the Marine Biota of New Zealand

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Carina Sim-Smith, Dorte Janussen, Pilar Ríos, Diana Macpherson, Michelle Kelly

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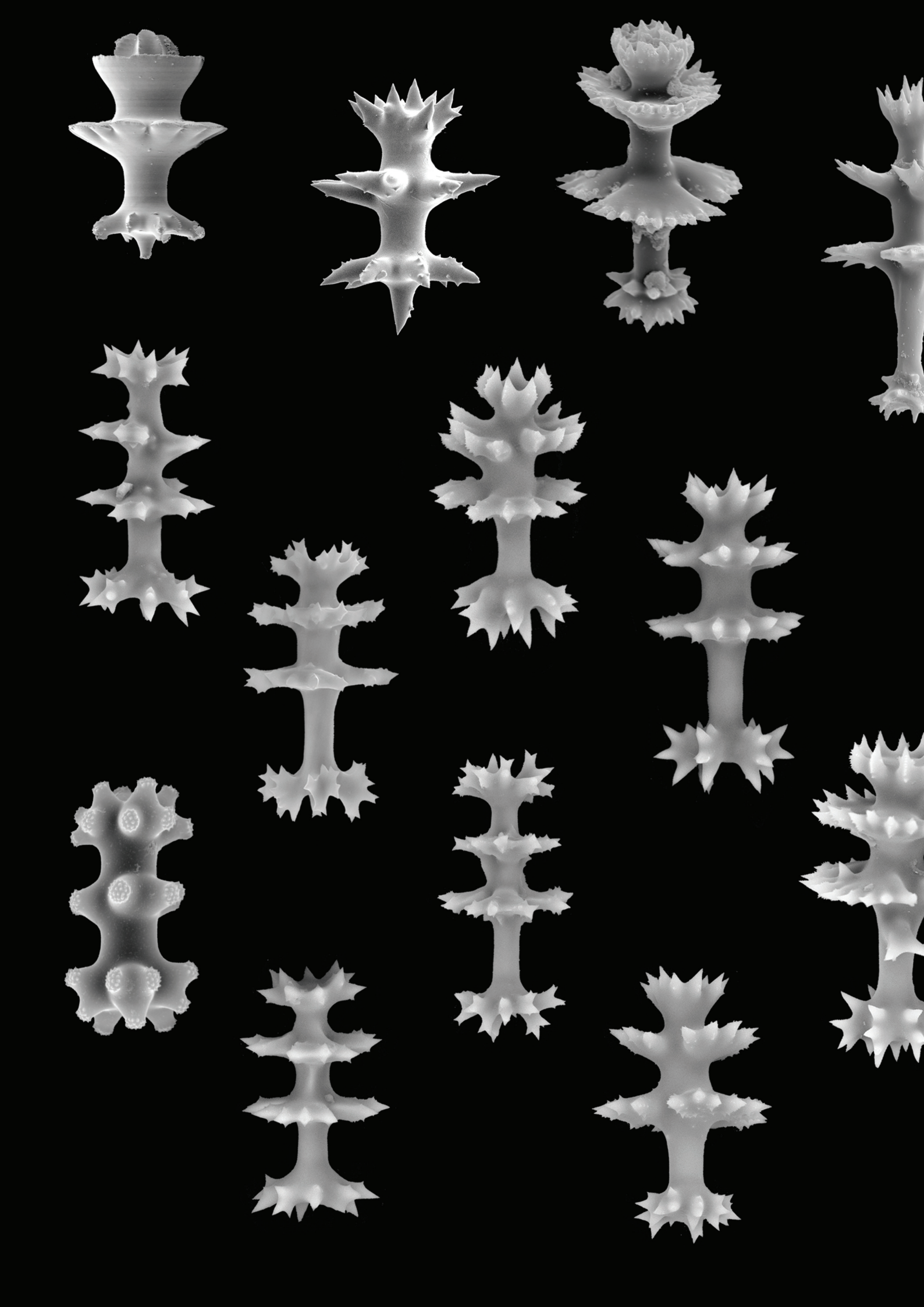

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Latrunculia (*Biannulata*) *procumbens* Alvarez, Bergquist & Battershill, 2002 (family Latrunculiidae), Poor Knights Islands, Feb 2013. Image courtesy of NIWA.

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PREFACE

A review of New Zealand and Antarctic latrunculid sponges with new taxa and new systematic arrangements within family Latrunculiidae (Demospongiae, Poecilosclerida)

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Abstract

Over 250 latrunculid sponge specimens (class Demospongiae Sollas, 1885, order Poecilosclerida Topsent, 1928, family Latrunculiidae Topsent, 1922) from around New Zealand and Antarctica were examined and registered from new and existing collections. Fifteen species were previously known from these regions, but differentiation on the basis of morphological traits has been challenging due to the paucity of information on key morphological and live characters in earlier published descriptions. Moreover, the easily recognisable and highly ornamented anisodiscorhabd microsclere, the key diagnostic character in latrunculid sponges, often differs in subtle ways between species.

Of these fifteen known Latrunculiidae species, we have redescribed fourteen with new scanning electron microscope images, emphasising detailed spicule dimensions and morphological descriptions to strengthen and clarify the differences between these species. We have also resurrected *Latrunculia* (*Latrunculia*) *lendenfeldi* Hentschel, 1914 based on new material. A fourth subgenus, *Latrunculia* (*Aciculatrunculia*) **subgen. nov.**, has been established for two known species, *Latrunculia biformis* Kirkpatrick, 1908 and *Latrunculia apicalis* Ridley & Dendy, 1886 *sensu stricto*, both of which possess aciculodiscorhabds with extended apical spires. Both are redescribed from new material.

Fourteen new extant species of *Latrunculia* du Bocage, 1869 and one fossil species (†) are described from the New Zealand Exclusive Economic Zone, the Australia Exclusive Economic Zone around Macquarie Island on Macquarie Ridge to the southwest of New Zealand, Antarctic waters, and International Waters just beyond the New Zealand Exclusive Economic Zone: *Latrunculia* (*Latrunculia*) *andeepi* **sp. nov.**; *Latrunculia* (*L.*) *bransfieldi* **sp. nov.**; *Latrunculia* (*L.*) *morrisoni* **sp. nov.**; *Latrunculia* (*L.*) *gracilis* **sp. nov.**; *Latrunculia* (*L.*) *incristata* **sp. nov.**; *Latrunculia* (*L.*) *kiwi* **sp. nov.**; *Latrunculia* (*L.*) *nelumbo* **sp. nov.**; *Latrunculia* (*L.*) *magistra* **sp. nov.**; *Latrunculia* (*L.*) *robertsoni* **sp. nov.**; *Latrunculia* (*L.*) *prendens* **sp. nov.**; *Latrunculia* (*L.*) *toufieki* **sp. nov**.; *Latrunculia* (*L.*) *variornata* **sp. nov.**; *Latrunculia* (*Biannulata*) *macquariensis* **sp. nov.**, *Latrunculia* (*B.*) *alvarezae* **sp. nov.**, and *Latrunculia* (*L.*) *tutu*† **sp. nov.**

Due to the wide-ranging nature of this review, which includes new systematic arrangements for the globally distributed genus *Latrunculia*, it seemed appropriate to extend the study to include two other taxa with representatives in New Zealand and further afield in New Caledonia and the Atlantic Ocean (Iceland, Azores Archipelago, and Southwest Brazil). *Latrunpagoda* **gen. nov.** is established for species whose anisodiscorhabds are characterised by multiple whorls of spines and/or palmate flanges, as first described in the early Eocene New Zealand species, *L. oamaruensis*† Hinde & Holmes, 1892. Two living species and a single fossil Atlantic species have been transferred to this new genus: *Latrunculia multirotalis* Topsent 1927 and *L. tetraverticillata* Mothes, Campos, Eckert & Lerner, 2008, from the Azores and Brazil, respectively, and Iceland fossil species *Latrunpagoda icelandica*† **gen. et sp. nov.**, exemplified in Bukry (1979, Fig. 60F). The enigmatic *Latrunculia crenulata* Lévi, 1993, from deep waters off New Caledonia, is reviewed and a new genus *Latrundiabolo* **gen. nov**. established for this monotypic genus.

Non-technical summary

Over 250 sponge specimens in the sponge family Latrunuculiidae Topsent, 1922, from around New Zealand and Antarctica, were examined and registered from new and existing collections. Fifteen species were previously known from these areas, but telling them apart has been challenging due to the lack of good descriptions. Moreover, the key character used to identify these latrunculid sponges, the highly ornamented and easily recognisable anisodiscorhabd microsclere, often differs in subtle ways between species.

We have redescribed these existing species, using new scanning electron microscope images and detailed spicule descriptions to characterise the morphological differences between species. We have also resurrected *Latrunculia* (*Latrunculia*) *lendenfeldi* Hentschel, 1914 based on new material collected. A fourth subgenus *Aciculatrunculia* **subgen. nov.** is established for *Latrunculia biformis* Kirkpatrick, 1908 and *Latrunculia apicalis* Ridley & Dendy, 1886 *sensu stricto*, both of which have microscleres with a pointed spire on one end (aciculodiscorhabd).

Fourteen new species of genus *Latrunculia* du Bocage, 1869 (class Demospongiae Sollas, 1885, order Poecilosclerida Topsent, 1928, family Latrunculiidae) and one fossil species (†) are described from the New Zealand Exclusive Economic Zone, Macquarie Ridge (Australia Exclusive Economic Zone), Antarctic waters, and International Waters just beyond the New Zealand Exclusive Economic Zone: *Latrunculia* (*Latrunculia*) *andeepi* **sp. nov.**; *Latrunculia* (*L.*) *bransfieldi* **sp. nov.**; *Latrunculia* (*L.*) *morrisoni* **sp. nov.**; *Latrunculia* (*L.*) *gracilis* **sp. nov.**;

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Due to the broad nature of this review, we decided to extend the study to include two other taxa with representatives in New Zealand and further afield in New Caledonia and the Atlantic Ocean (Iceland, Azores Archipelago, and Southwest Brazil). *Latrunpagoda* **gen. nov.** is established for species whose microscleres are characterised by multiple whorls as first described in the early New Zealand fossil species, *L. oamaruensis*† Hinde & Holmes, 1892. Two living species and a single fossil Atlantic species have been transferred to this new genus: *Latrunculia multirotalis* Topsent 1927 and *L. tetraverticillata* Mothes, Campos, Eckert & Lerner, 2008, from the Azores and Brazil, respectively, and Iceland fossil species *Latrunpagoda icelandica*† **gen. et sp. nov.**, exemplified in Bukry (1979, Fig. 60F). The enigmatic *Latrunculia crenulata* Lévi, 1993, from deep waters off New Caledonia, is reviewed and a new genus *Latrundiabolo* **gen. nov**. established, being the only species in the genus.

Keywords

Porifera, Demospongiae, Poecilosclerida, Latrunculiidae, *Latrunculia*, *Latrunpagoda* **gen. nov.**, *Latrundiabolo* **gen. nov.**, *Aciculatrunculia* **subgen. nov.**, systematics, taxonomy, new genera, new subgenera, new species, New Zealand, Three Kings Islands, Northland, northeastern New Zealand, Hauraki Gulf, Bay of Plenty, Wellington, Chatham Rise, Kaikoura, Otago, Fiordland, Chatham Islands, Macquarie Ridge, Subantarctic Islands of New Zealand, Auckland Islands, Antipodes Islands, Ross Sea, Weddell Sea, Cooperation Sea, Cosmonauts Sea, New Zealand EEZ, Australia EEZ, New Caledonia, Antarctica, International Waters, Azores Archipelago, Brazil, Reykjanes Ridge, Iceland.

Introduction

The family Latrunculiidae Topsent, 1922 (class Demospongiae Sollas 1885, order Poecilosclerida Topsent, 1928) is a well-defined and highly recognisable group of demosponges, most of which possess a characteristic microsclere – the discorhabd – that when present, immediately identifies the taxon. The majority of species possess a differentiated aquiferous system of raised (inhalant) areolate porefields and volcano-shaped (exhalant) oscules, and typically range from deep emerald, turquoise, (rarely) purple, to sage green, and light brown to deep chocolate brown hues in life. With a few exceptions, the 82 valid species generally display an amphipolar distribution with most species distributed between South Africa, New Zealand, Antarctica and South America, and the North Pacific Ocean. Family Latrunculiidae comprises eight genera: *Latrunculia* du Bocage, 1869 (with three subgenera); *Sceptrella* Schmidt, 1870; *Strongylodesma* Lévi, 1969; *Tsitsikamma* Samaai & Kelly, 2002; *Cyclacanthia* Samaai & Kelly, 2004 in Samaai *et al.* (2004); *Bomba* Kelly, Reiswig & Samaai, 2016 in Kelly *et al.* (2016); *Latrunclava* Kelly, Reiswig & Samaai, 2016 in Kelly *et al.* (2016), and *Biverticillus* Payne, Samaai & Kelly, 2022, differentiated primarily on the morphology and ornamentation of the diagnostic anisodiscorhabd microsclere and the possession of additional spicules (Plate 1). Latrunculiidae are also renowned for their chemistry, which is dominated by (bis)pyrroloiminoquinone alkaloids (discorhabdins, tsitsikammamines) that display various anticancer, antimicrobial, and antimalarial bioactivities. To date, almost 100 compounds belonging to this chemical family have been reported from latrunculid sponges, and their structure and activity relationships and biosynthetic pathways have been studied (see Li *et al.* 2021 for the most recent review).

Currently, 40 species of *Latrunculia* are recognised as valid (De Voogd *et al.* 2021), with the greatest diversity of species found around the southern hemisphere coastlines of South Africa, South America, New Zealand and Antarctica [summarised in Samaai *et al.* (2006) and Samaai *et al.* (2012)], and in the North Pacific (Kelly *et al.* 2016). In a review of the genus, Samaai *et al.* (2006) separated known species of *Latrunculia* into two subgenera, *Latrunculia* and *Biannulata* Samaai, Gibbons & Kelly, 2006, based on the number of whorls around the base of the anisodiscorhabds. The most recent study by Kelly *et al.* (2016), of material from the waters around British Columbia, Aleutian Islands, and the Gulf of Alaska, expanded our knowledge of the biodiversity of family Latrunculiidae, with the establishment of two new genera, *Bomba* and *Latrunclava*, and a new subgenus of

Latrunculia: *L.* (*Uniannulata*) Kelly, Reiswig & Samaai, 2016.

Prior to this work, fifteen species of *Latrunculia* had been identified in New Zealand waters. Before the seminal works of Miller *et al.* (2001) and Alvarez *et al.* (2002), only two species of *Latrunculia* had been recorded from New Zealand waters: *Latrunculia spinispiraefera* Brøndsted, 1924, from '2 miles east of North Cape', and *Latrunculia brevis* Ridley & Dendy, 1886 *sensu* Bergquist (1968), from the Three Kings Islands, Cape Brett, Chatham Rise and Campbell Plateau. However, the validity of Bergquist's identifications were questioned by subsequent researchers, due to differences between the holotype of *L. brevis* from Argentina and the New Zealand specimens [Alvarez *et al.* 2002; Samaai *et al.* 2006; see species description of *L.* (*L.*) *brevis* for more details]. Miller *et al.* (2001) conducted a genetic study to, primarily, determine the origin of discorhabdin secondary metabolites in the genus. That study revealed a complex of species, which Alvarez *et al.* (2002) used to support descriptions of nine new species from shallow, coastal New Zealand waters. Miller *et al.* (2001) and Alvarez *et al.* (2002) employed a combination of allozyme profiles, biochemical compositions, and live colour to differentiate several species, which were otherwise morphologically indistinguishable. They also noted that they had collected several other *Latrunculia* specimens from Spirits Bay, Gisborne, Chatham Rise, New Plymouth, and Auckland Islands, which were likely to be new species, but which were not described at the time.

While we acknowledge the early contribution and important baseline established by Miller *et al.* (2001) and Alvarez *et al.* (2002) to delimit latrunculid species using genetic tools, our work focuses primarily on morphology, and in particular, the study of anisodiscorhabd shape and ornamentation, megasclere and microsclere dimensions, and live characters in specimens across a greatly extended geographic range. Over the years, numerous specimens of *Latrunculia* have been collected from the waters around New Zealand, Subantarctic New Zealand, and Antarctica, many of which have been collected from deep waters in remote regions. Identification of these individual specimens as they were delivered from each research voyage, without the benefit of a comprehensive review of all material, has been challenging, as there are few morphological characters beyond spicule dimensions, colour in life and areolate porefield morphology, that provide for clear differentiation at the species level (and for practical reasons, without having to resort to length and often challenging molecular systematics studies). We found that comparing all New Zealand and Antarctic specimens as a group, has facilitated the establishment of stronger species morphology boundaries, clear gradients of spicule dimensions, and concomitantly, overlap in the dimensions of spicules from different species are clearer. Furthermore, non-metric multidimensional scaling plots based on spicule lengths and widths, depth, and latitude, have provided relatively clear separation of New Zealand *Latrunculia* species. The extensive use of scanning electron microscopy, as in previous work such as Kelly *et al.* (2016), has shown that ornamentation of the microscleres is an important character in the identification of species and subgenera. This focus facilitates the rapid identification of species in the field, without recourse to additional genetic and molecular systematics studies.

In the light of recent broad-scale systematic arrangements for the globally distributed genus *Latrunculia*, accomplished in recent studies (see Kelly *et al.* 2016; Payne *et al.* 2022), it seemed appropriate to extend this study to two remaining species groups that have been commented upon (Kelly *et al.* 2016) but not formally considered: these are *L. crenulata* Lévi, 1993 from New Caledonia, with unique 'diabolo-shaped' isodiscorhabds; *L. oamaruensis*† Hinde & Holmes, 1892 from the New Zealand early Eocene, *L. multirotalis* Topsent 1927, and *L. tetraverticillata* Mothes, Campos, Eckert & Lerner, 2008, from the Atlantic Ocean, all with extended multi-whorled anisodiscorhabds.

The objective of this study was to conduct a comprehensive review of genus *Latrunculia* and other Latrunculiidae species from New Zealand and Antarctic waters, to distinguish new species and redescribe known species from the New Zealand Exclusive Economic Zone (EEZ), Australia EEZ around Macquarie Island and Ridge (Australia EEZ), Subantarctic New Zealand, the Antarctic Exclusive Economic Zone (AEZ), and nearby International Waters.

Methods and materials

Sample collection. Most of the specimens were collected by epibenthic sled or rock dredge down to depths of 2700 m, deployed from various research and fisheries vessels between 1929 and 2018. The majority of specimens were collected onboard the National Institute of Water & Atmospheric Research (NIWA) research

vessels RV *Tangaroa* and RV *Kaharoa*, as part of long running research programmes studying the ecology of New Zealand seamounts and ridges; numerical voyage identifier and collection station are cited as NIWA Stn TAN(voyage number)/(station number) or KAH(voyage number)/(station number). Older specimens were collected by NIWA's predecessor, the New Zealand Oceanographic Institute (NZOI). Many specimens were collected on various fisheries trawl surveys conducted by NIWA for the former New Zealand Ministry of Fisheries. Some shallow water specimens were collected by SCUBA.

Specimens from the Antarctic Peninsula and Weddell Sea were collected by Agassiz trawl, between 2002 and 2016, during several deep-sea expeditions on research vessel RV *Polarstern* (see Göcke & Janussen 2013). The collection stations are listed as Naturmuseum Senckenberg (SMF) stations (SMF Stn XXX) and all Antarctic specimens are kept in the Naturmuseum Senckenberg Porifera collection. In 2018, six additional specimens were collected from Elephant Island, South Shetland Islands, Southern Ocean, during the RV *Polarstern* Expedition PS112. The collection stations are listed as RV *Polarstern* stations PS112_64 and PS112_64 and these specimens are kept at Institute for Chemistry and Biology of the Marine Environment (ICBM), Carl von Ossietzky University of Oldenburg, Oldenburg, Germany, in the personal voucher collection of Dr Sven Rohde.

Several specimens and seafloor images were collected as part of Project *PoribacNewZ* of the ICBM, Carl von Ossietzky University of Oldenburg, on the new German RV *Sonne* (Voyage SO254), using the GEOMAR Helmholtz Centre for Ocean Research Kiel ROV *Kiel 6000* (Schupp *et al*. 2017).

Specimens were also borrowed for examination from: the NIWA Invertebrate Collection, Wellington, New Zealand; National Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand; Canterbury Museum, Christchurch, New Zealand; Queensland Museum, Brisbane, Australia; South Australian Museum, Adelaide, Australia; Naturalis Biodiversity Centre, Leiden, Netherlands; Natural History Museum, London; Naturmuseum Senckenberg, Frankfurt, Germany.

Upon collection, specimens were either frozen at –10°C or preserved in 95% ethanol, and later transferred to 70% ethanol. Some specimens are now dry.

Area of study. The main area of study is the New Zealand EEZ, including, from North to South: Three Kings Islands; Northland and the northeastern coast of the North Island; Hauraki Gulf; Bay of Plenty; Wellington; Chatham Rise and Chatham Islands; Kaikoura; Otago; Fiordland; New Zealand Subantarctic waters; Macquarie Island and Ridge (Australia EEZ); the Antarctic Exclusive Economic Zone (AEZ), and nearby International Waters (Fig. 1). Eight specimens were collected from the Australia EEZ (Macquarie Ridge) and one specimen collected from International Waters surrounding New Zealand. Numerous Antarctic AEZ specimens have been examined from the Ross Sea, Weddell Sea, Cooperation Sea, and Cosmonauts Sea.

Sample preparation. Spicule slides and scanning electron microscopy (SEM) spicule preparations were made following the methods of Boury-Esnault & Rützler (1997). For SEM examination, spicules were cleaned in nitric acid at 80°C, rinsed multiple times in distilled water and spread on a glass disc, air-dried, and coated with platinum. Spicules were viewed on a Hitachi TM3000 benchtop SEM. Spicules were also examined using a Meiji Techno ML5000 compound microscope at 40–400× fitted with a PixeLINK digital camera that was connected to PixeLINK μScope imaging software. Digital images were taken for spicule measurements. A minimum of twenty spicules per category were measured for each type specimen, and a minimum of 10 spicules per category were measured for other specimens examined. Spicules were measured for maximum length and maximum width and are presented as mean length (range) × mean width (range). Spicule measurements in the species descriptions are the mean of all tabulated measurements for the examined specimens. Mean anisostyle and anisodiscorhabd lengths for each specimen are also presented graphically to show the variation in the range of mean spicule lengths (Figs 3, 4).

Histological sections of the sponges were not prepared, as previous studies has found that histological sections of *Latrunculia* spp. are of little benefit in differentiating species due to the uniformity of the skeleton architecture.

Data analyses. Non-metric multi-dimensional scaling plots using a Euclidean distance resemblance matrix were used to examine the separation between species groups in the subgenera *Biannulata* and *Latrunculia* (Figs 73, 74). Data analysed for each specimen included: average anisostyle length, average anisodiscorhabd length, presence, or absence of oxydiscorhabds, anisodiscorhabds length:width (L:W) ratio, latitude, and depth. Multivariate analyses were conducted using PRIMER software, ver. 6.

Registration of type and general material. Most primary and secondary type materials are accessioned within the NIWA Invertebrate Collection (NIC) at the

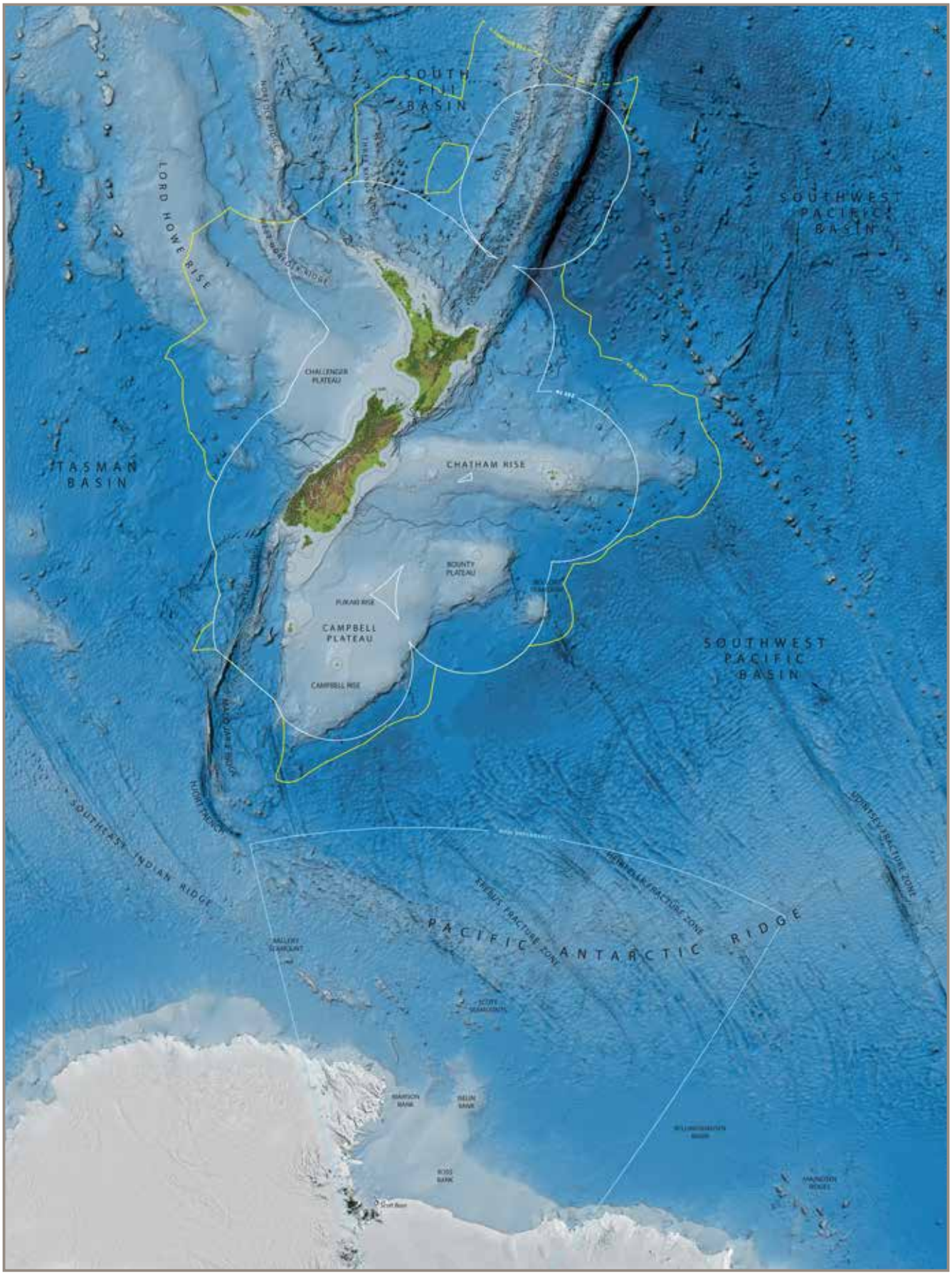

Figure 1. Major features of New Zealand's marine realm. The white line shows New Zealand's EEZ, the yellow line shows the Outer Limits of the Extended Continental Shelf, and the blue line shows the Ross Dependency. Produced by NIWA using bathymetry data from CANZ (2008).

National Institute of Water & Atmospheric Research (NIWA; formerly New Zealand Oceanographic Institute, NZOI), Greta Point, Wellington (prefix NIWA—). Five type specimens were collected from the Australia EEZ around Macquarie Island, Macquarie Ridge to the Southwest of New Zealand; these have been donated to the Queensland Museum and accessioned into their biodiversity collections (accession prefix QM G—). Naturmuseum Senckenberg, Frankfurt, Germany, Antarctic specimens are kept in the Naturmuseum Senckenberg Porifera collection (prefix SMF—) and are accessible online in the SESAM database. Elephant Island (South Shetland Islands) specimens are stored in the personal collection of Dr Sven Rohde (personal accession prefix PO_; SR_PO_) at the ICBM, Carl von Ossietzky University of Oldenburg, Oldenburg, Germany.

ZooBank registration. This published work and the nomenclatural acts that it contains (i.e., creation of new species) have been registered in ZooBank (http://www.zoobank.org/), the official registry of Zoological Nomenclature. The ZooBank Life Science Identifier for this publication is urn:lsid:zoobank.org:pub:B5E43ECB-032B-461A-A796-7840FB32C6F9. New scientific names and other comments are registered in ZooBank, and the registration details are included as part of the descriptions under the subheading 'ZooBank registration'.

Taxonomic authority. The taxonomic authorities for new taxa described in this paper are restricted to primary taxonomists, Kelly & Sim-Smith, to reduce unwieldiness for future species name citations.

Seafloor images of living latrunculid sponges. The majority of recent NIWA biodiversity voyages onboard RV *Tangaroa* and visiting international voyages with ROV and submersible capability, provide crucial seafloor images of living organisms and their habitat at a time when physical collections are declining. NIWA's Deep Towed Imaging System (DTIS) provides increasingly detailed images that facilitate the potential identification of many organisms *in situ*, and these images provide essential information for our understanding of the morphology and ecology of seafloor communities.

A selection of seafloor images of living latrunculid sponges, captured on SCUBA and NIWA's DTIS, provided by NIWA and GEOMAR, are included as an addendum (Seafloor Images 1–16). Many of the specimens in images in the addendum were collected and fully identified, but many remain unidentified and species names are given as best guesses only.

While we may be able to improve our accuracy of identification of specimens from images by examining specimens taken from the same stations, an element of doubt always remains as to the identity of the species, especially if they do not display obvious diagnostic morphological characters. The identifications provided from these seafloor images are the most accurate possible, based upon best knowledge of the species featured in this study. We also feature sponge images captured by individuals using SCUBA in diving depths. Unless otherwise indicated, all images are provided courtesy of NIWA (in the case of DTIS images) and the individual NIWA staff members who may have provided images captured on SCUBA.

Terminology

General demosponge terms and specialist terms for latrunculid sponges follow Boury-Esnault and Rützler (1997) and are included here for convenience. Some terms have been modified.

acantho – prefix meaning spined

aniso – prefix meaning unequal; generally referring to the ends of a spicule; see anisostyle, anisodiscorhabd

anisoconicorhabd – long microscleres with manubrium and basal whorl, apical whorl and apex, and lightly acanthose shaft, and spines arrayed irregularly between the ends of the spicule, around the shaft. Present in the genus *Latrunclava*

anisostyle – monaxon spicule with one end pointed, the other blunt, the blunt end tapers towards the tip

aciculodiscorhabd – asymmetrical discorhabds with an extended apical projection or spine, found in *Latrunculia* (*Aciculatrunculia*) **subgen. nov.**

anisodiscorhabd – an asymmetrical microsclere with several smooth or serrated discs along the shaft that may be highly micro-ornamented; the key diagnostic character for family Latrunculiidae

apex – the top of an anisodiscorhabd

apical whorl – the uppermost whorl of an anisodiscorhabd

basal whorl – the lowest whorl of an anisodiscorhabd, located just above the manubrium, absent in the anisodiscorhabds of *Latrunculia* (*Biannulata*) Samaai, Gibbons & Kelly, 2006

choanosomal skeleton – skeleton of the main body, supporting the canal system and responsible for the form of the sponge

conical – adjective referring to the extremities of spicules or rays, which are abruptly pointed

ectosomal skeleton – skeleton of the surface/superficial region of a sponge, distinct from that of the choanosome

encrusting – thin, sheet-like coating of the substrate

fistules – a tube-like protuberance projecting from the sponge surface

fusiform – shape of a monactin spicule, tapering regularly towards a point

isoconicodiscorhabd – discorhabds with equal ended whorls of conical spines, found in the genus *Sceptrella*

isochiadiscorhabd – equal ended discorhabds with whorls of truncated tubercles, found in the genus *Tsitsikamma* Samaai & Kelly, 2002

isodiscorhabd – equal ended discorhabd, as in the genus *Latrundiabolo* **gen. nov.**

isospinodiscorhabd – equal ended discorhabds where the whorls are replaced with rings of discrete spines, found in the genus *Cyclacanthia*

manubrium – the bottom cluster of spines on an anisodiscorhabd

median whorl – the middle whorl of an anisodiscorhabd, located near the midpoint of the shaft and usually the broadest in diameter

megasclere – large spicule

microsclere – small spicule, often ornate in shape

monaxon – linear, non-radiate spicule, or a spicule type not having more than two rays along a single axis

osculum – opening through which the water leaves a sponge, oscule (pl. oscula or oscules)

ostium – any pore through which the water enters a sponge (pl. ostia)

oxea – monaxon spicule pointed at both ends

oxydiscorhabd – rod-shaped microsclere with multiple pointed rays emerging from the central rod

papillae – nipple-like protuberance projecting from the sponge surface and bearing either ostia, oscula, or both

pore sieve – a specialised area of the cortex or ectosome with a cluster of ostia and an underlying inhalant cavity called the vestibule

sensu – in the sense of

sensu stricto – in a narrow or strict sense

sceptre – a long, rod-shaped microsclere with ornamental protrusions

sieve plate – perforated plate that extends over the broad terminal opening

subsidiary whorl – the whorl between the median whorl and the apical whorl on an anisodiscorhabd. Present in the discorhabds from subgenera *Latrunculia* (*Latrunculia*), *Latrunculia* (*Biannulata*) and *Latrunculia* (*Aciculatrunculia*) **subgen. nov**.

Abbreviations

AIMS – Australian Institute of Marine Sciences, Townsville, Australia

BANZARE – British Australian and New Zealand Antarctic Research Expedition

BANZARE S – Accession prefix for South Australian Museum, Adelaide, Australia, porifera collection

CASIZ – Accession prefix for the California Academy of Sciences, San Francisco, invertebrate zoology collection. These vouchers were originally collected by Lori J. Bell and Patrick L. Colin, Coral Reef Research Foundation (CRRF), from New Zealand under contract to the US National Cancer Institute in 1999. All CASIZ vouchers are sister vouchers to the NIWA vouchers listed herein and are vouchers from the original specimens collected by CRRF, sent to the US National Cancer Institute, that are now held at the USNM in a special collection

CMC – Canterbury Museum, Christchurch, New Zealand

CMC AQ – Accession prefix for Canterbury Museum, Christchurch, New Zealand, porifera collection

CRRF – Coral Reef Research Foundation, Palau

DTIS – NIWA's Deep-Towed Imaging System

EEZ – Exclusive Economic Zone

GEOMAR – Research Centre for Marine Geosciences, Helmholtz Centre for Ocean Research, Kiel, Germany

ICBM – Institute for Chemistry and Biology of the Marine Environment, Carl von Ossietzky University of Oldenburg, Oldenburg, Germany

L:W – length:width (L:W) ratio of the anisodiscorhabd microscleres

MNHN – Muséum National d'Histoire Naturelle, Paris

NHM – Natural History Museum, London, United Kingdom

NHMUK – Accession prefix for Natural History Museum, London (formerly British Museum of Natural History, BMNH, BM (NH), NHM, London) collections

NIC – NIWA Invertebrate Collection, Wellington

NIWA – National Institute of Water and Atmospheric Research, New Zealand

NIWA– Accession prefix for the NIWA Invertebrate Collection (NIC), Wellington, New Zealand

NIWA Stn TAN/KAH(voyage number)/(station number) – Numerical voyage identifier and collection station for NIWA research vessels RV *Tangaroa* (TAN) and RV *Kaharoa* (KAH)

NMNZ – Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand

NMNZ PO. – Accession prefix for Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand, porifera collection

NZOI – New Zealand Oceanographic Institute (NZOI), Wellington (now NIWA)

QM, QM G–, Q66C–, Q66D– Accession prefix for sponges in the Queensland Museum, Brisbane. Specimen sample prefixes for specimens collected for the first United States National Cancer Institute shallow-water collection program, contracted to the Australian Institute of Marine Science, Townsville (1987–1991). All specimens have now been accessioned into Queensland Museum (accession prefix QM G–)

ROV – Remote-Operated Vehicle

SMF – Accession prefix for Naturmuseum Senckenberg, Frankfurt, Germany, porifera collection

SMF Stn (station number) – Naturmuseum Senckenberg (SMF) collection stations are listed as (SMF Stn XXX)

SOP – Scientific Observer Programme

ZMA.Por.P. – Accession prefix for Naturalis Biodiversity Centre, Leiden, Netherlands, porifera collection

NORFANZ – Joint New Zealand-Australian RV *Tangaroa* voyage TAN0306 during May and June of 2003, funded by Australia's National Oceans Office (NOO), CSIRO Marine and Atmospheric Research (CMAR), NIWA, and New Zealand's Ministry of Fisheries (MFish), covering 14 seamount and slope sites in the general region of the Norfolk Ridge and Lord Howe Rise

DSMZ – Leibniz Institute, Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH, Braunschweig, Germany

LMU – Ludwig Maximilian University, Munich, Germany

NIOZ – Nederlands Institut voor Onderzoek de Zee (Royal Netherlands Institute for Sea Research, Texel, Netherlands

ETH-Zurich – Eidgenössische Technische Hochschule Zürich

Acknowledgements

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Project *PoribacNewZ*, grant number 03G0254A by the Federal Ministry of Education and Research (BMBF) is gratefully acknowledged. NIWA voyage participation was funded through MBIE SSIF 'Enhancing Collections' project. We are most grateful to Prof. Peter Schupp, ICBM, University of Oldenburg, Germany, for his persistence in obtaining funding for this voyage and supporting our participation on this voyage. Specimens from the Antarctic Peninsula and Weddell Sea were collected by Agassiz trawl, between 2002 and 2016, during several deep-sea expeditions on research vessel RV *Polarstern* (see Göcke & Janussen 2013). Images of spicules of some material were provided by Dr Sven Rohde, Carl-von-Ossietzky University Oldenburg, Germany.

We also thank the following institutes for the loan of specimens: Museum of New Zealand Te Papa Tongarewa, Wellington, Canterbury Museum, Christchurch, Natural History Museum, London, and Naturalis Biodiversity Centre, Leiden, Netherlands. We thank Satya Amirapu, Auckland University, for histological work and John Rosser MA (Doub. Hons) CNZM MA LTCL, for his assistance with the correct form of the new species names. We thank Lori J. Bell and Patrick L. Colin, Coral Reef Research Foundation (CRRF), Palau, for provision of several specimens and their associated images from their New Zealand collection under contract to the US National Cancer Institute in 1999: NIWA 101594 (CASIZ 300694); NIWA 101628 (CASIZ 300712); NIWA 101458 (CASIZ 300800).

We are grateful to Merrick Ekins and John Hooper, Collections Manager, Queensland Museum, Brisbane, who assisted us with reconciliation of older specimens collected in New Zealand during the first United States National Cancer Institute shallow-water collection program, contracted to the Australian Institute of Marine Science, Townsville (1987–1991).

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Joanne Howells (NIWA Invertebrate Collection volunteer from August 2016 until March 2017) carried out important preparatory work for this Memoir, gathering comments on the morphology and colour of each specimen, subsampling the specimens for our work, and photographing each whole specimen. We are also very grateful to two outstanding reviewers, Belinda Alvarez and Toufiek Samaai, whose comments and advice improved the manuscript considerably. This research was funded by NIWA under Oceans Research Programme 2 Marine Biological Resources: Discovery and definition of the marine biota of New Zealand (2015/2016 to and 2021/2022 SCI).

Latrunculia and friend. Image reproduced with permission by Alison Perkins (www.InspiredToDive.com) of Auckland, New Zealand.

TAXONOMY & SYSTEMATICS

Checklist of species known from the New Zealand EEZ, Australia EEZ around Macquarie Island, nearby International Waters, Subantarctic New Zealand waters, and Antarctic waters

Phylum PORIFERA Grant, 1836
Class DEMOSPONGIAE Sollas, 1885
Subclass HETEROSCLEROMORPHA Cárdenas, Pérez & Boury-Esnault, 2012
Order POECILOSCLERIDA Topsent, 1928
Family LATRUNCULIIDAE Topsent, 1922
Genus ***Latrunculia*** du Bocage, 1869
Subgenus ***Latrunculia*** du Bocage, 1869
Latrunculia (*Latrunculia*) *basalis* Kirkpatrick, 1908
Latrunculia (*Latrunculia*) *bocagei* Ridley & Dendy, 1886
Latrunculia (*Latrunculia*) *brevis* Ridley & Dendy, 1886
Latrunculia (*Latrunculia*) *fiordensis* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Latrunculia*) *lendenfeldi* Hentschel, 1914
Latrunculia (*Latrunculia*) *oxydiscorhabda* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Latrunculia*) *triverticillata* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Latrunculia*) *andeepi* **sp. nov.**
Latrunculia (*Latrunculia*) *bransfieldi* **sp. nov.**
Latrunculia (*Latrunculia*) *morrisoni* **sp. nov.**
Latrunculia (*Latrunculia*) *gracilis* **sp. nov.**
Latrunculia (*Latrunculia*) *incristata* **sp. nov.**
Latrunculia (*Latrunculia*) *kiwi* **sp. nov.**
Latrunculia (*Latrunculia*) *nelumbo* **sp. nov.**
Latrunculia (*Latrunculia*) *magistra* **sp. nov.**
Latrunculia (*Latrunculia*) *prendens* **sp. nov.**
Latrunculia (*Latrunculia*) *robertsoni* **sp. nov.**
Latrunculia (*Latrunculia*) *toufieki* **sp. nov.**
Latrunculia (*Latrunculia*) *tutu*† **sp. nov.**
Latrunculia (*Latrunculia*) *variornata* **sp. nov.**
Subgenus ***Biannulata*** Samaai, Gibbons & Kelly, 2006
Latrunculia (*Biannulata*) *duckworthi* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Biannulata*) *kaikoura* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Biannulata*) *millerae* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Biannulata*) *procumbens* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Biannulata*) *spinispiraefera* Brøndsted, 1924
Latrunculia (*Biannulata*) *wellingtonensis* Alvarez, Bergquist & Battershill, 2002
Latrunculia (*Biannulata*) *macquariensis* **sp. nov.**
Latrunculia (*Biannulata*) *alvarezae* **sp. nov.**
Subgenus ***Uniannulata*** Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *artuditu*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *astronavus*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *caelicapsula*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *carduus*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *daphneleeae*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *delautouri*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *edwardsi*† Kelly, Reiswig & Samaai, 2016

Latrunculia (*Uniannulata*) *paeonia*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *pupaparvula*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *struma*† Kelly, Reiswig & Samaai, 2016
Latrunculia (*Uniannulata*) *turbo*† Kelly, Reiswig & Samaai, 2016

Subgenus ***Aciculatrunculia*** **subgen. nov.**

Latrunculia (*Aciculatrunculia*) *apicalis* Ridley & Dendy, 1886 **subgen. nov.**, **comb. nov.**
Latrunculia (*Aciculatrunculia*) *biformis* Kirkpatrick, 1908 **subgen. nov.**, **comb. nov.**

Genus ***Latrunpagoda*** **gen. nov.**

Latrunpagoda oamaruensis† (Hinde & Holmes, 1892) **gen. nov.**, **comb. nov.**

Checklist of species representing new systematic arrangements outside the New Zealand and Antarctic regions

Phylum PORIFERA Grant, 1836
Class DEMOSPONGIAE Sollas, 1885
Subclass HETEROSCLEROMORPHA Cárdenas, Pérez & Boury-Esnault, 2012
Order POECILOSCLERIDA Topsent, 1928
Family LATRUNCULIIDAE Topsent, 1922

Genus ***Latrunpagoda*** **gen. nov.**

Latrunpagoda multirotalis (Topsent 1927) **gen. nov.**, **comb. nov.**
(Azores Archipelago, North Atlantic Ocean)
Latrunpagoda tetraverticillata (Mothes, Campos, Eckert & Lerner, 2008) **gen. nov.**, **comb. nov.**
(Santa Catarina State, Brazil, Southwestern Atlantic Ocean)
Latrunpagoda icelandica† **gen. et sp. nov.**
(Reykjanes Ridge, west of Iceland)

Genus ***Latrundiabolo*** **gen. nov.**

Latrundiabolo crenulatus (Lévi, 1993) **gen. nov.**, **comb. nov.**
(New Caledonia)

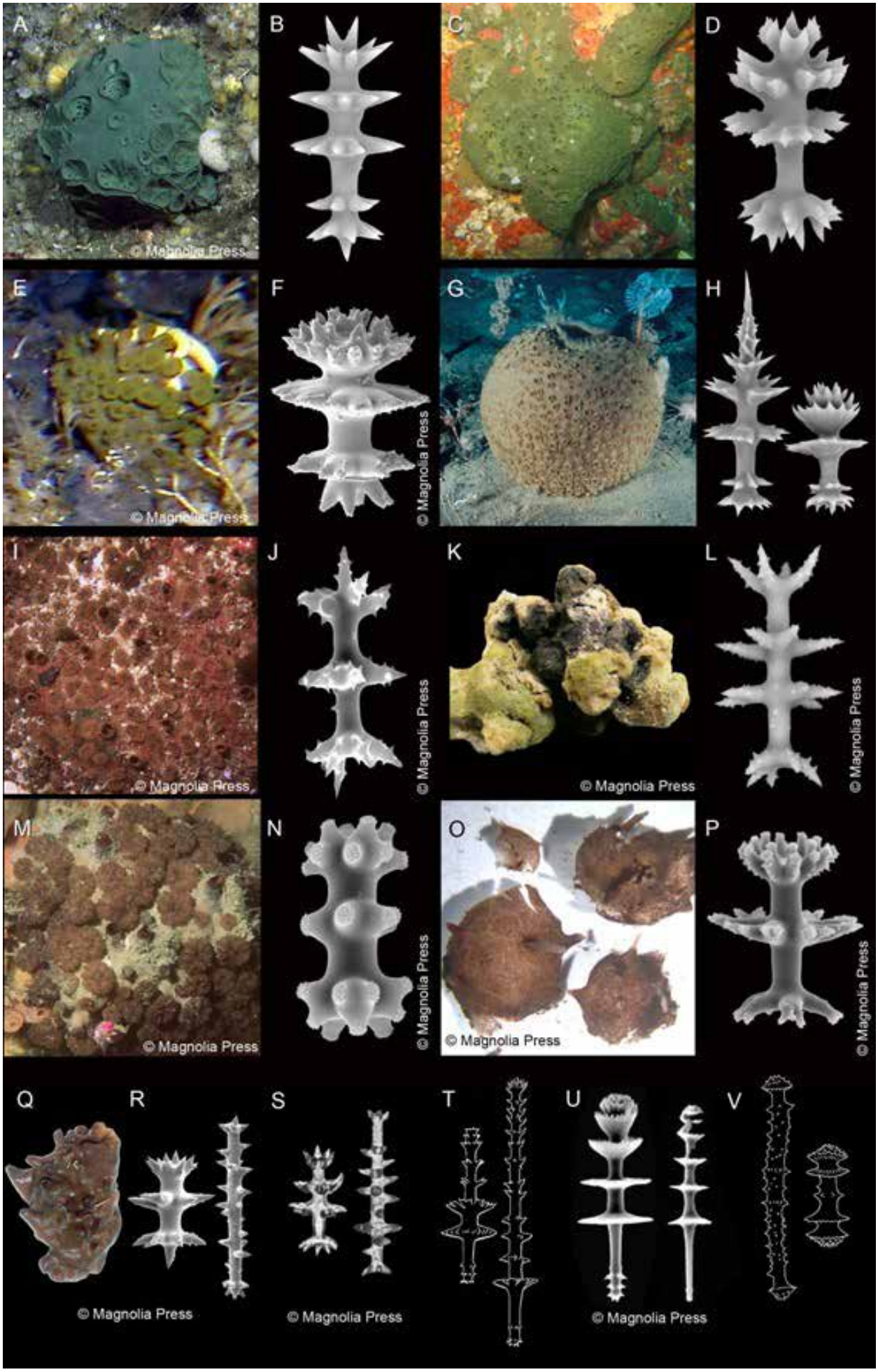
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Plate 1. Representatives of living Latrunculiidae genera and their diagnostic spicules

This plate was originally prepared for Li *et al.* (2021) and has been updated here to include all new taxa. Images A, E, I–S, & U are reproduced with permission from the original photographers and from the copyright holder, Magnolia Press. Plate 1V is reproduced from Lévi (1993) figure 10B with permission from Science Press. S*trongylodesma* is not represented here, as species in the genus lack the diagnostic anisodiscorhabds of family Latrunculiidae.

Species in subgenus *Latrunculia* (*Latrunculia*) du Bocage, 1869 have anisodiscorhabd microscleres with six visibly distinct substructures: **A.** *Latrunculia* (*L.*) *austini* Samaai, Gibbons & Kelly, 2006, Gulf of Alaska, reproduced from Kelly *et al.* (2016: fig. 3F); **B.** Typical anisodiscorhabd from *L.* (*L.*) *robertsoni* **sp. nov.**, Chatham Islands.

Species in subgenus *Latrunculia* (*Biannulata*) Samaai, Gibbons & Kelly, 2006, have anisodiscorhabd microscleres with two distinct substructures around the shaft, the median and subsidiary whorls, between an undifferentiated manubrium and basal whorl, and the undifferentiated apical whorl and apex: **C.** *Latrunculia* (*B.*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002, Three Kings Islands, reproduced with permission from Crispin Middleton, NIWA; **D.** Typical anisodiscorhabd from the same species.

Species in subgenus *Latrunculia* (*Uniannulata*) Kelly, Reiswig & Samaai, 2016, have anisodiscorhabd microscleres with only a single substructure around the shaft, the median whorl, between the manubrium and basal whorl, and the apical whorl and apex: **E.** *Latrunculia* (*U.*) *oparinae* Samaai & Krasokhin, 2002, Aleutian Islands, reproduced from Kelly *et al.* (2016: fig. 8A) with permission from Robert Stone; **F.** Typical anisodiscorhabd from the same species.

Species in subgenus *Latrunculia* (*Aciculatrunculia*) **subgen. nov.** have aciculodiscorhabds with attenuated apical spines of varying lengths, and anisodiscorhabds: **G**. *Latrunculia* (*Aciculatrunculia*) *biformis* Kirkpatrick, 1908 **subgen. nov., comb. nov.**, Ross Sea, Antarctica, reproduced with permission from Jim Mastro; **H.** Aciculodiscorhabd (left) and anisodiscorhabd from the same species.

Species in genus *Cyclacanthia* Samaai & Kelly, 2004, have acanthose isospinodiscorhabd microscleres which have a shaft bearing identical apical and basal substructures: **I.** *Cyclacanthia bellae* Samaai, Gibbons, Kelly & Davies-Coleman, 2003, reproduced from Samaai *et al.* (2004: fig. 3A) with permission from Coral Reef Research Foundation, Palau, Micronesia; **J.** Typical isospinodiscorhabd from the same species, reproduced from Kelly *et al.* (2016: fig. 1D).

Species in genus *Biverticillus* Payne, Samaai & Kelly, 2022 have heavily spined anisospinodiscorhabd microscleres which have a shaft bearing equally spaced, equidiametral whorls that differ slightly in the form of the spines and the angle of repose of the spines: **K.** *Biverticillus tenuissimus* Payne, Samaai & Kelly, 2022, reproduced from Payne *et al.* (2002: fig. 1B); **L.** Typical anisospinodiscorhabd from the same species, reproduced from Payne *et al.* (2002: fig. 1D).

Species in genus *Tsitsikamma* Samaai & Kelly, 2002, have acanthose isospinodiscorhabd microscleres which have a shaft bearing identical apical and basal substructures: **M** *Tsitsikamma favus* Samaai & Kelly, 2002, Algoa Bay, South Africa, reproduced from Samaai *et al.* (2020: fig. 8E) with permission from Coral Reef Research Foundation, Palau; **N.** Typical isochiadiscorhabd from the same species, reproduced from Kelly *et al.* (2016: fig. 1E).

Species in genus *Bomba* Kelly, Reiswig & Samaai, 2016, have unusual anisodiscorhabds that have only three substructures: **O.** *Bomba endeavorensis* Kelly, Reiswig & Samaai, 2016, British Columbia, reproduced from Kelly *et al.* (2016: fig. 11A); **P.** Typical anisodiscorhabd from the same species.

Species in genus *Latrunclava* Kelly, Reiswig & Samaai, 2016, have two microsclere forms, an anisodiscorhabd and several longer anisoconicorhabds that have structurally different apical and basal whorls: **Q.** *Latrunclava imago* Kelly, Reiswig & Samaai, 2016, Aleutian Islands, reproduced from Kelly *et al.* (2016: fig. 13A); **R.** Anisodiscorhabd and long anisoconicorhabd reproduced from Kelly *et al.* (2016: fig. 1G).

Species in genus *Sceptrella* Schmidt, 1870 have two microsclere forms, an anisodiscorhabd (left) and amphiclad sceptre (right): **S.** Anisodiscorhabd and amphiclad sceptre with identical apical and basal whorls, *Sceptrella regalis* Schmidt, 1870, reproduced from Kelly *et al.* (2016: fig. 1F).

Species in genus *Latrunpagoda* **gen. nov.** have anisodiscorhabds with a prolonged shaft supporting multiple whorls between the median whorl and the apical tuft, sometimes greatly extended: **T.** Multi-whorled anisodiscorhabds from the type species, *Latrunpagoda multirotalis* (Topsent, 1927) **gen. nov., comb. nov.**, reproduced from Topsent (1927: pl. VII fig. 19); **U.** Multi-whorled anisodiscorhabds from *Latrunpagoda tetraverticillata* (Mothes, Campos, Eckert & Lerner, 2008) **gen. nov., comb. nov.**, reproduced from Mothes *et al.* (2008: fig. 2E).

Species in genus *Latrundiabolo* **gen. nov.** have isodiscorhabds, the terminal features of which resemble a diabolo or yoyo. Sceptres are also diabolo-shaped with an extended shaft; **V**. Sceptre and isodiscorhabd from *Latrundiabolo crenulatus* (Lévi 1993) **gen. nov., comb. nov.**, reproduced from Lévi (1993) figure 10B.

Systematics

The systematics scheme for New Zealand Latrunculiidae follows that advocated in the World Porifera Database (http://www.marinespecies.org/porifera) (De Voogd *et al.* 2021) in which the names of class, subclass, order and family follow the classification proposal by Morrow & Cárdenas (2015). The Latrunculiidae systematics scheme follows Kelly & Samaai (2002), Samaai & Kelly (2002), Samaai *et al.* (2006), Samaai *et al.* (2012), and Kelly *et al.* (2016). A full synonymy and diagnosis of the genus *Latrunculia* and subgenus *Latrunculia* are given in Kelly *et al.* (2016). A comparison of the diagnostic anisodiscorhabds in living Latrunculiidae species is presented in Figure 2, updated from Kelly *et al.* (2016), including examples of the new taxa *Aciculatrunculia* **subgen. nov.**, *Latrunpagoda* **gen. nov.**, and *Latrundiabolo* **gen. nov.**, described herein. Plate 1 illustrates representatives of living Latrunculiidae genera and their diagnostic spicules.

Phylum **Porifera** Grant, 1836
Class **Demospongiae** Sollas, 1885
Subclass **Heteroscleromorpha** Cárdenas, Pérez & Boury-Esnault, 2012
Order **Poecilosclerida** Topsent, 1928
Family **Latrunculiidae** Topsent, 1922

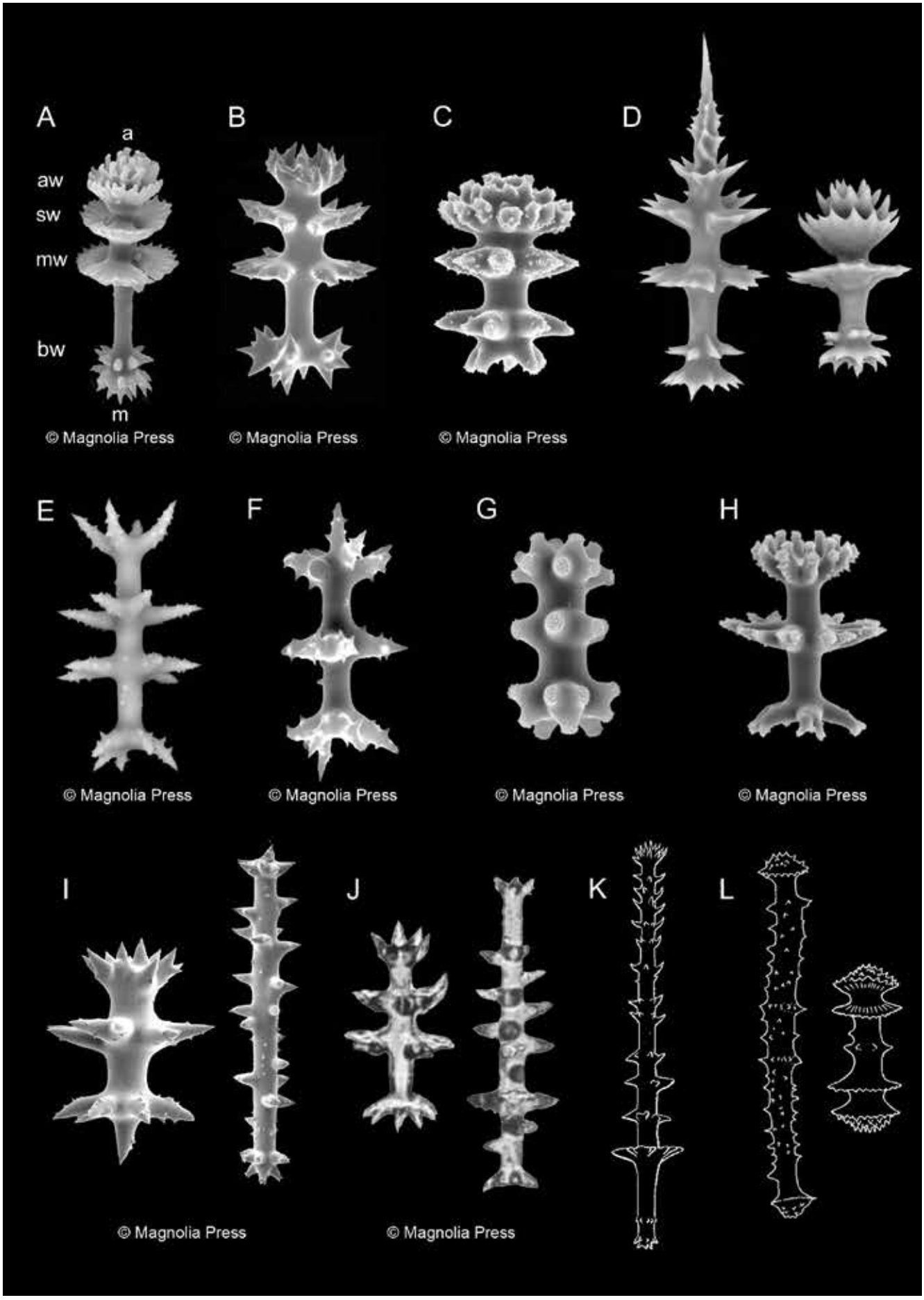
Genus *Latrunculia* du Bocage, 1869

Microstylifer Vacelet, 1969

Diagnosis. Thickly encrusting or cushion-shaped sponges with trumpet-shaped or cylindrical oscules and convex or concave areolate pore fields, colour in life typically chocolate brown through light green to dark green. Choanosomal architecture consists of megascleres arranged in an irregular, broad-meshed, reticulation of wispy tracts that lack spongin reinforcement. Megascleres are frequently slightly irregular and wavy anisostyles, occasionally strongyloxeas, occasionally with acanthose heads. Ectosomal skeleton composed of an oblique to tangential layer of megascleres, above which is a palisade of anisodiscorhabd microscleres with their basal portions buried in the outer ectosome. Anisodiscorhabds have multiple substructures that may merge or fuse to varying degrees. The manubrium is the most basal part of the microsclere, above which, lies a basal whorl (in the subgenus *Latrunculia*). The top of the microsclere consists of the apical whorl, and sometimes an apex, sometimes a spine. Between the basal and apical whorls lie one to four or more whorls that gradually decrease in diameter, and which are typically located on the upper half of the spicule shaft. The morphology of the whorls is diverse: smooth or with acanthose spines, often with curved rows of tiny teeth; smooth or acanthose flared leaf-like structures with denticulate margins forming a continuous, partially or fully incised frill around the shaft, or undulating petal-like whorls with curved, occasionally incised denticulate margins (modified from Kelly *et al.* 2016).

Remarks. The type species of genus *Latrunculia* du Bocage, *L. cratera* du Bocage, 1869, was lost when the Museu Bocage, Lisbon, Portugal, burnt down in 1978. Samaai & Kelly (2002) subsequently established *L. bocagei* Ridley & Dendy, 1886, as a representative species, providing a firm concept for the genus.

Figure 2. (*Opposite*) Comparison of the diagnostic anisodiscorhabds in living Latrunculiidae (not to scale): **A.** Anisodiscorhabd form in subgenus *Latrunculia* (*Latrunculia*) du Bocage, 1869 [type species *L.* (*L.*) *bocagei* Ridley & Dendy, 1886], showing the six substructures that characterise the anisodiscorhabds, whether differentiated or undifferentiated: m = manubrium, bw = basal whorl, mw = median whorl, sw = subsidiary whorl, aw = apical whorl, a = apex; **B.** Anisodiscorhabd form in subgenus *Latrunculia* (*Biannulata*) Samaai, Gibbons & Kelly, 2006 [type species *L.* (*B.*) *kaakaariki* Alvarez *et al.*, 2002]; **C.** Anisodiscorhabd form in subgenus *Latrunculia* (*Uniannulata*) Kelly, Reiswig & Samaai, 2016 [type species *L.* (*U.*) *oparinae* Samaai & Krasokhin, 2002]; **D.** Anisodiscorhabd form in subgenus *Latrunculia* (*Aciculatrunculia*) **subgen. nov.** [type species *L. biformis* Kirkpatrick, 1908]; **E.** Anisospinodiscorhabds in the genus *Biverticillus* Payne, Samaai & Kelly, 2022 [type species *B. tenuissimus* Payne, Samaai & Kelly, 2022]; **F.** Isospinodiscorhabd in genus *Cyclacanthia* Samaai & Kelly, 2004 [type species *C. bellae* (Samaai & Kelly, 2003)]; **G.** Isochiadiscorhabd in genus *Tsitsikamma* Samaai & Kelly, 2002 [type species *T. favus* Samaai & Kelly, 2002]; **H.** Anisodiscorhabd in genus *Bomba* Kelly, Reiswig & Samaai, 2016 [type species *B. endeavourensis* Kelly, Reiswig & Samaai, 2016]; **I.** Short anisodiscorhabd and long anisoconicorhabd in genus *Latrunclava* Kelly, Reiswig & Samaai, 2016 [type species *L. imago* Kelly, Reiswig & Samaai, 2016]; **J.** Anisodiscorhabd and amphiclad sceptre in genus *Sceptrella* Schmidt, 1870 [type species *Sceptrella regalis* Schmidt, 1870]; **K.** Multi-whorled anisodiscorhabd from the genus *Latrunpagoda* **gen. nov.** [type species *L. multirotalis* Topsent 1927]; **L.** Sceptre and isodiscorhabd from the genus *Latrundiabolo* **gen. nov.** [type species *L. crenulatus* Lévi, 1993). (A–C, E–I reproduced from Kelly *et al.* (2016: fig. 1) with permission from the copyright holder; E reproduced from Payne *et al.* (2022) with permission from the copyright holder; J reproduced from Topsent (1927: pl. VII fig. 19); K reproduced from Lévi (1993: fig. 10B) with permission from Science Press.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L

Type species. *Latrunculia cratera* du Bocage, 1869: 161, by monotypy (lost).

Representative species. *Latrunculia bocagei* Ridley & Dendy, 1887: 238; pl. XLIV fig. 1; pl. XLV figs 8, 8A (after Samaai & Kelly 2002: 714; Samaai *et al*. 2006).

Subgenus *Latrunculia* du Bocage, 1869

Diagnosis. *Latrunculia* species in which the anisodiscorhabd microscleres have three distinct whorls of projections around the shaft, the median, subsidiary, and basal whorls, that lie between the apical whorl and manubrium. An apex or apical spine is present in some species but is fused with the apical whorl in other species (modified from Samaai *et al*. 2006 and Kelly *et al*. 2016).

Remarks. Figure 70 provides a visual comparison of the anisodiscorhabds of all known New Zealand and Antarctic species of *Latrunculia* (*Latrunculia*).

Latrunculia (*Latrunculia*) *bocagei* Ridley & Dendy, 1886 Figs 3, 5, 6, 70; Table 1

Latrunculia bocagei Ridley & Dendy, 1886: 492.

Latrunculia bocagei, Ridley & Dendy, 1887: 238, pl. XLIV fig. 1, pl. XLV figs 8, 8A; Koltun 1964: 24; Samaai & Kelly 2002: 714, fig. 4; Ríos 2006: 471, figs 245–248.

NOT *Latrunculia lendenfeldi* Hentschel 1914 of Burton 1932: 340.

Latrunculia (*Latrunculia*) *bocagei*, Samaai, Gibbons & Kelly 2006: 14–15, figs 1–4.

Material examined. Holotype—NHMUK 1887.5.2.237 (microscope slides), Kerguelen HMS *Challenger* Expedition, 1873–1876, Kerguelen Islands, 18–31 m.

Other material. *Antarctica, Antarctic Peninsula*, *Bransfield Strait*: SMF 11225, RV *Polarstern* 2013 LASSO Expedition Stn 217-6, 62.883° S, 58.217° W, 483 m, 2 Mar 2013; 119-DR5, 141-DR5, 142-DR5, Stn DR5, 62.877° S, 59.985° W, 699–992 m, 1 Jan 1997.

Type locality. Kerguelen Islands (French Southern and Antarctic Lands).

Distribution. Falkland Islands, Kerguelen Islands, Antarctica (Fig. 5D).

Description. Hemispherical to cushion-shaped sponge densely covered with numerous short, conical or cylindrical fistules (Figs 5A–C). Colour in life dark brown to deep olive green, colour of holotype in preservative tan to pale yellow. Texture soft, compressible, friable, ectosome easily separated from the choanosome. Pores not visible by eye.

Spicules (Fig. 6, Table 1). Megascleres are slightly sinuous anisostyles; 513 (434–564) × 11 (8–18) μm (n = 101).

Microscleres are very large anisodiscorhabds with a long slender shaft; 64 (55–72) × 36 (27–42) μm (n = 101); average L:W ratio is 1.80. They are top-heavy with a wide, funnel-shaped apical whorl of blunt spines that are very finely serrated. The apex is a cluster of vertical blunt spines, also finely serrated. Subsidiary whorl located close to the apical whorl and slightly upturned, while the median whorl is horizontal with margin slightly upturned. The subsidiary and median whorls are approximately the same diameter and divided into several flanges or segments with sharply notched margins. The basal whorl is a horizontal ring of well-separated conical spines located just above the manubrium.

Substrate, depth range and ecology. Found growing on gravel, 18–992 m.

Remarks. The key distinguishing features of the anisodiscorhabds in *L.* (*L.*) *bocagei* is the very wide apical whorl and apex composed of blunt, curling spines, combined with the clear separation of the apical whorl from the subsidiary whorl beneath it. The anisodiscorhabds are comparable to those of *L.* (*L.*) *basalis* and *L.* (*L.*) *lendenfeldi* (Fig. 9), which also have a wide crown of blunt or pointed spines, but *L.* (*L.*) *basalis* has a much narrower apical whorl than *L.* (*L.*) *bocagei*, while in *L.* (*L.*) *lendenfeldi* the apical and subsidiary whorls are so close together that they appear to be part of a combined apical substructure, such as in species of *Uniannulata* Kelly, Reiswig & Samaai, 2016; see remarks for *L.* (*L.*) *lendenfeldi* for more details.

The spicules of *L.* (*L.*) *bocagei* are similar to those of *L.* (*L.*) *toufieki* **sp. nov.** from the Ross Sea. However, the latter species has smaller anisostyles and the apex of the anisodiscorhabds comprises a fused ring of blunt, sculptured spines (rather than a cluster of spines as in *L.* (*L.*) *bocagei*).

Latrunculia (*L.*) *bocagei* appears to be a rare species and there are few records of it since the collection of the Kerguelan Islands holotype. In 2006, additional specimens of *L.* (*L.*) *bocagei* were described from Bransfield Strait, on the Antarctica Peninsula (119-DR5, 141-DR5 & 142-DR5; Ríos 2006) and in 2013, a third specimen (SMF 11225 included here) was also collected from the Bransfield Strait. These recent collections have added to our understanding of this important species as representative of the genus *Latrunculia*.

Key diagnostic characters

- massive sponge densely covered with long conical or cylindrical fistules
- anisostyles are large, 513 (434–564) μm long
- anisodiscorhabds are very large, 64 (55–72) μm long
- apical whorl is very wide, funnel-shaped
- both apex and apical whorl have blunt spines

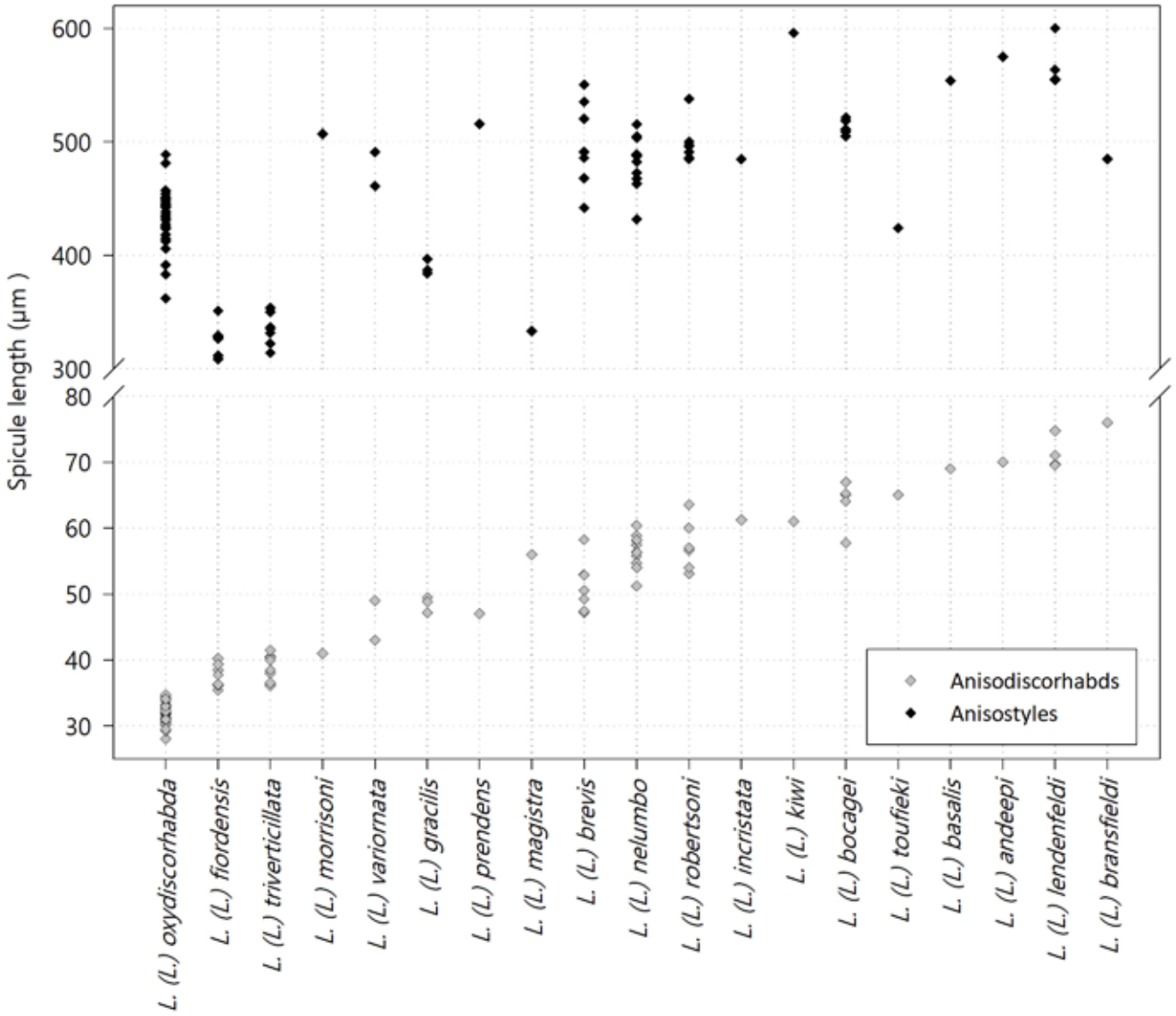


Figure 3. Megasclere and microsclere spicule lengths for New Zealand and Antarctic species of *Latrunculia* (*Latrunculia*). Each point represents the mean spicule length for a specimen.

- apical whorl is a cluster of blunt spines
- clear separation between the apical and subsidiary whorls
- distribution Falkland Islands, Kerguelen Islands, Antarctica, 18–992 m

Latrunculia (*Latrunculia*) *basalis* Kirkpatrick, 1908 Figs 3, 7, 70

Latrunculia apicalis var. *basalis* Kirkpatrick, 1908: 14.

Latrunculia lendenfeldi, Koltun 1964: 23; pl. IV figs 1–3, of Samaai *et al.* (2006).

NOT *Latrunculia lendenfeldi* Hentschel, 1914: 44, pl. V fig. 1, of Samaai *et al.* (2006).

NOT *Latrunculia antarctica*, Tanita 1959: 7, figs 7, 8, of Samaai *et al.* (2006).

NOT *Latrunculia brevis, sensu* Uriz 1988: 49, fig. 25, of Samaai *et al.* (2006).

Latrunculia (*Latrunculia*) *basalis*, Samaai, Gibbons & Kelly, 2006: 31, figs 1E, 2, 4D.

Type & locality (not examined). Holotype—BMNH 1908.2.5.72, HMS *Discovery* expedition 1901–1904, west of Balleney Island, Antarctica, 462 m, 4 Mar 1904.

Distribution. Antarctica (Fig. 7).

Description. Holotype is cake-shaped, 30 × 20 × 6 mm thick, several discoidal, raised pore areas and one conical papilla is present. Surface is smooth, texture is sandpapery, ectosome is easily separated from the underlying choanosome. Colour is light brown in preservative (adapted from Kirkpatrick 1908; Samaai *et al.* 2006).

Spicules (Fig. 7). Megascleres are large anisostyles, 554 (500–592) × 16 (16) µm. Microscleres are large anisodiscorhabds, 69 (69) × 34 µm (measurements from Samaai *et al.* 2006). The manubrium is a spinous base of diagonally downward-pointing spines. The basal whorl is located just above the manubrium and is

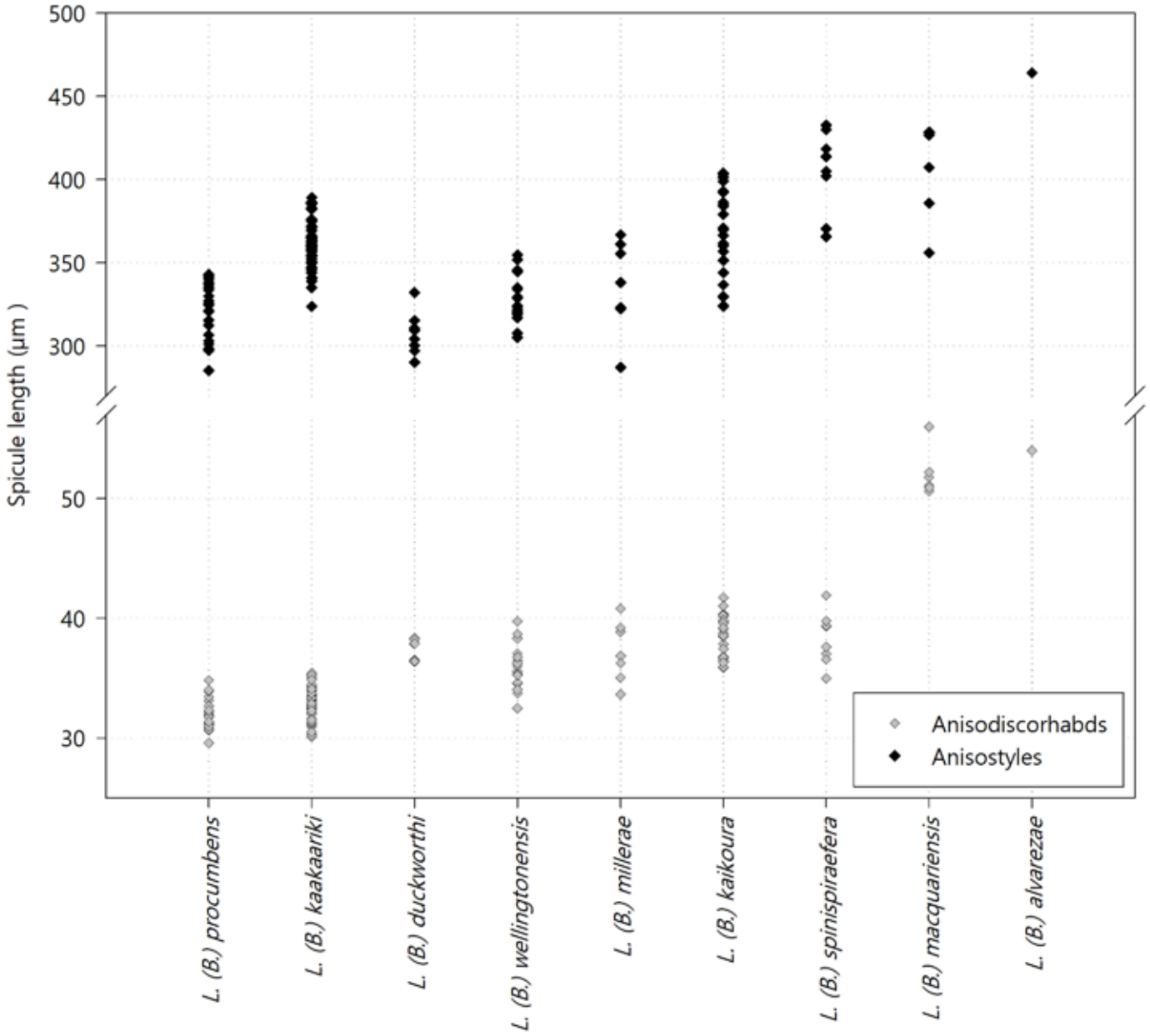


Figure 4. Megasclere and microsclere spicule lengths for New Zealand and Antarctic species of *Latrunculia* (*Biannulata*). Each point represents the mean spicule length for a specimen.

a simple whorl of horizontal spines. The median whorl is deeply divided into four, well-separated segments with denticulate margins, and is well separated from the basal and subsidiary whorls. The subsidiary whorl is located close to the apical whorl and is slanted upwards. It is divided into three well-separated segments with denticulate margins. The apical whorl is a bulbous cluster of smooth, slightly curved, pointed spines (adapted from Kirkpatrick 1908; Samaai *et al*. 2006).

Substrate, depth range and ecology. Substrate and ecology unknown; 462 m.

Remarks. Samaai *et al*. (2006) synonymised four specimens with *L*. (*L*.) *basalis*: 1) the holotype of *L. lendenfeldi* Hentschel, 1914 (ZMB 4812) from Wilhelm II Coast, Antarctica (see Fig. 9A here); 2) Koltun's (1964) *L. lendenfeldi* from Antarctica; 3) *Latrunculia brevis sensu* Uriz (1988) from Namibia; and 4) the holotype of *L. antarctica* Tanita 1959 from Cape Cook, Antarctica. While we have not examined these specimens directly, they have been well described and figured. Based on the published descriptions, we concur with Samaai *et al*.'s (2006) relegation in synonymy with *L*. (*L*.) *basalis* of Koltun's *L. lendenfeldi* from Antarctica (1964: 23, pl. IV figs 1–3), as the illustrated anisodiscorhabd has a clear apex of sharp spines well-separated from the apical whorl (as in the image of a holotype anisodiscorhabd in Fig. 7). We disagree, however, with the other three actions:

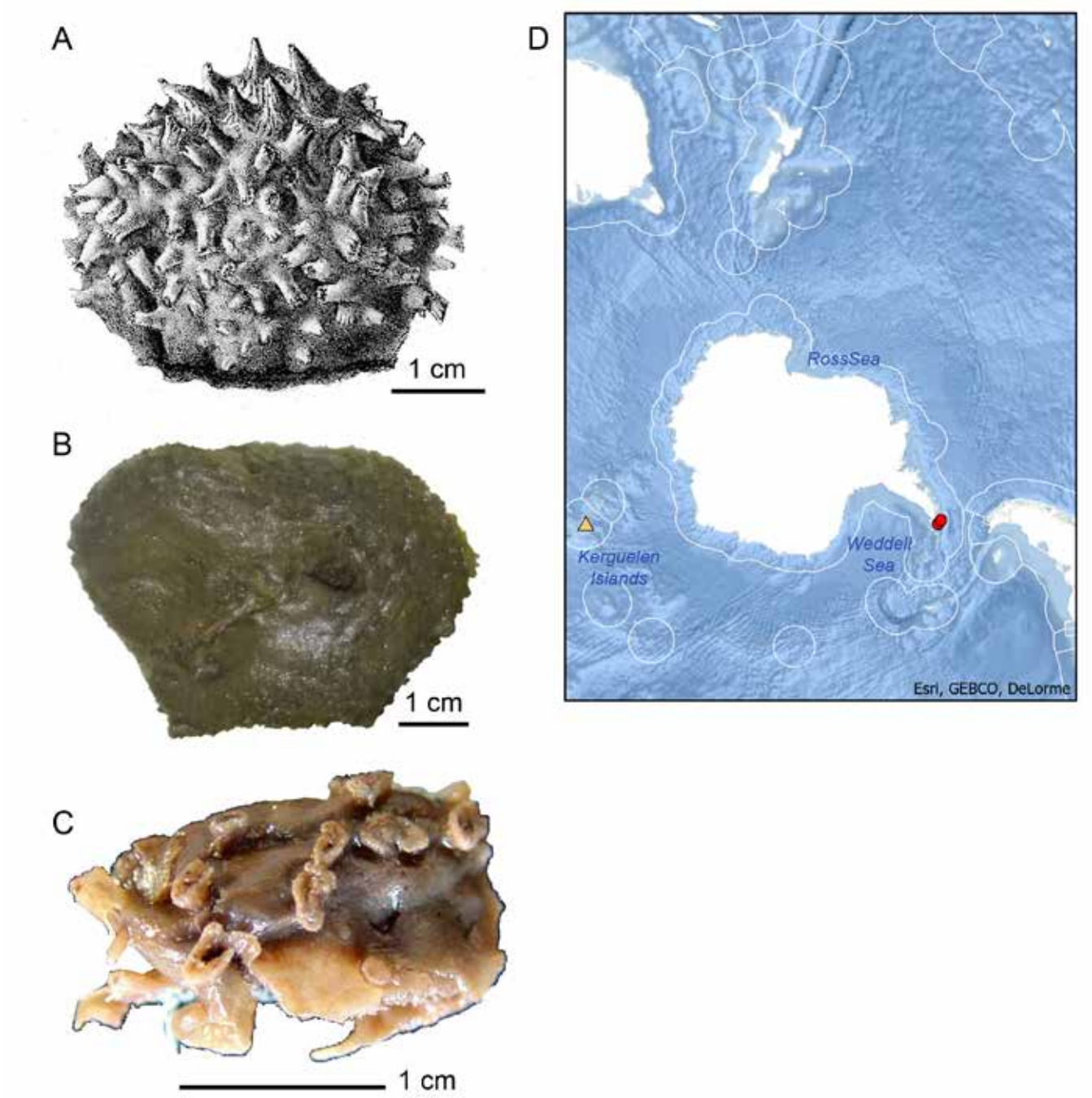


Figure 5. *Latrunculia* (*Latrunculia*) *bocagei* Ridley & Dendy 1886, morphology and distribution: **A.** Drawing of the holotype from the Kerguelen Islands, reproduced from Ridley & Dendy (1887); **B.** SMF 11225 from the Bransfield Strait, Antarctic Peninsula, deck specimen; **C.** 141-DR5 from the Bransfield Strait, Antarctic Peninsula, preserved specimen; **D.** Distribution and type locality (triangle) of *L.* (*L.*) *bocagei* and other specimens examined in this study (circles). Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

1. The anisodiscorhabd from the holotype of *L. lendenfeldi* (ZMB 4812) shown in Fig. 9A here differs from the anisodiscorhabd from the holotype of *L.* (*L.*) *basalis* figured in Fig. 7 here, in the following ways. In *L.* (*L.*) *lendenfeldi*, the subsidiary whorl is orientated sharply away from the shaft and closely appressed to an (apparently) undifferentiated apical whorl and apex of irregular, sculpted, serrated, chiaster-blunt, finger-like spines that resemble a peony. In *L.* (*L.*) *basalis*, the subsidiary whorl is also orientated away from the shaft and is also close to the undifferentiated apical whorl and apex, but these features are composed of simple, short, sharp spines.
2. *Latrunculia brevis sensu* Uriz (1988: 49, fig. 25) from Namibia has markedly smaller anisostyles [400 (340–430) μm] and anisodiscorhabds [56 (48–58) μm] than the holotype of *L.* (*L.*) *basalis* [554 (500–592) μm; 69 μm], and it is the only specimen not found in Antarctica.

Table 1. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *bocagei* Ridley & Dendy, 1886. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NHMUK 1887.5.2.237 (holotype)	505 (451–564) × 14 (10–18)	65 (60–68) × 31 (27–33)
SMF 11225	522 (460–560) × 10 (10–10)	58 (55–65) × 37 (35–38)
119-DR5	509 (434–533) × 12 (10–14)	67 (61–72) × 37 (32–42)
141-DR5	511 (484–559) × 10 (8–12)	65 (60–70) × 37 (34–40)
142-DR5	519 (494–546) × 11 (8–13)	64 (60–71) × 37 (33–42)

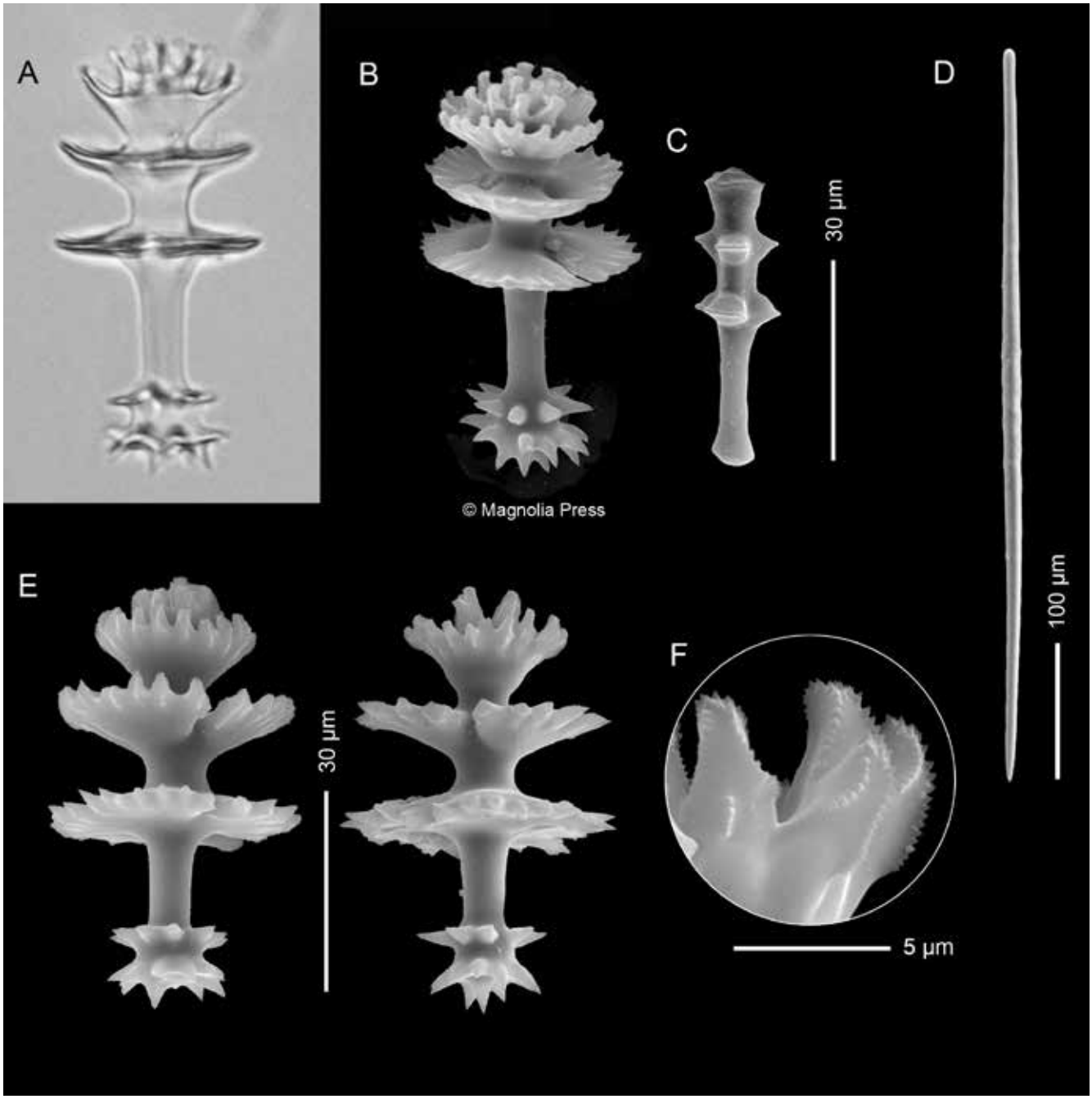


Figure 6. *Latrunculia* (*Latrunculia*) *bocagei* Ridley & Dendy 1886, spicules: **A.** Anisodiscorhabd of the holotype NHMUK 1887.5.2.237, by light microscopy; **B.** Anisodiscorhabd of the holotype NHMUK 1887.5.2.237, by SEM, reproduced from Samaai *et al.* (2006: fig. 1B); **C.** Immature anisodiscorhabd from the holotype; **D.** Anisostyle of 142-DR5 from Antarctica; **E.** Anisodiscorhabds of 142-DR5; **F.** Close-up of the apical whorl of an anisodiscorhabd from 142-DR5. Images B & C reproduced with permission from the copyright holder and Toufiek Samaai.

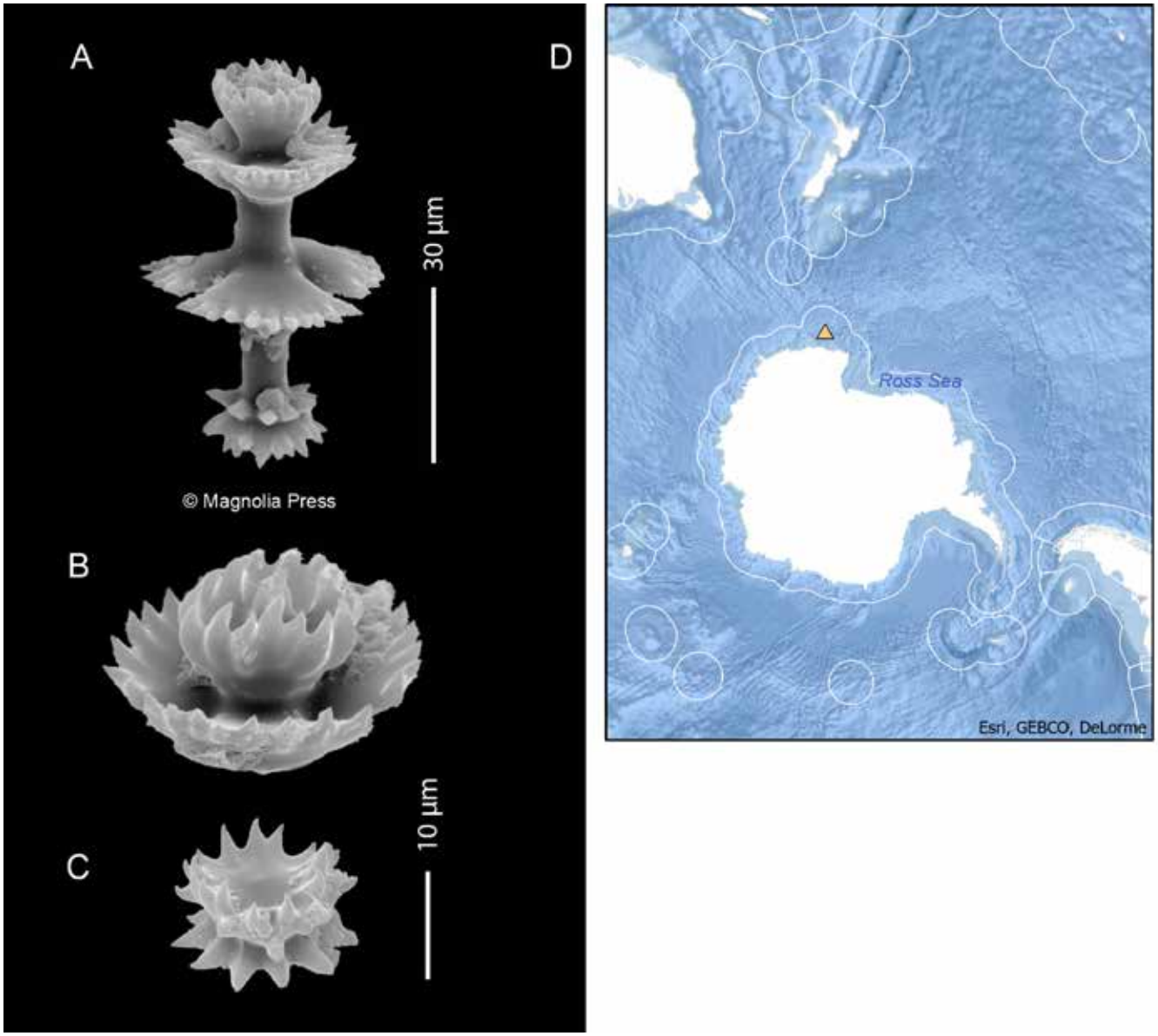


Figure 7. *Latrunculia* (*Latrunculia*) *basalis* Kirpatrick, 1908, spicules and distribution: **A.** Anisodiscorhabd of the holotype NHMUK1908.2.5.72, reproduced from Samaai *et al.* (2006: fig. 1E), with permission from the copyright holder and Toufiek Samaai; **B.** Close up of the apical whorl and apex; **C.** Upside-down view of the manubrium and basal whorl; **D.** Type locality (triangle) of *L.* (*L.*) *basalis* holotype. Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection. All SEM images from holotype.

3. The anisodiscorhabds illustrated from the holotype of *L. antarctica* Tanita 1959 from Cape Cook, Antarctica, have substructures formed of heavy, curved spines, being very irregular in form and in length, according to Tanita's (1959) figure 8. *Latrunculia antarctica* also has longer anisostyles (520–779 µm) than those of the holotype of *L.* (*L.*) *basalis*. Furthermore, *L. antarctica* is a thinly encrusting sponge while *L.* (*L.*) *basalis* has a massive form.

Based on the above differences between the holotypes of *L.* (*L.*) *basalis* and *L. lendenfeldi*, we thus consider *L. lendenfeldi* to be valid and herewith resurrect this species to *L.* (*L.*) *lendenfeldi* (see below for more details). The correct assignment of *Latrunculia brevis sensu* Uriz (1988) and *L. antarctica* Tanita 1959 will require examination of the specimens.

Latrunculia (*Latrunculia*) *lendenfeldi* Hentschel, 1914

Figs 3, 8, 9, 70; Table 2

Latrunculia lendenfeldi Hentschel, 1914: 44, pl. V fig. 1.
?NOT *Latrunculia lendenfeldi*, Burton 1932: 340.
NOT *Latrunculia lendenfeldi*, Burton 1940: 118, pl. 6 fig. 4; Koltun 1964: 23; Desqueyroux 1975: 55, pl. I figs 13, 14; 1976: 100.
NOT *Latrunculia antarctica* Tanita 1959: 7, figs 7, 8.

Type & locality (not examined). Holotype—ZMB 4812, Gauss Stn, Wilhelm II Coast, Antarctica, 66.036° S, 89.633° E, 385 m, 20 Oct 1902.

Table 2. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *lendenfeldi* Hentschel, 1914. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined. Measurements for the holotype are taken from Hentschel (1914).

Specimen	Anisostyles	Anisodiscorhabds
ZMB 4812 (holotype)	464–608 × 12–13	67–73
NIWA 29112	555 (415–602) × 12 (10–14)	70 (65–75) × 38 (30–42)
NIWA 29141	600 (573–637) × 12 (10–14)	75 (70–80) × 44 (40–48)
NIWA 100537	554 (519–579) × 12 (11–14)	70 (65–76) × 39 (34–44)
SMF 11172	564 (510–610) × 13 (13–13)	71 (65–78) × 43 (40–46)

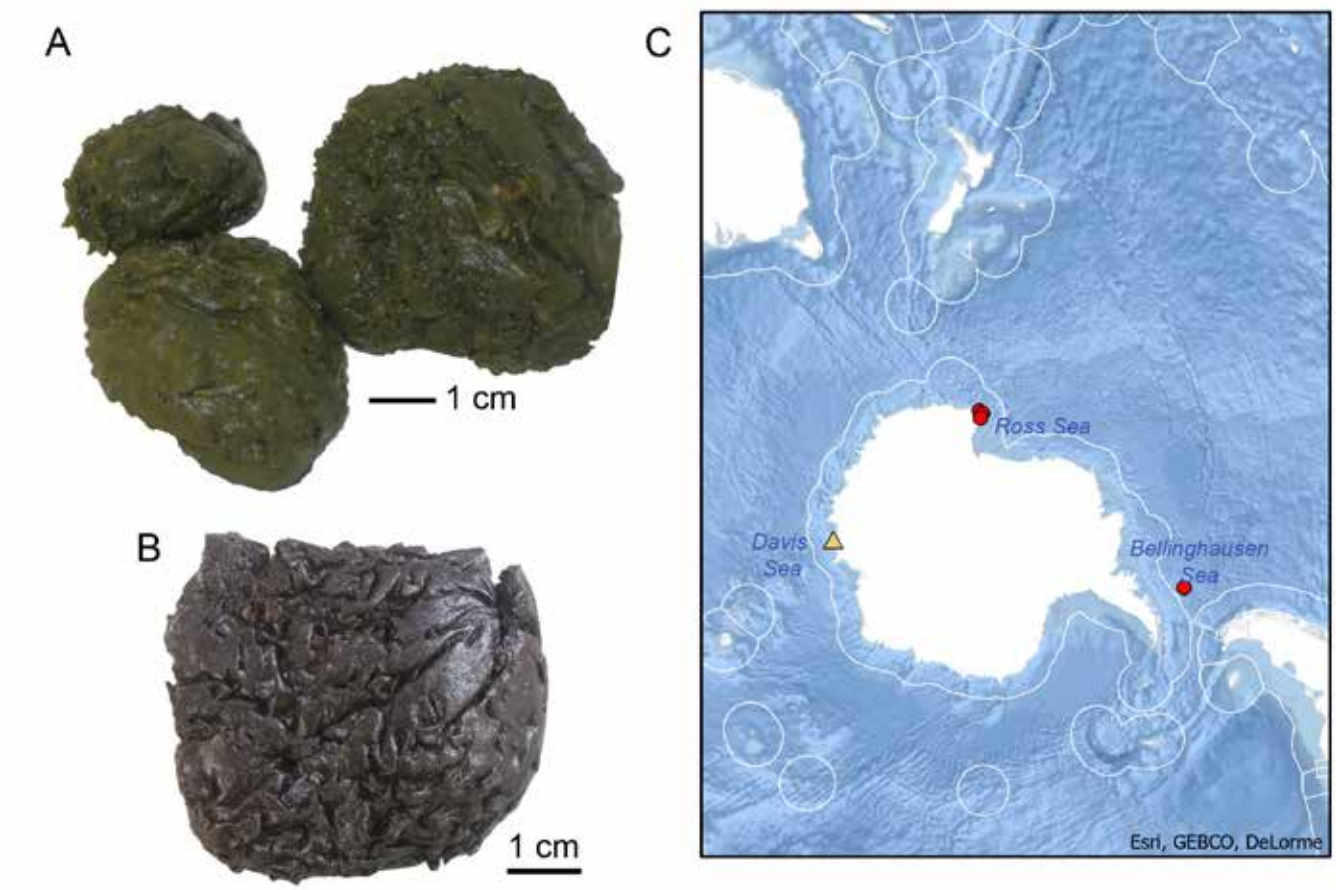


Figure 8. *Latrunculia* (*Latrunculia*) *lendenfeldi* Hentschel, 1914, morphology and distribution: **A.** SMF 11172, deck specimen; **B.** NIWA 29141, preserved specimen; **C.** Distribution and type locality (triangle) of *L.* (*L.*) *lendenfeldi* and other specimens examined in this study (circles). Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

Material examined. *Antarctica, Ross Sea*: NIWA 29112, NIWA Stn TAN0402/57, 72.342° S, 170.443° E, 203–206 m, 13 Feb 2004; NIWA 29141, NIWA Stn TAN0402/20, 71.741° S, 171.644° E, 400–415 m, 5 Feb 2004; NIWA 100537, NIWA Stn TAN0402/118, 71.299° S, 170.536° E, 312–323 m, 18 Feb 2004.

Antarctica, Bellingshausen Sea: SMF 11172, RV *Polarstern* 2013 LASSO Expedition Stn 193-8 AGT12 v.105, 62.717° S, 75.483° W, 430 m, 20 Feb 2013.

Distribution. Antarctica (Fig. 8C).

Description. The holotype is a fragment of a sponge with flaky surface (Hentschel 1914). SMF 11172 is cushion-shaped and covered with numerous long volcano-shaped fistules (Fig. 8A). NIWA 29141 is hemispherical and covered in long volcano-shaped or mushroom-shaped fistules, ≤5 mm long and ≤2 mm in diameter (Fig. 8B). Colour in life is deep olive green, colour in ethanol is dark brown. Texture is very soft, fragile, and easily torn. Ectosome easily separated from the choanosome, which has a fibrous appearance.

Spicules (Fig. 9, Table 2). Megascleres are large anisostyles that are centrally thickened with tapered ends, occasionally polytylote; 567 (415–637) × 12 (10–14) μm (n = 50).

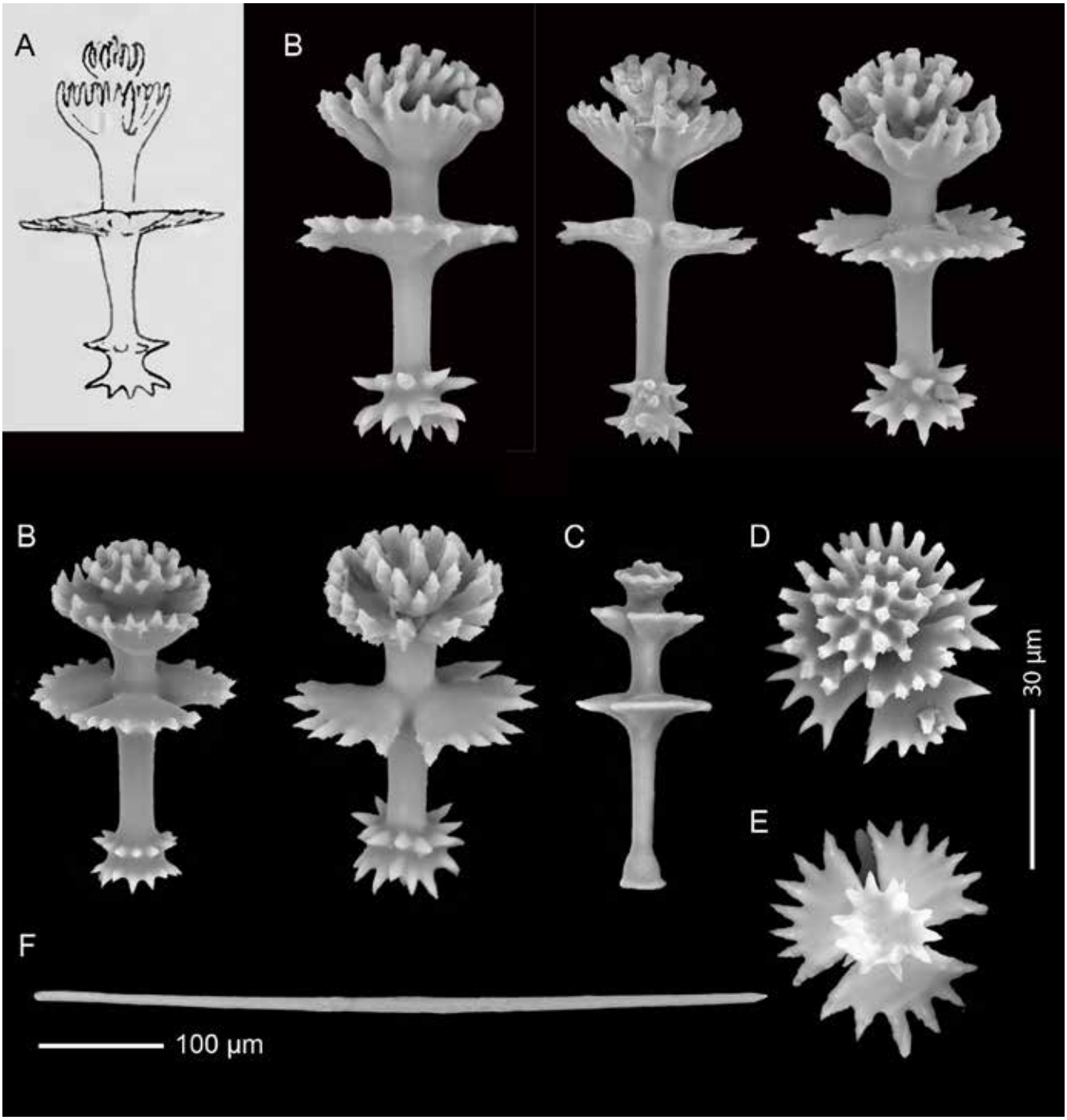


Figure 9. *Latrunculia* (*Latrunculia*) *lendenfeldi* Hentschel, 1914, spicules: **A.** Drawing of an anisodiscorhabd from the holotype, ZMB 4812, reproduced from Hentschel (1914); **B–C.** Anisodiscorhabds from NIWA 29112; **D.** Immature anisodiscorhabd from NIWA 29112; **E.** Top-down view of an anisodiscorhabd from NIWA 29112 showing the apex, apical and flanged subsidiary whorl; **F.** Basal view of a NIWA 29112 anisodiscorhabd showing the manubrium and flanged median whorl; **G.** Anisostyle from NIWA 29112.

Microscleres are anisodiscorhabds that are top-heavy with a long, slender shaft. The apical whorl is a cluster of upward-pointing, mostly blunt spines. The subsidiary whorl is closely appressed to the apical substructures and is slanted upwards enclosing the apical whorl and apex. The median whorl is horizontal, comprising three, well-separated flanges that have deeply notched, sharply pointed margins. The basal whorl is a narrow horizontal ring of conical spines, located just above the manubrium, which is a cluster of diagonally downward-pointing spines; 71 (65–80) × 41 (30–48) µm (n = 50); L:W ratio = 1.72.

Substrate, depth range and ecology. Substrate unknown, 203–415 m.

Remarks. Samaai *et al.* (2006) synonymised the holotype of *L.* (*L.*) *lendenfeldi* with *L.* (*L.*) *basalis*. However, as discussed in the remarks for *L.* (*L.*) *basalis*, there are sufficient differences in the shape

of the anisodiscorhabds to differentiate between the two holotypes. The key character that differentiates *lendenfeldi* from *basalis* is the peony-shaped apex of irregular, sculpted, serrated, chiaster-blunt, finger-like spines in the former. We thus consider *L. lendenfeldi* to be valid and herewith resurrect this species to *L.* (*L.*) *lendenfeldi*.

The only other known New Zealand and Antarctic species with a similar size range of spicules are *L.* (*L.*) *andeepi* **sp. nov.** and *L.* (*L.*) *bocagei*. However, in both species the apical and the subsidiary whorls are clearly separated, while in *L.* (*L.*) *lendenfeldi* the subsidiary whorl is so close to the apical whorl that it appears to be part of the apical structures.

The anisodiscorhabds of NIWA 29112 shown here in Figs 9C–F are very similar to the drawing of the anisodiscorhabds of *L. lendenfeldi* (Fig. 9A). NIWA 29112, NIWA 100537 and NIWA 29141 are confirmed here as being closer to the holotype of *L. lendenfeldi* than *L.* (*L.*) *basalis*.

Several other specimens have been previously assigned to *L. lendenfeldi*. While we have not examined these specimens, based on their published descriptions we conclude that the following records are unlikely to be *L.* (*L.*) *lendenfeldi* for the reasons given below:

1. The specimen from Deception Island, South Shetland Islands, Antarctica, described in Desqueyroux (1975) has smaller anisodiscorhabds (60 μm) than the holotype of *L.* (*L.*) *lendenfeldi* (67–73 μm), and the drawing of the anisodiscorhabds (pl. I fig. 13) does not resemble those of *L.* (*L.*) *lendenfeldi*.
2. Desqueyroux (1976) provides no description of the specimens assigned to *L. lendenfeldi*; however, they are from the Chilean Coast between 41.59° S and 45.88° S, while all other *L.* (*L.*) *lendenfeldi* specimens have been found in Antarctica.
3. Similarly, Burton (1940) provides no description of the specimens assigned to *L. lendenfeldi*; however, they are from Uruguay between 35.5° S and 36.03° S and are more likely to be *L.* (*L.*) *brevis* Ridley & Dendy, 1886 based on their location.
4. *Latrunculia brevis sensu* Uriz (1988: 49, fig. 25) from Namibia has markedly smaller anisostyles [400 (340–430) μm] and anisodiscorhabds [56 (48–58) μm] than the holotype of *L.* (*L.*) *lendenfeldi* [464–608 μm; 67–73 μm], and it is not found in Antarctica.
5. The anisodiscorhabds illustrated from the holotype of *L. antarctica* Tanita 1959 from Cape Cook, Antarctica, have substructures formed of heavy, curved spines, being very irregular in form and in length, according to Tanita's (1959) figure 8. *Latrunculia antarctica* also has longer anisostyles (520–779 μm) than those of the holotype of *L.* (*L.*) *lendenfeldi* (464–608 μm). Furthermore, *L. antarctica* is a thinly encrusting sponge while *L.* (*L.*) *lendenfeldi* has a massive form.

Burton (1932) also assigned several specimens from the Falkland Islands to *L. lendenfeldi,* but no description of the specimens was given and therefore, it cannot be determined from the paper whether the specimens are *L.* (*L.*) *lendenfeldi* or not. Samaai *et al.* (2006) examined the specimens and noted that they are similar to *L.* (*L.*) *brevis*, but no spicule measurements or figures of the specimens were provided.

The only other known New Zealand and Antarctic species with a similar size range of spicules are *L.* (*L.*) *andeepi* **sp. nov.** and *L.* (*L.*) *bocagei*. However, in both species the apical and the subsidiary whorls are clearly separated, while in *L.* (*L.*) *lendenfeldi* the subsidiary whorl is so close to the apical whorl that it appears to be part of the apical structures.

Key diagnostic characters

- massive sponge, may be covered in long, conical fistules
- anisostyles are large, 567 (415–637) μm long
- very large, top-heavy anisodiscorhabds, 71 (65–80) μm long
- subsidiary whorl is located very close to the apical whorl so that the anisodiscorhabd only appears to have one whorl around the shaft
- apical spines are irregular, sculpted, serrated, chiaster-blunt, finger-like
- distribution Antarctica, 203–415 m.

Latrunculia (*Latrunculia*) *brevis* Ridley & Dendy, 1886

Figs 3, 10, 11, 70; Table 3; Seafloor Image 9

Latrunculia brevis Ridley & Dendy, 1886: 492.

Latrunculia brevis, Ridley & Dendy 1887: 236, pl. XLIV fig. 5, pl. XLV figs 10, 10a; Topsent 1915: 40–41, fig. 5; Boury-Esnault & van Beveren 1982: 44–45; Uriz 1988: 49–50, fig. 25; Kelly *et al.* 2009: 43.

Latrunculia (*Latrunculia*) *brevis*, Samaai *et al.* 2006: 33, figs 1F, 2, 3C, 4E.

NOT *Latrunculia brevis*, Bergquist 1968: 17, pl. 1; Lévi 1993: 30.

Material examined. Syntype—NHMUK 1887.5.2.270 (microscope slides), Stn 320, Rio de la Plata, Argentina-Uruguay, Kerguelen HMS *Challenger* Expedition, 1873–76, 37.283° S, 53.867° W, 1097 m, 14 Feb 1876.

Other material. *New Zealand, Northland*: NIWA 72986, NIWA Stn TAN1105/9, 34.269° S, 173.025° E, 168–174 m, 26 Mar 2011.

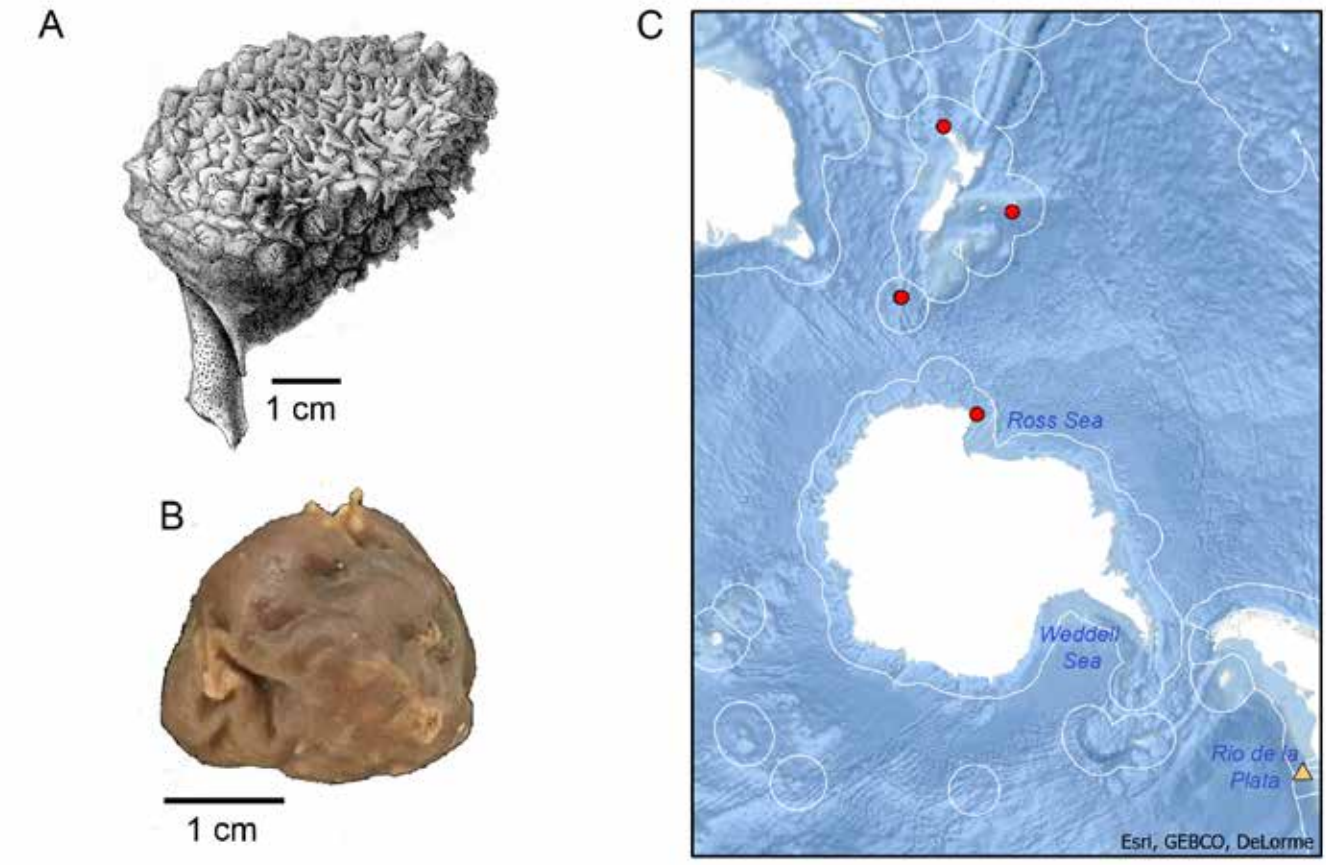


Figure 10. *Latrunculia* (*Latrunculia*) *brevis* Ridley & Dendy, 1886, morphology and distribution: **A.** Drawing of holotype, reproduced from Ridley & Dendy (1887); **B.** QM G339774, preserved specimen; **C.** Distribution and type locality (triangle) of *L.* (*L.*) *brevis* and other specimens examined in this study (circles). Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

New Zealand, Chatham Islands: NIWA 100852, NIWA Stn Z10918 (TAN0117/04), 44.701° S, 176.654° W, 956 m, 29 Oct 2001.

Macquarie Ridge (*Australia EEZ*), *Seamount 7*: QM G339774, NIWA Stn TAN0803/79, 53.715° S, 159.131° E, 770–810 m, 12 Apr 2008; QM G339775, NIWA Stn TAN0803/82, 53.729° S, 159.163° E, 1087–1160 m, 12 Apr 2008.

Antarctica, *Ross Sea*: NIWA 37496, NIWA Stn TAN0802/144, Site C27, 71.939° S, 173.302° E, 1431–1658 m, 23 Feb 2008; ZMA.PO.P.12732 (no data).

Type locality. Rio de la Plata, Argentina-Uruguay.

Distribution. Rio de la Plata, Argentina-Uruguay; Antarctica; Macquarie Ridge (Australia and New Zealand EEZ); Chatham Islands and Northland, New Zealand (Fig. 10D).

Description. Thickly encrusting, massive or hemispherical sponge. Surface may be densely covered with conical fistules that are around 6 mm high, or mostly smooth. Colour in life unknown, colour in preservative tan to yellowish grey (Figs 10A–C). Texture is soft, compressible, ectosome easily separated from the choanosome.

Spicules (Fig. 11, Table 3). Megascleres are slightly sinuous anisostyles; 492 (389–600) × 11 (6–16) μm (n = 200).

Microscleres are large anisodiscorhabds with a variable shape; 52 (38–70) × 32 (21–41) μm (n = 200); average L:W ratio is 1.66. Morphology of the apical whorl varies from tulip-shaped with a rounded base to funnel-shaped. The apex is a cluster of long, vertical spines. The subsidiary whorl is located very close to the apical whorl and is curved upwards to partially enclose the apical whorl. It is divided into three distinct segments that have deeply notched margins. The median whorl is a horizontal ring of three distinct segments that have deeply notched margins. The outsides of the spines of the apical, subsidiary, and median whorls are lightly microspined. The basal whorl is a small horizontal ring of conical spines, located just above the manubrium, which is a cluster of diagonally downward-pointing spines. A vertical basal spine is present in some spicules.

Substrate, depth range and ecology. Found growing on sand and hard substrata, 168–1658 m.

Remarks. *Latrunculia* (*L.*) *brevis* has few distinguishing characteristics and has subsequently

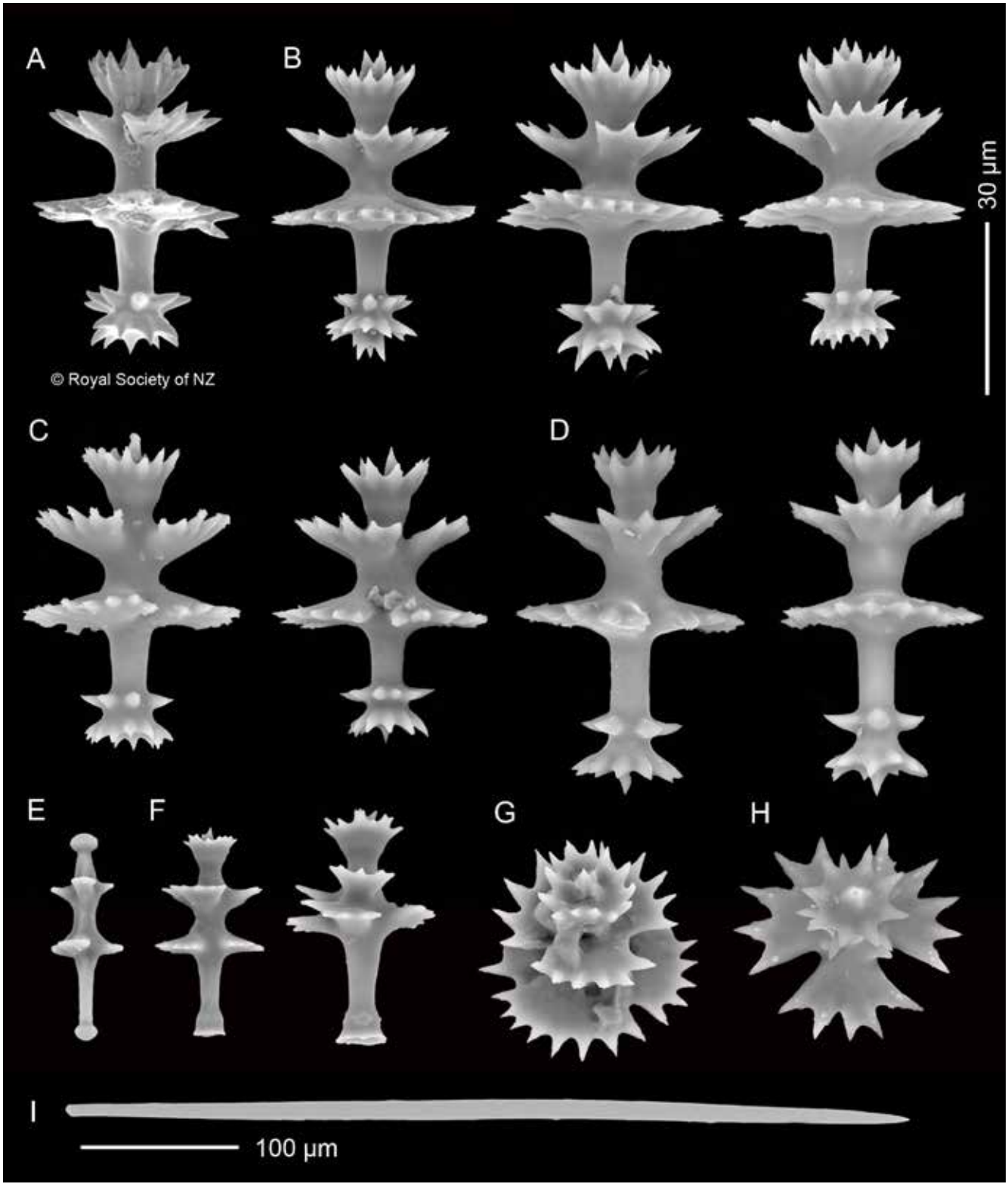


Figure 11. *Latrunculia* (*Latrunculia*) *brevis* Ridley & Dendy, 1886, spicules: **A.** Anisodiscorhabd from syntype NHMUK 1887.5.2.270, reproduced from Alvarez *et al.* (2002: fig. 12A), with permission from Taylor & Francis on behalf of The Royal Society of New Zealand); **B.** Anisodiscorhabds from QM G339774; **C.** Anisodiscorhabds from QM G339775; **D.** Anisodiscorhabds from NIWA 37496; **E.** Immature anisodiscorhabd from QM G339775; **F.** Immature anisodiscorhabds from QM G339774; **G.** Top-down view of an anisodiscorhabd from QM G339774 showing the apex, apical whorl, subsidiary whorl and median whorl; **H.** Upside-down view of an anisodiscorhabd from NIWA 37496 showing the manubrium and median whorl; **I.** Anisostyle from QM G339774.

Table 3. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *brevis* Ridley & Dendy, 1886. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NHMUK 1887.5.2.270 (syntype)	442 (406–470) × 11 (9–14)	53 (43–59) × 30 (21–37)
NIWA 37496	468 (413–522) × 10 (8–13)	58 (52–70) × 33 (29–36)
NIWA 72986	486 (430–558) × 13 (9–16)	49 (41–53) × 27 (24–30)
NIWA 100852	550 (488–600) × 10 (8–13)	47 (44–52) × 30 (24–33)
QM G339774	520 (472–569) × 12 (10–15)	51 (46–54) × 33 (26–38)
QM G339775	535 (476–569) × 10 (7–14)	47 (43–52) × 30 (26–35)
ZMA.PO.P.12732	491 (455–531) × 10 (7–13)	53 (47–56) × 31 (24–39)

been used as a 'catch-all' for *Latrunculia* specimens from the Southern Hemisphere. The problems are likely to have originated from the two syntypes collected from Rio de la Plata, which have very different looking anisodiscorhabds. NHMUK 1887.5.2.270 has anisodiscorhabds with a funnel-shaped apical whorl with a margin of short, pointed spines, and a slightly slanted subsidiary whorl, which is clearly separated from the apical whorl (Fig. 11A). In contrast, NHMUK 1887.5.2.269 has anisodiscorhabds with a wide bowl-shaped apical whorl comprising long, sharp, vertical spines, a strongly curved subsidiary whorl, also with a margin of long spines, and very little separation between the apical and subsidiary whorls so that the subsidiary whorl encloses the apical structures (Fig. 21A).

Careful examination of the specimens in our collection that were previously identified as *L.* (*L.*) *brevis* revealed that they can be separated into two clear groups by anisodiscorhabd appearance as above. Furthermore, the group with the funnel-shaped apical whorl typically possess a slightly narrower apical whorl diameter [17 (13–24) μm, n = 75] and a single apical spine (Fig. 11G), while the group with the bowl-shaped apical whorl has a large apical diameter [20 (14–28] μm, n = 96] and a cluster of apical spines (Fig. 21F).

While there is little difference between the spicule lengths of the two type specimens [NHMUK 1887.5.2. 270 anisostyles 442 (406–470) μm, anisodiscorhabds 53 (43–59) μm; NHMUK 1887.5.2.269 anisostyles 463 (455–482) μm, anisodiscorhabds; 54 (50–58) μm], or the geographic distribution of the two groups (both being spread across Argentina-Uruguay, Antarctica and New Zealand), we consider the differences in the morphology of the anisodiscorhabds to be sufficient to separate the two groups into separate species. NHMUK 1887.5.2.270 is retained as the holotype of *L.* (*L.*) *brevis*, and NHMUK 1887.5.2.269 is made the holotype of a new species, *L.* (*L.*) *nelumbo* **sp. nov.**

The spicule size ranges of *L.* (*L.*) *brevis* overlap with five other New Zealand and Antarctic *Latrunculia* (*Latrunculia*) species: *L.* (*L.*) *prendens* **sp. nov.**, *L.* (*L.*) *robertsoni* **sp. nov.**, *L.* (*L.*) *incristata* **sp. nov.**, *L.* (*L.*) *bocagei*, and *L.* (*L.*) *variornata* **sp. nov.** (Fig. 3). *Latrunculia* (*L.*) *brevis* can be differentiated from the first four species by the anisodiscorhabd morphology: *L.* (*L.*) *brevis* has a funnel-shaped apical whorl with a spined margin; *L.* (*L.*) *incristata* **sp. nov.** has a flat-topped apical whorl; *L.* (*L.*) *prendens* **sp. nov.** has a bulbous apical whorl that has inwardly curved spines; *L.* (*L.*) *robertsoni* **sp. nov.** has an apical whorl that comprises a ring of individual spines, and *L.* (*L.*) *bocagei* has an apical whorl and apex that comprises a cluster of blunt, finger-like spines. The anisodiscorhabds of *L.* (*L.*) *brevis* are most similar to those of *L.* (*L.*) *variornata* **sp. nov.**, but those of *L.* (*L.*) *variornata* **sp. nov.** are more irregular and proportionally wider (L:W ratio is 1.44) than those of *L.* (*L.*) *brevis* (L:W ratio is 1.68) (Fig. 70).

Bergquist (1968) synonymised the holotype of *L.* (*B.*) *spinispiraefera* Brøndsted, 1924 with *L.* (*L.*) *brevis*, and assigned three specimens collected from Three Kings Islands, Chatham Rise and Campbell Plateau to *L.* (*L.*) *brevis*. However, subsequent studies by Alvarez *et al.* (2002) and Samaai *et al.* (2006) regarded *L.* (*B.*) *spinispiraefera* Brøndsted, 1924, to be a valid species. The Chatham Rise specimens of Bergquist (1961) (CMC AQ1083) were borrowed from the Canterbury Museum, but only microscope slides of the other specimens could be found. Examination of this material found that these specimens were quite different from *L.* (*L.*) *brevis sensu stricto* and one another. We conclude that:

1. *Latrunculia* (*B.*) *spinispiraefera* is a valid species (see section on *L.* (*B.*) *spinispiraefera* for more details).
2. CMC AQ1083 from the Chatham Rise that Bergquist identified as *L.* (*B.*) *spinispiraefera* in Bergquist (1961), and subsequently transferred

to *L.* (*L.*) *brevis* in Bergquist (1968) is actually *L.* (*L.*) *triverticillata* based on anisodiscorhabd morphology and spicule measurements (Table 5).

3. The specimen from the Three Kings Islands is a new species—*L.* (*L.*) *magistra* **sp. nov.** (see species description below).
4. The specimen from Campbell Plateau (Stn B176, 50.483° S, 166.508° E, 83 m) is not recognisable, as no anisodiscorhabds are present in Bergquist's microscope slide.

We found one other specimen identified as *L.* (*L.*) *brevis* in Bergquist's collection that is deposited in Museum of New Zealand Te Papa Tongarewa. Examination of this specimen (PO.1441 from Coromandel) found that it was *L.* (*B.*) *procumbens*.

Latrunculia (*L.*) *brevis* is unusual in that it has a very wide geographic distribution ranging from Argentina to Antarctica to northern New Zealand. This geographic distribution is not unprecedented, however, as circumpolar Southern Ocean currents link these three regions, and a few other sponge species have been recorded from South America, Antarctica, and New Zealand (e.g., *Cercicladia australis* Ríos, Kelly & Vacelet, 2011, found on Macquarie Ridge and the Argentine margin of Patagonia). However, given the wide geographic distribution, it is possible that *Latrunculia* (*L.*) *brevis*, as currently described, may contain multiple species that cannot be differentiated by morphological characteristics alone. Molecular studies may be required to confirm the geographical distribution of *L.* (*L.*) *brevis*.

Key diagnostic characters

- thickly encrusting, massive or hemispherical sponge, typically densely covered with long, conical fistules
- anisostyles are moderate, 500 (406–600) μm long, but there is a relatively large variation in size within and amongst specimens
- anisodiscorhabds are large, 51 (41–70) μm long, but there is a relatively large variation in size within and amongst specimens
- apical whorl is funnel-shaped
- subsidiary whorl is clearly separated from the apical whorl
- distribution Argentina-Uruguay, Antarctica, Macquarie Ridge, New Zealand, 168–1658 m.

Latrunculia (*Latrunculia*) *fiordensis* Alvarez, Bergquist & Battershill, 2002

Figs 3, 12, 13, 70; Table 4

Latrunculia 'Fiordland A' Miller *et al.* 2001: 245.

Latrunculia fiordensis Alvarez, Bergquist & Battershill, 2002: 172, figs 3E, 10.

Latrunculia fiordensis, Kelly *et al.* 2009: 43.

Latrunculia (*Latrunculia*) *fiordensis*, D'Archino *et al.* 2014: 80; Kelly 2018: 76.

Latrunculia (*Biannulata*) *millerae*, QM G 312177 in Samaai *et al.* 2006: 66, originally labelled *Latrunculia brevis* (NOT Q66C6062-G in Samaai *et al.* 2006: 66).

Material examined. Holotype—NIWA 7601, NIWA Stn Z10030, Bauza Island, Doubtful Sound, Fiordland, 45.284° S, 166.906° E, 18–22 m, 29 Nov 1995. Paratypes—NIWA 5093, NIWA Stn Z10028, Bauza Island, Doubtful Sound, Fiordland, 45.295° S, 166.915° E, 16–18 m, 29 Nov 1995; NIWA 5094, NIWA Stn Z10029, Bauza Island, Doubtful Sound, Fiordland, 45.295° S, 166.915° E, 8–13 m, 29 Nov 1995.

Other material. *Fiordland*: QM G312177, East side of Harsal Point, Caswell Sound, 45.006° S, 167.094° E, 30 m, 18 Apr 1991; NIWA 120483, NZOI Stn Q100, Passage Point to Wet Jacket Arm, 45.73° S, 166.732° E, 21 m, 7 Nov 1978; NIWA 143926, NIWA Stn Z15393, Crayfish Heights, Thompson Sound, 45.220° S, 166.978° E, 10 m, 30 Jan 2006.

Type locality. Doubtful Sound, Fiordland, New Zealand.

Distribution. Fiordland (Fig. 12E).

Description. Massive or globular sponge. Olive green in life, dark brown in alcohol (Alvarez *et al.* 2002). Surface covered in, at times, broad crater-like areolate porefields, with a thin raised rim, 1–2 mm high, and short fistular oscules, 1–2 cm diameter and 2–3 mm high (Figs 12A–D).

Spicules (Fig. 13, Table 4). Megascleres are small, slender anisostyles, sometimes with centrotylote swellings; 330 (258–400) × 6 (3–9) μm (n = 80).

Microscleres are anisodiscorhabds; 38 (30–47) × 14 (10–19) μm (n = 80); average L:W ratio is 2.67. Apical whorl is a flattish cluster of serrated spines. Subsidiary and median whorls are divided into three, well-separated segments that have sharply notched margins. The median whorl is located midway down the shaft. The basal whorl is located just above the manubrium and comprises a simple horizontal ring of conical spines. The manubrium is a cluster of diagonally downward-pointing spines. Malformed anisodiscorhabds are common that have extra spines protruding from the shaft or have missing whorls that have been reduced to single spines.

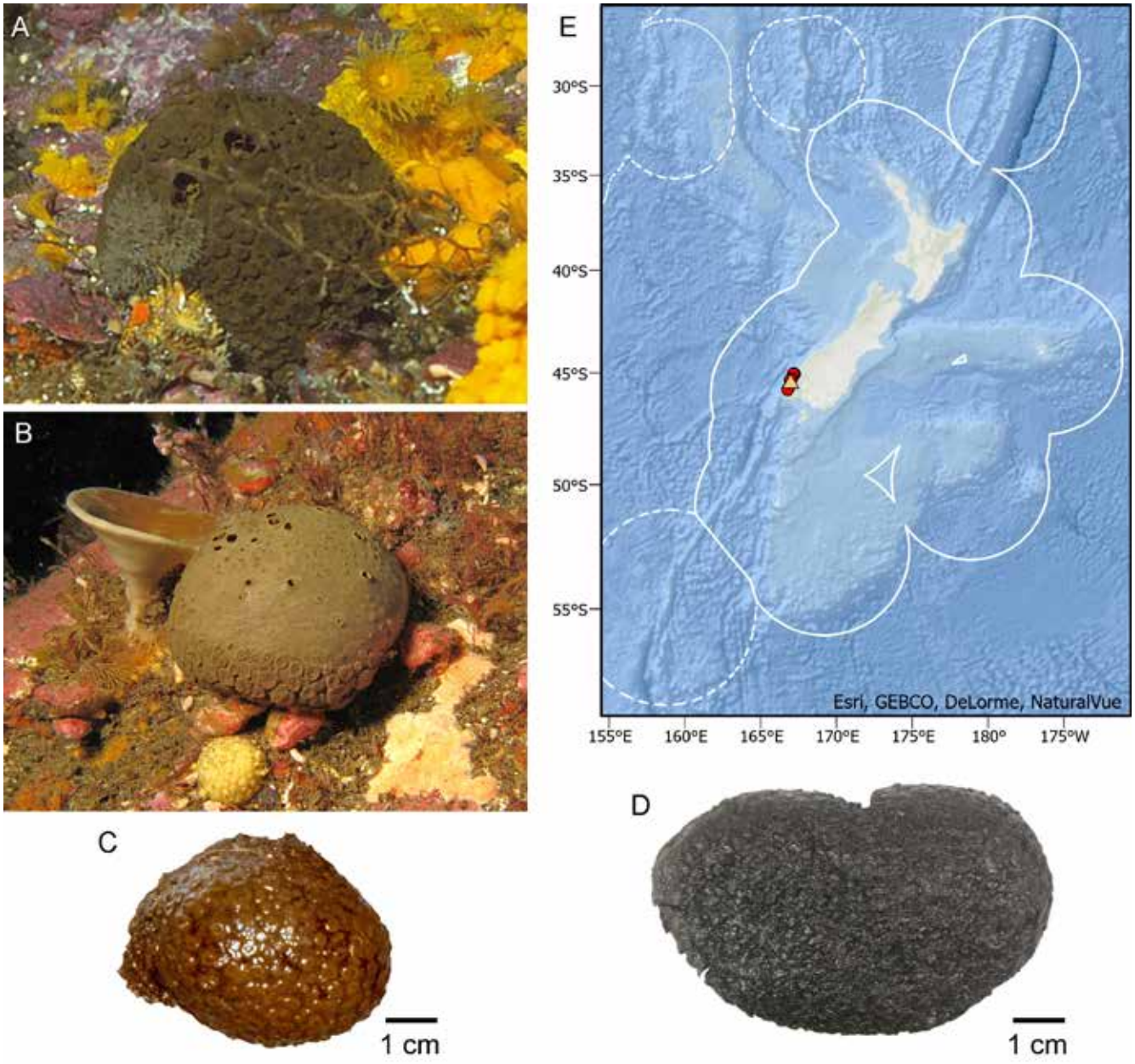


Figure 12. *Latrunculia* (*Latrunculia*) *fiordensis* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** *In situ*, identified from image and locality only (Image: Ken Grange); **B.** *In situ*, identified from image and locality only (Image: Mike Page); **C.** QM G312177, freshly collected specimen (Image: AIMS, reproduced with permission); **D.** Holotype NIWA 7601, preserved specimen; **E.** Distribution and type locality (triangle) of *L.* (*L.*) *fiordensis* and other specimens examined in this study (circles). New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Substrate, depth range and ecology. Found growing on rock, 8–30 m.

Remarks. Only two species of *Latrunculia* have been found in Fiordland, *L* (*L.*) *fiordensis* and *L* (*B.*) *millerae*. These two species can be easily differentiated as they belong to different subgenera (Figs 70, 71).

However, *Latrunculia* (*L.*) *fiordensis* has very similar spicule lengths to *L.* (*L.*) *triverticillata* (Fig. 3), recorded here from Kaikoura, Chatham Rise, and the Auckland Islands but absent from Fiordland, and the two species cannot be differentiated by spicule morphology. Alvarez *et al.* (2002) and Miller *et al.* (2001) differentiated these two species on live colour, chemistry and genetics. *Latrunculia* (*L.*) *fiordensis* is olive green in life and mainly produces discorhabdin B, while *L* (*L.*) *triverticillata* is brown in life and only produces discorhabdin C. The two species are genetically separated by Nei's unbiased genetic distance (*D*) of around 1 (Miller *et al.* 2001), which is larger than the genetic differences recorded among sibling species of some marine invertebrates ($D > 0.5$, Knowlton 1993).

However, these characteristics are not particularly usefully for the routine taxonomic identification of specimens under light microscopy. The only

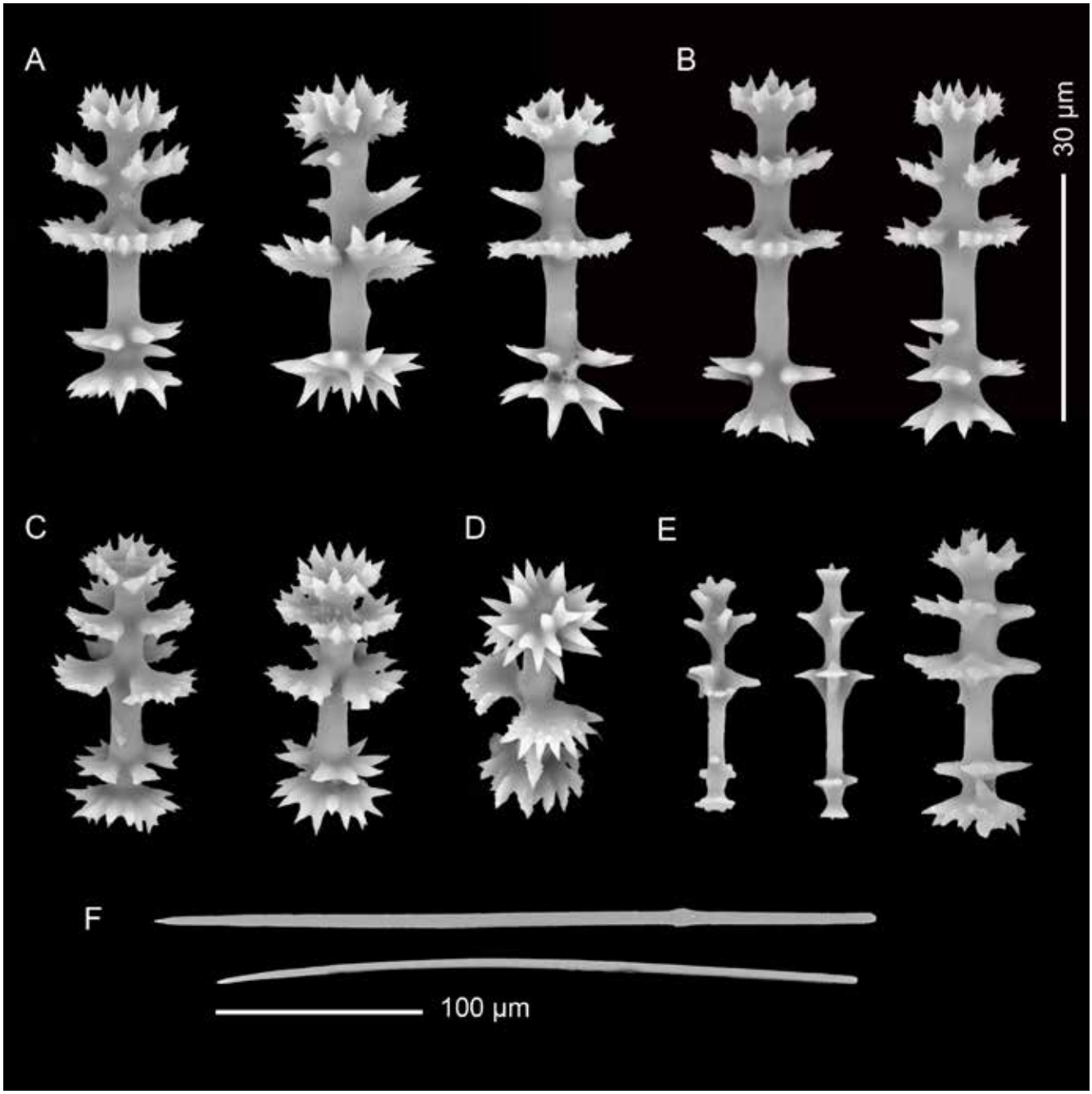


Figure 13. *Latrunculia* (*Latrunculia*) *fiordensis* Alvarez, Bergquist & Battershill, 2002, spicules: **A.** Anisodiscorhabds from holotype NIWA 7601; **B.** Anisodiscorhabds from paratype NIWA 5093; **C.** Top-down view of anisodiscorhabds from NIWA 7601; **D.** Upside-down view of an anisodiscorhabd from NIWA 7601; **E.** Immature anisodiscorhabds from NIWA 7601; **F.** Anisostyles from NIWA 5093.

characteristics that are useful (at the field and laboratory level) in separating the two species are their colour in life, and their distribution—*L.* (*L.*) *fiordensis* is olive green in life and has only been recorded from shallow waters of Fiordland, while *L.* (*L.*) *triverticillata* is brown in life and has been recorded from Kaikoura, Chatham Rise, and the Auckland Islands from shallow to deep waters (Figs 12, 14). *Latrunculia* (*L.*) *fiordensis* can be differentiated from all the other species of New Zealand *Latrunculia* (*Latrunculia*) by its combination of megasclere and microsclere lengths, and morphology (Figs 3, 70).

Samaai *et al.* (2006) regarded NIWA 123978 (TS 051) from the Ross Sea as *L.* (*L.*) *fiordensis*. Re-examination of this specimen suggests that it is most closely comparable to *L.* (*L.*) *nelumbo* **sp. nov.** as it has similar-shaped, but smaller anisodiscorhads (Table 7 & Table 20), and *Latrunculia* (*L.*) *fiordensis* is restricted to the fiords of southern New Zealand. We refer to this specimen as *L.* (*L.*) cf *nelumbo* **sp. nov.** (see discussion in that species).

Samaai *et al.* (2006) also listed the original non-accessioned specimen number of QM G312177 as Q66C6062–G. This is incorrect; the correct number

Table 4. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *fiordensis* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). Twenty spicules per category were measured for type specimens and ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 7601 (holotype)	311 (258–332) × 6 (3–8)	35 (30–40) × 15 (12–17)
NIWA 5093 (paratype)	329 (278–400) × 6 (4–8)	40 (35–47) × 13 (10–17)
NIWA 5094 (paratype)	251 (302–386) × 7 (5–8)	38 (33–43) × 15 (11–19)
QM G312177	327 (264–387) × 6 (4–9)	38 (33–42) × 15 (12–17)

is Q66C5406-R (Merrick Ekins, QM, pers. comm.). Q66C6062–G is a species of *Negombata* (family Podospongiidae de Laubenfels).

Key diagnostic characters

- massive or globular sponge covered with crater-like areolated porefields and short fistular oscules
- olive green in life
- short anisostyles, 330 (258–400) μm long
- small, slender anisodiscorhabds, 38 (30–47) μm long
- distribution Fiordland, New Zealand, 8–30 m

Latrunculia (*Latrunculia*) *triverticillata* Alvarez, Bergquist & Battershill, 2002

Figs 3, 14, 15, 70; Table 5

Latrunculia 'Kaikoura brown' Miller *et al.* 2001: 245.
Latrunculia triverticillata Alvarez, Bergquist & Battershill, 2002: 170, fig. 3D.
Latrunculia triverticillata, Kelly *et al.* 2009: 43.
Latrunculia spinispiraefera, Bergquist 1961: 189, fig. 13.
Latrunculia brevis, Bergquist 1968: 17 (CMC AQ1083).
Latrunculia (*Latrunculia*) *triverticillata*, Samaai *et al.* 2006: 43, figs 1L, 2, 3F, 5C; Zou *et al.* 2019: Table S2 (Supporting Information)

Material examined. Holotype—NIWA 7789, NIWA Stn Z10036, Kaikoura, 42.433° S, 173.7° E, 20 m, 12 Dec 1997. Paratypes—NIWA 5091, NIWA 5092, NIWA Stn Z10036, Kaikoura, 42.433° S, 173.7° E, 20 m, 12 Dec 1997.

Other material. *Chatham Rise*, *Chatham Islands*: NIWA 92322, NIWA 92323, NIWA 92324, NIWA Stn Z10036, 42.433° S, 173.7° E, 20 m, 12 Dec 1997; Q66D 87-0307-V, East Head, Ocean Bay, 8 m, 6 Mar 1988, identified from microscope slide & image; CMC AQ1083, Stns 6.21, 6.22, 43.667° S, 179.467° E, 396 m, 24 Jan 1954 (was named as *L. brevis*).

Auckland Islands: NIWA 93016, NZOI Stn D196, Adams Island, 50.917° S, 166.35° E, 110 m, 23 Jan 1964.

Type locality. Kaikoura, New Zealand.

Distribution. Kaikoura; Chatham Islands, New Zealand (Fig. 14C).

Description. Massive globular sponge, dark brown in life and in alcohol. Surface covered in densely packed, mushroom-shaped inhalant pores, 1–2 mm high, which are covered with a distinct pellucid poral membrane. Fistular, cylindrical oscules, 1–2 cm in diameter and ≤ 5 mm high are scattered over the sponge (Figs 14A, B). Texture is moderately soft, compressible.

Spicules (Fig. 15, Table 5). Megascleres are small and slender anisostyles, sometimes with polytylote swellings; 337 (241–415) × 6 (3–9) μm (n = 132).

Microscleres are slender anisodiscorhabds with a narrow apical whorl of diagonally upward-pointing, serrated spines; 38 (31–49) × 15 (10–21) μm (n = 140); average L:W ratio is 2.68. Subsidiary and median whorls are located on the upper half of the shaft. The whorls are divided into three to four segments that

Table 5. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *triverticillata* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 7789 (holotype)	331 (285–376) × 6 (5–9)	36 (33–39) × 15 (11–20)
NIWA 5091 (paratype)	354 (323–390) × 6 (4–8)	38 (33–39) × 15 (10–18)
NIWA 5092 (paratype)	350 (271–402) × 6 (4–7)	41 (34–45) × 14 (12–18)
NIWA 92322	322 (287–349) × 5 (3–6)	40 (37–44) × 16 (12–19)
NIWA 92323	335 (269–378) × 5 (4–6)	41 (38–49) × 15 (11–17)
NIWA 92324	314 (291–346) × 6 (5–7)	40 (34–43) × 14 (12–17)
NIWA 93016	350 (322–396) × 6 (5–9)	38 (35–44) × 17 (16–21)
CMC AQ1083	340 (316–366) × 6 (4–7)	37 (33–41) × 13 (10–17)
Q66D 87-0307-V	292 (241–341) × 6 (3–9)	36 (31–41) × 14 (10–19)

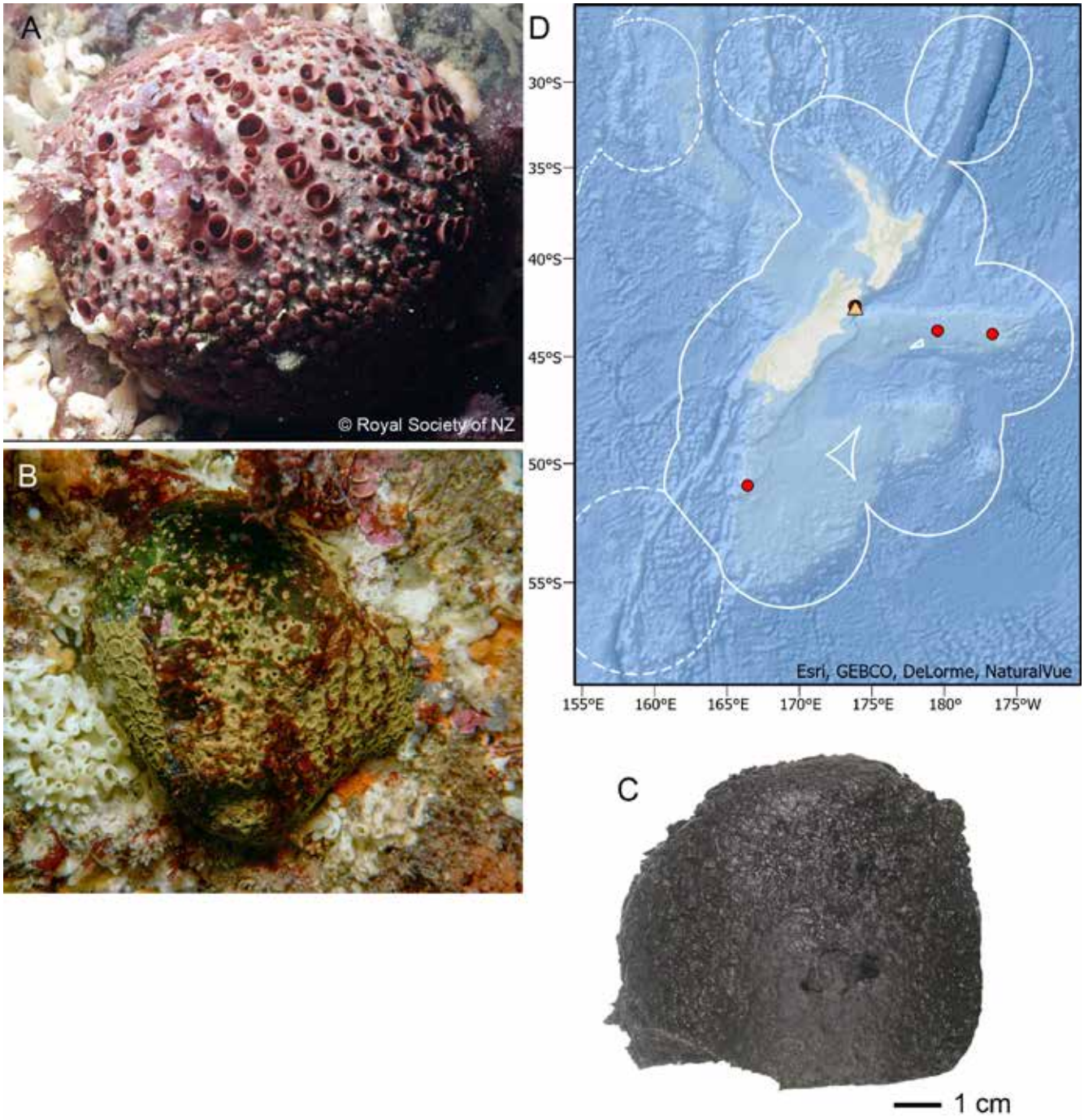


Figure 14. *Latrunculia* (*Latrunculia*) *triverticillata* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** Kaikoura (Image: Chris Battershill), reproduced from Alvarez *et al.* (2002: fig. 3D), with permission from Taylor & Francis on behalf of The Royal Society of New Zealand; **B.** Q66D 87-0307-V, East Head, Ocean Bay, Chatham Island, 8 m, 6 Mar 1988, identified from microscope slide & image; **C.** Holotype NIWA 7789, preserved specimen; **D.** Distribution and type locality (triangle) of *L.* (*L.*) *triverticillata* holotype (triangle) and other specimens (circles) examined in this study. The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

have sharply notched margins. The horizontal median whorl is wider that the other whorls and has a slightly upwards curved rim. The basal whorl is a horizontal ring of conical spines that is located above the manubrium, which is a diagonally downward-pointing cluster of spines.

Substrate, depth range and ecology. Shallow-water specimens found growing on rock, deep-water specimens found growing on soft sediment, 8–396 m.

Remarks. Only two species of *Latrunculia* have been found in Kaikoura, *L.* (*L.*) *triverticillata* and *L.* (*B.*) *kaikoura*, which are easily differentiated by their

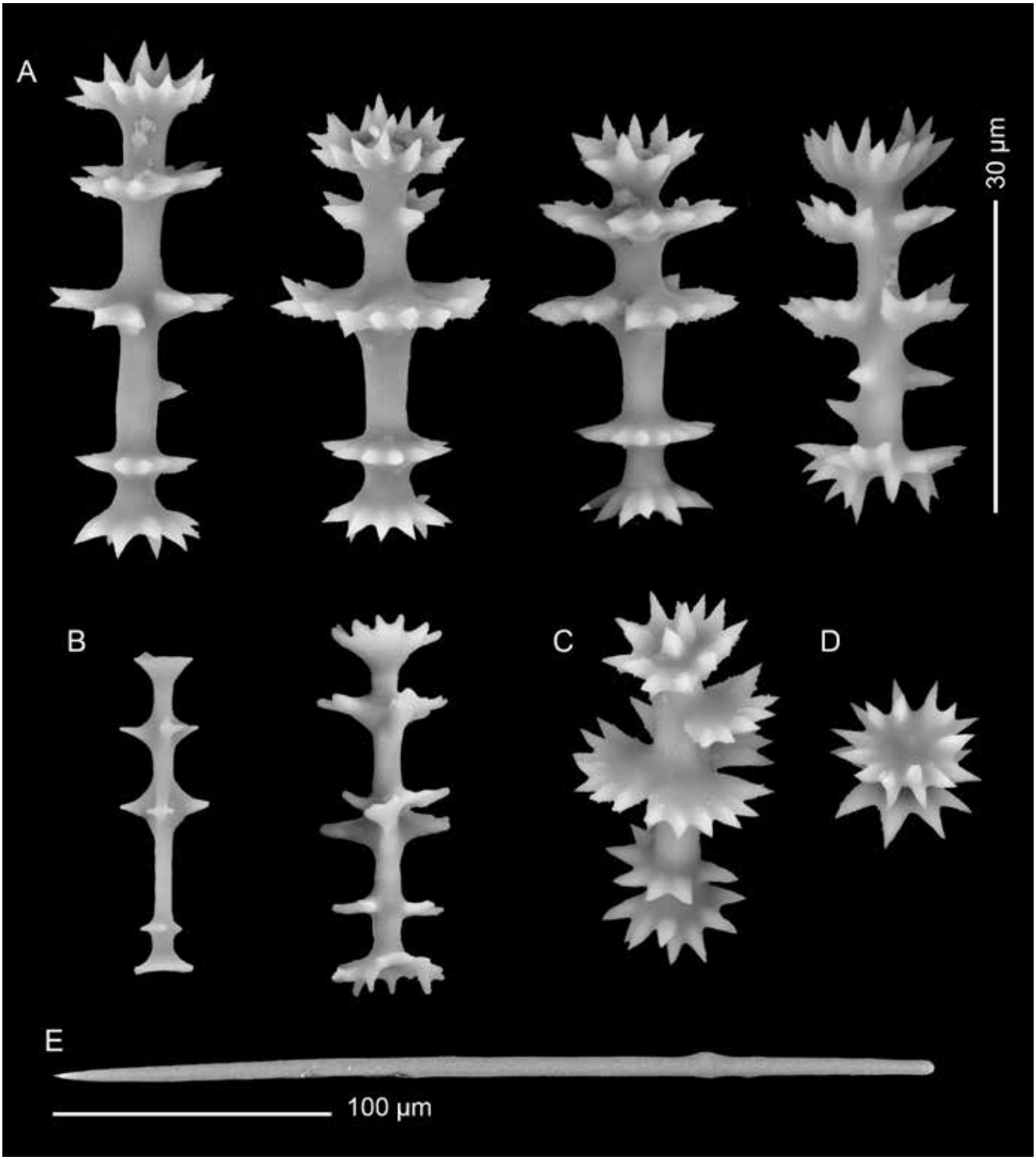


Figure 15. *Latrunculia* (*Latrunculia*) *triverticillata* Alvarez, Bergquist & Battershill, 2002, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabds; **C.** Top-down view of an anisodiscorhabd showing the apical whorl; **D.** Upside-down view of an anisodiscorhabd showing the manubrium and basal whorl (image has been cropped). All SEM images are from NIWA 7789.

different subgenera. *Latrunculia* (*L.*) *triverticillata* has very similar anisostyle and anisodiscorhabd lengths to *L.* (*L.*) *fiordensis* and the two species can only be differentiated by live colour and geographic distribution (see remarks for *L.* (*L.*) *fiordensis*). *Latrunculia* (*L.*) *triverticillata* can be differentiated from all the other species of New Zealand *Latrunculia* (*Latrunculia*) by its combination of megasclere and microsclere lengths, and morphology (Figs 3, 70).

Samaai *et al.* (2006) classified specimen NIWA 92995 (TS 055) from Milford Sound as *L.* (*L.*) *triverticillata*. However, on re-examination of this specimen we found that it is *L.* (*B.*) *millerae* (Table 20). The specimens (CMC AQ1083) from Chatham

Rise in Bergquist (1968), named as *L. brevis*, are *L.* (*L.*) *triverticillata*.

Key diagnostic characters

- massive or globular sponge densely covered with mushroom-shaped inhalant pores and short and wide cylindrical oscules
- brown in life
- small, slender anisodiscorhabds, 38 (31–49) μm long
- short anisostyles, 337 (241–415) μm long
- distribution southeastern New Zealand (Kaikoura, Chatham Islands, Auckland Islands), 8–396 m.

***Latrunculia* (*Latrunculia*) *oxydiscorhabda* Alvarez, Bergquist & Battershill, 2002**

Figs 3, 16, 17, 70; Table 6

Latrunculia oxydiscorhabda Alvarez, Bergquist & Battershill, 2002: 174, figs 11A–F.

Latrunculia oxydiscorhabda, Kelly et al. 2009: 43.

Latrunculia (Latrunculia) oxydiscorhabda Samaai, Gibbons & Kelly, 2006: 41, figs 1K, 2, 3E, 5B, 6H1.

Material examined. Holotype—NIWA 7602 [original holotype NZOI H–801 (=BA Por 339 in Alvarez *et al.* 2002: 174), and NIWA 92994 (=Ts 57 in Samaai *et al.* 2006: 29 (table 3), 41, a subsample of the holotype)], NIWA Stn Z9243, Spirits Bay, Northland, 34.368° S, 172.768° E, 44 m, 28 Feb 1997.

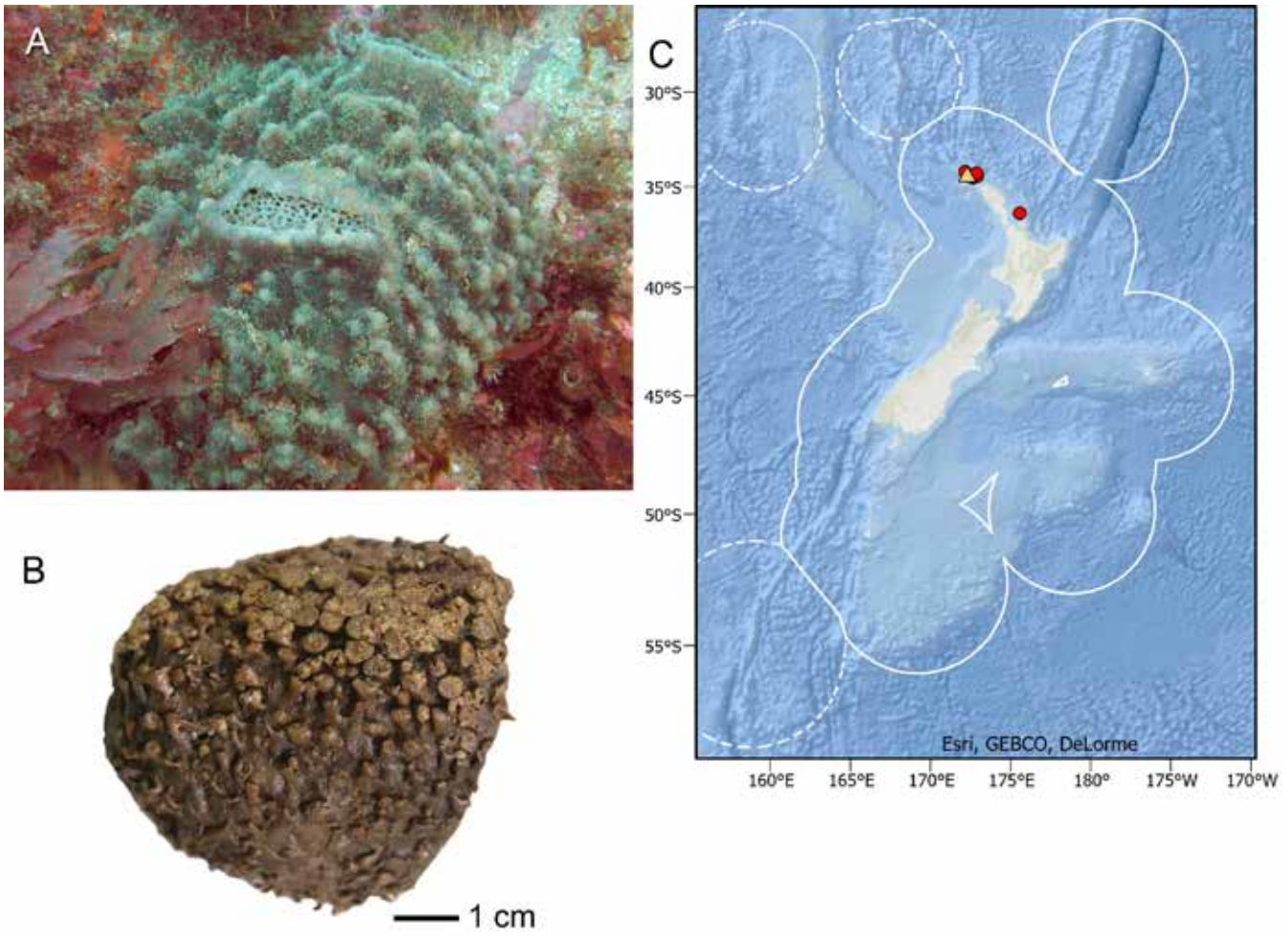


Figure 16. *Latrunculia* (*Latrunculia*) *oxydiscorhabda* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** NIWA 93019 *in situ*, note the sieve plate over the opening of the oscule vestibule (Image: Mike Page); **B.** NIWA 7602, preserved specimen; **C.** Distribution and type locality (triangle) of *L.* (*L.*) *oxydiscorhabda* and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Figure 17. (*Opposite*) *Latrunculia* (*Latrunculia*) *oxydiscorhabda* Alvarez, Bergquist & Battershill, 2002, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabds; **C.** Top-down view of an anisodiscorhabd showing the apical and subsidiary whorls (image has been cropped); **D.** Upside-down view of an anisodiscorhabd showing the manubrium and basal whorl (image has been cropped); **E.** Oxydiscorhabds; **F.** Anisostyle. All SEM images from holotype NIWA 93019.

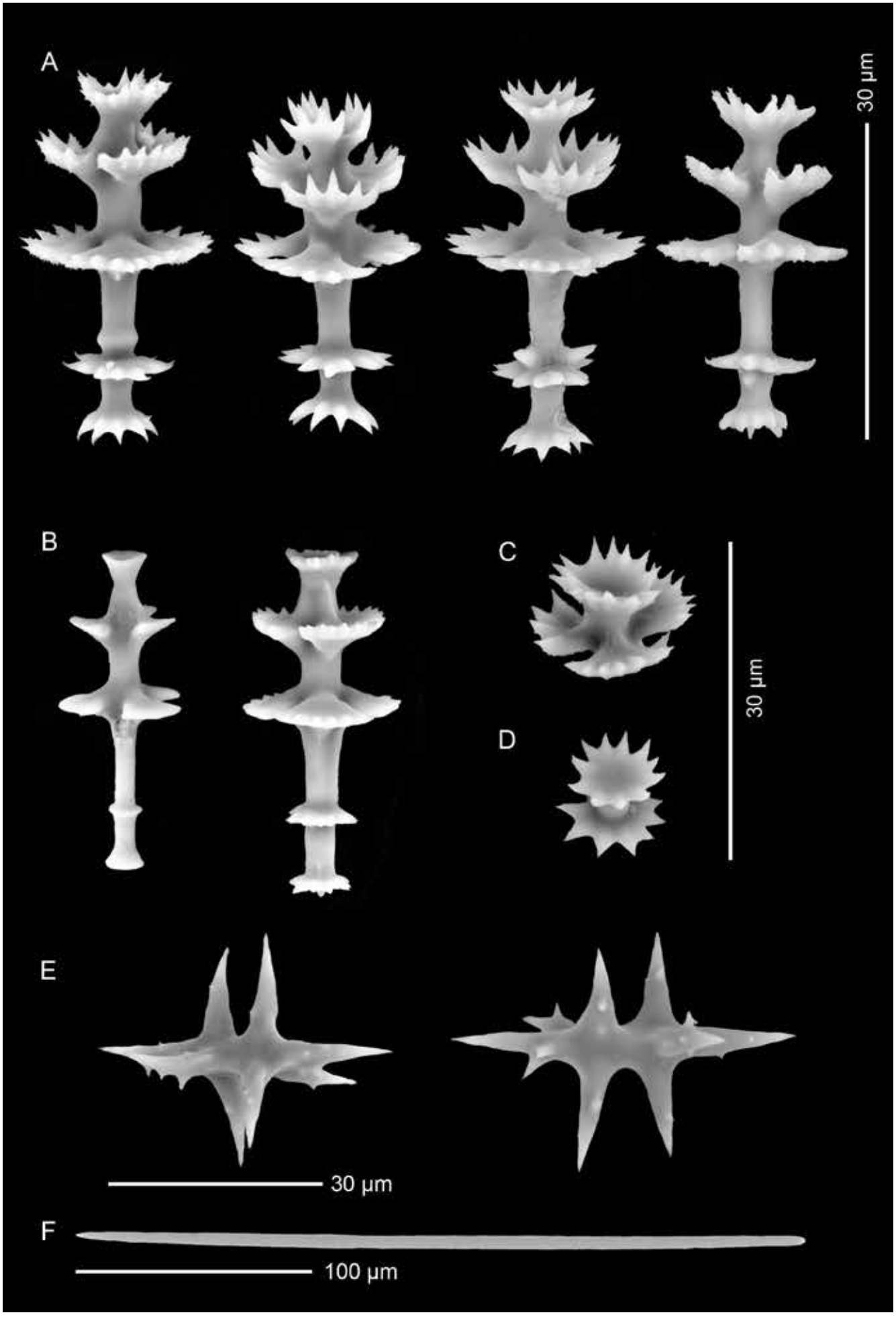

A
30 µm
B
C
D
30 µm
E
30 µm
F
100 µm

Table 6. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *oxydiscorhabda* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds	Oxydiscorhabds
NIWA 7602 (holotype)	449 (314–530) × 7 (5–8)	30 (28–33) × 15 (11–18)	36 (28–45) × 25 (19–30)
NIWA 7120	431 (407–264) × 8 (6–10)	35 (33–37) × 16 (14–19)	39 (35–50) × 26 (23–31)
NIWA 51032	406 (297–243) × 6 (5–8)	33 (28–36) × 17 (16–20)	39 (29–45) × 23 (18–27)
NIWA 51117	449 (389–245) × 7 (5–8)	32 (30–34) × 19 (18–22)	38 (28–45) × 24 (21–27)
NIWA 51147	391 (340–258) × 8 (6–10)	30 (26–32) × 16 (13–22)	38 (31–44) × 26 (21–30)
NIWA 51193	442 (357–284) × 8 (6–10)	31 (26–35) × 17 (15–19)	41 (32–50) × 28 (21–34)
NIWA 51217	413 (342–218) × 9 (7–11)	32 (28–36) × 18 (17–21)	38 (29–44) × 26 (21–31)
NIWA 51222	457 (433–288) × 7 (5–10)	33 (28–37) × 16 (13–18)	41 (33–49) × 29 (20–36)
NIWA 51296	446 (397–275) × 8 (7–10)	31 (25–34) × 17 (13–20)	36 (28–40) × 27 (19–37)
NIWA 51413	444 (398–309) × 8 (6–10)	33 (30–35) × 19 (16–21)	39 (28–46) × 31 (20–37)
NIWA 51435	425 (403–280) × 7 (6–9)	31 (27–34) × 17 (15–21)	39 (34–44) × 28 (24–33)
NIWA 51453	481 (450–247) × 6 (5–7)	33 (31–35) × 19 (15–21)	42 (32–49) × 29 (19–35)
NIWA 51482	454 (421–295) × 9 (8–10)	31 (29–33) × 17 (15–19)	39 (32–45) × 29 (21–35)
NIWA 51560	434 (391–281) × 8 (6–10)	32 (28–35) × 15 (12–17)	39 (34–43) × 28 (24–32)
NIWA 51561	450 (398–288) × 8 (7–10)	29 (27–34) × 16 (13–19)	40 (35–46) × 29 (24–33)
NIWA 51577	424 (337–256) × 7 (4–9)	33 (29–35) × 16 (12–19)	39 (31–47) × 26 (24–30)
NIWA 52417	438 (401–241) × 7 (6–8)	31 (27–32) × 17 (13–23)	37 (26–42) × 24 (20–28)
NIWA 62201	413 (342–218) × 7 (4–9)	31 (27–33) × 16 (15–17)	38 (32–49) × 22 (19–24)
NIWA 62362	438 (386–242) × 5 (4–6)	34 (32–36) × 17 (15–18)	39 (31–48) × 24 (15–30)
NIWA 73038	452 (415–491) × 8 (6–11)	34 (32–37) × 20 (16–22)	42 (35–49) × 32 (25–39)
NIWA 92994	481 (450–247) × 8 (6–11)	31 (29–34) × 16 (13–18)	37 (29–41) × 25 (18–34)
NIWA 93019	362 (321–410) × 7 (5–8)	34 (32–36) × 15 (13–17)	29 (31–48) × 25 (21–32)
NIWA 93023	383 (288–114) × 6 (5–8)	33 (28–36) × 17 (15–19)	39 (37–42) × 28 (25–31)
NIWA 101458	489 (452–248) × 7 (5–9)	33 (31–35) × 19 (17–21)	38 (33–43) × 25 (19–29)
NIWA 101788	424 (337–256) × 7 (5–9)	30 (27–33) × 15 (13–18)	36 (32–42) × 22 (19–25)
NIWA 101803	383 (288–114) × 8 (6–11)	32 (29–36) × 17 (15–20)	36 (29–44) × 26 (22–31)
NIWA 101840	450 (398–288) × 8 (6–10)	28 (25–31) × 15 (14–18)	40 (33–44) × 26 (23–30)
NIWA 101882	457 (433–288) × 7 (6–9)	31 (28–34) × 16 (13–20)	43 (32–51) × 30 (26–34)
NIWA 101901	438 (401–241) × 9 (8–10)	34 (32–39) × 18 (16–20)	46 (40–52) × 28 (23–30)
NIWA 102067	431 (407–264) × 7 (5–9)	32 (28–36) × 17 (16–19)	39 (33–43) × 29 (24–34)
NMNZ PO.000613	406 (297–243) × 6 (5–8)	30 (28–32) × 15 (12–18)	37 (30–44) × 24 (18–28)

Other material. *Three Kings Islands*: NIWA 7120, NIWA Stn Z10041, 34.173° S, 172.098° E, 10–19 m, 19 Apr 1999.

Pandora Bank, *west of Cape Maria van Diemen*: NMNZ PO.000613 (TS106), 34.49° S, 172.587° E, 38–43 m, Feb 1991.

Cape Reinga: NIWA 101458 (CASIZ 300800), NIWA Stn Z15930, 34.384° S, 172.654° E, 53–75 m, 21 Apr 1999, collected by CRRF; NIWA 51435, NIWA Stn Z9699 (KAH9901/67), 34.360° S, 172.673° E, 41 m, 28 Jan 1999; NIWA 51453, NIWA Stn Z9700 (KAH9901/69), 34.381° S, 172.662° E, 54 m, 28 Jan 1999.

Spirits Bay: NIWA 62362, NIWA Stn Z9243 (BG9701/64), 34.368° S, 172.768° E, 44 m, 28 Feb 1997; NIWA 101788, NIWA Stn Z9666 (KAH9901/02), 34.405° S, 172.823° E, 33 m, 24 Jan 1999; NIWA 51032, NIWA Stn Z9667 (KAH9901/03), 34.405° S, 172.833° E, 29 m, 24 Jan 1999; NIWA 51117, NIWA 101803, NIWA Stn Z9676 (KAH9901/24), 34.364° S, 172.841° E, 57 m, 25 Jan 1999; NIWA 51147, NIWA 101840, NIWA Stn Z9677 (KAH9901/25), 34.369° S, 172.825° E, 55 m, 25 Jan 1999; NIWA 51193, NIWA 101882, NIWA Stn Z9679 (KAH9901/29), 34.333° S, 172.714° E, 73 m, 26 Jan 1999; NIWA 51217, NIWA 51222, NIWA 101901, NIWA Stn Z9681 (KAH9901/33), 34.315° S, 172.818° E, 63 m, 26 Jan 1999; NIWA 51296, NIWA Stn Z9688 (KAH9901/47), 34.375° S, 172.701° E, 53 m, 27 Jan 1999; NIWA 51413, NIWA Stn Z9696 (KAH9901/61), 34.324° S, 172.749° E, 69 m, 28 Jan 1999; NIWA 51482, NIWA Stn Z9701 (KAH9901/71), 34.298° S, 172.7 92° E, 76 m, 28 Jan 1999; NIWA 51560, NIWA 51561, NIWA

Stn KAH9901/83, 34.341° S, 172.742° E, 59 m, 28 Jan 1999; NIWA 51577, NIWA 102067, NIWA Stn Z9710 (KAH9901/85), 34.3525° S, 172.765° E, 54 m, 28 Jan 1999; NIWA 52417, NIWA Stn KAH0606/D5, 34.345° S, 172.788° E, depth unknown, 15 May 2005; NIWA 93019, NIWA Stn Z15920, 34.42° S, 172.848° E, 2–28 m, 1 Dec 2002; NIWA 62201, NIWA Stn KAH1005/20, 34.360° S, 172.825° E, 56 m, 13 May 2010; NIWA 73038, NIWA Stn TAN1105/27, 34.272° S, 172.787° E, 66–67 m, 27 Mar 2011.

Hauraki Gulf: NIWA 93023; Great Barrier Island, <30 m, 8 Jun 2006.

Type locality. Spirits Bay, Northland, New Zealand.

Distribution. Three Kings Islands; Northland; Great Barrier Island, Hauraki Gulf (Fig. 16C).

Description. Massive to thickly encrusting. Surface densely covered with raised papillae, ≤ 2 cm diameter. Papillae may be cylindrical, mushroom-shaped, or volcano-shaped, flattened in preservative (Figs 16A, B). Large, raised compound oscule covered with a distinct sieve-plate may be present (Fig. 16A). Colour in life is khaki to medium brown, colour in alcohol is dark brown. Texture is compressible.

Spicules (Fig. 17, Table 6). Megascleres are slightly sinuous anisostyles with a large size range; 434 (288–619) × 7 (4–11) μm (n = 320).

Microscleres are anisodiscorhabds and oxydiscorhabds. Anisodiscorhabds (Figs 17A–D) are small, slender, with a narrow apical whorl and manubrium; 32 (25–39) × 17 (11–23) μm (n = 310); average L:W ratio is 1.92. The apical whorl is a simple whorl of diagonally upward-pointing, lightly acanthose spines (Fig. 17C). The subsidiary whorl is strongly curved upwards, and comprising three, well-separated segments that have deeply notched rims. The median whorl is horizontal and is located halfway down the shaft. It has a larger diameter than the other whorls, comprising three, well-separated segments that have deeply notched margins. The basal whorl is a narrow, simple, horizontal ring of spines. The manubrium is a narrow cluster of diagonally downward-pointing spines. Oxydiscorhabds are non-uniform, lightly microspined, with a straight axis with pointed tips, from which long, attenuating spines protrude; 39 (26–52) × 27 (15–39) μm (n = 314).

Substrate, depth range and ecology. Found growing on rock, 2–76 m.

Remarks. This species is one of the most frequently collected species of *Latrunculia*. It is easily differentiated from all other *Latrunculia* species by the presence of oxydiscorhabds, though they are uncommon in some specimens.

Key diagnostic characters

- massive to thickly encrusting sponge densely covered with cylindrical, mushroom-shaped, or volcano-shaped papillae
- large, raised oscular chimneys are covered with a distinct sieve plate
- very small anisodiscorhabds, 32 (25–39) μm long
- oxydiscorhabds present
- distribution Three Kings Islands and northeastern New Zealand, 2–76 m

***Latrunculia* (*Latrunculia*) *toufieki* Kelly & Sim-Smith sp. nov.** Figs 3, 18, 19, 70

Material examined. Holotype NIWA 39321, NIWA Stn TAN0802/311, Site C24, Admiralty Seamount, Ross Sea, Antarctica, 67.060° S, 170.966° E, 479–480 m, 14 Mar 2008.

Type locality. Admiralty Seamount, Ross Sea, Antarctica.

Distribution. Only known from type locality (Fig. 18B).

Description. Very thinly encrusting sponge growing on rock (Fig. 18A).

Spicules (Fig. 19). Megascleres are moderately long, stout anisostyles; 424 (355–460) × 12 (7–19) μm (n = 52).

Microscleres are very large anisodiscorhabds with a long slender shaft below the median whorl; 65 (58–72) × 36 (31–43) μm (n = 32); average L:W ratio is 1.84. They have a wide, funnel-shaped apical whorl of blunt spines that are sculptured with finely ridges. The apex is a fused ring of short, blunt sculptured spines. The subsidiary whorl is clearly separated from the apical whorl. Both the subsidiary and median whorls comprise horizontal rings that are divided into into several flanges or segments with a margin of blunt spines/notches.

The basal whorl is a horizontal ring of well-separated conical spines located just above the manubrium.

Substrate, depth range and ecology. Found growing on a rock, 479–480 m.

Etymology. Named for Dr Toufiek Samaai, Cape Town, for his valuable contribution to our understanding of the systematics of latrunculid sponges.

ZooBank registration. *Latrunculia* (*Latrunculia*) *toufieki* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act: 409AB466-5806-4D1D-B999-49C7FE00C214.

Remarks. *Latrunculia* (*L.*) *toufieki* **sp. nov.** can be differentiated from most other New Zealand and

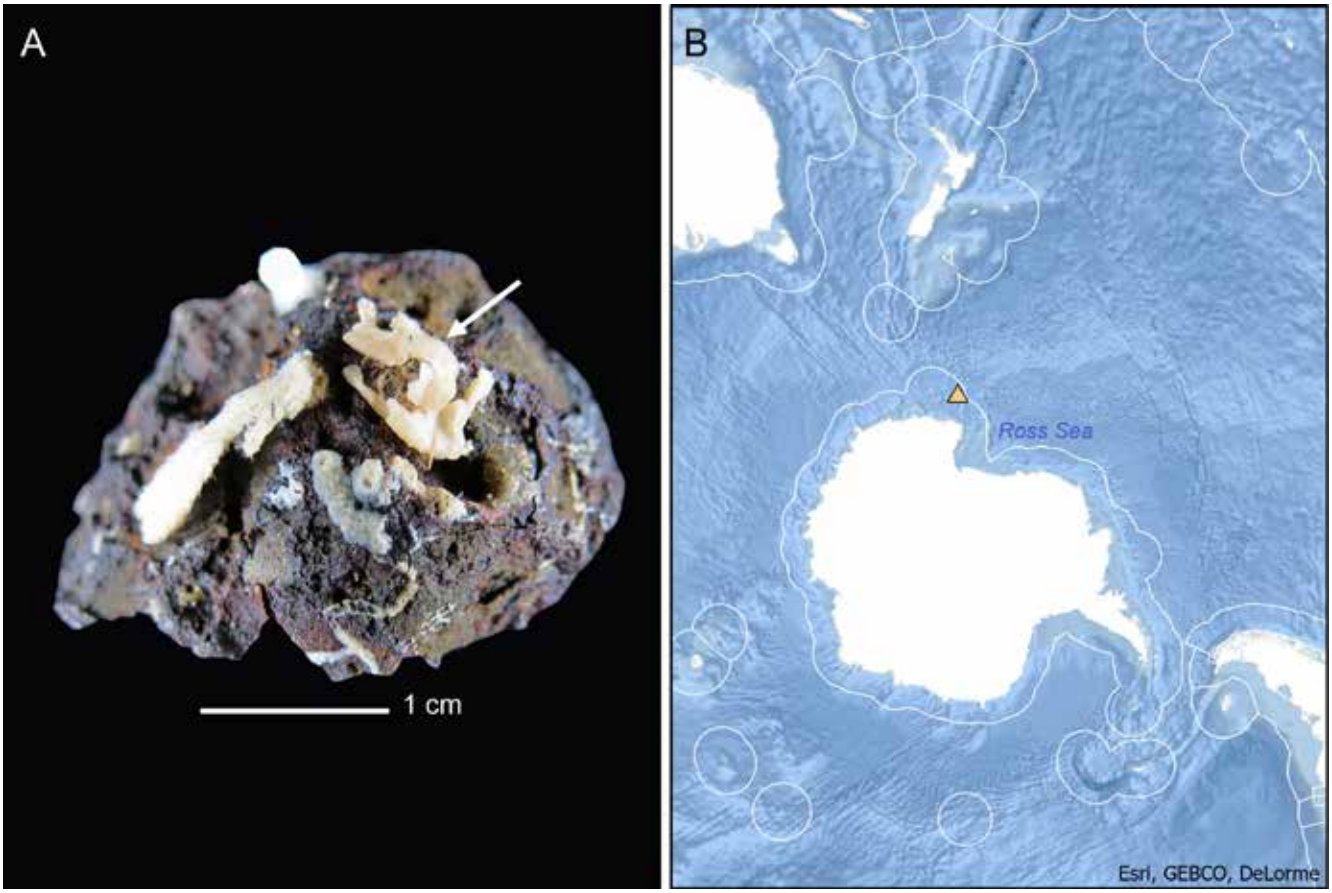


Figure 18. *Latrunculia* (*Latrunculia*) *toufieki* **sp. nov.**, morphology and distribution: **A.** Holotype NIWA 39321, preserved specimen (arrow); **B.** Type locality (triangle). Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

Antarctic species of *Latrunculia* (*Latrunculia*) by its combination of very large anisodiscorhabds and moderately small anisostyles (Fig. 3). It has similar sized spicules to *L.* (*L.*) *brevis* and *L.* (*L.*) *nelumbo* **sp. nov.** but the shapes of the apical whorl are very different for the three species: *L.* (*L.*) *toufieki* **sp. nov.** has a very wide apical whorl of fused short, blunt spines; *L.* (*L.*) *brevis* has a narrow, funnel-shaped apical whorl of short, pointed spines; and *L.* (*L.*) *nelumbo* **sp. nov.** has a bowl-shaped apical whorl of long, vertical, finger-like spines.

The size and general shape of the anisodiscorhabds of *L.* (*L.*) *toufieki* **sp. nov.** are very similar to those of *L.* (*L.*) *bocagei*. However, *L.* (*L.*) *toufieki* **sp. nov.** has smaller anisostyles [424 (355–460) μm] than *L.* (*L.*) *bocagei* [513 (434–564) μm] and the apex of the anisodiscorhabds comprises a fused ring of blunt, sculptured spines (rather than a cluster of spines as in *L.* (*L.*) *bocagei*).

The anisodiscorhabds of *Latrunculia* (*L.*) *toufieki* **sp. nov.** are comparable to those of *L.* (*L.*) *basalis* and *L.* (*L.*) *lendenfeldi* (Fig. 9) which also have a wide crown of blunt or pointed spines, but in which the subsidiary whorl is so close to the apical whorl as to appear to be part of a combined apical substructure, such as in species of *Uniannulata* Kelly, Reiswig & Samaai, 2016; see remarks for *L.* (*L.*) *lendenfeldi* for more details. Both *L.* (*L.*) *basalis* and *L.* (*L.*) *lendenfeldi* also have much longer anisostyles than *L.* (*L.*) *toufieki* **sp. nov.** (Fig. 3).

Key diagnostic characters

- thinly encrusting sponge
- anisostyles are moderate, 424 (355–460) μm long
- anisodiscorhabds are very large, 65 (58–72) μm long
- apical whorl is very wide, funnel-shaped comprising a fused ring of short, blunt spines
- apex has blunt, sculptured spines
- clear separation between the apical and subsidiary whorls
- distribution, Ross Sea, Antarctica, 480–479 m

Latrunculia (*Latrunculia*) *nelumbo* Kelly & Sim-Smith sp. nov. Figs 3, 20, 21, 70; Table 7

Material examined. Syntype—NHMUK 1887.5.2.269 (microscope slides), Stn 320, Rio de la Plata, Argentina-Uruguay, Kerguelen HMS *Challenger* Expedition, 1873–76, 37.283° S, 53.867° W, 1097 m, 14 Feb 1876.

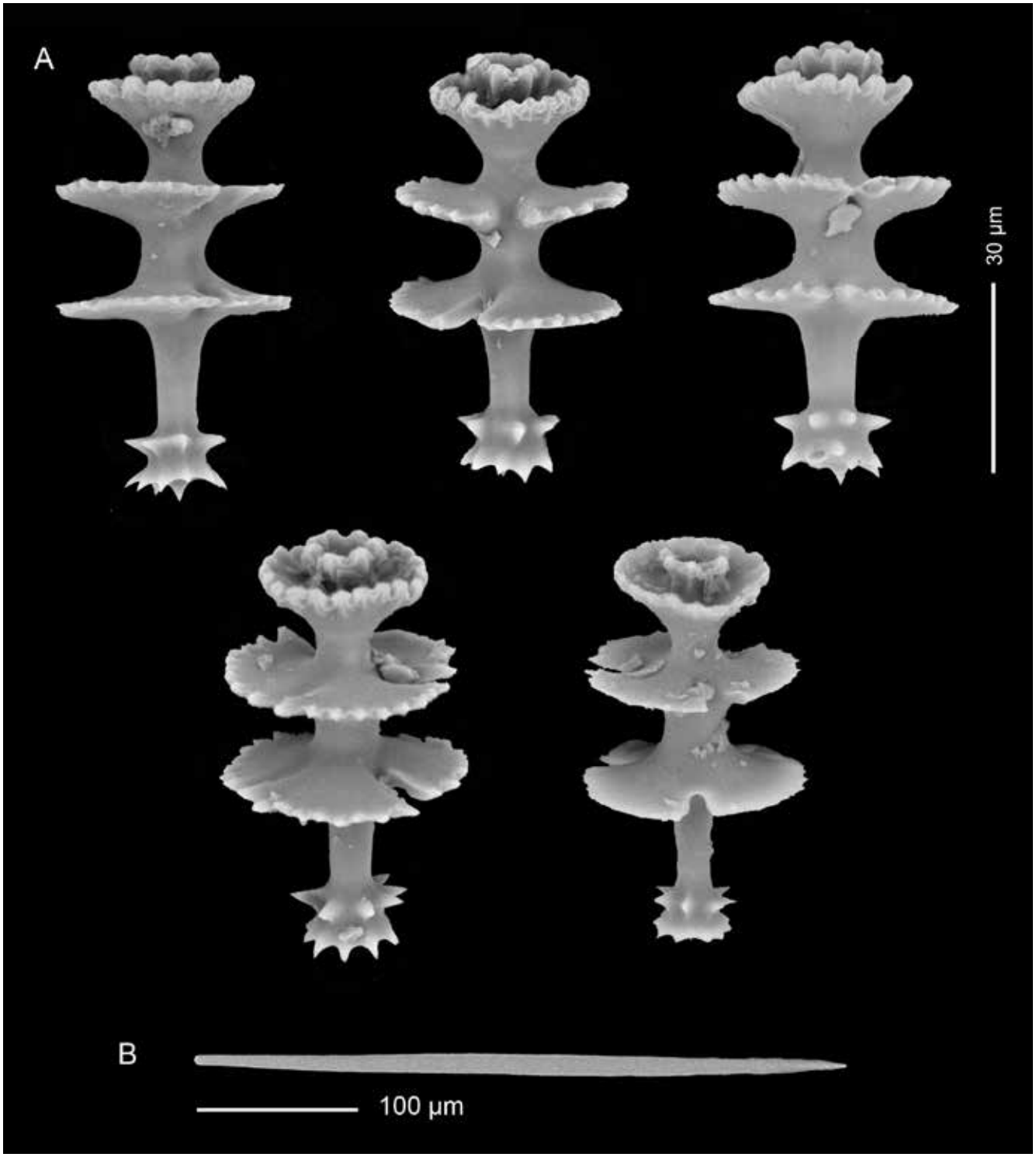


Figure 19. *Latrunculia* (*Latrunculia*) *toufieki* **sp. nov.**, spicules: **A.** Anisodiscorhabds. **B.** Anisostyle. All SEM images from holotype.

Other material. *New Zealand, Gisborne Knolls*: NIWA 31178, NIWA Stn TAN0413/184, 39.042° S, 179.341° E, 2595–2700 m, 17 Nov 2004.

Macquarie Ridge, Seamount 3 Clementsville: NIWA 39848, NIWA Stn TAN0803/3, 50.097° S, 163.474° E, 1070–1123 m, 1 Apr 2008.

Antarctica, *Ross Sea*: NIWA 28905, NIWA Stn TAN0402/204, 71.154° S, 171.186° E, 1138 m, 29 Feb 2004; NIWA 28921, NIWA Stn TAN0402/203, 71.156° S, 171.174° E, 1158–1165 m, 29 Feb 2004; NIWA 123978, NZOI Stn A521, 73.9° S, 177.733° W, 546–569 m, 4 Feb 1960.

Antarctica, Antarctic Peninsula, *Bransfield Strait*: SMF 11255, RV *Polarstern* 2013 LASSO Expedition Stn 199-4, 62.950° S, 58.233° W, 325 m, 27 Feb 2013.

Antarctica, Weddell Sea, *Antarctic Peninsula*, *James Ross Island*: SMF 11227, RV *Polarstern* 2013 LASSO Expedition Stn 217-6, 63.883° S, 58.217° W, 483 m,

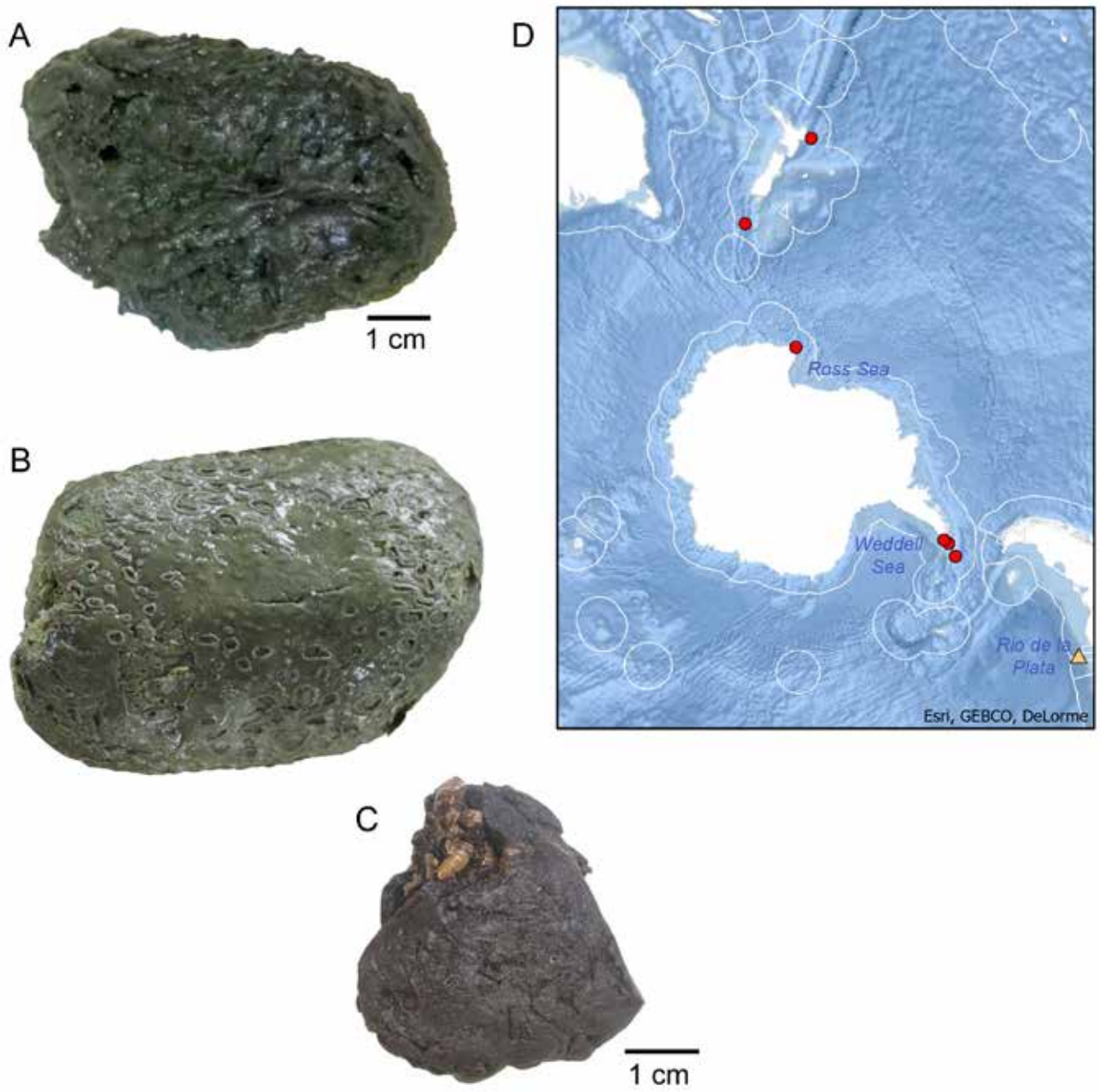


Figure 20. *Latrunculia* (*Latrunculia*) *nelumbo* **sp. nov.**, morphology and distribution: **A.** SMF 11255, deck specimen; **B.** PO_89, deck specimen; **C.** NIWA 28921, preserved specimen. **D.** Distribution and type locality (triangle), and other specimens examined (circles). Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

2 Feb 2013; ZMA.Por.P.12732, no other collection details available.

Elephant Island, *South Shetland Islands*, *Southern Ocean*, *245 kilometres north-northeast off the tip of the Antarctic Peninsula*: PO_086, PO_088, PO_089, SR_PO_17, SR_PO_18, RV *Polarstern* Expedition PS112 Stn PS112_64, 60.887° S, 55.611° W, 158 m, 11 Apr 2018.

Type locality. Rio de la Plata, Argentina-Uruguay.

Distribution. Rio de la Plata, Argentina-Uruguay; Antarctica; Macquarie Ridge (NZ EEZ), Gisborne Knolls, New Zealand (Fig. 20).

Description. Thickly encrusting or massive sponge. Surface wrinkled or covered with crater-like areolate porefields, smooth in places. Colour in life, moss green, colour in preservative dark brown (Fig. 20). Texture is soft, compressible.

Spicules (Fig. 21, Table 7). Megascleres are slightly sinuous anisostyles; 486 (414–550) × 10 (6–14) μm (n = 120).

Microscleres are large anisodiscorhabds; 57 (46–68) × 35 (27–41) μm (n = 120); average L:W ratio is 1.65. Morphology of the apical whorl is bowl-shaped with a rounded base and long vertical spines. The apex

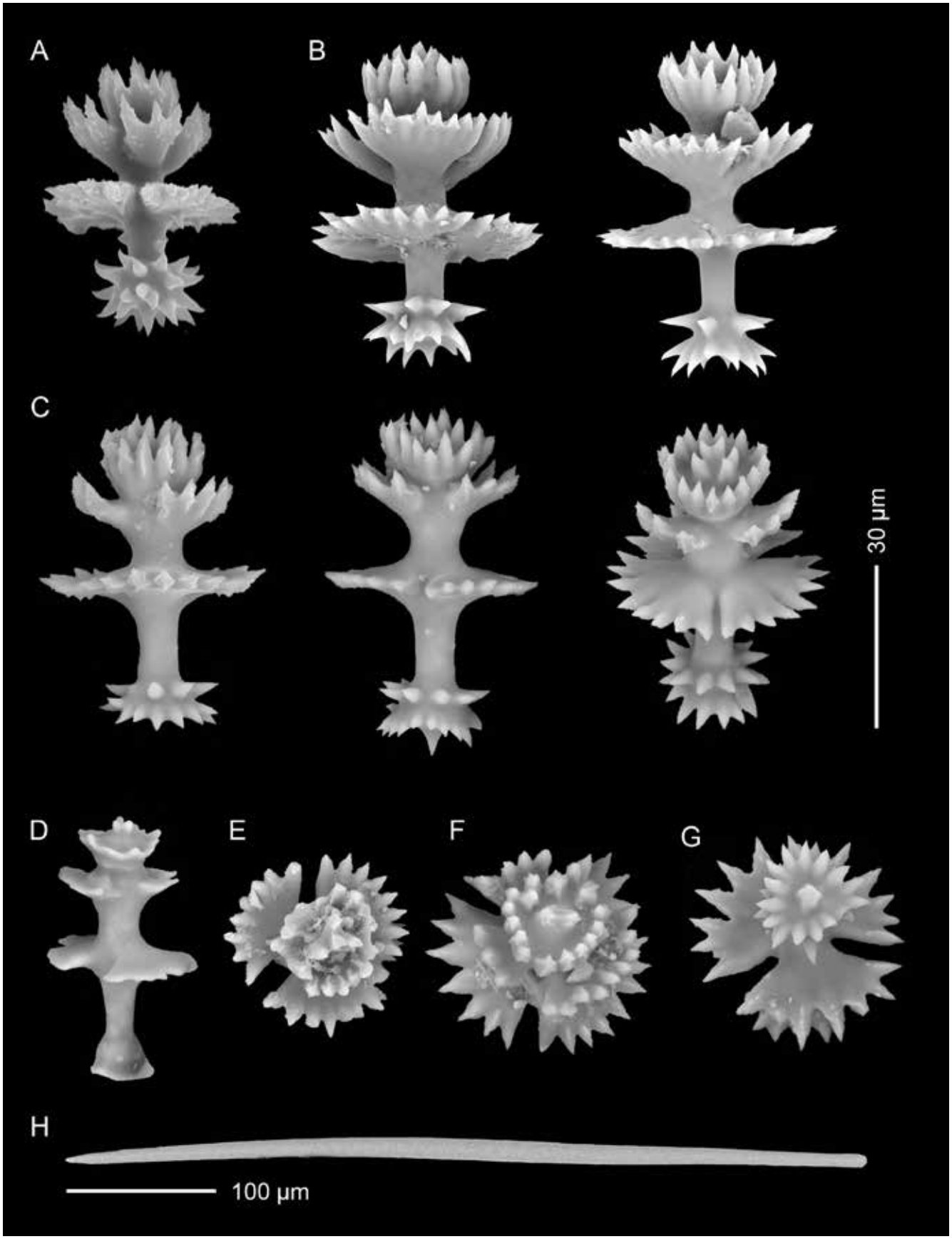


Figure 21. *Latrunculia* (*Latrunculia*) *nelumbo* **sp. nov.**, spicules: **A.** Anisodiscorhabd from NHMUK 1887.5.2.269 (Image: T. Samaai); **B.** Anisodiscorhabds from NIWA 31178; **C.** Anisodiscorhabds from NIWA 28905; **D.** Immature anisodiscorhabd from NIWA 28905; **E.** Top-down view of an anisodiscorhabd from NIWA 31178 showing the apex, apical whorl, subsidiary whorl; **F.** Top-down view of an anisodiscorhabd from NIWA 28905 showing the apex, apical whorl, subsidiary whorl and median whorl; **G.** Upside-down view of an anisodiscorhabd from NIWA 28905 showing the manubrium and median whorl; **H.** Anisostyle from NIWA 28905.

Table 7. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *nelumbo* **sp. nov.** Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined. Measurements of NHMUK 1887.5.2.269 are taken from Samaai *et al.* (2006).

Specimen	Anisostyles	Anisodiscorhabds
NHMUK 1887.5.2.269 (holotype)	463 (455–482) × 14	54 (50–58)
NIWA 28905	505 (463–550) × 13 (11–14)	57 (51–61) × 36 (33–39)
NIWA 28921	515 (428–539) × 11 (10–12)	60 (57–65) × 37 (34–40)
NIWA 31178	504 (475–520) × 11 (9–14)	59 (55–63) × 39 (35–41)
NIWA 123978 (cf. *nelumbo*)	433 (389–473) × 11 (9–13)	43 (38–52) × 26 (21–31)
PO_86	473 (447–516) × 10 (8–13)	56 (53–64) × 33 (30–36)
PO_88	432 (414–457) × 10 (8–11)	55 (51–60) × 34 (31–38)
PO_89	468 (446–491) × 10 (6–13)	56 (53–62) × 33 (29–37)
SMF 11227	483 (470–490) × 10 (10–10)	58 (53–68) × 33 (30–35)
SMF 11255	488 (440–530) × 10 (10–10)	56 (50–65) × 36 (31–38)
SR_PO_18	504 (479–536) × 10 (9–11)	58 (55–65) × 35 (32–37)

is a cluster of long, vertical spines. The subsidiary whorl is located very close to the apical whorl and is strongly curved upwards to partially enclose the apical whorl. It is divided into three distinct segments that have deeply notched, pointed margins. The median whorl is a horizontal ring of three distinct segments that have deeply notched margins. The outsides of the spines of the apical, subsidiary, and median whorls are lightly microspined. The basal whorl is a small horizontal ring of conical spines, located just above the manubrium, which is a cluster of diagonally downward-pointing spines. A vertical basal spine is present in some spicules.

Substrate, depth range and ecology. Found growing on sand and hard substrata, 158–2700 m.

Etymology. Named for the shape of the apical whorl and apex of the anisodiscorhabd, which resembles a lotus flower (*nelumbo*, lotus; Latin).

ZooBank registration. *Latrunculia* (*Latrunculia*) *nelumbo* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act: C7DE8EB4-D599-4668-86B0-95A8F95B0207.

Remarks. As discussed in the Remarks section for *L.* (*L.*) *brevis*, we have separated the two syntypes of *L.* (*L.*) *brevis* based on their anisodiscorhabd morphology: NHMUK 1887.5.2.270 has anisodiscorhabds with a funnel-shaped apical whorl with a margin of short, pointed spines, and a slightly slanted subsidiary whorl, which is clearly separated from the apical whorl (Fig. 11A). In contrast, NHMUK 1887.5.2.269 has anisodiscorhabds with a wide bowl-shaped apical whorl comprising long, sharp, vertical spines, a strongly curved subsidiary whorl, also with a margin of long spines, and very little separation between the apical and subsidiary whorls so that the subsidiary whorl encloses the apical structures (Fig. 21A).

Careful examination of the specimens in our collection that were previously identified as *L.* (*L.*) *brevis* found that they can be separated into two groups by anisodiscorhabd appearance as above. Furthermore, the group with the funnel-shaped apical whorl typically possesses a slightly narrower apical whorl diameter [17 (13–24) μm, n = 75] and a single apical spine (Fig. 11G), while the group with the bowl-shaped apical whorl has a large apical diameter [20 (14–28] μm, n = 96] and a cluster of apical spines (Fig. 21F).

While there is little difference between the spicule lengths of the two type specimens (NHMUK 1887.5.2.270 anisostyles 442 (406–470) μm, anisodiscorhabds 53 (43–59) μm; NHMUK 1887.5.2.269 anisostyles 463 (455–482) μm, anisodiscorhabds 54 (50–58) μm), or the geographic distribution of the two groups (both being spread across Argentina-Uruguay, Antarctica and New Zealand), we consider the differences in the morphology of the anisodiscorhabds to be sufficient to separate the two groups into separate species. NHMUK 1887.5.2.270 is retained as the holotype of *L.* (*L.*) *brevis*, and NHMUK 1887.5.2.269 is made the holotype of *L.* (*L.*) *nelumbo* **sp. nov.**

Latrunculia (*L.*) *nelumbo* **sp. nov.** has similar-looking anisodiscorhabds to *L.* (*L.*) *morrisoni* **sp. nov.** with both species having a bowl-shaped apical whorl which is enclosed by a closely spaced, curved subsidiary whorl (Figs 70L, M). However, *L.* (*L.*) *morrisoni* **sp. nov.** has much smaller and proportionally wider anisodiscorhabds [41 (38–44) μm, L:W = 1.36] than *L.* (*L.*) *nelumbo* **sp. nov.** [57 (46–68) μm; L:W = 1.65]. The margins of the anisodiscorhabd whorls are also different between the two species: *L.* (*L.*) *morrisoni* **sp. nov.** has denticulate margins of short, triangular spines, while *L.* (*L.*) *nelumbo* **sp. nov.** has whorls comprising long, finger-like spines.

The spicule size ranges of *L.* (*L.*) *nelumbo* **sp. nov.** overlap with five other New Zealand and Antarctic *Latrunculia* (*Latrunculia*) species: *L.* (*L.*) *prendens* **sp. nov.**, *L.* (*L.*) *robertsoni* **sp. nov.**, *L.* (*L.*) *incristata* **sp. nov.**, *L.* (*L.*) *bocagei*, and *L.* (*L.*) *variornata* **sp. nov.** (Fig. 3). *Latrunculia* (*L.*) *nelumbo* **sp. nov.** can be differentiated from the first four species by the anisodiscorhabd morphology: *L.* (*L.*) *nelumbo* **sp. nov.** has a bowl-shaped apical whorl with long vertical spines; *L.* (*L.*) *incristata* **sp. nov.** has a flat-topped apical whorl; *L.* (*L.*) *prendens* **sp. nov.** has a small, bulbous apical whorl that has inwardly curved spines; *L.* (*L.*) *robertsoni* **sp. nov.** has an apical whorl that comprises a ring of individual, diagonally upward-pointing spines, and *L.* (*L.*) *bocagei* has an apical whorl and apex that comprises a cluster of blunt, finger-like spines. The anisodiscorhabds of *L.* (*L.*) *nelumbo* **sp. nov.** are most similar to those of *L.* (*L.*) *variornata* **sp. nov.**, but those of *L.* (*L.*) *variornata* **sp. nov.** are more irregular and proportionally wider (L:W ratio is 1.44) than those of *L.* (*L.*) *nelumbo* **sp. nov.** (L:W ratio is 1.65) (Fig. 70).

Latrunculia (*L.*) *nelumbo* **sp. nov.** has an overlapping geographic distribution with *L.* (*L.*) *brevis*, with both species found in Argentina, Antarctica and New Zealand. This geographic distribution is not unprecedented, however, as circumpolar Southern Ocean currents link these three regions, and a few other sponge species have been recorded from both South America, Antarctica, and New Zealand (e.g., *Cercicladia australis* Ríos, Kelly & Vacelet, 2011, found on Macquarie Ridge and the Argentine margin of Patagonia). However, like *L.* (*L.*) *brevis*, given the wide geographic distribution it is possible that *L.* (*L.*) *nelumbo*, as currently described, may contain multiple species that cannot be differentiated by morphological characteristics alone. Molecular studies may be required to confirm the geographical distribution of *L.* (*L.*) *nelumbo*.

Finally, Samaai *et al.* (2006) classified specimen NIWA 123978 (TS 051) from the Ross Sea as *L.* (*L.*) *fiordensis*, an unlikely identification based on distribution alone. Re-examination of this specimen reveals that it is most closely comparable to *L.* (*L.*) *nelumbo* **sp. nov.** as it has similar-shaped, but smaller anisodiscorhads to that species (Table 7 & Table 20). We refer to this specimen as *L.* (*L.*) cf. *nelumbo* **sp. nov.**

Key diagnostic characters

- thickly encrusting or massive sponge, wrinkled, covered with crater-like aerolated porefields or smooth
- anisostyles are moderate, 486 (414–550) μm long
- anisodiscorhabds are large, 57 (46–68) μm long
- apical whorl is bowl-shaped with long finger-like spines
- subsidiary whorl is located very close to the apical whorl so that it encloses the apical whorl
- distribution Argentina-Uruguay; Antarctica; Macquarie Ridge, Gisborne Knolls, New Zealand, 158–2700 m.

***Latrunculia* (*Latrunculia*) *morrisoni* Kelly & Sim-Smith sp. nov.** Figs 3, 22, 23, 70

Material examined. Holotype NIWA 49096, SOP Stn TRIP2704/20, west of 90 Mile Beach, Northland, 34.8° S, 171.6° E, 992–1028 m, 4 Oct 2008.

Type locality. West of 90 Mile Beach, Northland, New Zealand.

Distribution. Only known from type locality (Fig. 22B).

Description. Massive sponge, holotype has been cut into several pieces, approximately 140 × 110 × 15 mm high in total. Colour in life unknown, colour in alcohol is dark brown. Texture soft, compressible. Surface is smooth and covered with small, volcano-shaped oscules, 2–3 mm in diameter at the base and 2 mm high, and tiny cylindrical pores that are approximately 0.5 mm in diameter and 1 mm high (Fig. 22A).

Spicules (Fig. 23). Megascleres are stout, slightly sinuous anisostyles; 507 (449–544) × 10 (7–13) μm (n = 20).

Microscleres are short, wide anisodiscorhabds with a stout shaft; 41 (38–44) × 30 (24–34) μm (n = 20); average L:W ratio is 1.36. The apical whorl is cup-shaped cluster of upward-pointing, serrated spines, serrations run down the centre line of the outside of each spine. The subsidiary whorl is located just below the apical whorl and is curved upwards. The whorl comprises three segments that have a sharply notched margin and serrated ridges down the outside of each spine. The median whorl is very wide and saucer-shaped with a sharply notched, microspined margin. Segments are not well-separated and the whorls form almost one continuous piece. The basal whorl is a simple, narrow horizontal ring of smooth spines, which is located just above the manubrium. The manubrium is a narrow, flattish whorl of short, diagonally downward-pointing spines.

Substrate, depth range and ecology. Holotype encrusting a piece of dead plate coral; 992–1028 m.

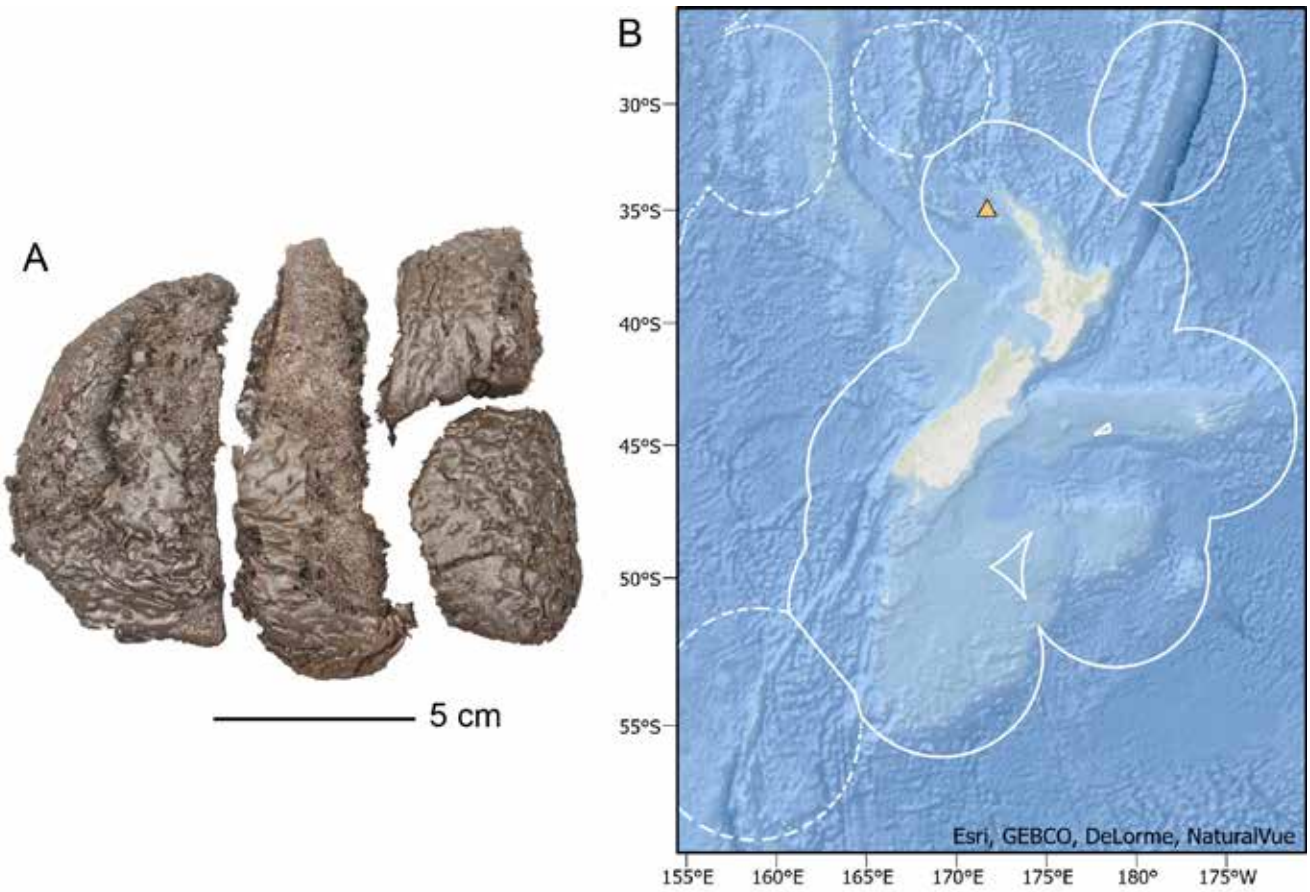


Figure 22. *Latrunculia* (*Latrunculia*) *morrisoni* **sp. nov.**, morphology and distribution: **A.** Holotype NIWA 49096, preserved specimen; **B.** Distribution and type locality (triangle) of *L.* (*L.*) *morrisoni* **sp. nov.** The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Etymology. Named for the significant contribution of NIWA ecologist, Dr Mark Morrison, to our knowledge of the coastal sponges of New Zealand, and his support of taxonomic research on sponges.

ZooBank registration. *Latrunculia* (*Latrunculia*) *morrisoni* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:B536B121-6115-489B-BCBF-4BD77D6455DD.

Remarks. *Latrunculia* (*L.*) *morrisoni* **sp. nov.** has similar-looking anisodiscorhabds *L.* (*L.*) *nelumbo* **sp. nov.** with both species have a bowl-shaped apical whorl that is enclosed by a closely spaced, curved subsidiary whorl (Figs 70L, M). However, *L.* (*L.*) *morrisoni* **sp. nov.** has much smaller, and proportionally wider anisodiscorhabds (41 (38–44) μm; L:W = 1.36) than *L.* (*L.*) *nelumbo* **sp. nov.** (57 (46–68) μm; L:W = 1.65). The margins of the anisodiscorhabd whorls are also different between the two species: *L.* (*L.*) *morrisoni* **sp. nov.** has denticulate margins of short, triangular spines, while *L.* (*L.*) *nelumbo* **sp. nov.** has whorls comprising long, finger-like spines.

Latrunculia (*L.*) *morrisoni* **sp. nov.** has similar-sized spicules to *L.* (*L.*) *variornata* **sp. nov.** from Antarctica, but the two species are well-separated geographically and can be differentiated by anisodiscorhabd morphology, with the latter species having irregular-shaped anisodiscorhabds with longer, well-separated spines and fewer spines per segment on the median and subsidiary whorls (Figs 70M, P). *Latrunculia* (*L.*) *morrisoni* **sp. nov.** can be differentiated from all other New Zealand and Antarctic *Latrunculia* (*Latrunculia*) species by the combination of anisodiscorhabd and anisostyle sizes (Fig. 3).

Key diagnostic characters

- massive sponge covered in volcano-shaped oscules and pores
- anisostyles are large, 507 (449–544) μm long
- anisodiscorhabds are moderately long, 41 (38–44) μm long
- subsidiary whorl is located close to the apical whorl and curved upwards
- median whorl is very wide
- distribution northern New Zealand, 992–1028 m

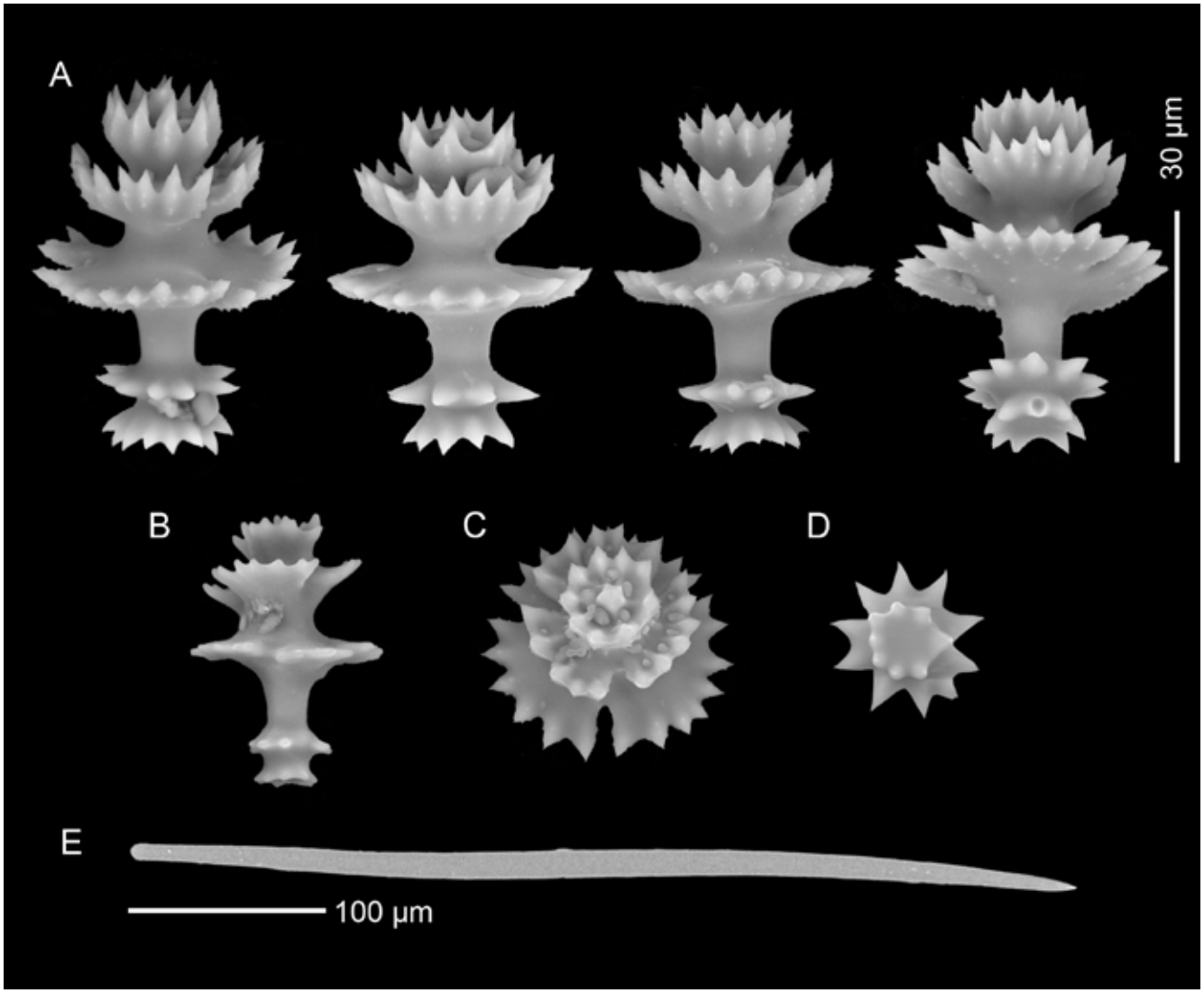


Figure 23. *Latrunculia* (*Latrunculia*) *morrisoni* **sp. nov.**, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabd; **C.** Top-down view of an anisodiscorhabd showing the apex, apical whorl, subsidiary whorl, and median whorl; **D.** Upside-down view of an anisodiscorhabd showing the manubrium and basal whorl (image has been cropped); **E.** Anisostyle. All SEM images from NIWA 49096.

Latrunculia (*Latrunculia*) *gracilis* Kelly & Sim-Smith sp. nov.

Figs 3, 24, 25, 70; Table 8; Seafloor Images 9, 16

Material examined. Holotype NIWA 74781, NIWA Stn TAN1108/117, east of Dunedin, 45.899° S, 171.044° E, 197–215 m, 23 May 2011. **Paratypes** NIWA 136601, NIWA Stn TAN1108/117, east of Dunedin, 45.899° S, 171.044° E, 197–215 m, 23 May 2011; NIWA 75986, SOP Stn TRIP3681/42, Auckland Islands, 50.3° S, 166.7° E, depth unknown, 11 Mar 2013.

Type locality. East of Dunedin, New Zealand.

Distribution. Dunedin and Auckland Islands (Fig. 24C).

Description. Massive to thickly encrusting sponge, holotype is 60 × 50 × 20 mm thick. Surface covered in small, cylindrical, or volcano-shaped papillae, 1–3 mm in diameter and up to 4 mm long when preserved. Surface heavily wrinkled in preserved state. Colour in life unknown, colour in alcohol medium to dark brown. Texture firm, slightly compressible (Figs 24A, B).

Spicules (Fig. 25, Table 8). Megascleres are small and slender anisostyles, occasionally polytylote; 389 (328–465) × 7 (4–9) µm (n = 60).

Microscleres are moderately long and slender anisodiscorhabds; 48 (43–57) × 30 (18–29) µm (n = 60); average L:W ratio is 2.06. The apical whorl is a narrow funnel- or bowl-shaped cluster of upward-pointing spines. A single vertical apical spine may be present. The subsidiary whorl is divided into three distinct segments that are slightly curved upwards and have deeply notched margins. The median whorl is a horizontal ring comprising three, well-separated segments that have deeply notched margins. The basal whorl is a narrow,

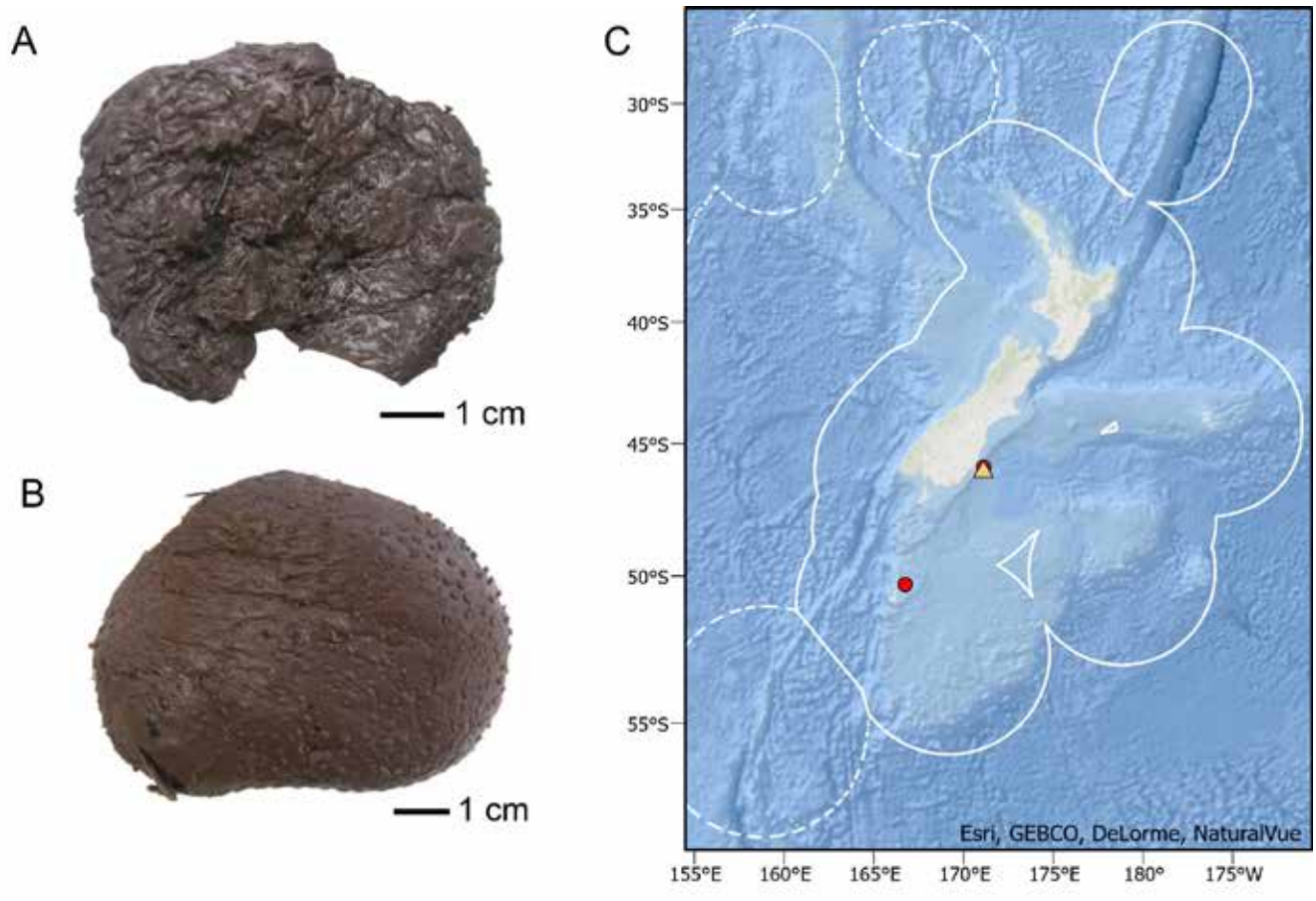


Figure 24. *Latrunculia* (*Latrunculia*) *gracilis* **sp. nov.**, morphology and distribution: **A.** Holotype NIWA 74781, preserved specimen; **B.** NIWA 75986, preserved specimen; **C.** Distribution and type locality (triangle) of *L.* (*L.*) *gracilis* **sp. nov.** and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

horizontal ring of relatively long, conical spines and is well-separated from the manubrium. The manubrium is a whorl of conical spines that are angled very slightly diagonally downwards.

Substrate, depth range and ecology. NIWA 136601 was found growing on shell; 197–215 m.

Etymology. Named for the delicate, slender anisodiscorhabds (*gracilis*, slender; L.).

ZooBank registration. *Latrunculia* (*Latrunculia*) *gracilis* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:014CAD45-A4F6-4A94-9AC9-9FCBAC3EE5E9.

Remarks. The combination of anisostyle and anisodiscorhabd sizes differentiates *L.* (*L.*) *gracilis* **sp. nov.** from all other New Zealand and Antarctic species of *Latrunculia* (*Latrunculia*). *Latrunculia* (*L.*) *gracilis* **sp. nov.** has similar anisodiscorhabd lengths to *L.* (*L.*) *prendens* **sp. nov.**, *L.* (*L.*) *brevis*, *L.* (*L.*) *robertsoni* **sp. nov.**, *L.* (*L.*) *bransfieldi* **sp. nov.**, *L.* (*L.*) *variornata* **sp. nov.** and *L.* (*A.*) *biformis* **subgen. nov., comb. nov.**, but it has much shorter anisodiscorhabds than all these species (Fig. 3).

Key diagnostic characters

- massive to thickly encrusting sponge densely covered in slender, cylindrical, or volcano-shaped fistules
- small anisostyles, 389 (328–465) μm long
- moderately long, slender anisodiscorhabds, 48 (43–57) μm long
- apical whorl is bowl- or funnel-shaped
- distribution southern New Zealand, 197–215 m

Latrunculia (*Latrunculia*) *prendens* Kelly & Sim-Smith sp. nov. Figs 3, 26, 27, 70

Material examined. Holotype QM G339776, NIWA Stn TAN0803/77, Seamount 7, Macquarie Ridge (Australia EEZ), 53.738° S, 159.114° E, 925–1014 m, 11 Apr 2008.

Type locality. Seamount 7, Macquarie Ridge (Australia EEZ).

Distribution. Only known from type locality (Fig. 26D).

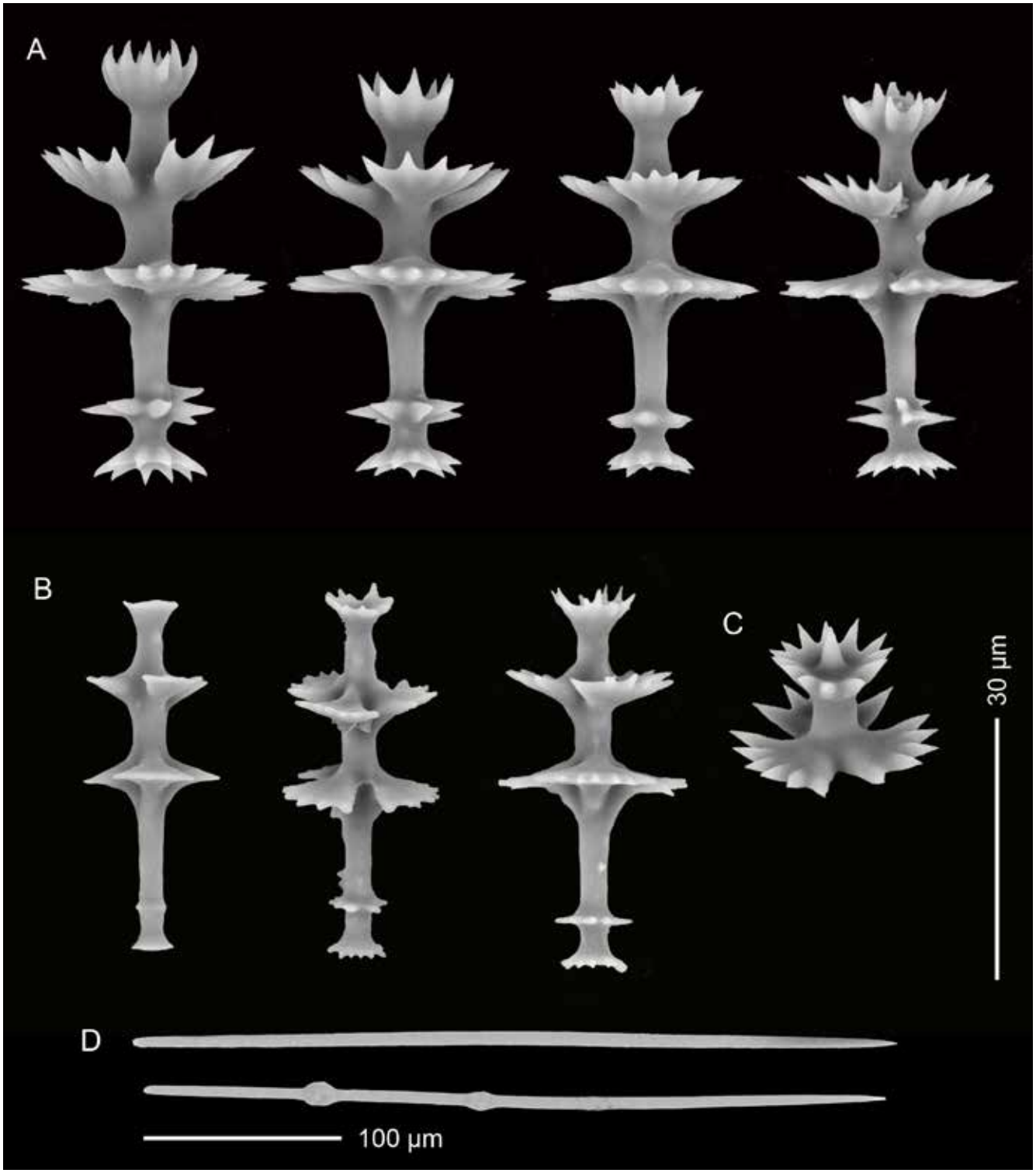


Figure 25. *Latrunculia* (*Latrunculia*) *gracilis* **sp. nov.**, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabds; **C.** Top-down view of an anisodiscorhabd showing the apex, apical whorl, and subsidiary whorl; **D.** Anisostyles, occasionally polytylote. All SEM images from NIWA 74781.

Table 8. Spicule dimensions (µm) of *Latrunculia* (*Latrunculia*) *gracilis* **sp. nov.** Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 74781 (holotype)	386 (356–399) × 7 (5–9)	47 (45–49) × 23 (22–25)
NIWA 75986 (paratype)	382 (328–434) × 5 (4–7)	48 (43–56) × 24 (18–29)
NIWA 136601 (paratype)	387 (341–413) × 7 (5–9)	49 (45–57) × 23 (19–27)

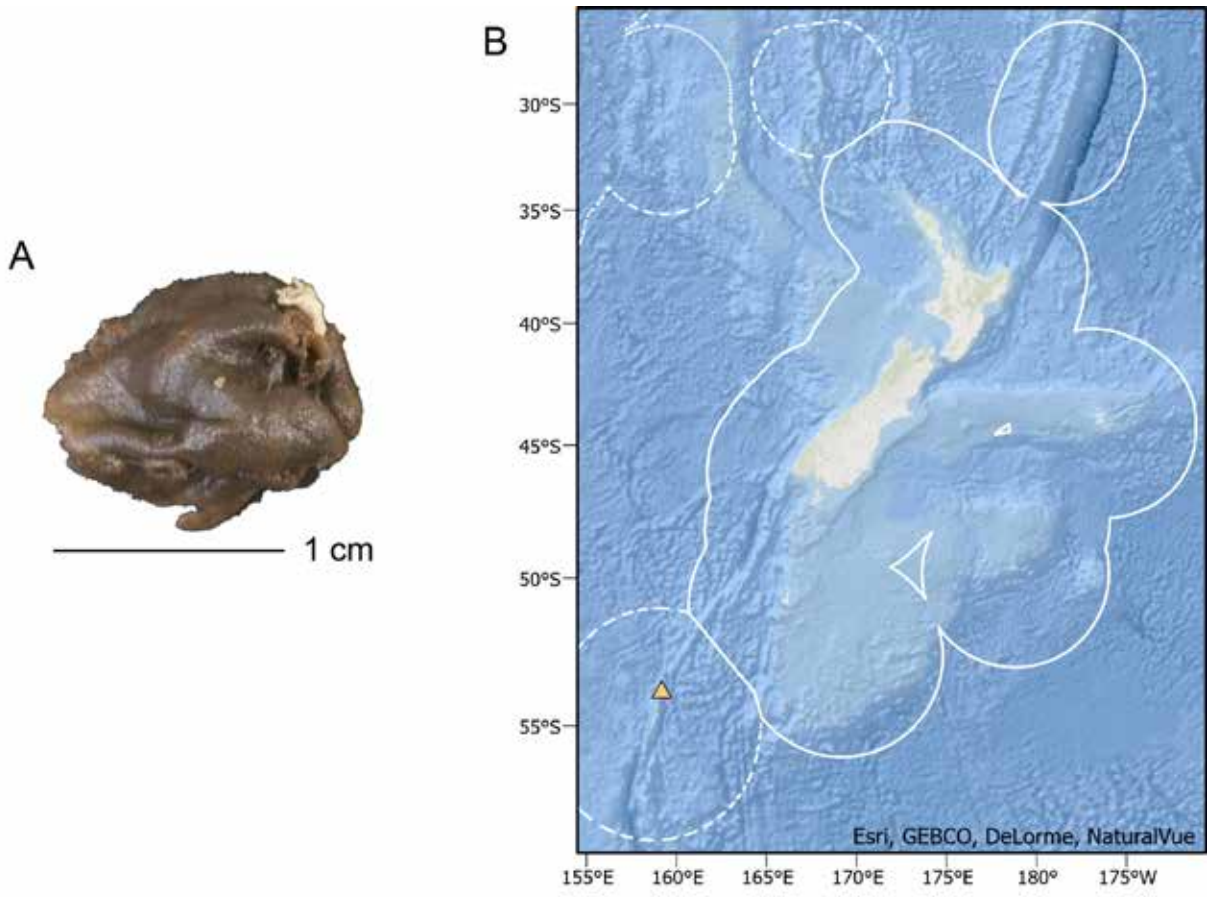


Figure 26. *Latrunculia* (*Latrunculia*) *prendens* **sp. nov.**, morphology and distribution: **A.** Holotype QM G339776, preserved specimen; **B.** Type locality of *L.* (*L.*) *prendens* **sp. nov.** The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Description. Small, thinly encrusting sponge, 15 mm long × 5 mm thick. Colour in life unknown, colour in alcohol tan. Surface is smooth, lumpy, a few very small oscules are visible on the holotype (Figs 26A–C).

Spicules (Fig. 27). Megascleres are large and stout anisostyles that taper towards the tips and are centrally thickened; 516 (472–569) × 12 (9–15) μm (n = 20).

Microscleres are very wide anisodiscorhabds; 47 (43–51) × 31 (27–35) μm (n = 20); average L:W ratio is 1.53. Apical whorl is narrow and bulbous, comprising a ring of inwardly curved spines. An apical spine is sometimes present. The subsidiary whorl is located close to the apical whorl and is curved upwards. It is divided into three segments that have deeply notched rims. The median whorl is horizontal and much wider than the other whorls. It is divided into three segments that have deeply notched rims. Rows of microspines are present on the undersides of the outer edges of the apical, subsidiary, and median whorls giving them a serrated appearance. The basal whorl is a narrow horizontal ring of conical spines. Additional spines or sometimes an extra complete whorl are present in around 50% of anisodiscorhabds (Fig. 27). The manubrium is a simple ring of diagonally downward-pointing spines. A single vertical basal spine may be present.

Substrate, depth range and ecology. Substrate unknown, 770–1014 m.

Etymology. Named for the curled, claw-like apical ornamentation of the anisodiscorhabd in this species (*prendens*, grasping; L.).

ZooBank registration. *Latrunculia* (*Latrunculia*) *prendens* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:59FE926B-A839-46E4-ABCE-F4F0B253A802.

Remarks. The highly distinctive anisodiscorhabds of *L.* (*L.*) *prendens* **sp. nov.** separates this species from several other species of New Zealand and Antarctic *Latrunculia* (*Latrunculia*) that have similar-sized anisodiscorhabds and anisostyles—*L.* (*L.*) *variornata* **sp. nov.**, *L.* (*L.*) *brevis*, *L.* (*L.*) *morrisoni* **sp. nov.**, *L.* (*L.*) *nelumbo* **sp. nov.** and *L.* (*L.*) *robertsoni* **sp. nov.** (Fig. 3). The microscleres of *L.* (*L.*) *prendens* **sp. nov.** have a very wide median whorl, a small, bulbous apical whorl of inwardly curved spines, and often an extra row of spines, or a few extra spines, above the manubrium (Figs 27, 70).

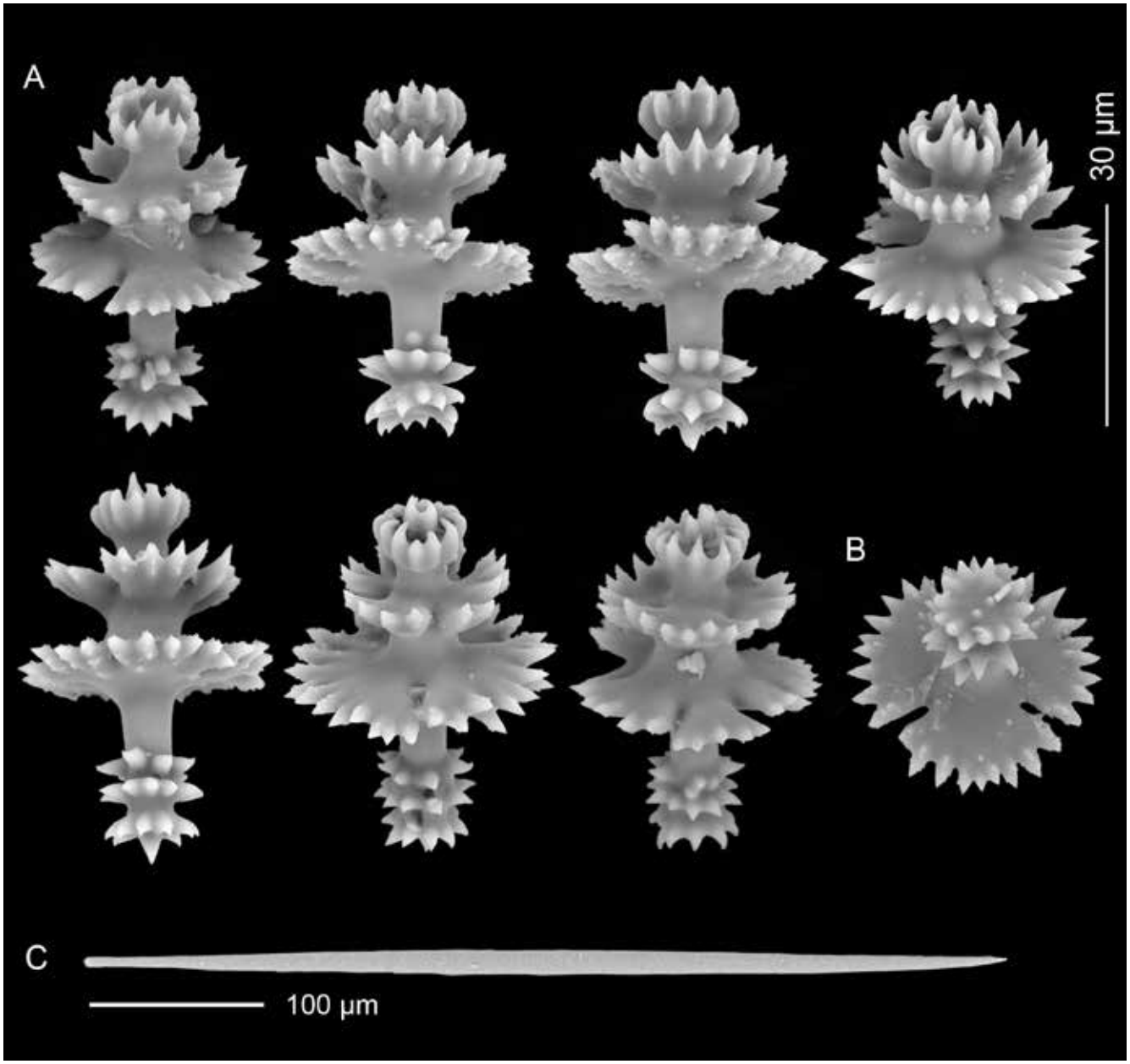


Figure 27. *Latrunculia* (*Latrunculia*) *prendens* **sp. nov.**, spicules: **A.** Anisodiscorhabds; **B.** Upside-down view of an anisodiscorhabd showing the manubrium, basal whorl, and median whorl; **C.** Anisostyle. All SEM images from QM G339776.

Key diagnostic characters

- thinly encrusting sponge with a smooth surface and a few scattered oscules
- anisostyles are moderately long, 516 (472–569) µm long
- anisodiscorhabds are moderately long, 47 (43–51) µm and very wide
- spines on the apical whorl are curved inwardly
- distribution, Macquarie Ridge (Australia EEZ), 925–1014 m

Latrunculia (*Latrunculia*) *robertsoni* Kelly & Sim-Smith sp. nov.

Figs 2, 28, 29, 70; Table 9; Seafloor Images 12, 13

Material examined. Holotype NIWA 44855, NIWA Stn TAN0801/37, Chatham Rise, 44.226° S, 179.129° W, 484–492 m, 3 Jan 2008. **Paratypes** NIWA 73799, NIWA Stn TAN1105/133, The Well Canyon, North Taranaki Bight, 38.415° S, 173.340° E, 217–218 m, 4 April 2011; NIWA 88183, NIWA Stn J679, 8.6 NM north of White Island, Bay of Plenty, 37.353° S, 177.196° E, 316 m, 8 Sep 1974.

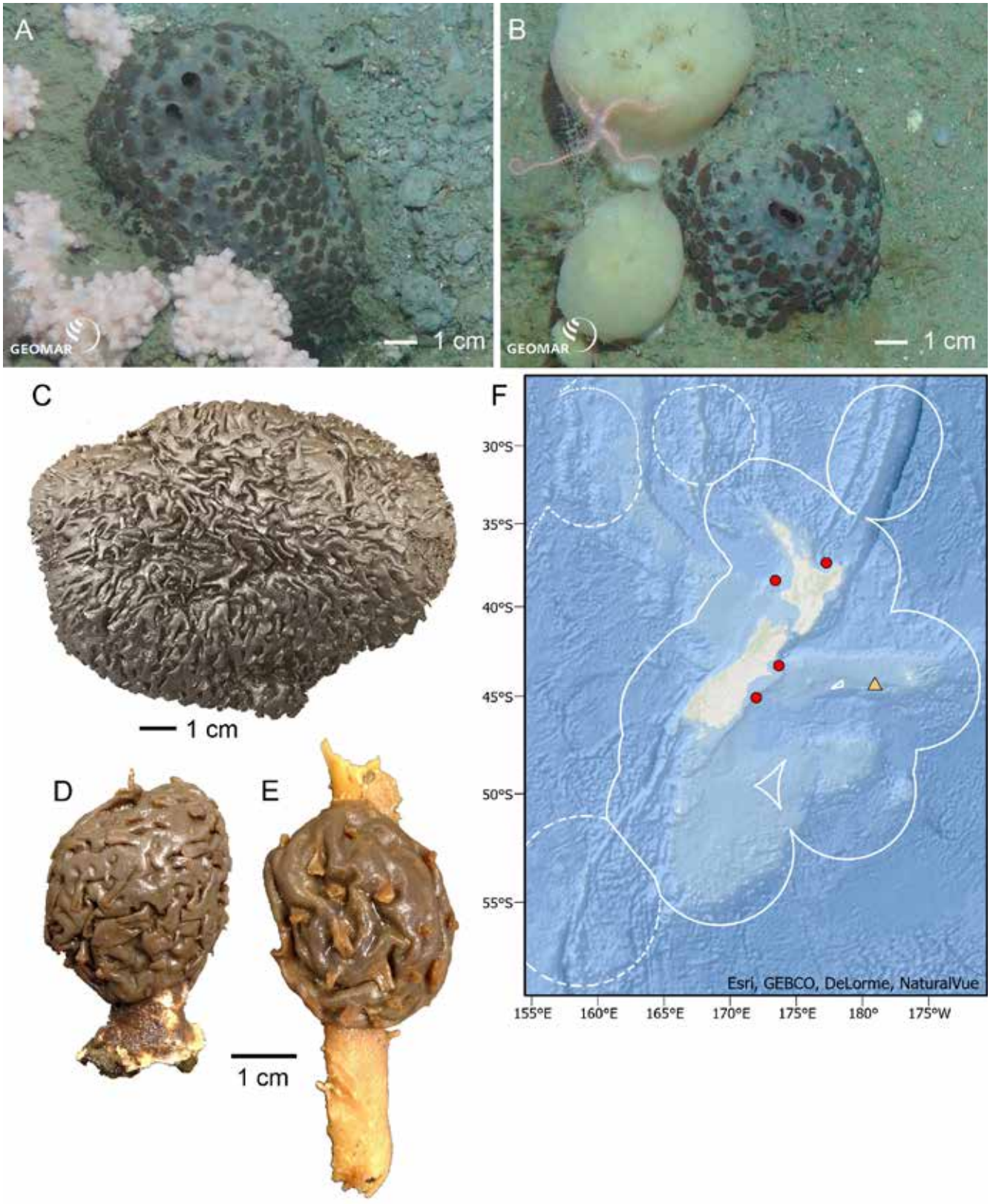


Figure 28. *Latrunculia* (*Latrunculia*) *robertsoni* **sp. nov.**, morphology and distribution: **A.** NIWA 126240, *in situ*; **B.** NIWA 126220, *in situ*; **C.** Holotype NIWA 44855, preserved specimen, fistules visible on upper surface; **D.** Paratype NIWA 73799, preserved specimen; **E.** Paratype NIWA 88183, preserved specimen; **F.** Distribution and type locality (triangle) of *L.* (*L.*) *robertsoni* **sp. nov.** and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line. Images in A and B captured by GEOMAR ROV *Kiel 6000* on-board RV *Sonne* (voyage SO254), courtesy of Project *PoriBacNewZ*, GEOMAR & ICBM.

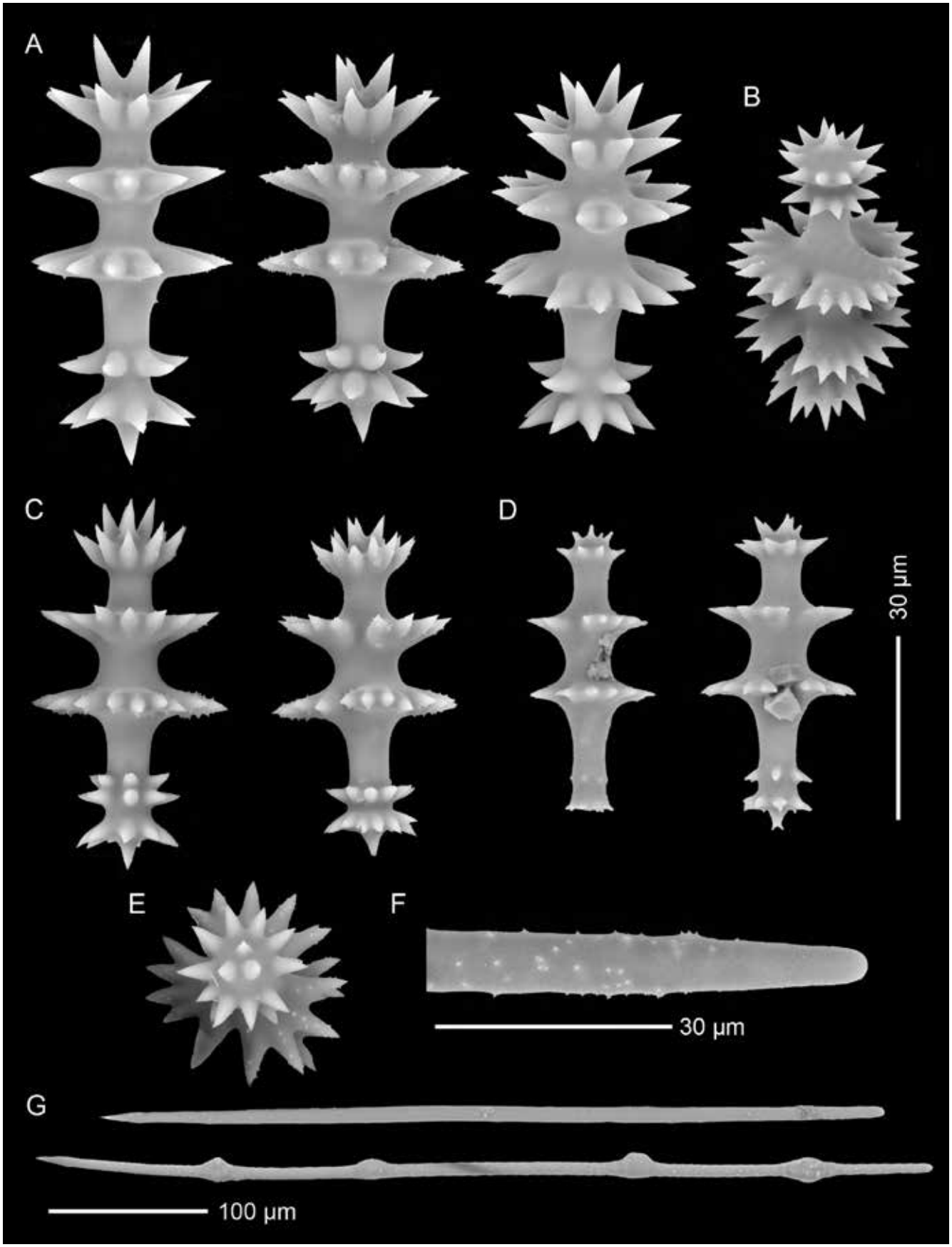


Figure 29. *Latrunculia* (*Latrunculia*) *robertsoni* **sp. nov.**, spicules: **A.** Anisodiscorhabds from the holotype NIWA 44855; **B.** Upside down view of an anisodiscorhabd from NIWA 73799 showing the manubrium with a basal spine; **C.** Anisodiscorhabds from the paratype NIWA 88183; **D.** Immature anisodiscorhabds from the paratype NIWA 73799; **E.** Top-down view of an anisodiscorhabd from NIWA 44855 showing the apical whorl and apex; **F.** Anisostyle tip from NIWA 73799 lightly covered in microspines; **G.** Anisostyles from NIWA 44855.

Table 9. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *robertsoni* **sp. nov.** Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 44855 (holotype)	538 (466–605) × 10 (8–13)	64 (58–71) × 29 (24–34)
NIWA 73799 (paratype)	500 (436–546) × 9 (6–10)	53 (44–62) × 26 (22–29)
NIWA 88183 (paratype)	497 (359–608) × 8 (5–10)	57 (51–60) × 30 (27–36)
NIWA 126220	485 (458–502) × 11 (9–16)	57 (52–62) × 28 (25–31)
NIWA 126221	496 (459–527) × 10 (9–14)	54 (49–62) × 25 (20–29)
NIWA 126240	491 (454–521) × 11 (7–15)	54 (47–61) × 26 (20–29)
NIWA 126241	486 (451–527) × 12 (8–18)	60 (55–67) × 30 (26–36)

Other material. *Canyon slope*, *off Christchurch shelf*, *East coast of South Island* (collected by GEOMAR ROV *Kiel 6000*, onboard RV *Sonne*, ICBM expedition SO254): NIWA 126240, NIWA Stn SO254/77ROV14_BIOBOX12, 43.289° S, 173.607° E, 706 m, 20 Feb 2017; NIWA 126241, NIWA Stn SO254/77ROV14_BIOBOX19, 43.289° S, 173.606° E, 670 m, 20 Feb 2017 (Seafloor Image 12).

Otago/Canterbury slope, *East coast of South Island* (collected by GEOMAR ROV *Kiel 6000*, onboard RV *Sonne*, ICBM expedition SO254): NIWA 126220, NIWA 126221 (Seafloor Image 13), NIWA Stn SO254/76ROV13_BIOBOX25, 45.024° S, 171.904° E, 595 m, 19 Feb 2017.

Type locality. Chatham Rise, New Zealand.

Distribution. West and east coasts of New Zealand (Fig. 28F).

Description. Holotype massive, 110 mm long × 75 wide × 40 mm high, densely covered in narrow, tapered fistules that are up to 10 mm long when preserved; surface deeply wrinkled in preservative (Fig. 28C). The two paratypes are small globular sponges attached to debris—NIWA 73799 is attached to a thick piece of carbonate rubble, possibly old coral (Fig. 28D), while NIWA 88183 is attached to the tubular section of a specimen of *Petrosia* (*Petrosia*) *australis* Bergquist & Warne 1980 (Fig. 28E). Colour in life images dull light brown, colour in alcohol is medium to dark brown. Texture is firm, compressible.

Spicules (Fig. 29, Table 9). Megascleres are slight sinuous anisostyles; 503 (359–608) × 11 (5–18) μm (n = 100); lightly acanthose, but the microspines are not visible under 400× light microscopy. Occasionally anisostyles are polytylote.

Microscleres are large, stout anisodiscorhabds; 57 (44–71) × 28 (22–36) μm (n = 100); average L:W ratio is 1.84. Shaft is sometimes thicker in the middle section. The apical whorl is a ring of individual, diagonally upward-pointing conical spines. The subsidiary and median whorls are equal in diameter and comprise three, well-separated segments of horizontal conical spines. Each segment has a serrated margin of 4–8 conical spines that are lightly acanthose at the tips. The basal whorl is located just above the manubrium and is a simple, narrow whorl of conical spines that have slightly upturned tips. The manubrium is a cluster of diagonally downward-pointing spines, a single vertical basal spine is sometimes present.

Substrate, depth range and ecology. Attached to hard substrate; 218–492 m.

Etymology. Named for Hector Gordon Robertson, the Captain of the inter-island ferry, TEV *Wahine*, which sailed regularly through Cook Strait, reflecting the distribution of this species. The *Wahine* was caught in a fierce storm on 10 April 1968, foundering off Barrett Reef in the entrance to Wellington Harbour, with the tragic loss of 53 lives. Charges were brought against her officers, but all were acquitted; ten weeks after the disaster a Court of Inquiry found that there were errors of judgement but stressed that the weather and sea conditions at the time were difficult and dangerous. MK's mother, the captain's cousin, noted that although Robertson was acquitted, he never fully recovered; the event and loss of life under his watch seemed to have weighed heavily on him. He suffered ill health and died a few years later.

ZooBank registration. *Latrunculia* (*Latrunculia*) *robertsoni* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act: 0D3B7AE0-BAB1-4555-8E84-1C6CE71663CE.

Remarks. The spicule sizes of *L.* (*L.*) *robertsoni* **sp. nov.** overlap with several other New Zealand and Antarctic species (Fig. 3). However, the anisodiscorhabds are quite distinctive—they have a balanced appearance due the similar diameters of the subsidiary and median whorls, and likewise, the apical whorl and manubrium (Figs 29, 70), and the anisostyles are acanthose, a first for New Zealand species. Only two other South Pacific

species are known to have acanthose anisostyles, *L.* (*L.*) *novaecaledoniae* Samaai, Gibbons & Kelly, 2006 and *L.* (*L.*) *kiwi* **sp. nov**. However, *L* (*L.*) *verenae* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013 from Chile, *L.* (*U.*) *velera* Lehnert, Stone & Heimler, 2006 from the Aleutian Islands, *L.* (*U.*) *oparinae* Samaai & Krasokhin, 2002 from the Kurile Islands, and *L.* (*B.*) *kerwathi* Samaai, Janson & Kelly, 2012 from South Africa (Samaai *et al.* 2012) also have acanthose anisostyles.

Key diagnostic characters

- massive sponge densely covered in long, slender, conical fistules
- anisostyles are large, 503 (359–608) µm long, with acanthose tips (not visible under light microscopy)
- anisodiscorhabds are large, 57 (44–71) µm long
- median and subsidiary whorls are similar in diameter
- distribution Chatham Rise, lower North Island, South Island, New Zealand, 218–706 m

***Latrunculia* (*Latrunculia*) *kiwi* Kelly & Sim-Smith sp. nov.** Figs 3, 30, 31, 70

Material examined. Holotype NIWA 126008, NIWA Stn SO254/02ROV01_BIOBOX4, Kiwi Seamount, Three Kings Ridge (International Waters), 30.733° S, 173.910° E, 759 m, 30 Jan 2017, collected by GEOMAR ROV *Kiel 6000*, onboard RV *Sonne*, ICBM expedition SO254.

Type locality. Kiwi Seamount, Three Kings Ridge (International Waters).

Distribution. Only known from the type locality (Fig. 30B).

Description. Holotype small, 22 mm wide × 20 mm × 2 mm thick, growing around a dead coral branch. A few sharply pointed, volcano-shaped fistules < 2 mm long are scattered over the sponge. Texture is soft, ectosome is easily separated from the choanosome. Colour in life dark brown, colour in ethanol is medium brown (Fig. 30A).

Spicules (Fig. 31). Megascleres are very large anisostyles that are lightly acanthose near the proximal

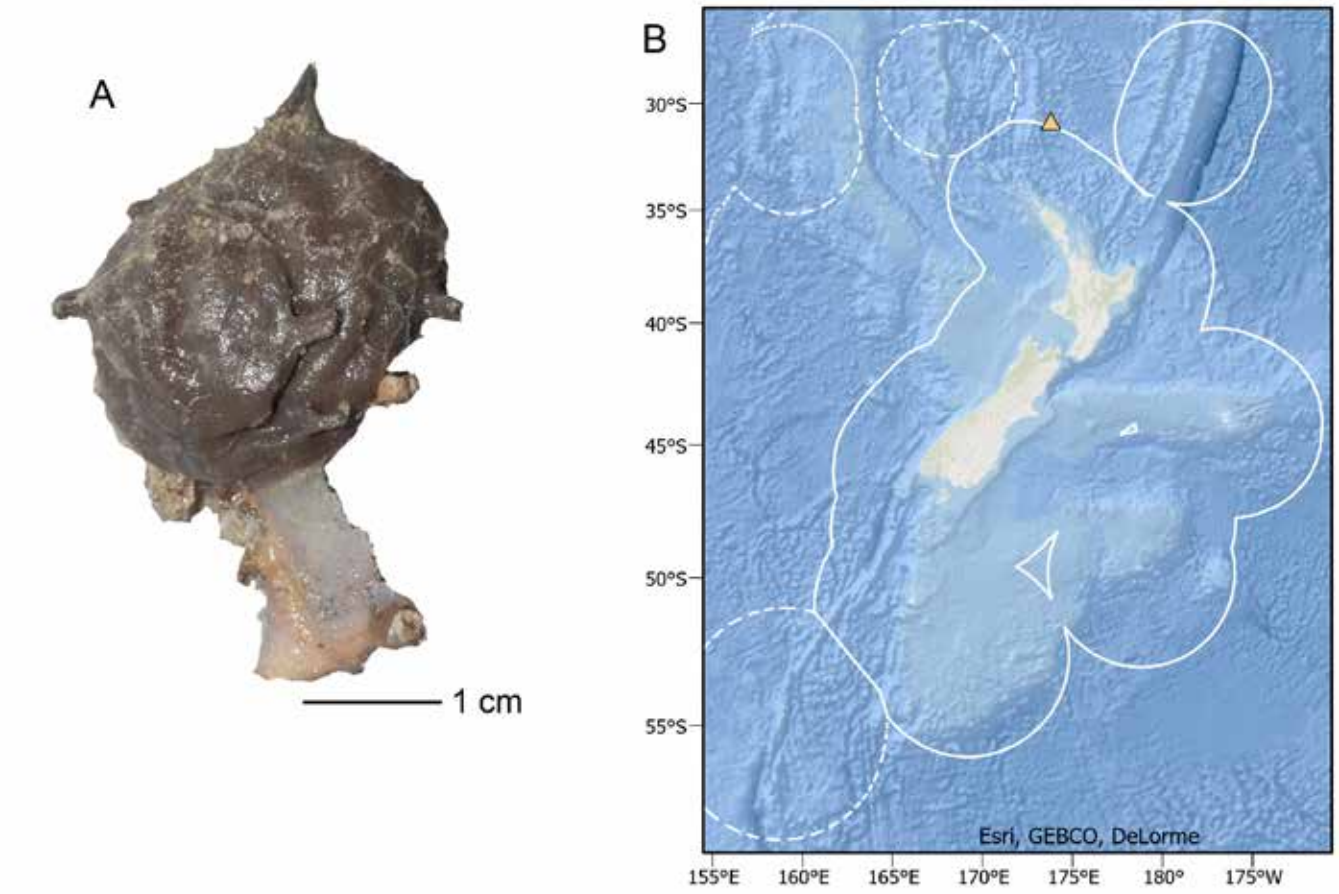


Figure 30. *Latrunculia* (*Latrunculia*) *kiwi* **sp. nov.**, morphology and distribution: **A.** NIWA 126008, deck specimen; **B.** Type locality of *L.* (*L.*) *kiwi* **sp. nov.** The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

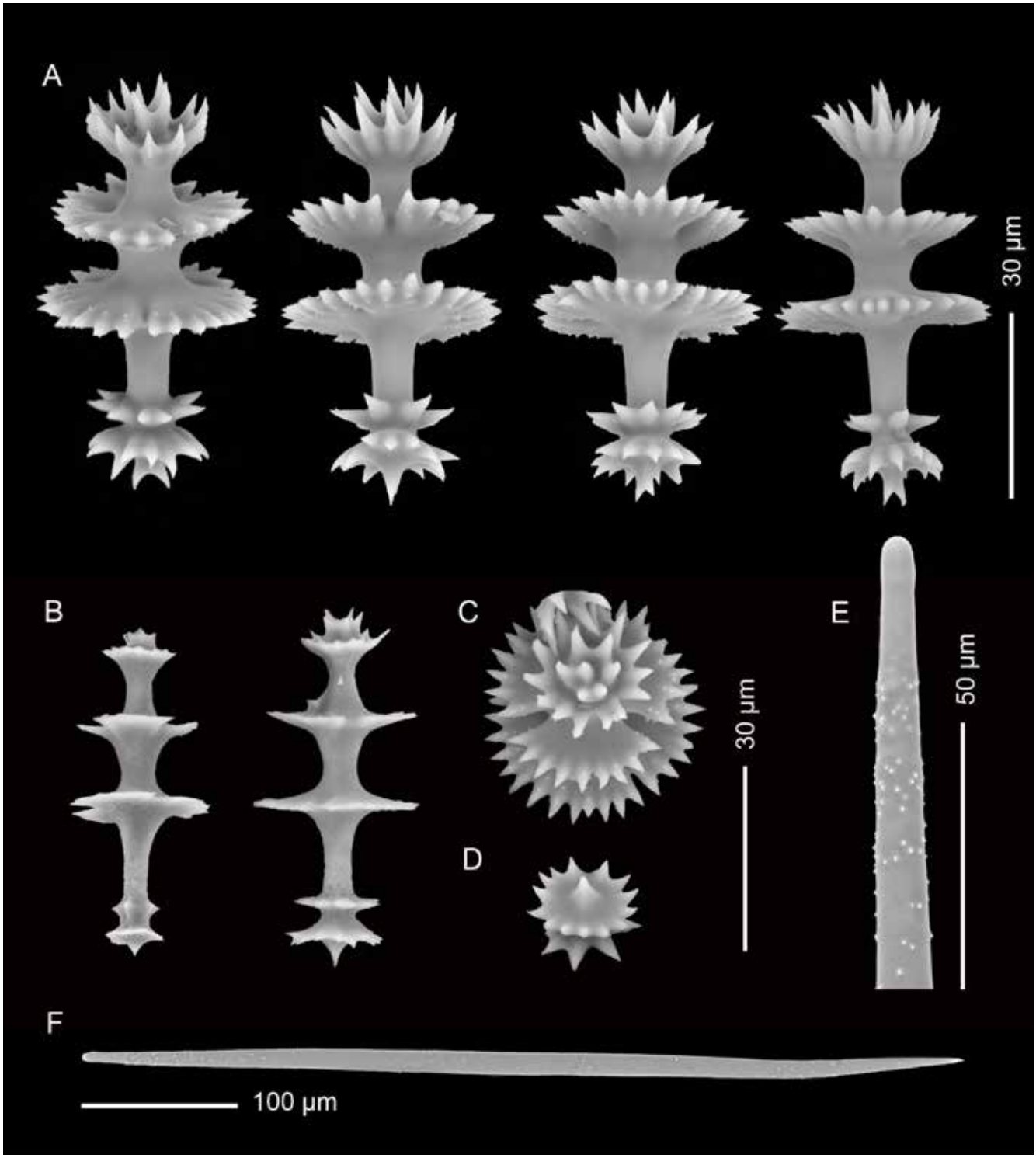


Figure 31. *Latrunculia* (*Latrunculia*) *kiwi* **sp. nov.**, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabds; **C.** Top-down view showing the apical whorl, subsidiary whorl, and median whorl of an anisodiscorhabd; **D.** Upside-down view of the manubrium of an anisodiscorhabd (image has been cropped); **E.** Anisostyle tip lightly covered in microspines; **F.** Anisostyle. All SEM images from holotype NIWA 126008.

end, though this can only be seen under SEM; 596 (546–662) × 13 (11–17) µm (n = 20).

Microscleres are very large anisodiscorhabds; 61 (55–67) × 30 (24–36) µm (n = 20). Apical whorl a ring of upward-pointing, long spines that encloses a smaller cluster of vertical spines. Subsidiary whorl very slightly slanted upwards and comprises three distinct segments that have deeply notched, pointed margins. The median whorl is similar to the subsidiary whorl, but slightly larger in diameter and horizontal. The basal whorl is located immediately above the manubrium and is a simple horizontal ring of spines. The manubrium is a cluster of diagonally downward-pointing spines. A vertical basal spine is sometimes present.

Substrate, depth range and ecology. Holotype encrusting a piece of dead coral, 759 m.

Etymology. Named after the location of the holotype, Kiwi Seamount.

ZooBank registration. *Latrunculia* (*Latrunculia*) *kiwi* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:8288D7BD-1B45-4A7E-BCC7-8BB32B61E6E5.

Remarks. *Latrunculia* (*L.*) *kiwi* **sp. nov.** possesses acanthose anisostyles, a feature recorded in two other South Pacific *Latrunculia* species: *L.* (*L.*) *robertsoni* **sp. nov.** and *L.* (*L.*) *novaecaledoniae* Samaai, Gibbons & Kelly, 2006. However, the microspines can only be seen under SEM, which has not been conducted for all South Pacific *Latrunculia* species.

Latrunculia (*L.*) *kiwi* **sp. nov.** can be differentiated from all other New Zealand and Antarctica *Latrunculia* (*Latrunculia*) by the combination of anisostyle and anisodiscorhabd sizes (Fig. 3). The anisodiscorhabds of *Latrunculia* (*L.*) *kiwi* **sp. nov.** are similar in size to *Latrunculia* (*L.*) *novaecaledoniae* from New Caledonia (57 × 30 µm), but the latter species has much shorter anisostyles [469 (455–482) mm; measurements from Samaai *et al.* 2006] than *L.* (*L.*) *kiwi* **sp. nov.**

Key diagnostic characters

- small semi-globular or thickly encrusting sponge
- anisostyles are very large, 596 (546–662) µm long, with acanthose tips (not visible under light microscopy)
- anisodiscorhabds are very large, 61 (55–67) µm long, with a narrow, funnel-shaped apical whorl
- median and subsidiary whorls are similar in diameter
- distribution Kiwi Seamount, New Zealand and Three Kings Ridge (International Waters)

Latrunculia (*Latrunculia*) *incristata* Kelly & Sim-Smith sp. nov. Figs 3, 32, 33, 70

Material examined. Holotype NIWA 90986, NIWA Stn TAN0308/5, south of Reinga Ridge, west of North Maria Ridge, southern Norfolk Ridge, 34.062° S, 171.123° E, 1228–1332 m, 11 May 2003.

Type locality. Southern Norfolk Ridge, New Zealand.

Distribution. Only known from type locality (Fig. 32).

Description. The holotype was a tiny fragment of a thinly encrusting sponge, which was entirely consumed by the spicule preparations. Nothing remains of the holotype except microscope slides and SEM stubs.

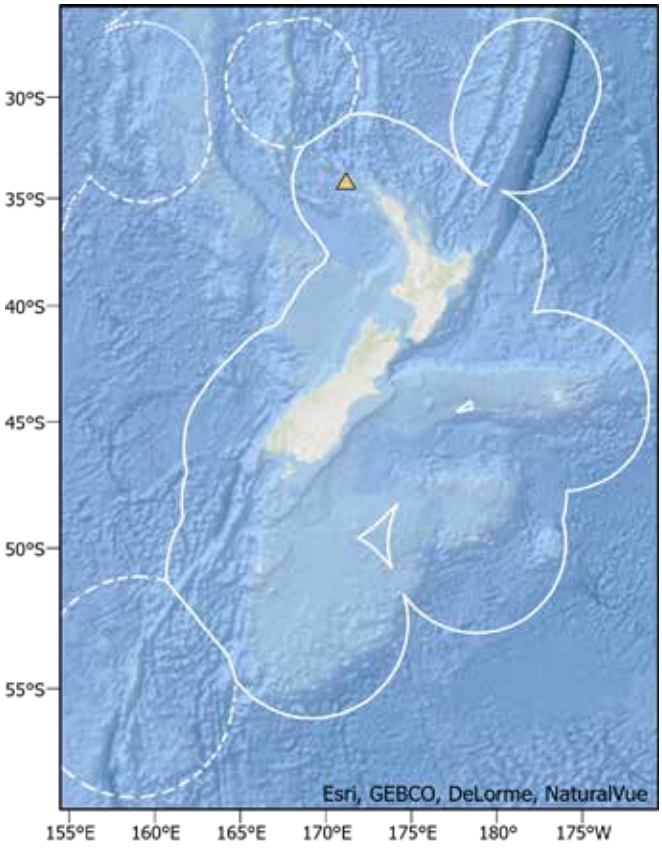


Figure 32. Type locality of *Latrunculia* (*Latrunculia*) *incristata* **sp. nov.** The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Spicules (Fig. 33). Megascleres are large, stout anisostyles that are centrally thickened and taper towards the tips; 485 (444–532) × 15 (11–18) µm (n = 20).

Microscleres are anisodiscorhabds that have a wide, funnel-shaped apical whorl that is flat on top and has a finely notched rim, i.e., there is no apical tuft. The subsidiary and median whorls are equal in diameter and are horizontal, almost completely solid discs that have finely notched rims. One to several larger notches may be present in the whorls, but these are rare. The basal whorl is located just above the manubrium and is a simple, narrow horizontal whorl of conical spines. The manubrium is a narrow whorl of diagonally downward-pointing spines; 61 (56–67) × 35 (30–42) µm (n = 20). Average L:W ratio is 1.76.

Substrate, depth range and ecology. Encrusting on hard substrates, 1228–1332 m.

Etymology. Named for the very unusual morphology of the anisodiscorhabds which lack an apical tuft or spine. The apical whorl is simply a solid cone with a crenulate margin, a form that is unprecedented in *Latrunculia* spp.: all species known have some sort of apical tuft or crown or spines (*cristata*, crested, tufted; *incristata*, without an (apical) tuft; L.)

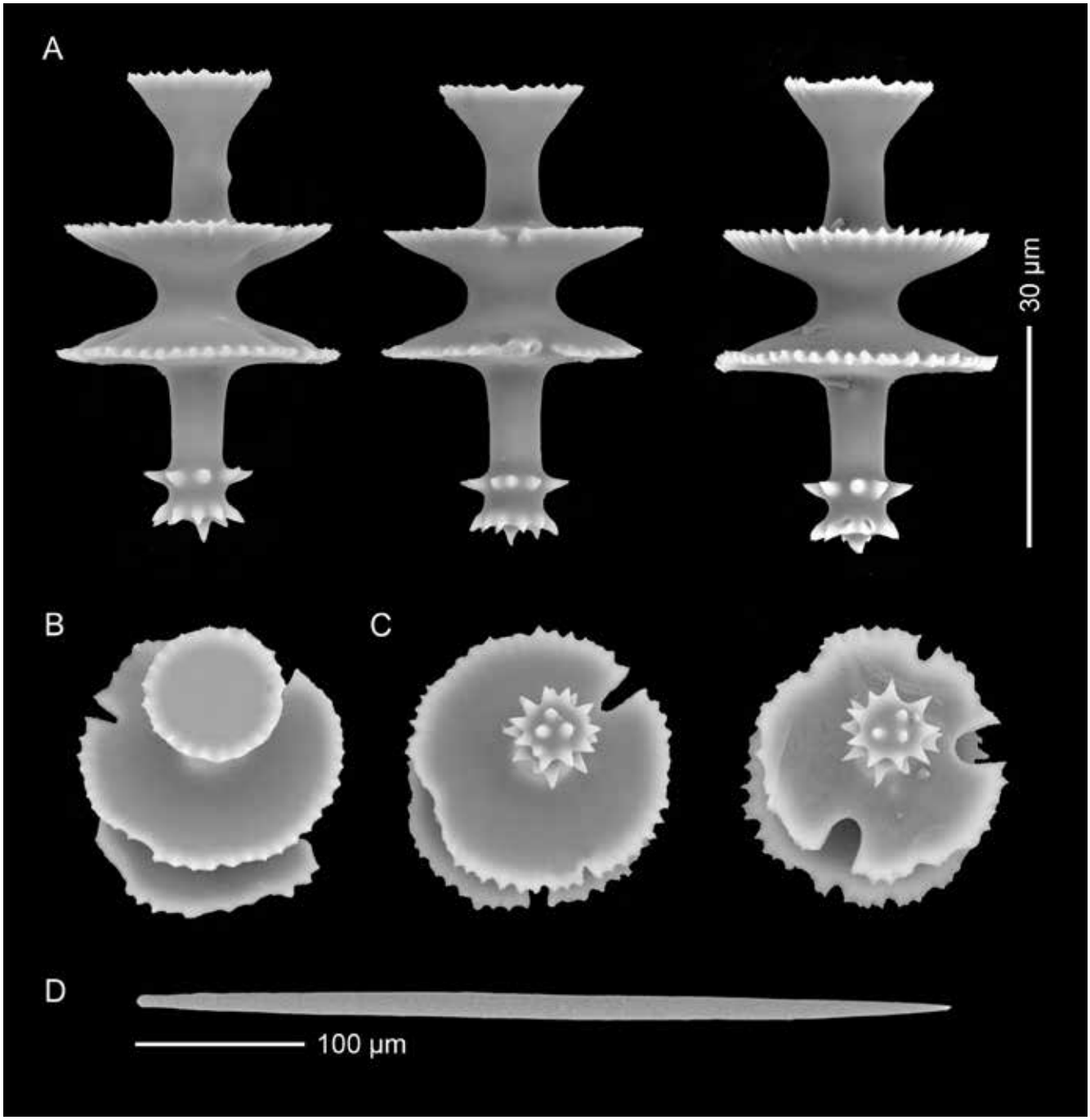


Figure 33. *Latrunculia* (*Latrunculia*) *incristata* **sp. nov.**, spicules: **A.** Anisodiscorhabds; **B.** Top-down view of an anisodiscorhabd showing the apical whorl; **C.** Upside-down view of anisodiscorhabds showing the basal whorl and manubrium; **D.** Anisostyle. All SEM images from NIWA 90986.

ZooBank registration. *Latrunculia* (*Latrunculia*) *incristata* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:16C8804A-1637-44E9-8BD1-B4D7C03F1778.

Remarks. We have chosen to describe this species, despite the lack of a holotype specimen, which is now on microscope slides and SEM stubs, due to the unique morphology of the anisodiscorhabds of *L.* (*L.*) *incristata* **sp. nov.**—smooth, finely crenulate, disc-shaped whorls, and a solid cone-shaped apical whorl in which an apical tuft or spine is absent (Fig. 33B). Hinde & Holmes (1892: pl. 11 figs 25–27, 33, 38) illustrated several microfossil spicules that have similar plate-like whorls on the anisodiscorhabds, two of which have been described in Kelly *et al.* [2016: fig. 10C: *L.* (*U.*) *delautori* Kelly, Reiswig & Samaai, 2016; fig. 10D: *L.* (*U.*) *turbo* Kelly, Reiswig & Samaai, 2016]. The closest microfossil spicule to those of our living species is *L.* (*L.*) *tutu*† (Fig. 42A), which is described below, but the latter is only 43 µm long and 27 µm maximum width, as opposed to 61 (56–67) × 35 (30–42) µm for *L.* (*L.*) *incristata* **sp. nov.**

Key diagnostic characters

- thinly encrusting sponge
- anisostyles are moderately long, 485 (444–532) µm
- anisodiscorhabds are very large, 61 (56–67) µm
- anisodiscorhabds with simple discate median and subsidiary whorls and flat-topped apex
- distribution Norfolk Ridge, New Zealand, 1228–1332 m

Latrunculia (*Latrunculia*) *magistra* Kelly & Sim-Smith sp. nov. Figs 3, 34, 35, 70

Latrunculia brevis Ridley & Dendy, 1886, Bergquist 1968: 17 (encrusting, Three Kings, 30–60 fm, Sta. B 93).

Material examined. Holotype NIWA 143571, microscope slide of Bergquist (1968) labelled '*Latrunculia brevis* from the Three Kings', Stn B93, east of Three Kings Islands, 34° S, 172.5° E, 55–110 m, 22 Oct 1958; specimen lost.

Type locality. East of Three Kings Islands, New Zealand.

Distribution. Only known from type locality (Fig. 34).

Description. The holotype was a small fragment of an encrusting sponge, 12 × 6 × 18 mm high, now lost. Small pores (0.4–0.7 mm in diameter) were present on the surface that are very slightly raised (0.06 mm) (after Bergquist 1968).

Spicules (Fig. 35). Megascleres are short anisostyles; 333 (290–376) µm long × 10 (7–13) µm wide (n= 20).

Microscleres are large anisodiscorhabds; 56 (50–63) µm long × 33 (26–38) µm wide (n = 20); average L:W ratio is 1.71. Apical whorl is funnel-shaped with short spines. Subsidiary whorl is slightly slanted upwards and has deeply notched margins. Median whorl is horizontal, wider than the subsidiary whorl, and has deeply notched margins. Basal whorl is a simple, narrow horizontal ring of spines. The manubrium is well-separated from the basal whorl and is a flattish cluster of spines.

Substrate, depth range and ecology. Found growing on an irregular rocky seabed interspersed with patches of sand; 54–108 m.

Etymology. Named for Dame Professor Patricia Bergquist, who originally identified this specimen, and for her huge contribution to MK's tertiary education, Master of Science and doctoral theses, and the establishment of her career as a sponge taxonomist and systematist (*magistra*, teacher; L.).

ZooBank registration. *Latrunculia* (*Latrunculia*) *magistra* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:7C7A844E-16FE-41F7-9AAD-7375622A9DBB.

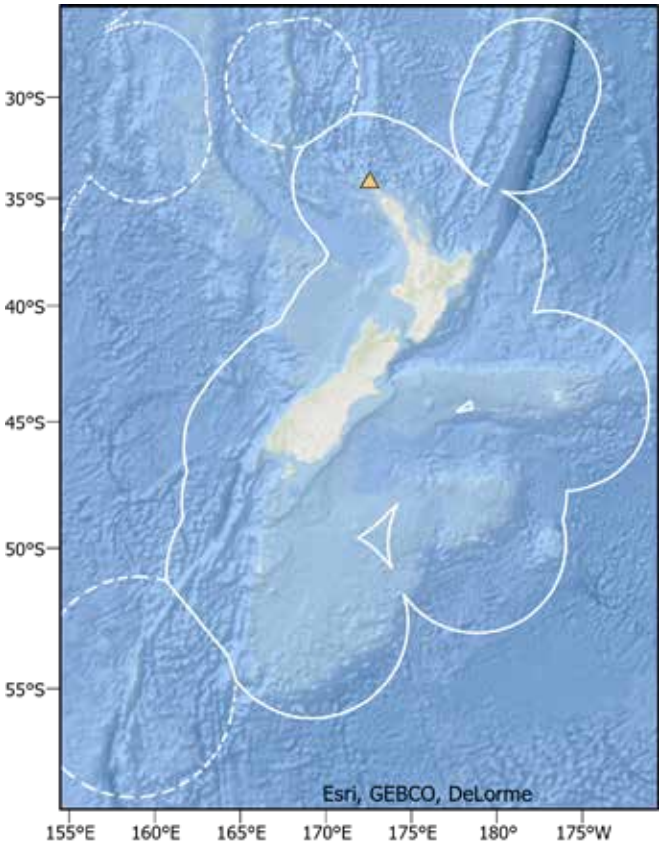


Figure 34. Type locality of *Latrunculia* (*Latrunculia*) *magistra* **sp. nov.** The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Remarks. Bergquist (1968) assigned a specimen from Three Kings Islands to *L. brevis*. The specimen, now lost, was a small fragment of an encrusting sponge, 12 × 6 × 18 mm high, and considerably different from the thickly encrusting to massive hemispherical morphology of *L.* (*L.*) *brevis*. While the anisodiscorhabds of Berguist's specimen are very similar in appearance to those of *L.* (*L.*) *brevis*, its anisostyles are much shorter (Figs 3, 70J, K). Remeasurement of the anisostyles in Bergquist's slide confirm that the megascleres are about the same thickness but shorter than Bergquist reported [Bergquist (1968: 17): 386 (299–435) µm long, versus this work: 333 (290–376) µm long], and much shorter than those of *L.* (*L.*) *brevis* [499 (406–600) µm long] as described above.

Remeasurement of the anisodiscorhabds in Bergquist's slide confirms that the microscleres are slightly longer than Bergquist reported [Bergquist (1968: 17): 54 (52–59) µm long, versus this work: 56 (50–63) µm long]. They are about the same length as those for *L.* (*L.*) *brevis* [51 (41–70) µm] as described above.

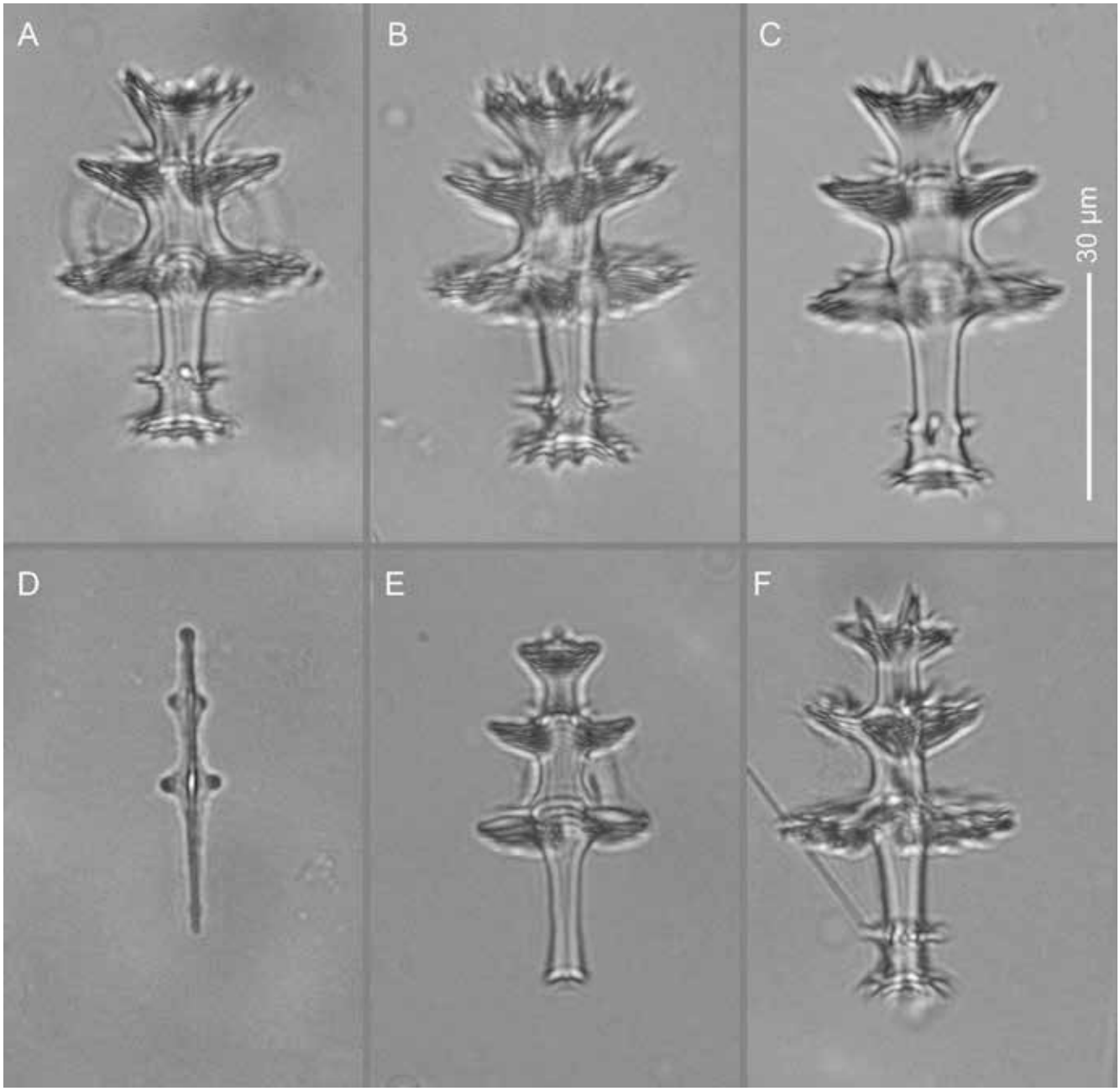


Figure 35. *Latrunculia* (*Latrunculia*) *magistra* **sp. nov.**, spicules: **A–C.** Anisodiscorhabds; **D–F.** Immature anisodiscorhabds. All images from NIWA 143571.

Whilst five other species of *Latrunculia* are known from the Three Kings Islands, only *L. oxydiscorhabda* is also assigned to subgenus *Latrunculia* and is thus comparable to the new species. *Latrunculia* (*L.*) *magistra* **sp. nov.** is easily differentiated from *L. oxydiscorhabda* as it lacks oxydiscorhabds and has much larger anisodiscorhabds [*L.* (*L.*) *oxydiscorhabda*: 32 (25–39) µm long].

Key diagnostic characters

- short anisostyles; 333 (290–376) µm long
- large anisodiscorhabds; 56 (50–63) µm long
- distribution Three Kings Islands, New Zealand, 54–108 m

Latrunculia (*Latrunculia*) *andeepi* Kelly & Sim-Smith sp. nov. Figs 3, 36, 37, 70

Material examined. Holotype SMF 10591, RV *Polarstern* 2005 ANDEEP III Expedition Stn 121-7 v. 109b, Weddell Sea, Antarctica, 63.583° S, 50.700° W, 2618 m, 14 Mar 2005.

Type locality. Weddell Sea, Antarctica.

Distribution. Only known from type locality (Fig. 36B).

Description. The holotype is a part of an encrusting sponge, 22 mm long × 11 mm wide × 15 mm thick, with only a few short papillae. Surface is smooth and easily detached. Texture is firm, somewhat compressible.

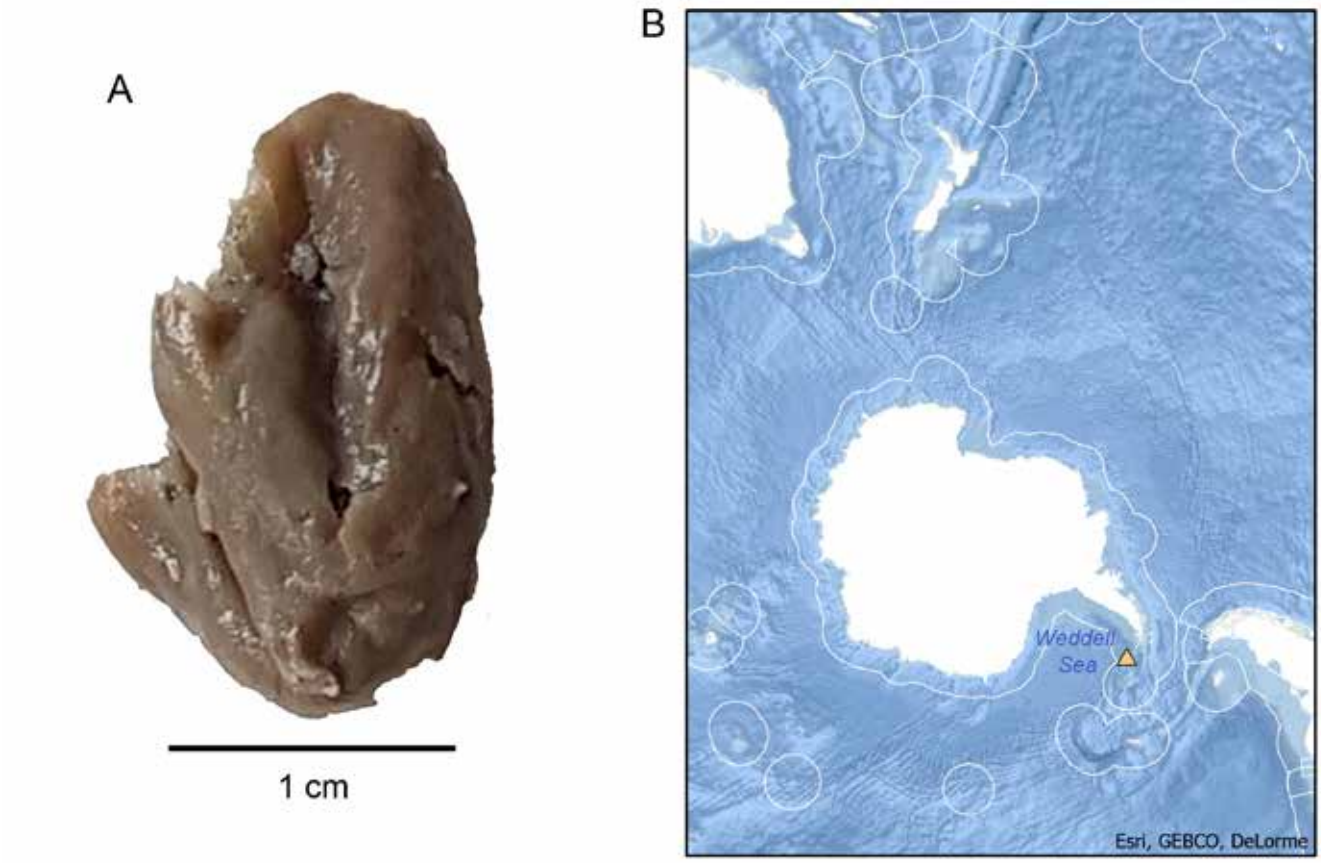


Figure 36. *Latrunculia* (*Latrunculia*) *andeepi* **sp. nov.**, morphology and distribution: **A.** Preserved holotype SMF 11255; **B.** Type locality of *L.* (*L.*) *andeepi* **sp. nov.** Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

Color in life unknown, colour in ethanol light greyish brown (36A).

Spicules (Fig. 37). Megascleres (Fig. 37D) are large, stout anisostyles that are wider in the centre and taper towards the tips. Often slightly wavy; 575 (540–610) × 11 (10–18) μm (n = 20).

Microscleres (Figs 37A–C) are very large and relatively slender anisodiscorhabds; 70 (63–78) × 41–38–45) μm (n = 20); average L:W ratio is 1.70. The apical whorl is a narrow, funnel-shaped whorl of upward-pointing spines. The subsidiary whorl is well-separated from the apical whorl and is slightly curved upwards. It comprises three, well-separated segments that have sharply notched rims. The median whorl is horizontal and also comprises three, well-separated segments that have sharply notched rims. The basal whorl is a simple, narrow horizontal ring of short, well-separated spines, which is located just above the manubrium. The manubrium is a narrow whorl of short, diagonally downward-pointing spines.

Substrate, depth range and ecology. Found growing on gravel, 2618 m.

Etymology. Named for the ANDEEP expeditions to the deep Weddell Sea (2001–2005), from which the sponge was collected.

ZooBank registration. *Latrunculia* (*Latrunculia*) *andeepi* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:22BCA6AA-885E-418A-B55E-CCC1FD67A011.

Remarks. *Latrunculia* (*L.*) *andeepi* **sp. nov.** has a similar spicule size range to *L.* (*L*). *basilis* and *L.* (*L*). *lendenfeldi*, but the three species can be clearly differentiated by anisodiscorhabd morphology (Figs 70B, C, E): 1) the anisodiscorhads in *L.* (*L.*) *andeepi* **sp. nov.** have a simple ornamentation of sharp spines, while those in *L.* (*L*). *basalis* form serrated flanges (Fig. 7); 2) The subsidiary and apical whorls in *L.* (*L*). *andeepi* are well-separated, while they are closer together in *L.* (*L*). *basalis*, and even more so in *L.* (*L*). *lendenfeldi* (Fig. 9). *Latrunculia* (*L.*) *andeepi* **sp. nov.** has much larger anisodiscorhabds than all other New Zealand and Antarctic *Latrunculia* species except for *L.* (*L.*). *bransfieldi*, which has shorter anisostyles [485 (460–510) μm]. The appearance of the anisodiscorhabds of *L.* (*L.*) *andeepi* **sp. nov.** is similar to those of *L.* (*L.*) *gracilis* **sp. nov.** (Figs 70B, O), but *L.* (*L.*) *gracilis* **sp. nov.** has much shorter anisodiscorhabds and anisostyles than *L.* (*L.*) *andeepi* **sp. nov.** (Fig. 3) and *L.* (*L.*) *gracilis* **sp. nov.** lives in much shallower depths (197–215 m) than *L.* (*L.*) *andeepi* **sp. nov.** (2618 m).

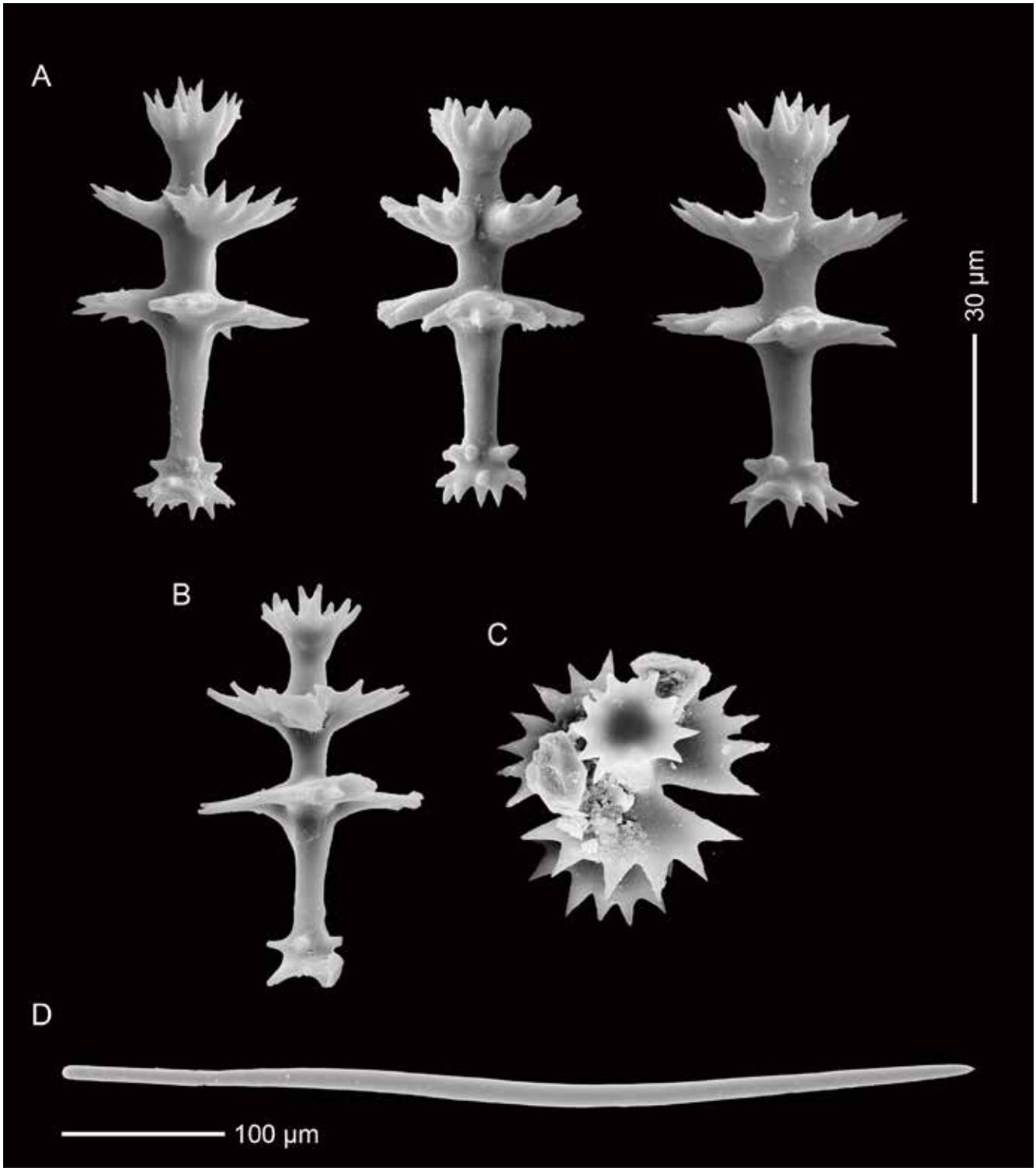


Figure 37. *Latrunculia* (*Latrunculia*) *andeepi* **sp. nov.**, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabd; **C.** Upside-down view of the manubrium and median whorl; **D.** Anisostyle. All images from holotype SMF 11255.

Key diagnostic characters

- anisostyles are large, 575 (540–610) µm long
- anisodiscorhabds are very large, 70 (63–78) µm long
- subsidiary whorl is well-separated from the apical whorl
- distribution Antarctica, 2618 m

***Latrunculia* (*Latrunculia*) *bransfieldi* Kelly & Sim-Smith sp. nov.** Figs 3, 38, 39, 70

Material examined. Holotype SMF 11191, RV *Polarstern* 2013 LASSO Expedition Stn 196-8 AGT15 v.130, Bransfield Strait, Antarctic Peninsula, Antarctica, 62.783° S, 55.133° W, 580 m, 24 Feb 2013.

Type locality. Bransfield Strait, Antarctic Peninsula, Antarctica.

Distribution. Only known from type locality (Fig. 38B).

Description. Thickly encrusting, around 50 mm long × 40 mm wide × 9 mm thick, covered by numerous 1–2 mm long papillae. Texture is firm, barely compressible. Colour in life olive green, colour in ethanol black (Fig. 38A).

Spicules (Fig. 39). Megascleres are moderately long anisostyles; 485 (460–510) × 10 (10–10) μm (n = 20).

Microscleres are very long, slender anisodiscorhabds; 76 (69–83) × 26 (25–28) μm; average L:W ratio is 1.89. The apical whorl is a narrow, cluster of fused undulating petals with minutely denticulate margins. The subsidiary whorl is slanted upwards and is located close to the apical whorl. It comprises three segments that have a sharply or bluntly notched margin. The median whorl is horizontal and comprises three segments that have a sharply notched margin. The basal whorl is a simple ring of conical spines that is located just above the manubrium. The manubrium is a ring of diagonally downward-pointing spines.

Substrate, depth range and ecology. Found growing on gravel, 580 m.

Etymology. Named for the type locality of this species, Bransfield Strait, between the South Shetland Islands and the Antarctic Peninsula.

ZooBank registration. *Latrunculia* (*Latrunculia*) *bransfieldi* **sp. nov.** is registered in ZooBank urn:lsid:zoobank.org:act:B6CD7ACB-99B7-42DA-97F3-E21D794500A6.

Remarks. *Latrunculia* (*L.*) *bransfieldi* **sp. nov.** has the largest anisodiscorhabds of the known New Zealand and Antarctic *Latrunculia* [76 (69–83) μm] (Fig. 3). Three other Antarctic species have large anisodiscorhabds of comparable length: *L.* (*L.*) *basalis* [69 μm]; *L.* (*L.*) *lendenfeldi* [71 (65–80) μm]; and *L.* (*L.*) *andeepi* **sp. nov.** [70 (63–78) μm]. However, these last three species have much longer anisostyles than *L.* (*L.*) *bransfieldi* **sp. nov.** [485 (460–510) μm]: *L.* (*L.*) *basalis*: [554 (500–592) μm]; *L.* (*L.*) *lendenfeldi* [567 (415–637) μm]; and *L.* (*L.*) *andeepi* **sp. nov**. 575 (540–610) μm] (Fig. 3).

The morphology of the anisodiscorhabds of the four species also differ markedly (Figs 70A–C, E). The

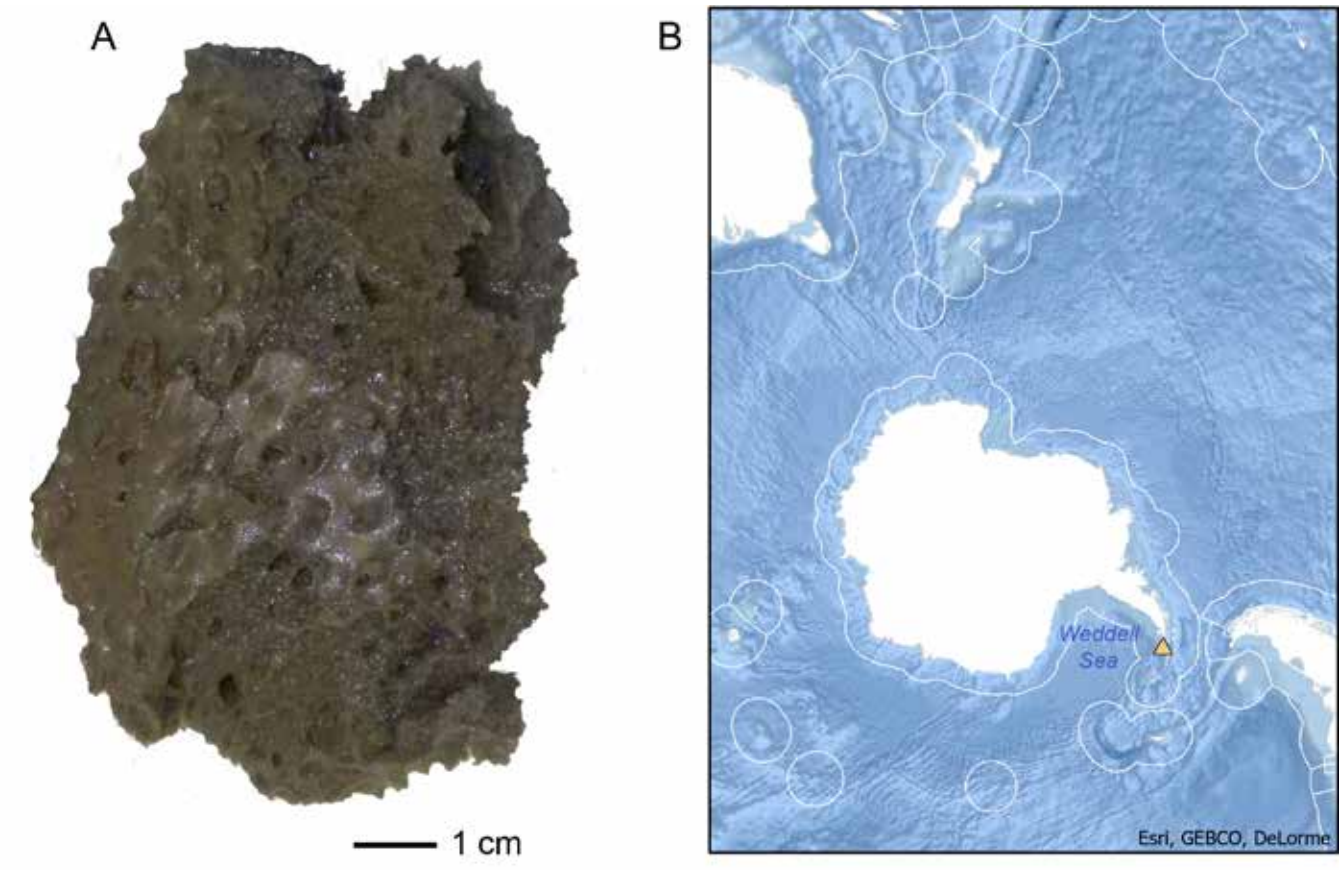


Figure 38. *Latrunculia* (*Latrunculia*) *bransfieldi* **sp. nov.**, holotype SMF 11191, morphology and distribution: **A.** Deck image of holotype; **B.** Type locality of *L.* (*L.*) *bransfieldi* **sp. nov.** Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

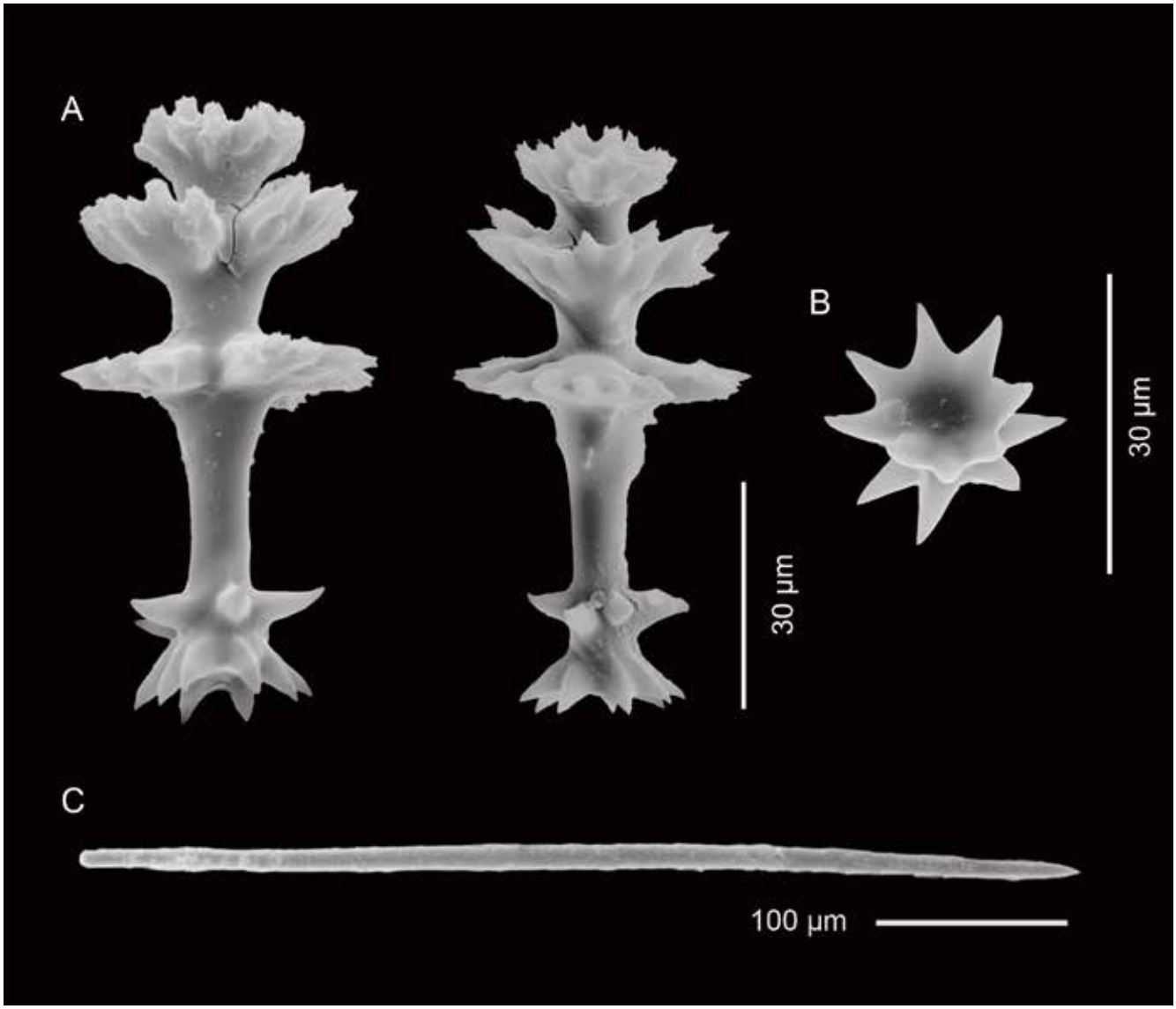


Figure 39. *Latrunculia* (*Latrunculia*) *bransfieldi* **sp. nov.**, holotype SMF 11191, spicules: **A.** Anisodiscorhabds; **B.** Upside-down view of an anisodiscorhabds showing the manubrium (image has been cropped); **C.** Anisostyle.

apical and subsidiary whorls in the anisodiscorhabds of *L.* (*L.*) *bransfieldi* **sp. nov.** have a wavy, petal-shaped (petaliform) ornamentation (Fig. 70A) strongly reminiscent of those in *L.* (*L.*) *austini* Samaai, Gibbons & Kelly, 2006 from the Gulf of Alaska and British Columbia, while those in *L.* (*L.*) *andeepi* **sp. nov.** have a simple ornamentation of long, smooth spines (Fig. 70B). Those in *L.* (*L.*) *lendenfeldi* comprise a cluster of blunt, finger-like spines and a very closely spaced apical and subsidiary whorls (Fig. 70C), and those in *L.* (*L.*) *basalis* have a simple ornamentation of short spines forming flanges with a serrated edge (Fig. 70E).

Key diagnostic characters

- thickly encrusting sponge covered by short papillae
- moderate anisostyles; 485 (460–510) µm long
- very large anisodiscorhabds; 76 (69–83) µm long
- anisodiscorhabds have a flower-shaped apical whorl
- distribution Antarctica, 580 m

Latrunculia (*Latrunculia*) *variornata* Kelly & Sim-Smith sp. nov. Figs 3, 40, 41, 70; Table 10

Material examined. Holotype NIWA 52208, Myall Islands, Cosmonauts Sea, Antarctica, 25–30 m, 21 Dec 1970. **Paratype** SMF 11949, RV *Polarstern*, 2011 BENDEX Expedition Stn 77/208-5 v.20, Burdwood Bank, south of Falkland Islands, 54.533° S, 56.150° W, 289 m, 11 Feb 2011.

Type locality. Myall Islands, Cosmonauts Sea, Antarctica.

Distribution. Antarctica and Falkland Islands (Fig. 40C).

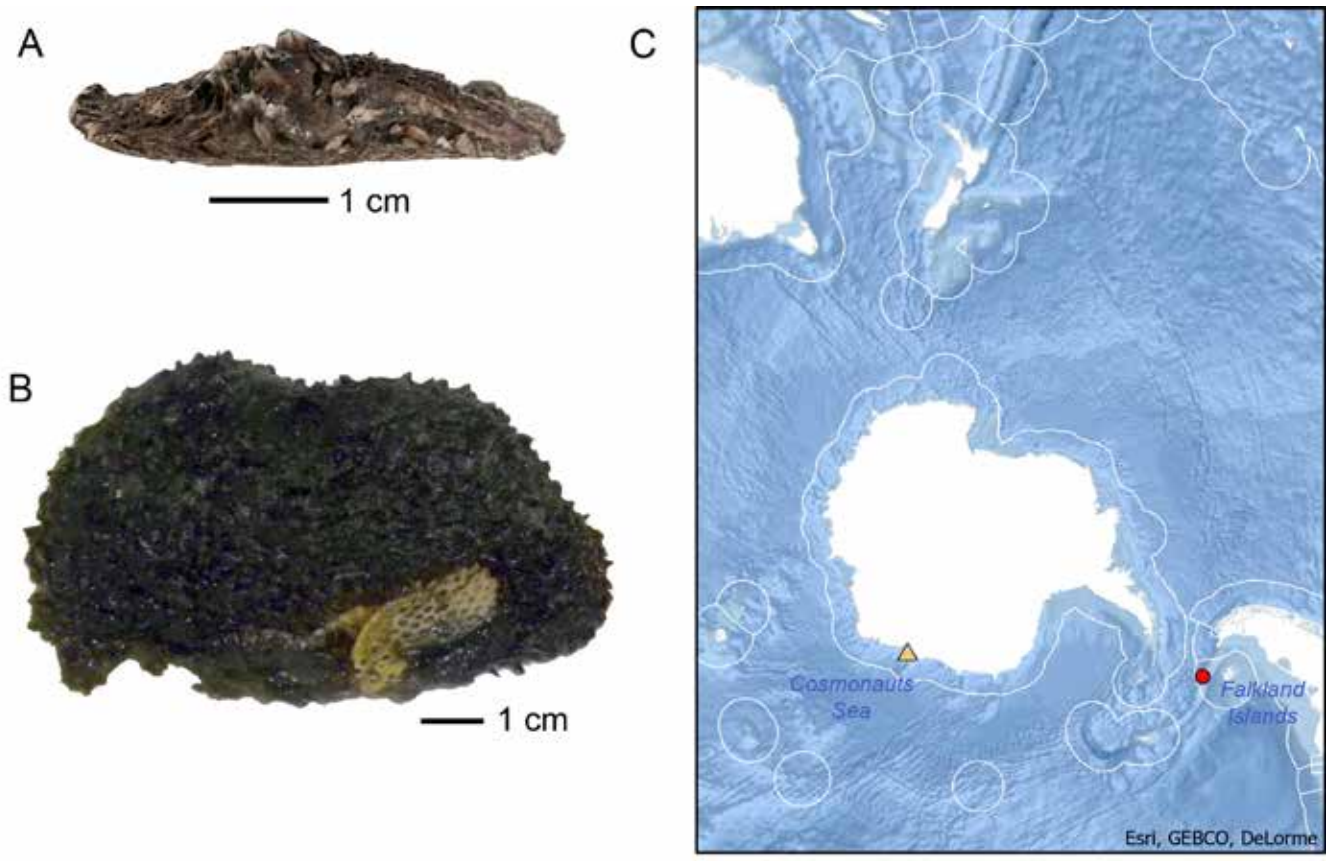


Figure 40. *Latrunculia* (*Latrunculia*) *variornata* **sp. nov.**, morphology and distribution: **A.** Holotype NIWA 52208, dried; **B.** Paratype SMF 11949, deck specimen; **C.** Distribution and type locality (triangle) of *L.* (*L.*) *variornata* **sp. nov.** and other specimens examined in this study (circles). Country EEZs and 200 NM beyond Antarctica are outlined white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

Description. Specimens are thickly encrusting, cushion-shaped, with numerous papillae (1 mm high) covering the surface. SMF 11949, is around 85 mm long × 53 mm wide × 29 mm thick. Colour in life dark green, colour in ethanol is black (Figs 40A, –B).

Spicules (Fig. 41). Megascleres (Fig. 41E) are moderately long anisostyles; 468 (366–530) × 8 (5–11) μm (n = 60).

Microscleres (Figs 41A–D) are moderately sized, squat anisodiscorhabds that are highly irregular; 47 (38–64) × 31 (28–33) μm (n = 60); average L:W ratio is 1.44. The apical whorl is a cluster of upward-pointing spines. An apical spine may be present. The subsidiary whorl is located close to the apical whorl and is slanted upwards. It typically comprises three, well-separated segments that have deeply notched rims, but malformed whorls are common, and may be missing altogether. The median whorl is a horizontal ring of well-separated segments that have deeply notched margins. The basal whorl is located very close to the manubrium and is sometimes difficult to distinguish from the manubrium. It comprises a ring of simple, slightly curved spines. Missing or unaligned spines are common. The manubrium is a cluster of diagonally downward-pointing spines. A basal spine may be present.

Substrate, depth range and ecology. Found growing on gravel, 25–289 m.

Etymology. Named for the extraordinary variability of ornamentation in the anisodiscorhabds in this species and deformity of the overall spicule (*variornata*, variously ornamented; L).

ZooBank registration. *Latrunculia* (*Latrunculia*) *variornata* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:566BA9F9-DA24-455F-ADE2-BA3DE12F4449.

Remarks. *Latrunculia* (*L.*) *variornata* **sp. nov.** has similar-sized spicules to *L.* (*L.*) *prendens* **sp. nov.**, *L.* (*L.*) *robertsoni* **sp. nov.**, *L.* (*L.*) *morrisoni* **sp. nov.**, *L.* (*L.*) *nelumbo* **sp. nov.** and *L.* (*L.*) *brevis* (Fig. 3). It can be easily separated by anisodiscorhabd morphology from the first two species, as they have distinctive anisodiscorhabds (Figs 70P, H, N). The anisodiscorhabds of *L.* (*L.*) *variornata* **sp. nov.** are most similar-looking to *L.* (*L.*) *nelumbo* **sp. nov.**, *L.* (*L.*) *brevis* and *L.* (*L.*) *morrisoni* **sp. nov.**, but those of

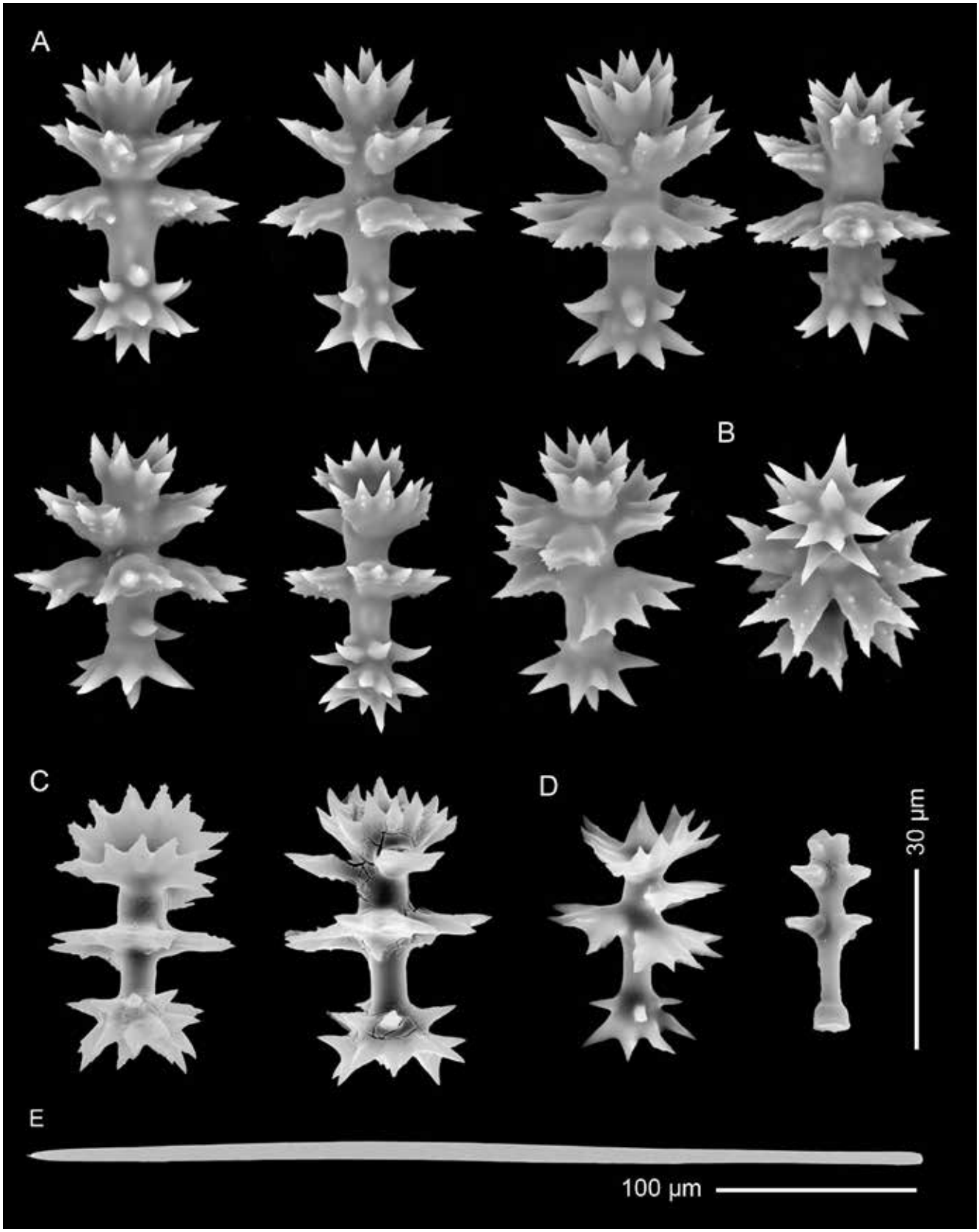


Figure 41. *Latrunculia* (*Latrunculia*) *variornata* **sp. nov.**, spicules: **A.** Anisodiscorhabds from the holotype NIWA 52208; **B.** Upside down view of an anisodiscorhabd from the holotype; **C.** Anisodiscorhabds from the paratype, SMF 11949. **D.** Immature anisodiscorhabds from the paratype; **E.** Anisostyle from the holotype.

Table 10. Spicule dimensions (μm) of *Latrunculia* (*Latrunculia*) *variornata* **sp. nov.** Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 52208 (holotype)	456 (366–494) × 8 (5–11)	50 (43–64) × 34 (27–39)
SMF 11949 (paratype)	491 (460–530) × 10 (10–10)	43 (38–50) × 31 (28–33)

L. (*L.*) *variornata* **sp. nov.** are more irregular with fewer spines per segment and larger separations between the segments of the median and subsidiary whorls.

Key diagnostic characters

- thickly encrusting sponge covered in short papillae
- anisostyles are moderately long; 468 (366–530) μm long
- anisodiscorhabds are moderately large; 47 (38–64) μm long
- anisodiscorhabds are squat and frequently malformed with few spines per segment and large separations between the median and subsidiary whorls
- distribution Antarctica, 25–289 m

Latrunculia (*Latrunculia*) *tutu*† Kelly & Sim-Smith sp. nov. Fig. 42

Latrunculia (m) Hinde & Holmes, 1892: 219, pl. XI fig. 38.
Latrunculia (m), Wiedenmayer, 1994: 63, fig. 21.18.

Type & locality (not examined). Holotype microfossil anisodiscorhabds illustrated as *Latrunculia* (m) by Hinde & Holmes (1892: 219; pl. 11 Fig. 38), Taylor's Quarry, Oamaru, New Zealand.

Material examined. None.

Type location and age. Hinde & Holmes (1892) did not specify the exact location of the microfossil spicule collection, other than it came from three possible locations in the Oamaru District (Fig. 42B): Cormacks Siding, Jackson's Paddock and Bain's Farm

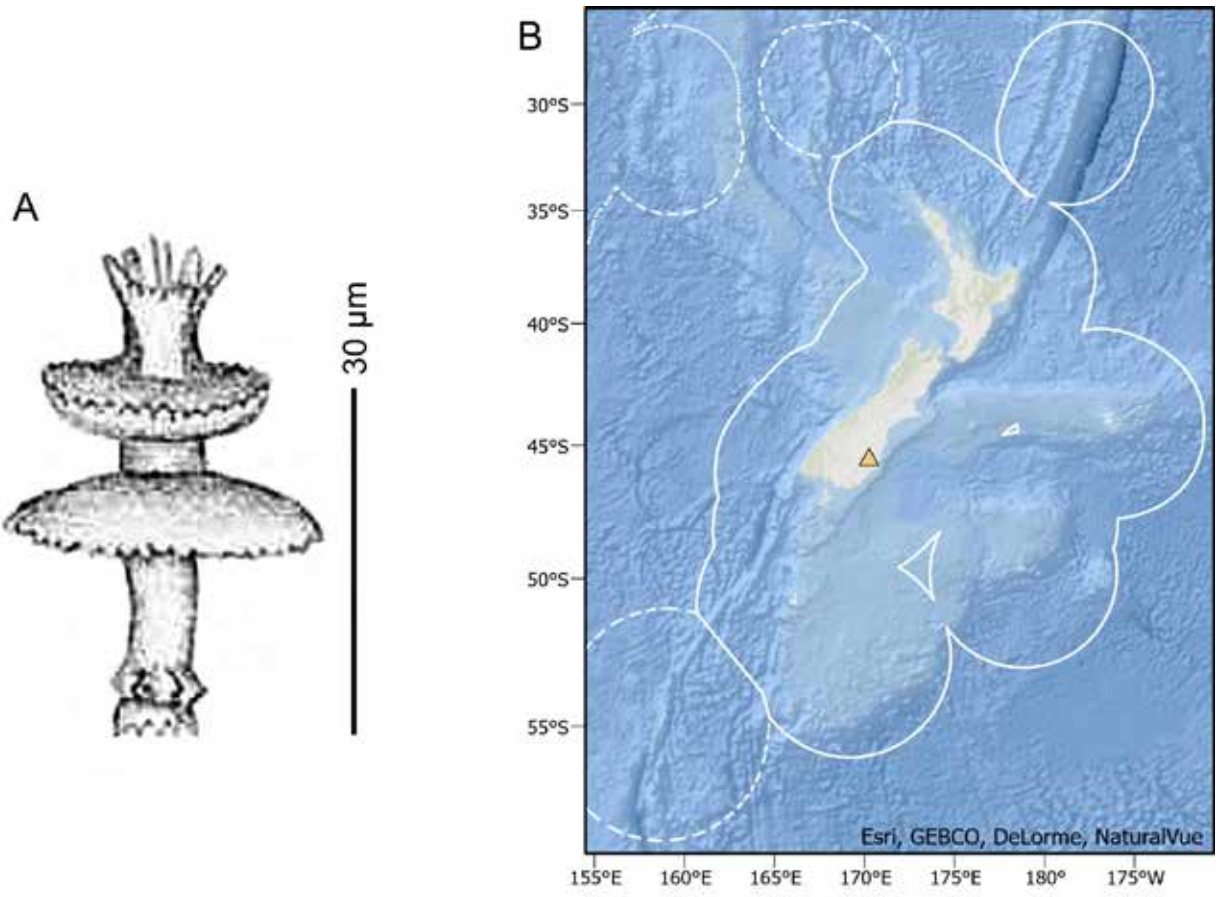


Figure 42. *Latrunculia* (*Latrunculia*) *tutu*† **sp. nov.**, spicule and distribution: **A.** Illustration of '*Latrunculia* (m)' in Hinde & Holmes (1892: pl. 11 fig. 38); **B.** Type locality, Oamaru Diatomite. The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

(Lautour 1889; Edwards 1991) (see Kelly *et al.* 2016). The microfossil anisodiscorhabds are from marine diatomaceous sediments of the Oamaru Diatomite member of the basaltic Waiareka Volcanic Formation (Hinde & Holmes 1892). Runangan (Late Eocene) age (36.4–34.6 Ma) (Edwards 1991). The dagger symbol (†) following the species name indicates that this is a fossil species (from Kelly *et al.* 2016).

Spicules (Fig. 42). Microscleres are microfossil anisodiscorhabds with a stout, 'subcylindrical' shaft, with two whorls of small spines at the base, the manubrium spines appearing to form an inverted crown, while the basal whorl appears to be eroded but forms a ring of spines projecting horizontally. Above the base of the anisodiscorhabd is an '*inverted saucer-like disc with dentated margin*', the median whorl, succeeded by a '*similar but smaller disc with concavity upwards*', the subsidiary whorl. At the summit is an apical whorl of curved teeth or spines that appear to splay obliquely in the shape of a crown, but an apical tuft or spine is absent. The overall length of the anisodiscorhabd is 43 μm, the width of the lower, widest disc is 27 μm, and the thickness of the shaft is 7.5 μm (modified from Hinde & Holmes 1892).

Etymology. Named for the form of the median whorl which resembles a ballerina's tutu.

ZooBank registration. *Latrunculia* (*Latrunculia*) *tutu*† **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:997E7D6B-5B3D-41E3-8074-8CF8541AE0AC.

Remarks. The morphology of the microfossil anisodiscorhabd of Late Eocene *L.* (*L.*) *tutu* **sp. nov.** strongly resembles that of the extant species, *L.* (*L.*) *incristata* **sp. nov.** Both anisodiscorhabds are highly distinctive with smooth, finely crenulate, disc-shaped whorls, and both lack an apical tuft or spine. The major differences between the two species are that, in *L.* (*L.*) *tutu* **sp. nov.**, the apical whorl is a whorl of everted spines that form a crown, but in *L.* (*L.*) *incristata* **sp. nov.**, the apical whorl forms a solid inverted cone with denticulate margins. The microfossil anisodiscorhabd of *L.* (*L.*) *tutu* **sp. nov.** (43 × 27 μm) is also much smaller than that of *L.* (*L.*) *incristata* **sp. nov.** (61 × 35 μm). Finally, the two species have a disjunct distribution: *L.* (*L.*) *tutu* **sp. nov.** was collected from the Oamaru district in the South Island, whereas *L.* (*L.*) *incristata* **sp. nov.** was collected from the Norfolk Ridge to the northwest of New Zealand.

Subgenus *Biannulata* Samaai, Gibbons & Kelly, 2006

Diagnosis. *Latrunculia* species in which the anisodiscorhabd microscleres have only two distinct whorls of projections around the shaft, the median and subsidiary whorls, between the undifferentiated manubrium and basal whorl, and the undifferentiated apical whorl and apex [modified from Samaai *et al.* (2006) and Kelly *et al.* 2016)].

Remarks. Figure 71 provides a visual comparison of the anisodiscorhabds of all known New Zealand and Antarctic species of *Latrunculia* (*Biannulata*).

Type Species. *Latrunculia* (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002: 157, figs 2, 3A.

Latrunculia (*Biannulata*) *spinispiraefera* Brøndsted, 1924 Figs 4, 43, 44, 71; Table 11

Latrunculia spinispiraefera Brøndsted, 1924: 480, figs 33A–E.
Latrunculia spinispiraefera, Kelly *et al.* 2009: 43.
NOT *Latrunculia spinispiraefera,* Bergquist 1961: 189, fig. 13.
Latrunculia (*Biannulata*) *spinispiraefera*, Samaai, Gibbons & Kelly, 2006: 48, figs 1P, 7.
Latrunculia (*Biannulata*) *duckworthi,* "P.R. Bergquist, Ikatere 20" (Ts 109) in Samaai *et al.* 2006: 60.
Latrunculia (*Biannulata*) *kaakaariki*, NMNZ PO.000601, NMNZ PO.000605 and NMNZ PO.000618 in Samaai *et al.* 2006: 59.

Material examined. Holotype—Microscope slides of holotype, 2 miles east of North Cape, 99 m, 2 Jan 1915. Accessioned at the Zoological Museum, University of Copenhagen.

Other material. *Three Kings Islands*: NMNZ PO.000601, 34.377° S, 172.775° E, 190–200 m, 8 Feb 1984; NMNZ PO.000605, 34.277° S, 172.262° E, 173–178 m, 2 Feb 1981; NMNZ PO.000618, 34.418° S, 172.845° E, 133 m, 2 Feb 1981.

Northland: NIWA 51343, NIWA Stn Z9694 (KAH9901/58), North Cape, 34.376° S, 172.995° E, 65 m, 27 Jan 1999; '*Ikatere* 20' (microscope slides from P. R. Bergquist collection), off Cape Kari Kari, 34.8° S, 173.3° E, 46 m, 12 June 1965.

Coromandel: NIWA 106472, SOP Stn TRIP4693/2, 36.9° S, 176.0° E, 76 m, 12 May 2016.

Bay of Plenty: NIWA 155936, NIWA Stn KAH2101/22, Bay of Plenty, 37.568° S, 176.284° E, 48 m, 5 Feb 2021.

Type locality. North Cape, Northland, New Zealand.

Distribution. Three Kings Islands; Northland; Coromandel (Fig. 43D).

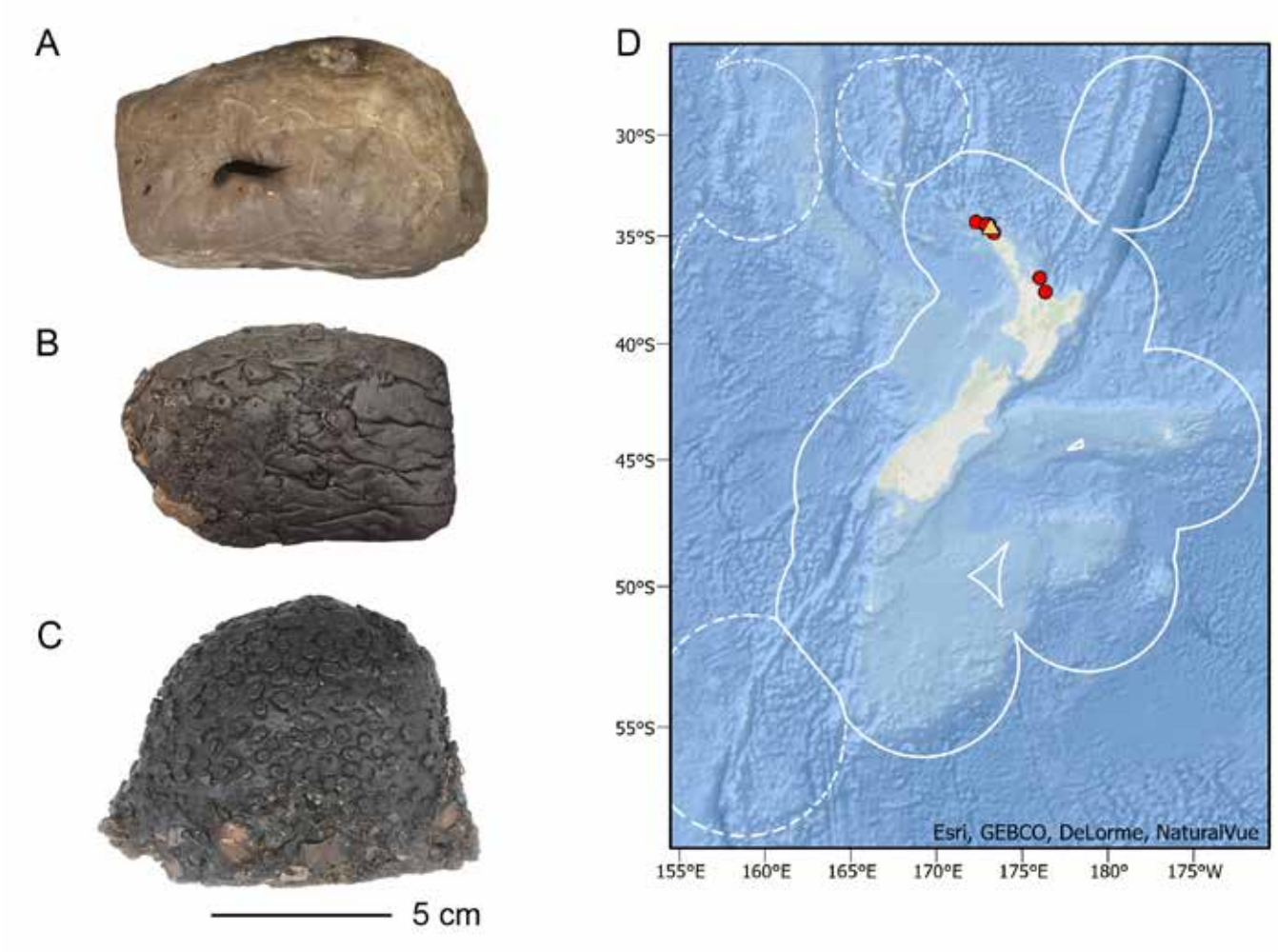


Figure 43. *Latrunculia* (*Biannulata*) *spinispiraefera* Brøndsted, 1924, morphology and distribution: **A.** NMNZ PO.000618, preserved specimen; **B.** NMNZ PO.000601, preserved specimen; **C.** NIWA 106472 preserved specimen; **D.** Distribution and type locality (triangle) of *L.* (*B.*) *spinispiraefera* and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Description. Massive to hemispherical sponge, holotype 10 cm in diameter. Surface may be flat or covered with mushroom-shaped fistules 1–3 mm high and 1–10 mm in diameter (Figs 43A–C). Texture firm, barely compressible. Choanosome has a lot of shell debris incorporated in it. Colour in life dark reddish brown, colour in preservative mid to dark brown, interior dark brown.

Spicules (Fig. 44, Table 11). Megascleres are smooth anisostyles, centrally thickened, fusiform, and slightly sinuous, with a narrow head region; 408 (327–472) × 9 (5–14) μm (n = 135).

Microscleres are small anisodiscorhabds; 38 (29–46) × 22 (17–27) μm (n = 135) with an average L:W ratio of 1.76. The apical whorl is a simple, funnel-shaped whorl of short, upward-pointing spines. The subsidiary whorl is divided into three distinct segments with sharply notched margins. The horizontal median whorl is the largest of the three whorls and is located just below the halfway point on the shaft. It is divided into three distinct segments that have sharply notched margins. The subsidiary whorl and median whorl are lightly microspined. Manubrium and basal whorl are undifferentiated, forming a frilly spined base [modified from Brøndsted 1924) and Samaai *et al.* (2006)].

Substrate, depth range and ecology. Found on hard substrata; 46–200 m.

Remarks. This species was first described by Brøndsted (1924) from a single specimen, collected off northern New Zealand. The holotype was described as possessing spinispirae, but these microscleres were determined by Bergquist (1968) to belong to *Trachycladus stylifer* Dendy 1924, which was collected and packed with the specimen of *L. spinispiraefera* described by Brøndsted. Bergquist (1968) subsequently concluded that *L. spinispiraefera* was a junior synonym of *L. brevis* [after Samaai *et al.* (2006)]. However, Alvarez *et al.* (2002) and Samaai *et*

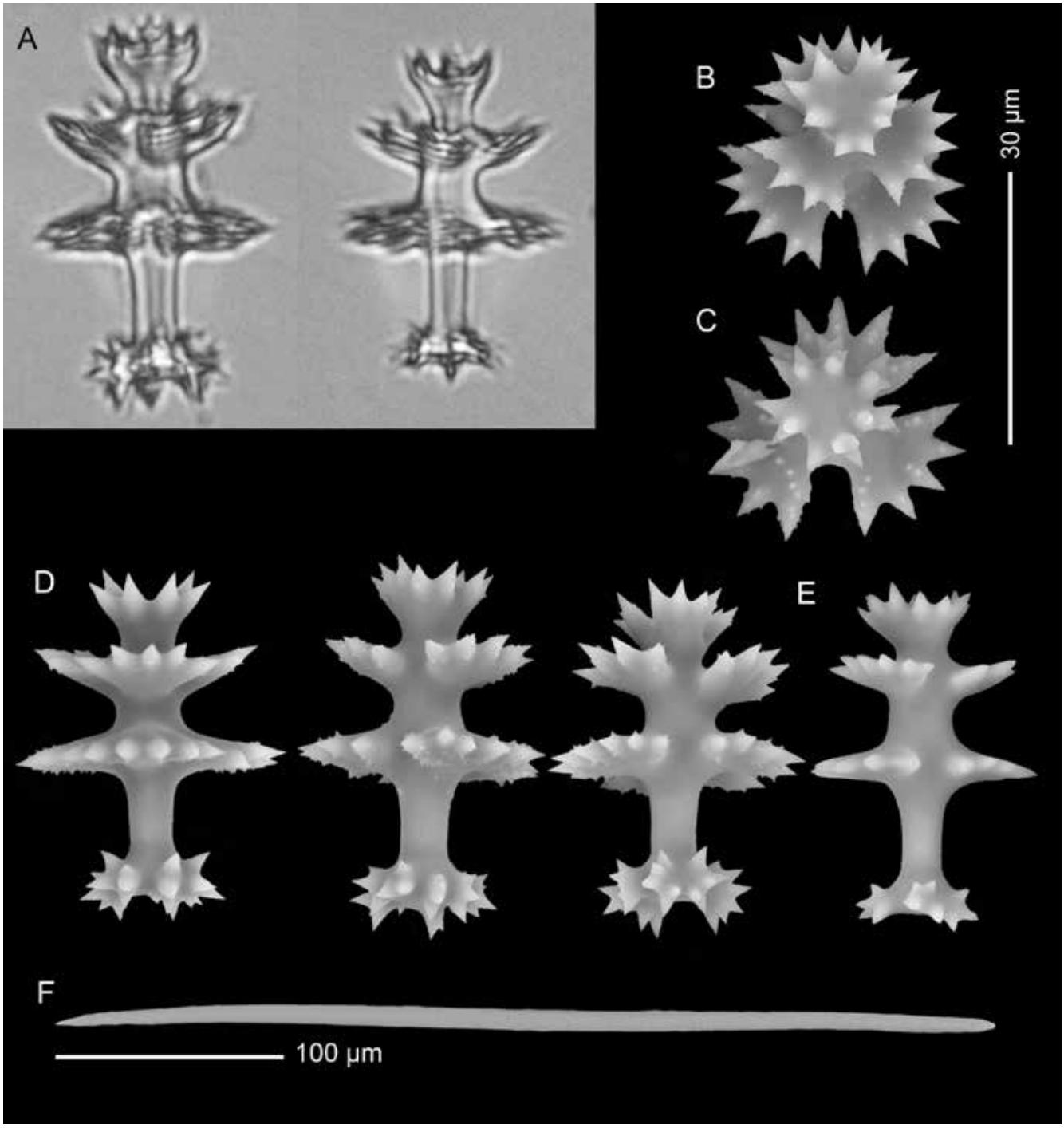


Figure 44. *Latrunculia* (*Biannulata*) *spinispiraefera* Brøndsted, 1924, spicules: **A.** Light microscope images of anisodiscorhabds from the holotype; **B.** Top-down view of an anisodiscorhabd showing the apical whorl; **C.** Upside-down view of an anisodiscorhabd showing the manubrium; **D.** Anisodiscorhabds; **E.** Immature anisodiscorhabd; **F.** Anisostyle. All SEM images from NMNZ PO.000618.

al. (2006) considered *L. spinispiraefera* to be a valid species. Upon re-examination of microscope slides of the holotype, we concur with these latter studies that *L.* (*B.*) *spinispiraefera* is a valid species. Four additional specimens of *L.* (*B.*) *spinispiraefera* have been found in deep waters around the Three Kings Islands and Coromandel, allowing us to obtain SEM images of the spicules (Figs 44B–E).

In 1961, Bergquist assigned two specimens from the Chatham Rise as *L. spinispiraefera*, but the anisodiscorhabds (Bergquist 1961, Fig. 13) bore no resemblance to Brøndsted's original description and illustration (Brøndsted 1924, Fig. 33). The anisodiscorhabds in Bergquist's 1961 specimens are also clearly from a species in subgenus *Latrunculia*, not *Biannulata* Samaai, Gibbons & Kelly, 2006, within

Table 11. Spicule dimensions (μm) of *Latrunculia* (*Biannulata*) *spinispiraefera* Brøndsted, 1924. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
Holotype slide of Brøndsted (1924)	430 (398–472) × 7 (6–8)	37 (34–41) × 23 (19–26)
NIWA 51343	366 (346–385) × 8 (5–10)	39 (37–42) × 21 (18–22)
NIWA 106472	418 (399–440) × 8 (6–11)	37 (34–38) × 20 (17–22)
NIWA 155936	402 (366–460) × 8 (6–10)	35 (29–39) × 21 (18–25)
NMNZ PO.000601	433 (408–457) × 9 (6–11)	42 (38–46) × 24 (18–27)
NMNZ PO.000605	414 (386–451) × 9 (5–10)	39 (36–43) × 22 (18–26)
NMNZ PO.000618	406 (390–426) × 9 (7–11)	38 (35–41) × 22 (18–25)
P.R. Bergquist '*Ikatere* 20'	371 (327–385) × 11 (8–14)	40 (35–42) × 23 (20–25)

which *L.* (*B.*) *spinispiraefera* is currently recognised. Bergquist (1968) later synonymised the Chatham Rise specimens with *L.* (*L.*) *brevis*. We have examined these specimens (CMC AQ1083) and microscope slides of the Chatham Rise specimens and have identified them as *L.* (*L.*) *triverticillata* (Table 5, Table 20).

We found two other specimens identified as *L. spinispiraefera* in Bergquist's collection, deposited in Museum of New Zealand Te Papa Tongarewa. Examination of these specimens found that NMNZ PO.001436 from the Hauraki Gulf is *Rhaphidhistia mirabilis* (Dendy, 1924), and NMNZ PO.001288 from North Cape is *Amphiastrella kirkpatricki* Dendy, 1924.

Latrunculia (*B.*) *spinispiraefera* has overlapping spicule lengths with *L.* (*B.*) *wellingtonensis*, *L.* (*B.*) *millerae* and *L.* (*B.*) *kaikoura*. However, the anisodiscorhabds of *L.* (*B.*) *spinispiraefera* have a simple funnel-shaped apical whorl with short spines, and a subsidiary whorl that is angled slightly upwards and is slightly smaller than the median whorl. In contrast, the latter three species have apical whorls that are flattish crowns of divaricating spines, and both the subsidiary and median whorls are horizontal (Fig. 71). Furthermore, *L.* (*B.*) *spinispiraefera* has a northern New Zealand distribution, whereas the latter three species are only found south of East Cape.

Key diagnostic characters

- massive sponge with a flat surface or covered in small oscules
- anisodiscorhabds are small, 39 (34–46) μm long, with a funnel-shaped crown
- subsidiary whorl is slanted slightly upwards and is slightly smaller than the median whorl
- anisostyles are moderately long, 415 (346–472) μm long
- distribution Three Kings Islands and northeastern New Zealand, 46–200 m

Latrunculia (*Biannulata*) *procumbens* Alvarez, Bergquist & Battershill, 2002

Figs 4, 45, 46, 71; Table 12; Seafloor Image 4, 5

Latrunculia 'Tutukaka' Miller *et al.* 2001: 245.
Latrunculia procumbens Alvarez, Bergquist & Battershill, 2002:161, figs 3B, 5.
Latrunculia procumbens, Kelly *et al.* 2009: 43.
Latrunculia (*Biannulata*) *procumbens*, Samaai, Gibbons & Kelly, 2006: 62, figs 6D, 7, 8H; Kelly 2018: 78; Zou *et al.* 2019: Table S2 (Supporting Information)

Material examined. Holotype—NIWA 7783, NIWA Stn Z15045, Whau Point, Tutukaka, Northland, 35.617° S, 174.540° E, 7 m, 3 Dec 1997. Paratypes—NIWA 5083, NIWA 5084, NIWA Stn Z10037, Whau Point, Tutukaka, Northland, 35.237° S, 174.246° E, 7 m, 3 Dec 1997.

Other material. *Three Kings Islands*: NIWA 101628 (CASIZ 300712), NIWA Stn Z15954, 34.145° S, 172.144° E, 5–18 m, 14 Apr 1999, collected by CRRF (Seafloor Image 4).

Northland: NIWA 62245, NIWA Stn Z18267, Spirits Bay, 34.438° S, 172.761° E, 19 m, 25 Mar 2007; NIWA 62318, Spirits Bay, 34.418° S, 172.845° E, 18 m, 23 Mar 2007; QM G310718, Waiwiri Island, Cape Brett, 35.192° S, 174.340° E, 12 m, 13 Dec 1988; NIWA 123999, Waiwiri Island, Cape Brett, 35.166° S, 174.334° E, 15–20 m, 15 Dec 1988; NIWA 92319, NIWA 92320, NIWA Stn Z10037, Whau Point, Tutukaka, 35.237° S, 174.246° E, 7 m, 3 Dec 1997; NIWA 123998, Poor Knights Islands, 35.474° S, 174.743° E, date and depth unknown; NIWA 92985, NIWA 92986, NIWA 92987, NIWA 92988, NIWA 92989, NIWA 92990, Tutukaka Coast, 35.611° S, 174.525° E, 10 m, Dec 1993; NIWA 92991, NIWA 92992, Tutukaka Coast, 35.611° S, 174.525° E, 10 m, Jul 1995; NIWA 139881, Tutukaka Heads, 3 m, 1 Jan 1993; NIWA 144622 (microscope slide), NIWA Stn Z18374, Barren Arch (east wall), Poor Knights Islands, 35.450° S, 174.740° E, 25 m, 16 Feb

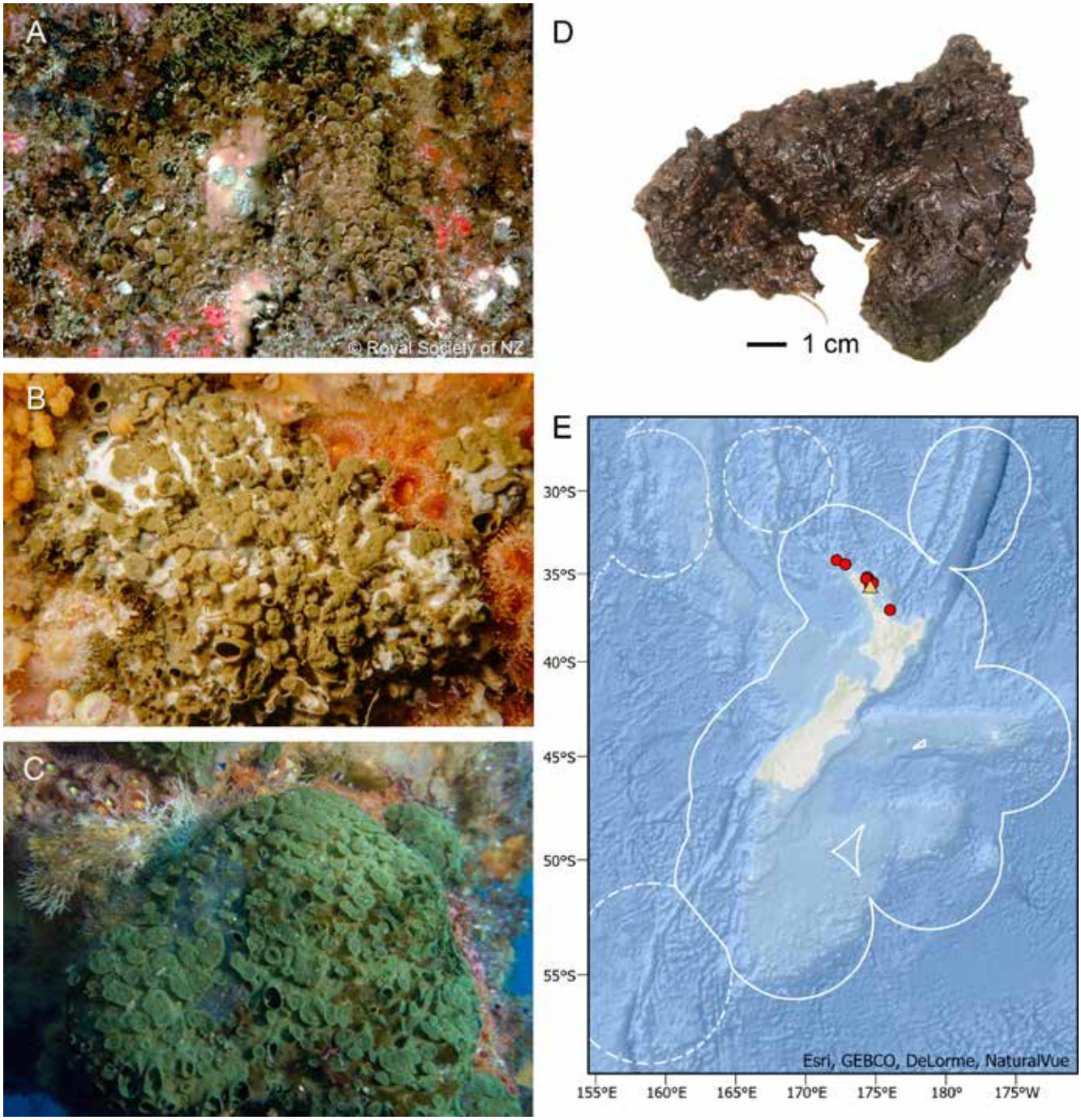


Figure 45. *Latrunculia* (*Biannulata*) *procumbens* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** Tutukaka, Northland, 8 m (Image: Allan Duckworth), reproduced from Alvarez *et al.* (2002: fig. 3B) with permission from Taylor & Francis on behalf of The Royal Society of New Zealand; **B.** NIWA 144622, *in situ* (Image: AIMS, reproduced with permission); **C.** *L.* (*B.*) *procumbens*, *in situ*, Poor Knights Islands identified from the image and locality only; **D.** Holotype NIWA 7783, preserved specimen; **E.** Distribution and type locality (triangle) of *L.* (*B.*) *procumbens* and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

1987; Q66D 87-0127, Third Gable, Tutukaka, 15 m, 18 Feb 1987, identified from microscope slide & image.

Coromandel: NMNZ PO.001441, Slipper Island, 29 m, Dec 1966.

Type locality. Tutukaka, Northland, New Zealand.

Distribution. Three Kings Islands; Northland (Tutukaka, Cape Brett, Poor Knights Islands); Coromandel; Bay of Plenty (Fig. 45E).

Description. Thinly to thickly encrusting sponge. Surface is densely covered in cylindrical or flat-topped mushroom-shaped fistules, around 5 mm high and 3 mm in diameter when preserved. Colour in life is khaki

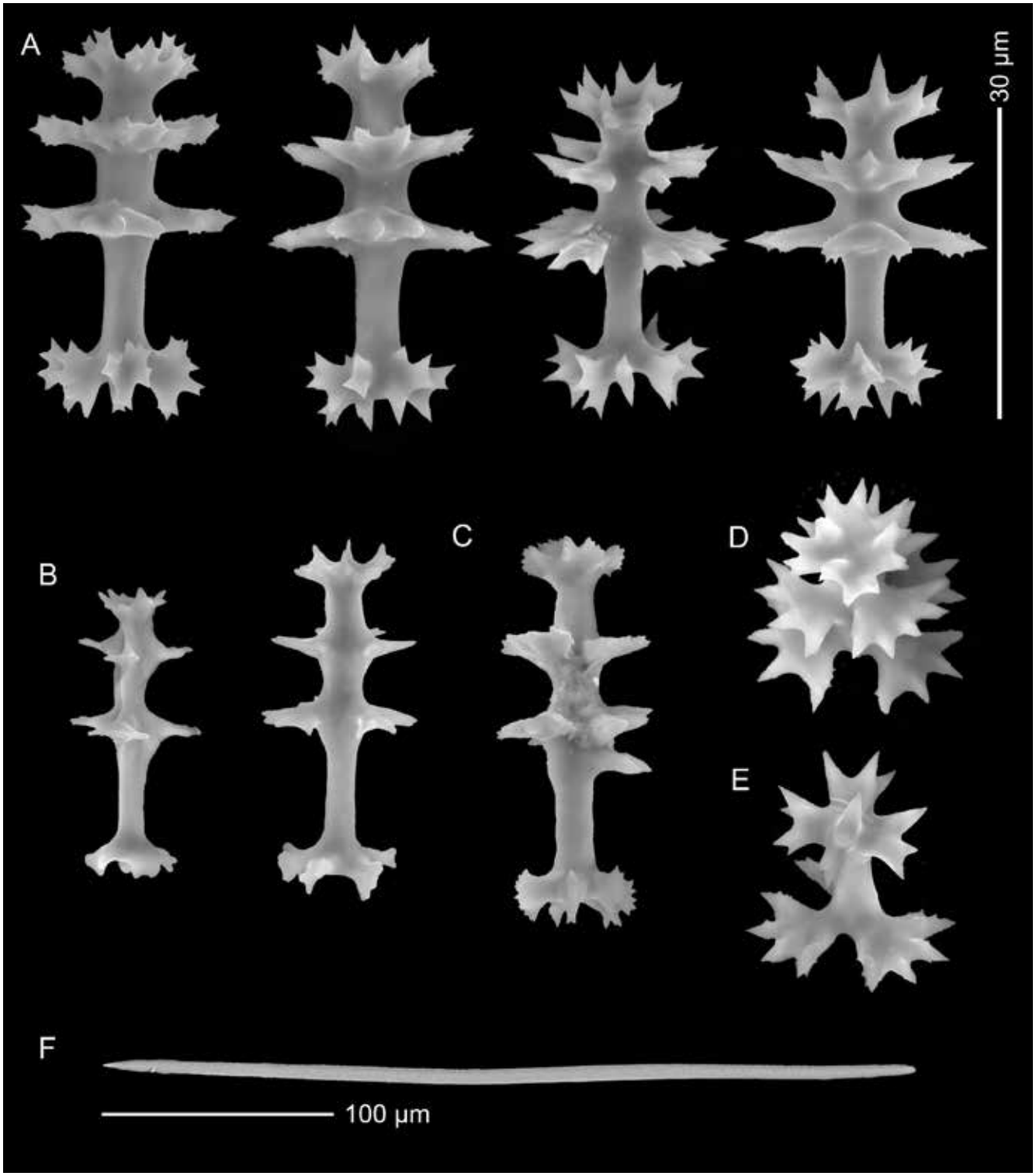


Figure 46. *Latrunculia* (*Biannulata*) *procumbens* Alvarez, Bergquist & Battershill, 2002, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabds; **C.** Malformed anisodiscorhabd with extra spines along the shaft. **D.** Top-down view of an anisodiscorhabd showing the apical whorl; **E.** Upside-down view of an anisodiscorhabd showing the manubrium (image has been cropped); **F.** Anisostyle. All SEM images from NIWA 7783.

green to brown, colour in alcohol is medium brown (Figs 45A–D). Texture is compressible.

Spicules (Fig. 46, Table 12). Megascleres are fusiform and slightly sinuous anisostyles; 324 (237–413) × 6 (3–10) µm (n = 250).

Microscleres are small, slender anisodiscorhabds, 32 (26–39) × 15 (9–19) µm (n = 270), with an average L:W ratio of 2.20. Apical whorl is an expanded spiny crown with no visible apical spire or spine. Subsidiary whorl located close to the apical whorl and comprises

Table 12. Spicule dimensions (μm) of *Latrunculia* (*Biannulata*) *procumbens* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 7783 (holotype)	342 (275–373) × 7 (5–8)	32 (30–35) × 16 (12–19)
NIWA 5083 (paratype)	337 (279–380) × 6 (5–9)	32 (28–36) × 15 (12–17)
NIWA 5084 (paratype)	321 (254–374) × 6 (4–10)	31 (28–34) × 16 (12–19)
NIWA 62245	337 (257–373) × 6 (5–8)	31 (26–33) × 13 (10–17)
NIWA 62318	301 (273–344) × 6 (5–8)	30 (27–32) × 13 (11–16)
NIWA 92319	325 (294–348) × 7 (5–9)	31 (28–34) × 15 (13–19)
NIWA 92320	312 (286–334) × 7 (5–9)	31 (26–34) × 14 (11–16)
NIWA 92985	303 (263–336) × 7 (4–8)	33 (28–39) × 14 (9–18)
NIWA 92986	340 (295–355) × 7 (5–9)	31 (29–33) × 15 (13–18)
NIWA 92987	330 (294–357) × 6 (5–9)	32 (26–35) × 14 (12–18)
NIWA 92988	307 (295–316) × 7 (5–9)	33 (29–36) × 15 (12–18)
NIWA 92989	341 (251–356) × 6 (4–7)	32 (28–34) × 14 (11–18)
NIWA 92990	315 (286–349) × 7 (5–9)	31 (29–34) × 16 (14–17)
NIWA 92991	338 (298–413) × 6 (3–8)	32 (28–35) × 15 (12–16)
NIWA 92992	297 (272–325) × 7 (5–8)	32 (30–34) × 15 (12–19)
NIWA 101628	298 (272–311) × 6 (5–7)	35 (30–38) × 13 (10–15)
NIWA 123998	334 (237–376) × 6 (5–6)	33 (31–35) × 15 (13–17)
NIWA 123999	342 (294–388) × 6 (5–7)	31 (28–34) × 12 (9–15)
NIWA 139881	327 (313–341) × 7 (5–8)	34 (31–36) × 16 (14–18)
NIWA 144622	335 (280–365) × 6 (4–8)	31 (28–34) × 15 (14–17)
NMNZ PO.001441	285 (237–305) × 8 (5–10)	34 (31–37) × 15 (9–20)
QM G310718	321 (293–377) × 7 (5–9)	32 (29–35) × 15 (13–17)
Q66D 87-0127	343 (305–377) × 7 (5–8)	32 (30–36) × 17 (14–19)

a ring of well-separated segments that are slanted slightly upwards. Median whorl is located halfway down the shaft and is divided into three segments, which are deeply notched along the margin. Manubrium and basal whorl are undifferentiated, forming a frilly spined base. Median and subsidiary whorls are frequently irregular, sometimes missing sections of the whorl or possessing extra spines on the shaft (Fig. 46C).

Substrate, depth range and ecology. Found growing on hard substrates; 3–29 m.

Remarks. *Latrunculia* (*B.*) *procumbens* has an overlapping distribution with *L.* (*B.*) *kaakaariki*, *L.* (*B.*) *spinispiraefera*, and *L.* (*B.*) *duckworthi*. *Latrunculia* (*B.*) *procumbens* cannot be differentiated from *L.* (*B.*) *kaakaariki* by spicule morphology, but the two species can be differentiated by gross morphology—*L.* (*B.*) *kaakaariki* is a massive, mound-shaped sponge with a predominantly flat surface, while *L.* (*B*). *procumbens* is a thinly to thickly encrusting sponge that is densely covered with cylindrical or mushroom-shaped fistules. *Latrunculia* (*B.*) *procumbens* has smaller anisodiscorhabds than *L.* (*B.*) *duckworthi*, and shorter anisostyles than *L.* (*B.*) *spinispiraefera*.

There is some overlap in average spicule lengths between *L.* (*B.*) *procumbens* and *L.* (*B.*) *wellingtonensis*, *L.* (*B.*) *millerae,* and *L.* (*B.*) *kaikoura* (Fig. 4). *Latrunculia* (*B.*) *procumbens* can be differentiated from these three species by gross morphology, as *L.* (*B.*) *procumbens* is an encrusting sponge that is densely covered with distinctive cylindrical or mushroom-shaped fistules, while the last three are mound-shaped sponges that lack the dense fistules. Furthermore, *L.* (*B.*) *procumbens* has a northern New Zealand distribution, while the last three sponges have a central to southern New Zealand distribution.

Key diagnostic characters

- thinly to thickly encrusting sponge densely covered with cylindrical or mushroom-shaped fistules
- anisodiscorhabds are very small, 32 (26–39) μm long
- anisostyles are small, 324 (237–413) μm long
- distribution Three Kings Islands, Poor Knights Islands, Northland, Coromandel, New Zealand, 5–20 m

Latrunculia (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002

Figs 4, 47, 48, 71; Table 13; Seafloor Images 2, 3, 6–8

Latrunculia 'Three Kings green' Miller *et al.* 2001: 245.
Latrunculia kaakaariki Alvarez, Bergquist & Battershill, 2002: 157, figs 2, 3A.
Latrunculia kaakaariki, Kelly *et al.* 2009: 43.
Latrunculia (*Latrunculia*) *kaakaariki,* Samaai, Gibbons & Kelly, 2006: 59, figs 6B, 7, 8G, 9D; Kelly 2018: 77.

Material examined. Holotype—NIWA 7781, NIWA Stn Z10041, Three Kings Islands, 34.173° S, 172.098° E, 10–19 m, 19 Apr 1999. Paratypes—NIWA 5080, NIWA 5081, NIWA Stn Z10042, Three Kings Islands, 34.173° S, 172.0978° E, 10–19 m, 19 Apr 1999.

Other material. *Three Kings Islands*: NIWA 101594 (CASIZ 300694), NIWA Stn Z15951, 34.153° S, 172.134° E, 6–17 m, 14 Apr 1999, collected by CRRF; NIWA 92316, NIWA Stn J957, 34.158° S, 172.145° E,

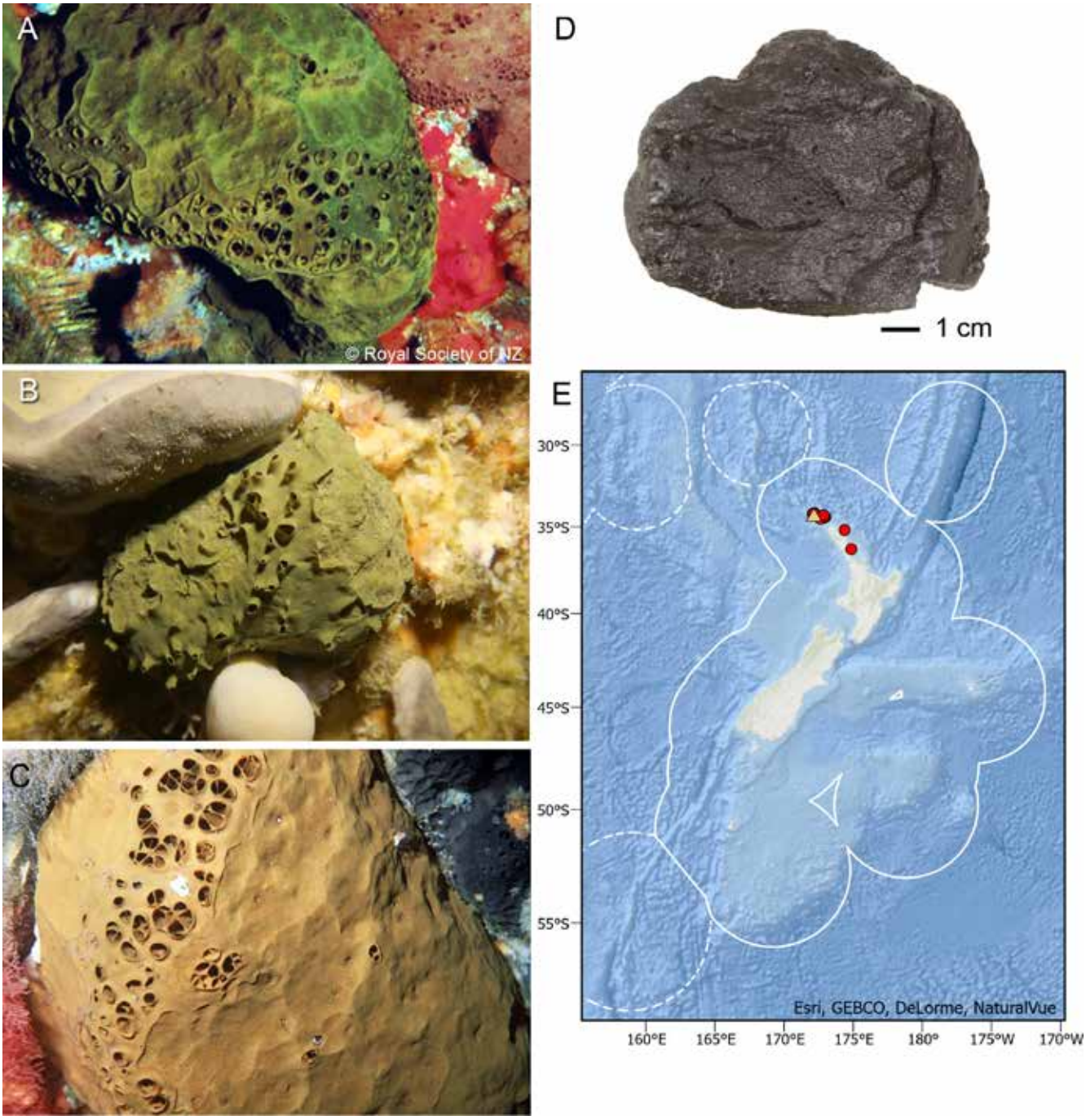


Figure 47. *Latrunculia* (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** Irishman's Garden, the Princes Islands, Three Kings Islands, 5–15 m (Image: Malcolm Francis), modified from Alvarez *et al.* (2002: fig. 3A) with permission from Taylor & Francis on behalf of The Royal Society of New Zealand; **B.** Bay of Islands (identified from the image and locality only) (Image: CSS); **C.** NIWA 101594, *in situ* (Image: CRRF); **D.** Holotype (NIWA 7781), preserved specimen; **E.** Distribution and type locality (triangle) of *L.* (*B.*) *kaakaariki* other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

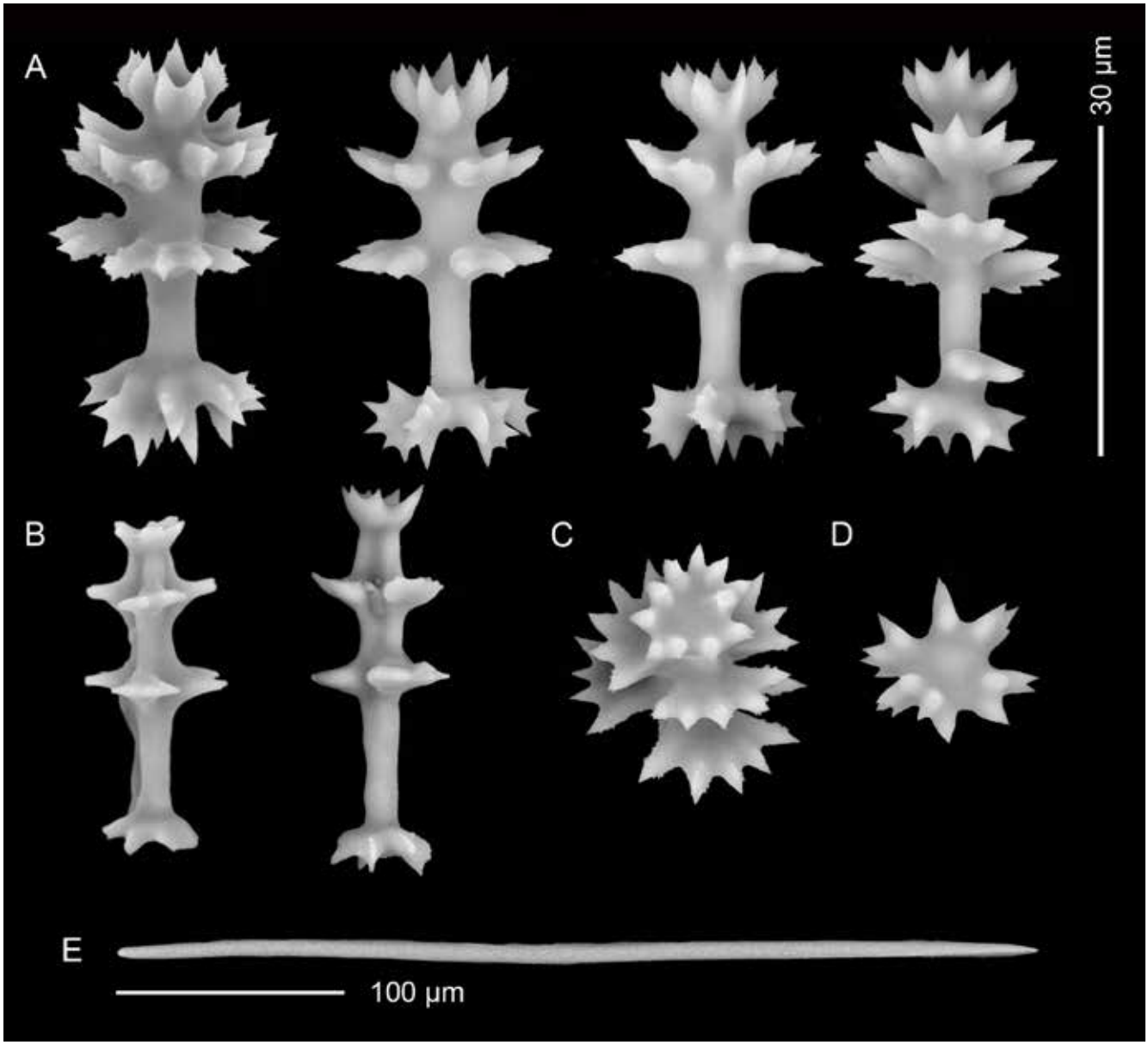


Figure 48. *Latrunculia* (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabds; **C.** Top-down view of an anisodiscorhabd showing the apical whorl (image has been cropped); **D.** Upside-down view of the manubrium (image has been cropped); **E.** Anisostyle. All SEM images from holotype NIWA 7781.

10–33 m, 19 Jun 1981; NIWA 93022, NIWA Stn Z15412, 34.166° S, 172.165° E, 10 m, 24 Nov 2002; NMNZ PO.000576, 34.278° S, 172.2627° E, 133 m, 2 Feb 1981; NIWA 144405, NIWA Stn Z18260, 34.178° S, 172.043° E, 25 m, 4 Mar 1997; NIWA 144469, NIWA Stn Z18314, 34.170° S, 172.04° E, <30 m, 3 Mar 1997; NIWA 144472, NIWA Stn Z18360, 34.178° S, 172.043° E, <30 m, 4 Mar 1997; NIWA 144544, NIWA 144158, NIWA 144167, NIWA Stn Z18302, 34.170° S, 172.04° E, 31–33 m, 2 Mar 1997; NIWA 144548, NIWA 144549, NIWA 144550, NIWA 144567, NIWA Stn Z18367, 34.152° S, 172.140° E, <30 m, 3 Mar 1997.

Spirits Bay: NIWA 51221, NIWA 101900, NIWA Stn Z9681, 34.315° S, 172.818° E, 63 m, 26 Jan 1999; NIWA 51505, NIWA 51506, NIWA 51507, NIWA 102041, NIWA 102042, NIWA 102043, NIWA Stn Z9702, 34.316° S, 172.792° E, 68 m, 28 Jan 1999; NIWA 51315, NIWA 51316, NIWA 51317, NIWA 51318, NIWA 51319, NIWA 51320, NIWA Stn Z9689, 34.324° S, 172.826° E, 63 m, 27 Jan 1999; NIWA 51397, NIWA 51403, NIWA Stn Z9696, 34.324° S, 172.749° E, 69 m, 28 Jan 1999; NIWA 51559, NIWA Stn KAH9901/83, 34.341° S, 172.742° E, 59 m, 28 Jan 1999; NIWA 52422, NIWA Stn KAH0606/R12, 34.345° S, 172.786° E, 59 m, 11 May 2005; NIWA 62203, NIWA Stn KAH1005/29, 34.372° S, 172.794° E, 45 m, 13 May 2010; NIWA 51297, NIWA Stn Z9688, 34.375° S, 172.701° E, 53 m, 7 Jan 1999; NIWA 51594, NIWA Stn Z9713, 34.375° S,

Table 13. Spicule dimensions (μm) of *Latrunculia* (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 7781 (holotype)	389 (336–415) × 8 (6–12)	35 (31–40) × 17 (14–21)
NIWA 5080 (paratype)	350 (321–373) × 8 (6–10)	34 (31–38) × 18 (16–20)
NIWA 5081 (paratype)	354 (283–407) × 8 (5–12)	33 (29–37) × 16 (12–21)
NIWA 51011	372 (340–410) × 5 (4–6)	33 (31–34) × 18 (15–21)
NIWA 51221	386 (335–429) × 7 (5–10)	34 (32–36) × 19 (16–22)
NIWA 51297	335 (307–354) × 6 (5–8)	34 (30–38) × 19 (17–21)
NIWA 51315	362 (343–383) × 7 (6–9)	32 (30–35) × 17 (14–18)
NIWA 51316	360 (333–381) × 6 (5–7)	33 (27–36) × 18 (16–21)
NIWA 51317	365 (337–387) × 7 (5–9)	33 (30–36) × 19 (16–23)
NIWA 51318	355 (341–380) × 6 (5–7)	32 (30–35) × 18 (16–20)
NIWA 51319	363 (343–381) × 7 (5–7)	31 (27–37) × 18 (15–20)
NIWA 51320	371 (354–384) × 7 (5–10)	32 (30–34) × 20 (18–23)
NIWA 51397	386 (357–407) × 7 (6–8)	31 (27–34) × 19 (15–22)
NIWA 51403	386 (369–397) × 7 (5–8)	33 (30–37) × 20 (18–23)
NIWA 51423	350 (309–383) × 8 (6–12)	34 (32–38) × 19 (17–21)
NIWA 51434	385 (303–411) × 5 (4–7)	35 (34–37) × 19 (17–22)
NIWA 51505	346 (326–363) × 6 (4–9)	35 (33–37) × 20 (18–22)
NIWA 51506	364 (346–409) × 7 (5–8)	33 (31–36) × 18 (15–21)
NIWA 51507	352 (317–389) × 7 (5–8)	34 (31–36) × 18 (16–21)
NIWA 51559	376 (349–407) × 6 (4–7)	34 (29–36) × 19 (15–21)
NIWA 51594	375 (349–400) × 8 (6–9)	33 (30–36) × 16 (12–21)
NIWA 52422	369 (312–399) × 7 (5–8)	31 (28–34) × 17 (15–20)
NIWA 62203	354 (332–375) × 5 (4–7)	33 (30–35) × 18 (17–20)
NIWA 62233	366 (319–427) × 6 (5–9)	32 (30–34) × 18 (15–21)
NIWA 92316	383 (354–402) × 7 (4–9)	31 (27–33) × 15 (11–20)
NIWA 93022	357 (327–381) × 8 (6–11)	34 (31–38) × 19 (17–22)
NIWA 101594	366 (341–409) × 8 (7–9)	33 (29–40) × 17 (14–20)
NIWA 101793	382 (354–398) × 6 (4–10)	35 (33–38) × 13 (11–14)
NIWA 101900	376 (339–406) × 7 (5–9)	34 (32–36) × 16 (13–19)
NIWA 102006	339 (310–363) × 7 (5–9)	30 (26–32) × 17 (15–18)
NIWA 102041	350 (312–376) × 6 (5–7)	34 (31–37) × 18 (15–20)
NIWA 102042	361 (321–394) × 7 (5–9)	33 (30–35) × 18 (16–21)
NIWA 102043	358 (342–374) × 7 (6–9)	33 (28–39) × 18 (14–22)
NIWA 123971	369 (353–391) × 6 (5–7)	34 (32–38) × 17 (13–20)
NIWA 143118	341 (324–360) × 6 (5–7)	35 (33–38) × 17 (14–21)
QM G310735	324 (300–343) × 7 (6–8)	30 (27–33) × 17 (13–22)

172.929° E, 65 m, 29 Jan 1999; NIWA 51011, NIWA 101793, NIWA Stn Z9666, 34.405° S, 172.823° E, 33 m, 24 Jan 1999; NIWA 62233, 34.418° S, 172.845° E, 18 m, 23 Mar 2007; NIWA, 123971, NIWA Stn Z9243, 34.368° S, 172.768° E, 44 m, 28 Feb 1997; NIWA 73030, NIWA Stn TAN1105/27, 34.272° S, 172.787° E, 66–67 m, 27 Mar 2011.

Cape Reinga: NIWA 51423, NIWA 102006, NIWA Stn Z9698, 34.360° S, 172.673° E, 41 m, 28 Jan 1999; NIWA 51434, NIWA Stn Z9699 (KAH9901/67), Cape Reinga, 34.360° S, 172.673° E, 41 m, 28 Jan 1999.

Cape Brett: QM G310735, entrance to Piercy Cave, west side of Motukokako Island, 35.154° S, 174.338° E, 15–22 m, 15 Dec 1988.

Hauraki Gulf: NIWA 143118, Leigh, depth unknown, 1983.

Type locality. Three Kings Islands, New Zealand.

Distribution. Three Kings Islands; Northland, Hauraki Gulf (Fig. 47E).

Description. Massive to thickly encrusting sponge. Surface smooth with characteristically broad, smooth porefields, flush with the surface or slightly sunken, edged by an irregular, slightly raised membranous rim. Short, cylindrical oscules, 1–2 cm in diameter, are clustered in patches, often on the apex of the sponge. Colour in life khaki green to olive brown, colour in alcohol very dark brown (Figs 47A–D). Texture when preserved very hard, barely compressible, choanosome often has some shell incorporated in it.

Spicules (Fig. 48, Table 13). Megascleres are slightly fusiform anisostyles; 363 (283–429) × 7 (4–12) μm (n = 410).

Microscleres are small and relatively unornamented anisodiscorhabds; average L:W ratio is 1.88. Apical whorl is tuft of upward-pointing spines. Subsidiary whorl is slightly slanted upwards while the median whorl is horizontal. Both the subsidiary and median whorls are divided into three, well-separated segments that have sharply notched margins. Manubrium and basal whorl are undifferentiated forming a ring of spines; 33 (26–40) × 18 (11–23) μm (n = 410). All spines are serrated along the base of the spine.

Substrate, depth range and ecology. Shallow-water specimens found on rocky reefs, particularly in exposed locations. Deep-water specimens found on soft sediment, 10–133 m.

Remarks. *Latrunculia* (*B.*) *kaakaariki* cannot be reliably differentiated from *L.* (*B*). *procumbens* by spicule morphology (Figs 4, 46, 48). However, the two species can be differentiated on gross morphology [see remarks for *L.* (*B.*) *procumbens*)]. There is some overlap in average spicule lengths between *L.* (*B.*) *kaakaariki* and *L.* (*B.*) *wellingtonensis*, *L.* (*B.*) *millerae* and *L.* (*B.*) *kaikoura* (Fig. 4). *Latrunculia* (*B.*) *kaakaariki* can be differentiated from these three species by the shape of the anisodiscorhabds: in *L.* (*B.*) *kaakaariki* the apical whorl is a tuft of upward-pointing spines that are clearly different from the manubrium, while the apical whorls of *L.* (*B.*) *wellingtonensis*, *L.* (*B.*) *millerae* and *L.* (*B.*) *kaikoura* are flattened and similar in appearance to their manubriums. Furthermore, *L.* (*B.*) *kaakaariki* has a northern New Zealand distribution whereas the last three species have a central and southern New Zealand distribution.

Based on differences in spicule morphology and size, we have re-assigned a number of specimens assigned to *L.* (*B.*) *kaakaariki* by Samaai *et al.* (2006) to *L.* (*B.*) *spinispiraefera* or *L.* (*B.*) *wellingtonensis* (Table 20).

Key diagnostic characters

- massive sponge, khaki green to olive brown in life, with a mostly flat surface
- very small anisodiscorhabds, 33 (26–40) μm long
- small anisostyles, 363 (283–429) μm long
- apical whorl is a tuft of upward-pointing spines
- distribution Three Kings Islands and northeastern New Zealand, 10–69 m

Latrunculia (*Biannulata*) *duckworthi* Alvarez, Bergquist & Battershill, 2002

Figs 4, 49, 50, 71; Table 14; Seafloor Image 3

Latrunculia 'Three Kings brown' Miller *et al.* 2001: 245.

Latrunculia duckworthi Alvarez, Bergquist & Battershill, 2002: 161, figs 3A, 4.

Latrunculia duckworthi, Kelly *et al.* 2009: 43.

Latrunculia (*Biannulata*) *duckworthi*, Samaai, Gibbons & Kelly, 2006: 60, figs 6C, 7, 8F, 10A.

NOT *Latrunculia* (*Biannulata*) *duckworthi,* "Ts 105" in Samaai *et al.* 2006: 60.

Material examined. Holotype—NIWA 7782, NIWA Stn Z10042, Three Kings Islands, 34.173° S, 172.098° E, 10–19 m, 19 Apr 1999. Paratype—NIWA 5082, NIWA Stn Z10041, Three Kings Islands, 34.173° S, 172.098° E, 10–19 m, 19 Apr 1999.

Other material. *Three Kings Islands*: NIWA 101752, NIWA Stn Z15984, 34.176° S, 172.049° E, 10–20 m, 2 Dec 2003; NIWA 93020, NIWA Stn Z15942, 34.176° S, 172.049° E, 10–20 m, 24 Feb 2002 (Seafloor Image 2); NIWA 144154, NIWA 144171, NIWA Stn Z18302, 34.170° S, 172.04° E, <30 m, 2 Mar 1997; NIWA 144204, NIWA Stn Z18314, 34.170° S, 172.04° E, <30 m, 3 Mar 1997; NIWA 144502, NIWA Stn Z18360, 34.178° S, 172.043° E, 24–26 m, 4 Mar 1997.

Type locality. Three Kings Islands, New Zealand.

Distribution. Three Kings Islands (Fig. 49D).

Description. Massive sponge with a smooth surface, moderately densely covered with small, cylindrical pores we think are oscules, 1 mm high and 1 mm in diameter, that are encircled by a raised fleshy collar or lying flush with the rim. Large, fistular oscules, 1–2 cm diameter, are also irregularly distributed in patches over the sponge. Medium brown in life, dark brown in alcohol (Figs 49A–C). Texture is very firm, barely compressible.

Spicules (Fig. 50, Table 14). Megascleres are small and slightly sinuous anisostyles; 307 (253–359) × 8 (5–13) μm (n = 110).

Microscleres are anisodiscorhabds with a narrow, funnel-shaped apical whorl of upward-pointing

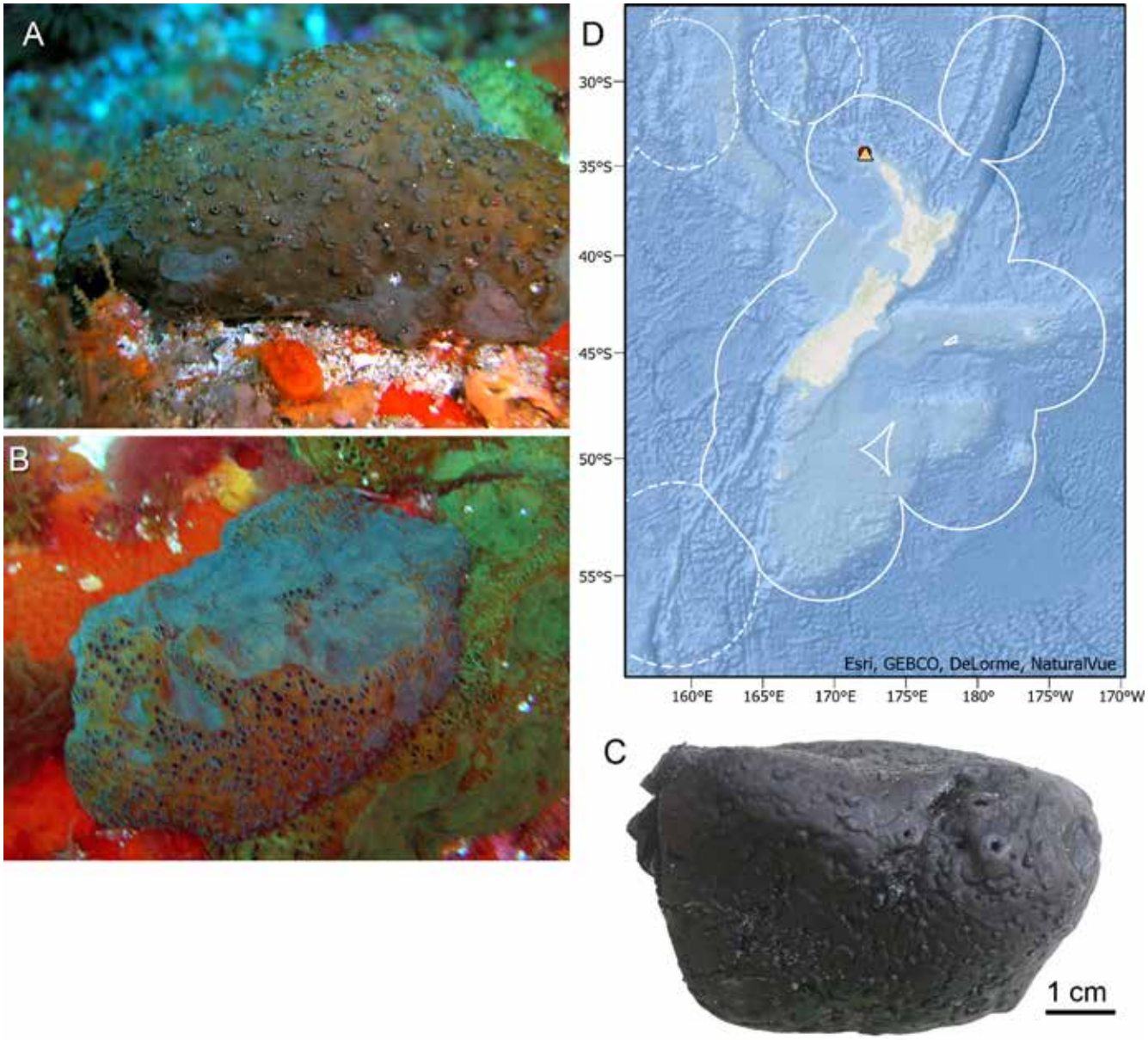


Figure 49. *Latrunculia* (*Biannulata*) *duckworthi* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** NIWA 101752 *in situ* (Image: Mike Page); **B.** NIWA 93020 *in situ* (Image: Mike Page); **C.** NIWA 101752, preserved specimen; **D.** Distribution and type locality (triangle) of *L.* (*B.*) *duckworthi* and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

serrated spines. The horizontal median whorl is located halfway down the shaft. The shaft is tapered below the median whorl. Both the subsidiary and median whorls comprise a whorl of three, well-separated segments that have sharply notched margins and are lightly microspined. Manubrium and basal whorl are undifferentiated, forming a ring of spines; 37 (32–46) × 17 (14–23) µm (n = 110). Average L:W ratio is 2.21.

Substrate, depth range and ecology. Found growing on shaded, rock walls, particularly in exposed locations; 10–20 m.

Remarks. Three other species of *Latrunculia* (*Biannulata*) are found around the Three Kings Islands: *L.* (*B.*) *procumbens*, *L.* (*B.*) *kaakaariki* and *L.* (*B.*) *spinispiraefera*. However, these species have overlapping megasclere and microsclere sizes with *L.* (*B.*) *duckworthi* (Fig. 4). *Latrunculia* (*B.*) *duckworthi* has similar spicule sizes to *L.* (*B.*) *wellingtonensis* and *L.* (*B.*) *millerae*, but the three species have non-overlapping distributions: *L.* (*B.*) *duckworthi* is only found around the Three Kings Islands; *L.* (*B.*) *wellingtonensis* is found south of East Cape; and *L.* (*B.*) *millerae* is only found around Fiordland (Fig. 76). In addition, the apical whorls of the anisodiscorhabds of *L.* (*B.*) *wellingtonensis* and *L.* (*B.*) *millerae* are expanded spiny crowns, whereas the apical whorl of *L.* (*B.*) *duckworthi* is a funnel-shaped cluster of upward-pointing spines (Figs 71C, D, F).

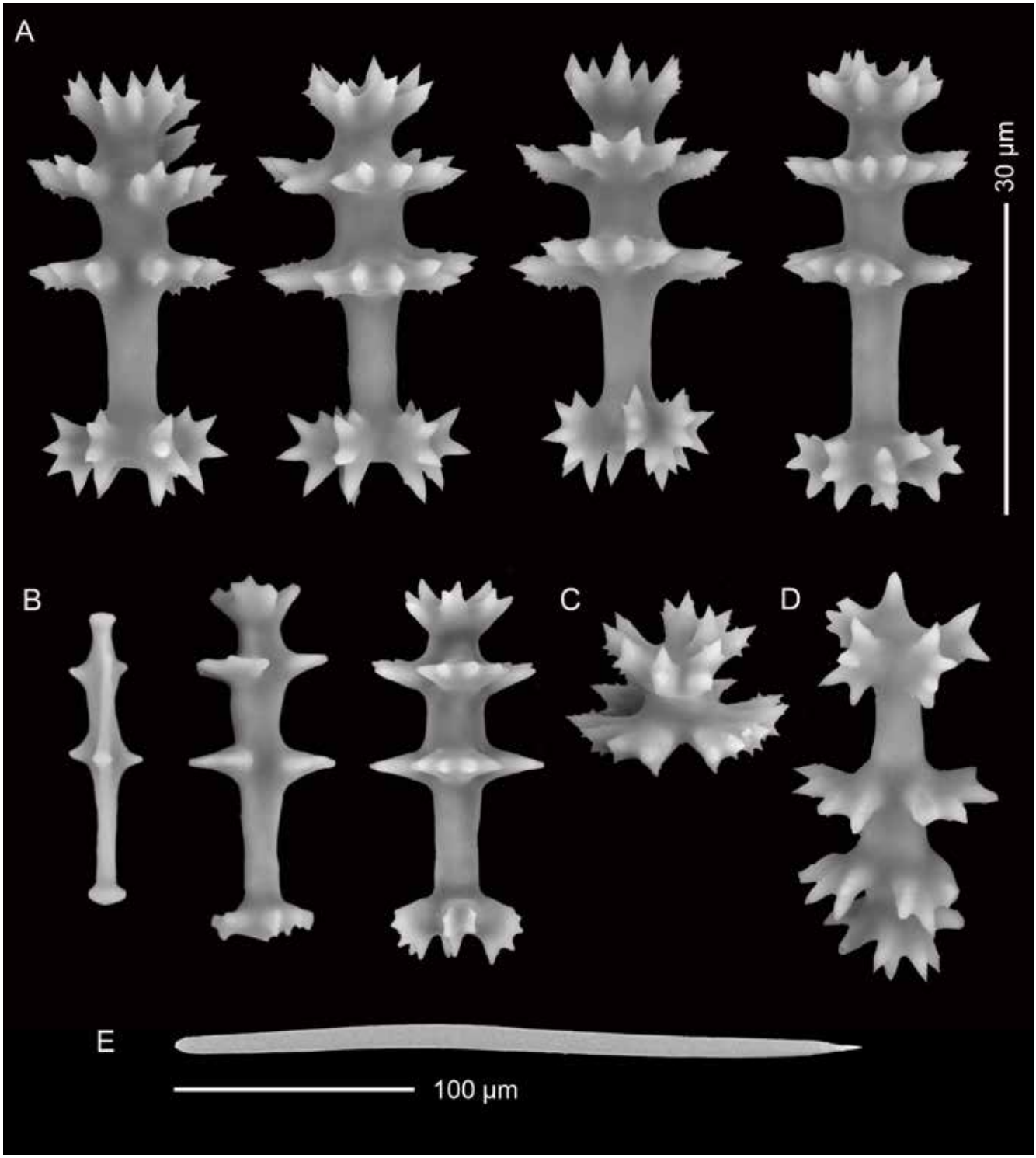


Figure 50. *Latrunculia* (*Biannulata*) *duckworthi* Alvarez, Bergquist & Battershill, 2002, spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabds; **C.** Top half of an anisodiscorhabd showing the apical and subsidiary whorls (image has been cropped); **D.** Upside-down view of an anisodiscorhabd showing the manubrium; **E.** Anisostyle. All SEM images from holotype NIWA 7782.

Key diagnostic characters

- massive sponge covered in small, raised pores and cylindrical oscules
- anisostyles are very small, 307 (253–359) µm long
- anisodiscorhabds are small, 37 (32–46) µm long with a tapered shaft below the median whorl
- apical whorl is a funnel-shaped cluster of upward-pointing spines
- distribution, Three Kings Islands, New Zealand, 10–20 m

Table 14. Spicule dimensions (μm) of *Latrunculia* (*Biannulata*) *duckworthi* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 7782 (holotype)	315 (299–332) × 8 (6–9)	38 (34–44) × 17 (14–20)
NIWA 5082 (paratype)	297 (258–323) × 7 (5–11)	36 (32–42) × 16 (14–18)
NIWA 93020	311 (290–327) × 7 (6–9)	37 (34–40) × 17 (16–20)
NIWA 101752	290 (253–317) × 8 (5–10)	36 (33–40) × 16 (14–21)
NIWA 144154	332 (308–359) × 8 (7–9)	38 (36–42) × 18 (15–21)
NIWA 144171	300 (270–338) × 10 (8–13)	36 (34–40) × 18 (14–21)
NIWA 144204	309 (291–330) × 9 (6–11)	38 (36–40) × 18 (15–20)
NIWA 144502	304 (279–327) × 7 (5–10)	37 (32–46) × 17 (14–23)

Latrunculia (*Biannulata*) *kaikoura* Alvarez, Bergquist & Battershill, 2002

Figs 4, 51, 52, 71; Table 15; Seafloor Images 9–11, 15

Latrunculia 'Kaikoura green' Miller *et al.* 2001: 245.
Latrunculia kaikoura Alvarez, Bergquist & Battershill, 2002: 166, fig. 7.
Latrunculia kaikoura, Kelly *et al.* 2009: 43.
Latrunculia (*Biannulata*) *kaikoura,* Samaai, Gibbons & Kelly, 2006: 64, figs 6F, 7, 10C, D.

Material examined. Holotype—NIWA 7786, NIWA Stn Z10036, Kaikoura, 42.433° S, 173.700° E, 20 m, 12 Dec 1997. Paratypes—NIWA 5087, NIWA Stn Z10043, South Bay, Kaikoura, 42.433° S, 173.684° E, 20 m, 12 Dec 1997; NIWA 5088, NIWA Stn Z10036, Kaikoura, 42.433° S, 173.700° E, 20 m, 12 Dec 1997.

Other material. *Kaikoura*: NIWA 92317, NIWA 92318, NIWA Stn Z10036, 42.433° S, 173.700° E, 20 m, 12 Dec 1997; NIWA 144148, NIWA Stn Z18311, 42.451° S, 173.685° E, depth unknown, 10 Feb 1992; NIWA 74027, NIWA Stn TAN1108/5, 42.823° S, 173.571° E, 108 m, 12 May 2011.

Chatham Rise: NIWA 124175, NIWA Stn W452, 43.450° S, 175.135° E, 120–180 m, 22 Feb 1995.

Dunedin: NIWA 75989, SOP Stn TRIP3659/4, 46.1° S, 170.9° E, 189 m, 21 Jan 2013.

Off Stewart Island: NIWA 74560, NIWA Stn TAN1108/96, 46.774° S, 167.461° E, 160–178 m, 21 May 2011.

Southern Snares Platform: NIWA 75867, SOP Stn TRIP3460/35, 48.7° S, 166.4° E, 178–200 m, 8 Mar 2012; NIWA 75868, SOP Stn TRIP3460/70, 48.8° S, 166.8° E, 190–197 m, 20 Mar 2012; NIWA 75869, SOP Stn TRIP3460/72, 48.8° S, 166.7° E, 228–255 m, 21 Mar 2012; NIWA 75978, SOP Stn TRIP3676/22, 48.8° S, 166.6° E, 218–285 m, 14 Feb 2013; NIWA 48099, NIWA Stn TAN0813/5, 47.589° S, 169.044° E, 436–456 m, 28 Nov 2008; NIWA 61943, SOP Stn TRIP3072/1, 47.9° S, 168.7° E, 146–149 m, 18 Feb 2010; NIWA 61972, SOP Stn TRIP3075/67, 48.0° S, 168.6° E, 549 m, 15 Mar 2010; NIWA 95140, SOP Stn TRIP4374/20, 47.9° S, 168.7° E, 154 m, 24 Apr 2015; NMNZ PO.000566, 47.382° S, 169.192° E, 156 m, 4 Sep 1993;.

Antipodes Islands: NIWA 52570, NIWA Station Z15524, Ord Lees Islet, Antipodes Islands, 49.670° S, 178.757° E, 15–20 m, 11 Mar 2009.

Auckland Islands: NIWA 75985, SOP Stn TRIP3681/43, 50.3° S, 166.7° E, 20 m, 12 Mar 2013; NIWA 92326, NIWA 92998, NZOI Stn D196, Adams Island, 50.917° S, 166.350° E, 110 m, 23 Jan 1964; NIWA 92997, NZOI Stn D194B, 50.733° S, 166.35° E, 75 m, 21 Jan 1964.

Type locality. Kaikoura, New Zealand.

Distribution. Kaikoura; Chatham Rise, Dunedin; Stewart Island; Southern Snares Platform; Auckland Islands; Antipodes Islands (Fig. 51C).

Description. Massive to thickly encrusting sponge. Green in life, dark brown in alcohol (Figs 51A, B). Surface smooth or covered with crater-like pore areas, variably shaped ≤ 2 cm in diameter, which are encircled with a 1–2 mm high rim. Oscules, ≤ 2 cm in diameter, are encircled by membranous collars, elevated 2–3 mm or flush with the surface. Texture is firm, compressible.

Spicules (Fig. 52, Table 15). Megascleres are slender and slightly sinuous anisostyles; 366 (281–469) × 8 (3–13) μm (n = 330).

Microscleres are anisodiscorhabds with a flattened apical whorl and undifferentiated manubrium/basal whorl, and horizontal median and subsidiary whorls, the whole spicule has a stocky, symmetrical appearance. The apical whorl is a flattish crown of divaricating spines, which is smaller in diameter than the manubrium. Subsidiary and median whorls are divided into three segments that have deeply notched margins and are lightly microspined. The median whorl is located slightly below the halfway mark on the shaft. Occasionally, one whorl is completely or partially missing (Fig. 52B); 39 (28–48) × 21 (13–29) μm (n = 326); average L:W ratio is 1.89.

Substrate, depth range and ecology. Shallow-water specimens found growing on shaded, vertical

walls. Deep-water specimens found growing on soft sediment, 20–549 m.

Remarks. Alvarez *et al.* (2002) only found *L.* (*B.*) *kaikoura* in the Kaikoura region. Samaai *et al.* (2006) subsequently recorded it from North Otago and the Auckland Islands. Specimens examined in this study expand the distribution of this species to the Southern Snares Platform and the Antipodes Islands. *Latrunculia* (*B.*) *kaikoura* has similar spicule lengths to *L.* (*B.*) *millerae*, *L.* (*B.*) *wellingtonensis* and *L.* (*B.*) *spinispiraefera*. The anisodiscorhads of *L.* (*B.*) *kaikoura* are very similar to those of *L.* (*B.*) *millerae*, *L.* (*B.*) *wellingtonensis*, but *L.* (*B.*) *kaikoura* has ornamented, stocky, symmetrical-looking anisodiscorhabds, whereas *L.* (*B.*) *millerae* and *L.* (*B.*) *wellingtonensis* have more slender, irregular, and less ornamented anisodiscorhabds (Figs 71D–F). The anisodiscorhabds of *L.* (*B.*) *spinispiraefera* are quite different to those of *L.* (*B.*) *kaikoura*, the former having asymmetrical anisodiscorhabds with a funnel-shaped apical whorl (Fig. 44). Based on differences in spicule morphology, we have re-assigned one specimen assigned to *L.* (*B.*) *kaikoura* by Samaai *et al.* (2006) to *L.* (*B.*) *wellingtonensis* (NMNZ PO.000567) (Table 20).

Interestingly, Locker & Martini (1986: pl. 13 fig. 4; redrawn in Wiedenmayer 1994, fig. 21.38) illustrated a microfossil anisodiscorhabd from core Site 594-47 (middle Miocene), south of the Chatham Rise Site 594–47 (45.524° S, 174.948° E; 1204 m deep), as part of the Deep Sea Drilling Project. The spicule resembles the discorhabds of *L.* (*B.*) *kaikoura* and is a similar size (40 × 20 μm).

Key diagnostic characters

- massive to thickly encrusting sponge
- anisostyles are small, 366 (281–469) μm long
- anisodiscorhabds are small, 39 (28–48) μm long, with a stocky, symmetrical appearance
- distribution South Island and Subantarctic New Zealand waters, 20–549 m

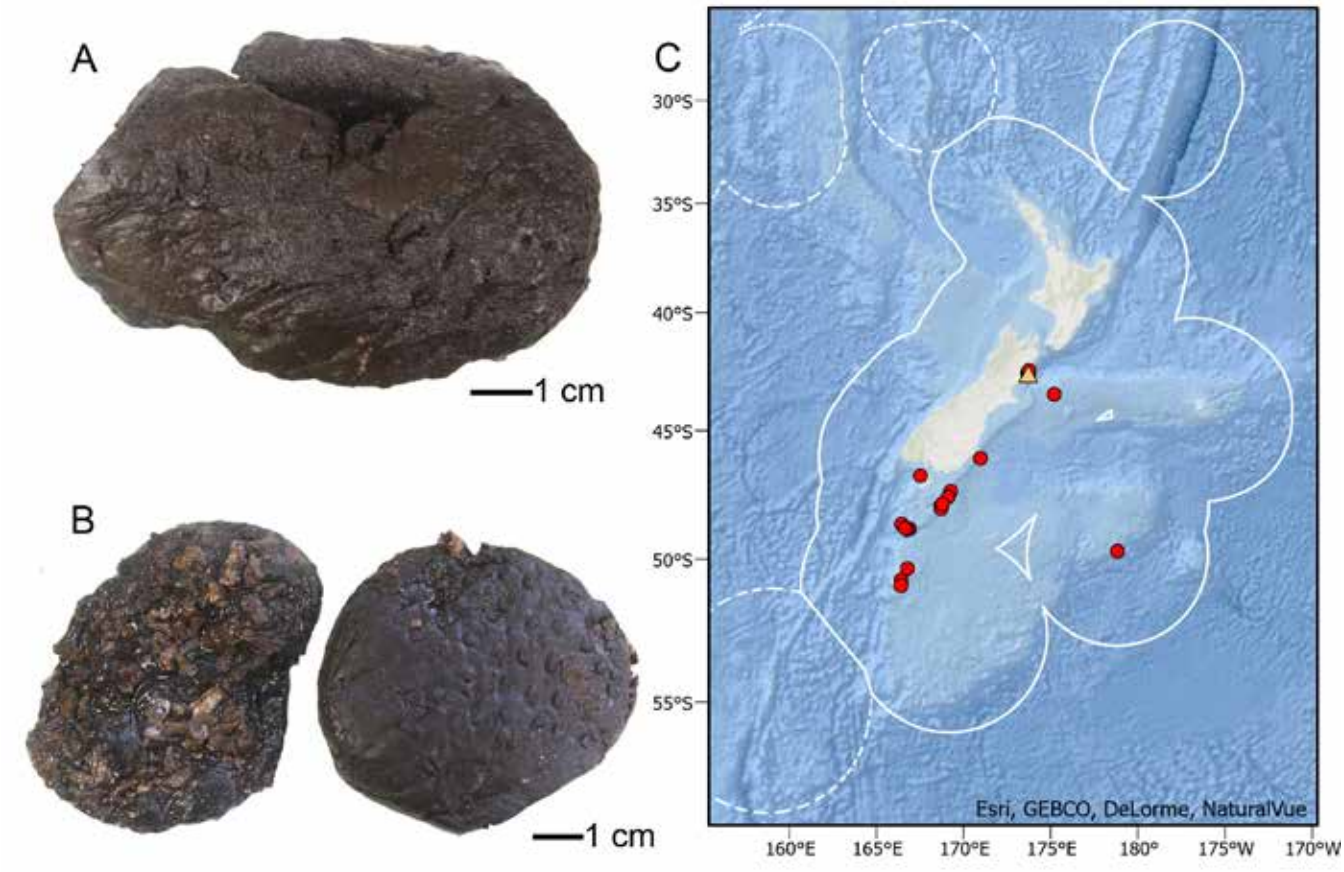


Figure 51. *Latrunculia* (*Biannulata*) *kaikoura* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** Holotype NIWA 7786, preserved specimen; **B.** NIWA 57978, preserved specimen; **C.** Distribution and type locality (triangle) of *L.* (*B.*) *kaikoura* and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Figure 52. (*Opposite*) *Latrunculia* (*Biannulata*) *kaikoura* Alvarez, Bergquist & Battershill, 2002, spicules: **A.** Anisodiscorhabds of holotype NIWA 7786; **B.** Malformed anisodiscorhabd of NIWA 7786 missing the subsidiary whorl; **C.** Anisodiscorhabd of NIWA 75868; **D.** Anisodiscorhabd of NIWA 75867; **E.** Top-down view of an anisodiscorhabd of NIWA 7786; **F.** Upside-down view of an anisodiscorhabd of NIWA 52570 showing the manubrium; **G.** Immature anisodiscorhabds of NIWA 75867; **H.** Immature anisodiscorhabd of NIWA 7786; **I.** Anisostyle of NIWA 7786.

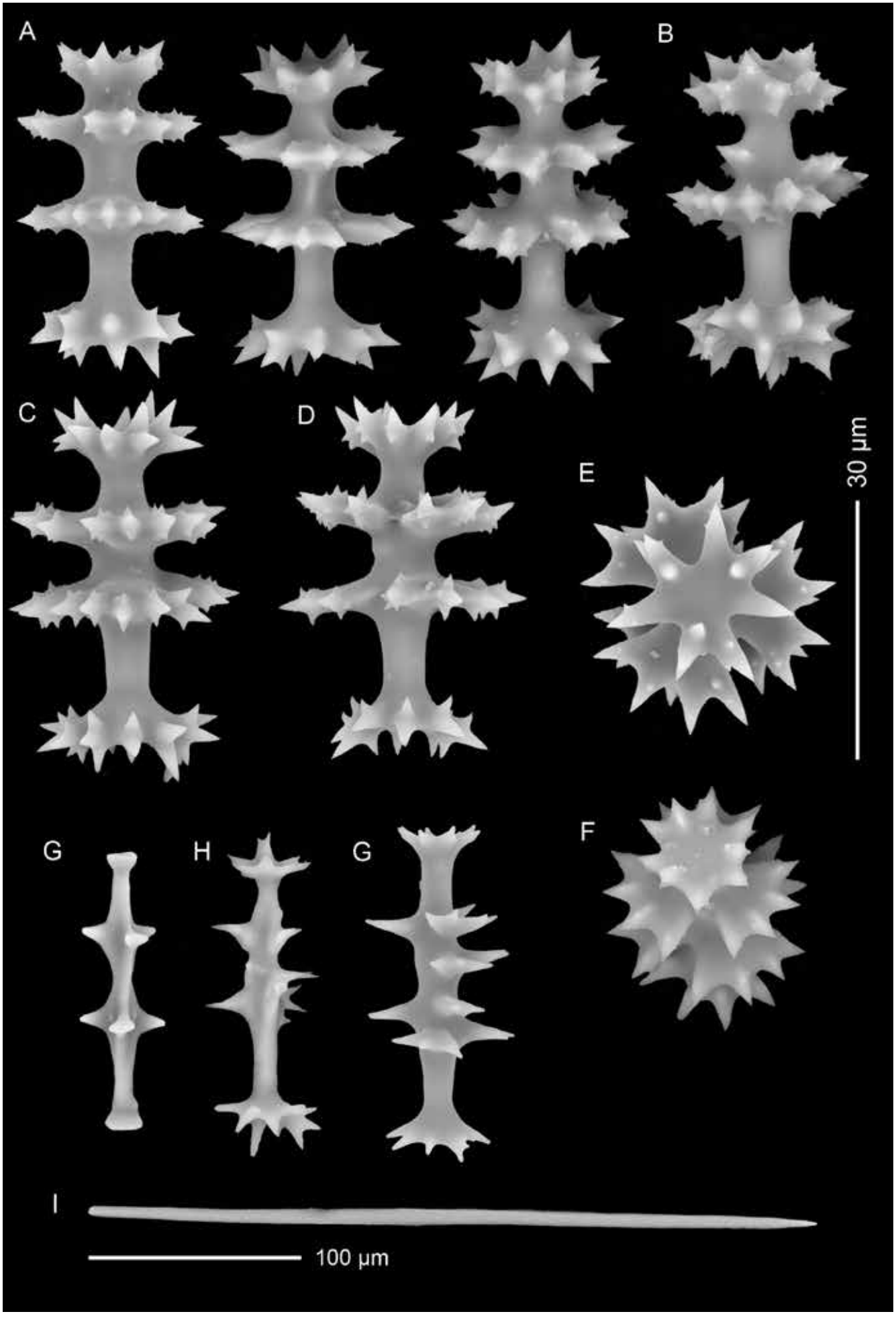

A
B
C
D
E
30 µm
G
H
G
F
I
100 µm

Table 15. Spicule dimensions (μm) of *Latrunculia* (*Biannulata*) *kaikoura* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 7786 (holotype)	329 (307–357) × 8 (6–11)	37 (31–40) × 16 (14–20)
NIWA 5087 (paratype)	344 (306–367) × 8 (6–9)	40 (35–46) × 19 (15–22)
NIWA 5088 (paratype)	351 (305–397) × 7 (5–9)	37 (34–42) × 17 (13–21)
NIWA 48099	384 (364–398) × 8 (7–10)	40 (35–43) × 22 (16–26)
NIWA 52570	386 (362–420) × 9 (6–12)	40 (35–43) × 23 (19–27)
NIWA 61943	385 (348–401) × 7 (5–9)	38 (34–41) × 24 (20–27)
NIWA 61972	379 (361–400) × 9 (7–11)	36 (34–39) × 22 (20–23)
NIWA 74027	370 (331–387) × 9 (8–11)	36 (31–40) × 20 (17–23)
NIWA 74560	403 (356–439) × 10 (7–13)	41 (36–48) × 24 (20–28)
NIWA 75867	366 (336–389) × 8 (7–10)	40 (35–44) × 23 (20–27)
NIWA 75868	392 (362–416) × 7 (5–9)	40 (36–45) × 21 (16–28)
NIWA 75869	371 (335–469) × 8 (6–11)	38 (34–44) × 21 (14–25)
NIWA 75978	362 (335–400) × 8 (6–11)	39 (36–41) × 24 (19–28)
NIWA 75985	401 (370–427) × 9 (6–12)	40 (37–44) × 25 (22–29)
NIWA 75989	404 (362–433) × 7 (5–9)	39 (34–41) × 22 (18–25)
NIWA 92317	324 (292–347) × 7 (6–10)	36 (34–38) × 17 (13–19)
NIWA 92318	324 (281–345) × 7 (6–10)	37 (34–42) × 18 (16–20)
NIWA 92326	357 (340–373) × 7 (5–9)	39 (37–42) × 23 (18–28)
NIWA 92997	393 (370–414) × 7 (3–8)	40 (37–43) × 22 (20–25)
NIWA 92998	360 (339–386) × 7 (5–9)	40 (36–44) × 21 (16–26)
NIWA 95140	401 (349–438) × 7 (5–10)	39 (33–46) × 23 (18–27)
NIWA 124175	332 (312–347) × 7 (6–9)	36 (28–41) × 18 (15–25)
NIWA 144148	337 (322–355) × 7 (5–9)	36 (31–42) × 17 (13–21)
NMNZ PO.000566	399 (375–416) × 9 (7–10)	42 (39–44) × 24 (18–28)

Latrunculia (*Biannulata*) *wellingtonensis* Alvarez, Bergquist & Battershill, 2002

Figs 4, 53, 54, 71; Table 16

Latrunculia 'Wellington' Miller et al. 2001: 245.

Latrunculia wellingtonensis Alvarez, Bergquist & Battershill, 2002: 164, figs 3C, 6.

Latrunculia wellingtonensis, Kelly *et al.* 2009: 43.

Latrunculia (*Biannulata*) *wellingtonensis,* Samaai et al. 2006: 63, figs 6E, 7, 8I, 10B.

Latrunculia (*Biannulata*) *kaakaariki,* "NMNZ PO.000572" in Samaai *et al.* 2006: 59.

Latrunculia (*Biannulata*) *kaikoura,* "NMNZ PO.000567" in Samaai *et al.* 2006: 64.

Material examined. Holotype—NIWA 7784, NIWA Stn Z10039, Barrett Reef, Wellington, 41.345° S, 174.837° E, 18 m, 2 Feb 1998. Paratypes—NIWA 5085, NIWA 5086, NIWA Stn Z10039, Barrett Reef, Wellington, 41.345° S, 174.837° E, 18 m, 2 Feb 1998.

Other material. *Gisborne*: NIWA 92327, NIWA Stn Z7129, Tuahine Point, 15 m, 1 Feb 1993.

Ranfurly Bank: NIWA 75389, NIWA Stn TAN1108/217, 37.582° S, 178.898° E, 42–48 m, 31 May 2011; NMNZ PO.000572, 37.568° S, 178.893°E, 39–50 m, 17 Jan 1970.

Barrett Reef, Wellington: NIWA 92321, NIWA Stn Z10039, 41.345° S, 174.837° E, 18 m, 2 Feb 1998; NIWA 92976, 41.312° S, 174.835° E, 10–15 m, 10 Sep 1997; NIWA 92977, NIWA Stn Z7108, 41.312° S, 174.835° E, 10–15 m, 1993; NIWA 92978, NIWA Stn Z7109, 41.312° S, 174.835° E, 10–15 m, 1993; NIWA 92979, NIWA Stn Z7119, 41.312° S, 174.835° E, 10–15 m, 1993; NIWA 92980, NIWA Stn Z7110, 41.312° S, 174.835° E, 10–15 m, 1993; NIWA 92981, NIWA Stn Z7122, 41.343° S, 174.836° E, 10–15 m, 1993; NIWA 92982, NIWA Stn Z7107, 41.343° S, 174.836° E, 10–15 m, 1993; NIWA 92983, NIWA Stn Z7111, 41.343° S, 174.836° E, 10–15 m, 1993; NIWA 92984, NIWA Stn Z7115, 41.434° S, 174.836° E, 10–15 m, 1993.

North Otago: NMNZ PO.000567, 90 m, Dec 1960.

Type locality. Wellington, New Zealand.

Distribution. Wellington, Gisborne, Ranfurly Bank, Otago (Fig. 53C).

Description. Massive to thickly encrusting, green in life, dark brown in alcohol. Surface covered with irregularly shaped sunken pore areas, ≤ 2 cm in diameter, with raised rims, 1–2 mm high, giving the appearance of shallow craters. Oscules are ≤ 2 cm in

diameter, encircled with membranous collars, may be slightly elevated (2–3 mm) or flush with the surface (Figs 53A, B). Texture is firm, compressible.

Spicules (Fig. 54, Table 16). Megascleres are small, slender, and slightly sinuous anisostyles; 330 (204–434) × 7 (3–13) μm (n = 220).

Microscleres are sparsely ornamented anisodiscorhabds that have a similar-looking apical whorl and undifferentiated manubrium/basal whorl. The apical whorl is an expanded spiny crown. The subsidiary and median whorls are horizontal and typically comprise three segments of fused spines. Commonly, irregular median and subsidiary whorls are present, replaced by single spines that are irregularly distributed along the shaft, or completely missing; 36 (28–43) × 17 (11–23) μm (n = 230); average L:W ratio is 2.06.

Substrate, depth range and ecology. Found growing on hard substrata, 10–90 m.

Remarks. *Latrunculia* (*B.*) *wellingtonensis* has only previously been recorded from the Wellington region. Specimens examined in this study extend the range of this species up the east coast of the lower North Island. *Latrunculia* (*B.*) *wellingtonensis* has an overlapping megasclere and microsclere size range with six other New Zealand *Latrunculia* (*Biannulata*) (Fig. 4). The anisodiscorhabds of *L.* (*B.*) *wellingtonensis* are notable in that they are frequently malformed and irregular in shape. They are most similar to the anisodiscorhabds of *L.* (*B.*) *millerae*, but the latter species has more slender, ornamented anisodiscorhabds and has only been found in Fiordland. *Latrunculia* (*B.*) *wellingtonensis* also has similar anisodiscorhabds and distribution to *L.* (*B.*) *kaikoura*, but the latter species has more regular-shaped and more ornamented anisodiscorhabds.

Key diagnostic characters

- massive to thickly encrusting sponge, green in life
- anisostyles are small and slender, 330 (204–434) μm long
- anisodiscorhabds are small, 36 (28–43) μm long, and frequently malformed with irregular whorls
- distribution Wellington, Gisborne, Ranfurly Bank, Otago, New Zealand, 10–50 m

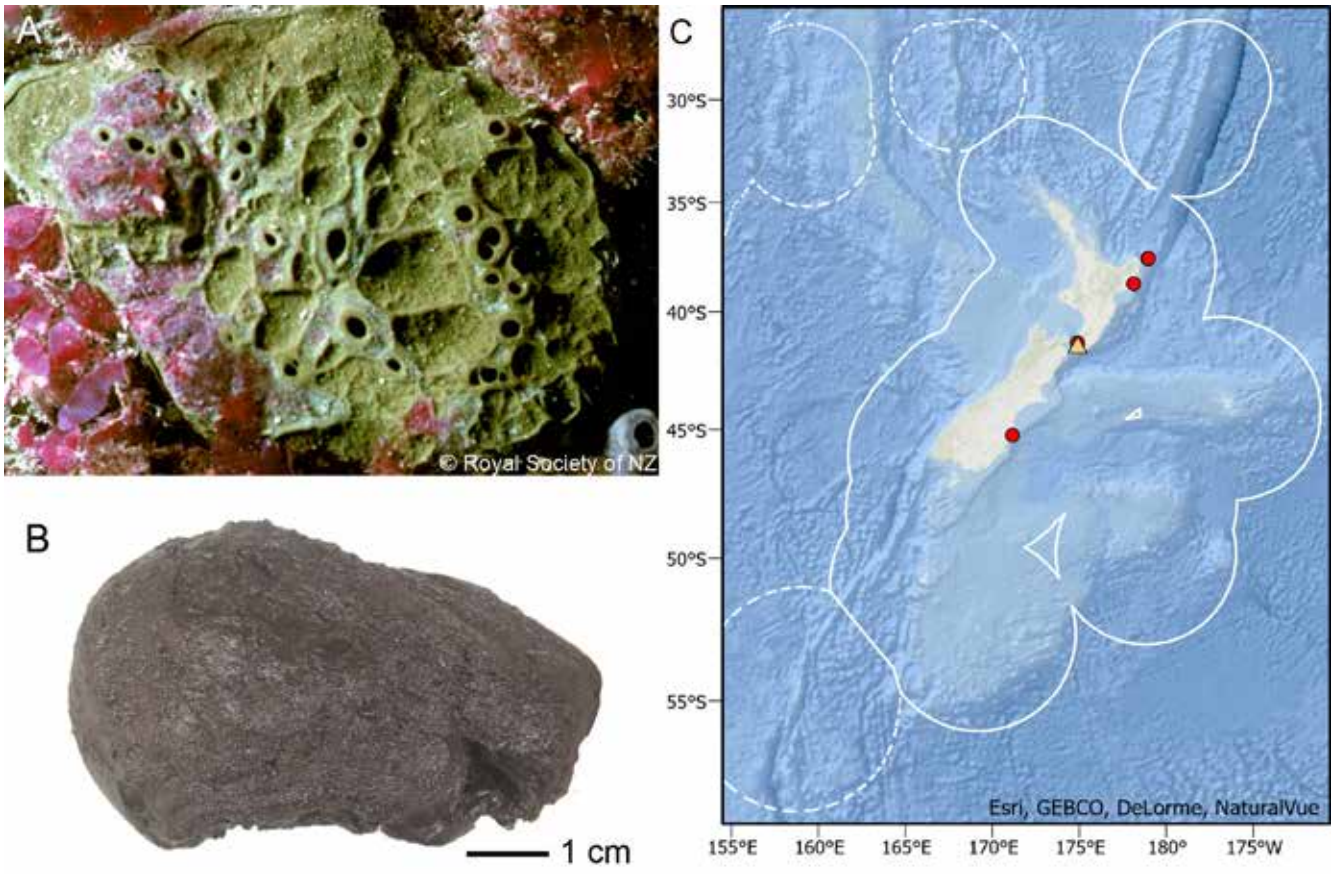


Figure 53. *Latrunculia* (*Biannulata*) *wellingtonensis* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** Barrett Reef, Wellingtron Harbour, 18 m (Image: Allan Duckworth), modified from Alvarez *et al.* (2002: fig. 3C) with permission from Taylor & Francis on behalf of The Royal Society of New Zealand; **B.** Holotype NIWA 7784, preserved specimen; **C.** Distribution and type locality (triangle) of *L.* (*B.*) *wellingtonensis* and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

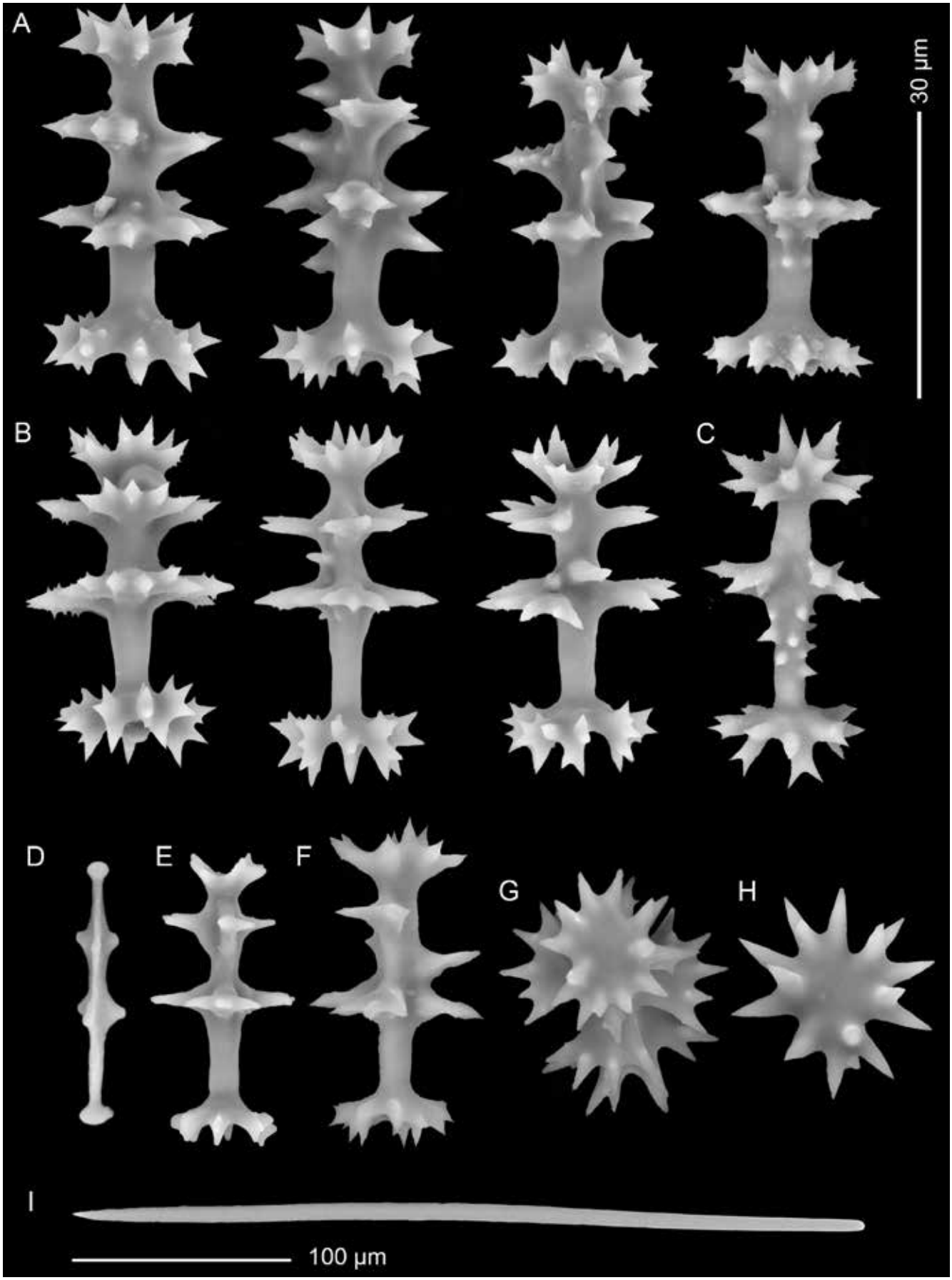


Figure 54. *Latrunculia* (*Biannulata*) *wellingtonensis* Alvarez, Bergquist & Battershill, 2002, spicules: **A.** Anisodiscorhabds from holotype NIWA 7784; **B.** Anisodiscorhabds from NIWA 92327; **C.** Malformed anisodiscorhabd from NMNZ PO.000567; **D.** Immature anisodiscorhabd from NMNZ PO.000572; **E.** Immature anisodiscorhabds from NIWA 92327; **F.** Immature anisodiscorhabds from NIWA 7784; **G.** Top-down view of an anisodiscorhabd from NIWA 7784 showing the apical whorl; **H.** Upside-down view of an anisodiscorhabd from NIWA 7784 showing the manubrium (image has been cropped); **I.** Anisostyle from NIWA 7784.

Table 16. Spicule dimensions (μm) of *Latrunculia* (*Biannulata*) *wellingtonensis* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 7784 (holotype)	319 (290–347) × 6 (5–10)	35 (31–40) × 17 (14–22)
NIWA 5085 (paratype)	334 (306–379) × 6 (4–8)	36 (29–39) × 17 (14–21)
NIWA 5086 (paratype)	335 (295–375) × 7 (5–9)	35 (31–42) × 17 (12–20)
NIWA 75389	355 (282–434) × 6 (3–7)	36 (33–40) × 17 (14–20)
NIWA 92321	317 (300–339) × 8 (6–10)	36 (34–41) × 17 (15–20)
NIWA 92327	345 (305–383) × 7 (4–13)	35 (33–39) × 18 (14–23)
NIWA 92976	322 (309–338) × 7 (5–10)	34 (30–37) × 18 (15–21)
NIWA 92977	329 (307–359) × 7 (6–10)	35 (31–38) × 18 (14–22)
NIWA 92978	308 (204–331) × 7 (6–9)	36 (29–39) × 20 (16–22)
NIWA 92979	329 (292–354) × 8 (6–10)	38 (35–41) × 18 (15–21)
NIWA 92980	305 (245–339) × 7 (5–9)	37 (34–40) × 19 (16–22)
NIWA 92981	320 (292–354) × 9 (7–10)	39 (36–41) × 20 (17–22)
NIWA 92982	324 (245–339) × 6 (5–8)	37 (33–40) × 18 (15–20)
NIWA 92983	324 (300–340) × 7 (5–9)	34 (31–40) × 18 (15–22)
NIWA 92984	319 (221–393) × 9 (6–11)	35 (32–38) × 18 (15–20)
NMNZ PO.000567	352 (320–378) × 6 (5–8)	32 (28–36) × 14 (11–18)
NMNZ PO.000572	345 (308–376) × 7 (5–9)	40 (36–43) × 18 (16–21)

Latrunculia (*Biannulata*) *millerae* Alvarez, Bergquist & Battershill, 2002

Figs 4, 55, 56, 71; Table 17; Seafloor Image 1

Latrunculia 'Fiordland B' Miller *et al.* 2001: 245.
Latrunculia millerae Alvarez, Bergquist & Battershill, 2002: 168, fig. 8.
Latrunculia millerae, Kelly *et al.* 2009: 43.
Latrunculia (*Biannulata*) *millerae*, Samaai *et al.* 2006: 66, figs 6G, 7.
Latrunculia (*Latrunculia*) *triverticillata*, "TS 055" in Samaai *et al.* 2006: 44.

Material examined. Holotype—NIWA 7787, NIWA Stn Z10033, Huey's Bluff, Doubtful Sound, 45.295° S, 166.915° E, 10–14 m, 2 Dec 1995. Paratypes—NIWA 5089, NIWA 5090, NIWA Stn Z10035, Doubtful Sound, 45.270° S, 166.867° E, 11–14 m, 2 Dec 1995.

Other material. *Fiordland*: NIWA 92995, NZOI Stn M780, Milford Sound, 44.610° S, 167.868° E, 40 m, 1 Apr 1981; NIWA 93021, NIWA Stn Z15393, Crayfish Heights, Thompson Sound, 45.220° S, 166.978° E, 10 m, 30 Jan 2006 (Seafloor Image 1); QM G310738, South of Bauza Island, Doubtful Sound, 45.3° S, 166.9° E, 16 m, 15 Dec 1988; QM G312170, Bligh Sound, North Head, 44.475° S, 167.331° E, 20 m, 16 Apr 1991.

Type locality. Doubtful Sound, Fiordland (Fig. 55C).

Distribution. Fiordland (Fig. 55C).

Description. Massive to globular sponge, green in life, dark brown in alcohol. Surface covered with broad, irregularly shaped pore areas, ≤ 2 cm in diameter, with a raised rim, 1–2 mm high, and covered with a fleshy poral membrane. The rim may be undercut, producing a saucer-shaped effect. Oscules are large, solitary, ≤ 2 cm in diameter with a raised (2–3 mm) collar. Texture is firm, slightly compressible.

Spicules (Fig. 56, Table 17). Megascleres are small and narrow anisostyles; 333 (237–448) × 6 (3–9) μm (n = 110).

Microscleres are delicate anisodiscorhabds with a slender shaft. They have a balanced, symmetrical shape, with a similar-shaped apical whorl and manubrium, which is undifferentiated from the basal whorl. The apical whorl is an expanded spiny crown. The horizontal subsidiary and median whorls are of similar diameter with expanded, spinous tips that give the spicule an ornate appearance. Malformed anisodiscorhabds are common that either have reduced or missing whorls, or additional whorls or spines; 38 (30–46) × 17 (10–22) μm (n = 110); average L:W ratio is 2.34.

Substrate, depth range and ecology. Found on vertical rock walls in Fiordland in calm, low light conditions; 10–40 m.

Remarks. Two species of *Latrunculia* occur in Fiordland: *L.* (*B.*) *millerae* and *L.* (*L.*) *fiordensis*. These species cannot be differentiated on their external morphology, but they are easily separated by the structure of the anisodiscorhabds as the two species belong to different subgenera. *Latrunculia* (*B.*) *millerae* has an overlapping spicule range with six other

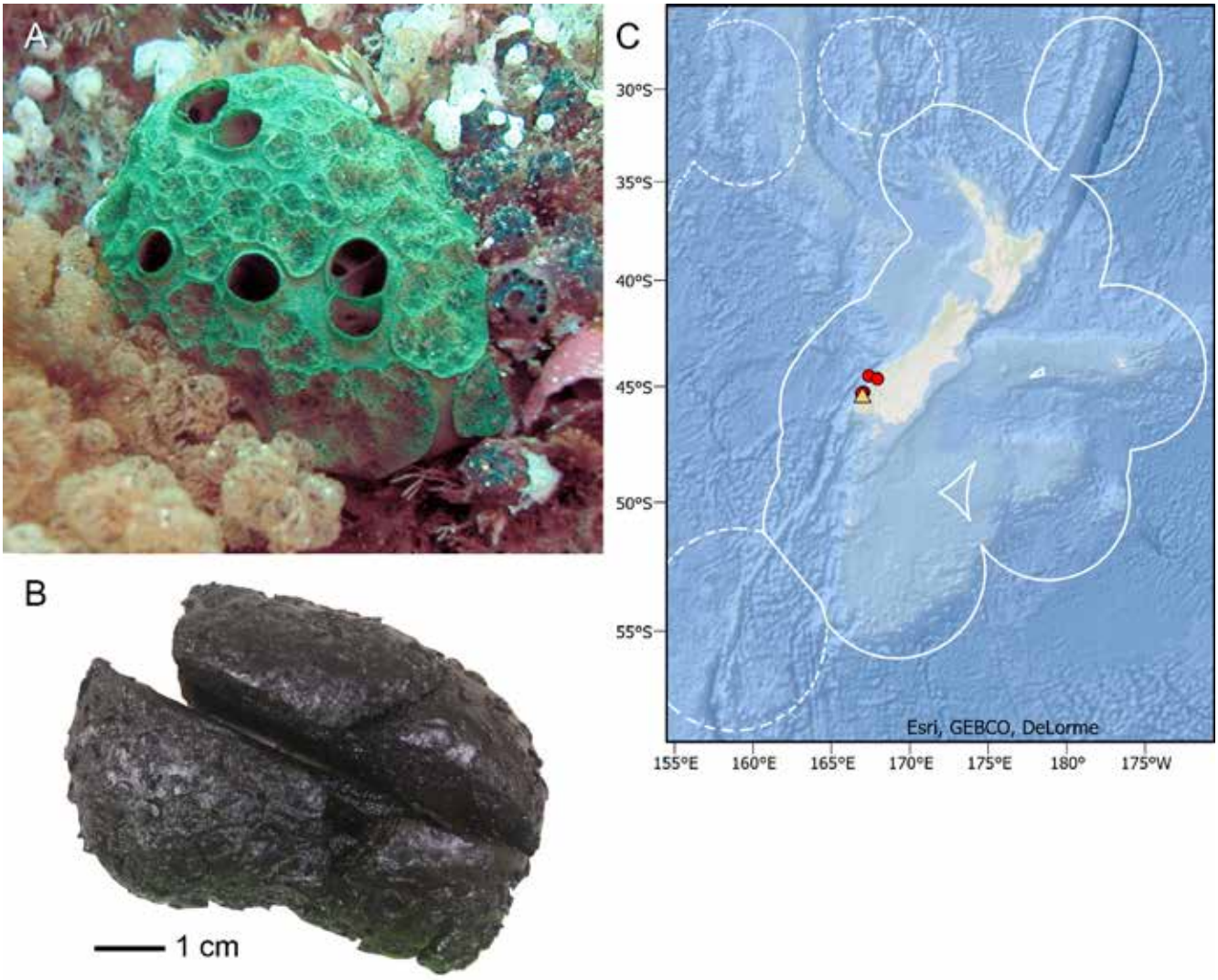


Figure 55. *Latrunculia* (*Biannulata*) *millerae* Alvarez, Bergquist & Battershill, 2002, morphology and distribution: **A.** NIWA 93021 *in situ* (Image: Mike Page); **B.** Holotype NIWA 7787, preserved specimen; **C.** Distribution and type locality (triangle) of *L.* (*B.*) *millerae* and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Table 17. Spicule dimensions (μm) of *Latrunculia* (*Biannulata*) *millerae* Alvarez, Bergquist & Battershill, 2002. Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
NIWA 7787 (holotype)	323 (263–358) × 7 (5–8)	39 (36–42) × 18 (15–21)
NIWA 5089 (paratype)	338 (302–388) × 7 (5–9)	39 (34–42) × 18 (15–22)
NIWA 5090 (paratype)	356 (316–391) × 6 (4–7)	41 (36–46) × 17 (14–20)
NIWA 92995	361 (348–382) × 6 (5–6)	37 (30–43) × 17 (14–20)
NIWA 93021	287 (237–312) × 5 (4–6)	36 (32–41) × 12 (10–15)
QM G310738	367 (321–448) × 6 (4–7)	34 (31–36) × 17 (14–20)
QM G312170	322 (306–338) × 4 (3–5)	35 (33–38) × 14 (11–15)

New Zealand *Latrunculia* (*Biannulata*) (Fig. 4). The anisodiscorhabds of *L.* (*B.*) *millerae* can be differentiated from those of other *Latrunculia* (*Biannulata*) by their slender, delicate, balanced appearance and ornamented whorls, though these differences are difficult to see under light microscopy (Fig. 71).

Samaai *et al.* (2006) classified NIWA 92995 (TS 55) from Fiordland as *L.* (*L.*) *triverticillata*, but upon examination of this specimen we have found this to be *L.* (*B.*) *millerae*.

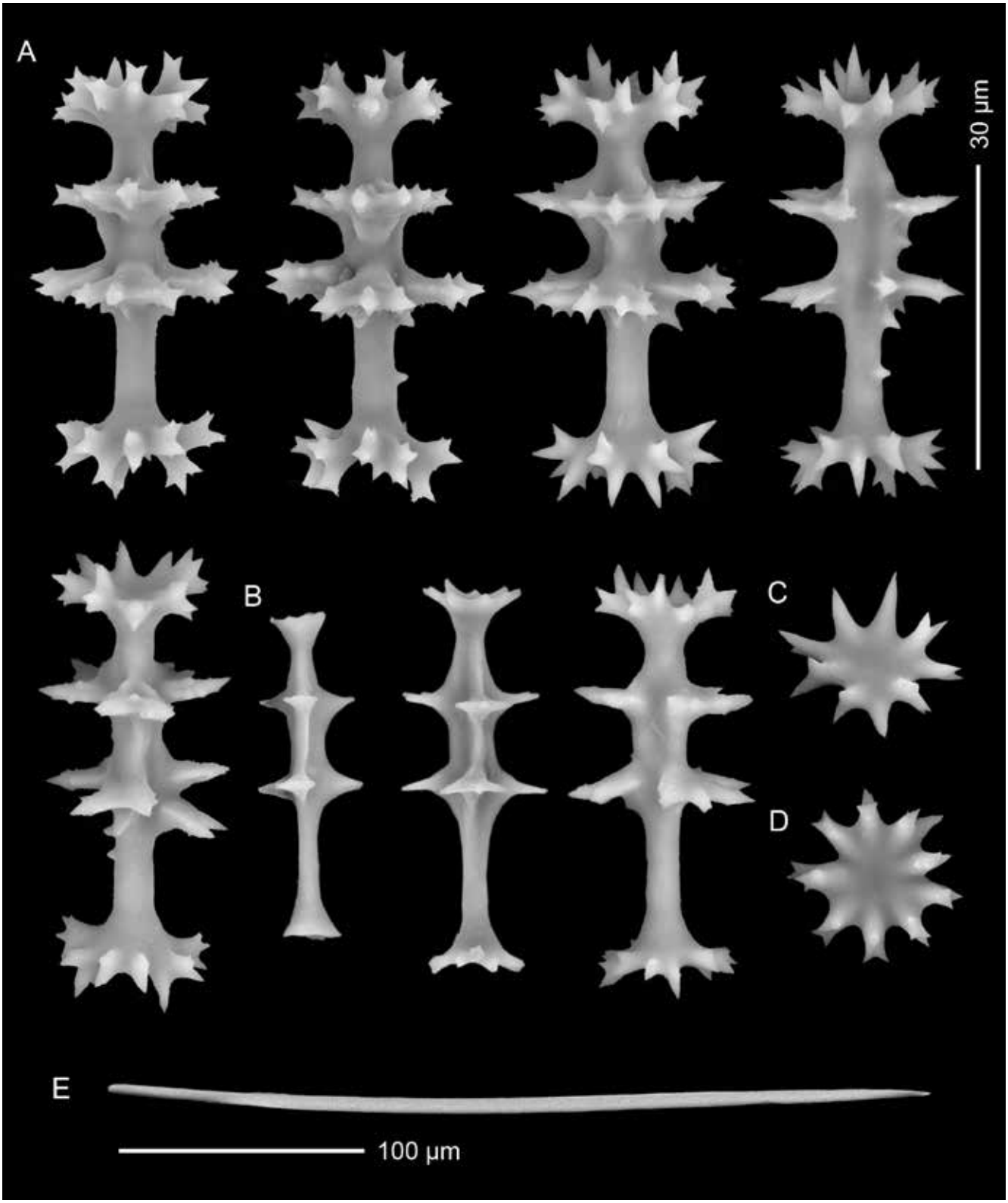


Figure 56. *Latrunculia* (*Biannulata*) *millerae* Alvarez, Bergquist & Battershill, 2002 (holotype holotype NIWA 7787), spicules: **A.** Anisodiscorhabds; **B.** Immature anisodiscorhabds; **C.** Top-down view of the apical whorl from NIWA 7787; **D.** Upside-down view of the manubrium (image has been cropped); **E.** Anisostyle. All SEM images from holotype NIWA 7787.

Key diagnostic characters

- massive to globular sponge, olive green in life
- anisostyles are small; 333 (237–448) µm long
- anisodiscorhabds are small and slender with ornate whorls, 38 (30–46) µm long
- distribution Fiordland, New Zealand, 10–40 m

***Latrunculia* (*Biannulata*) *macquariensis* Kelly & Sim-Smith sp. nov.**

Figs 4, 57, 58, 71; Table 18; Seafloor Image 9, 16

Material examined. Holotype QM G339778, NIWA Stn TAN0803/65, Seamount 6, Macquarie Ridge (Australia EEZ), 52.497° S, 160.489° E, 119–125 m, 9 Apr 2008. **Paratypes** QM G339779, NIWA Stn TAN0803/65, Seamount 6, Macquarie Ridge (Australia EEZ), 52.497° S, 160.489° E, 119–125 m, 9 Apr 2008; QM G339780, NIWA Stn TAN0803/65, Seamount 6, Macquarie Ridge (Australia EEZ), 52.497° S, 160.489° E, 119–125 m, 9 Apr 2008.

Other material. *Off Dunedin*: NIWA 136602, NIWA Stn TAN1108/117, 45.899° S, 171.044° E, 197–215 m, 23 May 2011.

Stewart Island: NIWA 143593, NIWA Stn TAN1108/96, 46.774° S, 167.461° E, 160–178 m, 21 May 2011.

Macquarie Ridge (*Australia EEZ*), *Seamount 6*: QM G339781, NIWA Stn TAN0803/65, 52.497° S, 160.489° E, 119–125 m, 9 Apr 2008.

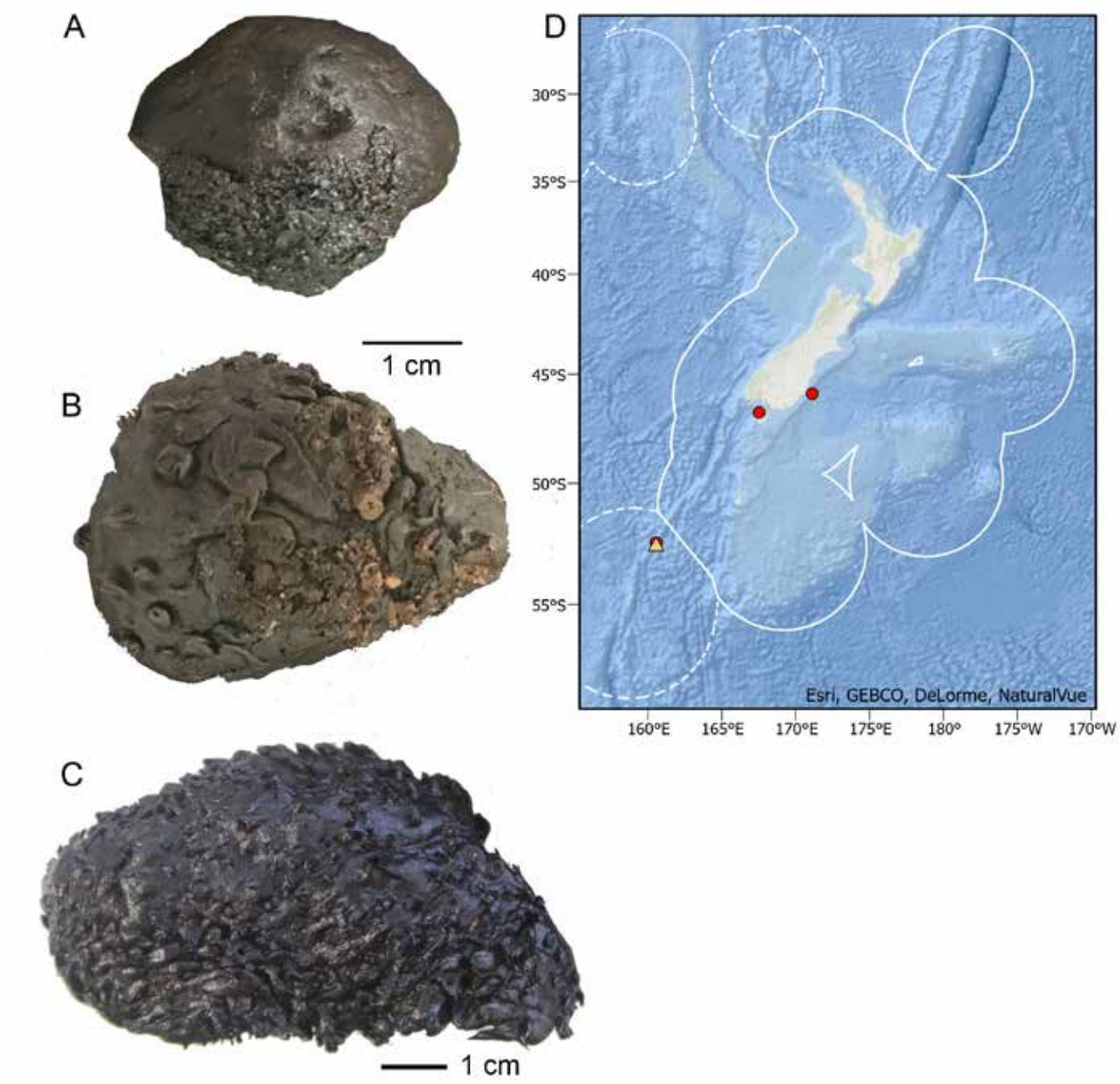


Figure 57. *Latrunculia* (*Biannulata*) *macquariensis* **sp. nov.**, morphology and distribution: **A.** Preserved holotype QM G339778; **B.** Preserved paratype QM G339779; **C.** Preserved paratype QM G339780; **D.** Distribution and type locality (triangle) of *L.* (*B.*) *macquariensis* **sp. nov.** and other specimens examined in this study (circles). The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

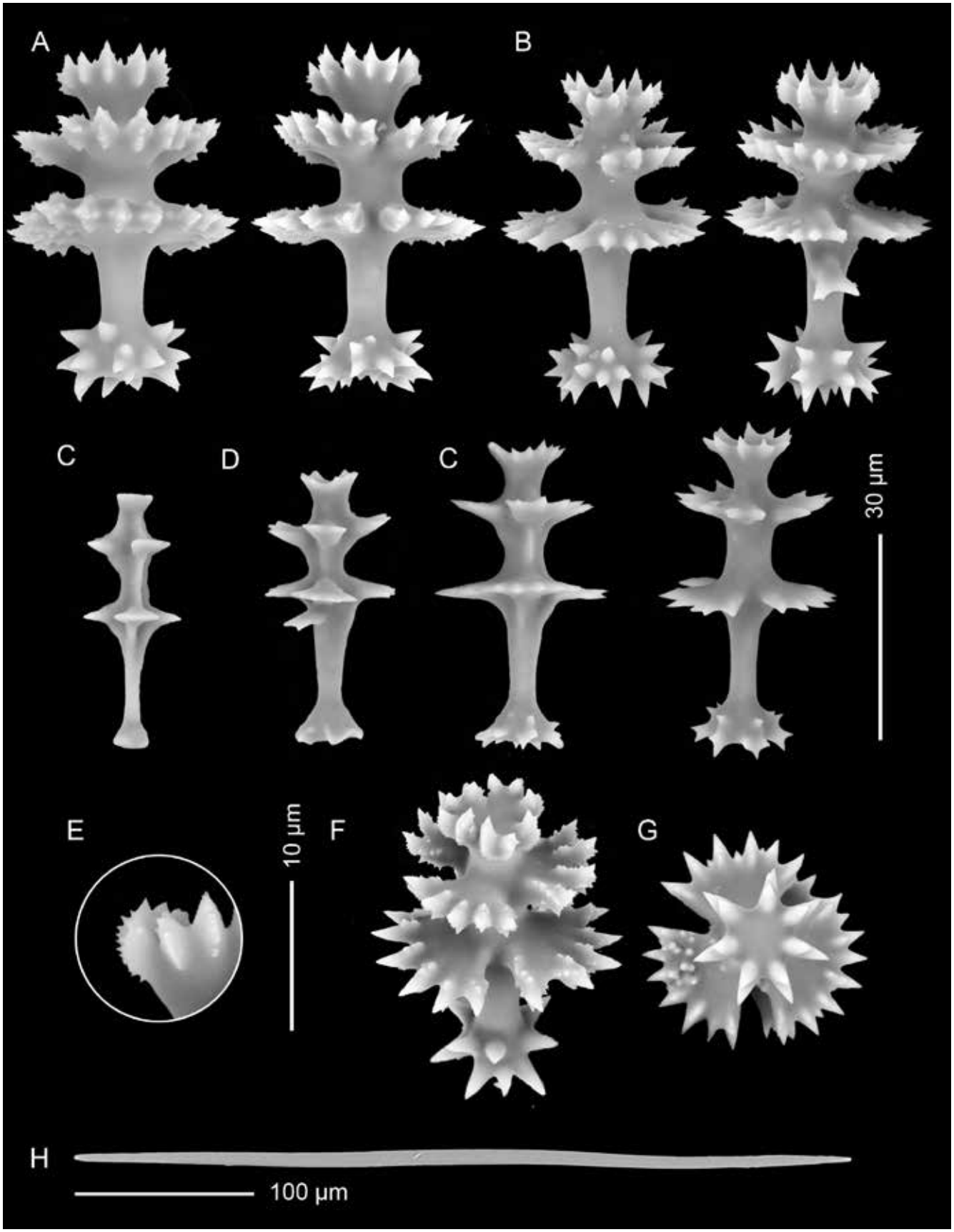


Figure 58. *Latrunculia* (*Biannulata*) *macquariensis* **sp. nov.**, spicules: **A.** Anisodiscorhabds of holotype, QM G339778; **B.** Anisodiscorhabds of paratype QM G339779; **C.** Immature anisodiscorhabds of QM G339779; **D.** Immature anisodiscorhabd of QM G339778; **E.** Close-up of the apical whorl of an anisodiscorhabd showing the serrated ridge down the middle of each spine; **F.** Top-down view of an anisodiscorhabd from QM G339779; **G.** Upside-down view of an anisodiscorhabd from QM G339778 showing the manubrium; **H.** Anisostyle from QM G339779.

Table 18. Spicule dimensions (μm) of *Latrunculia* (*Biannulata*) *macquariensis* **sp. nov.** Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds
QM G339778 (holotype)	407 (364–451) × 8 (5–11)	52 (47–56) × 29 (21–34)
QM G339779 (paratype)	428 (403–455) × 9 (6–11)	51 (47–54) × 31 (27–36)
QM G339780 (paratype)	429 (366–459) × 10 (7–13)	52 (43–57) × 30 (25–37)
NIWA 136602	386 (341–426) × 9 (7–11)	51 (48–57) × 26 (21–30)
NIWA 143593	356 (329–389) × 8 (7–9)	56 (51–61) × 23 (19–28)
QM G339781	427 (364–478) × 10 (7–15)	51 (45–54) × 27 (23–30)

Type locality. Seamount 6, Macquarie Ridge (Australia EEZ).

Distribution. Seamount 6, Macquarie Ridge (Australia EEZ) and east of Dunedin (Fig. 57D).

Description. Small, mound-shaped sponge. Holotype is 30 × 20 × 15 mm high. Surface is smooth, densely covered with small cylindrical or conical fistules, ≤ 5 mm high, or scattered pores that are surrounded by a raised fleshy collar. Some flat areas may be present. Colour in life unknown, colour in alcohol dark brown. Texture is firm, compressible (Figs 57A–C).

Spicules (Fig. 58, Table 18). Megascleres are anisostyles; 410 (329–478) × 9 (5–15) μm (n = 110).

Microscleres are large, ornate anisodiscorhabds. Apical whorl is a ring of spines that are triangular in cross-section, spines are often slightly inwardly curved. Each spine is serrated with a microspined ridge that runs down the outside of the spine. The subsidiary and median whorls are divided into three distinct segments. The edges of the whorls are divided into 4–8 angular spines that are themselves strongly microspined. The microspines often are arranged into lines, forming serrated ridges. The manubrium is an expanded spinous base of smooth spines; 52 (43–61) × 28 (19–37) μm (n = 110); average L:W ratio is 1.86. Some of the anisodiscorhabds appear to have a basal whorl, but the majority have a manubrium without a distinct basal whorl, and no basal whorls are apparent in immature anisodiscorhabds (Figs 58C, D); thus, this species has been assigned to the subgenus *Biannulata*.

Substrate, depth range and ecology. NIWA 136602 found growing on shell; 119–215 m.

Etymology. Named for the type locality of this species, Macquarie Ridge.

ZooBank registration. *Latrunculia* (*Biannulata*) *macquariensis* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:967A914E-8F46-4722-963D-FFAE9BE1887C.

Remarks. *Latrunculia* (*B.*) *macquariensis* **sp. nov.** can be differentiated from all other New Zealand *Latrunculia* (*Biannulata*) by the combination of anisostyle and anisodiscorhabd sizes (Fig. 4). The apical whorl of the anisodiscorhabds also have distinctive spines with serrated ridges on the outside of each spine. The anisodiscorhabds of *L.* (*B.*) *macquariensis* **sp. nov.** are similar in appearance to those of *L.* (*L.*) *prendens* **sp. nov.** (Fig. 27), which also occurs on Macquarie Ridge. However, the anisodiscorhabds of *L.* (*L.*) *prendens* **sp. nov.** have a clearly defined basal whorl (sometimes two) that is well-separated from the manubrium. There are differences in the spicule sizes between the two species also, with *L.* (*L.*) *prendens* **sp. nov.** having slightly smaller anisodicorhabds [47 (43–51) μm long] and longer anisostyles [516 (472–569) μm] than those of *L.* (*B.*) *macquariensis* **sp. nov.**

Key diagnostic characters

- small, mound-shaped sponge
- anisostyles are moderately long, 410 (329–478) μm long
- anisodiscorhabds are large, 52 (43–61) μm long
- apical whorl is a ring of spines with a serrated ridge down the outside of each spine
- distribution Macquarie Ridge (Australia EEZ), Stewart Island, and east of Dunedin, New Zealand, 119–215 m

Latrunculia (*Biannulata*) *alvarezae* Kelly & Sim-Smith sp. nov. Figs 4, 59, 60, 71

Material examined. Holotype QM G339777, NIWA Stn TAN0803/79, Seamount 7, Macquarie Ridge (Australia EEZ), 53.715° S, 159.131° E, 770–810 m, 12 Apr 2008.

Type locality. Seamount 7, Macquarie Ridge (Australia EEZ).

Distribution. Only known from type locality (Fig. 59C).

Description. Very thinly encrusting sponge, 1 mm thick. Colour in life green, colour in alcohol tan to medium brown. Surface is smooth, (Figs 59A, B).

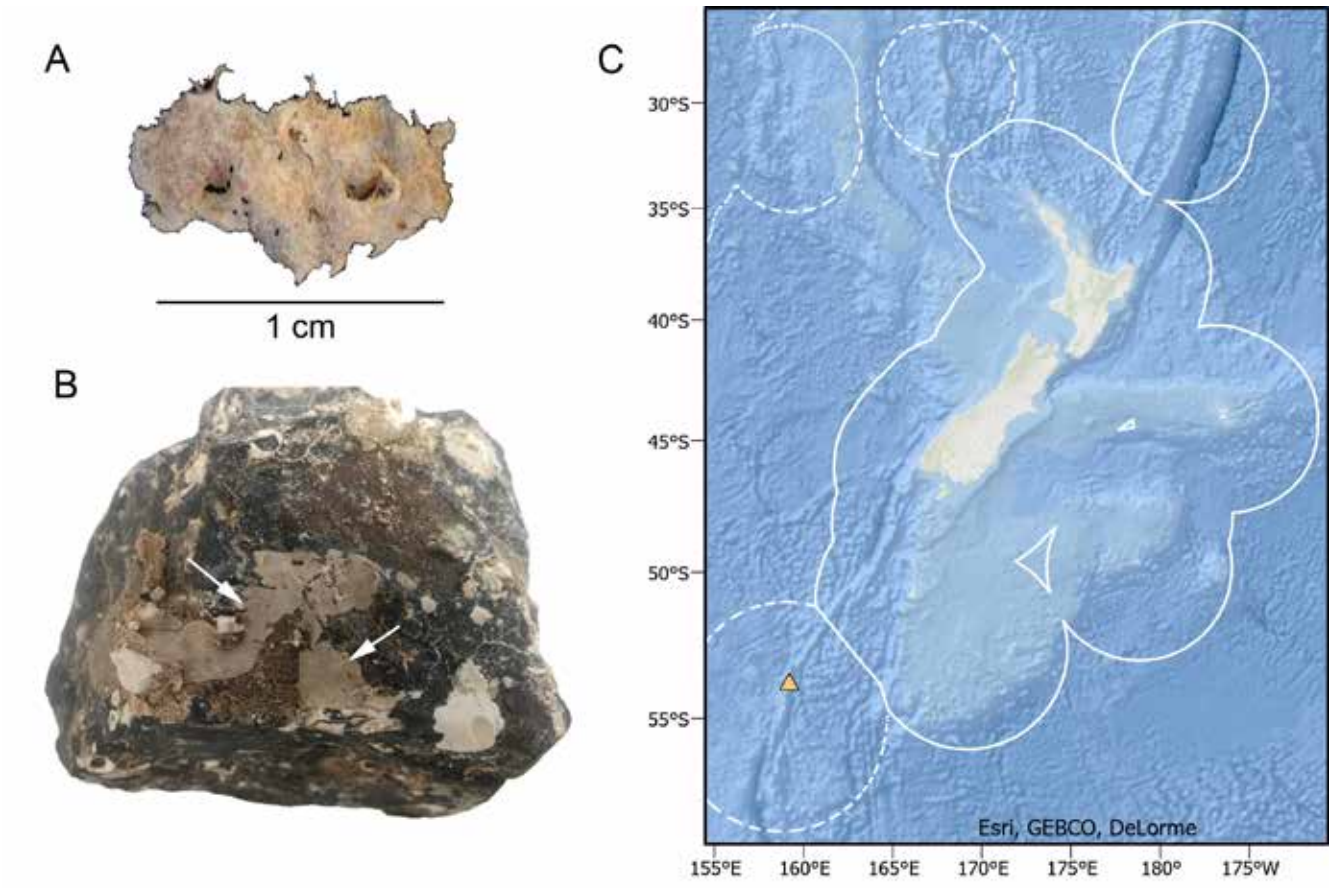


Figure 59. *Latrunculia* (*Biannulata*) *alvarezae* **sp. nov.**, morphology and distribution: **A.** Close-up of preserved holotype QM G339777; **B.** Preserved holotype on rock (arrows); **C.** Type locality of *L.* (*B.*) *alvarezae* **sp. nov.** The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Spicules (Fig. 60). Megascleres are moderately long and stout anisostyles that taper towards the tips; 464 (414–505) × 11 (8–13) μm (n = 20).

Microscleres are stumpy, very wide anisodiscorhabds with a thick shaft; 54 (48–61) × 39 (34–43) μm (n = 20); average L:W ratio is 1.39. Apical whorl narrow and nearly cylindrical, with a margin of short spines with microspined ridges on the outer edges. Apex is flat with no apical spines. The subsidiary whorl is located close to the apical whorl and is curved upwards. It is divided into three segments that have a margin of pointed to blunt spines with microspined ridges on the outer edges. The median whorl is horizontal and much wider than the other whorls. It has a margin of spines that are microspined, often with microspined ridges on the outer edges. The manubrium is a fused cluster of conical spines, sometimes loosely arranged into two rows, with a ring of diagonally downward-pointing spines. A single vertical basal spine may be present.

Substrate, depth range and ecology. Found encrusting on a rock; 770–810 m.

Etymology. Named for Dr Belinda Alvarez, Te Papa Tongarewa Museum of New Zealand, for her early contributions to our knowledge of Latrunculiidae in New Zealand waters, and for her thorough review of this work.

ZooBank registration. *Latrunculia* (*Biannulata*) *alvarezae* **sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act: 74E093F6-9753-481E-9501-D26E8BB5C79D.

Remarks. The very large, stumpy anisodiscorhabds of *L.* (*B.*) *alvarezae* **sp. nov.** separate this species from all other New Zealand and Antarctic *Latrunculia* (*Biannulata*) species. Only *L.* (*B.*) *macquariensis* **sp. nov.** has similar-sized anisodiscorhabds but those are much thinner and more delicate (Figs 71H, I). *Latrunculia* (*B.*) *macquariensis* **sp. nov.** also has smaller anisostyles [410 (329–478) μm long] than *L.* (*B.*) *alvarezae* **sp. nov.** (Fig. 4).

Latrunculia (*Biannulata*) *alvarezae* **sp. nov.** is found in the same location as *L.* (*L.*) *prendens* **sp. nov.** and the spicules are of comparable size. However, *L.* (*L.*) *prendens* **sp. nov.** has a clearly defined basal whorl (or two), a small, bulbous apical whorl with inward-curling spines (Fig. 27).

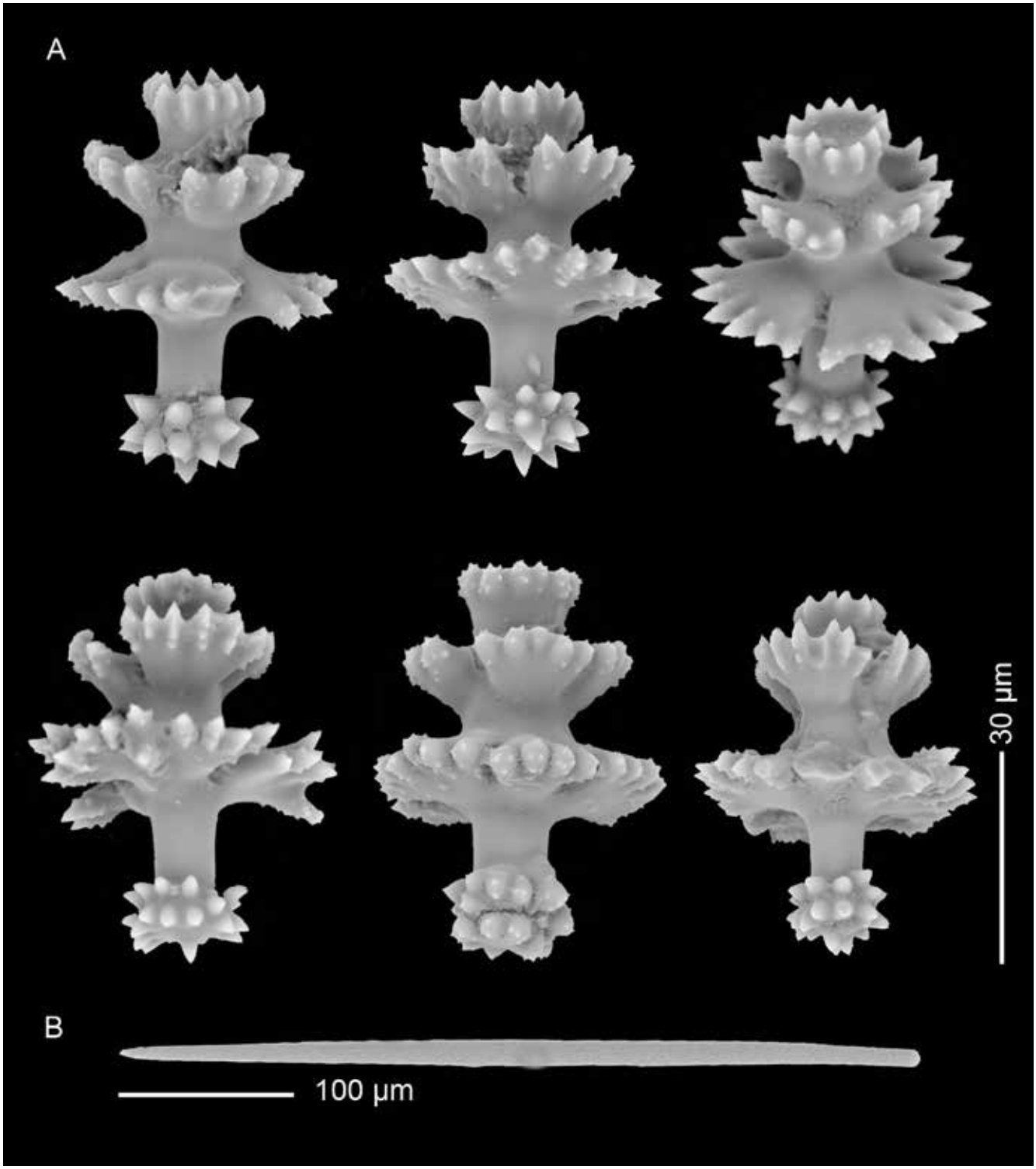


Figure 60. *Latrunculia* (*Biannulata*) *alvarezae* **sp. nov.**, holotype QM G339777, spicules: **A.** Anisodiscorhabds; **B.** Anisostyle.

Key diagnostic characters

- very thinly encrusting sponge with a smooth surface
- anisostyles are moderately long, 464 (414–505) µm long
- anisodiscorhabds are stumpy and very wide, 54 (48–61) µm long, with a very thick shaft
- apical whorl is almost cylindrical with short spines
- apical, subsidiary and median whorls have microspined ridges on the outer edges
- distribution, Macquarie Ridge (Australia EEZ), 770–810 m

Subgenus *Aciculatrunculia* Kelly & Sim-Smith subgen. nov.

Diagnosis. *Latrunculia* species in which the microscleres are exclusively, or include, aciculodiscorhabds with attenuated apical spines of varying lengths. Anisodiscorhabds may or may not be present. Hypertrophied aciculodiscorhabds may be variably present; these range from an elongated aciculodiscorhabd to an aciculodiscorhabd-like ornamented acanthostyle.

Etymology. Named for the appearance of the additional form of anisodiscorhabd microsclere, which has an attenuated apical spine of variable length, emanating from the apical whorl (*acicula*, a needle-like spine or bristle; L).

ZooBank registration. *Aciculatrunculia* **subgen. nov.** is registered in ZooBank under urn: lsid:zoobank.org:act:C170CCCF-A2C2-4359-A8CA-C49832B74F8A.

Remarks. Ridley & Dendy (1886, 1887) cited the possession of a single, special form of anisodiscorhabd in their Kerguelen species, *Latrunculia apicalis* as the most characteristic feature of the species. This special anisodiscorhabd, now termed an aciculodiscorhabd (Samaai & Kelly 2002), was described as having an "*apical prolongation of the discaster, by which it may at once be distinguished*." However, this description may have misled both the authors and later taxonomists because Ridley & Dendy (1886, 1887) failed to note that two of the three specimens that they identified as *L. apicalis* also possessed anisodiscorhabds in addition to aciculodiscorhabds. These two specimens were later identified as *L. biformis* by Samaai *et al.* (2003).

Differentiation between the two species is now relatively simple: *L. apicalis* possesses only aciculodiscorhabds [which Samaai *et al.* (2006) confirmed for the holotype], while *L. biformis* possesses both aciculodiscorhabds and anisodiscorhabds. Prior to this review, differentiation between these two species has been difficult, probably due (in part) to Ridley & Dendy's original description and the large variation in microsclere lengths, both within and between specimens. Samaai *et al.* (2003; 2006) examined several specimens that were previously identified as *L. apicalis*, including those of Koltun (1964) and Boury-Esnault & van Beveren (1982), and reassigned them all to *L. biformis,* based on the presence and size of both aciculodiscorhabds and anisodiscorhabds [see remarks in *L.* (*A.*) *apicalis* **subgen. nov.** for more details].

Because there have been no confirmed new collections of *L. apicalis* since the holotype, and the vast majority of specimens collected are *L. biformis*, we establish the new subgenus for *L. biformis*, rather than for *L. apicalis*.

Type species. *Latrunculia biformis* Kirkpatrick, 1908.

Latrunculia (*Aciculatrunculia*) *biformis* Kirkpatrick, 1908 subgen. nov., comb. nov.

Figs 61, 62; Table 19

Latrunculia apicalis Ridley & Dendy, 1886: 492.

Latrunculia apicalis, Ridley & Dendy 1887: 239, pl. XLIV fig. 4, pl. XLV figs 9, 9A–C [in part, NHMUK 1887.5.2.84a].

Latrunculia apicalis var. *biformis* Kirkpatrick 1908: 14, pl. XV figs 1–7; Burton 1929: 444.

Latrunculia apicalis, Koltun 1964: 23, pl. IV figs 4–6; Koltun 1976: 169; Boury-Esnault & van Beveren 1982: 42, figs 10 c, d; Samaai *et al.* 2003: 6.

Latrunculia biformis, Samaai *et al.* 2003: 6, figs 4A, 5A; Ríos *et al.* 2004: 117–118, fig. 15; Ríos 2006: 475, figs 249–252; Boury-Esnault & van Beveren 1982: 44, fig. 11.

Latrunculia (*Latrunculia*) *biformis*, Samaai *et al.* 2006: 19, figs 1D, 2, 4C.

Material examined. Holotype—NHMUK 1908.2.5.70 (microscope slide 1908.2.5.70a) labelled *Latrunculia apicalis* var. *biformis* by Kirkpatrick, Winter Quarters, Ross Sea, Antarctica, National Antarctic Expedition 1901–04, HMS *Discovery*, 18–27 m. Paratype—NHMUK 1908.2.5.69 (microscope slide 1908.2.5.69g) labelled *Latrunculia apicalis* var. *biformis* by Kirkpatrick, Winter Quarters, Ross Sea, Antarctica, National Antarctic Expedition 1901–04, HMS *Discovery*, 18–27 m.

Other material. *Antarctica*, *Ross Sea*: NIWA 28925, NIWA Stn TAN0402/202, 71.155° S, 171.092° E, 930–940 m, 29 Feb 2004; NIWA 29135, NIWA Stn TAN0402/20, 71.741° S, 171.644° E, 400–415 m, 5 Feb 2004; NIWA 35591, NIWA 35607, NIWA Stn TAN0802/22, Site D2, 74.111° S, 170.796° E, 632–639 m, 11 Feb 2008; NIWA 36261, NIWA Stn TAN0802/61, Site C3, 75.622° S, 169.805° E, 520–522 m, 14 Feb 2008; NIWA 36398, NIWA Stn TAN0802/70, Site D4, 76.775° S, 167.836° E, 724–738 m, 15 Feb 2008; NIWA 36848, NIWA Stn TAN0802/100, Site C4, 76.202° S, 176.248° E, 451–447 m, 18 Feb 2008; NIWA 37305, NIWA Stn TAN0802/123, Site C16, 72.329° S, 175.471° E, 915–936 m, 21 Feb 2008; NIWA 52698, NIWA Stn TAN0802/66, Site D3, 75.624° S, 167.321° E, 474–480 m, 14 Feb 2008; NIWA 92328, NZOI Stn A464, 73.33° S, 174° E, 361–376 m, 22 Jan 1959; NIWA 100547, NIWA Stn TAN0402/119, 71.190° S, 170.949° E, 621–675 m, 18 Feb 2004; NIWA 62363, NZOI Stn A461, 73.533° S, 171.367° E, 567–578 m, 18 Jan 1959; NIWA 123979, NZOI Stn A464, 73.333° S, 174° E, 367 m,

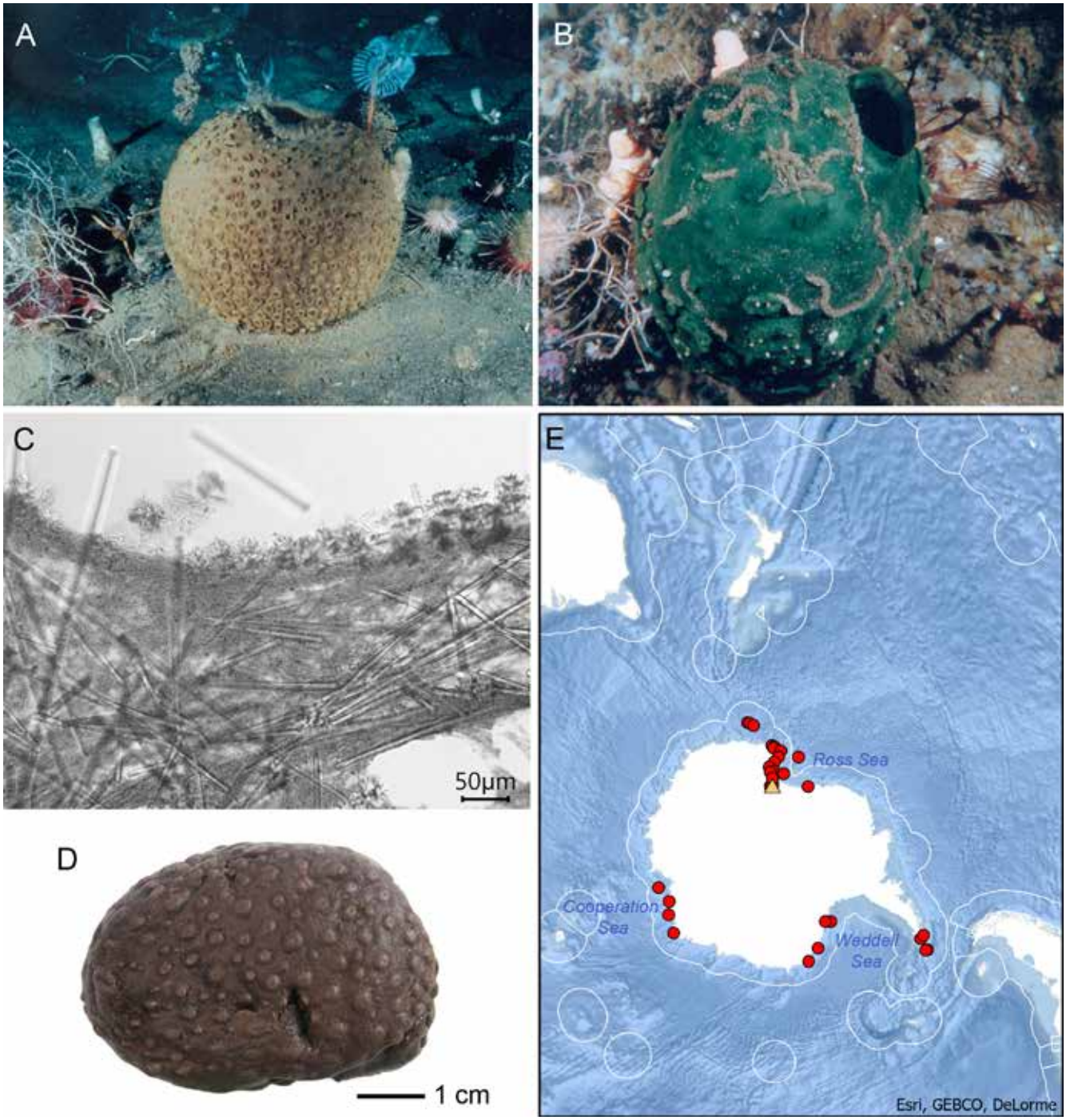


Figure 61. *Latrunculia* (*Aciculatrunculia*) *biformis* Kirkpatrick, 1908 **subgen. nov., comb. nov.**, morphology and distribution: **A.** ZMA.PO.P. 12730, *in situ* (Image: Jim Mastro); **B.** ZMA.PO.P. 12731, *in situ* (Image: Bill Baker); **C.** Cross-section of the ectosome of NHMUK 1908.2.5.69f showing the palisade of discorhabds at the surface; **D.** NIWA 26329, preserved specimen; **E.** Distribution and type locality (triangle) of *L.* (*A.*) *biformis* **subgen. nov., comb. nov.** and other specimens examined in this study (circles). Country EEZs and 200 NM beyond Antarctica are outlined in white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

Figure 62. (*Opposite*) *Latrunculia* (*Aciculatrunculia*) *biformis* Kirkpatrick, 1908 **subgen. nov., comb. nov.**, spicules: **A.** Anisodiscorhabds from NIWA 62363; **B.** Anisodiscorhabds from NIWA 92328; **C.** Upside-down view of an anisodiscorhabd from NIWA 92328 showing the manubrium; **D.** Immature anisdiscorhabds from NIWA 92328; **E.** Aciculodiscorhabds from NIWA 92328; **F.** Aciculodiscorhabd from NIWA 62363; **G.** Immature aciculodiscorhabds from NIWA 62363; **H.** Anisostyle from NIWA 62363; **I.** Gradation of aciculodiscorhabds to hypertrophied aciculodiscorhabds that resemble ornamented anisostyles (from NIWA 92328).

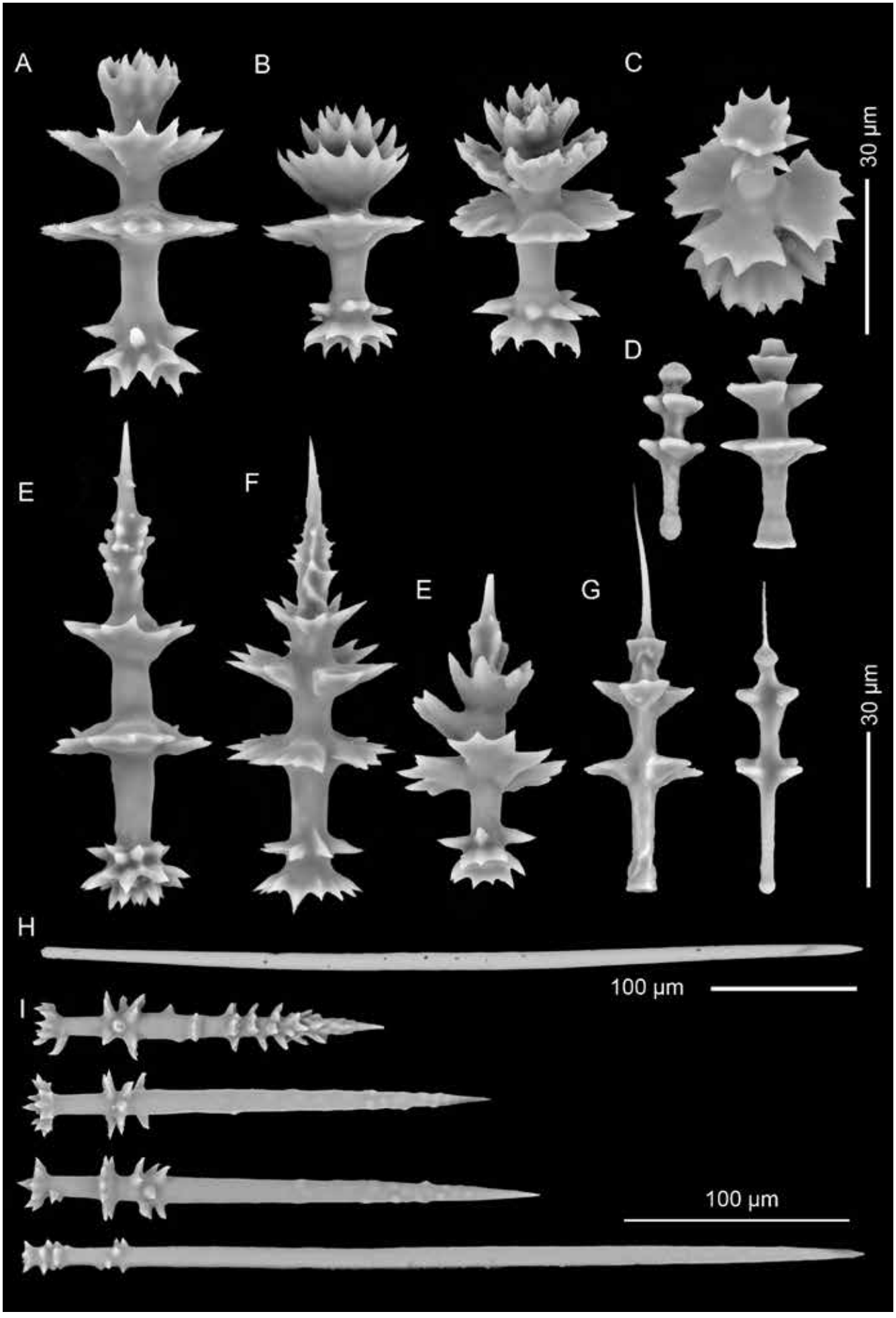

A
B
C
30 µm
D
E
F
E
G
30 µm
H
100 µm
I
100 µm

Table 19. Spicule dimensions (μm) of *Latrunculia* (*Aciculatrunculia*) *biformis* **subgen. nov., comb. nov.** Measurements are given as mean length (range) × mean maximum width (range). A minimum of twenty spicules per category were measured for type specimens and a minimum of ten spicules per category were measured for other specimens examined.

Specimen	Anisostyles	Anisodiscorhabds	Aciculodiscorhabds
NHMUK 1908.2.5.70 (holotype)	477 (442–567) × 11 (8–14)	55 (50–61) × 36 (25–40)	76 (66–98) × 36 (26–42)
BANZARE S270	526 (490–556) × 10 (9–12)	57 (55–60) × 32 (29–37)	83 (73–113) × 31 (25–36)
NIWA 26323	495 (450–542) × 11 (9–12)	54 (50–62) × 36 (31–41)	97 (71–138) × 32 (23–43)
NIWA 26329	482 (442–509) × 10 (8–11)	55 (49–59) × 37 (31–45)	99 (76–122) × 35 (31–38)
NIWA 28925	444 (350–468) × 10 (9–12)	61 (57–66) × 35 (30–40)	81 (73–94) × 34 (28–41)
NIWA 29135	502 (481–551) × 11 (9–13)	56 (53–59) × 32 (27–37)	104 (87–129) × 34 (29–38)
NIWA 29146	489 (423–512) × 10 (9–11)	69 (62–79) × 37 (32–41)	119 (86–159) × 38 (30–46)
NIWA 29183	537 (506–562) × 10 (8–11)	55 (50–61) × 33 (25–39)	97 (79–110) × 36 (32–41)
NIWA 35591	542 (485–588) × 10 (7–12)	59 (54–66) × 34 (28–39)	98 (79–116) × 37 (30–46)
NIWA 35607	523 (427–571) × 10 (7–12)	63 (60–66) × 40 (37–45)	110 (89–125) × 41 (35–46)
NIWA 35969	446 (380–500) × 9 (7–11)	67 (61–73) × 36 (31–42)	139 (107–174) × 35 (30–40)
NIWA 36068	484 (448–509) × 8 (7–10)	67 (62–75) × 34 (28–38)	142 (107–171) × 31 (24–36)
NIWA 36261	524 (487–567) × 11 (8–15)	58 (48–62) × 32 (28–36)	88 (70–101) × 34 (31–37)
NIWA 36398	452 (391–501) × 7 (4–8)	61 (58–64) × 30 (26–34)	81 (70–88) × 32 (28–36)
NIWA 36848	526 (499–558) × 11 (10–13)	62 (55–67) × 35 (29–42)	97 (78–110) × 38 (35–44)
NIWA 37305	491 (410–541) × 9 (7–14)	54 (50–61) × 35 (27–39)	83 (71–92) × 35 (28–39)
NIWA 52698	543 (496–569) × 11 (9–12)	63 (57–73) × 32 (25–36)	103 (86–144) × 31 (27–36)
NIWA 62363	514 (467–550) × 11 (9–14)	63 (59–69) × 39 (36–43)	98 (84–114) × 36 (27–42)
NIWA 100547	510 (456–557) × 11 (9–13)	55 (53–58) × 30 (25–36)	73 (64–83) × 30 (26–32)
NIWA 100688	512 (466–551) × 10 (8–13)	53 (47–61) × 34 (24–43)	94 (72–133) × 34 (30–40)
NIWA 123979	459 (424–492) × 10 (7–12)	49 (45–55) × 30 (26–35)	80 (68–110) × 32 (29–37)
QM G311163	506 (478–534) × 11 (10–13)	57 (52–63) × 38 (34–41)	75 (64–90) × 35 (32–38)
QM G311144	483 (442–516) × 10 (8–12)	60 (57–63) × 36 (33–39)	90 (74–105) × 36 (33–40)
QM G301316	422 (393–460) × 8 (7–10)	58 (54–63) × 36 (32–39)	87 (74–102) × 33 (30–36)
SMF 11653	495 (460–520) × 10 (10–10)	57 (53–73) × 41 (40–43)	116 (95–133) × 40 (40–41)
SMF 11203	509 (465–580) × 10 (10–10)	59 (53–65) × 36 (33–38)	77 (70–95) × 36 (33–38)
SMF 12106	491 (420–520) × 10 (10–10)	51 (40–55) × 36 (33–38)	63 (54–78) × 36 (33–38)
SMF 7946	468 (425–500) × 10 (8–10)	55 (45–68) × 33 (28–40)	80 (69–90) × 39 (37–41)
SMF 7945	479 (450–505) × 10 (8–10)	66 (58–72) × 39 (32–42)	80 (75–85) × 38 (37–38)
ZMA.PO.P.12730	496 (457–570) × 11 (8–17)	63 (56–72) × 32 (26–39)	95 (67–123) × 36 (28–41)
ZMA.PO.P.12731	483 (459–520) × 10 (6–14)	54 (49–64) × 38 (34–44)	76 (69–90) × 35 (29–37)
109-DR8	523 (469–583) × 10 (7–13)	69 (41–78) × 42 (35–50)	97 (73–123) × 40 (33–45)

22 Jan 1951; NIWA 29146, NIWA Stn TAN0402/159, 71.471° S, 171.999° E, 727 m, 26 Feb 2004; NIWA 35969, NIWA Stn TAN0802/41, Site C2, 74.726° S, 167.013° E, 916–930 m, 12 Feb 2008; NIWA 36068, NIWA Stn TAN0802/46, Site C2, 74.737° S, 167.061° E, 863–866 m, 13 Feb 2008.

Antarctica, *McMurdo Sound*: ZMA.PO.P.12730, Intake Jetty, Granite Harbour, 33 m, 16 Oct 1996; ZMA.PO.P.12731, depth unknown, 16 Oct 1996; QM G311163, Salmon Bay, Cape Chocolate, 77.931° S, 163.567° W, 30 m, 8 Dec 1989; QM G311144, Ross Island, South Jetty at McMurdo Base, Cape Armitage, 77.867° S, 166.65° E, 20 m, 23 Oct 1989.

Antarctica, *Somov Sea*: NIWA 26323, NIWA Stn Z15161, Buckle Island, Balleny Islands, 66.633° S, 163.042° E, 185 m, 1 Mar 2001; NIWA 26329, NIWA Stn Z15162, Young Island, Balleny Islands, 66.488° S, 162.369° E, 240–270 m, 3 Mar 2001; NIWA 29183, NIWA 100688, NIWA Stn TAN0402/225, Balleny Islands, 67.273° S, 164.520° E, 183–212 m, 3 Mar 2004.

Antarctica, *Prydz Bay*, *between Lars Christensen Coast & Ingrid Christensen Coasts*: QM G301316, RV *Aurora Australis*, 67.017° S, 78.185° E, 260 m, 1 Jan 1991.

Antarctica, *Cooperation & Cosmonauts Seas*: BANZARE S270, S271, S272, BANZARE Stn 30, Mac. Robertson Land, 66.8° S, 74.4° E, 540 m, 27 Dec 1929; BANZARE S273, BANZARE Stn 42, Enderby Land, 65.833° S, 54.383° E, 220 m, identified on 26 Jan 1930, 26 Jan 1930; BANZARE S274, S276, BANZARE Stn

105, Mac.Robertson Land, 67.767° S, 67.05° E, 163 m, 13 Feb 1931; BANZARE S275, BANZARE Stn 107, Mac.Robertson Land, 66.75° S, 62.05° E, 219 m, 16 Feb 1931.

Antarctica, *Weddell Sea*: SMF 7945, RV *Polarstern* 2015/16 FROSN Expedition Stn 072-1, AGT 8, 75.850° S, 32.367° W, 747 m, 23 Jan 2016; SMF 7946, RV *Polarstern* 2015/16 FROSN Expedition Stn 106-5, 72.583° S, 18.050° W, 350 m, 31 Jan 2015; SMF 12106, RV *Polarstern* 2015/2016 FROSN Expedition Stn 001-9 #12, 70.717° S, 11.133° W, 303 m, 24 Dec 2015; SMF 12109, RV *Polarstern* 2015/2016 FROSN Expedition Stn 057-6, 76.274° S, 29.113° W, 291 m, 21 Jan 2016.

Antarctica, *Antarctic Peninsula, Bransfield Strait*: SMF 11203, RV *Polarstern* 2013 LASSO Expedition Stn 197-5, 62.733° S, 57.433° W, 286 m, 25 Feb 2013; 109-DR8, Stn DR8, 62.703 ° S, 58.984 ° W, 1192–1379 m, 3 Jan 1997.

Elephant Island, *South Shetland Islands*, *Southern Ocean*, *245 kilometres north-northeast off the tip of the Antarctic Peninsula*: SMF 11653, Stn TB07, 60.817° S, 55.633° W, 470 m, 21 Mar 2012; PO_078, RV *Polarstern* Expedition PS112 Stn PS112_63, 60.978° S, 55.138° W, 278 m, 11 Apr 2018.

Type locality. Winter Quarters, Ross Sea, Antarctica.

Distribution. Rio de la Plata, Argentina; Kerguelen Islands; Antarctica; South Africa (Fig. 61C).

Description. Hemispherical to globular sponge, densely covered with small, circular areolate porefields that are surrounded by a raised fleshy collar. Kirkpatrick (1908) noted that the holotype had a single, large apical oscule about 16 mm diameter (see Figs 54A, B). Colour in life dark green to khaki brown, colour in alcohol tan to dark brown (Figs 61A, B, D). Texture is very soft.

Spicules (Fig. 62, Table 19). Megascleres are slightly sinuous anisostyles; 494 (350–602) × 10 (4–17) μm (n = 380).

Microscleres are: 1) anisodiscorhabds, 58 (40–79) × 35 (24–45) μm (n = 380); average L:W ratio is 1.68; and 2) aciculodiscorhabds with a long apical spire, 91 (54–174) × 35 (23–46) μm (n = 375). There is a large variation in the size and appearance of the microscleres within and between specimens. In some specimens, hypertrophied aciculodiscorhabds are present; these range from aciculodiscorhabds with a prolonged, acanthose apical spine to ornamented anisostyles with a spined end similar in form to the manubrium and basal whorl of the anisodiscorhabds (Fig. 55I); 228 (126–389) μm long, n = 29. We do not regard these as a true spicule category, but rather an extension of the aciculodiscorhabds in some specimens because: a) there is an overlap in size between the largest aciculodiscorhabds and the smallest hypertrophied aciculodiscorhabds; b) only 12 of the 31 specimens examined in this study possessed hypertrophied aciculodiscorhabds; c) hypertrophied aciculodiscorhabds are rare when present.

Substrate, depth range and ecology. Found growing on rocky substrata in shallow waters, and on fine sediment in deeper waters, 20–1379 m.

Remarks. *Latrunculia* (*A.*) *biformis* **subgen. nov.** is the most commonly collected latrunculid species from Antarctic waters and is readily identifiable by the combination of aciculodiscorhabds and anisodiscorhabds in the spicule complement. As noted by Samaai *et al.* (2006), there is considerable variation in the dimensions reported for the anisostyles, anisodiscorhabds and aciculodiscorhabds in *L.* (*A.*) *biformis* **subgen. nov.**

It is interesting to note that Hinde & Holmes (1892: pl. 11 fig. 37 – see also Wiedenmayer 1994, fig. 21.21) illustrated a microfossil spicule that is strongly reminiscent of the aciculodiscorhabd of *L.* (*A.*) *biformis* **subgen. nov.** in form and dimensions (93 μm long, 43 μm wide), but with a shorter apical spine.

Key diagnostic characters

- hemispherical to globular sponge densely covered in raised pores and short, raised oscules
- aciculodiscorhabds in addition to anisodiscorhabds
- sometimes hypertrophied aciculodiscorhabds are present
- distribution Argentina, Kerguelen Islands, South Africa, Antarctica, 20–1379 m

Latrunculia (*Aciculatrunculia*) *apicalis* Ridley & Dendy, 1886 subgen. nov., comb. nov. Figs 63, 64

Latrunculia apicalis Ridley & Dendy, 1886: 492.
Latrunculia apicalis, Ridley & Dendy 1887: 239, pl. XLIV fig. 4, pl. XLV figs 9, 9A–C [in part NHMUK 1887.5.2.88].
Latrunculia (*Latrunculia*) *apicalis*, Samaai, Gibbons & Kelly, 2006: 17–19; figs 1C, 2, 3B, 4B.

Material examined. Holotype—NHMUK 1887.5.2.88a (microscope slide), off Christmas Harbour, Kerguelen Island, 48.678° S, 69.021° E, Kerguelen HMS *Challenger* Expedition, 1873–76, 29 Jan 1874, 128 m.

Type locality. Christmas Harbour, Kerguelen Islands

Distribution. Only known from type locality (Fig. 63).

Description. Samaai *et al.* (2006) re-examined the holotype and described it as a massive, hemispherical

sponge with a broad base and convex upper surface, 6 cm thick and about 8 cm diameter, deep chocolate brown in life, pale yellow in the preserved state. The surface is characterised by numerous volcano-shaped oscules, 6 mm high, and mammiform areolate porefields, 2 mm high and 2 mm diameter.

Spicules (Fig. 64). Megascleres are anisostyles that are thicker centrally, tapering towards both ends; 425 (379–443) μm (n = 20) (Fig. 64F).

Microscleres are aciculodiscorhabds of variable length—the length of the apical projection is particularly variable; 72 (56–90) μm (n = 20) (Figs 64C–E). Two horizontal whorls of small spines are present at the base of the apical projection. The apical whorl is a diagonally upward-pointing tuft of spines. Both the median and subsidiary whorls are horizontal, comprising three, well-separated segments that have sharply notched margins. The basal whorl is a horizontal whorl of small, conical spines, located just above the manubrium, which is a narrow whorl of short, diagonally downward-pointing spines.

Substrate, depth range and ecology. Found on soft sediment, 126 m.

Remarks. *Latrunculia* (*Aciculatrunculia*) *apicalis* Ridley & Dendy, 1886 **subgen. nov.** is now considered to be restricted to the holotype specimen, the microscleres of which are exclusively aciculodiscorhabds (Ridley & Dendy 1887; Samaai *et al.* 2006). In a microscope slide

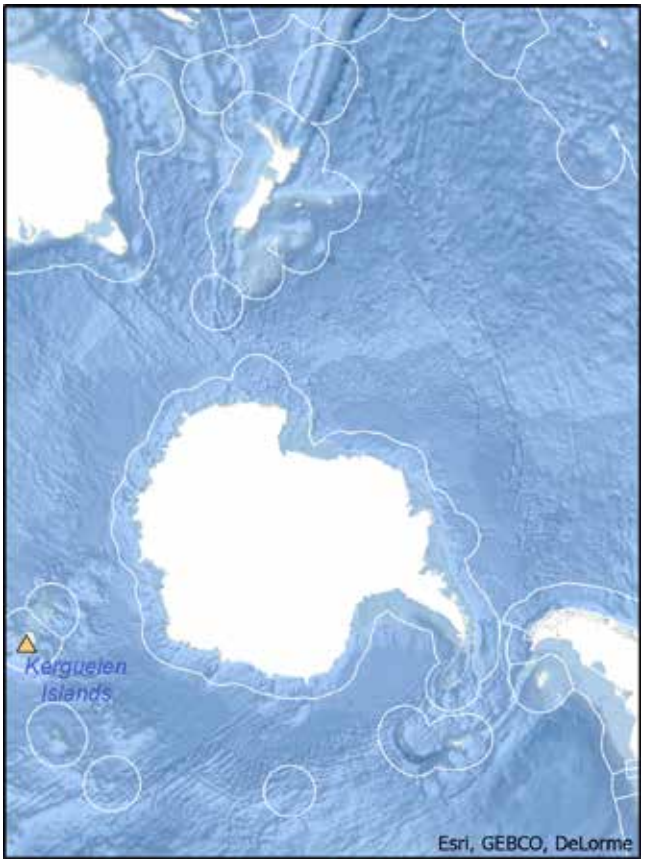


Figure 63. Type locality of *Latrunculia* (*Aciculatrunculia*) *apicalis* Ridley & Dendy, 1886 **subgen. nov., comb. nov.** Country EEZs and 200 NM beyond Antarctica are outlined in white. Map uses the circular WGS 84 Antarctic Polar Stereographic projection.

Table 20. Reassignment of some published specimens of New Zealand *Latrunculia, Latrunculia* (*Latrunculia*), or *Latrunculia* (*Biannulata*). Some of the specimens have since been registered within NIC (NIWA—); BA PO. — = prefix for Belinda Alvarez personal reference collection; TS— = prefix for Toufiek Samaai personal reference collection.

Specimen reference	NIWA accession	Original assignment	Reference	New assignment
CMC AQ1083	–	*L. brevis* Ridley & Dendy, 1886	Bergquist (1961, 1968)	*L.* (*L.*) *triverticillata*
NZOI Stn B93	–	*L. brevis* Ridley & Dendy, 1886	Bergquist (1968)	*L.* (*L.*) *magistra* **sp. nov.**
NZOI Stn A521 (TS 051)	NIWA 123978	*L. fiordensis* Alvarez *et al.* 2002	Samaai *et al.* (2006)	*L.* (*L.*) cf. *nelumbo* **sp. nov.**
NZOI Stn D194.2 (TS 053.2)	NIWA 92996	*Latrunculia oxydiscorhabda* Alvarez *et al.* 2002	Samaai *et al.* (2006)	Not Latrunculiidae
'*Ikatere* 20' (TS 109)	NIWA 92993	[1]*Latrunculia duckworthi* Alvarez *et al.* 2002	Samaai *et al.* (2006)	*Geodia vestigifera*
'*Ikatere* 20' (microscope slide)	–		Samaai *et al.* (2006)	*L.* (*B.*) *spinispiraefera*
NMNZ PO.000607 (TS 105)	–		Samaai *et al.* (2006)	Not Latrunculiidae
NMNZ PO.000618 (TS 107)	–	*L. kaakaariki* Alvarez *et al.* 2002	Samaai *et al.* (2006)	*L.* (*B.*) *spinispiraefera*
NMNZ PO.000605 (TS 104)	–		Samaai *et al.* (2006)	*L.* (*B.*) *spinispiraefera*
NMNZ PO.000572 (TS 099)	–		Samaai *et al.* (2006)	*L.* (*B.*) *wellingtonensis*
NMNZ PO.000601 (TS 102)	–		Samaai *et al.* (2006)	*L.* (*B.*) *spinispiraefera*
NMNZ PO.000567 (TS 098)	–	*L. kaikoura* Alvarez *et al.* 2002	Samaai *et al.* (2006)	*L.* (*B.*) *wellingtonensis*
[2]QM G312177 (=Q66C5406-R; TS 118)	–	*L. millerae* Alvarez *et al.* 2002	Samaai *et al.* (2006)	*L.* (*L.*) *fiordensis*
NZOI Stn M780 (BA PO. 417; TS 055)	NIWA 92995	*L. triverticillata* Alvarez *et al.* 2002	Samaai *et al.* (2006)	*L.* (*B.*) *millerae*

[1]Samaai *et al.* (2006) listed this specimen as *L.* (*B.*) *duckworthi*. The main specimen is *Geodia vestigifera* (Dendy 1924), encrusted with some tiny sponges, no longer containing any trace of the original *Latrunculia* specimen. NIWA 92993 is listed in the NIWA database as *G. vestigifera*. Note that station data for '*Ikatere* 20' has also been corrected to 34.8° S, 173.3° E.

[2]Q66C6062–G listed in Samaai *et al.* (2006) is incorrect (Merrick Ekins, QM, pers. comm.) as it is a species of *Negombata* (family Podospongiidae de Laubenfels).

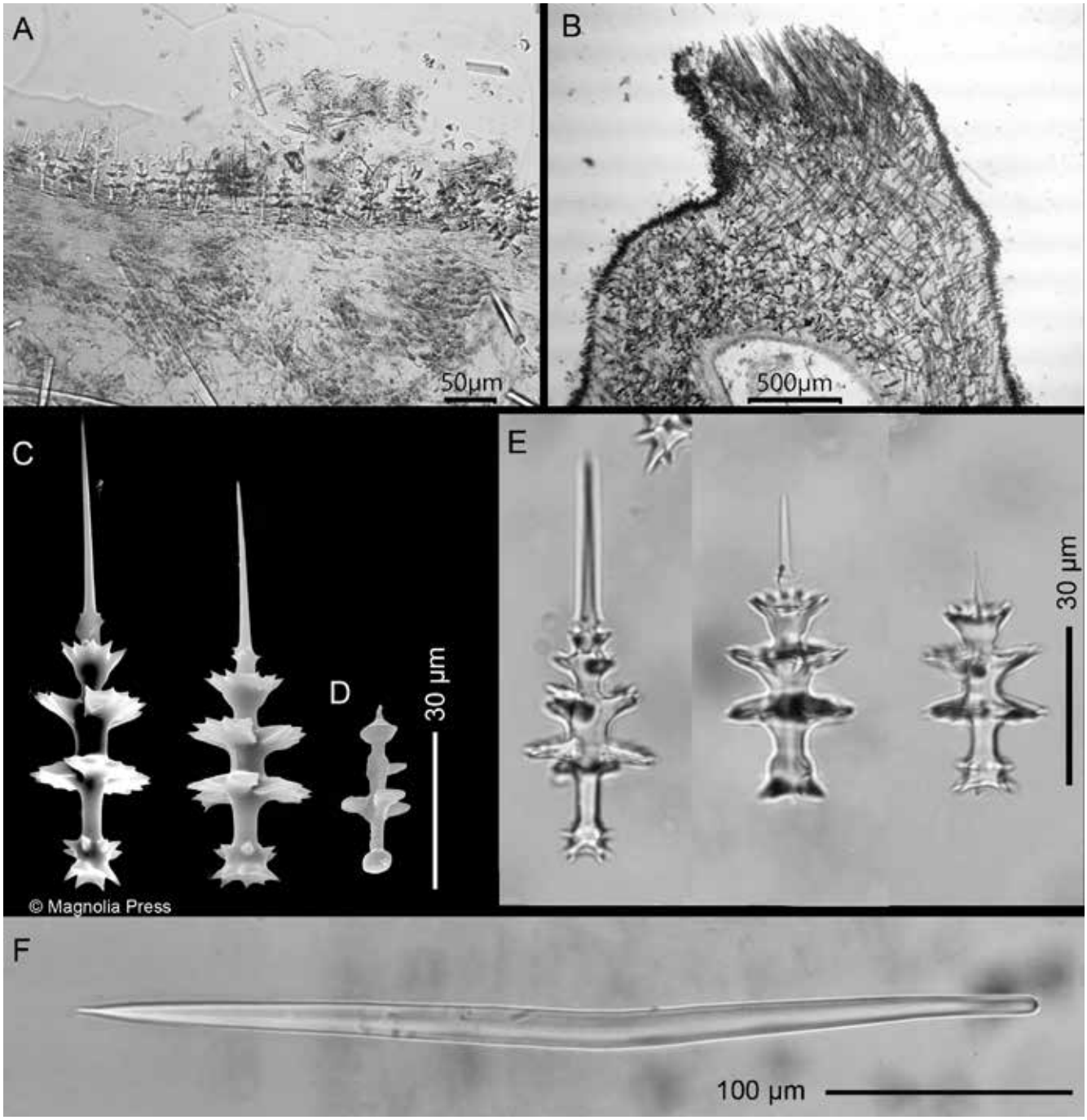


Figure 64. *Latrunculia* (*Aciculatrunculia*) *apicalis* Ridley & Dendy, 1886 **subgen. nov., comb. nov.**, holotype NHMUK 1887.5.2.88, skeleton and spicules: **A.** Cross-section of the ectosome showing the palisade of aciculodiscorhabds at the surface; **B.** Cross-section of a papillae reinforced with perpendicular anisostyles; **C.** Aciculodiscorhabds reproduced from Samaai *et al.* (2006: fig. 1C) with permission from the copyright holder and Toufiek Samaai; **D.** Immature aciculodiscorhabd (Image: Toufiek Samaai); **E.** Aciculodiscorhabds of a variety of lengths; **F.** Anisostyle.

of the holotype we found numerous microscleres that appeared superficially to be typical anisodiscorhabds (without an apical projection). On closer examination under the highest magnification, these microscleres turned out to be aciculodiscorhabds with the delicate apical spire broken off just above the apical whorl or the secondary expansion at the base of the spine.

Boury-Esnault & van Beveren (1982) assigned several Kerguelen Island specimens to *L. apicalis* despite them possessing both anisodiscorhabds and aciculodiscorhabds, primarily because the authors claimed that the two microscleres were indistinguishable in terms of dimensions, unlike in the holotype of *L. biformis*. However, Samaai *et al.* (2003) remeasured the spicules of one of Boury-Esnault & van Beveren's (1982) *L. apicalis* specimens and found a clear size difference between the aciculodiscorhabds [82 (73–85) µm] and the anisodiscorhabds [56 (55–57)

μm], and thus, reassigned the specimen to *L. biformis*. Similarly, Koltun (1964) assigned a specimen from Antarctica to *L. apicalis* but described the microscleres as "*discasters* (*with apical pointed process*) *0.074–0.126 mm long*; *sometimes also normal discasters may be found—0.04–0.081 mm long*", which clearly indicates that the specimen was *L.* (*L.*) *biformis*.

We examined three Antarctic specimens identified as *L. apicalis* that are deposited in the Naturalis Biodiversity Center (Netherlands), but these turned out to be two specimens of *L.* (*A.*) *biformis* **subgen. nov.** (ZMA.PO.P.12730, ZMA.PO.P.12731) and one specimen of *L.* (*L.*) *brevis* (ZMA.PO.P.12732).

In summary, we cannot confirm that *L.* (*A.*) *apicalis* **subgen. nov.** has been re-collected from the Kerguelen, or any other region, to this day. All specimens identified as *L. apicalis* that we have examined have turned out to be other *Latrunculia* species, and mostly *L.* (*A.*) *biformis* **subgen. nov.**

Key diagnostic characters

- hemispherical with volcano-shaped oscules and mammiform areolate porefields
- microscleres aciculodiscorhabds only
- distribution Kerguelen Islands, 126 m

Genus *Latrunpagoda* Kelly & Sim-Smith **gen. nov.**

Diagnosis. Latrunculiidae in which the microscleres are anisodiscorhabds with a prolonged shaft supporting multiple (more than three) whorls of spines, palmate flanges, or discs with denticulate margins, between the median whorl and the apical tuft. The basal substructures are simply three or more whorls or scatterings of spines of equal length at the base of the microsclere. Sceptre-like anisodiscorhabds with identical substructures, but greatly extended in length, may also be present.

Etymology. Named for Latrunculiidae with a new form of discorhabd that, in overall appearance, is reminiscent of an Asian pagoda (*pagoda*, a tiered tower with multiple eaves; L. feminine singular noun).

ZooBank registration. *Latrunpagoda* gen. nov. is registered in ZooBank under urn:lsid:zoobank.org:act:325AEB1B-D51F-4AE4-976C-63D8CEA3D9A9.

Remarks. The possession of atypically long anisodiscorhabds with additional whorls of spines or discs, and in addition, an identical but prolonged sceptre in several species, supports the establishment of a new genus, rather than assignment to *Latrunculia* (*Latrunculia*) as suggested by Samaai *et al.* (2006: 38). Kelly *et al.* (2016: 34) considered the possession of a second (longer) category of microsclere to be unusual enough within Latrunculiidae to "potentially warrant the establishment of another new subgenus in the future;" they removed *Latrunculia biformis* (with aciculodiscorhabds and sceptres) and *L. apicalis* (with aciculodiscorhabds), *L. multirotalis* (with prolonged anisodiscorhabds and sceptres) and *L. tetraverticillata* (with prolonged anisodiscorhabds) from subgenus *Latrunculia*. In this study we have established *Latrunculia biformis* as the type taxon of the new subgenus *Latrunculia* (*Aciculatrunculia*) **subgen. nov.**, and we herewith transfer *Latrunculia multirotalis* and *L. tetraverticillata* to the new genus *Latrunpagoda*.

Species attributed to *Latrunpagoda* **gen. nov**. possess highly characteristic, elongate anisodiscorhabds, with multiple whorls of spines or discs. The anisodiscorhabds of the best-known species from the Azores, *Latrunculia multirotalis* Topsent, 1927, and type of the new genus, have up to four additional whorls (incised, palmate discs) situated between a reduced spinose manubrium and basal whorl, and an apical tuft. The paratype also has a greatly elongated anisodiscorhabd (Topsent 1927, Fig. 19b) with up to 11 additional whorls of spines—at 217 μm, long these are effectively sceptres.

The anisodiscorhabds of *Latrunculia tetraverticillata* Mothes, Campos, Eckert & Lerner, 2008 from Brazil, have about four additional circular discs with a denticulate margin (lacking incisions), between a reduced, spinose manubrium and basal whorl, and a large, peony-like apical tuft. The holotype and paratype spicules are similar in length, ranging from 71 to 101 μm long. No sceptre-like spicules are described.

Samaai *et al.* (2006: 38) commented on the general likeness of the New Zealand Late Eocene Oamaru Diatomite microfossil anisodiscorhabds, provisionally named *Latrunculia oamaruensis*, to those of *Latrunclava imago* Kelly, Reiswig & Samaai, 2016, the type taxon for *Latrunclava* Kelly, Reiswig & Samaai, 2016. The microfossils (Hinde & Holmes 1892: pl. XI figs 34–35; redrawn in Wiedenmayer, 1994, figs 21.19–20), have four additional whorls of spines between a reduced, spinose manubrium and basal whorl, and a large, crown-like apical tuft—at about 206 μm long, these are also, effectively, sceptres. In all the illustrated spicules, the median whorl (immediately above the basal whorl) is the broadest in diameter. While the sceptres of *Latrunclava imago* and *Latrunculia oamaruensis* are both inequiended, the morphology of the base of these microscleres is what clearly differentiates them: in

Latrunclava imago the base of the sceptre has several blunt, spined structures emanating diagonally from the shaft, while the base of the microfossils only have several whorls of very short spines.

Kelly *et al*. (2016: 33) considered the microfossil spicules of *Latrunculia oamaruensis* to be comparable to the anisodiscorhabds of *L. multirotalis* and *L. tetraverticillata*, concluding that all three should be removed from the subgenus *Latrunculia*, and a new taxon established for these species, based on the possession of elongate, multiwhorled anisodiscorhabds. We must make a correction here: Kelly *et al*. (2016) inadvertently stated in the discussion that, "We also transfer…..the New Zealand Eocene fossil species, *Latrunculia oamaruensis*, to *Latrunclava* (Kelly *et al*. 2016: 44)," citing this transfer in their Table 9. This was never the intention, given their comments on the strong similarity between the microscleres of *Latrunculia oamaruensis*, *L. multirotalis* and *L. tetraverticillata*.

The sceptres in species of *Latrunpagoda* **gen. nov.** are superficially similar to those in *Sceptrella*, *Latrunclava*, and *Latrunculia* (*Aciculatrunculia*) **subgen. nov.**, but differ in the following ways (Fig. 72):

- the sceptres of *Latrunpagoda* **gen. nov.** are highly elongated versions of the normal anisodiscorhabds, except that the basal substructures are simply spines occurring in equal diameter rows or randomly scattered, with up to 11 additional whorls of spines, or discs along the shaft, between the median whorl and the apical tuft (Figs 72A–F);
- the sceptres in *Sceptrella* spp. are termed 'amphiclads', with almost identical patterns of spination on both ends of the spicule (Plate 1O);
- the sceptres in *Latrunclava* (Plate 1N) are termed 'anisoconicodiscorhabds' and are inequiended, with manubrium and basal whorl substructures being thick, chiaster-blunt, apically-spined extensions, which resemble those in the anisodiscorhabds of species of *Latrunculia* (*Uniannulata*) Kelly, Reiswig & Samaai, 2016, in particular *L.* (*U.*) *oparinae* (Plate 1F), *L.* (*U.*) *velera* Lehnert, Stone & Heimler, 2006, and various microfossil spicules from the Late Eocene Oamaru Diatomite of southern New Zealand (Kelly *et al*. 2016);
- the aciculodiscorhabd 'sceptres' in *Latrunculia* (*Aciculatrunculia*) *biformis* **subgen. nov., comb.** appear to be normal anisodiscorhabds with greatly extended apical spires (see Fig. 62I).

Type species. *Latrunculia multirotalis* Topsent, 1927.

Latrunpagoda multirotalis (Topsent, 1927) gen. nov., comb. nov.

Figs 65, 72

Latrunculia multirotalis Topsent, 1927: 8.
Latrunculia multirotalis, Topsent 1928: 222, pl. VII fig. 19; Wiedenmayer 1994: 64, figs 21.40–41; Kelly *et al*. 2016: 33–34, table 9.
Latrunculia sp. of Bukry 1979, pl. 6.12; Wiedenmayer 1994: 64, fig. 21.32.
Latrunculia (*Latrunculia*) *multirotalis*, Samaai *et al*. 2006: 36, figs 1, 2, 4.

Type & locality (not examined). Holotype—MNHN L.B.I.M. No D.CL. 1265, Azores, 1229 m.

Material examined. None.

Distribution. Azores Archipelago, North Atlantic (Fig. 65).

Description. Small encrusting sponge, 2 cm^3, with a slightly wrinkled surface and no visible openings. Choanosomal and ectosomal skeletons of the usual architecture.

Spicules. Megascleres are smooth, centrally thickened and often polytylote, 342 (309–364) × 11 μm long (315–335 μm; Topsent 1928).

Microscleres (Fig. 72A) are elongate, multiwhorled anisodiscorhabds with palmate whorls, incised to form regular, leaf-like structures, with a denticulate margin. Typically, these have two to three additional whorls

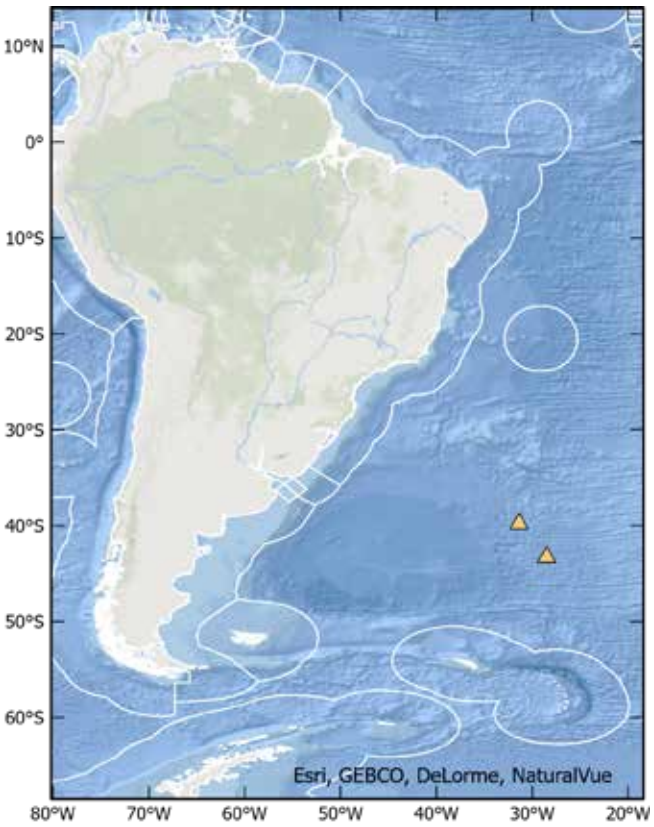


Figure 65. Syntype localities of *Latrunpagoda multirotalis* (Topsent, 1927) **gen. nov., comb. nov.** Country EEZs are outlined in white.

above the subsidiary whorl, forming a prolonged apex, the diameter of the whorls progressively diminishing in diameter towards the apical tuft, 142 μm (Topsent 1928; remeasured by Samaai *et al.* 2006: 117–186 μm; 110–130 μm).

Topsent noted some variations which include, in one specimen, smaller anisodiscorhabds measuring 104–110 μm long, with only two to three additional whorls, and in a specimen from Stn 2210, the anisodiscorhabds have three and sometimes up to ten additional whorls, reaching 217 μm in length, the latter being effectively sceptres (Fig. 72A; Topsent 1927: pl. VII fig. 19C).

Substrate, depth range and ecology. Found on soft sediment, 1229–2460 m.

Remarks. Samaai *et al.* (2006) considered the species *multirotalis* to be close to subgenus *Latrunculia*, basing their assignment on what appeared to be separate manubrium and basal whorls. However, Topsent (1928) described the manubrium as lacking a candelabrum-like base as in other species (notably *Latrunculia insignis* Topsent, 1890 which is now in *Sceptrella*), but having a straight stem adorned always by three rows of spines, not two separate rows, as in subgenus *Latrunculia*.

Samaai *et al.* (2006) discussed the 'sceptres' illustrated by Topsent (1927) in pl. VII fig. 19B, comparing them to Hinde & Hinde's (1892) microfossil spicules named tentatively as *Latrunculia oamaruensis*. With Wiedenmayer (1994), Samaai *et al.* (2006: 38) alluded to the difficulty of assessing homology between the microfossils from the New Zealand Oamaru Diatomite and the microscleres of extant species from the Atlantic Ocean. Bukry (1979: pl. 6.12) illustrated a microfossil microsclere (redrawn in Wiedenmayer 1994: fig. 21.32) from the Deep Sea Drilling Project Site 408, on the Northwestern flank of Reykjanes Ridge between Iceland and southern Greenland (Fig. 72F), that strongly resembles those of *L. multirotalis* (Fig. 72A) and Hinde & Holmes (1892: pl. XI figs 34–36) microfossils suggesting that several latrunculid species with prolonged apices must have coexisted at the 'source' of this assemblage, wherever it was.

Key diagnostic characters

- small encrustation with no visible aquiferous openings
- microscleres are multiwhorled anisodiscorhabds, occasional sceptres
- distribution Azores, Atlantic Ocean, 1229–2460 m

Latrunpagoda tetraverticillata (Mothes, Campos, Eckert & Lerner, 2008) gen. nov., comb. nov.

Figs 66, 72

Latrunculia (*Latrunculia*) *tetraverticillata* Mothes, Campos, Eckert & Lerner, 2008: 59–65; figs 1–3.

Latrunculia tetraverticillata, Muricy *et al.* 2011: 144–145; Kelly *et al.* 2016: 33–34.

Type & locality (not examined). Holotype—MCNPO. 3695, Brazil, off Santa Catarina State coast, 29.23° S, 47.946° W, 420 m, 24 April 1997.

Material examined. None.

Distribution. Off the coast of Santa Catarina State, Brazil, southwestern Atlantic (Fig. 66).

Description. Small encrusting sponge, about 7 mm square and 1 mm thick, with a velvety surface and a single conical oscule, 1 mm diameter. Choanosomal and ectosomal skeletons of the usual architecture.

Spicules. Megascleres are smooth, centrally thickened, and often polytylote, holotype 387 (333–442); paratype 349 (190–450) μm long.

Microscleres (Fig. 72B) with a straight, stout shaft that supports a reduced manubrium and base ornamented with whorls of small spines, supporting additional subsidiary whorls and a dense, peony-like

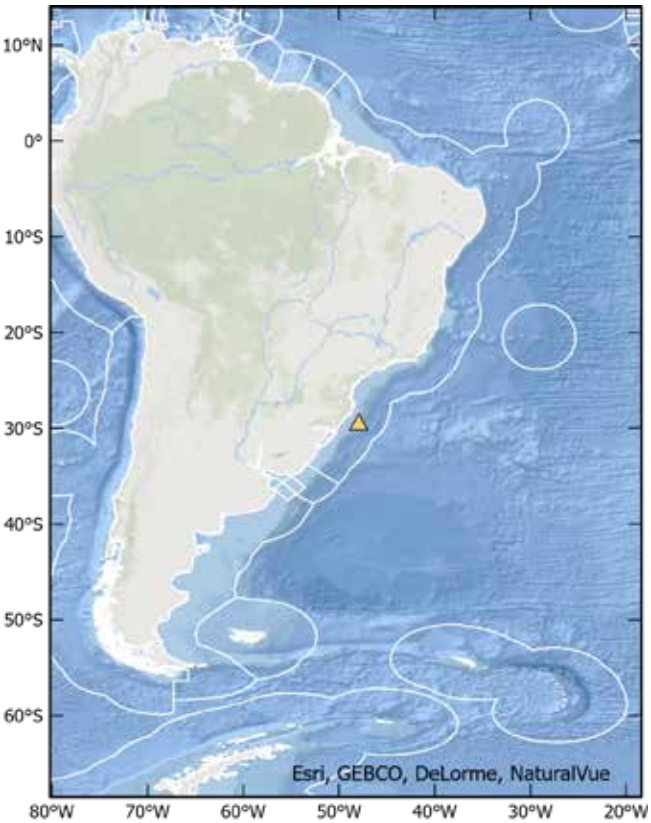


Figure 66. Type locality of *Latrunpagoda tetraverticillata* (Mothes, Campos, Eckert & Lerner, 2008) **gen. nov., comb. nov.** Country EEZs are outlined in white.

apical tuft. The whorls are discate with no apparent incisions, but with denticulate margins, the discs progressively diminishing in diameter towards the apical tuft, holotype 94 (83–99); paratype 90 (71–101) μm long (modified from Mothes *et al.* 2008).

Substrate, depth range and ecology. Found growing on pebbles, 420 m.

Remarks. The prolonged anisodiscorhabds of *Latrunculia* (*L.*) *tetraverticillata*, described and illustrated by Mothes *et al.* (2008), are beautiful examples of the microscleres that define the new genus *Latrunpagoda*; this Brazilian species has anisodiscorhabds with several, largely indistinguishable whorls of spines on the base of the spicule, above which are several additional discs including a median whorl, one to three subsidiary or apical whorls (Figs 72B, C), and finally, a compact apical tuft that resembles a peony (Fig. 72B). Sceptre-like anisodiscorhabds are not present in this species; microscleres in the holotype and paratype [Mothes *et al.* (2008, Table 1)] are consistent within a restricted range of 83–101 μm long.

Mothes *et al.* (2008) considered the microfossil spicule represented as *Latrunculia* sp. (l) (Hinde & Holmes Hinde & Holmes 1892: 218, pl. XI fig. 37) to be comparable to the anisodiscorhabds in their species *tetraverticillata*, in terms of the number of whorls and overall dimensions, but noted that the microfossil spicule was composed of whorls of spines, rather than being a disc, and that the apex of the microfossil spicule was a prominent spine, rather than a dense, 'rose-like' structure as in *tetraverticillata*. Those authors agreed with Samaai *et al.* (2006) that the similarity of the long, multiwhorled anisodiscorhabds, and the occurrence in the New Zealand fossil fauna, indicated the possible presence of a primary community in the Southern Ocean.

Key diagnostic characters

- small encrustation with a single conical oscule
- microscleres are multiwhorled anisodiscorhabds
- distribution Southwestern Brazil, Atlantic Ocean, 420 m

Latrunpagoda oamaruensis† (Hinde & Holmes, 1892) gen. nov., comb. nov. Figs 67, 72

Latrunculia oamaruensis Hinde & Holmes, 1892: 218, pl. XI figs 34, 35.

Latrunculia oamaruensis, Wiedenmayer 1994: 64, figs 21.19–21; Mothes *et al.* 2008: 59–65; figs 1–3; Kelly *et al.* 2016: 33–34, fig. 13C, table 9.

Latrunculia (k) Hinde & Holmes, 1892: 218, pl. XI fig. 36.

Latrunclava oamaruensis, Kelly *et al.* 2016: 33–34, 44, Table 9.

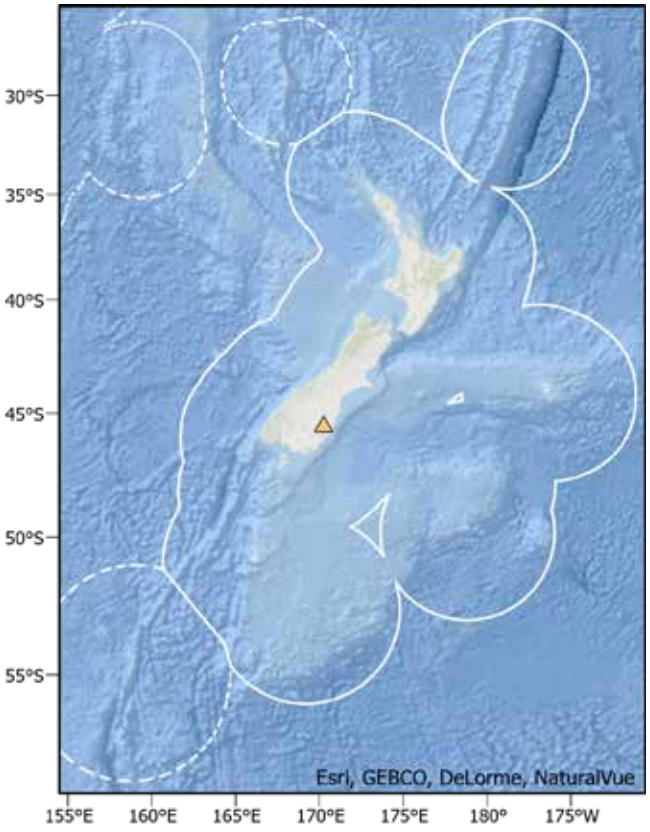


Figure 67. Type locality of *Latrunpagoda oamaruensis*† (Hinde & Holmes, 1892) **gen. nov., comb. nov.**, the Oamaru Diatomite, Taylor's Quarry, Oamaru, New Zealand. The New Zealand EEZ is shown by the solid white line and the Australia EEZ is shown by the dashed white line.

Type & locality. Holotype—microfossil anisodiscorhabds illustrated by Hinde & Holmes (1892: 218, plate XI, figs 34, 35), Taylor's Quarry, Oamaru, New Zealand.

Material examined. None.

Type location and age. Hinde & Holmes (1892) did not specify the exact location of the microfossil spicule collection, other than it came from three possible locations in the Oamaru District: Cormacks Siding, Jackson's Paddock, and Bain's Farm (Fig. 67; Lautour 1889; Edwards 1991) (see Kelly *et al.* 2016). The microfossil anisodiscorhabds are from marine diatomaceous sediments of the Oamaru Diatomite member of the basaltic Waiareka Volcanic Formation (see Fig. 42 here; Hinde & Holmes 1892). Runangan (Late Eocene) age (36.4–34.6 Ma) (Edwards 1991). A dagger symbol (†) following the species name indicates that this is a fossil species (from Kelly *et al.* 2016).

Spicules. The first microfossil anisodiscorhabd illustrated by Hinde & Holmes (1892: pl. XI fig. 34 (Fig. 72D left) has a 'stout, elongate, subfusiform shaft, at the base of which are 'three or four whorls of minute spines separated by short interspaces, separated from these by a smooth interval is a whorl of conical, horizontally disposed spines, followed by five additional irregular

whorls at regular intervals.' The upper end of the shaft is a whorl of upwardly curved, apparently serrated spines or plates and the apex is a 'stout vertical spine,' all spines are acanthose, being armed with secondary spines:' 206 μm long × 43 μm maximum diameter. A second microfossil spicule was illustrated (pl. XI fig. 35) (Fig. 72D middle), and was of about the same dimensions as the former (Fig. 72D left), but the latter has a curved shaft with less regular whorls of spines and with 'numerous intermediate single spines.' The upper end of the shaft was described as a 'shallow, cup-shaped expansion of a group of spines, some of which have minute globular heads.' These two microfossil spicules were considered to 'probably belong to the same species,' provisionally named *Latrunculia oamaruensis* (Hinde & Holmes 1892: 218).

Hinde & Holmes (1892: pl. XI fig. 36) (Fig. 72D right) illustrated a much shorter anisodiscorhabd, identifying it as '*Latrunculia* (k)', stating that in general character it resembled the preceding spicules, but that it had only a small number of additional whorls of spines between the base and apex of the spicule, and an apical whorl formed of 'curved spines or plate-like hooks, with the apical tuft being several projecting spines,' resembling the structures illustrated in pl. XI fig. 34: 133 μm long × 40 μm maximum diameter.

Remarks. The large microfossil spicules illustrated in Hinde & Holmes (1892: pl. XI figs 34–36), are strongly reminiscent of the prolonged anisodiscorhabds and spined sceptres in *Latrunpagoda multirotalis* and *Latrunpagoda tetraverticillata*. Taken together, the large, microfossil spicules illustrated in Hinde & Holmes (1892: pl. XI figs 34, 35: *Latrunculia oamaruensis* of Hinde & Holmes) and the shorter but prolonged anisodiscorhabd illustrated in the same pl. XI fig. 36 [*Latrunculia* (k)], could reasonably be considered a single species, *Latrunpagoda oamaruensis* **gen. nov., comb. nov.**

Nevertheless, some doubt as to the integrity of the species remains because the species was established on the basis of illustrations only; for example, in Table 9 of Kelly *et al.* (2016), the authors mistakenly transferred *Latrunculia oamaruensis* to *Latrunclava*. This was clearly an error because on page 33 of that paper, the authors stated that while "the anisodiscorhabds of *Latrunculia oamaruensis*…..also bear a general likeness to the anisoconicorhabds of *Latrunclava* gen. nov. (in that they are also inequiended), they are more strongly reminiscent of the anisodiscorhabds of *Latrunculia* (*Latrunculia*) *multirotalis* Topsent, 1927 and *Latrunculia* (*Latrunculia*) *tetraverticillata* Mothes, Campos, Eckert & Lerner, 2008, which also have multiple whorls around the shaft, but these are plate-like." Without new material, resolution remained very challenging.

However, Leal, C.V, Fernandez, J.C.C., Fonesca, C.A. & Hajdu, E. (unpublished data) kindly provided us with their images of microfossil spicules, isolated from a 30 cm^3 block of Oamaru diatomite, to help address these concerns. The images were of five fully intact prolonged anisodiscorhabds with remarkably similar morphology and ornamentation to those illustrated by Hinde & Holmes (1892: pl. XI fig. 36) (Figs 72G–K). The light microscope images showed that the base of the spicules is composed of several whorls of short spines and all spines are acanthose, just as in the illustrations in Hinde & Holmes (1892: pl. XI figs 34–36). The apex in each spicule is composed of a whorl of upward-pointing, acanthose, possibly serrated spines, just as in the illustrations in Hinde & Holmes (1892: pl. XI figs 34–36) (Figs 72F–K). The overall dimensions of the spicules are also close to those given in Hinde & Holmes for the smaller anisodiscorhabd (pl. XI fig. 36; 133 μm long × 40 μm max. diameter): 111 (78–137) long × 40 μm max. diameter (n=5; Figs 72G–K). A further image was of a long, curved, spined, broken spicule that strongly resembles the larger sceptre of Hinde & Holmes (Fig. 72E). Without a base, the length of the fragment is about 230 μm long × 40 μm maximum diameter, indicating that the full size of the spicule is likely to be about 275 μm long, based on the proportions of the illustrations in Hinde & Holmes. This is somewhat larger than Hinde & Holmes spicules (206 μm long × 43 μm maximum diameter) but could be within the realms of natural variation.

Given the additional information provided in this unpublished study, we are more confident in the decision to transfer *Latrunculia oamaruensis*, as represented by Hinde & Holmes (1892: 218, pl. XI fig. 34, 35), and *Latrunculia* (k), as represented by Hinde & Holmes (1892: 218, pl. XI fig. 36), to *Latrunpagoda oamaruensis* **gen. nov., comb. nov.**

Latrunpagoda icelandica† Kelly & Sim-Smith gen. et sp. nov. Figs 68, 72

"Siliceous sponge spicule sample 408-21-4" of Bukry 1979: 576, pl. 6 fig. 13; Wiedenmayer 1994: 63, fig. 21.33.

Type & locality (not examined). Holotype—named as the fossil species represented by the microfossil anisodiscorhabd, Sample 408-21-4, core depth 0–2 cm, 195 m depth, illustrated in Bukry (1979: pl. 6 fig. 13).

Material examined. None.

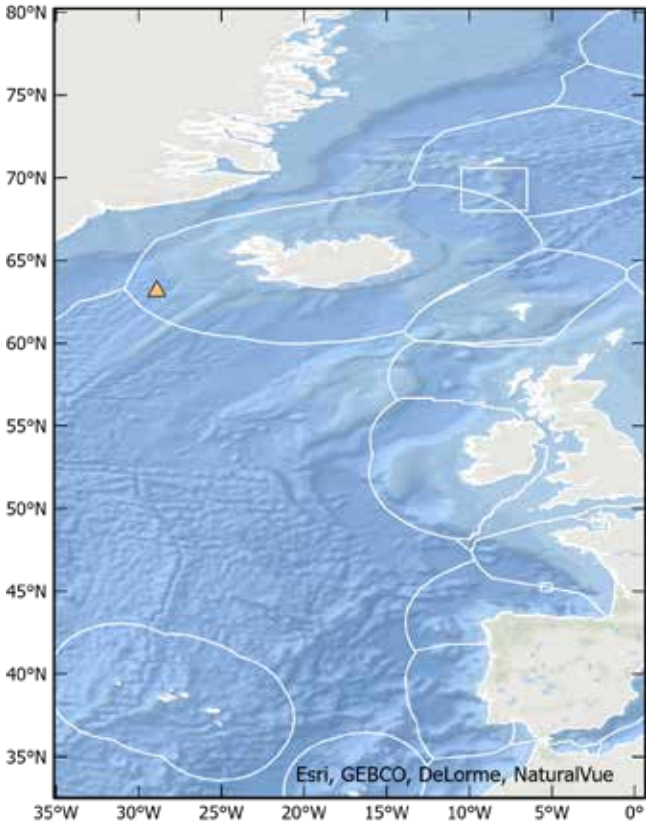


Figure 68. Type locality of *Latrunpagoda icelandica*† Kelly & Sim-Smith **gen. et sp. nov.** Country EEZs are outlined in white.

Type location and age. The microfossil anisodiscorhabd was obtained from a core drilled at Site 408, on Leg 49 of the Deep Sea Drilling Project, on the western flank of the Reykjanes Ridge west of Iceland at the position of magnetic anomaly 6 (63.377° N, 28.912° W, 1624 m) (Fig. 68). Lower Miocene age (23.03–5.3 Ma), magnetic anomaly 6 is about 20 Ma (Bukry 1979).

Spicules. Microscleres (Fig. 72F) are microfossil anisodiscorhabds of Miocene age with a stout, straight, elongate shaft, at the base of which are numerous rows of spines representing the reduced manubrium and basal whorls. Smaller spines are visible on the upper part of the shaft below the median whorl. Median whorl composed of raised concave palmate flanges that appear to be deeply incised and foliose, giving the impression of a series of petals arising from the shaft. Two to three subsidiary whorls with the same morphology are present above the median whorl. The apical whorl and tuft appear to be shaped like a cup or crown. Anisodiscorhabd 128 μm long × 54 μm wide (from Bukry 1979).

Etymology. Named for the type locality.

ZooBank registration. *Latrunpagoda icelandica*† **gen. et sp. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:8E350F3B-38BC-4F2F-B239-5B7679D28B55.

Remarks. The microfossil anisodiscorhabd was illustrated in Bukry (1979: pl. 6 fig. 13) from a marine sediment core drilled at Site 408, on Leg 49 of the Deep Sea Drilling Project, on the western flank of the Reykjanes Ridge west of Iceland at the position of magnetic anomaly 6. Although similar in general form to the anisodiscorhabds in other species of *Latrunpagoda* **gen. nov.**, particularly that of *Latrunpagoda multirotalis* **gen. nov.**, **comb. nov.**, the microfossil anisodiscorhabd of *Latrunpagoda icelandica* **gen. et sp. nov.** has highly incised, petal-shaped whorls that are irregular in the horizontal plane. Although the length of the spicule (128 μm) is similar to those in *Latrunpagoda multirotalis* **gen. nov.**, **comb. nov.**, the diameter of the median whorl and additional whorls in particular, appear to be broader than in those of *Latrunpagoda multirotalis* **gen. nov., comb. nov.** Given the uniformity of the anisodiscorhabds within species of *Latrunpagoda* **gen. nov.** generally, we consider the differences illustrated in *Latrunpagoda icelandica* **gen. et sp. nov.** to be sufficient for the recognition of a new species from the lower Miocene. This record constitutes the most northerly occurrence of a species of Latrunculiidae globally.

Genus *Latrundiabolo* Kelly & Sim-Smith gen. nov.

Diagnosis. Latrunculiidae in which the microscleres are isodiscorhabds with terminal features resembling a diabolo or yoyo, a central whorl, and spines along the shaft. Sceptres are also diabolo-shaped with an expanded shaft between the terminal hemispheres, along which are numerous spines that may or may not form whorls. The diabolo whorls are composed of numerous short spines that are joined at the base near the shaft.

Etymology. Named for Latrunculiidae with isodiscorhabds and sceptres in the form of a *diabolo*, a Chinese yoyo used in juggling, being hourglass- or eggcup-shaped, or with discs instead of cups, at each end (from *diabolo*, Greek; masculine singular noun).

Remarks. The species name has also been changed from *crenulata* to *crenulatus* to match the gender of *Latrundiabolo* **gen. nov.** Figure 72 provides an illustrated comparison of the microscleres of *Latrunpagoda* **gen. nov.** and *Latrundiabolo* **gen. nov.**

ZooBank registration. Genus *Latrundiabolo* **gen. nov.** is registered in ZooBank under urn:lsid:zoobank.org:act:F348959B-735E-456A-BA16-FE39CE6C2882.

Type species. *Latrunculia crenulata* Lévi, 1993: 30.

Latrundiabolo crenulatus (Lévi, 1993) gen. nov., comb. nov. Figs 69, 72

Latrunculia crenulata Lévi, 1993: 30, fig. 10B.
Latrunculia (*Latrunculia*) *crenulata*, Samaai *et al.* 2006: 38, figs 1I, 2.
Latrunculia crenulata incertae sedis, Kelly *et al.* 2016: 38, Table 9.

Type & locality (not examined). Holotype—MNHN DCL3550, Biocal Stn DW36, 23.14° S, 167.183° E, New Caledonia, 650–680 m, 29 Aug 1985.

Material examined. None.

Distribution. New Caledonia (Fig. 69).

Description. Very small sponge on a piece of coral debris, grey in colour. Surface has a striated appearance, due to the tangential alignment of the isodiscorhabds which form a regular layer over the entire surface.

Spicules. Megascleres are strongyles, more or less centrotylote and polytylote: 210–260 µm long × 6 µm thick, erect or oblique within the choanosome.

Microscleres (Fig. 72H) are isodiscorhabds with terminal diabolos or yoyos, a central whorl, and some intermediate spines: 60–65 µm long × 25 µm wide. The whorls of the terminal diabolos are formed of numerous very short spines, conjoined at the base near the shaft. Sceptres (Fig. 72G) are diabolo-shaped with an expanded shaft between the terminal hemispheres, with numerous spines that may or may not form whorls: 70–160 µm long, 20 µm diameter (modified from Lévi 1993).

Substrate, depth range and ecology. Substrate unknown, 650–680 m.

Remarks. Lévi (1993) considered *Latrunculia crenulata* to be closest to the North Atlantic species *L. cratera*, in terms of the morphology of the basal, median, subsidiary and apical whorls, which are "*four crenulated discs*"; but in terms of the overall structure of the discorhabds, they are completely different spicule forms. Indeed, two major differences exist between *L. cratera* and *Latrundiabolo crenulatus* **gen. nov.**, and certainly all *Latrunculia* species known to date:

1. The surface of *L. crenulatus* **gen. nov.** has a "*striated appearance due to the alignment of the discasters… which form a regular layer over the entire surface*"; thus, the isodiscorhabds of *Latrundiabolo crenulatus* **gen. nov.** are aligned tangentially on the sponge surface in the opposite orientation to all *Latrunculia* species, in which the anisodiscorhabds are aligned erect on the surface.
2. The microscleres of all *Latrunculia* species are anisodiscorhabds and the microscleres of *Latrundiabolo crenulatus* **gen. nov.**, are isodiscorhabds.
3. In their general form, the isodiscorhabds of *Latrundiabolo crenulatus* **gen. nov.** are vaguely comparable to the isospinodiscorhabds of species of *Cyclacanthia* and the isochiadiscorhabds of species of *Tsitsikamma* Samaai & Kelly, 2002, being more or less equiended in form and ornamentation. Lévi also noted the presence of longer microscleres, as in *Latrundiabolo crenulatus* **gen. nov.** (now termed 'sceptres'), in several species of

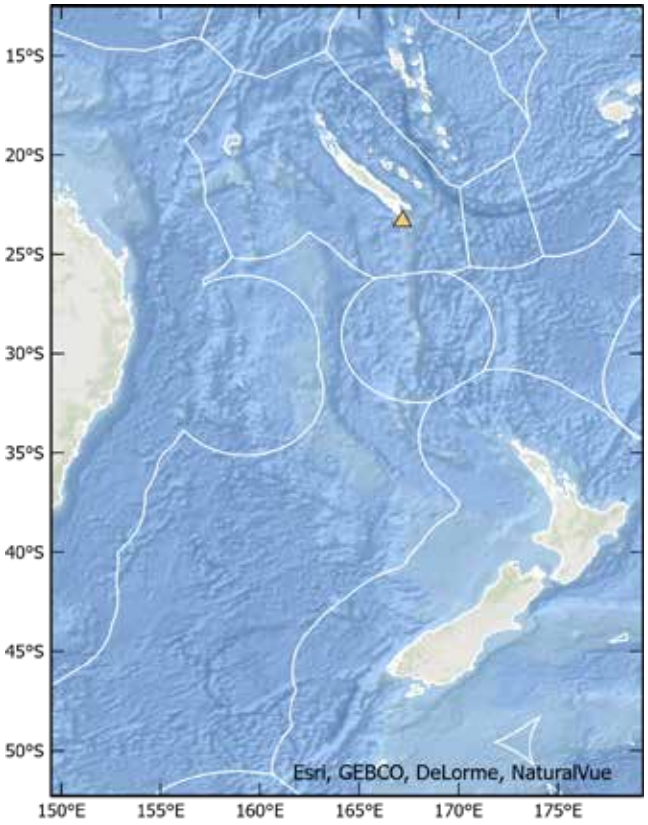
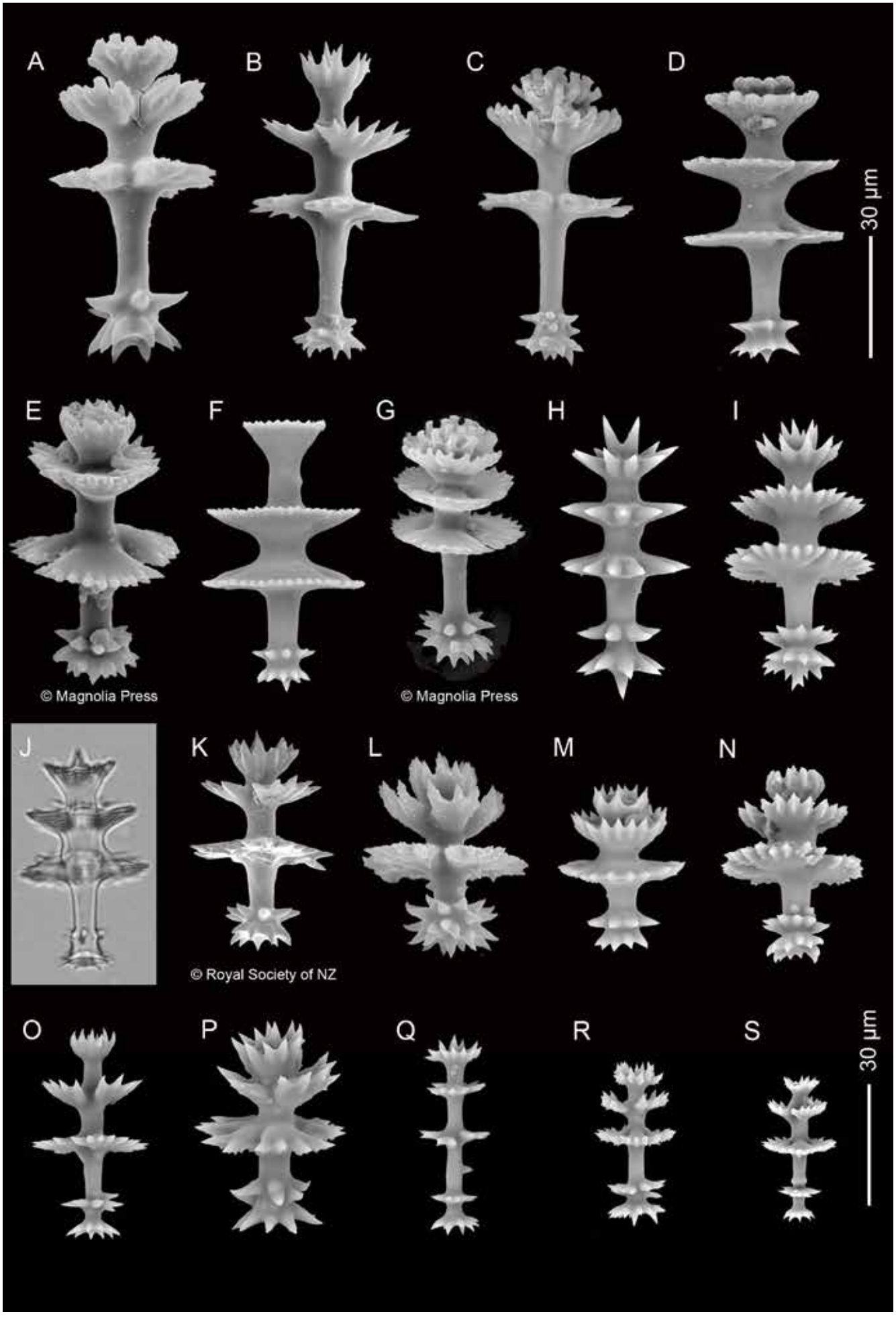


Figure 69. Type locality of *Latrundiabolo crenulatus* (Lévi 1993). Country EEZs are outlined in white.

Figure 70. (*Opposite*) Comparison of anisodiscorhabds (to scale) of New Zealand and Antarctic species of *Latrunculia* (*Latrunculia*) du Bocage, 1869: **A.** *L.* (*L.*) *bransfieldi* **sp. nov.**; **B.** *L.* (*L.*) *andeepi* **sp. nov.**; **C.** *L.* (*L.*) *lendenfeldi* Hentschel, 1914; **D.** *L.* (*L.*) *toufieki* **sp. nov.**; **E.** *L.* (*L.*) *basalis* Kirkpatrick, 1908, reproduced from Samaai *et al.* (2006: fig. 1E) with permission from the copyright holder and Toufiek Samaai; **F.** *L.* (*L.*) *incristata* **sp. nov.**; **G.** *L.* (*L.*) *bocagei* Ridley & Dendy, 1886, reproduced from Samaai *et al.* (2006: fig. 1B) with permission from the copyright holder and Toufiek Samaai; **H.** *L.* (*L.*) *robertsoni* **sp. nov.**; **I.** *L.* (*L.*) *kiwi* **sp. nov.**; **J.** *L.* (*L.*) *magistra* **sp. nov.**; **K.** *L.* (*L.*) *brevis* Ridley & Dendy, 1886, reproduced with permission from the copyright holder; **L.** *L.* (*L.*) *nelumbo* **sp. nov.**; **M.** *L.* (*L.*) *morrisoni* **sp. nov.**; **N.** *L.* (*L.*) *prendens* **sp. nov.**; **O.** *L.* (*L.*) *gracilis* **sp. nov.**; **P.** *L.* (*L.*) *variornata* **sp. nov.**; **Q.** *L.* (*L.*) *triverticillata* Alvarez, Bergquist & Battershill, 2002; **R.** *L.* (*L.*) *fiordensis* Alvarez, Bergquist & Battershill, 2002; **S.** *L.* (*L.*) *oxydiscorhabda* Alvarez, Bergquist & Battershill, 2002.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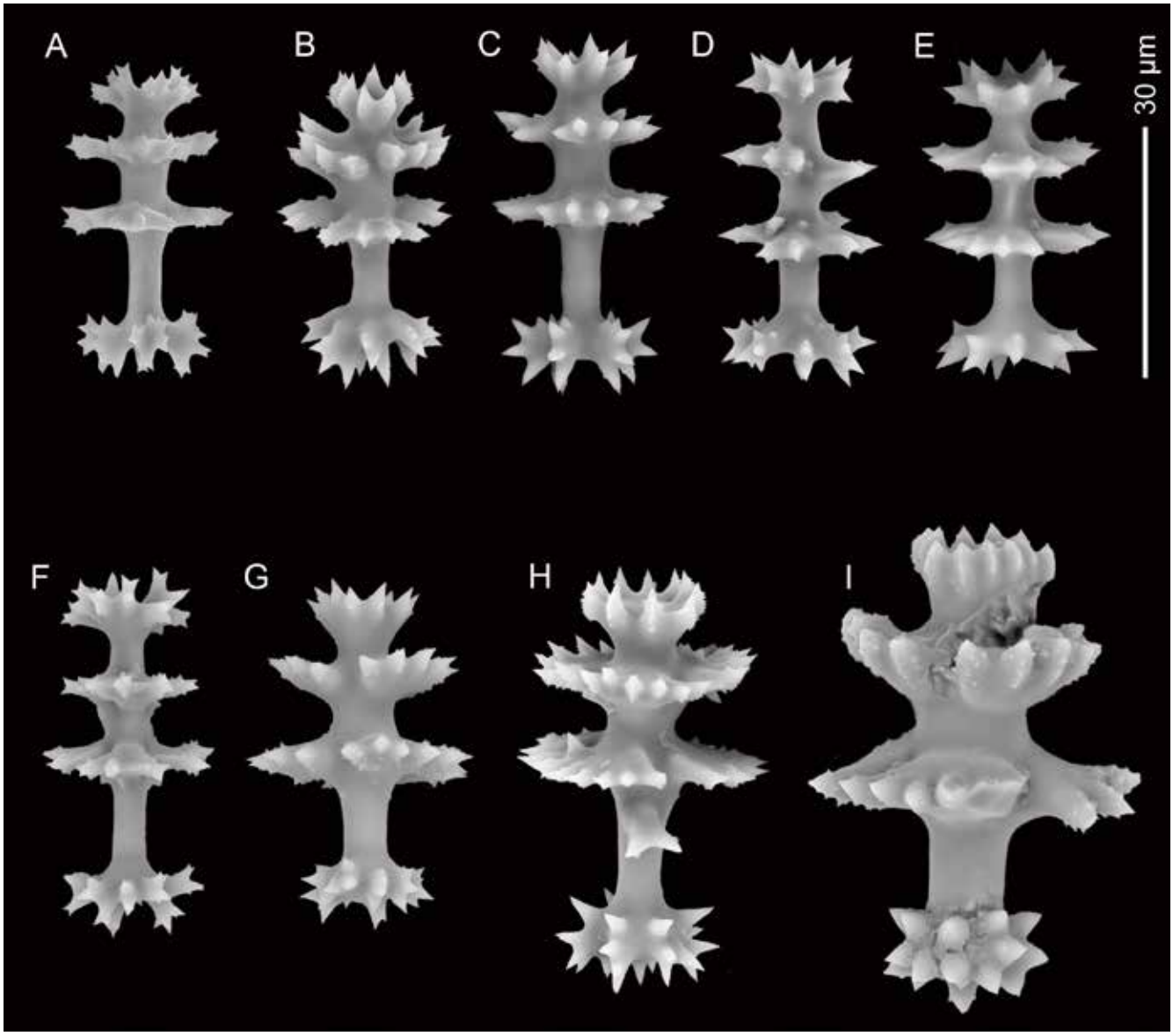
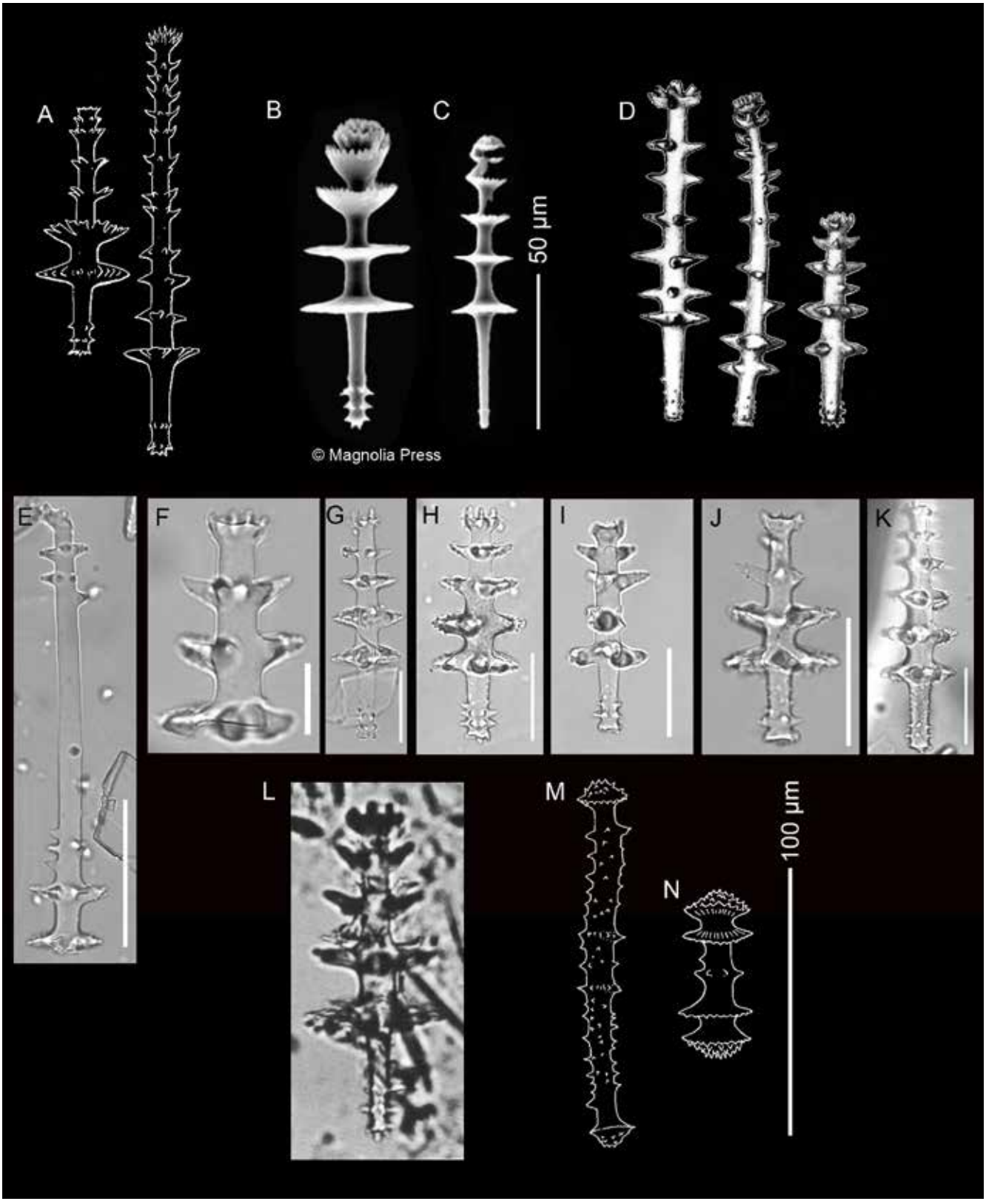


Figure 71. Comparison of anisodiscorhabds (to scale) of New Zealand and Antarctic species of *Latrunculia* (*Biannulata*) Samaai, Gibbons & Kelly, 2006: **A**. *L.* (*B.*) *procumbens* Alvarez, Bergquist & Battershill, 2002; **B.** *L.* (*B.*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002; **C.** *L.* (*B.*) *duckworthi* Alvarez, Bergquist & Battershill, 2002; **D.** *L.* (*B.*) *wellingtonensis* Alvarez, Bergquist & Battershill, 2002; **E.** *L.* (*B.*) *kaikoura* Alvarez, Bergquist & Battershill, 2002; **F.** *L.* (*B.*) *millerae* Alvarez, Bergquist & Battershill, 2002; **G.** *L.* (*B.*) *spinispiraefera* Brøndsted, 1924; **H.** *L.* (*B.*) *macquariensis* **sp. nov.**; **I.** *L.* (*B.*) *alvarezae* **sp. nov.**

Figure 72. (*Opposite*) Comparison of the microscleres of *Latrunpagoda* **gen. nov.** and *Latrundiabolo* **gen. nov.**: **A.** *Latrunpagoda multirotalis* (Topsent, 1927) **gen. nov., comb. nov.**, reproduced from Topsent (1927: pl. VII fig. 19); **B–C.** *Latrunpagoda tetraverticillata* (Mothes, Campos, Eckert & Lerner, 2008) **gen. nov., comb. nov.**, reproduced from Mothes *et al.* (2008: fig. 2E) with permission from the copyright holder; **D.** *Latrunpagoda oamaruensis*† (Hinde & Holmes, 1892) **gen. nov., comb. nov.**, reproduced from Hinde & Holmes (1892: pl. XI figs 34–36). Microfossil anisodiscorhabds and sceptre isolated from a piece of Oamaru Diatomite from Taylor's Quarry, Oamaru, New Zealand (Leal, C.V, Fernandez, J.C.C., Fonesca, C.A. & Hajdu, E. unpublished data): **E.** Broken sceptre with irregular apex, about 250 µm long × 40 µm maximum diameter, scale = 80 µm; **F.** Anisodiscorhabd apex with basal substructures missing, length about 65 µm, scale = 20 µm; **G.** Anisodiscorhabd about 137 µm long × 43 maximum diameter, scale = 40 µm; **H.** Anisodiscorhabd about 117 µm long × 45 µm maximum diameter, scale = 40 µm; **I.** Anisodiscorhabd about 97 µm long × 35 µm maximum diameter, scale = 40 µm; **J.** Anisodiscorhabd about 78 µm long × 35 µm maximum diameter, scale = 40 µm; **K.** Anisodiscorhabd about 125 µm long × 40 µm maximum diameter, scale = 40 µm; **L.** *Latrunpagoda icelandica*† **gen. et sp. nov.**, reproduced from Bukry (1979), figure 13, under Creative Commons Attribution 4.0 International (CC BY 4.0) license; **M–N.** *Latrundiabolo crenulatus* (Lévi 1993) **gen. nov., comb. nov.**, reproduced from figure 10B, with permission from Science Press]. Note that A, D, and L are not to scale. Figures E–K are reproduced with permission from Dr Eduardo Hajdu and Dr Julio C. C. Fernandez, Taxonomy Laboratory of Porifera (TAXPO), Department of Invertebrates, Museu Nacional/UFRJ, Rio de Janeiro, Brazil.

Latrunculia: *L. insignis* Topsent, 1890 (now *Sceptrella*), *L. multirotalis* Topsent, 1927, *L. apicalis*, and *L. oamaruensis*.

That Lévi (1993) recognised this highly unusual sponge as latrunculid, is a testimony to his remarkable taxonomic insight: the diabolo-shaped isodiscorhabds are unprecedented thus far in Latrunculiidae (Samaai *et al.* 2006) and globally: their closest relatives (diabolo-shaped anisodiscorhabds) are only found in the fossil literature (Hinde & Holmes 1892; Hinde 1910; summarised by Wiedenmayer 1994; Łukowiak 2015) and in the subgenus *Latrunculia* (*Uniannulata*) Kelly *et al.* 2016. Samaai *et al.* (2006) assigned *Latrunculia crenulata* to subgenus *Latrunculia*, but Kelly *et al.* (2016)



reversed this decision, referring the species to *Latrunculia incertae sedis* until the origin of the unusual microscleres could be assessed.

Kelly *et al.* (2016) compared the diabolo-like microscleres to the cricophalangasters of Schrammen (1924: pl. 7 figs 41–42, Late Cretaceous of Lower Saxony, northern Germany), figured by Wiedenmayer (1994, figs 22.14–15), but these are heavily spinose on the shaft and terminal crowns, not finely acanthose as in *Latrundiabolo crenulatus* **gen. nov.** A similar microsclere illustrated in Hinde (1910: pl. 1 fig. 12) and figured in Wiedenmayer (1994, fig. 22.13), was considered by the later author to be transitional between *Sceptrintus* Topsent, 1898 and latrunculid isodiscorhabds, but again, the whorls and terminal tufts are heavily spinose and nothing like the finely stippled apical and basal crowns of the microscleres of *Latrundiabolo crenulatus* **gen. nov.**

Kelly *et al.* (2016) considered that the 'stubby cricorhabds' of Reif (1967: pl. 13 fig. 2, Late Jurassic of the Swabian Alb, southern Germany), figured in Wiedenmayer (1994, figs 17.27, 17.28) were the most similar to the isodiscorhabds of *Latrundiabolo crenulatus* **gen. nov.**, despite being considered by Wiedenmayer as the microfossil remains of fossil Clionaidae d'Orbigny, 1851, The diabolo-like isodiscorhabds of *Latrundiabolo crenulatus* **gen. nov.** are also strongly reminiscent of the didiscorhabds of Wiedenmayer (1994: fig. 23) and the trochirhabds of species of *Chondrocladia* (*Meliiderma*) described in Vacelet *et al.* (2009, figs 2, 4), but these are now known to be poecilosclerid in origin.

Kelly *et al.* (2016) established the new subgenus *Latrunculia* (*Uniannulata*) for two living North Pacific species and 11 Late Eocene species from Hinde & Holmes (1892) and Hinde (1910), many of which have the finely spinose apical crown, but which are always inequiended with a spinose manubrium and basal whorl (Kelly *et al.* 2016, fig. 10). The Late Eocene microfossil spicule that represents the species, *L.* (*U.*) *struma* Kelly *et al.* 2016, from the Norseman District, Western Australia (Hinde 1910: pl. 1 fig. 17), is perhaps the closest to the isodiscorhabds in *Latrundiabolo crenulatus* **gen. nov.**, in terms of the morphology and specific ornamentation of the apical whorl and apex (see also Łukowiak 2015: 33, figs 19A–E) but, again these are clearly anisodiscorhabds.

Despite the possession of isodiscorhabds rather than anisodiscorhabds and their tangential, rather than vertical disposition in the ectosome, and despite there only being a single species in existence with these unique microscleres, we concur with Levi's assignment of this species to Family Latrunculiidae but recognise *Latrunculia crenulata* as representing a new genus that differs significantly from isodiscorhabd-possessing taxa in *Latrunculia* (*Uniannulata*), *Tsitsikamma* and *Cyclacanthia*.

Key diagnostic characters

- very small encrustation with a striated appearance
- microscleres, diabolo-like isodiscorhabds and sceptres
- distribution New Caledonia, 650–680 m

Discussion

Many species of *Latrunculia* are very difficult to differentiate using standard morphological techniques. Miller *et al.* (2001) used genetic differences to differentiate between eight New Zealand species, and while these genetic differences appear to be sufficiently large to justify separation into different species, they are of little assistance for the routine identification of species using standard morphological techniques. *Latrunculia* (*L.*) *triverticillata* and *L.* (*L.*) *fiordensis*, in particular, can only be differentiated by colour in life and geographic distribution.

We found the most useful characteristics for differentiating species were megasclere and microsclere lengths, anisodiscorhabd morphology and ornamentation (examined under SEM), and geographic location. We have used graphs of the mean spicule lengths (Figs 3, 4) and non-metric MDS plots based on average spicule lengths, anisodiscorhabd L:W ratios, latitude and depth to illustrate the differences among the different species (Figs 73, 74). The MDS plots show a number of species are separated out into clearly distinct groups based on the analysed data, but there is also a degree of overlap between many species, in particular between: *L.* (*L.*) *triverticillata* and *L.* (*L.*) *fiordensis*; *L.* (*B.*) *wellingtonensis*, *L.* (*B.*) *kaikoura*, and *L.* (*B.*) *millerae*; and, *L.* (*L.*) *brevis* and *L.* (*L.*) *nelumbo* **sp. nov.** Specimens currently identified as *L.* (*L.*) *brevis* and *L.* (*L.*) *nelumbo* **sp. nov.** warrant further investigation with genetic or chemical techniques because of their wide geographic distribution and the moderately large variation in spicule sizes amongst specimens. It is possible that these groups contain several species that cannot be differentiated by morphology alone.

Given the similarity between many species, a dichotomous key is not helpful for the identification of specimens. Rather, we have found that plots of ascending megasclere and microsclere spicule lengths for species of *Latrunculia* (*Latrunculia*) (Fig. 3) and *Latrunculia* (*Biannulata*) (Fig. 4) are most useful for rapid identification of species or at least, narrowing down the list of probable species. The careful examination of anisodiscorhabd morphology and consideration of other factors, such as location and gross morphology, is still required, as there are still a number of species that have overlapping spicule sizes.

The description of ten new species of *Latrunculia* from the New Zealand EEZ and surrounding waters brings the total number of extant *Latrunculia* species from this region to 21 (including species around Macquarie Island, a part of the Australia EEZ, and International Waters just beyond the New Zealand EEZ). This represents around 50% of the described species of *Latrunculia*, making New Zealand a biodiversity 'hotspot' for the genus (or perhaps reflecting in part the location of taxonomists interested in the genus!). The description of four new species of *Latrunculia* from waters surrounding Antarctica brings the total

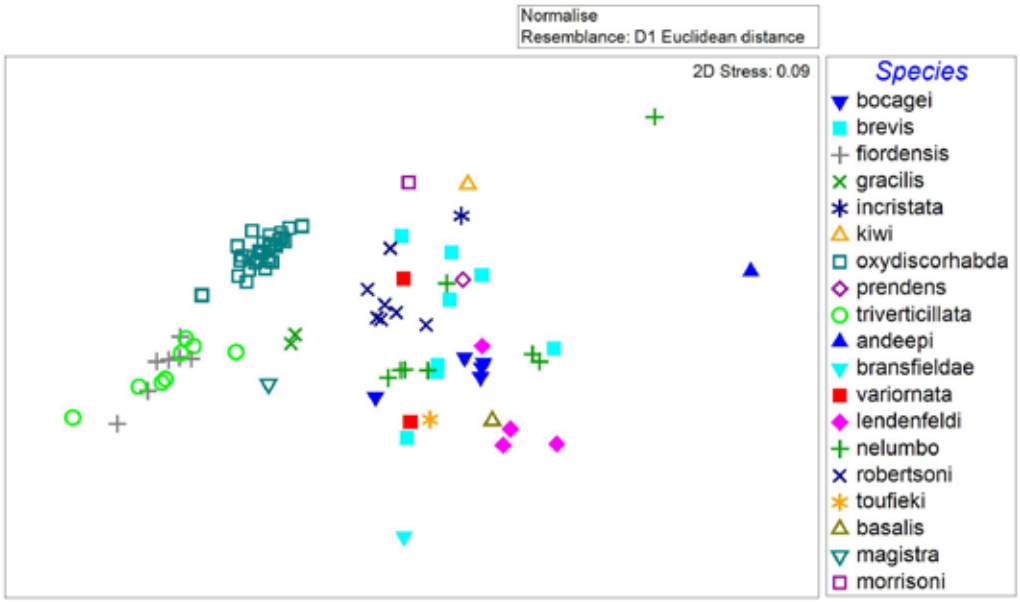


Figure 73. Non-metric multidimensional scaling plot of the separation among New Zealand *Latrunculia* (*Latrunculia*) species based on spicule lengths, anisodiscorhabd L:W, depth, and latitude.

number of extant *Latrunculia* from this region to nine. *Latrunculia* species are most abundant in temperate and polar waters, and other areas that have a moderate number of species include South Africa (five species), North Pacific (seven species), and South America (seven species).

In New Zealand and Antarctic waters, the rate of speciation in *Latrunculia* is high, with many species having relatively restricted distributions, and within those species geographic ranges and niches overlap, according to the New Zealand Marine Ecoregions of the World (MEoW) of Spalding *et al.* (2007) and the New Zealand biogeographic provinces recognised in Roberts *et al.* (2015) (Figs 75–78). For example, nine species of *Latrunculia* are restricted to Spalding *et al.*'s (2007) and Roberts *et al.*'s (2015) Northern New Zealand biogeographic ecoregions (*oxydiscorhabda*, *spinispiriferae*, *procumbens*, *kaakaariki*, *duckworthi*, *morrisoni* **sp. nov.**, *kiwi* **sp. nov.**, *incristata* **sp. nov.**, *magistra* **sp. nov.**), three species each are restricted to each of Spalding *et al.*'s (2007) and Roberts *et al.*'s (2015) Southern New Zealand (*fiordensis*, *millerae*, *macquariensis* **sp. nov.**), and Southern-Subantarctic biogeographic ecoregions (*triverticillata*, *kaikoura*, *gracilis* **sp. nov.**), and two new species (*prendens* **sp. nov.**, *alvarezae* **sp. nov.**) are restricted to the Australia EEZ around Macquarie Island. It is interesting to note that in each of these ecoregions, species in subgenus *Biannulata* make up just fewer than 50% of the species totals, and both subgenera are more-or-less equally distributed around the New Zealand EEZ.

In contrast to these rather restricted distributions, *L.* (*L.*) *brevis* and *L.* (*L.*) *nelumbo* **sp. nov.** have recorded distributions that arc from Argentina-Uruguay, through Antarctica, up to northern New Zealand (see Figs 10, 20). These two species have extraordinarily broad latitudinal distributions, but as circumpolar Southern Ocean currents link these three regions, the distribution is not unprecedented. We know of other non-latrunculid taxa that are distributed between New Zealand and Antarctica, for example, *Antarctotetilla leptoderma* (Sollas, 1886), *Tentorium papillatum* (Kirkpatrick, 1908), and *Polymastia invaginata* Kirkpatrick, 1907, and between Macquarie Ridge and the Argentine margin of Patagonia, for example, *Cercicladia australis* Ríos, Kelly & Vacelet, 2011. We are also aware that molecular sequencing may be helpful in confirming the integrity of these two species, but it is beyond the scope of this work.

Almost nothing is known about the reproductive biology of *Latrunculia*, and how this might affect speciation rate. Furthermore, depth does not appear to be a limiting factor in the distribution of species of *Latrunculia*, as many occur across an extensive depth range: *L.* (*L.*) *bocagei* 18–992 m; *L.* (*L.*) *brevis* 168–1658 m; *L.* (*L.*) *nelumbo* **sp. nov.** 158–2700 m; *L.* (*L.*) *triverticillata* 8–396 m; *L.* (*L.*) *variornata* 25–289 m; *L.* (*B.*) *kaikoura* 20–549 m; *L.* (*B.*) *spinispiraefera* 46–200 m; and *L.* (*A.*) *biformis* 20–1080 m (Table 21).

We have taken the opportunity here to compare the distribution of *Latrunculia* species according to the New Zealand ecoregions of Spalding *et al.* (2007),

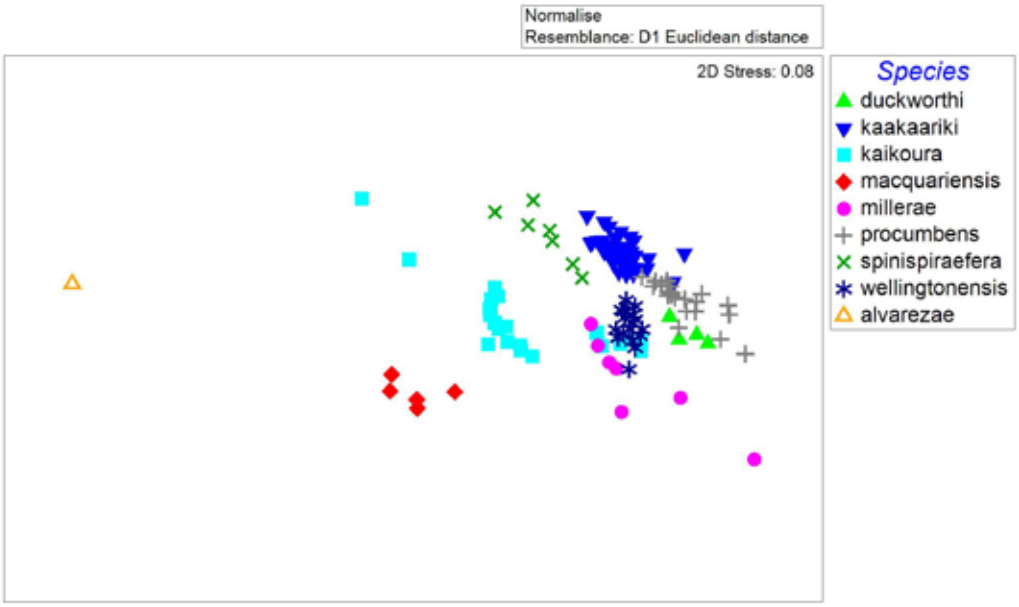


Figure 74. Non-metric multidimensional scaling plot of the separation among New Zealand *Latrunculia* (*Biannulata*) species based on spicule lengths, anisodiscorhabd L:W, depth, and latitude.

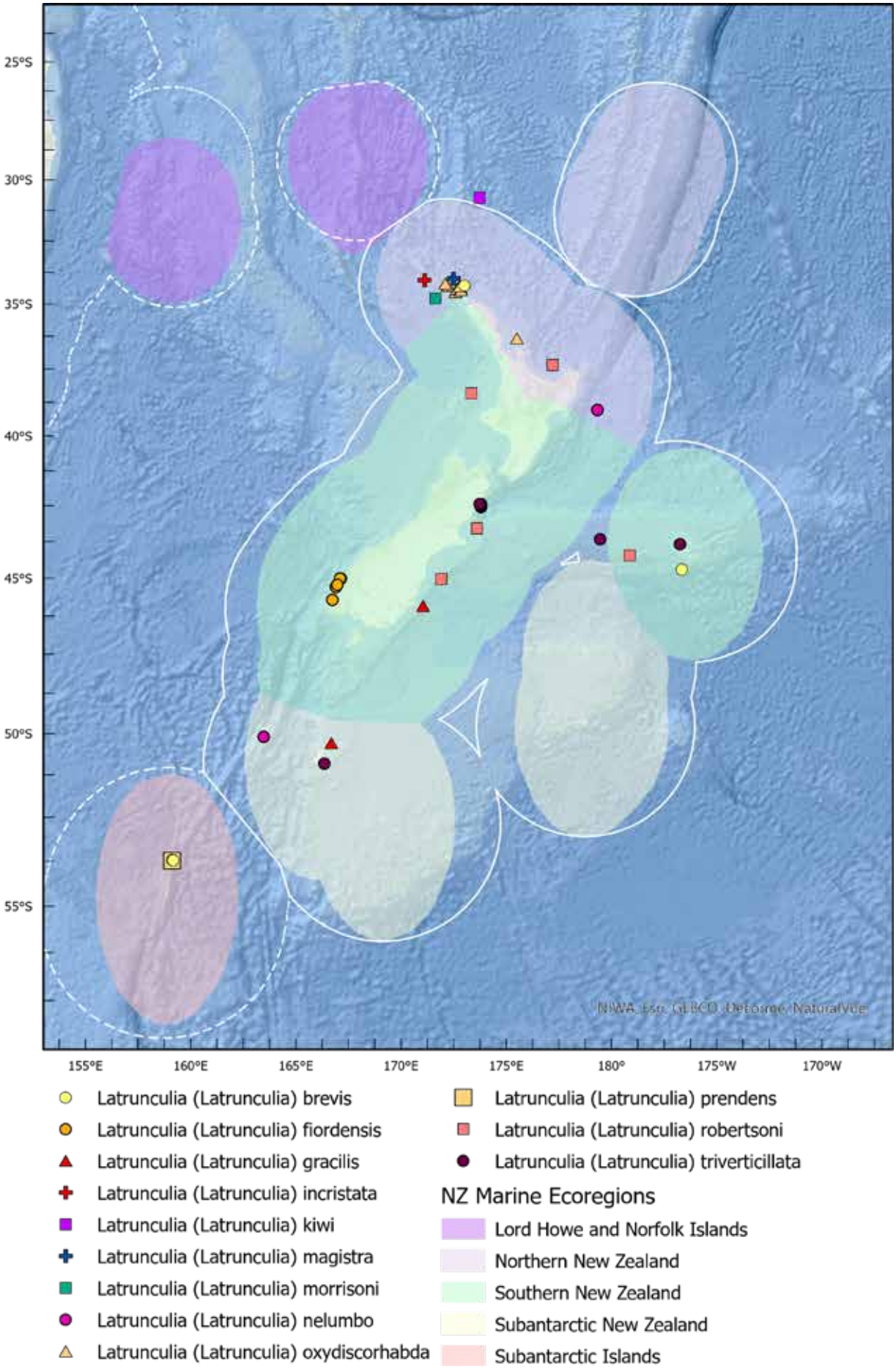


Figure 75. Distribution of New Zealand species of *Latrunculia* (*Latrunculia*) overlaid on the Marine Ecoregions of the World (MEoW) proposed by Spalding *et al.* (2007).

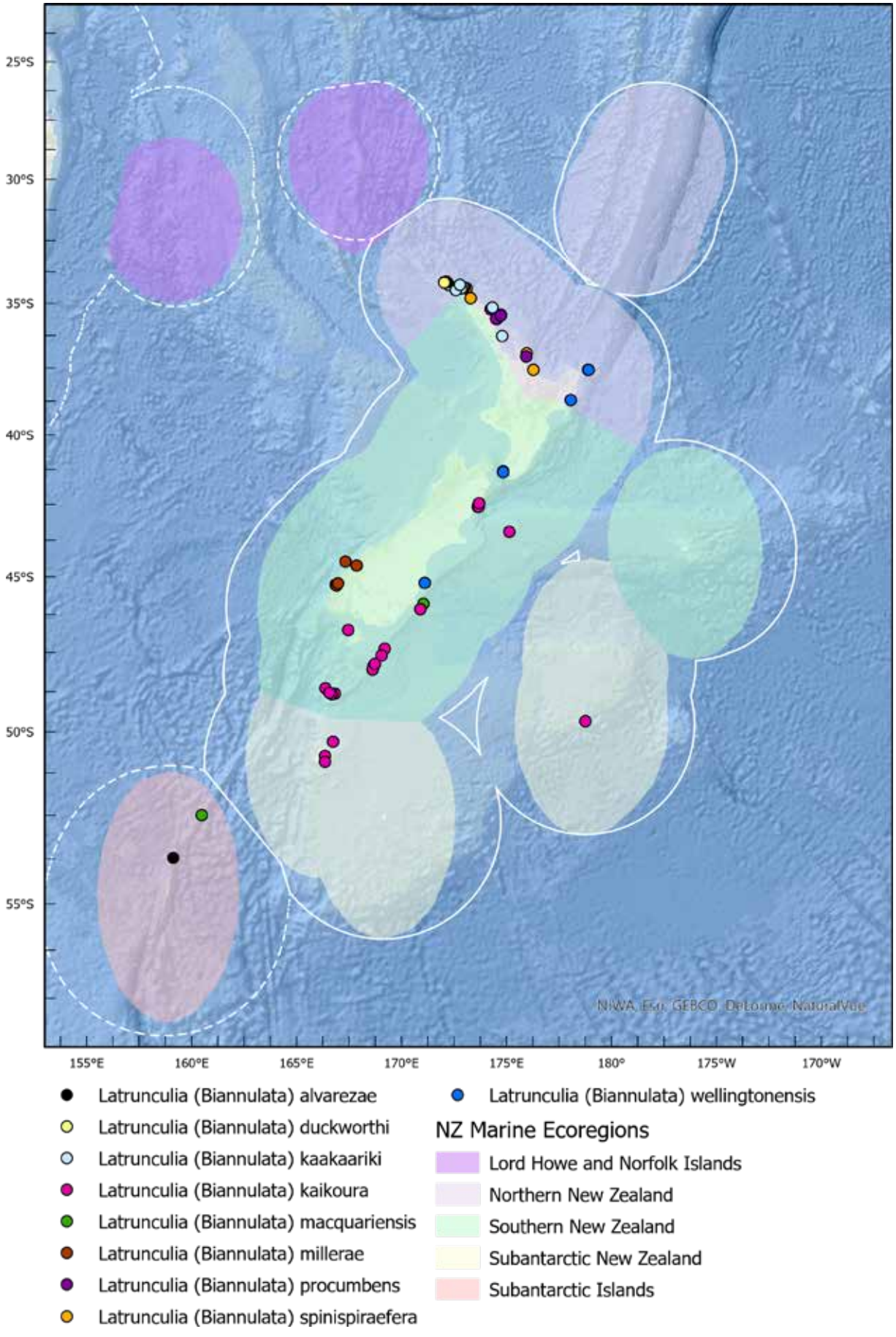


Figure 76. Distribution of New Zealand species of *Latrunculia* (*Biannulata*) overlaid on the Marine Ecoregions of the World (MEoW) proposed by Spalding *et al.* (2007).

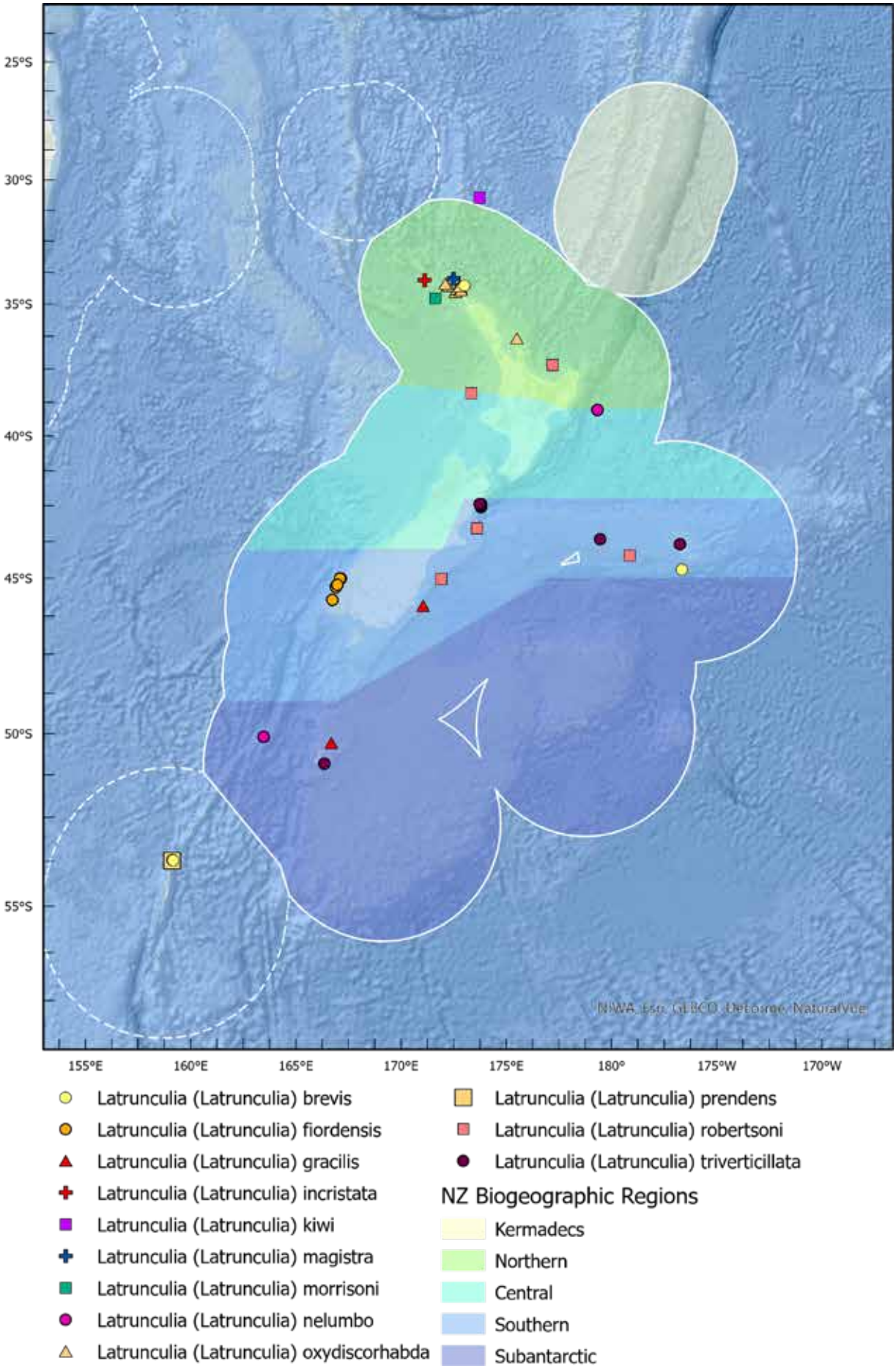


Figure 77. Distribution of New Zealand species of *Latrunculia* (*Latrunculia*) overlaid on the New Zealand biogeographic regions proposed by Roberts *et al.* (2015).

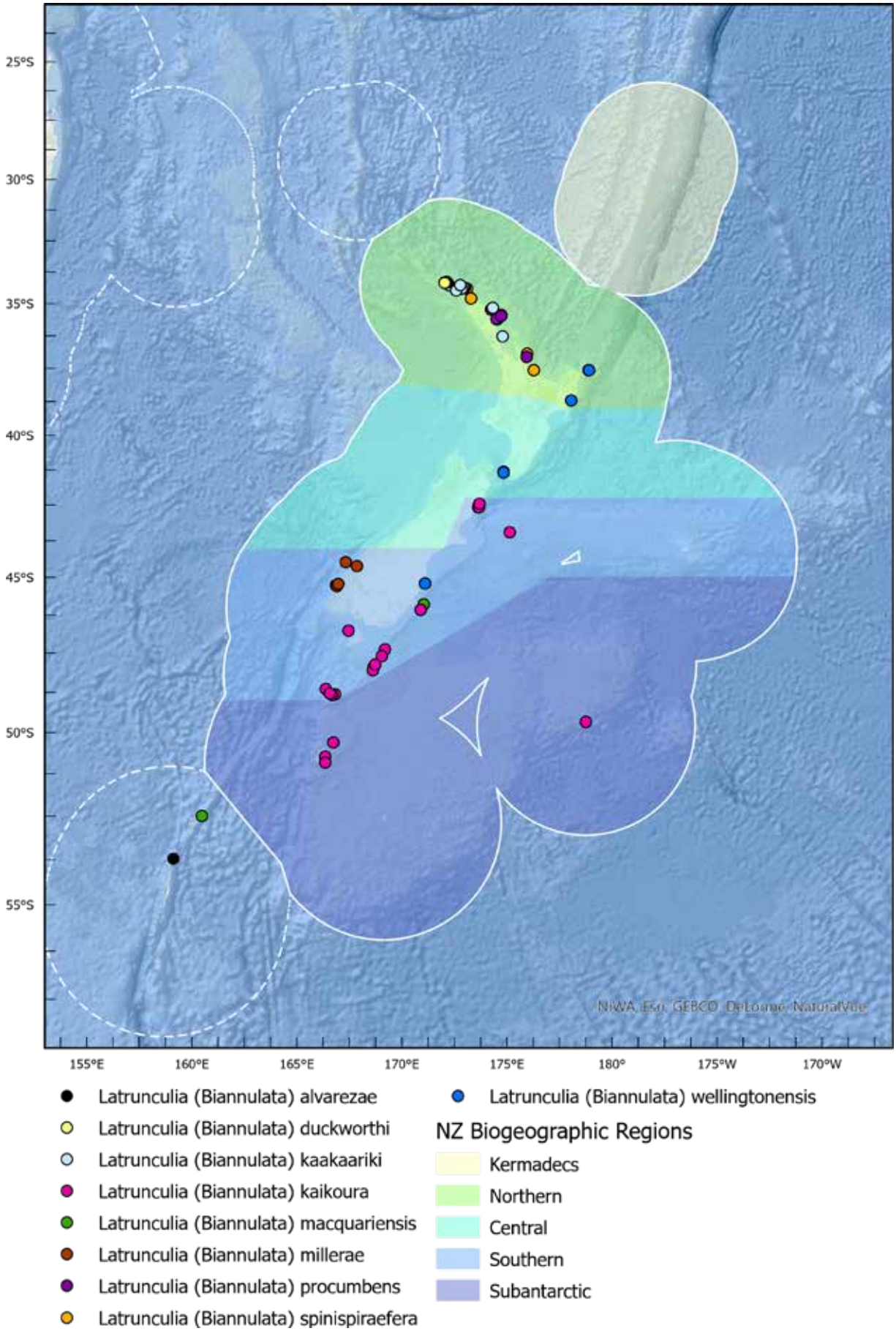


Figure 78. Distribution of New Zealand species of *Latrunculia* (*Biannulata*) overlaid on the New Zealand biogeographic regions proposed by Roberts *et al.* (2015).

and the biogeographic provinces recognised in Roberts *et al*. (2015). For the New Zealand sponge fauna, we consider the Roberts *et al*. (2015) model a more accurate representation of the New Zealand ecoregions than those of Spalding *et al*. (2007). The key differences between the two models are as follows:

1. The Kermadec Islands and Volcanic Arc ecoregion of Roberts *et al.* (2015) is separated from the Northern New Zealand ecoregion, while in Spalding *et al*. (2007), they are one and the same. Kelly *et al*. (2015) indicate that the sponge fauna of the Kermadec Islands region is "considerably different from that surrounding mainland New Zealand, having only a few species links with northern New Zealand." There is virtually no overlap (~1.5%) of species between the Kermadecs and northern New Zealand (Kelly *et al.* 2015, Table 1), while 13% were first described from the seamounts of the Norfolk Ridge south of New Caledonia, or other South Pacific locations, having stronger tropical to subtropical biogeographic links.
2. The Northern New Zealand ecoregion of Roberts *et al*. (2015) extends down the west coast of the North Island to North Taranaki Bight, which is accurate according to the distribution of several species including *Callyspongia* (*Callyspongia*) *nuda* (Ridley, 1884) (locally known as *Callyspongia ramosa* Gray, 1843), *Dactylia varia* Gray, 1843, *Polymastia aurantia* Kelly-Borges & Bergquist, 1997, *Stryphnus ariena* Kelly & Sim-Smith, 2012, lithistid sponge *Reidispongia coerulea* Lévi & Lévi, 1988, and glass sponges *Rossella ijimai* Dendy, 1924 and *Symplectella rowi* Dendy, 1924. In Spalding *et al*. (2007), the Northern New Zealand MEoW region extends directly southwest from Cape Maria van Diemen, and so does not reflect current ground truth.
3. The Central and Southern New Zealand ecoregions of Roberts *et al*. (2015) are separate, reflecting more accurately the distribution of many New Zealand sponge species distributions, particularly those for which the Chatham Rise is a physical barrier to distribution (for example lithistid sponges – see Kelly 2007). In Spalding *et al.* (2007), the Southern New Zealand MEoW region is probably too broad, extending into what Roberts *et al*. (2015) and others recognise as Subantarctic New Zealand, which includes the Snares Islands and Puysegur and Solander trenches, and parts of the Macquarie Ridge.

Table 21. Comparison of southern hemisphere extant *Latrunculia* species. Spicule dimensions (μm); S = anisostyles; OX = oxeas; AD = anisodiscorhabds; OD = oxydiscorhabds; SD = sanidaster-like discorhabds.

Species and depth range	Distribution	Morphology	Megascleres	Microscleres
***Latrunculia* (*Latrunculia*) species**				
L. (*L.*) *andeepi* **sp. nov.**	Antarctica; 2618 m	Thinly encrusting, smooth, with a few short papillae.	S: 575 (540–610)	AD: 70 (63–78)
L. (*L.*) *basalis* Kirkpatrick, 1908	Antarctica, Uruguay, Buenos Aires, South Africa; 462–700 m	Hemispherical, covered in long fistules, live colour unknown.	S: 554 (500–592)	AD: 69
L. (*L.*) *bocagei* Ridley & Dendy, 1886	Antarctica; 18–992 m	Hemispherical, densely covered with fistules, dark brown to olive green.	S: 513 (434–564)	AD: 64 (55–72)
L. (*L.*) *bransfieldi* **sp. nov.**	Antarctica; 580 m	Thickly encrusting, covered by numerous 1–2 mm long papillae, olive green.	S: 485 (460–510)	AD: 76 (69–83)
L. (*L.*) *brevis* Ridley & Dendy, 1886	Argentina-Uruguay, Antarctica, Macquarie Ridge, New Zealand; 168–1658 m	Thickly encrusting, massive or hemispherical. Surface may be densely covered with fistules or smooth, live colour unknown.	S: 500 (406–600)	AD: 51 (41–70)
L. (*L.*) *nelumbo* **sp. nov.**	Argentina-Uruguay, Antarctica, New Zealand; 158–2700 m	Massive, covered with aerolate porefields, moss green.	S: 486 (414–550)	AD: 57 (46–68)
L. (*L.*) *ciruela* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	Chile; 19–29 m	Globular, covered with large flat papillae, may have apical oscules, purplish brown.	S:265–400 OX: 300–500 (rare)	AD: 35–50
L. (*L.*) *copihuensis* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	Chile; 23 m	Globular, covered in mushroom-shaped papillae, few oscules, dark olive green.	S: 285–386 OX: 285–405 (rare)	AD: 34–42 SD: 32–47
L. (*L.*) *fiordensis* Alvarez, Bergquist & Battershill, 2002	New Zealand; 8–30 m	Massive or globular, covered in crater-like areolate porefields, few oscules, olive green.	S: 330 (258–400)	AD: 38 (30–47)
L. (*L.*) *gracilis* **sp. nov.**	New Zealand; 197–215 m	Massive to thickly encrusting, covered in small papillae, colour in life unknown.	S: 389 (328–465)	AD: 48 (43–57)
L. (*L.*) *incristata* **sp. nov.**	New Zealand; 1228–1332 m	Thinly encrusting, colour in life unknown.	S: 485 (444–532)	AD: 61 (56–67)
L. (*L.*) *kiwi* **sp. nov.**	New Zealand; 759 m	Thinly encrusting with a few sharply pointed, conical fistules, dark brown.	S: 596 (546–662) acanthose	AD: 61 (55–67)
L. (*L.*) *lendenfeldi* Hentschel, 1914	Antarctica; 203–415 m	Massive, densely covered in volcano-shaped fistules, olive green.	S: 567 (415–637)	AD: 71 (65–80)
L. (*L.*) *magistra* **sp. nov.**	New Zealand; 54–108 m	Thinly encrusting, colour in life unknown.	S: 333 (290–376)	AD: 56 (50–63)
L. (*L.*) *morrisoni* **sp. nov.**	New Zealand; 992–1028 m	Massive, soft, compressible, dark brown in life	S: 507 (449–544)	AD: 41 (38–44)
L. (*L.*) *robertsoni* **sp. nov.**	New Zealand; 218–492 m	Massive to globular, densely covered in narrow fistules, colour in life dull light brown.	S: 503 (359–608) acanthose	AD: 57 (44–71)
L. (*L.*) *oxydiscorhabda* Alvarez, Bergquist & Battershill, 2002	New Zealand; 2–76 m	Massive to thickly encrusting, densely covered with raised papillae, oscular chimney with sieve plate may be present, khaki to medium brown.	S: 434 (288–619)	AD: 32 (25–39) OD: 39 (26–52)

(*continued opposite*)

Table 21. (*continued*) Comparison of southern hemisphere extant *Latrunculia* species. Spicule dimensions (μm); S = anisostyles; OX = oxeas; AD = anisodiscorhabds; SD = sanidaster-like discorhabds.

Species and depth range	Distribution	Morphology	Megascleres	Microscleres
***Latrunculia* (*Latrunculia*) species** (*continued*)				
L. (*L.*) *prendens* **sp. nov.**	New Zealand; 925–1014 m	Thinly encrusting, smooth, colour in life unknown.	S: 516 (472–569)	AD: 47 (43–51)
L. (*L.*) *triverticillata* Alvarez, Bergquist & Battershill, 2002	New Zealand; 8–396 m	Massive or globular, covered in densely packed, mushroom-shaped papillae, numerous cylindrical oscules, dark brown.	S: 337 (241–415)	AD: 38 (31–49)
L. (*L.*) *toufieki* **sp.nov.**	Antarctica; 480–479 m	Thinly encrusting, colour in life unknown.	S: 424 (355–460)	AD: 65 (58–72)
L. (*L.*) *variornata* **sp. nov.**	Antarctica, Sub-antarctic New Zealand waters, and Falkland Islands; 25–289 m	Thickly encrusting, cushion-like, with numerous papillae (1 mm high), dark green.	S: 468 (366–530)	AD: 47 (38–64)
L. (*L.*) *verenae* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	Chile; 28–30 m	Globular, covered in dense mushroom-shaped papillae, few large oscules, dull green.	S: 311–400 acanthose	AD: 38–50
L. (*L.*) *yepayek* Hajdu, Desqueyroux-Faúndez, Carvalho, Lôbo-Hajdu & Willenz, 2013	Chile; 16 m	Globular-ovoid, irregular-shaped porefields, oscules barely visible, brownish purple.	S: 268–360 OX: 280–420 (rare)	AD: 38–43 SD: 42–46
***Latrunculia* (*Biannulata*) species**				
L. (*B.*) *algoaensis* Samaai, Janson, Kelly, 2012	South Africa; 22–33 m	Hemispherical with thick-lipped circular areolate porefields, scattered cylindrical oscules, green.	S: 369 (326–384)	AD: 48 (46–50)
L. (*B.*) *duckworthi* Alvarez, Bergquist & Battershill, 2002	New Zealand; 10–20 m	Massive, large porefields and numerous oscules, medium brown.	S: 307 (253–359)	AD: 37 (32–46)
L. (*B.*) *gotzi* Samaai, Janson & Kelly, 2012	South Africa; 41 m	Hemispherical, covered in irregular areolate porefields, scatter oscules, mahogany brown with lighter porefields.	S: 319 (288–346) acanthose	AD: 49 (48–53)
L. (*B.*) *janeirensis* Cordonis, Moraes & Muricy, 2012	Brazil; 15–29 m	Hemispherical, covered in short mushroom-shaped papillae, scattered oscules, tan.	S: 283 (190–380)	AD: 34 (25–41)
L. (*B.*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002	New Zealand; 10–133 m	Massive to thickly encrusting sponge, smooth with large irregular porefields, clusters of cylindrical oscules, khaki green to olive brown.	S: 363 (283–429)	AD: 33 (26–40)
L. (*B.*) *kaikoura* Alvarez, Bergquist & Battershill, 2002	New Zealand; 20–549 m	Massive to thickly encrusting, smooth or covered with irregular, crater-like pore areas, and oscules encircled by membranous collars, green.	S: 366 (281–469)	AD: 39 (28–48)
L. (*B.*) *kerwathi* Samaai, Janson & Kelly, 2012	South Africa; 85 m	Thinly encrusting, dark greenish brown.	S: 367 (346–394) acanthose	AD: 53 (48–55)

(*continued overleaf*)

Table 21. (*continued*) Comparison of southern hemisphere extant *Latrunculia* species. Spicule dimensions (μm); S = anisostyles; OX = oxeas; AD = anisodiscorhabds; AC = aciculodiscorhabds; MOX = microxea.

Species and depth range	Distribution	Morphology	Megascleres	Microscleres
***Latrunculia* (*Biannulata*) species** (*continued*)				
L. (*B.*) *lunaviridis* Samaai, Gibbons, Kelly & Davies-Coleman, 2003	South Africa; 17–32 m	Hemispherical, crater-shaped porefields, scattered cylindrical oscules, pale olive green.	S: 357 (336–384)	
L. (*B.*) *macquariensis* **sp. nov.**	New Zealand; 119–215 m	Mound-shaped, smooth or densely covered with small cylindrical or conical fistules, scattered pores are encircled by a raised fleshy collar, colour in life unknown.	S: 410 (329–478)	AD: 52 (43–61)
L. (*B.*) *microacanthoxea* Samaai, Gibbons, Kelly & Davies-Coleman, 2003	South Africa; 28 m	Hemispherical, crater-shaped porefields, scattered cylindrical oscules, olive green.	S: 397 (374–422)	AD: 55 (50–60) MOX: 52 (50–55) acanthose
L. (*B.*) *millerae* Alvarez, Bergquist & Battershill, 2002	New Zealand; 10–40 m	Massive to globular, irregularly shaped pore areas and circular oscules, olive green.	S: 333 (237–448)	AD: 38 (30–46)
L. (*B.*) *alvarezae* **sp. nov.**	Macquarie Ridge (Australia EEZ); 770–810 m	Very thinly encrusting, smooth, green.	S: 464 (414–505)	AD: 54 (48–61)
L. (*B.*) *procumbens* Alvarez, Bergquist & Battershill, 2002	New Zealand; 3–29 m	Thinly to thickly encrusting, densely covered in cylindrical oscules and mushroom-shaped fistules, khaki green to brown.	S: 324 (237–413)	AD: 32 (26–39)
L. (*B.*) *purpurea* Carter, 1881	Australia; 18–20 m	Massive, smooth, folded, dark green.	S: 324 (288–336)	AD: 32 (31–36)
L. (*B.*) *spinispiraefera* Brøndsted, 1924	New Zealand; 46–200 m	Massive to hemispherical, smooth, or covered with mushroom-shaped fistules, dark reddish brown.	S: 408 (327–472)	AD: 38 (29–46)
L. (*B.*) *wellingtonensis* Alvarez, Bergquist & Battershill, 2002	New Zealand; 10–90 m	Massive to thickly encrusting, irregularly shaped pore area and oscules encircled with membranous collars, green.	S: 330 (204–434)	AD: 36 (28–43)
***Latrunculia* (*Aciculatrunculia*) subgen. nov. species**				
L. (*A.*) *apicalis* Ridley & Dendy, 1886 **subgen. nov., comb. nov.**	Kerguelen Islands; 126 m	Hemispherical, with mammiform areolate porefields, numerous volcano-shaped oscules, chocolate brown.	S: 406 (382–436)	AC: 74 (53–83)
L. (*A.*) *biformis* Kirkpatrick, 1908 **subgen. nov., comb. nov.**	Kerguelen Islands, Antarctica, South Africa, Rio de la Plata; 20–1080 m	Hemispherical to globular, densely covered with areolate porefields or smooth, apical oscule may be present, dark green to khaki brown.	S: 497 (350–602)	AD: 59 (45–79) AC: 96 (64–174)

References

Alvarez, B., Bergquist, P. R., Battershill, C. N. (2002) Taxonomic revision of the genus *Latrunculia* du Bocage (Porifera: Demospongiae: Latrunculiidae) in New Zealand. *New Zealand Journal of Marine and Freshwater Research* 36: 151–184. https://doi.org/10.1080/00288330.2002.9517078

Bergquist, P. R. (1961) Demospongiae (Porifera) of the Chatham Islands and Chatham Rise, collected by the Chatham Islands 1954 expedition. *Department of Scientific and Industrial Research Bulletin* 139: 169–206.

Bergquist, P. R. (1968) The marine fauna of New Zealand: Porifera, Demospongiae, part 1 (Tetractinomorpha and Lithistida). New Zealand Department of Scientific and Industrial Research Bulletin 37. New Zealand Department of Scientific and Industrial Research, Wellington, New Zealand.

Bergquist, P. R., Warne, K. (1980) *The Marine Fauna of New Zealand*: *Porifera*, *Demospongiae*, *Part 3 Haplosclerida and Nepheliospongida*. New Zealand Oceanographic Institute, Wellington, New Zealand, 77 pp.

Boury-Esnault, N., Rützler, K. (1997) Thesaurus of sponge morphology. *Smithsonian Contributions to Zoology* 596: 1–55. https://doi.org/10.5479/si.00810282.596

Boury-Esnault, N., van Beveren, M. (1982) Les Démosponges du plateau continental de Kerguelen-Heard. *Comité National Français des Recherches Antarctiques* 52: 1–175.

Brøndsted, H. V. (1924) Papers from Dr. Th. Mortensen's Pacific Expedition 1914–16. XXIII. Sponges from New Zealand. Part I. *Videnskabelige Meddelelser fra Dansk naturhistorisk Forening i Kjøbenhavn* 77: 435–483.

Bukry, D. (1979) Coccolith and silicoflagellate stratigraphy, northern Mid-Atlantic Ridge and Reykjanes Ridge deep sea drilling project leg 49. *Deep Sea Drilling Project Initial Reports* 49 (18): 551–581. https://doi.org/10.2973/dsdp.proc.49.118.1979

Burton, M. (1929) Porifera. Part II. Antarctic sponges. British Antarctic ('Terra Nova') Expedition, 1910. Natural History Report, London, British Museum (Natural History). *Zoology* 6 (4): 393–458.

Burton, M. (1932) Sponges. *Discovery reports* 6: 237–392, pls 248–257. https://doi.org/10.5962/bhl.part.24379

Burton, M. (1940) Las esponjas marinas del museo Argentino de ciencias naturales. *Anales del Museo Argentino de Ciencias Naturalles* 6: 95–121.

CANZ (2008) New Zealand Region Bathymetry, 1:4 000 000, 2nd Edition. NIWA Chart, Miscellaneous Series No. 85. National Institute of Water and Atmospheric Research.

Cárdenas, P., Pérez, T., Boury-Esnault, N. (2012) Chapter two – Sponge systematics facing new challenges. *Advances in Marine Biology* 61: 79–209. http://dx.doi.org/10.1016/B978-0-12-387787-1.00010-6

Carter, H. J. (1881) Supplementary report on specimens dredged up from the Gulf of Manaar, together with others from the sea in the vicinity of the Basse Rocks and from Bass's Straits respectively, presented to the Liverpool Free Museum by Capt. H. Cawne Warren. *Annals and Magazine of Natural History* Series 5, 7: 361–385, pls XVIII. https://doi.org/10.1080/00222938109459534

Cordonis, C., Moraes, F., Muricy, G. (2012) A new species of *Latrunculia* (*Biannulata*) (Porifera: Demospongiae) from Rio de Janeiro, south-eastern Brazil. *Marine Biodiversity* 43: 105–111.

d'Orbigny, A. D. (1851) Cours élémentaire de paléontologie et de géologie stratigraphiques 1(1). Masson, Paris, 382 pp.

D'Archino, R., Page, M. J., Handley, S., Kelly, M. (2014) *Fiordland* (*Te Moana o Atawhenua*) *Sunday Cove Biosystematics Atlas*, *prepared for the Department of Conservation* (*Project DOC14401*), *September 2014*. National Institute of Water and Atmospheric Research, Nelson, 103 pp.

De Voogd, N. J., Alvarez, B., Boury-Esnault, N., Carballo, J. L., Cárdenas, P., Díaz, M.-C., Dohrmann, M., Downey, R., Hajdu, E., Hooper, J. N. A., Kelly, M., Klautau, M., Manconi, R., Morrow, C. C., Pisera, A. B., Ríos, P., Rützler, K., Schönberg, C., Vacelet, J., Van Soest, R. W. M. (2021) World Porifera Database. Latrunculia du Bocage, 1869. https://www.marinespecies.org/porifera/porifera.php?p=taxdetails&id=132038 (Accessed 9 May 2022).

Dendy, A. O. (1924) Porifera. Part I. Non-Antarctic sponges. Natural history report. British Antarctic ("Terra Nova") Expedition, 1910. *Zoology* 6 (3): 269–392, pls 1–15.

Desqueyroux, R. (1975) Esponjas (Porifera) de la region antartica chilena. *Cahiers de Biologie Marine* 16 (1): 47–82.

Desqueyroux, R. (1976) Démosponges signalées pour la Région des Canaux du Chili. *Cahiers de Biologie Marine* 17 (1): 93–109.

Du Bocage, J. V. B. (1869) Eponges siliceuses nouvelles du Portugal et de l'île Saint-Iago (Archipel de Cap-Vert). *Jornal de Sciencias Mathematicas*, *Physicas e Naturaes* 2: 159–162, pls X–XI.

Edwards, A. R. (1991) The Oamaru Diatomite. *New Zealand Geological Survey Paleontological Bulletin* 64: 1–260.

Göcke, C., Janussen, D. (2013) Demospongiae of ANT XXIV/2 (SYSTCO I) expedition. *Zootaxa* 3692 (1): 28–101.

Grant, R. E. (1836) Animal Kingdom. Pp. 107–118 *in*: Todd, R. B. (Ed), *The Cyclopaedia of Anatomy and Physiology*. Sherwood, Gilbert, and Piper, London.

Gray, J. E. (1843) Additional radiated animals and annelides. Pp. 292–295 *in*: Dieffenbach, E. (Ed), *Fauna of New Zealand. Travels in New Zealand*.

Hajdu, E., Desqueyroux-Faúndez, R., Carvalho, M. d. S., Lôbo-Hajdu, G., Willenz, P. (2013) Twelve new Demospongiae (Porifera) from Chilean fjords, with remarks upon sponge-derived biogeographic compartments in the SE Pacific. *Zootaxa* 3744: 1–64. https://doi.org/10.11646/zootaxa.3744.1.1

Hentschel, E. (1914) Monaxone Kieselschwämme und Hornschwämme der Deutschen Südpolar-Expedition 1901–1903. *Deutsche Südpolar-Expedition* 15 (1): 35–141, pls IV–VIII.

Hinde, G. J. (1910) On the fossil sponges spicules in a rock from the deep lead (?) at Princess Royal township, Norseman district, Western Australia. *Bulletin of the Geological Survey of Western Australia* 36: 7–24.

Hinde, G. J., Holmes, W. M. (1892) On the sponge remains in the Lower Tertiary strata near Oamaru, Otago, New Zealand. *Journal of the Linnean Society* (*London*), *Zoology* 24: 177–262. https://doi.org/10.1111/j.1096-3642.1892.tb02480.x

Kelly-Borges, M., Bergquist, P. R. (1997) Revision of Southwest Pacific Polymastiidae (Porifera: Demospongiae: Hadromerida) with descriptions of new species of *Polymastia* Bowerbank, *Tylexocladus* Topsent, and *Acanthopolymastia* gen. nov. from New Zealand and the Norfolk Ridge, New Caledonia. *Zealand Journal of Marine and Freshwater Research* 31 (3): 367-402.

Kelly, M. (2007) The marine fauna of New Zealand. Porifera: Lithistid Demospongiae (rock sponges). National Institute of Water and Atomospheric Research, Wellington, New Zealand, 100 pp.

Kelly, M. (2018) *Splendid Sponges*: *A Guide to the Sponges of New Zealand. Ver. 3*. National Institute of Water and Atmospheric

Research, 105 pp. Available from: https://niwa.co.nz/coasts-and-oceans/marine-identification-guides-and-fact-sheets/Splendid-Sponges (June 2021).

Kelly, M., Amirapu, S., Mills, S., Page, M., Reiswig, H. M. (2015) Kermadec Islands sponge biodiversity: a review and description of a new species, *Suberea meandrina* sp. nov. (Demospongiae, Verongida, Aplysinellidae). Trnski, T. & Schlumpf, H. (Eds). Auckland War Memorial Museum, Auckland, New Zealand, 295–307 pp.

Kelly, M., Edwards, A. R., Wilkinson, M. R., Alvarez, B., Cook, S. d. C., Bergquist, P. R., Buckeridge, J. S., Campbell, H. J., Reiswig, H., Valentine, C., Vacelet, J. (2009) Chapter 1. Phylum Porifera sponges. pp. 23–46. *In*: Gordon, D. P. (Ed), *New Zealand Inventory of Biodiversity Volume One Kingdom Animalia*: *Radiata*, *Lophotrochozoa*, *Deuterostomia*. Canterbury University Press, Christchurch.

Kelly, M., Samaai, T. (2002) Family Podospongiidae De Laubenfels, 1936. Pp. 694–702 *in*: Hooper, J. N. A. & Van Soest, R. W. M. (Eds), *Systema Porifera*: *A Guide to the Classification of Sponges*. Kluwer Academic/Plenum Publishers, New York. https://doi.org/10.1007/978-1-4615-0747-5_75

Kelly, M., Sim-Smith, C. (2012) A review of *Ancorina*, *Stryphnus*, and *Ecionemia* (Demospongiae: Astrophorida: Ancorinidae), with descriptions of new species from New Zealand waters. *Zootaxa* 3480: 1–47. https://doi.org/10.11646/zootaxa.3480.1.1

Kelly, M., Sim-Smith, C., Stone, R., Samaai, T., Reiswig, H., Austin, W. (2016) New taxa and arrangements within the family Latrunculiidae (Demospongiae, Poecilosclerida). *Zootaxa* 4121 (1): 1–48. https://doi.org/10.11646/zootaxa.4121.1.1

Kirkpatrick, R. (1907) Preliminary report on the Monaxonellida of the National Antarctic Expedition. *Annals and Magazine of Natural History* (*7*) 20 (117): 271–291.

Kirkpatrick, R. (1908) Porifera (Sponges). II. Tetraxonida, Dendy. National Antarctic Expedition, 1901–1904. *Natural History 4*, *Zoology*: 1–56, pls. VIII–XXVI.

Knowlton, N. (1993) Sibling species in the sea. *Annual Review of Ecology and Systematics* 24: 189–216. https://doi.org/10.1146/annurev.es.24.110193.001201

Koltun, V. M. (1964) Sponges of the Antarctic. 1. Tetraxonida and Cornacuspongida. Pp. 6–133, 443–448 *in*: Pavlovskii, E. P., Andriyashev, A. P. & Ushakov, P. V. (Eds), *Biological Reports of the Soviet Antarctic Expedition* (*1955–1958*), Akademya Nauk, SSSR.

Koltun, V. M. (1976) Porifera - Part 1: Antarctic Sponges. *Report B.A.N.Z. Antarctic Research Expedition 1929–1931* (*B*, *Zoology and Botany*) 5 (4): 153–198.

Lautour, H. A., de (1889) On the fossil marine diatomaceous deposit near Oamaru. *Transactions of the New Zealand Institute* 21: 293–311.

Lehnert, H., Stone, R., Heimler, W. (2006) New species of deep-sea demosponges (Porifera) from the Aleutian Islands (Alaska, USA). *Zootaxa* 1250: 1–35.

Lévi, C. (1969) Spongiaires du Vema Seamount (Atlantique Sud). *Bulletin du Muséum National d'Histoire Naturelle* Series 2, 41 (4): 952–973.

Lévi, C. (1993) Porifera Demospongiae: Spongiaires bathyaux de Nouvelle-Calédonie, récoltés par le 'Jean Charcot'. Campagne BIOCAL,1985. Résultats des campagnes MUSORSTOM. Vol. 11. Mémoires du Muséum National d'Histoire Naturelle (*A*, *Zoologie*) 158: 9–87.

Lévi, C., Lévi, P. (1988) Nouveaux spongiaires Lithistides bathyaux à affinités crétacées de la Nouvelle-Calédonie. *Bulletin du Muséum National d'Histoire Naturelle* 10 (A, 2): 241-263.

Li, F., Kelly, M., Tasdemir, D. (2021) Chemistry, chemotaxonomy and biological activity of the latrunculid sponges (order Poecilosclerida, family Latrunculiidae) *Marine Drugs* 19: 27. https://doi.org/10.3390/md19010027

Locker, S., Martini, E. (1986) Silicoflagellates and some sponge spicules from the Soutwest Pacific, Deep Sea Drilling Project, Leg 90. Pp. 887–924 *in*: Blakeslee, J. H. (Ed), *Initial reports of the Deep Sea Drilling Project*. U.S. Government Printing Office, Washington. https://doi.org/10.2973/dsdp.proc.90.116.1986

Łukowiak, M. (2015) Late Eocene siliceous sponge fauna of southern Australia: reconstruction based on loose spicules record. *Zootaxa* 3917 (1): 1–65. https://doi.org/10.11646/zootaxa.3917.1.1

Miller, K., Alvarez, B., Battershill, C., Northcote, P., Parthasarathy, H. (2001) Genetic, morphological, and chemical divergence in the sponge genus *Latrunculia* (Porifera: Demospongiae) from New Zealand. *Marine Biology* 139: 235–250. https://doi.org/10.1007/s002270100574

Morrow, C., Cárdenas, P. (2015) Proposal for a revised classification of the Demospongiae (Porifera). *Frontiers in Zoology* 12: 7. https://doi.org/10.1186/s12983-015-0099-8

Mothes, B., Campos, M., Eckert, R., Lerner, C. (2008) *Latrunculia* (*Latrunculia*) *tetraverticillata* sp. nov. (Porifera, Poecilosclerida, Latrunculiidae) from the bathyal region off the coast of Santa Catarina State, Brazil, Southwestern Atlantic. *Zootaxa* 1744: 59–65. https://doi.org/10.11646/zootaxa.1744.1.6

Muricy, G., Lopes, D. A., Hajdu, E., Carvalho, M. S., Moraes, F. C., Klautau, M., Menegola, C., Pinheiro, U. (2011) Catalogue of Brazilian Porifera. Museu Nacional, Série Livros, 300 pp.

Payne, R., Samaai, T., Kelly, M. (2022) New Latrunculiidae genus (Porifera, Poecilosclerida) from the Madagascar Ridge. *Zootaxa* 5105 (2): 296–300. 10.11646/zootaxa.5105.2.9

Reif, W.-E. (1967) Schwammspicula aus dem weißen Jura Zeta von Nattheim (Schwäbische Alb). *Paleontographica* (*Abt. A*) 127: 85–102.

Ridley, S. O. (1884) Spongiida. Pp. 366-482, pls 339-343; 582-630, pls 353-354 *in*: *Report on the Zoological Collections made in the Indo-Pacific Ocean during the Voyage of H.M.S. 'Alert', 1881-2*. British Museum (Natural History), London.

Ridley, S. O., Dendy, A. O. (1886) Preliminary report on the Monaxonida collected by H.M.S. 'Challenger'. *Annals and Magazine of Natural History* Series 5, 18: 325–351, 470–493. https://doi.org/10.1080/00222938609459998

Ridley, S. O., Dendy, A. O. (1887) Report on the Monaxonida collected by H.M.S. "Challenger" during the years 1873–1876. Report on the scientific results of the voyage of H.M.S. "Challenger", 1873–1876. *Zoology* 20 (59): 1–275, pls. I–LI, map.

Ríos, P. (2006) Esponjas del Orden Poecilosclerida de las campañas españolas de bentos antártico. *In*: Universidad de Santiago de Compostela, Spain, p. 552

Ríos, P., Cristobo, F. J., Urgorri, V. (2004) Poecilosclerida (Porifera, Demospongiae) collected by the Spanish Antarctic expedition BENTART-94. *Cahiers de Biologie Marine* 45: 97–119.

Ríos, P., Kelly, M., Vacelet, J. (2011) *Cercicladia australis*, a new carnivorous sponge with novel chelae from the Tasman Basin and the Argentine Patagonian Margin (Porifera, Cladorhizidae). *Zootaxa* 3131: 52–62.

Roberts, D. C., Stewart, A. L., Struthers, C. D. (2015) *The Fishes of New Zealand* (Vol. Vol. 1). Te Papa Press, Wellington, 255 pp.

Samaai, T., Gibbons, M. J., Kelly, M. (2006) Revision of the genus *Latrunculia* du Bocage, 1869 (Porifera: Demospongiae: Latrunculiidae) with descriptions of new species from New Caledonia and the northeastern Pacific. *Zootaxa* 1127: 1–71. https://doi.org/10.11646/zootaxa.1127.1.1

Samaai, T., Gibbons, M. J., Kelly, M., Davies-Coleman, M. (2003) South African Latrunculiidae (Porifera: Demospongiae: Poecilosclerida): descriptions of new species of *Latrunculia* du Bocage, *Strongylodesma* Lévi, and *Tsitsikamma* Samaai & Kelly. *Zootaxa* 371: 1–26. https://doi.org/10.11646/zootaxa.371.1.1

Samaai, T., Govender, V., Kelly, M. (2004) *Cyclacanthia* n. g. (Demospongiae: Poecilosclerida: Latrunculiidae incertae sedis), a new genus of marine sponges from South African waters, and description of two new species. *Zootaxa* 725: 1–18. https://doi.org/10.11646/zootaxa.725.1.1

Samaai, T., Janson, L., Kelly, M. (2012) New species of *Latrunculia* from the Agulhas Shelf, South Africa, with designation of a type species for subgenus *Biannulata* (Demospongiae, Poecilosclerida, Latrunculiidae). *Zootaxa* 3395: 33–45. https://doi.org/10.11646/zootaxa.3395.1.3

Samaai, T., Kelly, M. (2002) Family Latrunculiidae Topsent, 1922. Pp. 708–719 *in*: Hooper, J. N. A. & Van Soest, R. W. M. (Eds), *Systema Porifera*: *A Guide to the Classification of Sponges*. Kluwer Academic/Plenum Publishers, New York. https://doi.org/10.1007/978-1-4615-0747-5_78

Samaai, T., Krasokhin, V. (2002) *Latrunculia oparinae* n. sp. (Demospongiae, Poecilosclerida, Latrunculiidae) from the Kurile Islands, Sea of Okhotsk, Russia. *Beaufortia* 52 (8): 95–101.

Samaai, T., Ngwakum, B., Payne, R., Teske, P. R., Janson, L., Kerwath, S., Parker, D., Kelly, M., Gibbons, M. J. (2020) New Latrunculiidae (Demospongiae, Poecilosclerida) from the Agulhas ecoregion of temperate southern Africa. *Zootaxa* 4896 (3): 409–442. https://doi.org/10.11646/zootaxa.4896.3.4

Schmidt, O. (1870) *Grundzüge einer Spongien-Fauna des atlantischen Gebietes*. Wilhelm Engelmann, Leipzig, 88 pp. pls I–VI.

Schrammen, A. (1924) Die Kieselspongien der oberen Kreide von Nordwestdeutschland. III. und letzter Teil. *Monographien zur Geologie und Paläontologie* (*1*) *Heft* 2: 1–159.

Schupp, P. J., Rohde, S., Versluis, D., Petersen, L.-E., Clemens, T., Conrad, K. P., Mills, S., Kelly, M. (2017) Section 7.14. Investigations on the biodiversity of benthic sponge and invertebrate communities and their associated microbiome. Pp. 57–59 *in*: Simon, M. (Ed). Functional diversity of bacterial communities and the metabolome in the water column, sediment and in sponges in the southwest Pacific around New Zealand. RV Sonne SO254 cruise report, University of Oldenburg, Oldenburg, Germany.

Sollas, W. J. (1885) A classification of the sponges. *Annals and Magazine of Natural History* Series 5, 16 (95): 395. https://doi.org/10.1080/00222938509459901

Sollas, W. J. (1886) Preliminary account of the tetractinellid sponges dredged by HMS Challenger 1872–76. Part I. The Choristida. *Scientific Proceedings of the Royal Dublin Society* New Series, 5: 177–199.

Spalding, M. D., Fox, H. E., Allen, G. R., Davidson, N., Ferdaña, Z. A., Finlayson, M., Halpern, B. S., Jorge, M. A., Lombana, A., Lourie, S. A., Martin, K. D., McManus, E., Molnar, J., Recchia, C. A., Robertson, J. (2007) Marine Ecoregions of the World: A bioregionalization of coastal and shelf areas. *BioScience* 57 (7): 573–583. 10.1641/b570707

Tanita, S. (1959) Sponges. *Biological Results of the Japanese Antarctic Research Expedition* 1: 1–10. https://doi.org/10.5134/176431

Topsent, E. (1890) Notice préliminaire sur les spongiaires recueillis durant les campagnes de l'Hirondelle. *Bulletin de la Société zoologique de France* 15: 26–32, 65–71. https://doi.org/10.5962/bhl.part.18721

Topsent, E. (1898) Eponges nouvelles des Açores. *Mémoires de la Société zoologique de France* Première serie, 11: 225–255.

Topsent, E. (1915) Spongiaires recueillis par la 'Scotia' dans l'Antarctique (1903–1904). *Transactions of the Royal Society of Edinburgh Supplément* 51: 35–43.

Topsent, E. (1922) Les mégasclères polytylotes des Monaxonides et la parenté des Latrunculiines. *Bulletin de l'Institut océanographique Monaco* 415: 1–8.

Topsent, E. (1927) Diagnoses d'Éponges nouvelles recueillies par le Prince Albert I^{er} de Monaco. *Bulletin de l'Institut Océanographique Monaco* 502: 1–19.

Topsent, E. (1928) Spongiaires de l'Atlantique et de la Méditerranée provenant des croisières du Prince Albert I^{er} de Monaco. *Résultats des campagnes scientifiques accomplies par le Prince Albert I. Monaco* 74: 1–376, pls I–XI.

Uriz, M. J. (1988) Deep-water sponges from the continental shelf and slope off Namibia (Southwest Africa): classses Hexactinellida and Demospongia. *Monografías de Zoología Marina* 3: 9–157.

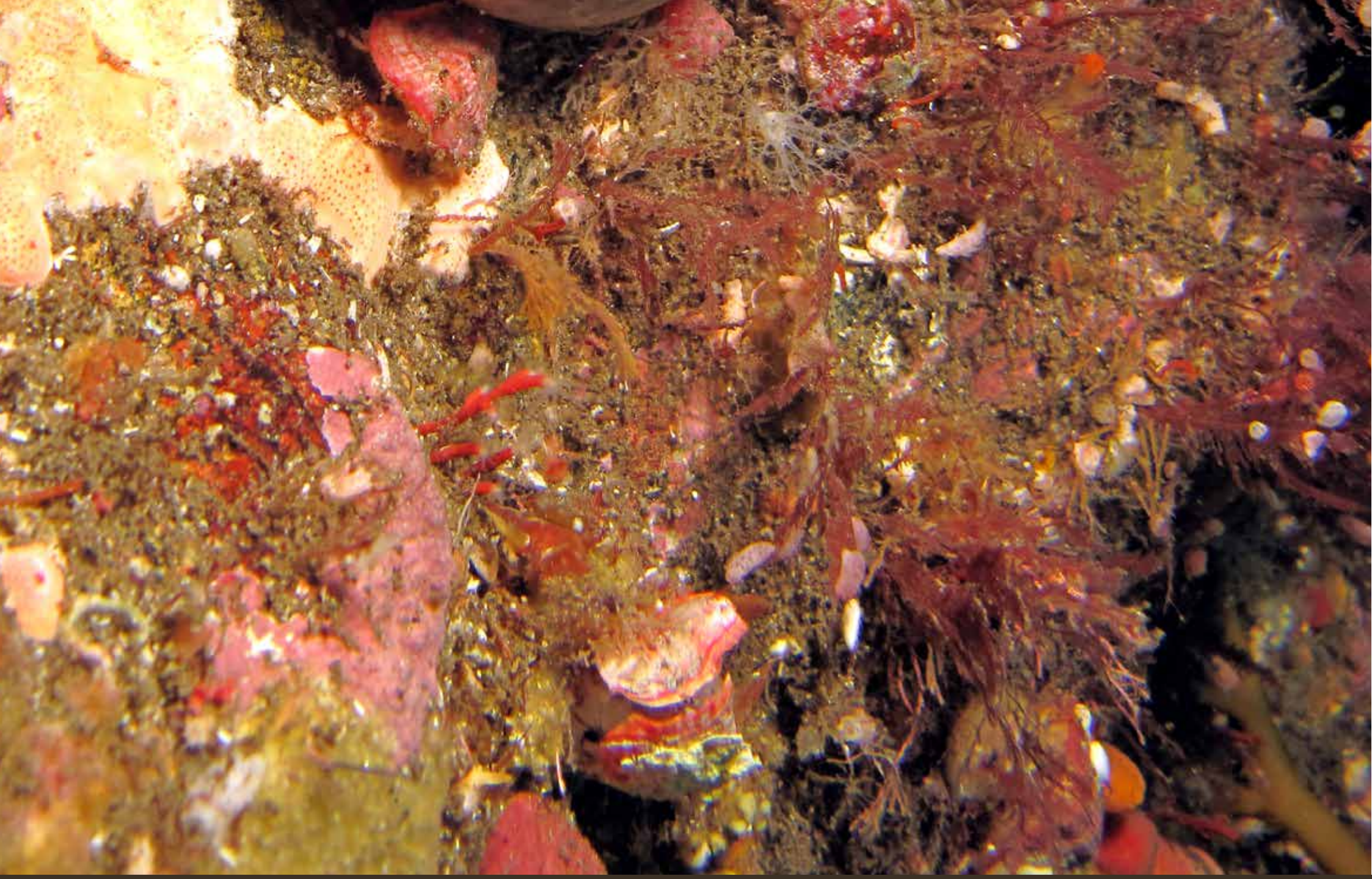
Vacelet, J. (1969) Éponges de la Roche du Large et de l'étage bathyal de Méditerranée. *Mémoires du Muséum National D'histoire Naturelle*. *Paris* Series A, 59: 145–219.

Vacelet, J., Kelly, M., Schlacher-Hoenlinger, M. (2009) Two new species of *Chondrocladia* (Demospongiae: Cladorhizidae) with a new spicule type from the deep south Pacific, and a discussion of the genus *Meliiderma*. *Zootaxa* 2073: 57–68 https://doi.org/10.11646/zootaxa.2073.1.5

Wiedenmayer, F. (1994) Contributions to the knowledge of post-Palaeozoic neritic and archibenthal sponges (Porifera): The stratigraphic record, ecology, and global distribution of intermediate and higher taxa. *Schweizerische Paläontologische Abhandlungen* 116: 62–66.

Zou, Y., Wang, X., Sims, J., Wang, B., Pandey, P., Welsh, C.L., Stone, R.P., Avery, M.A., Doerksen, R.J., Ferreira, D., Anklin, C., Valeriote, F.A., Kelly, M., Hamann, M.T. (2019) Computationally assisted discovery and assignment of a highly strained and PANC-1 selective alkaloid from Alaska's deep ocean. *Journal of the American Chemical Society* 141: 4338–4344. https://doi.org/10.1021/jacs.8b11403

Latrunculia (*Latrunculia*) *fiordensis* Alvarez, Bergquist & Battershill, 2002, Dusky Sound, Fiordland, 15 m, with the leathery chalice-sponge, *Cymbastela lamellata* (Bergquist, 1961), sitting to the left and behind. Image captured on 1 July 2014 by Mike Page, NIWA Nelson, on SCUBA. This image previously appeared as Fig.14FLD2-21 in D'Archino *et al.* (2014, page 80) and Splendid Sponges (Version 3, 2018, page 76) https://niwa.co.nz/coasts-andoceans/marine-identification-guides-and-fact-sheets/Splendid-Sponges. Reproduced with permission.



SEAFLOOR IMAGES

Seafloor images of living latrunculid sponges

The majority of recent NIWA biodiversity voyages onboard RV *Tangaroa*, and visiting international voyages with ROV and submersible capability, provide crucial seafloor images of living organisms and their habitat at a time when physical collections are declining. NIWA's Deep Towed Imaging System (DTIS) provides increasingly detailed images that facilitate the potential identification of many organisms *in situ*, and these images provide essential information for our understanding of the morphology and ecology of seafloor communities.

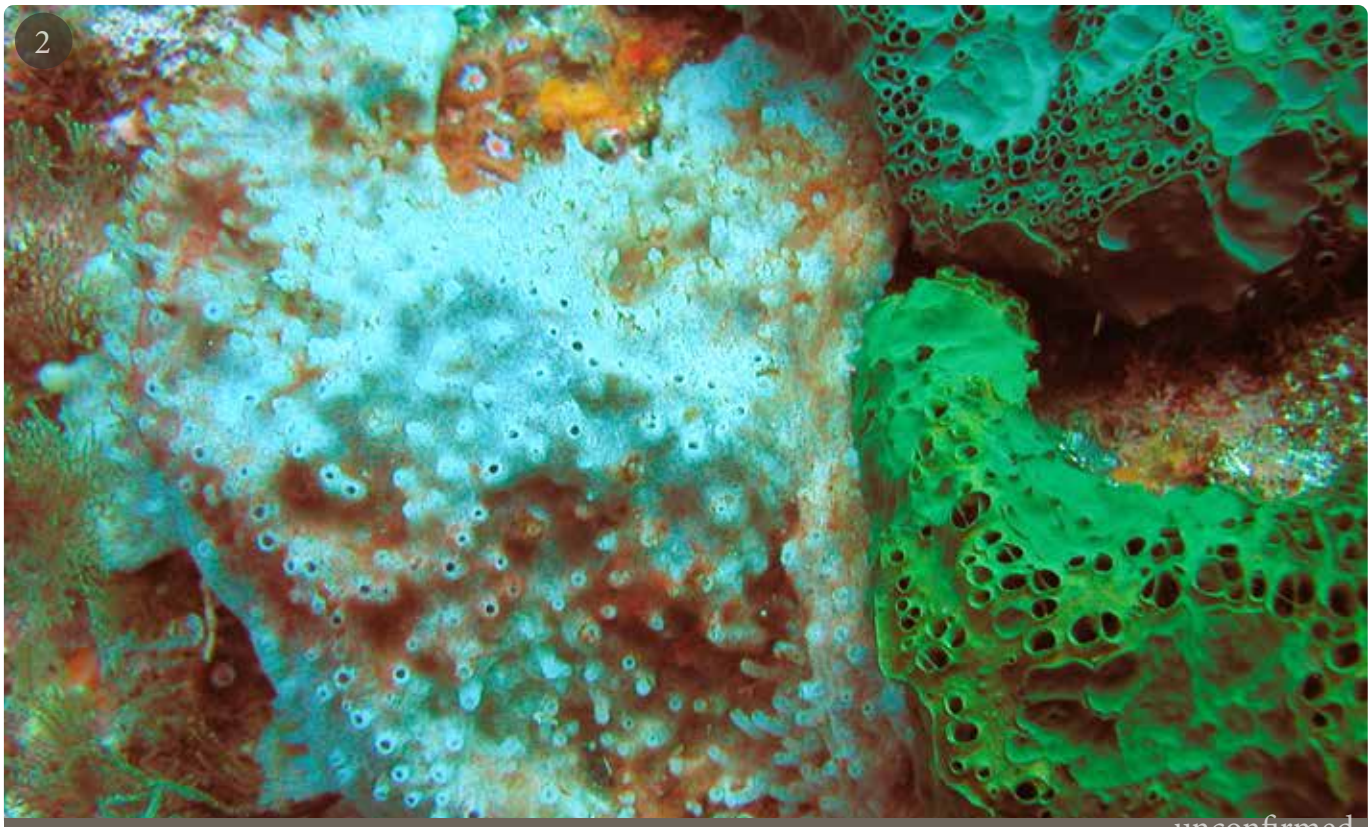
A selection of seafloor images of living latrunculid sponges, captured on SCUBA and DTIS, provided by NIWA and GEOMAR, are included here (Seafloor Images 1–16). Many of the sponges are fully identified, as they were collected, but many remain unidentified and species names are given as best guesses only.

While we may be able to improve our accuracy of identification of specimens from images by examining specimens taken from the same stations, an element of doubt always remains as to the identity of the species, especially if they do not display obvious diagnostic morphological characters. The identifications provided from these seafloor images are the most accurate possible, based upon best knowledge of the species featured in this study. We also feature sponge images captured by individuals using SCUBA in diving depths. Unless otherwise indicated, all images are provided courtesy of NIWA (in the case of DTIS images) and the individual NIWA staff members who may have provided images captured on SCUBA.

confirmed
(NIWA 93021)

Latrunculia (*Biannulata*) *millerae* Alvarez, Bergquist & Battershill, 2002

NZOI Stn Z15393, Crayfish Heights/Thompson Sound, Fiordland, 45.220° S, 166.978° E, 10 m, 30 Jan 2006. Image captured by Mike Page, NIWA Nelson, on SCUBA.



unconfirmed

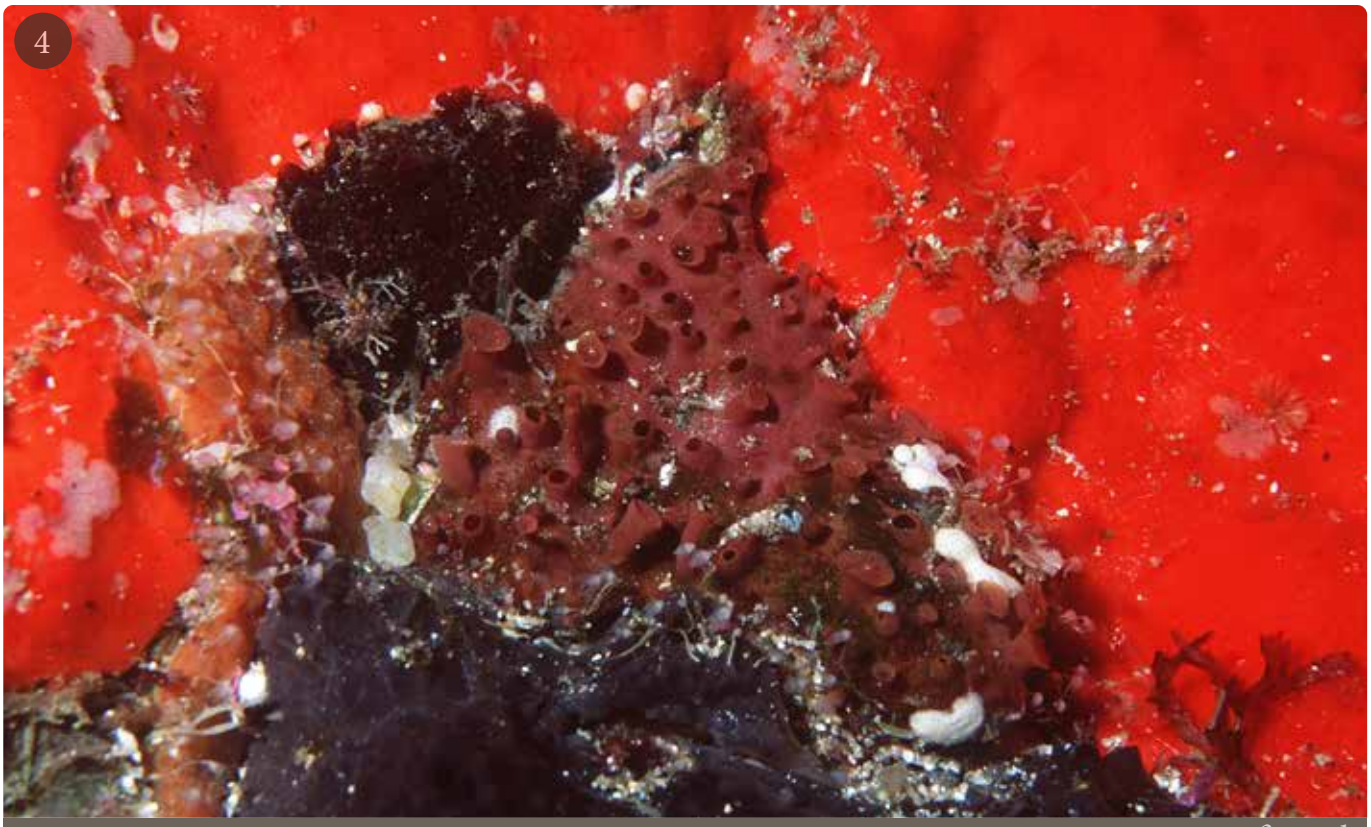
Latrunculia (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002 (lower and upper right)

Irishman's Garden, Princes Islands, Three Kings Islands, 34.176° S, 172.049° E, 10–20 m, 24 Feb 2002. Image captured by Mike Page, NIWA Nelson, on SCUBA. Reproduced with permission.

unconfirmed

Latrunculia (*Biannulata*) *duckworthi* Alvarez, Bergquist & Battershill, 2002 (right middle, bluish brown) and *L.* (*B.*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002 (upper middle, green)

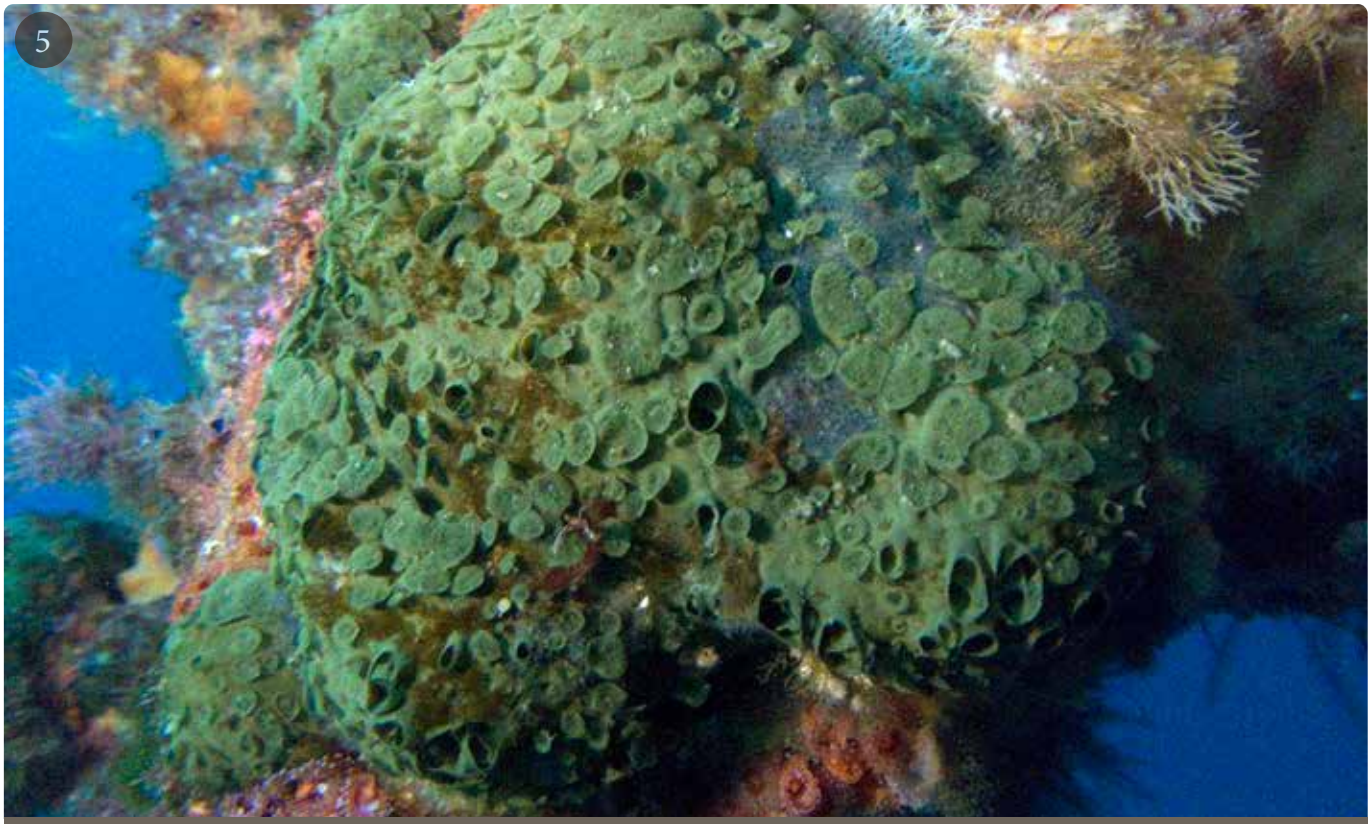
Irishman's Garden, Princes Islands, Three Kings Islands, 34.176° S, 172.049° E, 10–20 m, 24 Feb 2002. Image captured by Mike Page, NIWA Nelson, on SCUBA. Reproduced with permission.



confirmed
(NIWA 101628)

Latrunculia (*Biannulata*) *procumbens* Alvarez, Bergquist & Battershill, 2002

NIWA Stn Z15954, Great Island, Three Kings Islands, 34.145° S, 172.144° E, 5–18 m, 14 Apr 1999. Image captured by Patrick L Colin, Coral Reef Research Foundation, Palau, on SCUBA. Reproduced with permission.



unconfirmed

Latrunculia (*Biannulata*) *procumbens* Alvarez, Bergquist & Battershill, 2002

Northern Arch, Poor Knights Islands, 35.445° S, 174.732° E, 25 m, 14 Apr 2019. Image captured by Carina Sim-Smith on SCUBA.

unconfirmed

Latrunculia (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002

NIWA Stn TAN0906/171, Bay of Islands, 34.372° S, 172.921° E, 57–76 m, 15 Jul 2009

unconfirmed

Latrunculia (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002

NIWA Stn TAN0906/171, Bay of Islands, 34.372° S, 172.921° E, 57–76 m, 15 Jul 2009

unconfirmed

Latrunculia (*Biannulata*) *kaakaariki* Alvarez, Bergquist & Battershill, 2002

NIWA Stn TAN0906/082, Bay of Islands, 34.867° S, 173.908° E, 114–119 m, 9 Jul 2009

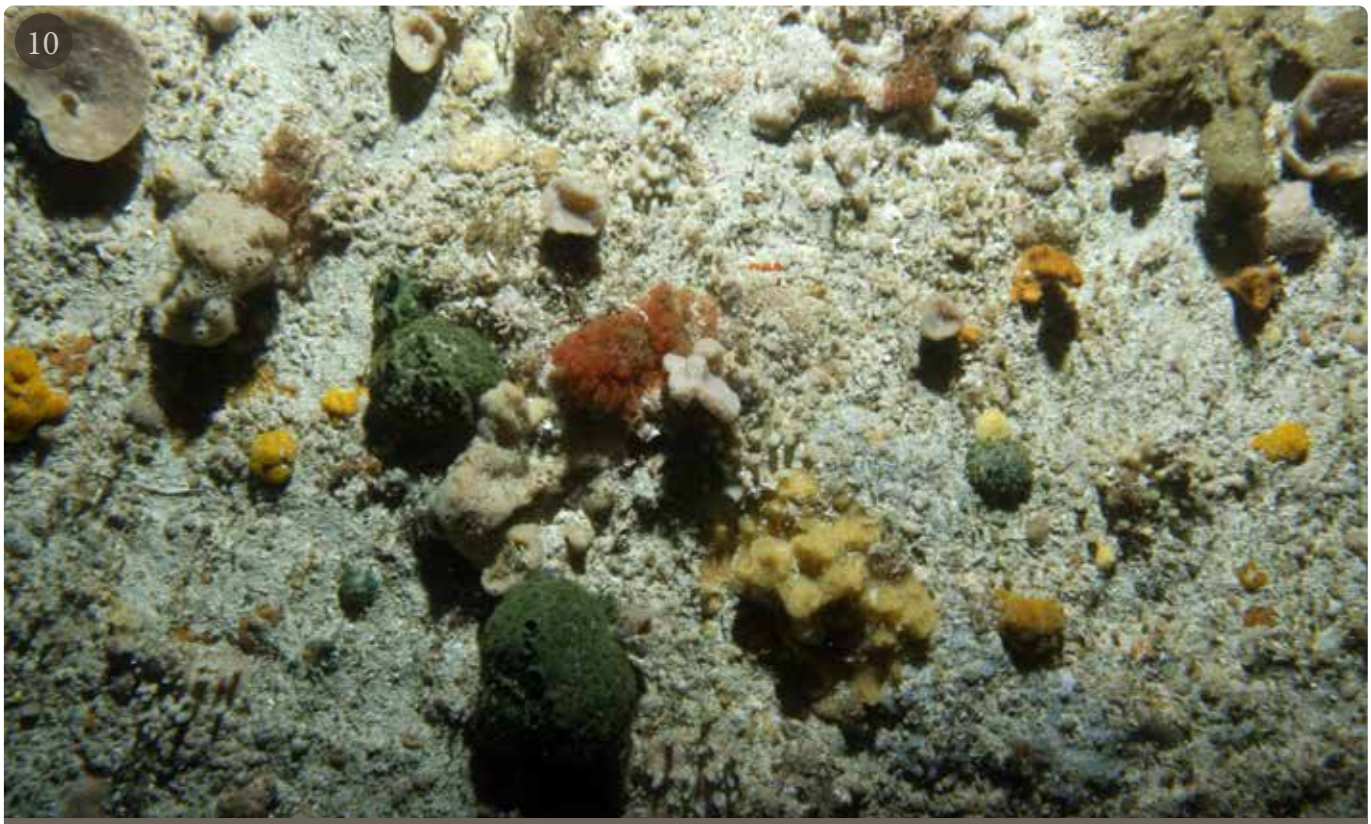
9

unconfirmed

The three large sponges indicated by white arrows are most likely *Latrunculia* (*Biannulata*) *kaikoura*. The identity of the three smaller sponges (black arrows) is uncertain and may be *L.* (*B.*) *macquariensis* sp. nov., *L.* (*L.*) *gracilis* sp. nov., or even *L.* (*L.*) *brevis*, given the location.

NIWA Stn TAN1602/067, Auckland Island, 50.621° S, 166.698° E, 100–102 m, 21 Feb 2016

10



unconfirmed

Latrunculia (*Biannulata*) *kaikoura* Alvarez, Bergquist & Battershill, 2002

NIWA Stn TAN1602/026, off Auckland Island, 50.050° S, 167.485° E, 116–118 m, 14 Feb 2016

11

unconfirmed

Latrunculia (*Biannulata*) *kaikoura* Alvarez, Bergquist & Battershill, 2002 with several specimens of subantarctic sponge species, *Lamellomorpha australis* Kelly & Cárdenas, 2019 (grey sculpted sponge, upper centre).

NIWA Stn TAN1602/026, Auckland Island, 50.050° S, 167.485° E, 116–118 m, 14 Feb 2016

12

confirmed
(NIWA 126241)

Latrunculia (*Latrunculia*) *robertsoni* sp. nov.

RV *Sonne* Stn SO254/77ROV14_BIOBOX19, Christchurch Canyon slope, 43.289° S, 173.606° E, 670 m, 20 Feb 2017. Image captured by GEOMAR ROV Kiel 6000 onboard RV *Sonne* (voyage SO254), courtesy of Project PoriBacNewZ, GEOMAR & ICBM. Reproduced with permission.

Latrunculia (*Latrunculia*) *robertsoni* sp. nov.

confirmed
(NIWA 126221)

RV *Sonne* Stn SO254/77ROV14_BIOBOX19, Christchurch Canyon slope, 43.289° S, 173.606° E, 670 m, 20 Feb 2017. Image captured by GEOMAR ROV Kiel 6000 onboard RV *Sonne* (voyage SO254), courtesy of Project PoriBacNewZ, GEOMAR & ICBM. Reproduced with permission.

unconfirmed

Latrunculia sp. indet. (upper right), *Antarctotetilla leptoderma* (Sollas, 1886) (lower left).

NIWA Stn TAN2004/076, Campbell Plateau, 48.615° S, 170.276° E, 1097–1104 m, 3 Jun 2020

15

unconfirmed

Latrunculia (*Biannulata*) *kaikoura* Alvarez, Bergquist & Battershill, 2002

NIWA Stn TAN2004/012, Campbell Plateau, 47.490° S, 168.995° E, 123 m, 20 May 2020

16

unconfirmed

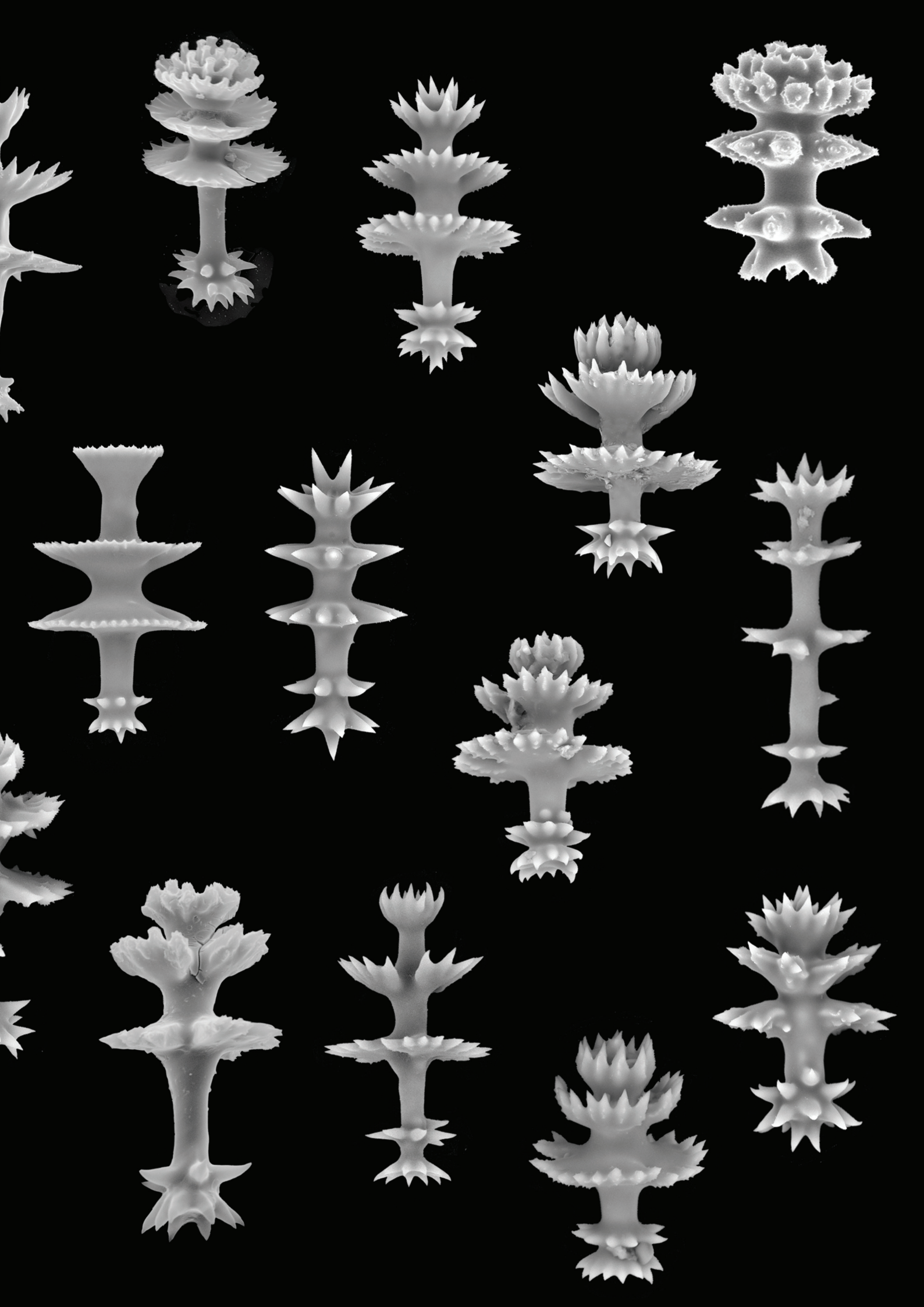
The identity of these tiny latrunculid sponges is uncertain; they may be either *Latrunculia* (*Biannulata*) *macquariensis* sp. nov. or *L.* (*L.*) *gracilis* sp. nov., given the location.

Oamaru Continental Shelf. Image captured by DTIS onboard RV *Tangaroa*. Reproduced with permission from the owner, Beach Energy, Discover Exploration and OGOG Limited as PEP 38264 Joint Venture Partners.

Taxonomic index

Principal taxonomic account is in bold font; species illustrations in bold italic. † indicates fossil species.

A checklist of species known from the New Zealand EEZ, Australia EEZ around Macquarie Island, nearby International Waters, Subantarctic New Zealand waters, and Antarctic waters is given on pages 18–19.



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