi Stream, Hawera, New Zealand.
Current name: *Maurea granti* Powell, 1931 –Spencer *et al.* (2016).

***Maurea* (*Mucrinops*) *punctulata ampla* Powell, 1939**
Powell, A.W.B., 1939, p. 229, pl. 50, fig. 6 (holotype).
Holotype: MA70450, collected from Mason Bay, Rakiura/Stewart Island, New Zealand.
Paratypes: MA71548, four specimens, from the type locality.
Current name: *Maurea punctulata* (Martyn, 1784) – Powell (1979: 62); Spencer *et al.* (2016).

†*Maurea* (*Mucrinops*) *waiareka* Laws, 1935
Laws, C.R., 1935, p. 32, pl. 5, fig. 5 (holotype).
Holotype: MA70451, Late Eocene (Kaiatan), Waiareka Volcanics, Whitstone [Lorne], Otago, New Zealand.
Current name: *Maurea waiareka* (Laws, 1935) – Maxwell in: Spencer *et al.* (2009: 240).

†*Modelia nukumaruensis* Laws, 1930
Laws, C.R., 1930, pp. 550, 551, pl. 90, fig. 8 (holotype).
Holotype: MA70483, collected from the Early Pleistocene (Nukumaruan) at Nukumaru, Taranaki, New Zealand.
Remarks: Possibly the Nukumaru Brown Sand, from the Early Pleistocene coastal section 7 km south east of Waiinu Beach, near the site of the former 'Nukumaru boat-landing', Manawatu-Whanganui.
Current name: *Maurea nukumaruensis* (Laws, 1930) – Maxwell in: Spencer *et al.* (2009: 240).

***Photinastoma taeniata nivea* Cooper & Preston, 1910**
Cooper, J.E. & H.B. Preston, 1910, pp. 112, not figured.
Paratypes: MA72775, two specimens, Falkland Islands, British Overseas Territory.
Current name: *Photinastoma taeniatum* (G.B. Sowerby I, 1825) – *Malacolog* Version 4.1.1

***Venustas blacki* Powell, 1950**
Powell, A.W.B., 1950, pp. 80, 81, pl. 7, figs 3, 4 (holotype).
Holotype: MA71168, collected by Captain A. Black from 91 m–128 m (50–60 fathoms) on the continental shelf, from the Nuggets north to the mouth of the Waitaki River, Otago, New Zealand.
Paratype: MA71454, from the type locality.
Current name: *Maurea blacki* (Powell, 1950) – Spencer *et al.* (2016).

***Venustas cunninghami regifica* Finlay, 1927**
Finlay, H.J., 1927, p. 485, pl.24, fig. 9 (paratype), fig. 10 (holotype).
Holotype: MA70823, collected from 55 m (30 fathoms) off Taiaroa Head [Otago Heads], New Zealand.
Paratype: MA72550; MA72873, four specimens, all from the type locality.
Current name: *Maurea selecta* (Dillwyn, 1817) – Powell (1979: 61, 62); Spencer *et al.* (2016).

***Venustas punctulata multigemmata* Powell, 1952**
Powell, A.W.B., 1952, p. 173, 174, pl. 35, figs 2, 3.
Holotype: MA71185, trawled by Captain J. Black from 55–128 m (30–70 fathoms), off eastern Otago, New Zealand.
Paratype: MA71439, from the type locality.
Current name: *Maurea granti* Powell, 1931 – Spencer *et al.* (2016).

***Venustas punctulata urbanior* Finlay 1926**
Finlay, H.J., 1926a, pp. 361, 362, pl. 18, fig. 27 (holotype).
Holotype: MA70824, collected with oyster dredge, from 36 m (20 fathoms), Foveaux Strait, New Zealand.

Paratype: MA72524, from the type locality.
Remarks: As *Venustas punctulata urbanior* in the text and as *Venustas (Mucrinops) urbanior* in the figure caption.
Current name: *Maurea punctulata* (Martyn, 1784) – Spencer *et al.* (2016).

***Venustas tigris chathamensis* Dell, 1950**
Dell, R.K., 1950, pp. 43, 45, figs 26, 27 (holotype).
Holotype: MONZ M.002128
Paratype: MA72771, collected by C.J. Lindsay in January 1924, from Mangere Island, Chatham Islands, New Zealand.
Current name: *Maurea tigris* (Gmelin, 1791) – Spencer *et al.* (2016).

***Venustatrochus georgianus* Powell, 1951**
Powell, A.W.B., 1951, pp. 92, 93, pl. 10, fig. 68 (holotype).
Holotype: NHM 1961307
Paratype: MA72386, collected on 1 April 1926, from the type locality, station 42, R.R.S. Discovery Investigation, in 120–204 m, off the mouth of Cumberland Bay, South Georgia, British Overseas Territory.
Current name: *Venustatrochus georgianus* Powell, 1951 – MolluscaBase (2019).

LIOTIIDAE

***Liotina tryphenensis* Powell, 1926**
Powell, A.W.B., 1926a, pp. 592, 593, figs 4–6.
Holotype: MA72080, collected by A.W.B. Powell in January 1924 from beneath stones at low water, from Tryphena, Aotea/Great Barrier Island, New Zealand.
Paratype: MA71407, from the type locality.
Current name: *Munditia tryphenensis* (Powell, 1926) – Spencer *et al.* (2016).

***Munditia anomala* Powell, 1940**
Powell, A.W.B., 1940, pp. 219, 220, pl. 28, figs 16, 17 (holotype).
Holotype: MA72098, collected from shell sand, Tom Bowling Bay, Northland, New Zealand.
Current name: *Munditia anomala* Powell, 1940 – Spencer *et al.* (2016).

***Munditia aupouria* Powell, 1937**
Powell, A.W.B., 1937, p. 181, pl. 50, figs 3, 4 (holotype).
Holotype: NHM 1962965
Paratypes: MA71912, six specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Paratypes: MA72225, 14 specimens, collected by A.W.B. Powell on 17 August 1932 from station 934, R.R.S. Discovery II cruise, in 92 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Munditia aupouria* Powell, 1937 – Spencer *et al.* (2016).

***Munditia delicatula* Powell, 1940**
Powell, A.W.B., 1940, p. 219, pl. 28, figs 1, 2 (holotype).
Holotype: MA70491, collected from 91 m (50 fathoms), between Spirits Bay and Manawatāwhi/Three Kings Islands, New Zealand.
Remarks: Specimen badly damaged by glass disease.
Current name: *Munditia delicatula* Powell, 1940 – Spencer *et al.* (2016).

***Munditia echinata* Powell, 1937**
Powell, A.W.B., 1937, p. 181, pl. 50, figs 5, 6 (holotype).
Holotype: NHM 1962966
Paratype: MA72226, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Munditia echinata* Powell, 1937 – Spencer *et al.* (2016).

***Munditia manawatawhia* Powell, 1937**
Powell, A.W.B., 1937, pp. 181, 182, pl. 50, figs 1, 2 (holotype).
Holotype: NHM 1962967
Paratypes: MA72227, four specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Munditia manawatawhia* Powell, 1937 – Spencer *et al.* (2016).

***Munditia owengaensis* Powell, 1933**
Powell, A.W.B., 1933b, p. 195, pl. 33, figs 9, 10.
Holotype: MA70492, collected by A.W.B. Powell and/or C.A. Fleming in February 1933, from 18 m (10 fathoms) off Owenga Beach, Rēkohu/Chatham Islands, New Zealand.
Remarks: Specimen damaged by glass disease.
Current name: *Munditia owengaensis* Powell, 1933 – Spencer *et al.* (2016).

†*Munditia proavita* Laws, 1936
Laws, C.R., 1936, pp. 102, 103, pl. 15, figs 49, 51 (holotype).
Holotype: MA70493, the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Paratypes: MA72694, two specimens, from the type locality.
Current name: *Munditia proavita* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 240).

TURBINIDAE

†*Astraea stirps* Laws, 1932
Laws, C.R., 1932, pp. 186, 187, pl. 26, figs 4, 7 (holotype), pl. 27, fig. 11 (holotype).
Holotype: MA70049, collected by F.J. Turner in 1930 from the Middle Miocene (Lillburnian) of the Park Bluff Sandstone [bed B] on the true left bank of the Waiau River, Clifden, Southland, New Zealand Southland.
Current name: *Astraea stirps* Laws, 1932 – Maxwell in: Spencer *et al.* (2009: 240).

***Astralium pyramidale* Webster, 1905**
Webster, W.H., 1905, pp. 276, 277, fig. 2a.
Holotype: MA70050, collected from Takapuna Beach, Auckland, New Zealand.
Current name: *Cookia sulcata* (Lightfoot, 1786) – Powell (1979: 67); Spencer *et al.* (2016).

†*Cookia kawauensis* Powell, 1938
Powell, A.W.B., 1938a, p. 378, pl. 39, fig. 15 (holotype).
Holotype: MA72053, collected in 1927 by A.W.B. Powell from the Early Miocene (Otaian) Bostaquet Member of the Cape Rodney Formation on the east side of Bostaquet Bay, Kawau Island, New Zealand.
Current name: *Cookia kawauensis* Powell, 1938 – Maxwell in: Spencer *et al.* (2009: 240).

***Tropidomarga biangulata* Powell, 1951**
Powell, A.W.B., 1951, pp. 101–102, pl. 5, fig. 5 (holotype).
Holotype: Powell, 1951 states type was lodged with NHM, but no record found through NHM Data Portal.
Paratype: MA71929, collected on 21 January 1927, from the type locality, station 159, R.R.S. Discovery Investigation, in 160 m, north east of Cumberland Bay, South Georgia, British Overseas Territory.
Current name: *Tropidomarga biangulata* Powell, 1951 – MolluscaBase (2019).

†*Turbo castaneus tiara* M. Smith, 1937
Smith, M., 1937, p. 66, pl. 6, fig. 9.
Holotype: Smith (1937) stated that the type is to be placed with the Museum of Comparitive Zoology. A search of this Museum's Online database did not locate a type.
Paratype: MA73224, collected from the Pliocene, Clewiston, Florida, United States of America.
Remarks: No further peer-reviewed references were found for this taxon.
Current name: unverified

***Turbo* (*Lunella*) *radina* Webster, 1905**
Webster, W.H., 1905, p. 276, figs 1, a, b.
Holotype: MA70785, Takapuna, Auckland, New Zealand.
Paratype: MA71585, from the type locality.
Current name: *Lunella smaragda* (Gmelin, 1791) – Powell (1979: 66, 67); Spencer *et al.* (2016).

CONRADIIDAE

***Crossea cuvieriana* Mestayer, 1919**
Mestayer, M., 1919, pp. 132, 133, pl. 8, fig. 10
Holotype: MONZ M.001069
Paratypes: MA72914, one specimen; MA73199, one specimen, collected from the type locality by Captain J. Bollons in 1914, from 69–73 m (38–40 fathoms), off Repanga/Cuvier Island, New Zealand.
Current name: *Crosseola cuvieriana* (Mestayer, 1919) – Spencer *et al.* (2016).

***Crosseola errata* Finlay, 1926**
Finlay, H.J., 1926a, pp. 402, 403, pl. 19, fig. 33 (holotype).
Holotype: MA70219, dredged from 22 m (12 fathoms), from Rangaunu [Awanui] Bay, Northland, New Zealand.
Current name: *Crosseola errata* Finlay, 1926 – Spencer *et al.* (2016).

***Crosseola favosa* Powell, 1937**
Powell, A.W.B., 1937, pp. 186, 187, pl. 51, fig. 13 (holotype).
Holotype: NHM 1962983
Paratypes: MA72239, ten specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Crosseola favosa* Powell, 1937 – Spencer *et al.* (2016).

***Crosseola intertexta* Powell, 1937**
Powell, A.W.B., 1937, p. 187, pl. 51, fig.12 (holotype).
Holotype: NHM 1962984
Paratypes: MA72240, two specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Crosseola intertexta* Powell, 1937 – Spencer *et al.* (2016).

†*Crosseola munditia* Laws, 1936
Laws, C.R., 1936, p. 104, pl. 16, fig. 57 (holotype).
Holotype: MA70220, the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Remarks: Affected by glass disease.
Current name: *Crosseola munditia* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 240).

†*Crosseola proerrata* Finlay, 1930
Finlay, H.J., 1930b, pp. 54, 55, pl. 1, fig. 11 (holotype), fig. 12 (paratype).
Holotype: MA70221, collected from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Glen Creek, Oamaru, Otago, New Zealand.
Paratype: MA72444, from the type locality.
Current name: *Crosseola proerrata* Finlay, 1930 – Maxwell in: Spencer *et al.* (2009: 240).

†*Crosseola sultan* Finlay, 1930
Finlay, H.J., 1930b, p. 55, pl. 1, fig. 6 (holotype).
Holotype: MA70222, collected from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Glen Creek, Oamaru, Otago, New Zealand.
Current name: *Crosseola sultan* Finlay, 1930 – Maxwell in: Spencer *et al.* (2009: 240).

†*Crosseola tenuisculpta* Laws, 1936
Laws, C.R.,1936, pp. 104, 105, pl. 15, figs 30a, 30b, (holotype).
Holotype: MA70223, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek,

south of Port Waikato, Waikato, New Zealand.
Current name: *Crosseola tenuisculpta* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 240).

SKENEIDAE

***†Cirsonella aedicula* Laws, 1936**
Laws, C.R., 1936, p. 104, pl. 15, figs 53, 54 (holotype).
Holotype: MA70171, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Paratypes: MA72696, three specimens, from the type locality.
Current name: *Cirsonella aedicula* Laws, 1936 – Maxwell in: Spencer *et al.* (2009: 240).

***Cirsonella consobrina* Powell, 1930**
Powell, A.W.B., 1930a, p. 534, pl. 61, figs 13, 14 (holotype).
Holotype: MA70172, dredged by W. La Roche in 1922 from 11 m (6 fathoms) near Mangonui Heads [*sic*], Doubtless Bay, New Zealand.
Paratypes: MA71392, ten specimens, from the type locality.
Remarks: Holotype badly affected by glass disease
Current name: *Cirsonella consobrina* Powell, 1930 – Spencer *et al.* (2016).

***Cirsonella laxa* Powell, 1937**
Powell, A.W.B., 1937, p. 184, pl. 50, figs 8, 9 (holotype).
Holotype: NHM 1962975
Paratypes: MA72233, two specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Cirsonella laxa* Powell, 1937 – Spencer *et al.* (2016).

***Cirsonella paradoxa* Powell, 1937**
Powell, A.W.B., 1937, pp. 183, 184, pl. 50, figs 15, 16 (holotype).
Holotype: NHM 1962973
Paratypes: MA72231, eight specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Paradoxa paradoxa* Powell, 1937 – Spencer *et al.* (2016).

***Cirsonella parvula* Powell, 1926**
Powell, A.W.B., 1926b, pp. 45, 46, pl. 5, figs 6, 7.
Holotype: CM M5217
Paratypes: MA72336, two specimens, collected by the New Zealand Government Trawling Expedition ('Nora Niven' Expedition) in 1907, from 183 m (100 fathoms) at 'Dredge Station C' 97 km (60 miles) east of Lyttelton, New Zealand.
Current name: *Cirsonella parvula* Powell, 1926 – Spencer *et al.* (2016).

***Cirsonella pisiformis* Powell, 1937**
Powell, A.W.B., 1937, p. 184, pl. 50, figs 13, 14 (holotype).
Holotype: NHM 1962974
Paratypes: MA72232, 31 specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Cirsonella pisiformis* Powell, 1937 – Spencer *et al.* (2016).

***Cirsonella variecostata* Powell, 1940**
Powell, A.W.B., 1940, pp. 220, 221, pl. 28, figs 9, 10.
Holotype: MA70173, off Manawatāwhi/Three Kings Islands, New Zealand.
Remarks: Specimen damaged by glass disease.
Current name: *Cirsonella variecostata* Powell, 1940 – Spencer *et al.* (2016).

***Cirsonella waikukuensis* Powell, 1937**
Powell, A.W.B., 1937, pp. 184, 185, pl. 50, figs 10, 11 (holotype).
Holotype: NHM 1962976
Paratypes: MA72234, 14 specimens, collected by A.W.B. Powell on 16 August 1932 from the type locality, station 930, R.R.S. Discovery II cruise, in 29 m off Waikuku Beach, Northland, New Zealand.
Current name: *Cirsonella waikukuensis* Powell, 1937 – Spencer *et al.* (2016).

***Crosseola cookiana* Dell, 1952**
Dell, R.K., 1952a, pp. 415, 416, pl. 85, fig. 4 (holotype).
Holotype: MONZ M.005502
Paratype: MA72765, collected by GS Matai on 6 Nov 1936 from 104 m, Mernoo Bank, Chatham Rise, New Zealand.
Current name: *Lodderia eumorpha cookiana* (Dell, 1952) – Spencer *et al.* (2016).

***Liotella aupouria* Powell, 1937**
Powell, A.W.B., 1937, p. 182, pl. 51, fig. 9 (holotype).
Holotype: NHM 1962968
Paratype: MA72228, a single specimen, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Liotella aupouria* Powell, 1937 – Spencer *et al.* (2016).

***Liotella rotuloides* Powell, 1937**
Powell, A.W.B., 1937, pp. 182, 183, pl. 51, fig. 8 (holotype).
Holotype: NHM 1961643
Paratypes: MA72229, 50 specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Liotella rotula* (Suter, 1908) – Powell (1979: 79); Spencer *et al.* (2016).

***Lodderena formosa* Powell, 1930**
Powell, A.W.B., 1930b, p. 541, pl. 87, figs 11, 12 (holotype).
Holotype: MA70420, collected by W. La Roche in 1922 from 11–18 m (6–10 fathoms), off 'Mangonui Heads', Doubtless Bay, New Zealand.
Current name: *Lodderena formosa* Powell, 1930 – Spencer *et al.* (2016).

***Lodderena nana* Powell, 1930**
Powell, A.W.B., 1930b, pp. 541, 542, pl. 87, figs 13, 14 (holotype).
Holotype: MA70421, collected by W. La Roche in 1922 from 11–18 m (6–10 fathoms), off 'Mangonui Heads' Doubtless Bay, New Zealand.
Current name: *Lodderena nana nana* Powell, 1930 – Spencer *et al.* (2016).

***Lodderia iota* Powell, 1940**
Powell, A.W.B., 1940, p. 220, pl. 28, fig. 6.
Holotype: MA70418, collected by W. La Roche from 22 m (12 fathoms), off Awanui River mouth [Awanui Heads], Rangaunu Bay, Northland, New Zealand.
Paratypes: MA71551, 21 specimens, from the type locality.
Remarks: Holotype destroyed by glass disease.
Current name: *Lodderia iota* Powell, 1940 – Spencer *et al.* (2016).

***Lodderia waitemata* Powell, 1940**
Powell, A.W.B., 1940, p. 220, pl. 28, fig. 7.
Holotype: MA70419, collected by C.A. Fleming on 19 July 1931, from seaweed washings, Takapuna Beach, Auckland, New Zealand.
Paratypes: MA71552, one specimen, from the type locality.
Remarks: Holotype destroyed by glassdisease.
Current name: *Lodderia waitemata* Powell, 1940 – Spencer *et al.* (2016).

***Starkeyna maoria* Powell, 1937**
Powell, A.W.B., 1937, p. 185, pl. 49, figs 10, 11 (holotype).
Holotype: NHM 1961669
Paratypes: MA71896, two specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Cirsonella maoria* (Powell, 1937) – Powell (1979: 70); Spencer *et al.* (2016).

***Tasmocrossea benthicola* Dell, 1952**
Dell, R.K., 1952b, p. 105, fig. 2 (holotype).
Holotype: MONZ M.005559
Paratypes: MA72769, two specimens, collected from the type locality by the R.S.S. Discovery II on 24 October 1950 from 536 m, Lord Howe Rise, Tasman Sea.
Remarks: Specimens were probably incomplete when collected and have been further affected by glass disease.
Current name: *Tasmocrossea benthicola* Dell, 1952 – Spencer *et al.* (2016).

***Zalipais benthicola* Powell, 1927**
Powell, A.W.B., 1927, pp. 115, 116, pl. 21, fig. 12.
Holotype: CM M5377
Paratypes: MA72341, two specimens, collected by Prof. R. Speight in December 1908, from 311 m (170 fathoms) off Puysegur Point, Fiordland, New Zealand.
Current name: *Zalipais benthicola* Powell, 1927 – Spencer *et al.* (2016).

***Zalipais turneri* Powell, 1939**
Powell, A.W.B., 1939, p. 230, pl. 49, fig. 11 (holotype).
Holotype: MA70857, collected by A.W.B. Powell in October/November 1934 from seaweeds, Ocean Beach, Rakiura/Stewart Island, New Zealand.
Remarks: Material described by Powell (1939) came from Mrs R.H. Harrison, Augustus Hamilton and a field trip that Powell undertook in Oct/Nov1934, which was hosted by Captain G.M. Turner. However, provenance often cannot be determined from the labels or Powell (1939). Given that this species was named after Captain Turner, it is assumed the specimen was collected by Powell on his 1934 trip.
Current name: *Zalipais turneri* Powell, 1939 – MolluscaBase (2019).

COLLONIIDAE

†*Argalista impervia* Finlay, 1930
Finlay, H.J., 1930b, p. 57, not figured.
Holotype: MA70040, **Figures 2e, f**, collected from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Glen Creek, Oamaru, Otago, New Zealand.
Paratypes: MA72449, 74 specimens, from the type locality.
Current name: *Eutinochilus impervius* (Finlay, 1930) – MolluscaBase (2019).

†*Argalista kaiparaensis* Finlay, 1930
Finlay, H.J., 1930b, pp. 56, 57, not figured.
Holotype: MA70041, **Figure 2g**, collected from Early Miocene (Late Otaian–Altonian) Pakaurangi Formation, Pakaurangi Point, Hukatere Peninsula, New Zealand.
Current name: *Argalista kaiparaensis* Finlay, 1930 – Beu & Raine (2009).

†*Argalista kingi* Powell, 1938
Powell, A.W.B., 1938c, p. 162, text figs 1, 2.
Holotype: MA70042, collected by A.W.B. Powell in 1924 from Early Pleistocene (Nukumaruan) Castlepoint Formation, Lighthouse Reef, Castle Point, Wairarapa, New Zealand.
Paratypes: MA71902, four specimens, from the type locality.
Current name: *Argalista kingi* Powell, 1938 – MolluscaBase (2019).

†*Argalista leniumbilicata* Laws, 1935
Laws, C.R., 1935, p. 33, not figured.
Holotype: MA70043, **Figures 2h**, **i**, collected from the

Late Eocene (Runangan) Totara Limestone at Trig M, Totara, Oamaru, New Zealand.
Paratypes: MA72676, four specimens, from the type locality.
Current name: *Argalista leniumbilicata* Laws, 1935 – MolluscaBase (2019).

***Argalista nana* Finlay, 1930**
Finlay, H.J., 1930a, p. 223, not figured.
Holotype: MA70044, **Figures 2j**, **k**, collected by W. La Roche, from 22 m (12 fathoms), Rangaunu [Awanui] Bay, Northland, New Zealand.
Paratype: MA72573, 12 specimens, from the type locality.
Current name: *Argalista nana* Finlay, 1930 – Spencer *et al.* (2016).

†*Argalista proimpervia* Laws, 1935
Laws, C.R., 1935, pp. 32, 33, pl. 5, fig. 6 (holotype).
Holotype: MA70045, collected from the Late Eocene (Runangan) Totara Limestone at Trig M, Totara, Oamaru, New Zealand.
Paratypes: MA72675, four specimens, from the type locality.
Current name:*Eutinochilus proimpervius* (Laws, 1935) – MolluscaBase (2019).

†*Argalista promicans* Laws, 1936
Laws, C.R., 1936, p. 105, pl. 16, figs 56, 58 (holotype).
Holotype: MA70046, the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Current name: *Argalista promicans* Laws, 1936 – MolluscaBase (2019).

†*Argalista proumbilicata* Finlay, 1930
Finlay, H.J., 1930b, p. 56, pl. 2, figs 20, 21 (holotype), fig. 22 (paratype).
Holotype: MA70047, collected from Early Miocene (Altonian) Target Gully Shellbed, Mount Harris Formation, Glen Creek, Oamaru, Otago, New Zealand.
Paratype: MA72447, one specimen; MA72448, 17 specimens; all from the type locality.
Current name: *Argalista proumbilicata* Finlay, 1930 – MolluscaBase (2019).

***Argalista rotella* Powell, 1937**
Powell, A.W.B., 1937, pp. 187, 188, pl. 50, figs 18, 19 (holotype).
Holotype: NHM 1962987
Paratypes: MA72242*, two specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
* specimens not sighted since 2016.
Current name: *Argalista rotella* Powell, 1937 – Spencer *et al.* (2016).

***Argalista umbilicata* Powell, 1926**
Powell, A.W.B., 1926b, p. 46, pl. 5, fig. 1, 2.
Holotype: CM M5217
Paratypes: MA72337*, collected by the New Zealand Government Trawling Expedition in 1907, from 182 m (100 fathoms) at 'Dredge Station C' 97 km (60 miles) east of Lyttelton, New Zealand.
* specimen not sighted since at least 1993.
Current name: *Argalista umbilicata* Powell, 1926 – Spencer *et al.* (2016).

***Argalista variecostata* Powell, 1937**
Powell, A.W.B., 1937, p. 188, pl. 50, fig. 17 (holotype).
Holotype: NHM 1962988
Paratypes: MA71907, 17 specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 934, R.R.S. Discovery II cruise, in 92 m off Manawatāwhi/Three Kings Islands, New Zealand.
Paratypes: MA72243, nine specimens, collected by A.W.B. Powell on 17 August 1932 from station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Argalista variecostata* Powell, 1937 – Spencer *et al.* (2016).

†*Risellopsis prisca* Powell, 1935
Powell, A.W.B., 1935, pp. 334, 335, pl. 78, figs 20, 21 (holotype).
Holotype: MA72128, collected from Early Miocene (Altonian) Nihotupu Formation (Powell's locality A), southern end of Maori Bay, south of Muriwai Beach, New Zealand.
Paratype: MA71380, one specimen, from the type locality.
Current name: *Cirsochilus priscus* (Powell, 1935) – MolluscaBase (2019).

CALLIOTROPIDAE

†*Calliotropis motutaraensis* Powell, 1935
Powell, A.W.B., 1935, pp. 333, 334, pl. 77, figs 12–14 (holotype).
Holotype: MA72038, collected from Early Miocene (Altonian) Nihotupu Formation (Powell's locality A), southern end of Maori Bay, south of Muriwai Beach, New Zealand.
Paratypes: MA71381, three specimens, from the type locality.
Current name: *Calliotropis motutaraensis* Powell, 1935 – Maxwell in: Spencer *et al.* (2009: 240).

CHILODONTAIDAE

†*Danilia neozelanica* Laws, 1935
Laws, C.R., 1935, p. 30, pl. 5, fig. 2 (holotype).
Holotype: MA70238, collected from the Late Eocene (Runangan) Totara Limestone at Trig M, Totara, Oamaru, New Zealand.
Current name: *Danilia neozelanica* Laws, 1935 – Maxwell in: Spencer *et al.* (2009: 240).

***Euchelus* (*Herpetopoma*) *larochei* Powell, 1926**
Powell, A.W.B., 1926c, p. 36, fig. P.37, fig. 2.
Holotype: MA72060, dredged live by W. La Roche, from

Taupo Bay, Whangaroa Bay, Northland, New Zealand.
Current name: *Herpetopoma larochei* (Powell, 1926) – Spencer *et al.* (2016).

***Herpetopoma benthicola* Powell, 1937**
Powell, A.W.B., 1937, p. 178, pl. 49, fig. 13 (holotype)
Holotype: NHM 1962957
Paratypes: MA71894, two specimens, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Herpetopoma benthicola* Powell, 1937 – Spencer *et al.* (2016).

***Herpetopoma larochei alacerrima* Dell, 1956**
Dell, R.K., 1956, pp. 34–36, fig. 34 (holotype).
Holotype: MONZ M.008833
Paratype: MA72753, collected by M.V. Alert on 2 September 1951 from the type locality, in 201 m (110 fathoms) off Stephens Island, Cook Strait, New Zealand.
Current name: *Herpetopoma alacerrimum* Dell, 1956 – Spencer *et al.* (2016).

***Herpetopoma mariae* Finlay, 1930**
Finlay, H.J., 1930a, p. 223, not figured.
Holotype: MA70357, **Figures 2l**, **m**, Cape Maria van Diemen, Northland, New Zealand.
Paratype: MA72572, one specimen from the type locality.
Current name: *Herpetopoma mariae* Finlay, 1930 – Spencer *et al.* (2016).

SEGUENZIIDAE

†*Notosetia tantilla* Laws, 1936
Laws, C.R., 1936, p. 106, pl. 16, fig. 59 (holotype).
Holotype: MA70543, collected from the Early Pliocene (Opoitian) of the Kaawa Formation at Kaawa Creek, south of Port Waikato, Waikato, New Zealand.
Current name: *Putilla tantilla* (Laws, 1936) – MolluscaBase (2019).

UNCERTAIN FAMILY

***Brookula annectens* Powell, 1937**
Powell, A.W.B., 1937, p. 183, pl. 51, fig. 14 (holotype).
Holotype: NHM 1962971
Paratypes: MA72230, 19 specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Brookula annectens* Powell, 1937 – Spencer *et al.* (2016).

***Brookula contigua* Powell, 1940**
Powell, A.W.B., 1940, pp. 222, 223, pl. 29, fig. 8.
Holotype: MA70106, presumed to have been collected by Captain J. Bollons from 179 m (98 fathoms) in 1914, 15'S of Great Island, Manawatāwhi/Three Kings Islands, New Zealand.
Paratypes: MA71565, four specimens, from the type locality
Current name: *Brookula contigua* Powell, 1940 – Spencer *et al.* (2016).

†*Brookula endodonta* Finlay, 1924
Finlay, H.J., 1924b, pp. 530, 531, pl. 53, figs 7a–c.
Holotype: MA70107, collected from the Early Miocene (Altonian) of the Mount Harris Formation, Pukeuri, Otago, New Zealand.
Paratypes: MA72514, five specimens, from the type locality.
Current name: *Brookula endodonta* Finlay, 1924 – Maxwell in: Spencer *et al.* (2009: 240).

†*Brookula fossilis* Finlay, 1924
Finlay, H.J., 1924b, p. 527, pl. 53, figs 4a–c.
Holotype: MA70109, collected from Pleistocene (Castlecliffian), Castlecliff, Whanganui, New Zealand.
Paratypes: MA72508, seven specimens, from the type locality.
Current name: *Brookula fossilis* Finlay, 1924 – Maxwell in: Spencer *et al.* (2009: 240).

†*Brookula funiculata* Finlay, 1924
Finlay, H.J., 1924b, p. 529, pl. 53, figs 5a–c.
Holotype: MA70110, collected from Pleistocene (Castlecliffian), Castlecliff, Whanganui, New Zealand.
Paratypes: MA72512, 23 specimens, from the type locality.
Current name: *Brookula funiculata* Finlay, 1924 – Maxwell in: Spencer *et al.* (2009: 240).

†*Brookula iredalei* Finlay, 1924
Finlay, H.J., 1924b, pp. 527, 528, pl. 53, fig. 2a–c.
Holotype: MA70111, collected from the Early Miocene (Altonian) of the Mount Harris Formation, Pukeuri, Otago, New Zealand.
Paratypes: MA72511, five specimens, from the type locality.
Current name: *Aequispirella iredalei* Finlay, 1924 – MolluscaBase (2019).

***Brookula lincta* Powell, 1940**
Powell, A.W.B., 1940, p. 222, pl. 29, fig. 9.
Holotype: MA70112, collected from 182 m (100 fathoms) off Great Island, Manawatāwhi/Three Kings Islands, New Zealand.
Paratypes: MA71555, ten specimens; MA71983, eight specimens, all from the type locality.
Remarks: The holotype was destroyed by glass disease.
Current name: *Brookula prognata* Finlay, 1926 – Powell (1979: 77); Spencer *et al.* (2016).

†*Brookula pukeuriensis* Finlay, 1924
Finlay, H.J., 1924b, pp. 529, 530, pl. 53, figs 3a–c.
Holotype: MA70113, collected from the Early Miocene (Altonian) of the Mount Harris Formation, Pukeuri, Otago, New Zealand.
Paratypes: MA72513, 28 specimens, from the type locality.
Current name: *Brookula pukeuriensis* Finlay, 1924 – Maxwell in: Spencer *et al.* (2009: 240).

†*Brookula tenuilirata* Finlay, 1924
Finlay, H.J., 1924b, p. 528, pl. 53, figs 1a–c.
Holotype: MA70114, collected from the Early Miocene (Altonian) of the Mount Harris Formation, Pukeuri, Otago, New Zealand.
Paratypes: MA72510, three specimens, from the type locality.
Current name: *Aequispirella tenuilirata* (Finlay, 1924) – Maxwell in: Spencer *et al.* (2009: 240).

***Brookula* (*Aequispirella*) *enderbyensis* Powell, 1931**
Powell, A.W.B., 1931b, pp. 372, 373, pl. L1, fig. 6.
Paratype: MA72856, three specimens from the type locality, from 155 m (85 fathoms), 16 km (10 miles) north of Enderby Island, Auckland Islands, New Zealand.
Current name: *Aequispirella enderbyensis* (Powell, 1931) – Spencer *et al.* (2016).

***Brookula* (*Aequispirella*) *finlayi* Powell, 1933**
Powell, A.W.B., 1933b, pp. 195, 196, pl. 33, fig. 1.
Holotype: MA70108, collected by A.W.B. Powell in February 1933, from 18 m (10 fathoms) off Owenga, Rēkohu/Chatham Islands, New Zealand.
Paratypes: MA71532, two specimens, from the type locality.
Current name: *Aequispirella finlayi* (Powell, 1933) – Spencer *et al.* (2016).

***Lissotesta aupouria* Powell, 1937**
Powell, A.W.B., 1937, pp. 186, 187, pl. 51, fig. 7 (holotype).
Holotype: NHM 1962981
Paratype: MA72237, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Lissotesta aupouria* Powell, 1937 – Spencer *et al.* (2016).

***Lissotesta benthicola* Powell, 1927**
Powell, A.W.B., 1927, p. 115, pl. 21, fig 7.
Holotype: CM M5375
Paratype: MA72340*, from the type locality by Prof. R. Speight in December 1908, from 311 m (170 fathoms) off Puysegur Point, Fiordland, New Zealand.
* the specimen has not been sighted since at least 1993.
Current name: *Lissotesta benthicola* Powell, 1927 – Spencer *et al.* (2016).

***Lissotesta bicarinata* Powell, 1940**
Powell, A.W.B., 1940, p. 222, pl. 28, fig. 12 (holotype).
Holotype: MA72082, collected from shell sand, Tom Bowling Bay, Northland, New Zealand.
Remarks: Specimen affected by glass disease.
Current name: *Lissotesta bicarinata* Powell, 1940 – Spencer *et al.* (2016).

***Lissotesta caelata* Powell, 1937**
Powell, A.W.B., 1937, pp. 185, 186, pl. 51, fig. 5 (holotype).
Holotype: NHM 1962979
Paratypes: MA72236, two specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Lissotestella caelata* (Powell, 1937) – Spencer *et al.* (2016).

***Lissotesta conoidea* Powell, 1937**
Powell, A.W.B., 1937, p. 186, pl. 51, fig. 6 (holotype).
Holotype: NHM 1962982
Paratypes: MA72238, seven specimens, collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Lissotesta conoidea* Powell, 1937 – Spencer *et al.* (2016).

***Lissotesta consobrina* Powell, 1940**
Powell, A.W.B., 1940, p. 221, pl. 28, fig. 11 (holotype).
Holotype: MA72083, collected from 183 m (100 fathoms) off Great Island, Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Lissotestella consobrina* (Powell, 1940) – Spencer *et al.* (2016).

***Lissotesta decipiens* Powell, 1940**
Powell, A.W.B., 1940, p. 221, pl. 28, fig. 3 (holotype).
Holotype: MA70415, collected from 137 m (75 fathoms) off Otou/North Cape, New Zealand.
Paratypes: MA71553, five specimens, from the type locality.
Current name: *Lissotesta decipiens* Powell, 1940 – Spencer *et al.* (2016).

***Lissotesta errata* Finlay, 1926**
Finlay, H.J., 1926a, p. 366, pl. 19, figs 28, 29 (holotype).
Holotype: MA70416, dredged from 91 m (50 fathoms), near The Snares, New Zealand.
Paratype: MA72525, a single specimen from the type locality.
Current name: *Lissotesta errata* Finlay, 1926 – Spencer *et al.* (2016).

***Lissotesta oblata* Powell, 1940**
Powell, A.W.B., 1940, pp. 221, 222, pl. 28, fig. 13 (holotype).
Holotype: MA70417, collected from 183 m (100 fathoms) off Great Island, Manawatāwhi/Three Kings Islands, New Zealand.
Paratypes: MA71554, three specimens, from the type locality.
Current name: *Lissotesta oblata* Powell, 1940 – Spencer *et al.* (2016).

***Lissotesta rissoaformis* Powell, 1931**
Powell, A.W.B., 1931b, p. 373, pl. L2, fig. 11.
Holotype: CM M2782
Paratype: MA72357, a single specimen from the type locality, from 155 m (85 fathoms), 16 km (10 miles) north of Enderby Island, Auckland Islands, New Zealand.
Remarks: Specimen affected by glass disease.
Current name: *Lissotestella rissoaformis* (Powell, 1931) – Spencer *et al.* (2016).

***Lissotesta tenuilirata* Powell, 1931**
Powell, A.W.B., 1931b, p. 373, pl. L2, figs 9, 10.
Holotype: CM M2778
Paratypes: MA72356, two specimens, from the type locality, from 155 m (85 fathoms), 16 km (10 miles) north of Enderby Island, Auckland Islands, New Zealand.
Current name: *Lissotestella tenuilirata* (Powell, 1931) – Spencer *et al.* (2016).

***Lissotesta tryphenensis* Powell, 1931**
Powell, A.W.B., 1931b, p. 374, pl. L2, fig. 8.
Holotype: MA72084, collected by A.W.B. Powell in 1922 from 9–11 m (5–6 fathoms) in Tryphena Harbour, Aotea/Great Barrier Island, New Zealand.
Current name: *Lissotestella tryphenensis* (Powell, 1931) – Spencer *et al.* (2016).

***Notosetia aoteana* Powell, 1937**
Powell, A.W.B., 1937, p. 200, pl. 53, fig. 11 (holotype).
Holotype: NHM 19621022
Paratype: MA72272, two specimens collected by A.W.B. Powell on 17 August 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Notosetia aoteana* Powell, 1937 – Spencer *et al.* (2016).

***Zerotula crenulata* Powell, 1937**
Powell, A.W.B., 1937, pp. 209, 210, pl. 44, figs 6, 7 (holotype).
Holotype: NHM 19621049
Paratypes: MA72289, seven specimens, collected by A.W.B. Powell in 1932 from the type locality, station 933, R.R.S. Discovery II cruise, in 260 m off Manawatāwhi/Three Kings Islands, New Zealand.
Current name: *Adeuomphalus crenulatus* (Powell, 1937) – MolluscaBase (2019).

***Zerotula nautiliformis* Powell, 1927**
Powell, A.W.B., 1927, p. 118, pl. 21, fig. 5.
Holotype: CM5364
Paratype: MA72344*, collected by Prof. R. Speight in December 1908, from 311m (170 fathoms) off Puysegur Point, Fiordland, New Zealand.
* specimen not sighted since at least 1993.
Current name: *Palazzia nautiliformis* (Powell, 1927) – Powell (1979: 249); Spencer et al. (2016).

***Zerotula ramosa* Powell, 1940**
Powell, A.W.B., 1940, p. 237, pl. 29, fig. 3 (holotype).
Holotype: MA70894, collected from 137 m (75 fathoms) depth off Otou/North Cape, Northland, New Zealand.
Paratypes: MA71574, two specimens, from the type locality.
Remarks: The holotype is affected by glass disease.
Current name: *Palazzia ramosa* (Powell, 1940) – Powell (1979: 249); Spencer *et al.* (2016).

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Description of *Laoma ordishi* new species (Eupulmonata: Punctidae) and reinstatement of *Laoma nerissa* (Hutton, 1883)

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Abstract
Laoma s.str., based on *Laoma leimonias* (Gray, 1850), also includes *L. marina* (Hutton, 1883), *L. ordishi* Climo n. sp., *L. labyrinthica* Powell, 1948 and *L. nerissa* (Hutton, 1883), which is reinstated as a valid species. Recently collected material of these *Laoma* spp. from a wide spread of localities in New Zealand shows that reabsorption of apertural lamellae during growth does not change their configuration in the manner proposed by Suter (1891: 283–285). All species discussed here are endemic to New Zealand. They overlap tightly in their distribution but are often allopatric at local scale, around Auckland–Waitemata–Hauraki Gulf, North Island, while elsewhere they are geographically well-separated. The naturally uncommon *L. labyrinthica* (Three Kings Islands) is the only species of conservation concern in this group.

Keywords
Laominae; New Zealand; terrestrial gastropods; taxonomy; new species.

Registration ID: *Laoma nerissa*
LSID urn:lsid:zoobank.org:pub:22B84676-5098-43C7-85E9-B3F6D9D14078

INTRODUCTION

Hutton described *Endodonta marina* and *E. nerissa* in 1883 and 1884, in the *New Zealand Journal of Science* and in the *Transactions and Proceedings of the New Zealand Institute* respectively (Hutton 1884a, b). Suter (1891: 271) transferred both species to *Phrixgnathus (Laoma)* based on 'spiral lamellae and teeth in the aperture.' In the subsequent mention of these species on p. 283, they were referred to as '*Laoma marina* Hutt. and *Laoma nerissa* Hutt.'

In his original description of *E. nerissa* Hutton clearly states: '…a columellar plait and six parietal plaits, three of which are on the basal margin' (Hutton 1883: 476) and for *E. marina* '… a columellar plait, and two parietal plaits, none of which are on the basal margin' (Hutton 1883: 476). However, eight years later, Suter (1891) synonymised *Laoma nerissa* with *L. marina*, based on a detailed analysis of their apertural lamellae and other shell features. He concluded that *L. nerissa* was a juvenile form of *L. marina* (Fig. 1): 'All my observations lead me to the conclusion that in the young shells all the seven plaits are developed, but are reabsorbed later on in such a way that 7 first disappears, followed by 2, 5, 6, thus leaving for the adult shell the plaits 1, 3, 4 only. I am of opinion that all these facts taken together show clearly that *L. marina* and *L. nerissa* are but one species' (Suter 1891: 284). He also said 'The name which has to be retained is *Laoma marina* Hutt., being that of the adult shell' and provided a diagnosis of *Laoma marina* Hutt. (1883) (=*Laoma nerissa* Hutt., 1883).

Our examination of more recently collected material from a wider spread of localities shows that while apertural lamellae are reabsorbed during growth, this does not change their configuration in the manner proposed by Suter (1891). A comparison between *L. nerissa* and *L. marina*

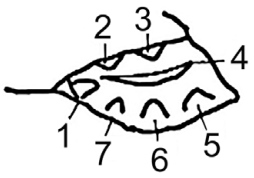

Figure 1. Apertural lamellae positions of *Laoma nerissa* (Hutton, 1883) (redrawn from Suter 1891: 284).

(Hutton, 1883), *L. ordishi* Climo n. sp., *L. labyrinthica* Powell, 1948 and *L. leimonias* (Gray, 1850) of shell and reproductive anatomy provides enough evidence for the reinstatement of *L. nerissa* as a valid species (apertural lamellae are described and discussed further in the taxonomic part and in the comparative remarks).

We consider that these five species are one set of species currently requiring inclusion in genus *Laoma s.str.,* as they form a natural group with comparable shell sizes, colour patterns, apertural barrier positions and anatomies (and possibly some *Phrixgnathus* species with *Laoma s.str.* characters). *Laoma s.str.* does not include species such as *L. ciliata*, *L. pirongiaensis*, *L. elegans* and *L. poecilosticta* listed in Suter (1913: 733), nor *L. mariae mariae* (Gray in Dieffenbach 1843), *L. mariae aupouria* Cumber, 1967 and *L. minuta* Climo, 1971 as listed in Spencer and Willan (1995: 41). These, and the ca. 130 mostly unnamed New Zealand species informally tag-named as '*Laoma*', are now seen as belonging to other natural groups to be listed in new genera or in subgenera of *Laoma s.lat.*, on a case-by-case basis. For example, six species, tagged in the Species 2000 list (Spencer, Marshall and Willan 2009) as '*Laoma*' spp., have already been formally described as members of *Kokopapa* Climo and Mahlfeld, 2011: *K. bispathulata*, *K. matarua*, *K. milleneri*, *K. mokihinui*, *K. rapahoe* and *K. unispathulata*, all Climo and Mahlfeld (2011).

METHODOLOGY

Animals were dissected with tools made of sections of 3 mm-square plastic strips with 0.11 mm diameter entomological pins melted into one end. Specimens were submerged in 70 percent ethanol. A Wild M7A stereomicroscope with drawing tube attached was used to draw the shells, and anatomical illustrations were drawn free hand. Shell dimensions were measured using a microscope eyepiece graticule. An Olympus SZX12 binocular microscope with an Olympus UC30 camera, and Zerene vers 1.04 (Littlefield) software were used to create high-resolution focus-stacked colour photos of the shells. Basemaps for the species distributions were created using the Fauna of New Zealand format. Fig. 1 illustrates Suter's nomenclature of apertural lamellae.

The species (re)descriptions follow a modern, commonly used nomenclature as laid out, for example, in Solem (1976, Fig. 36, p. 52–72 and 1983, pp. 15–23). For a key to reproductive anatomical characters please refer to Fig. 25 and related pages in Solem (1983). Both publications are available online.

Abbreviations

AM	Auckland Museum;
NMNZ	Museum of New Zealand Te Papa Tongarewa;
CM	Canterbury Museum.

Accession number identifications

AM	MA.
NMNZ	M.
CM	CM.

TAXONOMY

Superfamily PUNCTOIDEA Morse, 1864
Family PUNCTIDAE Morse, 1864
Subfamily LAOMINAE Suter, 1913

Genus *Laoma* Gray, 1850

Type species: *Bulimus*? (*L.*) *leimonias* Gray, 1850

Remarks: The systematics of the Laominae is poorly known as no intra- and intergeneric study with a comprehensive analysis of shell and reproductive morphology combined with molecular characters has been achieved yet. In this publication we provide comparative remarks on shell and reproductive characters of New Zealand laomine species sharing shell and/or anatomical characters that may eventually be corroborated by further molecular analysis as a subgroup within *Laoma s.str*. Thirty genera are currently recognised as belonging to the subfamily Laominae (WORMS Editorial Board 2019). The WORMS list reflects a compilation of available names from individual taxonomic publications but not much more. A more detailed analysis of other known and undescribed New Zealand endemic *Laoma* species is beyond the scope of the current paper, which predominantly deals with the reinstatement of *Endodonta nerissa* Hutton, 1884 as a distinct valid species, previously reduced to synonomy of *L. marina* by Suter (1891), and the introduction of a closely related new species, *L. ordishi* Climo n. sp. based on macro morphological characters. The necessary funds and institutional support are currently not available to us to embark on a full revision of Laominae, but we will attempt to publish all the accumulated knowledge gathered over a lifetime of research into Punctidae in a series of papers to make it accessible for further investigations.

Laoma ordishi Climo sp. nov.

(Figs 3C; 4D–E; 7E; 10; 14A)

Punctidae sp. 144 (NMNZ M.88107) Spencer *et al.* 2009: 218.

Material examined: Holotype (Fig. 10), MA73598, Taranga/Hen Island, SE of Whangarei, E1753468 N6018634, D.J. Roscoe, 16.10.2010. **Paratypes**, MA73599, same locality data as holotype; CM2019.89.1 – 2019.89.20, King Country, W of Te Kuiti, between Waikawau and Moeatoa, Whareorino Forest, E1749376 N5745385, Ian Payton, 12.11.2017, and NMNZ M.88107, Motairehe, Great Barrier Island, R.G. Ordish, 20.11.1964.

Other material: NMNZ: M.88107, M.28928, M.77515, M.57401, M.39140, M.39217, M.31011, M.56016, M.55807, M.76409, M.62609, M.70290, M.28934, M.88098, M.88100, M.88099, M.88108, M.72288, M.88033, M.88062, M.73303, M.85409, M.88084, M.24464, M.56748, M.48102, M.70169, M.88097, M.77583, M.69207, M.77640, M.70496, M.24614, M.75715, M.25516, M.99471, M.82615, M.97619, M.99332, M.97544, M.47830, M.78802, M.97305, M.82164, M.97765, M.51917, M.78665, M.46045, M.78894, M.88109, M.80249, M.82943, M.55176, M.36403, M.80358, M.99118, M.57641, M.77538,

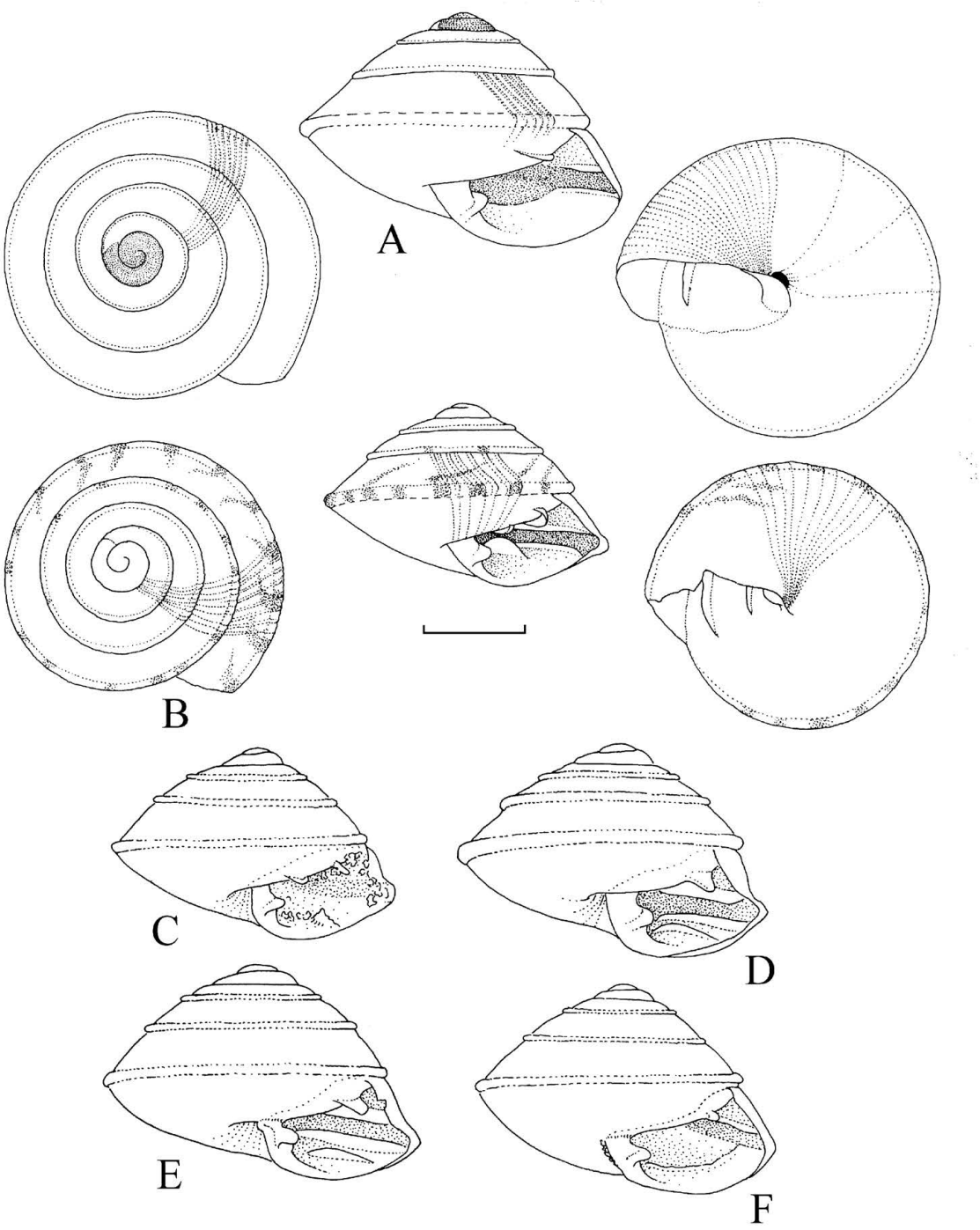

Figure 2. *A*, *Laoma marina* (Hutton, 1883), lectotype, Remuera, Auckland, T.F. Cheeseman. *B*, *Laoma nerissa* (Hutton, 1883), holotype, Remuera, Auckland, T.F. Cheeseman. *C–F*, 'supposed syntypes' of *Laoma marina* (CM/M.1049; *C* and *F*, *L. marina*; *D* and *E*, *L. nerissa*), Auckland.

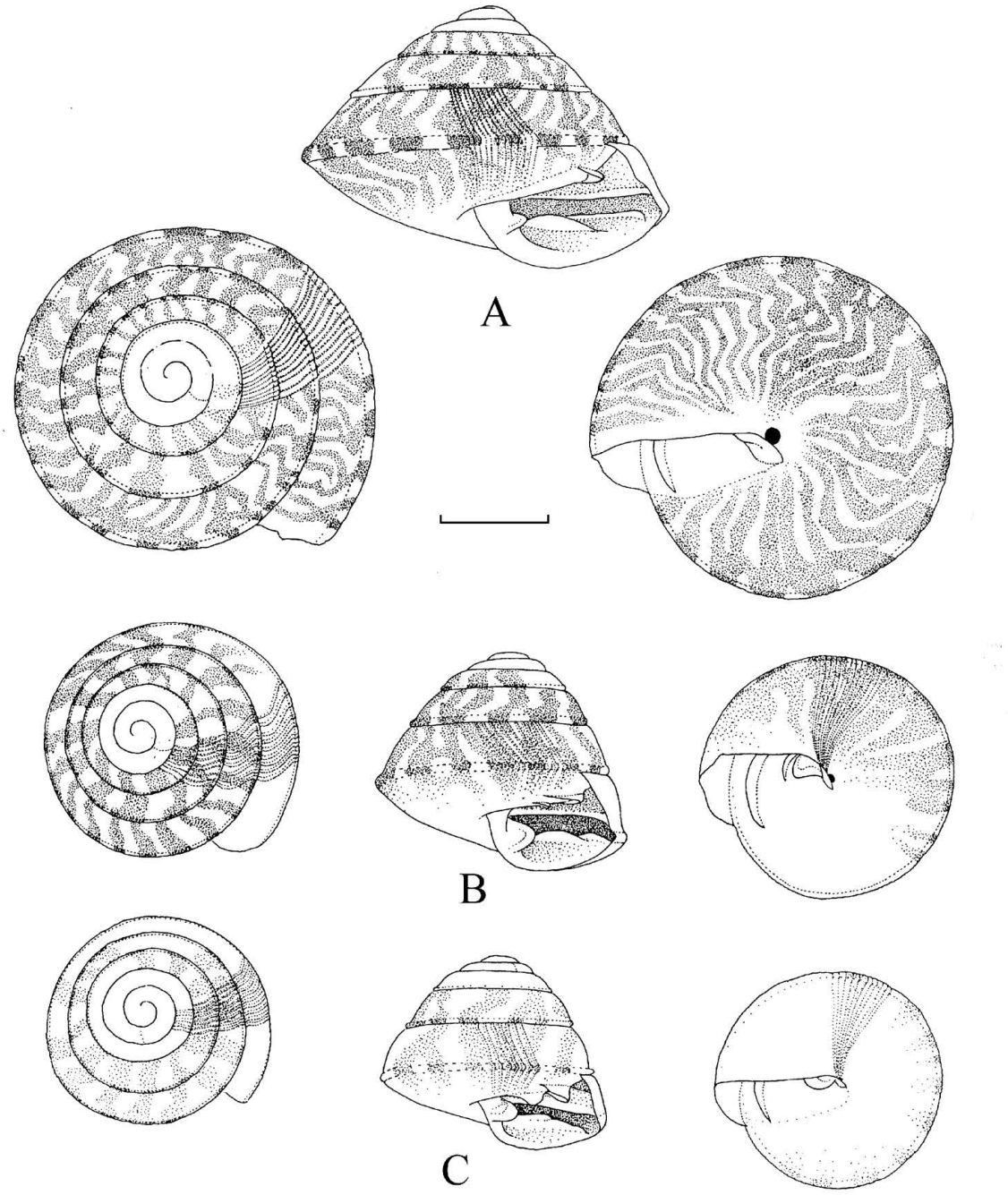

Figure 3. *Laoma*, group of *leimonias* (Gray, 1850). ***A***, *Laoma nerissa* (Hutton, 1883), Lost World Cave, Waitomo, Hamilton Junior Naturalists Club, 1970–72, NMNZ/M.54654. ***B***, *Laoma ordishi* n.sp., cave at Te Uku, Waikato, Hamilton Junior Naturalists Club, 1970–72, NMNZ/M.36403; ***C***, *Laoma ordishi* n.sp., voucher of Punctidae sp. 144, Motairehe, Great Barrier Island, R.G. Ordish, 20.11.1964, NMNZ/M.88107.

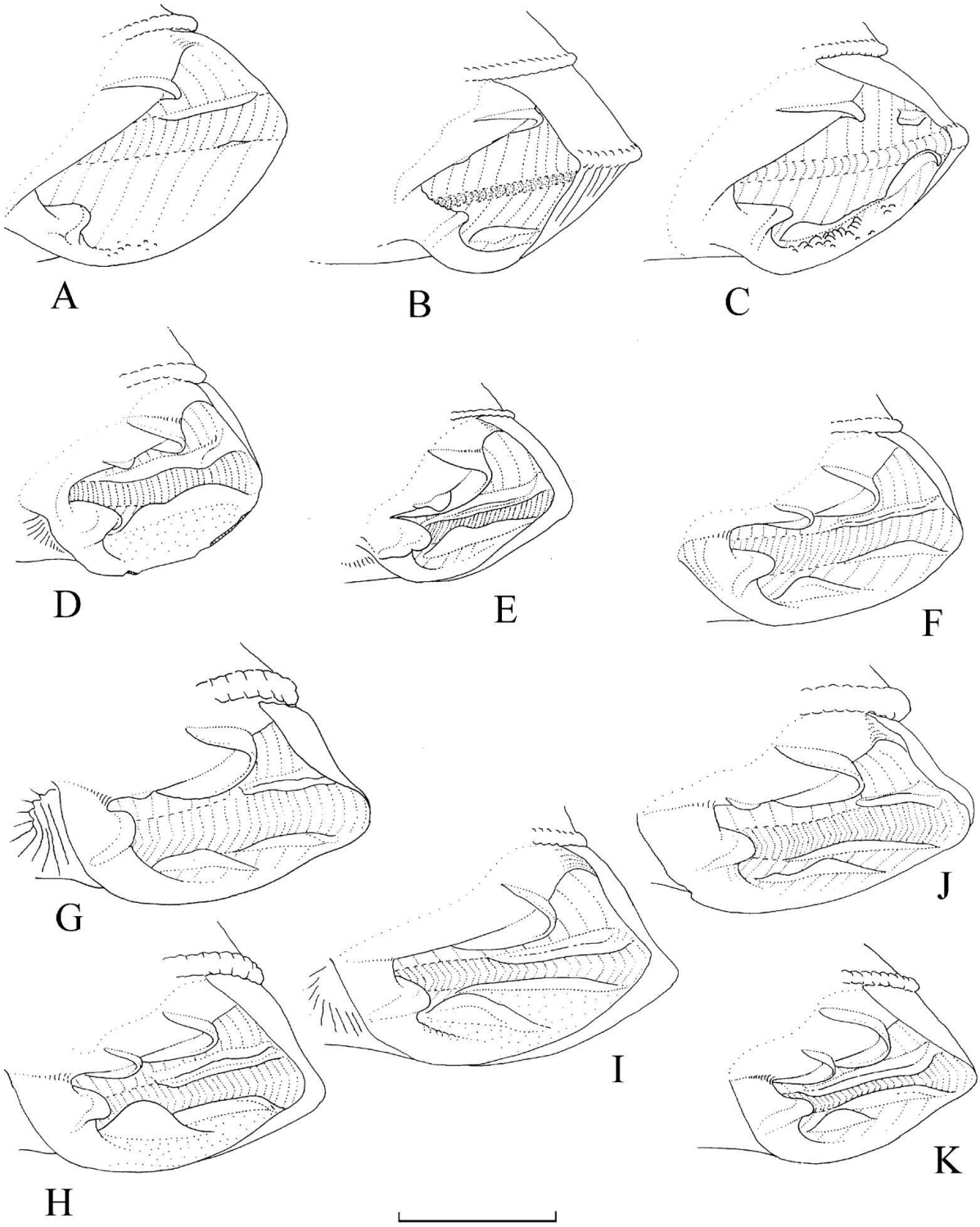

Figure 4. *Laoma*, group of *leimonias* (Gray, 1850), apertural teeth and plaits: ***A–C***, *Laoma marina* (Hutton, 1883). ***D–E***, *Laoma ordishi* n.sp.. ***F–K***, *Laoma nerissa* (Hutton, 1883). ***A***, broadleaf and mamaku litter, Jones Bush, Waiuku, F.M. Climo & D.J. Roscoe, 11–12.2.1981, NMNZ/M.78540. ***B–C***, Woodlands, Waitakere Ranges, Auckland. J.F. Goulstone, 20.9.1967, NMNZ/M.38388. ***D***, cave at Te Uku, Hamilton Junior Naturalists Club, 1970–72, NMNZ/M.36403. ***E***, paratype (Te Papa), Motairehe, Great Barrier Island, R.G. Ordish, 20.11.1964, NMNZ/M.28928. ***F***, Hen Island, C.A. Fleming, 26.2.1934, NMNZ/M.88109. ***G***, Mangatawhiri, Auckland, B.F. Hazelwood, 9.10.1976, NMNZ/M.55432. ***H***, Kaimai Range, A.C. O'Connor, -.4.1941, NMNZ/M.88096. ***I***, Lost World Cave, Waitomo. Hamilton Junior Naturalists Club, 1970–72, NMNZ/M.54659. ***J***, Hunua Gorge, Auckland, J.F. Goulstone, 3.10.1967, NMNZ/M.38381. ***K***, cave, Te Uku. Hamilton Junior Naturalists Club, 1970–72, NMNZ/M.39291. Scale line 1 mm.

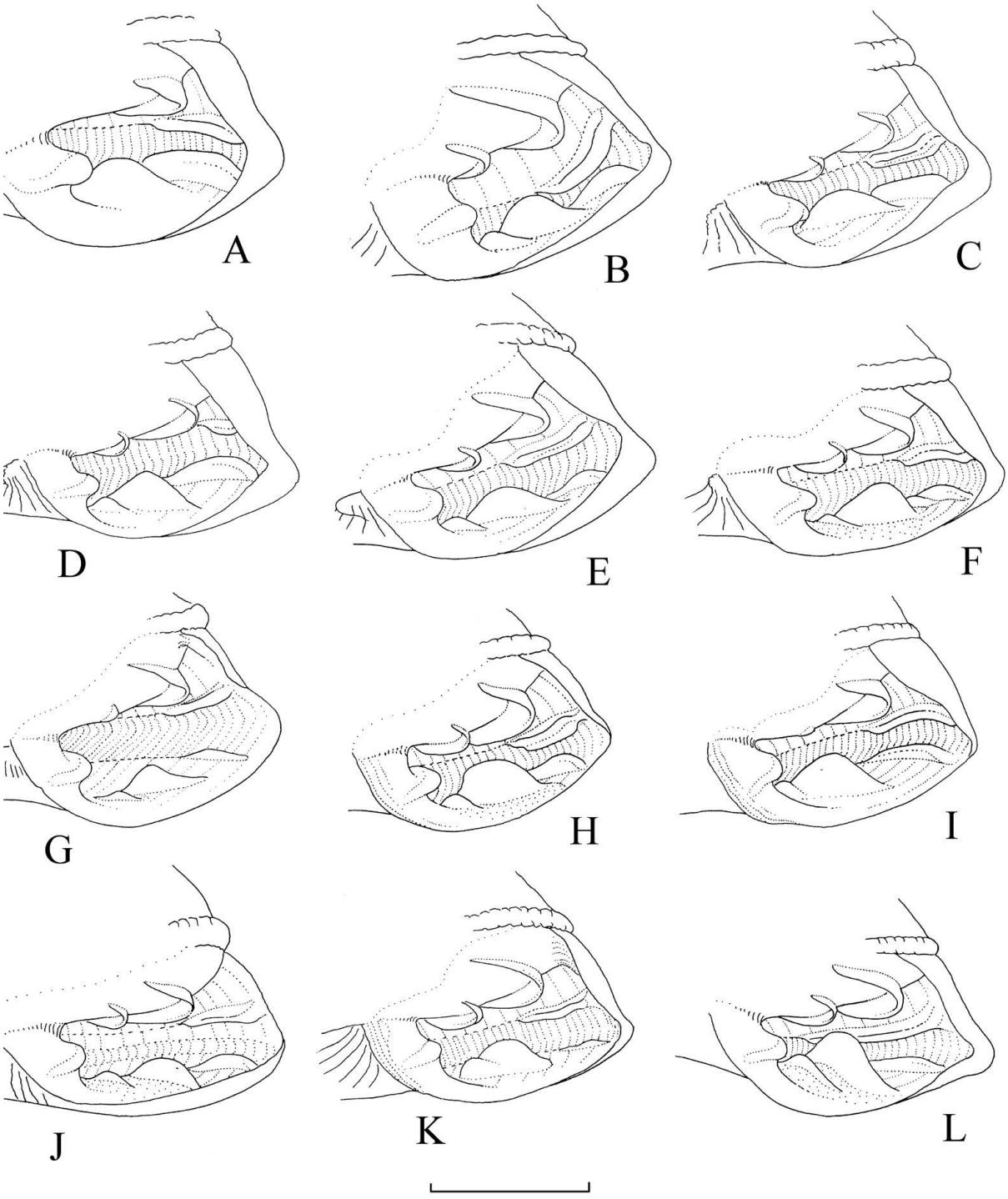

Figure 5. *Laoma*, group of *leimonias* (Gray, 1850), *Laoma nerissa* (Hutton, 1883), apertural teeth and plaits from 11 localities (from north to south): ***A–B***, Mokau River mouth, F.M. Climo, 5.3.1977, NMNZ/M.56728. ***C***, Clifton–Taumarunui boundary, inland Taranaki, F.M. Climo, 8.3.1977, NMNZ/M.56697. ***D***, Dawson Falls, Mt Taranaki, 3100', M.P. Buchler, NMNZ/M.14039. ***E***, Tangoio, Hawke Bay, N43/307610, D.J. Roscoe, 25.2.1968, NMNZ/M.46424. ***F***, Taoroa, Taihape, A.C. O'Connor, -.6.1942, NMNZ/M.88095. ***G***, Rock Rd, Konini, Wairarapa, B.F. Hazelwood, 1976, NMNZ/M.56257. ***H***, northeastern Kapiti Island, W.F. Ponder, -.4.1956, NMNZ/M.24898. ***I***, D'Urville Island, R.A. Cumber, 8.4.1941, NMNZ/M88106. ***J***, Lichfields Bay, Manaroa, Marlborough, W.F. Ponder, 7.1.1959, NMNZ/M.24945. ***K***, Pelorus Bridge, Nelson, A.C. O'Connor, -.1.1949, NMNZ/M.88105. ***L***, Richmond Reservoir, Nelson, F.M. Climo. 25.11.1967, NMNZ/M.38405. Scale line 1 mm.

M.80191, M.88789, M.70863, M.63375, M.76750, M.38477, M.8830, M.97311, M.104400, M.96607, M.99409, M.100263, M.104520, M.114620.

Description: Shell (Figs 3C; 4D–E; 10). Small, approx. 2.45 mm wide and 2.1 mm high at 5.5 whorls, trochiform, carinated, imperforate, thin, transparent, whitish to pale buff streaked with brown to dark brown zigzag bands. Suture impressed, strongly margined. Spire conic, slightly higher than height of aperture; outlines weakly convex. Protoconch of 1.5–1.75 whorls, sculptured with ~16 spiral lirae and weak irregular oblique axial ridges. Teleoconch whorls weakly convex, periphery carinate and ornamented with equidistant brown bands; base convex. Sculpture consisting of weakly oblique prominent and narrowly-spaced axials, these slightly weaker on base. Aperture oblique, rhombic, with one strongly calcareous columellar lamella, one upper parietal crescent-shaped thinner and one mid-parietal shorter and thicker lamella. Palatal wall with one short, thick lamella about midway. Basal part inside aperture with a calcareous thickening from columella to carina and two protuberances. Peristome sharp; columella short and arcuate; inner lip reflexed, thickened and sometimes with a calcareous smear across the umbilical depression.

Reproductive system (Fig. 7E; only dissected male genitalia available). Phallus duct long and cylindrical, tapering slightly towards atrium; retractor muscle attached apically. Vas deferens enters phallic lumen through a simple pore just below retractor muscle. Interior of phallus ornamented with three apical traverse pilasters, a median oval pilaster flanked by two wing-shaped thin folds with short apical bifurcations. The median part of the lumen wall is folded into three latitudinal ridges (perhaps indicative of a reduced sphincter?), and below these ridges the interior wall is partially but smoothly and uniformly thickened. A third, longitudinal, highly folded, ruffled, irregular pilaster fills most of the abapical part of the lumen.

Etymology: Named in memory of former colleague and entomologist at Museum of New Zealand Te Papa Tongarewa, R. G. Ordish, who collected some of the early material of *Laoma ordishi* n. sp.

Laoma marina (Hutton, 1883)

(Figs 2A,C,F; 4A–C; 7A–B; 11; 14B)

Punctidae sp. 145 (NMNZ M.88110) Spencer *et al*. 2009: 218.

Material examined: Lectotype, CM/M.1402.1, Remuera, Auckland. **Paralectotype**, CM/M.1401.2, same data.

Other material: NMNZ: M.88110, M.38398, M.81769, M.63321, M.63454, M.75578, M.88111, M.63438, M.58164, M.76291, M.88112, M.97512, M.80357, M.73569, M.48427, M.82899, M.32180, M.48548, M.47784, M.80304, M.61815, M.38404, M.75862, M.68654, M.77791, M.55832, M.57864, M.75323, M.24940, M.63274, M.63251, M.78540, M.38410, M.63307, M.89932, M.99314, M.88505, M.99525, M.116721, M.72363, M.84771, M.84772, M.84789, M.102706, M.84667, M.104021, M.114445, M.113678, M.97617, M.113648, M.99257, M.63412, M.113688.

Redescription: Shell (Figs 2A,C,F; 4A–C; 11). Small, 2 mm wide and 1.38 mm high at 4.25 whorls, trochiform, carinated, very narrowly umbilicated, thin, transparent whitish to pale buff streaked with reddish brown to brown zigzag lines. Suture impressed, margined. Spire conic, height equal to height of aperture; outlines slightly convex. Protoconch of 1.5 whorls, sculptured with 15+ narrowly-spaced fine spiral lirae. Teleoconch whorls flat, periphery carinate and ornamented with equidistant brown bands; base convex. Sculpture consisting of fine oblique growth wrinkles; last whorl somewhat concave below the peripheral keel. Aperture somewhat oblique, rhombic, with one strong columellar lamella, one upper long, thin parietal lamella, one long, thin palatal lamella just above the carinate periphery, and a basal callosity, which is sometimes developed into a diagonal irregular hump or is absent in some specimens. Peristome sharp; columella short, arcuate; inner lip reflexed and partially covering narrow, deep umbilicus.

Reproductive anatomy (Fig. 7A, B). Gonads relatively large, bilobed; each lobe consisting of seven to eight elongate acini. Albumen gland squarish-round, alveoli small; round talon on stalk buried in albumen gland. Prostatic gland bunched with large folds; uterus of similar size, surface smooth. Oviduct twice as large as spermathecal base, both round and slender. Apical part of spermatheca ovate. Hermaphroditic duct short, broad and kinked. Vagina relatively short, cylindrical. Vas deferens enters phallus through a simple pore adjacent to the retractor muscle near apex of phallus. Phallus with a constriction just above midway of lumen, which tapers off rapidly towards atrium. Apical half of phallus lumen interior adorned by three longish pilasters, joined in a broad base to lumen wall. Interior lumen wall below the apical pilasters and constriction uniformly smooth. Atrium relatively short.

Remarks: Punctidae sp. 145 (known by the tag name '*Laoma paucilamellata*') was used in the past for a conchological variant of *L. marina*. The voucher of Punctidae sp. 145 was collected by J.F. Goulstone from Woodlands Park, Auckland in 1967. Other specimen lots in the Te Papa Tongarewa collection that may have been associated either with this voucher or *Laoma marina* sensu Hutton lots will include extremely low spired specimens with weakly developed apertural lamellae and shell sculpture, which cannot be separated easily from the range of shell variation shown by *L. marina*. At present DNA material is insufficiently sampled to advance taxonomy further in this case (pers. comm. F.J. Brook).

Laoma nerissa (Hutton, 1883) reinstated

(Figs 2B,D–E; 3A; 4F–K; 5A–K; 7C–D; 12; 13)

Endodonta nerissa Hutton, 1883: 476; Hutton, 1884a: 176; Hutton, 1884b: 196.

Laoma marina Suter 1891: 285 (in part and also for authors from here on except Bogich *et al*. 2012); Pilsbry (1892: 57–58); Hedley and Suter (1893: 646); Suter (1893: 274); Suter (1913: 735–736); Powell (1979: 325, plate 59) (= *L. nerissa*); Marshall (1995: 498); Freeman *et al*. (1997: 32); Spencer *et al*. (2009: 217); Spencer *et al.* (2016).

Material examined: Holotype, CM/M.1400, Remuera, Auckland.

Other material: NMNZ: M.56687, M.55960, M.38696, M.68698, M.29654, M.46388, M.55432, M.32061, M.56672, M.56732, M.31957, M.31984, M.45801, M.45922, M.68572, M.32063, M.96916, M.98089, M.88092, M.45865, M.48439, M.56947, M.38988, M.96950, M.68073, M.24893, M.63334, M.39061, M.98470, M.96864, M.57649, M.24894, M.98374, M.98623, M.98467, M.92603, M.93097, M.98644, M.98066, M.97789, M.89318, M.98174, M.88667, M.98486, M.98920, M.96859, M.87678, M.87508, M.92877, M.89374, M.92635, M.97722, M.98562, M.96899, M.98533, M.98192, M.97794, M.97771, M.99576, M.96878, M.98499, M.97013, M.97827, M.97793, M.77345, M.73302, M.72250, M.72195, M.70280, M.722287, M.56204, M.14156, M.78925, M.78769, M.79053, M.72330, M.70571, M.76200, M.70472, M.72269, M.78919, M.72392, M.75642, M.80280, M.69029, M.76226, M.75945, M.79684, M.75818, M.75778, M.76411, M.76279, M.75928, M.80823, M.76168, M.56737, M.75852, M.29105, M.24897, M.22204, M.79982, M.80091, M.38401, M.80073, M.88101, M.46857, M.24891, M.24899, M.88103, M.24895, M.88102, M.24902, M.88105, M.24889, M.55526, M.79963, M.24901, M.24888, M.69391, M.70766, M.37031, M.37036, M.88104, M.108030, M.107447, M.107374, M.116183, M.108108, M.108164, M.88606, M.98678, M.98181, M.88521, M.89552, M.99594, M.89464, M.89456, M.89534, M.89391, M.99312, M.88754, M.89490, M.88562, M.89387, M.99555, M.114878, M.114918, M.113704, M.89431, M.114948, M.89785, M.98130, M.113787, M.98699, M.93113, M.98569, M.92655, M.97117, M.92612, M.98606, M.92734, M.98435, M.99874, M.101553, M.102759, M.102836, M.103593, M.103148, M.102001, M.104506, M.103498, M.103477, M.102790, M.102745, M.116630, M.114478, M.116582, M.115000, M.69252, M.101841, M.69469, M.106713, M.103676, M.101383, M.101494, M.115011, M.116487, M.101925, M.116045, M.115725, M.114492, M.51789, M.113661, M.102819, M.104298, M.101458, M.114662, M.116033, M.115862, M.116216, M.115896, M.116016, M.116072, M.107818, M.116124, M.103930, M.101514, M.101870, M.101988, M.104093, M.104200, M.102809, M.101373, M.101090, M.104377, M.101703, M.116084, M.103984, M.104825, M.101767, M.104056, M.101329, M.104683, M.106751, M.105338, M.106396, M.104914, M.105197, M.101954, M.105075, M.105321, M.105232, M.103083, M.101945, M.105410, M.106041, M.105868, M.106355, M.105294, M.69561, M.57121, M.69614, M.38405, M.24896, M.69639, M.22571, M.32066, M.25468, M.80146, M.24945, M.23597, M.88106, M.105101, M.69684, M.56975, M.81917, M.69671, M.105256, M.105175, M.108211, M.109737, M.108471, M.108648, M.100737, M.100789, M.107336, M.108566, M.108385, M.108619, M.107232, M.107273, M.62969, M.108432, M.69295, M.48513, M.46465, M.88085, M.47246, M.55939, M.46555, M.38379, M.38397, M.55952, M.52364, M.88089, M.25412, M.38386, M.46492, M.14272, M.88086, M.69119, M.32065, M.37508, M.24892, M.88091, M.63320, M.38381, M.88090, M.51834, M.22323, M.88088, M.88087, M.68586, M.56600, M.25323, M.45940, M.38387, M.14521, M.51756, M.45654, M.82032, M.24952, M.47911, M.56209, M.36404, M.39177, M.39291(mixed lot), M.57212, M.57172, M.57060, M.68602, M.62578, M.68583, M.68991, M.57299, M.57004, M.56776, M.24900, M.31081, M.38384, M.56222, M.38383, M.68439, M.55920, M.62637, M.85352, M.85308, M.78830, M.85417, M.85949, M.86112, M.82310, M.81681, M.77790, M.81847, M.81872, M.85529, M.82399, M.82024, M.78464, M.81815, M.82891, M.85720, M.78498, M.78730, M.85758, M.82206, M.77638, M.79853, M.80379, M.80193, M.80136, M.79779, M.82484, M.81957, M.82576, M.82239, M.82110, M.72900, M.52242, M.52050, M.85460, M.22068, M.75693, M.72760, M.75684, M.46433, M.70495, M.73287, M.46552, M.70661, M.46548, M.70866, M.72455, M.70457, M.29028, M.72872, M.72272, M.73349, M.70718, M.72424, M.78743, M.46464, M.72134, M.56257, M.52184, M.52038, M.46452, M.56131, M.1420, M.77249, M.77249, M.55733, M.46513, M.46551, M.31133, M.46461, M.56512, M.46509, M.48467, M.46430, M.46553, M.46545, M.56261, M.47862, M.76193, M.76122, M.48581, M.46431, M.76871, M.80163, M.76909, M.55298, M.46565, M.98446, M.46503, M.62724, M.46472, M.47161, M.75655, M.76924, M.68982, M.68045, M.39113, M.61719, M.45767, M.51939, M.47201, M.88094, M.46396, M.47970, M.47934, M.22369, M.37652, M.88095, M.55250, M.14148, M.31087, M.46375, M.68803, M.46390, M.46380, M.56697, M.46497, M.14499, M.69135, M.14236, M.36819, M.24898, M.46491, M.46410, M.46383, M.29978, M.46389, M.61860, M.46402, M.46561, M.46485, M.45711, M.56995, M.46448, M.46500, M.88096, M.69973, M.56985, M.47723, M.61991, M.57007, M.46562, M.68618, M.31208, M.63141, M.47683, M.55240, M.45894, M.69550, M.69504, M.70030, M.57759, M.63502, M.47797, M.57681, M.57087, M.48033, M.25093, M.55322, M.68842, M.68872, M.46406, M.63534, M.63379, M.56659, M.25232, M.56728, M.30056, M.61498, M.45691, M.14039, M.14452, M.57438, M.58254, M.68921, M.67907, M.46458, M.68541, M.24942, M.46424, M.46514, M.57865, M.56559, M.68891, M.57191, M.57872, M.97705, M.46550, M.32002, M.61974, M.52345, M.56628, M.56377, M.58282, M.57776, M.46447, M.32064.

Redescription: Shell (Figs 2B,D–E; 3A; 4F–K; 5A–K; 12; 13). Small, 2.32 mm wide and 1.41 mm high at five whorls, trochiform, carinated, narrowly umbilicated, thin transparent, whitish to pale buff streaked with brown to dark brown rather narrow zigzag lines. Suture impressed, margined. Spire conic, higher than height of aperture; outlines flat to slightly convex. Protoconch of 1.5–1.75 whorls, pustulate, with 10–12 spiral lirae broken up by irregular oblique axial ridges resulting in a beaded sculpture. Teleoconch whorls flat to slightly convex, periphery carinate and ornamented with equidistant brown bands; base convex. Sculpture consisting of

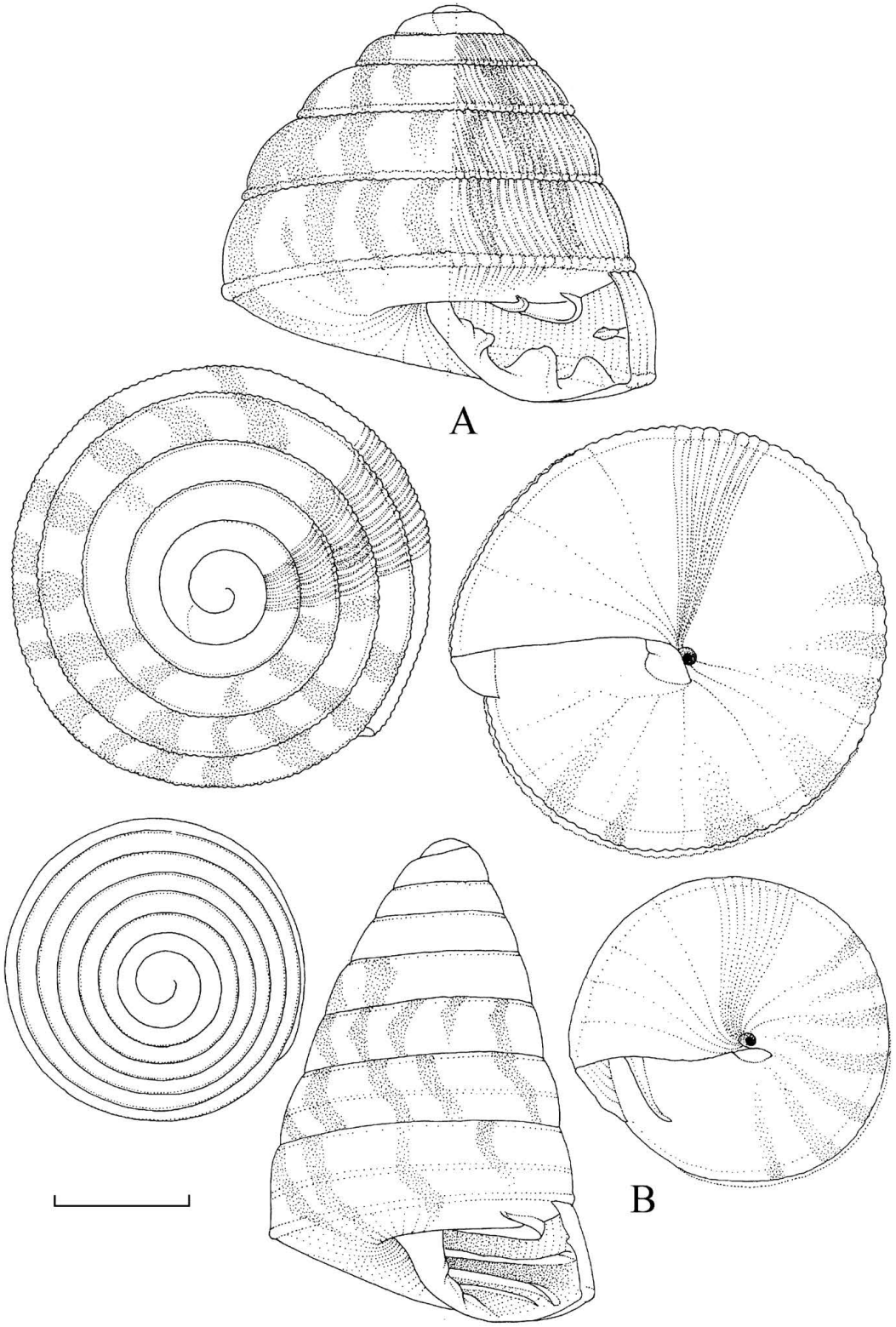

Figure 6. *Laoma*, group of *leimonias* (Gray, 1850). ***A***, *Laoma labyrinthica* Powell, 1948, *Brachyglottis*, 100' below camp, Castaway Valley, Great King Island, F.M. Climo, 28.11.1970, NMNZ/M.47288. ***B***, *Laoma leimonias*, broadleaf and mamaku litter, Jones Bush, Waitutu, Auckland, F.M. Climo and D.J. Roscoe, 11–12.2.1981, NMNZ/M.78562. Scale line 1 mm.

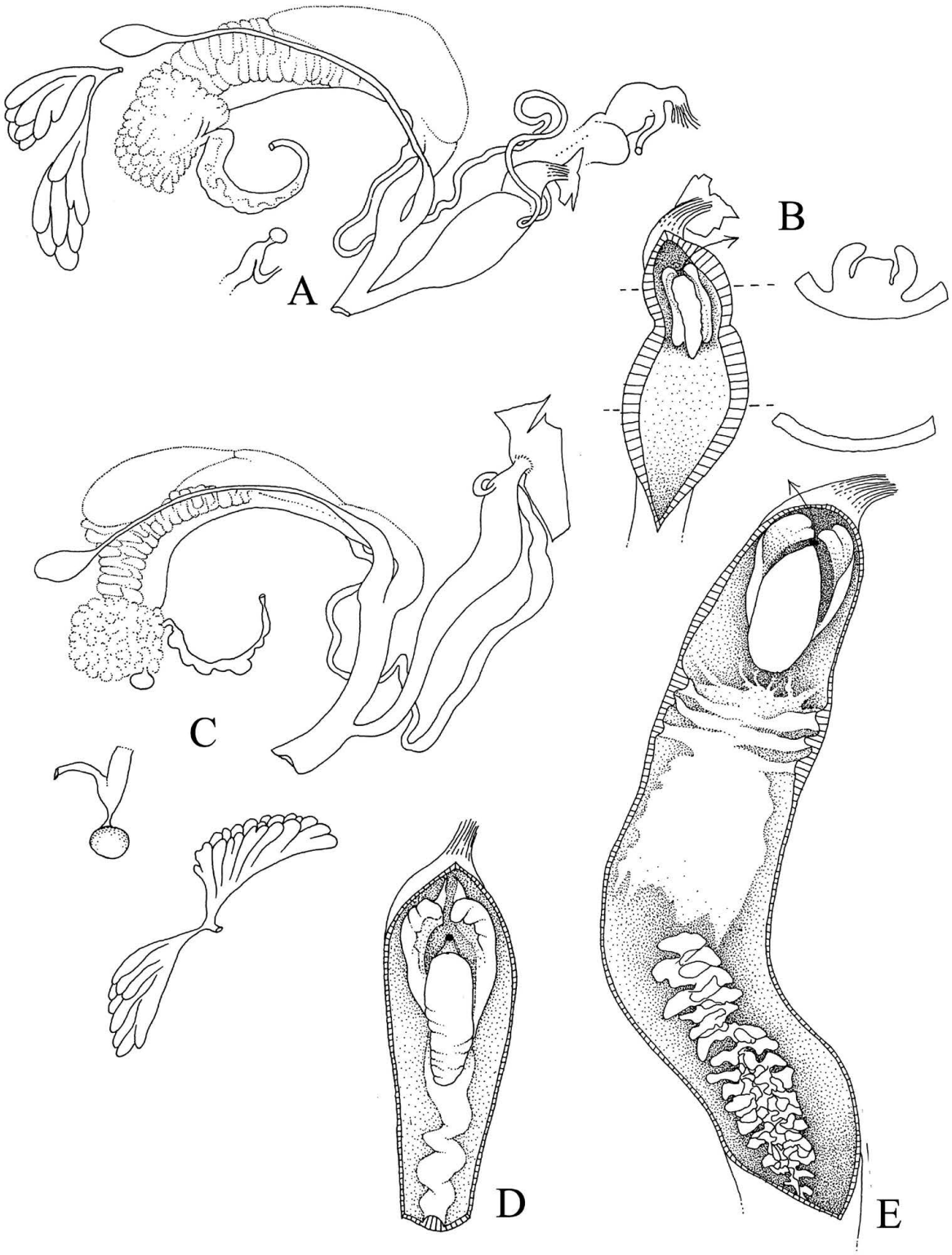

Figure 7. *A–B*, *Laoma marina* (Hutton, 1883), whole reproductive system and dissected epiphallus, Woodlands, Waitakere, Auckland, N. Douglas, 13.8.1967. *C–D*, *Laoma nerissa*, (Hutton, 1883), whole reproductive system and dissected epiphallus, Naenae, Hutt Valley, Wellington, F.M. Climo, 24.2.1966. *E*, *Laoma ordishi* n.sp., dissected epiphallus, 4 miles S of Wellsford, southern Northland, F.M. Climo, -.3.1968.

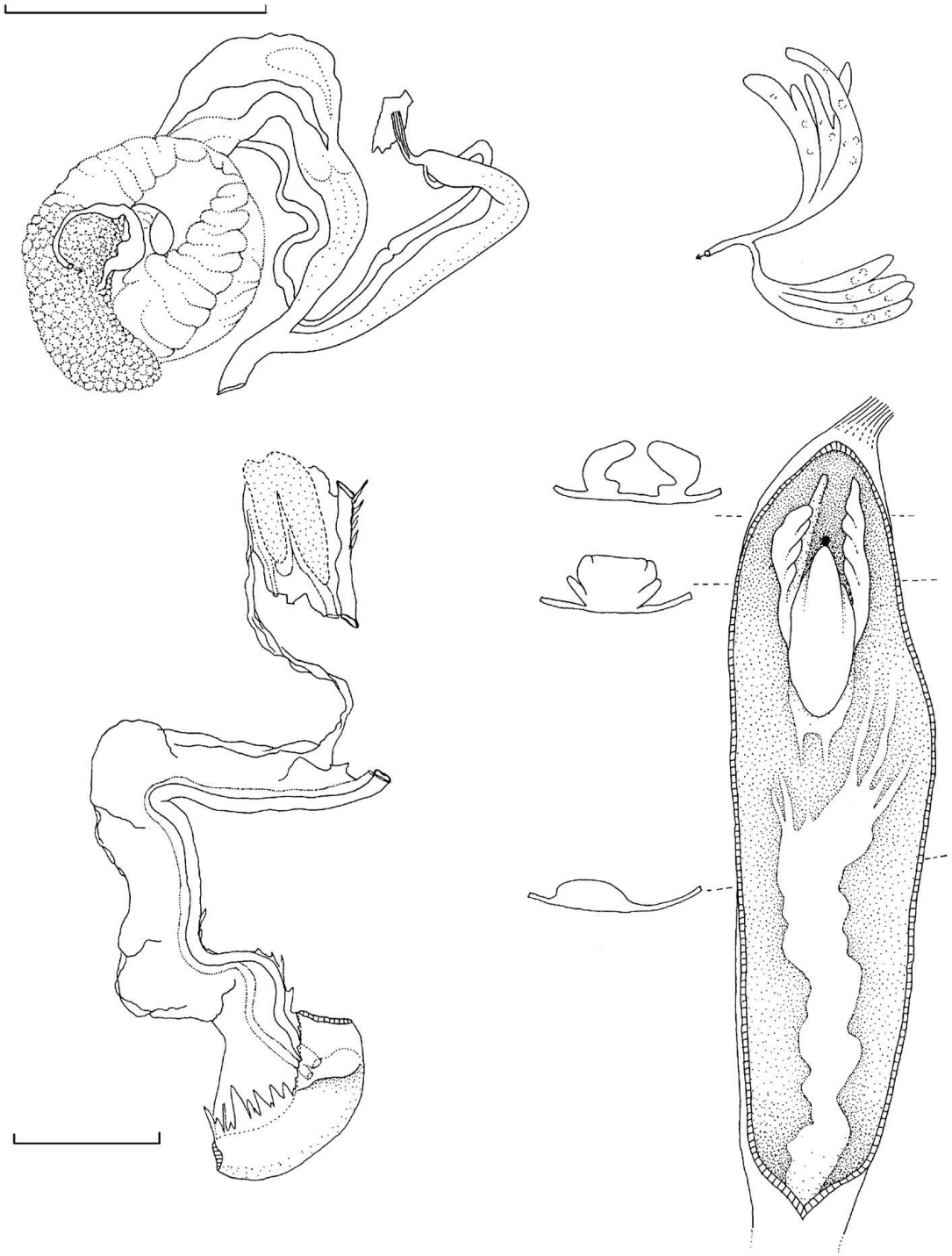

Figure 8. *Laoma*, group of *leimonias* (Gray, 1850). *Laoma leimonias*, pallial roof, whole reproductive system and dissected epiphallus, Mangatawhiri, Hunua, Auckland, N. Douglas, 3.10.1967. Scale line 1 mm.

Figure 9. *Laoma labyrinthica* Powell, 1948. Three Kings Islands, Great King, below camp, L01/320828, 100 m asl, F.M. Climo, 14.11.1970. Scale line 1 mm.

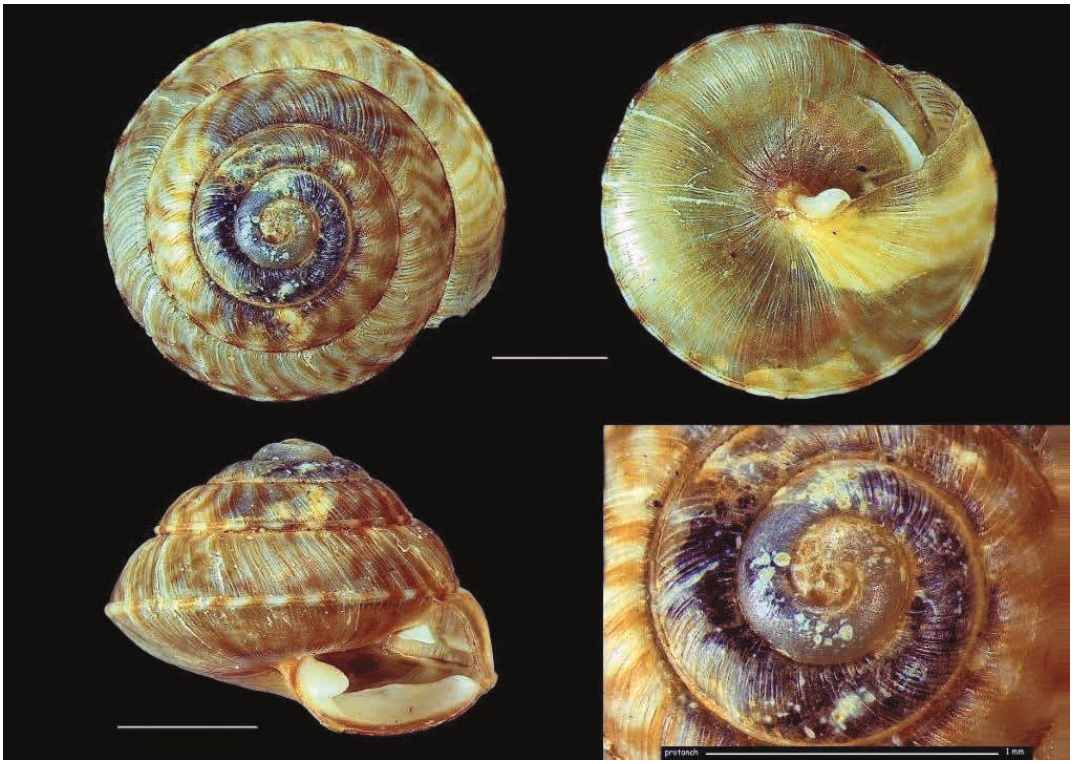

Figure 10. *Laoma ordishi* Climo n. sp., holotype, MA73598, Taranga/Hen Island, SE of Whangarei, E1753468 N6018634, D.J. Roscoe, 16.10.2010. Scale line 1 mm.

Figure 11. *Laoma marina* (Hutton, 1883), Mount Pirongia, King Country, E1786653 N5795052, K. Mahlfeld, 3.5.2018. Mainly tawa, 468 m asl. Scale line 1mm. (Note: calcareous thickening weak in this specimen).

Figure 12. *Laoma nerissa* (Hutton, 1883). Namunamu, Himatangi, Turakina Valley, E1809613 N 5581912, I.A.N. Stringer, 15 September 2007. Scale line 1 mm.

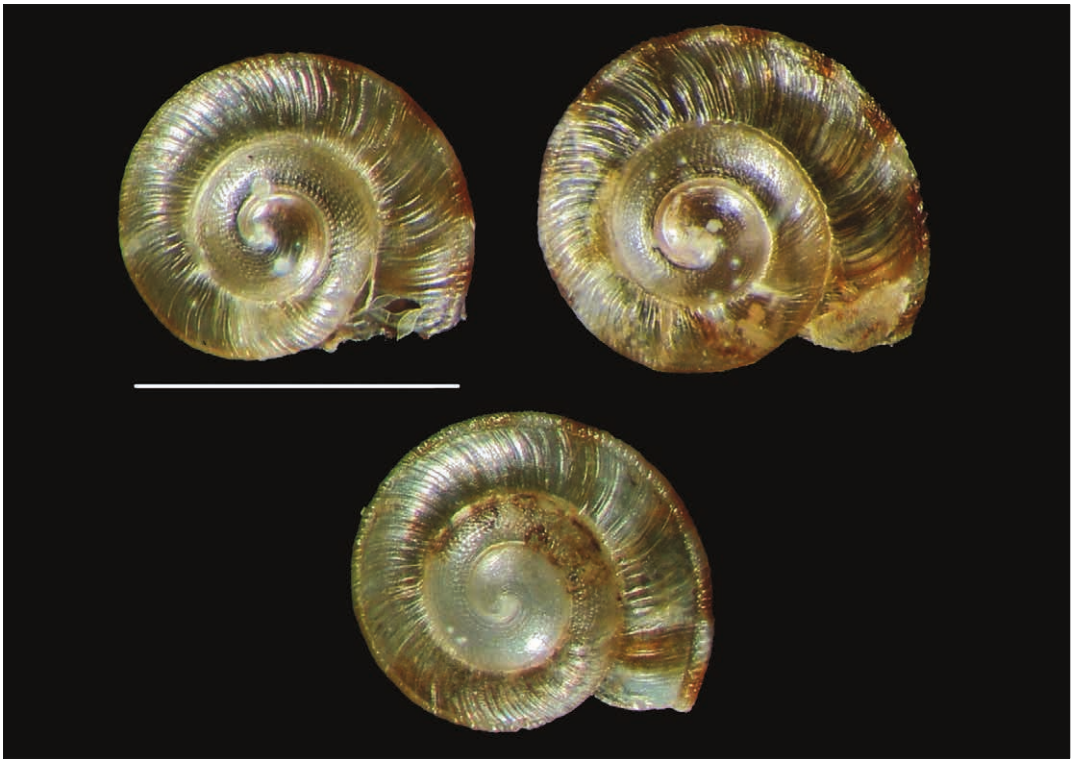

Figure 13. Close-up of protoconch sculpture of *Laoma nerissa* (Hutton, 1883). Mangakahia Stream W of Te Kuiti and NW of Taupo, E1758764 N5758472, L. Daglish, 10.8.2007. Beneath limestone bluffs. Scale line 1 mm.

prominent oblique growth wrinkles; last whorl sometimes slightly concave below the peripheral keel. Aperture oblique, rhombic, with one strong columellar lamella, one upper crescent-shaped thin parietal lamella, one smaller mid-parietal crescent-shaped lamella, the latter often nearly fully reabsorbed to leave just a little bump. Inner outer lip with one long thin palatal lamella just above the carinate periphery and three basal cone-shaped lamellae, which are fused in some specimens. Peristome sharp; columella short arcuate; inner lip reflexed and partially covering narrow, deep umbilicus.

Reproductive system (Fig. 7C–D). Gonads relatively large, bilobed; each lobe consisting of many elongate acini. Albumen gland squarish-round, alveoli small; round talon on stalk buried in albumen gland. Prostatic gland bunched with large folds; uterus of similar size, surface smooth. Oviduct and spermathecal base of similar proportions, both round, slender and tapering towards uterus and prostate respectively. Apical part of spermatheca ovate. Hermaphroditic duct short, broad and kinked. Vagina relatively long, cylindrical. Vas deferens enters phallus through a simple pore just below the retractor muscle near apex of phallus. Phallus tapers slowly towards atrium. Apical half of interior adorned by a large, longish oval pilaster flanked by crescent-shaped folded pilasters. Below the three apical pilasters, interior ornamented with a long, wavy, longitudinal pilaster or uniformly smooth walls; a trace of a constriction is discernible about midway of phallic lumen.

Remarks: Suter based his comparisons of *L. marina* and *L. nerissa* on a large sample from Auckland, one of the areas where the species' ranges overlap. Charles Mousson provided the sample, which he collected on the lava fields of Mount Wellington, Auckland. Hutton's samples were collected from Remuera, Auckland by T.F. Cheeseman (according to Dr A.W.B. Powell's notes lodged in Auckland Museum).

DISCUSSION

Comparative remarks

L. marina has a larger shell with fewer apertural lamellae, and weaker shell sculpture and carina than *L. nerissa* and *L. ordishi* n. sp., as shown by shell drawings of the type material and colour photos. Shell shape is also more depressed in *L. marina* (Figs 2 and 11) than in the slightly taller-spired *L. nerissa* (Figs 2 and 12) and *L. ordishi* n. sp. (Figs 3 and 10), which also tends to be more beehive-shaped. All three species have one prominent columellar lamella but differ in other barriers (Figs 4 and 5). *L. ordishi* n. sp. shares with *L. marina* a broad calcareous band from columella to carina. Generally, *L. nerissa* has two long parietal lamellae, one larger upper one and a smaller lower one; a long palatal lamella parallel to and just above the periphery and three large basal lamellae. Some minor variation (as illustrated in Figs 4 and 5), occurs depending on the growth stage and whether all lamellae are fully developed, or more

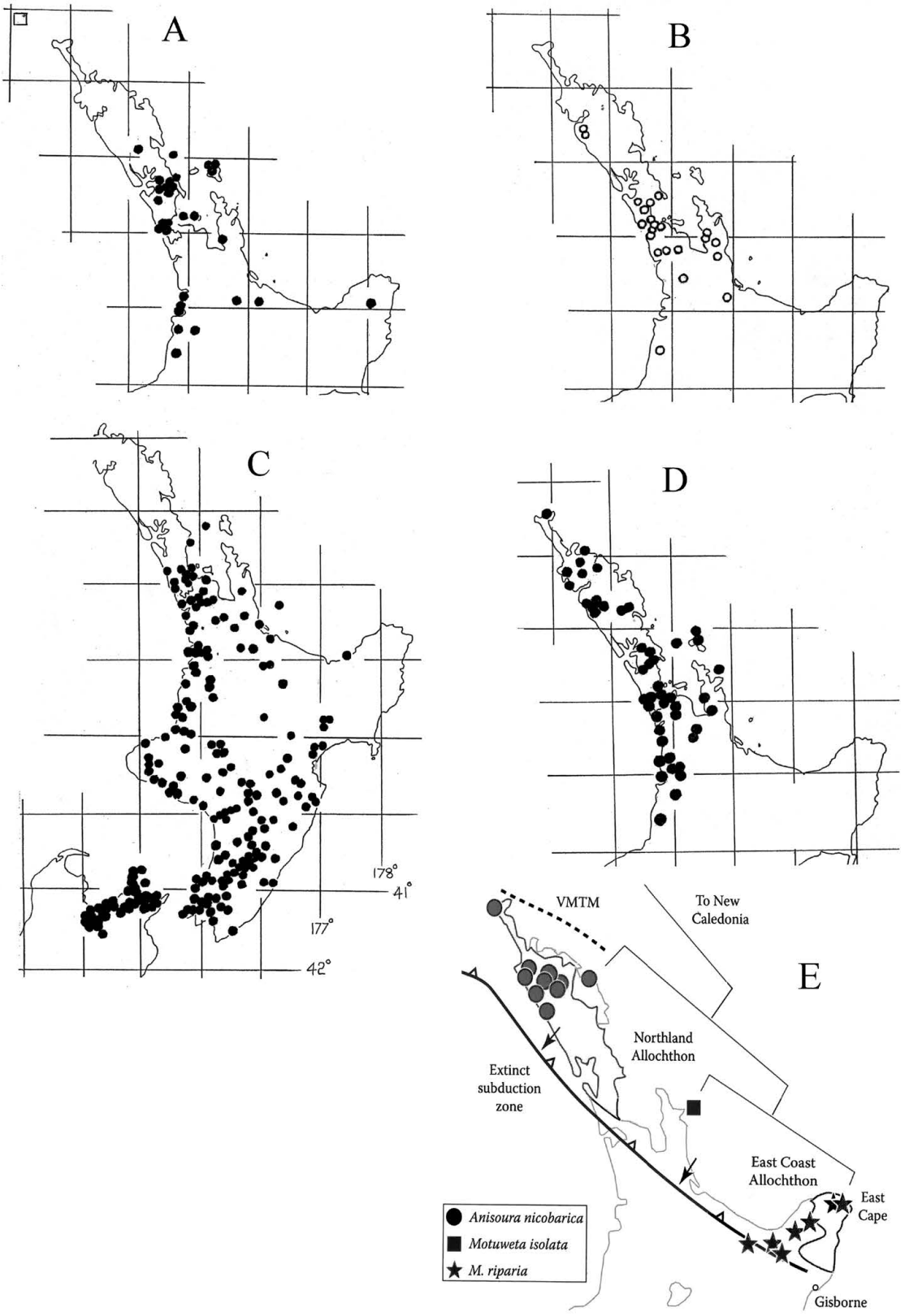

Figure 14. Distributions of *Laoma leimonias* group species. ***A***, *Laoma labyrinthica* Powell, 1948 (open square); *Laoma ordishi* n. sp. (filled circle). ***B***, *Laoma marina* (Hutton, 1883) (open circle). ***C***, *Laoma nerissa* (Hutton, 1883) (filled circle). ***D***, *Laoma leimonias* (Gray, 1850) (filled circle); ***E***, distribution and phylogeny of New Zealand tusked weta, *Motuweta* and *Anisoura* and associated allochthonous terranes; VMTM=Vening Meinesz transform margin; arrows indicate the former southeast rollback of subduction zone, now extinct (redrawn from Heads 2017: Fig. 5.6, p. 154).

rudimentary. Protoconch and teleoconch sculpture and carina are stronger in *L. nerissa* coupled with a slightly more open umbilicus, which is very small to obsolete in *L. marina* and *L. ordishi* n. sp. Teleoconch axial sculpture is weakest in *L. marina* but stronger and of similar grade in *L. ordishi* n. sp. and *L. nerissa*. The shells of *L. ordishi* n. sp. are the smallest of the three species. All three species also differ in protoconch sculpture (Figs 10–13). In contrast, *Laoma leimonias* (Gray, 1850) is glossy and a much taller-spired species with more shell whorls, while sharing a certain type of reproductive morphology with *L. nerissa*, *L. marina* and *L. ordishi* n. sp. (Figs 6 and 8). *L. labyrinthica* Powell, 1948 has the most heavily sculptured shell and barrier configuration (Figs 6 and 9) with a colour pattern of broad axial brown bands, but reproductive anatomy is unknown.

Dissections of the male reproductive systems of *L. marina* (Fig. 7A,B) and *L. nerissa* (Fig. 7C,D) show a weaker development of pilasters in the upper lumen and a more conspicuous constriction in the upper third of the lumen in *L. marina* compared to *L. nerissa*. The junction between epiphallus/phallus in *L. ordishi* n. sp. (Fig. 7E) is not marked by a constriction as in *L. marina* and is, as already mentioned, weaker in *L. nerissa*. The lumen wall is thinner in *L. ordishi* n. sp. and the median upper pilaster is larger while the pilasters on each side are thinner. The area of constriction is still marked by three latitudinal thin ridges followed by a thickened patch mid-lumen and a series of irregular, smaller pilasters on the lower lumen wall. The terminal male lumen interior is similar in *L. leimonias* without a constriction in the male terminal duct (Fig. 8).

All species addressed here share shell and anatomical characters which suggest that they form a group of related lamellate species within *Laoma s.str.* The non-lamellate species *Phrixgnathus murdochi* Suter, 1894, *P. sciadium* (Pfeiffer, 1857) and another unnamed closely related species may also warrant inclusion into *Laoma s.str.* based on shell and reproductive features. This hypothesis could be tested with molecular data in future.

Conservation status and geographic distributions

In New Zealand, the Department of Conservation (DOC) maintains and publishes lists of the conservation status of native species based on population size, area of occupancy, population trends, and type and severity of threats. The highest threat category is nationally critical, while the lowest rank is naturally uncommon (Townsend *et al*. 2008). Currently, over 600 terrestrial snails and slugs are of some conservation concern (Mahlfeld *et al*. 2012; an update will be published this year). *Laoma marina* is sparsely distributed from Auckland and Coromandel northwards to Hokianga Harbour with an outlier in the King Country and probably not threatened, but sparser than the other mainland species. *L. nerissa* is found from Auckland southwards with its range extending to Marlborough Sounds and Nelson in the South Island (Fig. 14). This species is common and not threatened. *L. labyrinthica* is endemic to Great King, Three Kings Islands and as an island endemic is automatically classified as naturally uncommon. *L. ordishi* n. sp. occurs from Taranga Island south to South Waikato and East Cape area and is not threatened. *L. leimonias* occurs from Aupouri Peninsula (Far North) south to Te Kuiti area and is not threatened either.

All species (except *L. labyrinthica*) intersect in a zone from Taranga Island off eastern Northland south to Te Kuiti including Coromandel Peninsula and islands in Hauraki Gulf.

The species distributions run largely parallel to an extinct subduction zone and the Vening Meinesz transform margin with a distributional gap across the Bay of Plenty (Fig. 14E). This is a standard type of distribution pattern, mapped and discussed in Heads (2017 and references therein) and involves plant and animals such as: *Beilschmiedia* species, NZ tusked weta, rhytidid and charopid snails (e.g., *Chaureopa* species Climo, 1985, Fig. 9 and *Phenacharopa novoseelandica* (Pfeiffer, 1853)). Other invertebrate species relationships between Three Kings Islands and mainland New Zealand were discussed recently by Buckley and Leschen (2013) and Leschen and Buckley (2015).

AUTHORS' CONTRIBUTIONS

FMC did all the original shell morphological analyses, dissections and line drawings of the species discussed and therefore is the author of *Laoma ordishi* Climo n. sp. KM collated all the information and wrote the text with contributions from IP & DJR, and DJR photographed and processed the colour photos presented in this paper.

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Establishment of the green lacewing *Mallada basalis* (Walker, 1853) (Neuroptera: Chrysopidae) on mainland New Zealand

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Abstract
The chrysopid lacewing *Mallada basalis* has recently established in the north of the North Island of New Zealand. Information on its life cycle, distribution and seasonality is presented.

Keywords
Chrysopidae; *Mallada basalis*; introduced species; citizen science

INTRODUCTION

The endemic New Zealand mainland neuropteran fauna is small with only seven species in the families Berothidae (1), Hemerobiidae (1), Myrmeleontidae (1) and Osmylidae (4). This is augmented by seven adventive species in Coniopterygidae (2), Hemerobiidae (4) and Sisyridae (1) (Wise 1991, 1998). Chrysopidae, the largest family of Neuroptera with 1,300–2,000 species worldwide (Strange 2004; New 1991), has hitherto been absent from mainland New Zealand although the species reported here has long been known from Raoul I of the Kermadec Is (Wise 1972, 1977, specimens in Auckland Museum). Many attempts to introduce various chrysopid species for biological control of aphids (Thomas 1989) and mealybugs (Charles 1989) have failed. The only temporary establishment of a chrysopa [*sic*] was reported by Broun (1898) from observations in Auckland and Whangarei, but Wise (1995) gave good reasons to conclude that this was most likely a misidentification of the common hemerobiid *Micromus tasmaniae* (Walker, 1860).

A single specimen of *M. basalis* (Walker, 1853) was found in 1976 on Moturoa I (off Cape Karikari, Northland) (MacDonald 1977). This was probably a natural occurrence, but no further specimens were found despite searching for it by Keith Wise in Northland in the 1970s and 1980s, so it seems that it didn't establish. Wise (1988) recorded the inadvertent advent of a single *Chrysopa* specimen (later identified as *Mallada* sp. near *M. alcestes* (Banks, 1911) (Wise, 1991) on an imported pineapple, and even if others have escaped border inspection it is clear that they have not established. The purpose of this note is to record the recent establishment of *Mallada basalis*, the only chrysopid, in New Zealand.

OBSERVATIONS

Recent records

The first recent record of *M. basalis* that I am aware of is a specimen photographed by Trevor Crosby in March 2010 on Tiritiri Matangi in the Hauraki Gulf. In 2016 a second photographic record from the same place was made by Olivier Ball (Fig. 1), and the first specimen from Auckland City was reported (https://inaturalist.nz/observations/3160897). In April 2017 I found a final instar larva on *Ficus rubiginosa* in Albert Park, Auckland, and reared it through to adult. The 2018–19 summer saw many observations of all life cycle stages being posted on iNaturalistNZ (https://inaturalist.nz/) which, along with verbal reports from other experienced observers (N.A. Martin, G. Hill pers. comms), indicate that it clearly is now a well-established member of the New Zealand insect fauna. The proliferation of observations prompted the Ministry for Primary Industries (MPI) to seek confirmation of its identity and this was provided by Dr Shaun Winterton (California Department of Food and Agriculture) based on specimens collected from the Auckland Domain.

Recognition and life history stages

Adult *M. basalis* are 10–15 mm long from head to tip of the wings. Their shape and colour are typical for many species of the family; their beautiful pale green colour fades in museum specimens as sometimes does the mid-dorsal golden yellow stripe running the length of the body, from the back of the head to tip of the abdomen (Fig. 1). The delicate wings with characteristic network of green veins are held in a flattened tent-like manner over the slender abdomen and are considerably longer than it. They sparkle in sunlight and when the insect is in flight. The eyes have a brilliant irridescent copper to green colour in life but this fades within hours of death.

Figure 1. *Mallada basalis* female, Tiritiri Matangi, May 2016. Photo: O. Ball.

Males are readily distinguished by the presence of a strong green pterostigma on the hind wing (Fig. 2). In the female the pterostigma may be absent or pale brown but never as strong as in the male (Fig. 3). New (1980) provided illustrations of the apex of the abdomen which also help identification of the sexes.

The pale green oval eggs are laid on long stalks attached to leaves (see https://inaturalist.nz/observations/21340459). Larvae are very similar in appearance to those of the common hemerobiid *Micromus tasmaniae* which is readily found on aphid-infested garden plants. They differ, however, by their habit of festooning the body with small pieces of detritus and the bodies of prey which they attach to tufts of setae on the dorsal thoracic and abdominal surface as in Fig. 4. This is a common behaviour in many Chrysopidae species and has earned them the moniker 'trash-carriers'. It provides camouflage as they live their lives exposed on leaves. The final instar larva spins a white silk cocoon, incorporating the larval detrital decoration (Fig. 5). Pupation occurs within the cocoon and the adult emerges after 13–14 days in the lab at 21°C. On some occasions the pupa leaves the cocoon and its exuviae can be found beside it on the leaf.

Diet

Larvae are generalist predators of small invertebrates and probably take anything they encounter. For this reason, *M. basalis* is not associated with any particular plant species. I have reared them in the lab on

- acacia psyllid *Acizzia acaciae* (Maskell, 1894) adults
- hellebore aphid *Macrosiphon hellebori* (Theobald & Walton, 1923)
- green peach aphid *Myzus persicae* (Sulzer, 1776)
- citrophilous mealybug *Pseudococcus calceolariae* (Maskell, 1879)
- greenhouse thrips *Heliothrips haemorrhoidalis* (Bouché, 1833) adults and immatures
- bottlebrush thrips *Teuchothrips disjunctus* (Hood, 1918) immatures

Other observers have found them associated with oleander aphid *Aphis nerii* Boyer de Fonscolombe, 1841 on swan plant (Sophie Potter, pers. comm.), and with whitefly and psyllids on ash (S.E. Thorpe, pers. comm.).

Distribution, seasonality and abundance

Mallada basalis has a wide geographic distribution including Australia (Queensland, New South Wales, Victoria), Philippines, Taiwan, Ryukyu Is, Micronesia and Polynesia to Easter I (Adams 1959; New 1980; Winterton 1995; Wise 1991). The population closest to mainland New Zealand is on the Kermadec Is (Wise 1977), some 1,100 km north-east from the northern tip of the North I. In New Zealand they have been found from the top of Northland (Spirits Bay, Auckland Museum voucher specimen AMNZ135369) to south Auckland with most of the records from the greater Auckland area. The current distribution based on records from iNaturalistNZ and the Auckland Museum collection is shown in Fig. 6.

Figure 2. *Mallada basalis* male.

Figure 3. *Mallada basalis* female.

Figure 4. *Mallada basalis* larva.

Figure 5. *Mallada basalis* cocoon.

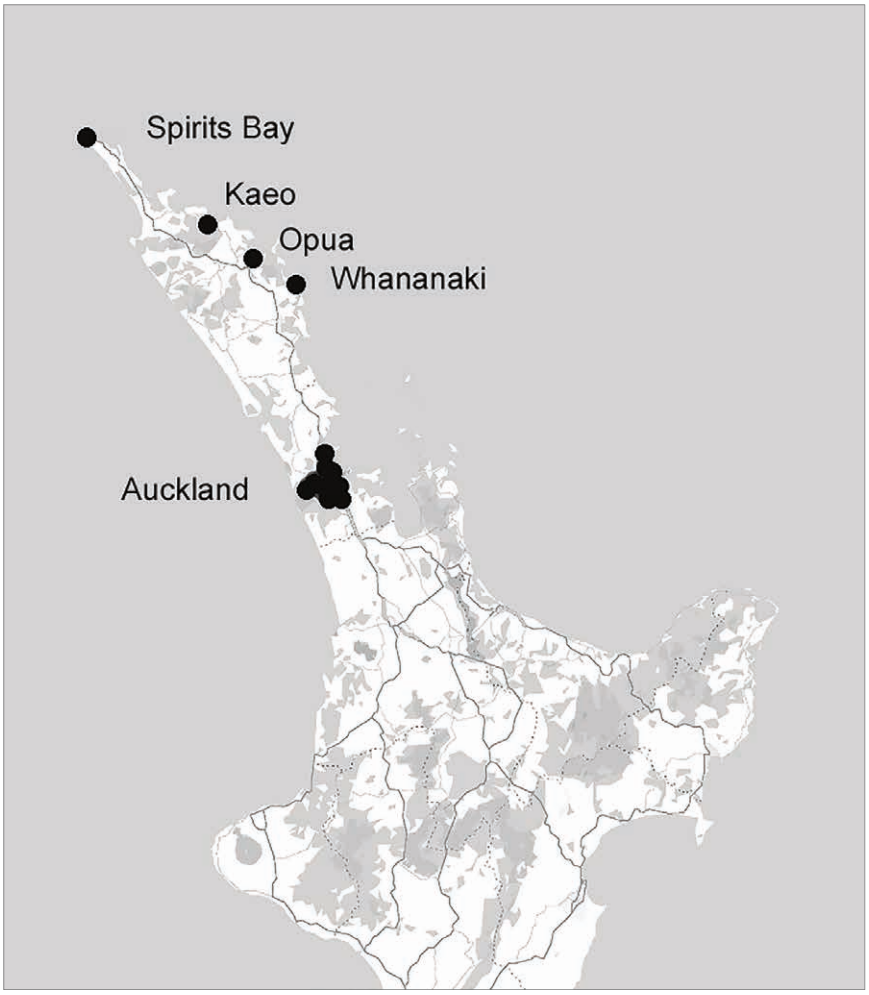

Figure 6. Distribution of *M. basalis* in the North Island.

Adults have been found from December to late July, but most records are from late summer to autumn (February–April). This probably reflects a build-up of populations by late season and increases the likelihood that they are observed. There is one record from September.

Natural enemies

One cocoon collected from the Auckland Domain on 26 March 2019 failed to emerge. It was dissected on 18 June and found to contain a well-formed but mouldy pupa of an ichneumonid which could not be identified further.

Other potential hymenopteran parasitoids are the figitids *Anacharis zealandica*, a common and widespread parasitoid of *Micromus tasmaniae* (Hemerobiidae) cocoons, and *Xyalaspis* sp., host unknown but possibly *Wesmaelius subnebulosus* (Hemerobiidae). Rearing of field collected cocoons is needed to obtain more information.

Friend or foe?

Most of specimens recorded here were seen and/or collected in modified habitats, mostly urban and suburban parks and gardens. *Mallada basalis* may prove to be beneficial for controlling pests like aphids and mealybugs in such environments and in horticultural crops. However, the two records from Tiritiri Matangi, where it was found on restoration plantings of endemic flora, indicate that it will colonise native habitats. Nicholas Martin (pers. comm) has also found it in native bush remnants around Auckland. It remains to be seen how far it will invade natural habitats and the extent to which it will feed on indigenous insects. Wise (1995) cautioned that introduced Neuroptera, all non-specific predators, ought to be considered as pests because of the risk they pose to the endemic insect fauna.

Material examined

45 records on https://inaturalist.nz/observations?place_id=6803&taxon_id=511376 (accessed 9 Oct 2019).

24 specimens in the Auckland Museum collection with the following accession numbers prefixed by AMNZ:

Kermadec Is: AMNZ75839-75861, 75864, 76463, 76464, 80178

Northland: AMNZ75863, 135369

Auckland: AMNZ118899, 135320-135324, 135352, 135368,135558-135563, 148177.

Specimen details can be obtained by searching for *Mallada basalis* at http://www.aucklandmuseum.com/collections-research/collections

DISCUSSION

It is not clear when this species arrived and naturalised, where the founders came from, nor whether this is a natural or human-aided introduction. Given the natural geographical distribution of this species and patterns of establishment of other insects, it seems that Australia or the Pacific islands are the most likely places of origin. If this was around 2010, when the first recent sighting occurred, then they will have been slowly building up population numbers until being recorded more frequently from 2016. The 2018–19 summer in Auckland was mild and long and this may have contributed to a population expansion and a surge of observations posted online on iNaturalistNZ. The current distribution from Auckland to the top of the North Island might also indicate that they have been present for some time, building up numbers and spreading. It remains to be seen how far south they will spread within New Zealand.

This study has relied heavily on observations and photographs on the online social media platform of iNaturalistNZ, demonstrating the importance of citizen science and the role that interested observers can play in documenting the fauna and monitoring the establishment of new species.

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