ISSN 0083-7903

NEW ZEALAND
DEPARTMENT OF
SCIENTIFIC AND
INDUSTRIAL
RESEARCH

DSIR
Marine and
Freshwater

The Marine Fauna of New Zealand:

# Stylasteridae (Cnidaria: Hydroida)

Stephen D. Cairns

*New Zealand Oceanographic Institute Memoir 98*

FRONTISPIECE. Top, *Errina dendyi* Hickson, NZOI Stn S235, 22 m, Long Sound, Preservation Inlet, Fiordland, with brachiopods (*Liothyrella neozelanica* Thomson). Bottom, *Errina novaezelandiae* Hickson, NZOI Stn M764, 28 m, Milford Sound, Fiordland. [Photos: Top, R.J. Singleton; Bottom, P.J. Hill]

[COVER PHOTO. *Stylaster brunneus* Boschma, Norfolk Island. [Photo: S.D. Cairns]]

NEW ZEALAND
DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

# The Marine Fauna of New Zealand: Stylasteridae (Cnidaria: Hydroida)

by

STEPHEN D. CAIRNS

Smithsonian Institution, Washington, D.C.

**New Zealand Oceanographic Institute Memoir 98**

**1991**

CAIRNS, S.D.
The marine fauna of New Zealand: Stylasteridae (Cnidaria: Hydroida) / by Stephen D. Cairns. — Wellington : New Zealand Oceanographic Institute, 1991.
(New Zealand Oceanographic Institute memoir, ISSN 0083-7903; 98)

ISBN 0-477-02613-3

I. Title II. Series

UDC

Received for publication:
23 November 1990

© Crown Copyright 1991

# CONTENTS

Page

LIST OF FIGURES ........ 6
LIST OF TABLES ........ 6
ABSTRACT ........ 7
INTRODUCTION ........ 8
MATERIAL AND METHODS ........ 10
LIST OF STATIONS ........ 12
CHECKLIST OF STYLASTERIDAE KNOWN FROM THE NEW ZEALAND REGION ........ 16
ZOOGEOGRAPHY ........ 17
CLASSIFICATION ........ 21
- Genus *Lepidopora* ........ 21
- Genus *Adelopora* ........ 27
- Genus *Lepidotheca* ........ 31
- Genus *Stephanohelia* ........ 39
- Genus *Inferiolabiata* ........ 40
- Genus *Sporadopora* ........ 43
- Genus *Distichopora* ........ 46
- Genus *Systemapora* ........ 47
- Genus *Errina* ........ 49
- Genus *Stylaster* ........ 60
- Genus *Calyptopora* ........ 66
- Genus *Stenohelia* ........ 70
- Genus *Conopora* ........ 71
- Genus *Astya* ........ 80
- Genus *Crypthelia* ........ 82
- Genus *Pseudocrypthelia* ........ 90

ACKNOWLEDGMENTS ........ 91
REFERENCES ........ 92
INDEX ........ 96
PLATES ........ 101

## LIST OF FIGURES

Page

1. Map of the northern New Zealand region, showing stations at which stylasterids were collected (500 and 1 000 m isobaths indicated) ........ 13

2. Map of the southern New Zealand region, showing stations at which stylasterids were collected (500 and 1 000 m isobaths indicated) ........ 14

## LIST OF TABLES

Page

1. Distribution patterns and depth ranges of New Zealand Stylasteridae ........ 19

2. Characteristics of the four species of *Adelopora* ........ 29

3. Characteristics of the six New Zealand species of *Lepidotheca* ........ 36

4. Characteristics of the three species of *Inferiolabiata* ........ 41

5. Characteristics of the five New Zealand species of *Stylaster* ........ 67

6. Characteristics of the six New Zealand species of *Conopora* ........ 79

7. Characteristics of the six New Zealand species of *Crypthelia* ........ 89

# The Marine Fauna of New Zealand: Stylasteridae (Cnidaria: Hydroida)

by

STEPHEN D. CAIRNS

Department of Invertebrate Zoology
National Museum of Natural History,
Smithsonian Institution, Washington, D.C. 20560

## ABSTRACT

Sixty-two species of stylasterids are known from the New Zealand region, consisting of 59 Recent and three exclusively fossil species, making it the most diverse stylasterid fauna known. Fifty-eight of the 59 Recent (except *Distichopora violacea*) and one of the fossil species are described and illustrated herein. Only 24 stylasterid species had previously been reported from the New Zealand area. Thus, 38 species are new records for the region, including 34 new species and 2 new genera. Two taxa (facies) are elevated to species rank : *Errina cooki* and *E. dendyi*. This revision is based on 427 lots of new material from 225 stations, primarily collected by NZOI vessels and, to a much lesser extent, by the USNS *Eltanin*. Several new skeletal descriptive terms are introduced, including : types of opercular articulation, platelet polarity, pseudotabulae, dactyloridges, and radial-imbricate coenosteal texture.

The New Zealand stylasterids are predominantly a deepwater (lower shelf and slope to 2355 m) group, 47 (80%) of the 59 Recent species not yet known outside the region. Seven patterns of species distribution are discerned: widespread, disjunct, Cookian, Aucklandian, Antipodean, Subantarctic, and primarily tropical. Few species occur directly off the coasts of New Zealand, most preferring the nonterrigenous, calcareous substrates characteristic of the surrounding submarine ridges, seamounts, and lesser islands. Consequently, the Aucklandian Province (including Three Kings, southern Norfolk, and Kermadec Ridges) is the most common distribution with 39 species occurring in this province, 23 of them characteristic of it. Five species (31% of total known from the Kermadecs) are endemic to the Kermadec Islands, supporting a designation as a separate province for these islands. The Antipodean fauna is closely related to that of the north Macquarie Ridge and is, in general, more closely related to the Subantarctic fauna than that of New Zealand. The 13 species occurring off Macquarie Island show a mixture of New Zealand, Subantarctic, and endemic elements.

**Keywords:** Stylasteridae, calcified hydroids, classification, distribution, new species, new genera, marine fauna, New Zealand, zoogeography, biodiversity.

New Zealand Oceanographic Institute Memoir 98. 1991.
ISSN 0083-7903

# INTRODUCTION

Stylasterids are common in the New Zealand region but not often found directly off the coasts of North and South Islands, clearly preferring the deep shelf and slope depths of the surrounding submarine ridges, seamounts, and smaller islands. This explains why the first record of a stylasterid from New Zealand waters resulted from a deep-sea dredge of the *Gazelle* at a relatively late date (Studer 1878). It is becoming increasingly apparent that stylasterids prefer open oceanic habitats and are rarely found off large land masses. The numerous ridges, seamounts, plateaus, and small islands that surround New Zealand make an ideal environment for stylasterids and support the highest diversity of stylasterid species yet known.

Once considered as the hydrozoan order Stylasterina, or lumped with the Milleporidae as the Hydrocorallia, the Stylasteridae is more accurately considered as one of five families in the athecate hydroid superfamily Hydractinioidea (*see* Bouillon 1985). Petersen (1979) considered the Hydractiniidae to be its sister family, the Milleporidae being only a distant relative. Cairns (1984, 1987b) discussed the relationships among the genera. Including this study, there are approximately 258 valid species and 25 genera of stylasterids (Cairns 1991b), consisting of 234 Recent and 24 exclusively fossil species.

Stylasterids are ubiquitous marine invertebrates, known from the Arctic Circle to continental Antarctica at depths of 0–2789 m, but clearly are more abundant between 200 and 1200 m. They are exclusively sessile, benthic, colonial organisms that require a hard substrate for original settlement and subsequent anchorage. They also all have a calcareous skeleton, a synapomorphy for the family, that usually consists of aragonite but in some genera is calcite (Lowenstam 1964). The majority of species have white coralla, but many species are brightly pigmented, the colors orange, red, and pink being most common in the New Zealand species.

## Previous Studies

The earliest record of a stylasterid from the New Zealand region was a tentative identification of *Stylaster sanguineus* Milne Edwards and Haime, 1850 by Pourtalès (1871: 83), who reported three specimens from off Florida and one from "New Zealand." The New Zealand record was reiterated by Moseley 1881 : 86), Lendenfeld (1885: 615), Hutton (1904:38), and Boschma (1953, 1957, 1964b: 184). Pourtalès' Floridian specimens were figured in 1880 (Pourtalès *in* Agassiz 1880 : pl. 3, figs 18–24) and subsequently reidentified as *Stylaster filogranus* Pourtalès, 1871 by Cairns (1986a) based on these illustrations. The four specimens of *S. sanguineus* reported by Pourtalès (1871, 1880) from Florida and New Zealand were recently examined on loan from the Museum of Comparative Zoology and all were found to be typical *S. sanguineus*. Although *S. sanguineus* is widespread in the western Pacific (Boschma 1964b), it is definitely not known from the Atlantic Ocean (Cairns 1986a), which casts doubt on the nominal localities of all four of Pourtalès' specimens. Joined with the fact that specimens of *Stylaster sanguineus* have not been subsequently reported from the New Zealand region, its occurrence there is considered to be unlikely.

The first unequivocal record of stylasterids from the New Zealand region was that of Studer (1878) of four deep-water species collected from two stations of the S.M.S. *Gazelle* off North Cape, North Island. Studer reported *Cryptohelia pudica* Milne Edwards and Haime, 1849 (= *Crypthelia studeri* n.sp.), *Stylaster laevis* n.sp. (= *Conopora laevis*), *Stylaster verrucosus* n.sp. (= *Conopora verrucosa*), and *Stylaster obliquus* n. sp. (= *Conopora laevis*). Studer's specimens are deposited at the Zoologisches Museum, Berlin.

In a postscript to a larger paper, Moseley (1879: 503) described *Conopora tenuis*, n.gen. n.sp., from a *Challenger* station in the Kermadec Islands; the species was later considered to be a junior synonym of *Conopora laevis* (Studer 1878).

Tenison-Woods (1880) described the fossil species *Sporadopora marginata* from the Chatham Islands, the age estimated to be Upper Eocene by Boschma (1953) and later revised to Late Pliocene (*see Remarks* on *Sporadopora micropora*). This specimen was recently rediscovered in the bryozoan collection of the New Zealand Geological Survey (DSIR Geology and Geophysics).

In reporting the stylasterids collected on the *Challenger* expedition, Moseley (1881) listed six species from two deep-water stations (*Challenger* Stns 170, 171) off the Kermadec Islands: *Stylaster laevis* Studer, 1878 (= *Conopora verrucosa* (Studer, 1878)); *Stylaster erubescens* Pourtalès, 1868 (= *Conopora verrucosa*); *Stylaster gracilis* Milne Edwards and Haime, 1850; *Stenohelia profunda* Moseley, 1881 (listed as *Stenohelia* sp. cf. *S. profunda* in this paper); *Conopora tenuis* Moseley, 1879 (= *Conopora laevis);* and *Cryptohelia pudia* Milne Edwards and Haime, 1849 (= *C. cymas* in part, *Challenger* Stn 171). Due to synonymy with *C. verrucosa*, of the six species reported, only five are valid, two of which were new records for the New Zealand region. All *Challenger* specimens are deposited at The Natural History Museum, London (British Museum (Natural History)).

Hutton (1904), in his index of the New Zealand fauna, reiterated the records of Pourtalès (1871), Studer (1878), and Moseley (1881), but incorrectly listed *Allopora profunda* Moseley, 1881 for New Zealand, meaning instead to cite *Stenohelia profunda* Moseley, 1881, a different species (*see* Boschma 1953: 171). Hutton also listed two unidentified species of *Errina* as present at the Canterbury Museum, the first indications of this widespread and speciose genus in the New Zealand region.

Although the *Siboga* expedition did not enter New Zealand waters, Hickson and England's (1905) account of the stylasterids from this expedition forms the basis of our knowledge of deep-water Western Pacific stylasterids. Some of the species they described from Indonesia were subsequently also found in the New Zealand region.

Hickson (1912) was the first to turn his attention to the shallow-water stylasterids of the New Zealand fiords, reporting one new species, *Errina novaezelandiae*, with four "facies." Two of the four facies are herein elevated to species rank, resulting in the equivalent addition of three species to the fauna.

Broch (1942) described three new species from relatively shallow water (91–119 m) off North Cape that were collected on Thomas Mortensen's Pacific Expedition (1914–1916): *Sporadopora mortenseni*, *Errina rubra*, and *Errina cervicornis* (= *Lepidotheca cervicornis*). Because *E. rubra* is considered to be a junior synonym of *E. dendyi* Hickson, 1912, this results in only two additional species records. These specimens are deposited at the Zoologisk Museum, Copenhagen. Broch also redescribed and figured one of the facies of Hickson's *Errina novaezelandiae.*

In his handbook of the native animals of New Zealand, Powell (1947) reported one stylasterid: *Errina* sp., from Chatham and Stewart Islands; the specimen from Chatham Island is undoubtedly *Errina chathamensis* n.sp. described herein.

Ralph (1948), in a popular article on New Zealand corals, was the first to report and figure *Distichopora* from New Zealand, as well as additional records of *E. novaezelandiae* (probably facies *cooki*) from Cook Strait. These specimens have not been reexamined and their deposition is unknown.

Broch's (1950) report on the *Discovery* stylasterids from the Southern Ocean includes one record from the New Zealand region: *Errina antarctica* (Gray, 1872) from Antipodes Island, reidentified as *Errina hicksoni* n.sp. herein. Although most of the *Discovery* corals are deposited at The Natural History Museum, London, this particular specimen could not be found.

In his listing of all stylasterids reported from the Pacific Ocean, Boschma (1953 : 173, 177) listed 17 species and facies as present in the New Zealand region, but his list was uncritical, including dubious identifications and synonyms, and did not add any new records to the New Zealand fauna. Likewise, his uncritical listing of all described stylasterid species (Boschma 1957) refers to all species previously reported from New Zealand, but does not add new records or taxonomic information.

Squires (1958) described *Sporadopora cleithridium* from the Upper Miocene of Port Craig, New Zealand; the species was subsequently transferred to *Axopora* by Cairns (1983d). Being exclusively fossil and known only from poorly preserved type specimens, it is not included in the species account.

Boschma (1959 : 142) reported *Distichopora violacea* (Pallas, 1776) from the mouth of the Rangitiki [sic] River, North Island (122 m), an unusually deep record for this species. Ralph's (1948) *Distichopora* specimen may also have been the same species. Otherwise, specimens of *Distichopora* appear to be very rare in the New Zealand region and the aforementioned records are not included in the species account. Boschma's unusual specimen is stated to be deposited at the Manchester Museum but was not present in 1990.

As a complement to his earlier paper in 1958, Squires (1962) reported three additional fossil stylasterid taxa from New Zealand: *Distichopora* sp. from the Miocene of Kaipara Harbour; *Paraerrina* sp. from the Middle Oligocene of Gee's Point, Kakanui; and *Sporadopora mortenseni* Broch, 1942 from the Pliocene of the Ruahine Range. Hayward (1977) also reported fossil (Lower Miocene) *Distichopora* from North Auckland. Squires (1965) later described *Pliobothrus grantmackiei* from the Middle Oligocene of Kakanui, New Zealand, this species later being identified as a bryozoan (*see* Cairns 1983b).

Toward the end of his career, H. Boschma began to study the stylasterid collections made by NZOI, describing four new species from three NZOI stations off the Antipodes and Auckland Islands. He described *Calyptopora reticulata* Boschma, 1968a; *Errina cruenta* Boschma, 1968b (= *E. novaezelandiae* Hickson, 1912); *Errina sarmentosa* Boschma, 1968c (= *Lepidopora sarmentosa*); and *Stenohelia conferta* Boschma, 1968e. Documentation of the type specimens pertaining to these species is found in Dawson (1979) and Vervoort and Zibrowius (1981); the type specimens are deposited primarily at NZOI and the Rijksmuseum van Natuurlijke Historie, Leiden. In his last paper on stylasterid corals, Boschma (1970) described *Stylaster brunneus* from off New Caledonia, a species reported from off Norfolk Island in this paper.

Both Richardson (1981) and Grange *et al.* (1981) reported *Errina novaezelandiae* from shallow water southern fiords, both records herein interpreted as *E. dendyi.*

Also in 1981, Zibrowius reported five new records of *Conopora laevis* from the New Zealand region, four of them based on NZOI stations, and provided a useful discussion of the synonymy of that species.

In my revision of the Antarctic and Subantarctic stylasterids (Cairns 1983a), based primarily on the collections of the *Eltanin* but also on selected NZOI material (station series A–F), I described three new species from the New Zealand region: *Errina cheilopora, Errina fascicularis* (= *Lepidotheca fascicularis*), and *Crypthelia fragilis;* added three new records to the region: *Errina gracilis* Marenzeller, 1903, *Errina labiata* Moseley, 1879 (= *Inferiolabiata labiata*), and *Allopora eguchii* Boschma, 1966 (= *Stylaster eguchii*); and reported additional records of three species: *Lepidopora sarmentosa* Boschma, 1968c, *Conopora pauciseptata* Broch, 1951a (= *Conopora verrucosa*), and *Calyptopora reticulata* Boschma, 1968a (*see* Cairns 1983a : Table 1). Altogether, six additional species were recognised from the New Zealand region. Type specimens of newly described species and nontype specimens were deposited at the U.S. National Museum. Also in 1983 (Cairns 1983b), I discussed and figured many species from the New Zealand region in the context of a generic revision of the Stylasteridae, but no new records were reported. Finally, in 1985, I described two new species of *Lepidopora* from the vicinity of Three Kings Islands, based on specimens collected by NZOI (station series E and P). Additional specimens of both species are reported herein, considerably expanding on our knowledge of their geographic range and morphological variation.

To summarise, the major advances in our knowledge of New Zealand stylasterids resulted primarily from deep-water expeditionary collections: the *Gazelle* (Studer 1878), *Challenger* (Moseley 1879, 1881), *Siboga* (Hickson and England 1905), Mortensen's South Pacific Expedition (Broch 1942), the *Eltanin* (Cairns 1983a), and, most recently, the NZOI collections (Boschma 1968a, b, c, e; Zibrowius 1981; Cairns 1985; present work). Twenty-four species had previously (1878–1985) been reported from the New Zealand region, including three exclusively fossil species but not including four subsequently reidentified species (i.e., *Errina* sp. of Powell 1947; *Errina antarctica* of Broch 1950; and *Cryptohelia pudica* of Studer 1878, and Moseley 1881). As a result of this study, 38 new records are added, resulting in a total of 62 species (59 Recent and 3 fossil) for the region, making it the most diverse stylasterid fauna known in the world.

## MATERIAL AND METHODS

### Material

This study is based primarily on the examination of 427 previously unpublished lots of stylasterids collected throughout the New Zealand region from 225 localities (Maps 1–2). Most of the specimens (88% of the localities) were collected by NZOI from 1958 to 1988 (*see* List of Stations); specimens from 17 stations (8% of the localities) resulted from the *Eltanin;* the remaining 4% of the localities derive from a variety of sources (*see* List of Stations and text).

In addition to this new material, previously reported specimens were examined from the following museums: BM(NH) (Moseley 1879, 1881; Hickson and England 1909; Hickson 1912); MCZ, Harvard University, Cambridge (Pourtalès 1871); NMNH (Squires 1958, 1962, 1965; Cairns 1983a, b, 1985); NZGS (Tenison-Woods 1880); NZOI (Boschma 1968c, e; Zibrowius 1981); RMNH (Boschma 1966 — examined in 1982); ZMA (Hickson and England 1905); ZMB (Studer 1878 — examined in 1982); and ZMC (Broch 1942 — examined in 1982).

Types of all stylasterid species reported from the New Zealand region were examined, with the exceptions of: *Distichopora violacea* [and Boschma's (1959) New Zealand specimen], *Stylaster gracilis,* and *Errina novaezelandiae* facies *benhami.*

## Methods

Stylasterid corallum morphology was reviewed and illustrated by Cairns (1983b, 1986a); however, several additional terms are introduced in this paper. **Open** (Plates 9c, d, 10d) and closed (Plate 12a, c) **opercular articulations** are described in the generic remarks of *Adelopora.* Coenosteal platelet polarity describes the growing direction of coenosteal plate-lets, particularly in species of *Lepidotheca.* **Normal polarity,** the most frequently observed condition is when the platelet leading (growing) edges are orientated distally; **reverse polarity** (Plate 18d–g) indicates that the leading platelet edges are orientated proximally; **alternating polarity** (Plates 20g, 23a, 31d) indicates that the platelet polarity of adjacent coenosteal strips or even the same strip frequently alternate. In the description of *Lepidotheca robusta,* incomplete dactylopore tabulae are termed **pseudotabulae** (Plate 21b–d). The thin, elongate, lamellar medial ridges that occur in dactylopores of *Distichopora dispar* are called **dactyloridges** (Plate 31a, b). Finally, a peculiar type of imbricate coenosteal texture found in *Errina sinuosa* is described as **radial-imbricate** (Plate 40e, g).

Internal skeletal structures, such as gastrostyles, dactylostyles, and ring palisades, are best revealed along branch fractures, but, where material was scarce or the structures exceedingly delicate, an ultra-high-speed precision air grinder (Dentsply 300KS) with a 1-mm-diameter burr was used carefully to remove overlaying calcium carbonate. Scanning electron microscopy was done by the author using a Cambridge Stereoscan 100. Stereo views are often presented in order to appreciate the three-dimensional topography of skeletal characters.

Species synonymies are usually complete; if not, a reference is given to a more exhaustive synonymy. Efforts were made to verify most of the historically important records (both type and non-type) by personal observation, but when specimens were not available and the publication unclear, the synonymy entry and corresponding distributional record were queried.

Holotypes and most paratypes of new species are deposited at NZOI, their catalogue numbers prefaced by an H or P, respectively. Representative paratypes and a synoptic collection of nontype specimens are also deposited at the NMNH.

About 158 SEM stub preparations were made in conjunction with this study, numerically labelled in the Material Examined sections. All stubs were retained at the USNM and bear the USNM catalog number corresponding to the parent lot of the specimen if a specimen was retained at the USNM.

Tables of comparisons are provided for the species of some of the genera instead of dichotomous keys, since it is assumed that not all species are known from the New Zealand region and thus a dichotomous key might force an incorrect identification. Dichotomous and tabular keys to the stylasterid genera are presented by Cairns (1991b).

The following abbreviations are used in the text.

*Museums*

| | |
|---|---|
| **BM(NH)** | British Museum (Natural History), London (The Natural History Museum) |
| **MCZ** | Museum of Comparative Zoology, Harvard University, Cambridge |
| **NMNH** | National Museum of Natural History, Smithsonian Institution, Washington, D.C. |
| **NZGS** | New Zealand Geological Survey, now DSIR Geology and Geophysics, Lower Hutt |
| **NZOI** | New Zealand Oceanographic Institute, Wellington |
| **RMNH** | Rijksmuseum van Natuurlijke Historie, Leiden |
| **USNM** | United States National Museum, now the National Museum of Natural History, Smithsonian Institution, Washington, D.C. |
| **WAM** | Western Australian Museum, Perth |
| **ZMA** | Zoologische Museum, Amsterdam |
| **ZMB** | Zoologisches Museum, Berlin |
| **ZMC** | Zoologisk Museum, Copenhagen |

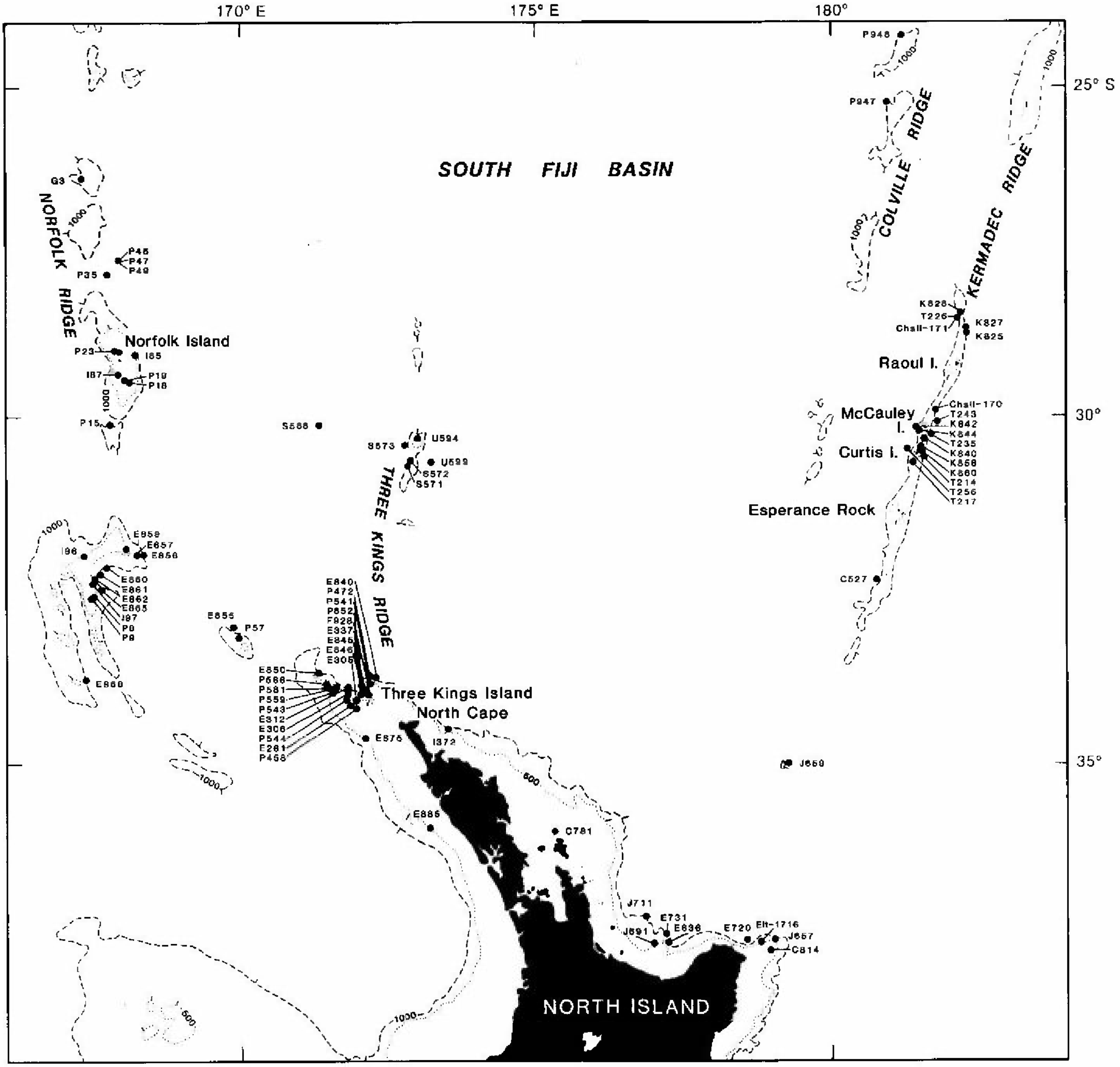
*Other abbreviations*

| | |
|---|---|
| **col.** | colony |
| **H : W** | Height-to-width ratio of a gastrostyle |
| **SEM** | Scanning electron microscope/microscopy |
| $\sigma$ | Standard deviation of sample (used with number of dactylopores per cyclosystem) |

# LIST OF STATIONS

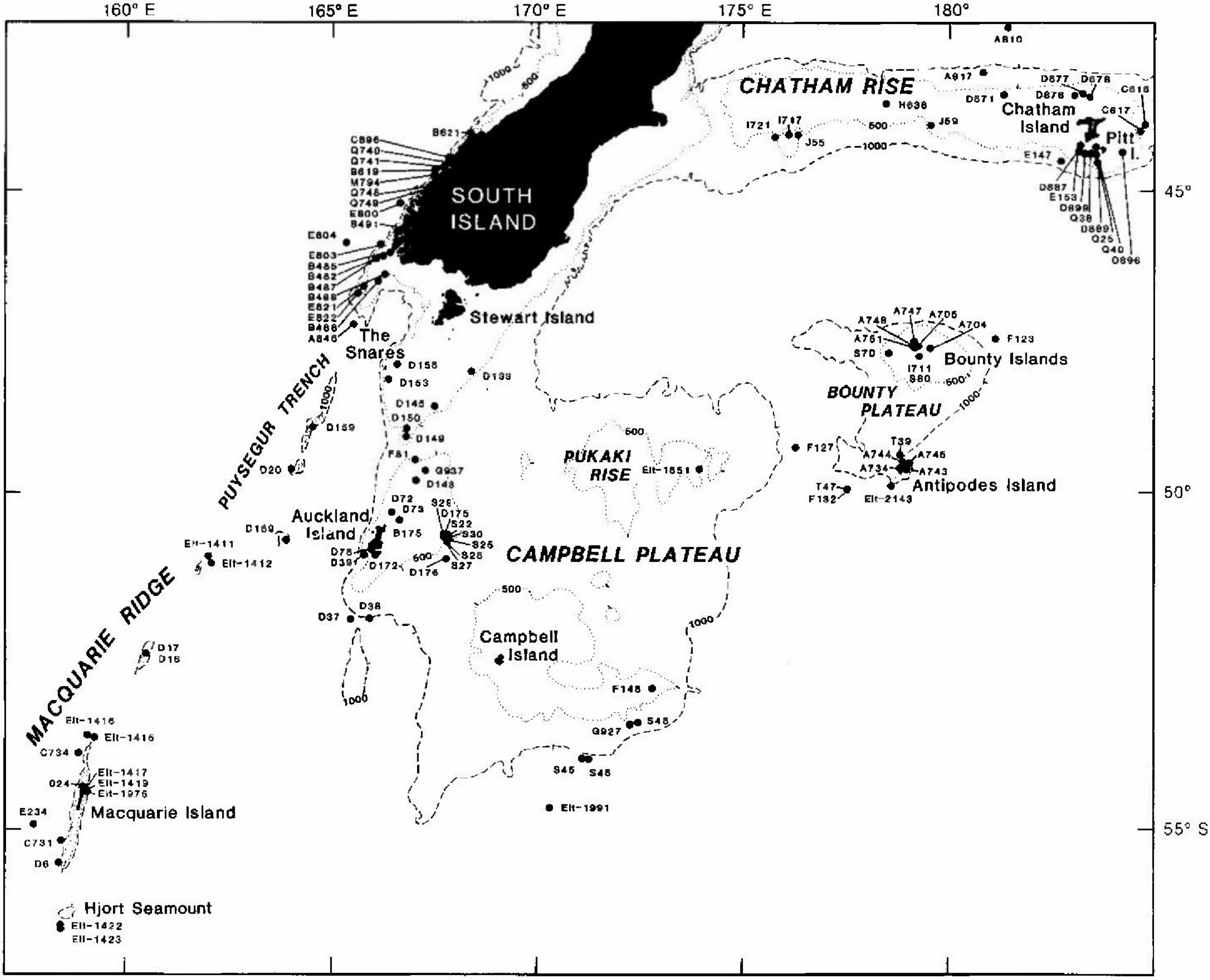
## NZOI (New Zealand Oceanographic Institute)

| Stn No. | Latitude (S) | Longitude | Depth (m) | Date |
|---|---|---|---|---|
| **A444** | 41°21' | 174°32' E | 276–380 | 5 Oct. 1958 |
| **A502** | 41°30' | 174°32.8'E | 457 | 14 Oct. 1959 |
| **A704** | 47°42' | 179°27' E | 154 | 4 Nov. 1962 |
| **A705** | 47°41.6' | 179°05.7'E | 48 | 4 Nov. 1962 |
| **A734** | 49°42' | 178°44.3'E | 150 | 8 Nov. 1962 |
| **A743** | 49°39.8' | 178°50.2'E | 40 | 9 Nov. 1962 |
| **A744** | 49°36.7' | 178°48.1'E | 360 | 9 Nov. 1962 |
| **A745** | 49°36.7' | 178°50.5'E | 399 | 9 Nov. 1962 |
| **A747** | 47°40.9' | 179°03.1'E | 113 | 16 Nov. 1962 |
| **A748** | 47°41.2' | 179°03.5'E | 62 | 16 Nov. 1962 |
| **A751** | 47°44.6' | 179°07.4'E | 155 | 16 Nov. 1962 |
| **A846** | 47°19.2' | 166°34.5'E | 1485 | 27 Aug. 1963 |
| **A910** | 43°04' | 178°39' W | 549 | 13 Sept. 1963 |
| **A917** | 43°56' | 179°15' W | 203 | 15 Sept. 1963 |
| **B175** | 50°26.5' | 166°37.5'E | 95 | 8 Oct. 1959 |
| **B482** | 46°08.8' | 166°06' E | 91 | 5 June 1961 |
| **B485** | 46°04.1' | 166°24.5'E | 62 | 6 June 1961 |
| **B487** | 46°16' | 166°03' E | 196 | 6 June 1961 |
| **B488** | 46°28.7' | 166°14.3'E | 164 | 7 June 1961 |
| **B489** | 46°39' | 166°09.5'E | 198 | 7 June 1961 |
| **B491** | 45°48.4' | 166°45.2'E | 232 | 8 June 1961 |
| **B619** | 44°42' | 167°33.3'E | 95 | 19 Oct. 1962 |
| **B621** | 43°59' | 168°20.4'E | 117 | 19 Oct. 1962 |
| **C60** | 41°23' | 174°25' E | 143 | 7 June 1956 |
| **C527** | 32°30' | 179°12' W | 508 | 10 Sept. 1960 |
| **C617** | 43°58.4' | 175°22.9'W | 288–302 | 30 April 1961 |
| **C618** | 43°52' | 175°20' W | 623–688 | 30 April 1961 |
| **C731** | 55°11' | 158°32' E | 1500 | 24 Nov. 1961 |
| **C734** | 53°55' | 158°55' E | 360 | 25 Nov. 1961 |
| **C781** | 36°00' | 175°20' E | 93 | 21 Feb. 1962 |
| **C814** | 37°40' | 178°56.4'E | 194 | 25 Feb. 1962 |
| **C896** | 44°33' | 167°43' E | 95 | 3 Dec. 1962 |
| **D6** | 55°29' | 158°31.5'E | 415 | 20 April 1963 |
| **D17** | 52°31' | 160°31' E. | 124 | 23 April 1963 |
| **D18** | 52°31' | 160°31' E | 128 | 22 April 1963 |
| **D20** | 49°39.8' | 164°02.2'E | 126 | 24 April 1963 |
| **D24** | 54°29.6' | 158°59.2'E | 459 | 29 April 1963 |
| **D37** | 51°58' | 165°28' E | 28 | 7 May 1963 |
| **D38** | 51°58' | 165°58' E | 252 | 7 May 1963 |
| **D39** | 50°58' | 165°45' E | 465–549 | 7 May 1963 |
| **D72** | 50°18.8' | 166°24' E | 163 | 11 May 1963 |
| **D73** | 50°18' | 166°23.5'E | 177 | 11 May 1963 |
| **D76** | 50°53.9' | 165°54' E | 168 | 12 May 1963 |
| **D133** | 48°11.5' | 168°21' E | 14 | 12 Jan. 1964 |
| **D145** | 48°42' | 167°27' E | 366 | 14 Jan. 1964 |
| **D148** | 49°48' | 167°02.5'E | 145 | 14 Jan. 1964 |
| **D149** | 49°10.5' | 166°51' E | 454 | 14 Jan. 1964 |
| **D150** | 49°04' | 166°52' E | 362 | 14 Jan. 1964 |
| **D153** | 48°15.5' | 166°16' E | 353 | 16 Jan. 1964 |
| **D156** | 48°01.5' | 166°35' E | 81 | 16 Jan. 1964 |
| **D159** | 49°01' | 164°30' E | 741 | 17 Jan. 1964 |
| **D169** | 50°47.5' | 163°57.5'E | 896 | 20 Jan. 1964 |
| **D172** | 51°00' | 166°03' E | 179 | 20 Jan. 1964 |
| **D175** | 50°38' | 167°38' E | 421 | 21 Jan. 1964 |
| **D176** | 51°06' | 167°48.5'E | 216 | 21 Jan. 1964 |
| **D216** | 67°14.6' | 164°05.5'E | 423 | 10 March 1964 |
| **D871** | 43°20' | 178°40' W | 454 | 24 March 1969 |
| **D876** | 43°20' | 176°59' W | 148 | 25 March 1969 |
| **D877** | 43°20' | 176°48' W | 148 | 25 March 1969 |
| **D878** | 43°25' | 176°40' W | 116 | 25 March 1969 |
| **D887** | 44°15' | 176°50.5'W | 156 | 27 March 1969 |
| **D889** | 44°16' | 176°30.3'W | 95 | 28 March 1969 |
| **D896** | 44°20' | 175°50' W | 106 | 29 March 1969 |
| **D899** | 44°23' | 176°49' W | 370 | 29 March 1969 |
| **E147** | 44°30' | 177°20' W | 766 | 17 Oct. 1964 |
| **E153** | 44°15' | 176°50' W | 91 | 18 Oct. 1964 |
| **E234** | 54°55.5' | 157°47' E | 220 | 27 Feb. 1965 |
| **E291** | 34°15' | 171°50' E | 410 | 8 April 1965 |
| **E305** | 34°10' | 171°55' E | 282 | 9 April 1965 |
| **E306** | 34°05' | 171°47.5'E | 263 | 9 April 1965 |
| **E312** | 34°00' | 171°47.5'E | 119 | 10 April 1965 |
| **E337** | 34°02.4' | 172°03.2'E | 198 | 12 April 1965 |
| **E636** | 37°28.5' | 177°13' E | 190 | 10 Oct. 1966 |
| **E720** | 37°33' | 178°35' E | 252–256 | 24 March 1967 |
| **E731** | 37°23.5' | 177°12' E | 503–602 | 25 March 1967 |
| **E751** | 41°39.7' | 175°15' E | 300–399 | 30 March 1967 |
| **E800** | 45°20.5' | 166°41.5'E | 695–1003 | 20 Oct. 1967 |
| **E803** | 45°57' | 166°09' E | 514–534 | 21 Oct. 1967 |
| **E804** | 45°58.5' | 166°18.5'E | 183 | 21 Oct. 1967 |
| **E821** | 46°43.5' | 165°46.5'E | 302–549 | 23 Oct. 1967 |
| **E822** | 46°50.6' | 165°36' E | 682–781 | 23 Oct. 1967 |
| **E840** | 33°52' | 172°16' E | 729–757 | 16 March 1968 |
| **E845** | 34°07.5' | 172°01' E | 179–277 | 16 March 1968 |
| **E846** | 34°07.5' | 171°57.5'E | 343–417 | 16 March 1968 |
| **E850** | 33°49' | 171°19' E | 509–515 | 17 March 1968 |
| **E855** | 33°10' | 169°56' E | 716–742 | 17 March 1968 |
| **E856** | 32°11' | 168°18' E | 1157–1169 | 18 March 1968 |
| **E857** | 32°10' | 168°16' E | 951–954 | 18 March 1968 |
| **E859** | 32°01' | 168°03' E | 500 | 18 March 1968 |
| **E860** | 32°21' | 167°41' E | 1246-1258 | 18 March 1968 |
| **E861** | 32°25' | 167°35' E | 318-383 | 18 March 1968 |
| **E862** | 32°28' | 167°31' E | 130 | 18 March 1968 |
| **E865** | 32°41' | 167°36' E | 168 | 19 March 1968 |
| **E868** | 33°51' | 167°20' E | 672-751 | 19 March 1968 |
| **E875** | 34°39' | 172°07' E | 489-492 | 21 March 1968 |
| **E885** | 35°58' | 173°16' E | 449-462 | 23 March 1968 |
| **F81** | 49°32' | 167°01' E | 401 | 14 Jan. 1965 |
| **F123** | 47°38' | 178°57' W | 1280 | 27 Jan. 1965 |
| **F127** | 49°22' | 176°16' E | 1280 | 28 Jan. 1965 |
| **F132** | 49°59' | 177°32' E | 1335 | 29 Jan. 1965 |
| **F146** | 53°00' | 172°45' E | 435 | 1 Feb. 1965 |
| **F928** | 34°06.2' | 172°06.8'E | 388-406 | 14 Oct. 1968 |



Map of the northern New Zealand region, showing stations at which stylasterids were collected (500 and 1 000 m isobaths indicated).

| | | | | |
|---|---|---|---|---|
| **G3** | 26°25' | 167°15' E | 710 | 27 Sept. 1966 |
| **G10** | 32°09.5'S | 168°15.0'E | 970 | 28 Sept. 1966 |
| **G927** | 53°32.8' | 172°16.6'E | 580 | 12 Jan. 1971 |
| **G937** | 49°41.3' | 167°16.5'E | 520 | 16 Jan. 1971 |
| **G941** | 39°59.7' | 178°08' E | 665 | 17 May 1973 |
| **H636** | 43°26.4' | 179°34.9'E | 395 | 10 March 1975 |
| **I85** | 29°07.9' | 168°15' E | 290 | 22 July 1975 |
| **I87** | 29°25' | 167°50' E | 89–170 | 23 July 1975 |
| **I96** | 32°10.8' | 167°21.2'E | 356 | 25 July 1975 |
| **I97** | 32°22.9' | 167°28.2'E | 540–544 | 25 July 1975 |
| **I372** | 34°32.2' | 173°29.5'E | 211–215 | 23 Nov. 1977 |
| **I711** | 47°50' | 179°15' E | 139 | 22 March 1979 |
| **I717** | 44°04.3' | 176°06.9'E | 200–300 | 25 March 1979 |
| **I721** | 44°07.4' | 175°46.2'E | 540 | 26 March 1979 |
| **I735** | 24°41.2' | 159°37' E | 291–360 | 11 May 1979 |
| **I739** | 23°57.9' | 159°21.5'E | 465–793 | 11 May 1979 |



Map of the southern New Zealand region, showing stations at which stylasterids were collected (500 and 1 000 m isobaths indicated).

| | | | | |
|---|---|---|---|---|
| **I741** | 22°43' | 159°16' E | 328 | 12 May 1979 |
| **J55** | 44°05.5' | 176°12' E | 198 | 17 May 1970 |
| **J59** | 43°51' | 179°25' E | 309 | 20 May 1970 |
| **J657** | 37°28.2' | 179°03.2'E | 695–726 | 4 Sept. 1974 |
| **J659** | 35°00.6' | 179°15.1'E | 689–695 | 4 Sept. 1974 |
| **J691** | 37°33.5' | 176°58.8'E | 168 | 9 Sept. 1974 |
| **J711** | 37°15' | 176°50.5'E | 366-472 | 11 Sept. 1974 |
| **K800** | 29°11.9' | 177°50.8'E | 555 | 22 July 1974 |
| **K825** | 28°47.8' | 177°47.8'W | 145-160 | 25 July 1974 |
| **K827** | 28°43.4' | 177°46.5'W | 260-318 | 25 July 1974 |
| **K828** | 28°35.4' | 177°50.7'W | 440-510 | 26 July 1974 |
| **K839** | 30°15.4' | 178°24.0'E | 290 | 28 July 1974 |
| **K840** | 30°17.6' | 178°25.3'W | 398-412 | 28 July 1974 |
| **K842** | 30°10.2' | 178°35.9'W | 325-370 | 29 July 1974 |
| **K844** | 30°11.2' | 178°33.8'W | 290 | 29 July 1974 |
| **K859** | 30°34.9' | 178°28.2'W | 443-460 | 30 July 1974 |

| Stn No. | Latitude (S) | Longitude | Depth (m) | Date |
|---|---|---|---|---|
| **K860** | 30°35.8' | 178°25.7'W | 605-720 | 30 July 1974 |
| **M764** | 44°36.5' | 167°49.5'E | 28 | 29 March 1981 |
| **M794** | 44°39' | 167°53.9'E | 45 | 7 April 1981 |
| **P8** | 32°40.8' | 167°26.8'E | 660-757 | 25 Jan. 1977 |
| **P9** | 32°40.4' | 167°27.7'E | 374-406 | 25 Jan. 1977 |
| **P15** | 30°10.7' | 167°44.2'E | 949-952 | 25 Jan.1977 |
| **P18** | 29°34.6' | 168°03' E | 86-90 | 25 Jan. 1977 |
| **P19** | 29°33.6' | 168°01.6'E | 80-81 | 25 Jan.1977 |
| **P23** | 29°06.7' | 167°56.9'E | 15-24 | 27 Jan. 1977 |
| **P35** | 28°57.9' | 167°45.5'E | 392-423 | 28 Jan. 1977 |
| **P46** | 28°42.3' | 167°56.7'E | 450-475 | 30 Jan. 1977 |
| **P47** | 28°42.6' | 167°55.3'E | 310-375 | 30 Jan. 1977 |
| **P49** | 28°43.3' | 167°53.6'E | 85-110 | 30 Jan. 1977 |
| **P57** | 33°15' | 169°59' E | 563-614 | 4 Feb. 1977 |
| **P458** | 34°13.8' | 171°56.4'E | 200 | 21 June 1978 |
| **P472** | 33°52.2' | 172°12' E | 161 | 23 June 1978 |
| **P541** | 33°56.5' | 172°08' E | 490 | 27 June 1978 |
| **P543** | 34°05' | 171°35' E | 710 | 27 June 1978 |
| **P544** | 34°09.9' | 171°49.5'E | 290 | 27 June 1978 |
| **P552** | 33°54.3' | 172°01.1'E | 850 | 28 June 1978 |
| **P559** | 33°59.8' | 171°41.6'E | 197 | 28 June 1978 |
| **P561** | 33°58' | 171°28' E | 506 | 28 June 1978 |
| **P566** | 33°56.1' | 171°27.2'E | 514 | 29 June 1978 |
| **P842** | 32°34.4' | 156°17.3'E | 285-290 | 28 Nov. 1979 |
| **P947** | 25°13.7' | 179°04.1'W | 547-646 | 1 June 1980 |
| **P948** | 24°17.7' | 178°50.1'W | 589-591 | 1 June 1980 |
| **Q25** | 44°26.2' | 176°30.4'W | 360 | 22 March 1978 |
| **Q38** | 44°24.8' | 176°43.6'W | 345 | 24 March 1978 |
| **Q40** | 44°29.5' | 176°32.5'W | 345-380 | 24 March 1978 |
| **Q68** | 29°14' | 159°00' E | 1045-1212 | 1 June 1978 |
| **Q73** | 24°09.8' | 159°29.8'E | 20 | 3 June 1978 |
| **Q740** | 44°36.5' | 167°49.7'E | 25 | 12 July 1982 |
| **Q741** | 44°37.8' | 167°51.7'E | 30 | 13 July 1982 |
| **Q748** | 44°55' | 167°25.7'E | 60 | 16 July 1982 |
| **Q749** | 44°54' | 167°26.2'E | 40 | 16 July 1982 |
| **Q754** | 44°47.9' | 167°33.7'E | 15-42 | 18 July 1982 |
| **S22** | 50°39' | 167°39.6'E | 400 | 17 Sept. 1978 |
| **S25** | 50°41.8' | 167°40.6'E | 339 | 17 Sept. 1978 |
| **S27** | 50°41.3' | 167°37.5'E | 335 | 18 Sept. 1978 |
| **S28** | 50°41.1' | 167°44' E | 375 | 18 Sept. 1978 |
| **S29** | 50°40.7' | 167°41.1'E | 300 | 18 Sept. 1978 |
| **S30** | 50°41' | 167°40.8'E | 265 | 18 Sept.1978 |
| **S45** | 54°01.5' | 171°04.5'E | 1262 | 21 Sept. 1978 |
| **S46** | 53°59.8' | 171°13.2'E | 1075 | 21 Sept. 1978 |
| **S48** | 53°30.6' | 172°24' E | 625 | 22 Sept. 1978 |
| **S53** | 53°00.7' | 172°59.9'E | 450 | 23 Sept. 1978 |
| **S70** | 47°45.6' | 178°30.8'E | 353 | 26 Sept. 1978 |
| **S80** | 47°50.2' | 179°15.2'E | 126 | 23 Nov. 1978 |
| **S235** | 45°59'8' | 166°48.7'E | 22 | 15 Feb. 1980 |
| **S568** | 30°10' | 171°20.2'E | 650-900 | 13 Aug. 1983 |
| **S571** | 30°47.3' | 172°45.2'E | 480-509 | 15 Aug. 1983 |
| **S572** | 30°45.5' | 172°47.7'E | 403-530 | 15 Aug. 1983 |
| **S573** | 30°29.7' | 172°42.3'E | 840-975 | 15 Aug. 1983 |
| **T39** | 49°30.2' | 178°44.6'E | 995 | 14 March 1981 |
| **T47** | 49°57.9' | 177°32.6'E | 1200-140 | 14 March 1981 |
| **T214** | 30°40.9' | 178°25.5'W | 565 | 18 March 1982 |
| **T217** | 30°44' | 178°38.1'W | 492 | 18 March 1982 |
| **T226** | 28°33' | 177°50' W | 800-930 | 22 March 1982 |
| **T235** | 30°19.3' | 178°21' W | 445-510 | 23 March 1982 |
| **T243** | 30°05' | 178°15' W | 1035 | 24 March 1982 |
| **T256** | 30°31' | 178°39' W | 710–814 | 27 March 1982 |
| **U567** | 35°00.3' | 169°09.7'E | 1480–1050 | 3 Feb. 1988 |
| **U581** | 31°51.3' | 172°08.8'E | 1170–1180 | 5 Feb. 1988 |
| **U582** | 31°52.0' | 172°26.5'E | 1058–988 | 5 Feb. 1988 |
| **U591** | 30°50.6' | 172°48.3'E | 486 | 7 Feb. 1988 |
| **U594** | 30°20.1' | 172°59.6'E | 406 | 7 Feb. 1988 |
| **U599** | 30°43' | 173°16.9'E | 590-640 | 8 Feb. 1988 |
| **U600** | 31°01.7' | 173°22.7'E | 620 | 9 Feb. 1988 |

### USNS *Eltanin*

| | | | | |
|---|---|---|---|---|
| **1411** | 51°01' | 162°01' E | 333-371 | 8 Feb. 1965 |
| **1412** | 51°07.2' | 162°03' E | 1647-1665 | 8 Feb.1965 |
| **1415** | 53°46' | 159°12' E | 750-996 | 9 Feb. 1965 |
| **1416** | 53°45' | 159°09' E | 787-842 | 9 Feb.1965 |
| **1417** | 54°24' | 159°01' E | 79-93 | 10 Feb. 1965 |
| **1419** | 54°32.5' | 159°02' E | 494-714 | 10 Feb. 1965 |
| **1422** | 56°19.4' | 158°29' E | 833-842 | 12 Feb. 1965 |
| **1423** | 56°21.4' | 158°28' E | 1574-1693 | 12 Feb. 1965 |
| **1536** | 54°29.5' | 39°22.3'W | 659-686 | 8 Feb. 1966 |
| **1716** | 37°35' | 178°46' E | 128-146 | 28 May 1966 |
| **1847** | 41°32' | 174°34' E | 192-238 | 19 Dec. 1966 |
| **1851** | 49°40' | 178°53.9'E | 476-540 | 3 Jan. 1967 |
| **1857** | 64°10.2' | 177°35.5'E | 1211-1336 | 8 Jan. 1967 |
| **1975** | 54°30.5' | 159°00' E | 443-549 | 15 Feb. 1967 |
| **1981** | 47°21.3' | 147°52.8'E | 910-915 | 24 Feb. 1967 |
| **1991** | 54°39.7' | 170°22.1'E | 1860-1940 | 2 Jan. 1968 |

### HMS *Challenger*

| | | | | |
|---|---|---|---|---|
| **170** | 29°55' | 178°14' W | 951-1152 | 14 July 1874 |
| **171** | 28°33' | 177°50' W | 1097 | 15 July 1874 |
| **214** | 4°33'N | 127°06' E | 914 | 10 Feb. 1875 |
| **320** | 37°17' | 53°52' W | 1097 | 14 Feb. 1876 |

### Other Vessels/Expeditions

| | | | | |
|---|---|---|---|---|
| *Albatross* | | | | |
| **5569** | 5°33.3'N | 120°15.5'E | 555 | 22 Sept. 1909 |
| BANZARE | | | | |
| **34** | 66°21' S | 58°50' E | 603 | 7 Jan. 1930 |
| Chalcal 1, *Coriolis* | | | | |
| **D5** | 20°58' S | 161°45.4'E | 400 | 14 July 1985 |
| *Terra Nova* | | | | |
| **90** | Summit of Great King, Three Kings Islands, (S14°W, 8 miles) | | 183 | 25 July 1911 |
| **91** | Summit of Great King, Three Kings Islands, (S14°W, 25 miles) | | 549 | 26 July 1911 |
| **96** | 11 km E of North Cape, N.Z. | | 128 | 3 Aug. 1911 |

# ALPHABETIC CHECKLIST OF STYLASTERIDAE
## known from the New Zealand Region

(+ = exclusively fossil species, * = not fully treated in this account,
! = new record for New Zealand region)

! *Adelopora crassilabrum* n. sp.
! *Adelopora fragilis* n. sp.
! *Adelopora moseleyi* n. sp.

! *Astya aspidopora* n. sp.

+* *Axopora cleithridium* (Squires, 1958)

*Calyptopora reticulata* Boschma, 1968
! *Calyptopora sinuosa* n. sp.

! *Conopora candelabrum* n. sp
! *Conopora gigantea* n. sp..
*Conopora laevis* (Studer, 1878)
! *Conopora tetrastichopora* n. sp.
! *Conopora unifacialis* n. sp.
*Conopora verrucosa* (Studer, 1878)
! "*Conopora*" (incertae sedis) *anthohelia* n. sp.

! *Crypthelia curvata* n. sp.
! *Crypthelia cymas* Cairns, 1986
*Crypthelia fragilis* Cairns, 1983
! *Crypthelia polypoma* n. sp.
! *Crypthelia robusta* n. sp.
! *Crypthelia studeri* n. sp.

! *Distichopora dispar* n. sp.
* *Distichopora violacea* (Pallas, 1766)
+* *Distichopora* spp. sensu Ralph (1948), Squires (1962), Hayward (1977)

! *Errina bicolor* n. sp.
! *Errina chathamensis* n. sp
*Errina cheilopora* Cairns, 1983.
*Errina cooki* Hickson, 1912 (new rank)
*Errina dendyi* Hickson, 1912 (new rank)
*Errina gracilis* Marenzeller, 1903
! *Errina hicksoni* n. sp.
! *Errina laevigata* n. sp.
*Errina novaezelandiae* Hickson, 1912
! *Errina reticulata* n. sp.
! *Errina sinuosa* n. sp.

*Inferiolabiata labiata* (Moseley, 1879)
! *Inferiolabiata lowei* (Cairns, 1983)
! *Inferiolabiata spinosa* n. sp.

*Lepidopora cryptocymas* Cairns, 1985
! *Lepidopora dendrostylus* n. sp.
! *Lepidopora microstylus* n. sp.
*Lepidopora polystichopora* Cairns, 1985
*Lepidopora sarmentosa* (Boschma, 1968)
! *Lepidopora symmetrica* n. sp.

! *Lepidotheca altispina* n. sp.
*Lepidotheca cervicornis* (Broch, 1942)
! *Lepidotheca chauliostylus* n. sp.
*Lepidotheca fascicularis* (Cairns, 1983)
! *Lepidotheca inconsuta* n. sp.
! *Lepidotheca robusta* n. sp.

! *Pseudocrypthelia pachypoma* (Hickson and England, 1905)

+* *Paraerrina* sp. sensu Squires, 1962

+* *Sporadopora marginata* Tenison-Woods, 1880
! *Sporadopora micropora* n. sp.
*Sporadopora mortenseni* Broch, 1942

*Stenohelia conferta* Boschma, 1968
* *Stenohelia* sp. cf. *S. profunda* Moseley, 1881

! *Stephanohelia praecipua* n. gen., n. sp.

! *Stylaster brunneus* Boschma, 1970
*Stylaster eguchii* (Boschma, 1966)
? *Stylaster gracilis* Milne Edwards and Haime, 1850
! *Stylaster horologium* n. sp.
! *Stylaster imbricatus* n. sp.

! *Systemapora ornata* n. gen., n. sp.

# ZOOGEOGRAPHY

The area covered by the systematic and zoogeographic accounts extends from 24°S (northern Norfolk Ridge) to 57°S (Hjort Seamount) and from 157°E (Lord Howe Seamount Chain) to 175°W (Chatham Island). It is a topographically and zoogeographically diverse area, containing tropical, warm-temperate, cold-temperate, and Subantarctic regions, as defined by Briggs (1974), in its 33° of latitude. But more important to the distribution and diversity of stylasterids, it contains an abundance of submarine ridges, seamounts, and small islands, that provide hard, nonterrigenous substrates that are exposed to oceanic water circulation. These appear to be the ideal conditions for stylasterid growth (Cairns 1986a). Thus, it is not surprising that the 59 Recent species reported for this region constitute the most diverse fauna in the world, the second highest number of species (42) occurring in the northwest Atlantic (Cairns 1986a).

Because female stylasterids brood their larvae to an advanced planula stage, it is assumed that larval dispersal is limited. Probably for this reason, stylasterid species distributions are highly circumscribed, there being no cosmopolitan species and few with amphioceanic distributions. Therefore, stylasterids are good zoogeographic indicators for deep-water benthic distributional patterns as well as good palaeontological indicators of oceanic, insular environments. Among the 59 species described from the New Zealand region, 47 (80%) are endemic to the region or have not yet been found elsewhere. Of the 12 nonendemic species, six have extended distributions in the Subantarctic (pattern 6) and six are also found in more tropical waters to the north (pattern 7).

### Patterns of Distribution and Affinities

Although there is substantial knowledge of the physical oceanography of the New Zealand region and collections of many invertebrates have been reviewed, very little is known about the patterns of distributions and affinities of deep-water (> 100 m) benthic invertebrates, with the notable exceptions of Millar (1982) and Dawson (1988), to be discussed later. Conventional zoogeographic analyses and province limits have been defined by the distributions of shallow-water organisms (*see* Briggs 1974 for a review). Although the distribution of deep-water invertebrates need not necessarily parallel those of shallow water, for the sake of convenience, the conventional shallow-water zoogeographic regions and provinces are used in this analysis.

There are seven basic patterns of distribution displayed among the 59 Recent New Zealand stylasterid species : 1, widespread (five species), 2, disjunct (five species), 3, Cookian (four species), 4, Aucklandian (23 species), 5, Antipodean (six species), 6, Subantarctic (six species), and 7, primarily tropical (eight species). Two species are unclassified (Table 1).

The first pattern (widespread) is represented by five species that are found throughout the New Zealand region in almost all provinces and geographic areas listed in Table 1. They are characteristic of the region and, for the most part, endemic to it. But, even though they are widespread, they rarely occur close to the coasts of North and South Islands, except off Fiordland, Bay of Plenty, and the North Cape area. These five species are predominantly deep water in distribution (depth ranges usually exceed 1000 m) and taxonomically diverse.

Pattern two, provisionally termed disjunct, comprises five species that occur on the seamounts, ridges, and islands north (Auckland Province) and south (Antipodean Province) of New Zealand, but not in the intervening Cookian Province of New Zealand proper, including the Chatham Rise. The pattern is similar to the widespread pattern, except for the complete absence from the terrigenous sediment of the New Zealand shelf and slopes in favour of the calcareous and volcanic sediments of the surrounding islands. These five species occur primarily between 400 and 800 m and are also taxonomically diverse.

Only four species are characteristic of the Cookian Province (pattern 3: southern North Island, South Island, Chatham Rise), comprising two species found in Cook Strait, one endemic to the Chatham Rise, and one commonest off Fiordland. This lack of species diversity from the longest coast line in the New Zealand region is not attributable to lack of collecting effort (*see* Beu 1978 : fig. 3), but rather to their apparent inability to live on the terrigenous sediment that occurs off most of New Zealand (Mitchell *et al.* 1989). The four Cookian species are all relatively shallow in distribution, three of the four species in the genus *Errina*. The Chatham Rise is considered by some to be a separate province (the

Moriorian Province), and by others to be a subregion of the Cookian Province (*see* Briggs 1974 : 172–173 for a discussion). Of the nine species that occur on the Chatham Rise, only one is endemic, one is Cookian, five are widespread (pattern 1), one is at the northern limit of a Subantarctic distribution (pattern 6), and one is unclassified. Based on its low endemicity and presence of a generalised fauna with one Cookian species, I consider the Chatham Rise as a part of the Cookian Province.

The Auckland Province (pattern 4) includes the northern half of North Island, Kermadec and Three Kings Ridges, and the southern half of Norfolk and Colville Ridges, and corresponds to Briggs's (1974) warm-temperate region of New Zealand. This is the best-defined and commonest pattern of stylasterid distribution in the region, found exclusively in 23 species, especially of the genera *Lepidopora, Adelopora, Lepidotheca,* and *Crypthelia* at depths of of 10–1000 m. *Lepidopora cryptocymas* occurs throughout and exclusively in this province; however, the remaining 22 species are not as uniformly distributed, some occurring on only one or two of the ridge systems. In all, 39 species occur in this province (Table 1), with a majority (23) endemic to it. The remaining 16 species include the five widespread species (pattern 1), the five disjunct species (pattern 2), and an element (four species) more characteristic of tropical waters (pattern 7). Furthermore, seven species that occur on the southern Norfolk Ridge also occur north of Norfolk Island, reinforcing its partial affinity with the tropics (pattern 7). Of the 16 species known from the Kermadec Islands, five (31%) are endemic, five occur elsewhere in the Auckland Province, three are widespread (pattern 1), two are disjunct in distribution (pattern 2), and only one is characteristic of more tropical waters (pattern 7). These results are in accordance with Briggs (1974), who considered the Kermadecs as a separate province having strong affinities to the Auckland Province.

The Antipodean Province (pattern 5) consists of the cold-temperate Campbell and Bounty Plateaus, and includes six species, but, based on their extended distributions, it is difficult to exclude the northern Macquarie Ridge (from Stewart Island to 50°S) from this province. Four of these six species belong to *Errina* and occur in relatively shallow water. In all, 22 Recent species occur in the Antipodean Province (Table 1) — 15 on the Campbell Plateau (none endemic), 11 on the Bounty Plateau (two endemic), and 13 on the northern Macquarie Ridge (none endemic). The fauna includes the 10 widespread and disjunct species (patterns 1 and 2), only one Cookian species (pattern 3), the six characteristic Antipodean species (pattern 5), and four of the six primarily Subantarctic species (pattern 6), showing its affinities to be more with the Subantarctic and Macquarie Island than with New Zealand. This conclusion is contrary to that of Briggs (1974) which was based on shallow-water organisms, but consistent with the distribution of ahermatypic Scleractinia (Cairns 1982a : 152) and brachiopods (Foster 1974).

Pattern 6 (Subantarctic) comprises six species having distributions in the Subantarctic, in some cases extending into the Antarctic region. The extent of the Subantarctic distributions is quite variable — three species are known from Magellanic South America and the South Georgia region, one species only from the South Tasmanian Rise, one only from the Pacific-Antarctic Ridge, and one is known only from Macquarie Island, where it may be endemic. Whether these species are attributed to a widespread circum-Subantarctic "Kerguelean" Province is not addressed here. Kusakin (1968), Briggs (1974), and Dawson (1988) have all argued for a distinct Macquarie Province, which is characterised by a small endemic element and affinities to both New Zealand and the Subantarctic. The 13 stylasterid species that occur off Macquarie Island and Hjort Seamount show a curious mixture — three are widespread (pattern 1), one is disjunct (pattern 2), three are Antipodean (pattern 5), one is endemic, four have widespread distributions in the Subantarctic (pattern 6), and one is unclassified. Macquarie Island thus appears to be a transitional region, with affinities to New Zealand (reinforced by the Macquarie Ridge), the Antipodean Province, and the Subantarctic fauna, with one endemic species.

Finally, there are eight species (pattern 7) that occur exclusively or predominantly in the "tropical" New Zealand region in the sense of Briggs (1974) — northern Norfolk and Colville Ridges, Lord Howe Seamount Chain, and points north. Technically, they occur in the region defined by this study but have affinities with more northern regions (e.g., New Caledonia, Micronesia, etc.).

One of the few zoogeographic analyses of a primarily deep-water benthic, sessile group of New Zealand invertebrates comparable to that of the stylasterids was that of Millar (1982), based on 159 species of ascidians. His patterns of distributions and affinities, however, show more differences than similarities. The ascidians have very few widespread species (pattern 1); no disjunct species (pattern 2); relatively few (only 9.4%) species with an Aucklandian distribution (pattern 3), which is so common (39%) among the stylasterids; and a much more distinct Moriorian fauna. However, the Antipodean

TABLE 1. Distribution, patterns, and depth ranges of New Zealand Stylasteridae (+ = fossil occurrence)

| | TROPICAL | | WARM TEMP. | | | COLD | | TEMPERATE | | | SUB-ANTARCTIC | | ANT-ARCTIC | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Aucklandian | | | Cookian | | Antipodean | | | Mac | | | | | |
| Species | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | Elsewhere | Pattern of distribution | Depth (m) |
| *Axopora cleithridium* | | | | | | + | | | | | | | | | – | Upper Miocene |
| *Lepidopora sarmentosa* | | | | | | | | | | x | x | x | | South Tasmanian Rise | 6 | 910–1665 |
| *Lepidopora dendrostylus* | | | x | x | | | x | | x | | | | | | 1 | 190–1258 |
| *Lepidopora microstylus* | | x | x | | x | | | | | | | | | | 4 | 710–1258 |
| *Lepidopora symmetrica* | | | | x | | | | | | | | | | | 4 | 282 |
| *Lepidopora cryptocymas* | | | x | x | x | | | | | | | | | | 4 | 168–544 |
| *Lepidopora polystichopora* | | x | x | | | | | | | | | | | | 4 | 197–710 |
| *Adelopora crassilabrum* | | | x | x | | | | | | | | | | | 4 | 282–1169 |
| *Adelopora fragilis* | | x | | x | | | | | | | | | | | 4 | 400–710 |
| *Adelopora moseleyi* | x | | | | | | | | | | | | | | 7 | 285–360 |
| *Lepidotheca fascicularis* | | | | ? | | | x | | x | x | x | x | | Magellanic and South Georgia | 6 | 282–2100 |
| *Lepidotheca inconsuta* | | | | | | | | | | | x | | | | 6 | 787–1500 |
| *Lepidotheca chauliostylus* | | x | x | x | | | | | | | | | | | 4 | 130–1169 |
| *Lepidotheca cervicornis* | | | | x | | | | | | | | | | | 4 | 101–410 |
| *Lepidotheca altispina* | x | | x | ? | x | | | | | | | | | | 4 | 445–1258 |
| *Lepidotheca robusta* | | | x | | | | | | | | | | | | 4 | 356 |
| *Stephanohelia praecipua* | x | | x | | | | | | | | | | | Chesterfield Islands | 7 | 318–793 |
| *Inferiolabiata labiata* | | | | | | | | | | x | | x | x | Scott, Balleny, Magellanic | 6 | 87–2100 |
| *Inferiolabiata spinosa* | | | x | x | x | | | x | x | | | | | | 2 | 211-781 |
| *Inferiolabiata lowei* | | | x | x | | | | x | | | | x | | Magellanic, South Georgia | 2 | 164–751 |
| *Paraerrina* sp. | | | | | | + | | | | | | | | | - | M. Oligocene |
| *Sporadopora mortenseni* | | | | x | | + | | | | | | | | ? Miocene of Australia | 4 | 119-290 |
| *Sporadopora micropora* | | | | | | | | x | x | | | | | | 5 | 465–741 |
| *Sporadopora marginata* | | | | | | | + | | | | | | | | - | L. Pliocene |
| *Distichopora dispar* | | | | x | | | | x | x | | | | | | 2 | 465–741 |
| *Distichopora violacea* | | | | | | x | | | | | | | | Indo-West | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Pacific | 3 | 122 |
| *Distichopora* spp. | | | + | | | | | | | | | | | - | Miocene |
| *Systemapora ornata* | x | | | | | | | | | | | | | 7 | 310–475 |
| *Errina novaezelandiae* | | | | | x | | x | x | | | | | | 3 | 15–177 |
| *Errina chathamensis* | | | | | | x | | | | | | | | 3 | 91–688 |
| *Errina laevigata* | | | | | | | x | | | x | | | | 5 | 113–371 |
| *Errina hicksoni* | | | | | | | | | x | | | | | 5 | 40–155 |
| *Errina cooki* | | | | | x | x | | | | | | | | 3 | 143–380 |
| *Errina gracilis* | | | | | | | | | | x | x | x | Crozet, South Georgia, Magellanic | 6 | 100–1226 |
| *Errina sinuosa* | | | | x | | | | | | | | | | 4 | 290–814 |
| *Errina cheilopora* | | | | | x | x | x | x | x | x | | | | - | 198–1400 |
| *Errina bicolor* | | | | | | | x | x | | x | | | | 5 | 95–625 |
| *Errina reticulata* | | | | | | | x | | x | x | | | | | 579–145 |
| *Errina dendyi* | | x | x | | x | | | | | | | | | - | 17–30 |
| *Stylaster eguchii* | | x | | x | x | x | x | x | x | x | | x | | 1 | 15–1485 |
| *Stylaster brunneus* | x | | | | | | | | | | | | | 7 | 15–170 |
| *Stylaster horologium* | | x | x | | | | | | | | | | | 4 | 179–1169 |
| *Stylaster imbricatus* | | x | x | | | | | | | | | | | 4 | 128–665 |
| ? *Stylaster gracilis* | | | x | x | | | | | | | | | ? Indo-West Pacific | 7 | ?18–951 |
| *Calyptopora reticulata* | x | x | x | | x | x | x | x | x | x | | | | 1 | 216–2100 |
| *Calyptopora sinuosa* | | | | x | | | | | | | | | | 4 | 260–814 |
| *Stenohelia conferta* | | | | | | | | | x | | | | | 5 | 1335 |
| *Stenohelia* cf. *S. profunda* | | | | x | | | | | | | | | | 4 | 1097 |
| *Conopora verrucosa* | | x | x | x | x | x | x | x | x | x | x | x | | 1 | 198–2355 |
| *Conopora laevis* | x | x | x | x | | x | | x | | | | | ? Indo-West Pacific | 1 | 130–1035 |
| *Conopora candelabrum* | x | x | x | | | | | x | | | | | | 2 | 403–1170 |
| *Conopora tetrastichopora* | | | x | | | | | | | | | | | 4 | 282–710 |
| *Conopora unifacialis* | | | | x | | | | | | | | | | 7 | 547–646 |
| *Conopora gigantea* | | x | | | | | | | | | | | | 4 | 356 |
| *"Conopora" anthohelia* | | | | x | | | | | | | | | | 7 | 547–1170 |
| *Astya aspidopora* | | | x | | | | | | | | | | | 4 | 590–640 |
| *Crypthelia studeri* | | | x | x | | | x | x | x | x | | | | 2 | 343–1940 |
| *Crypthelia robusta* | | x | x | | | | | | | | | | | 4 | 128–757 |
| *Crypthelia polypoma* | x | | x | x | | | | | | | | | | 4 | 590–814 |
| *Crypthelia fragilis* | | | | | | | | | x | x | x | | Pacific-Antarctic Ridge | 6 | 952–2329 |
| *Crypthelia curvata* | | x | x | | | | | | | | | | | 4 | 282–1258 |
| *Crypthelia cymas* | x | x | | x | | | | | | | | | Galápagos Islands | 4 | 263–757 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Pseudocrypthelia pachypoma* | | x | | | | | | | | | | | Western Pacific | 7 | 555–1089 |
| | 3 | 12 | 23 | 28 | 16 | 11 | 10 | 13 | 15 | 11 | 13 | 7 | 4 | | |

1 Lord Howe Seamount Chain
2 New Caledonia and northern Norfolk Ridge, including Norfolk Island
3 Southern Norfolk Ridge
4 Three Kings Ridge and northern North Island
5 Colville and Kermadec Ridges
6 Southern North Island and South Island
7 Chatham Rise
8 Northern Macquarie Ridge (north of 50°S)
9 Campbell Plateau
10 Bounty Plateau
11 Southern Macquarie Ridge (south of 50°S) and Hjort Seamount
12 Elsewhere in Subantarctic
13 Antarctic

and Macquarie Island stylasterids have similar affinities to those of the ascidians but show a stronger tie than the ascidians to the Subantarctic than to the South Island.

### Bathymetric Distribution

The bathymetric ranges of the New Zealand stylasterids are consistent with those of most other stylasterids, showing them to be a predominantly deep-water (lower shelf and slope depth) group most common between 200 m and 1200 m. Only nine species occur from 15–100 m : 47 from 100–500 m; 42 from 500–1000 m; 22 from 1000–1500 m; seven from 1500–2000 m; and only five from over 2000 m. Those found in shallow water often have much deeper bathymetric ranges, e.g., *Stylaster eguchii*, typical of 50–1400 m, is found in the cool upwelled waters off Fiordland at only 15 m. The deepest record of a New Zealand stylasterid is *Conopora verrucosa* at 2355 m. Genera characteristic of deep water (> 1000 m) are *Stenohelia* and *Crypthelia*; of shallow water, *Errina*.

# CLASSIFICATION

## Family STYLASTERIDAE Gray, 1847

### **Lepidopora** Pourtalès, 1871

Coordination of gastro- and dactylopores lacking; however, in several species dactylopores arranged in two or more longitudinal rows on branches or grouped in short abcauline crescents beneath gastropores. Coenosteal texture variable, including reticulate-granular and linear-imbricate. Abcauline gastropore lip present in some species. Gastro- and dactylopore tubes axial. Gastrostyles unridged, usually with a moderately high H : W ratio and robust, simple spination; however, one species has imbricate platelets covering the gastrostyle and the style of another species is rudimentary. Dactylopores apically perforate cones or flush with coenosteum, sometimes linked by ridges; dactylostyles usually lacking. Ampullae usually superficial but internal in some species.

TYPE SPECIES: *Errina glabra* Pourtalès, 1867, by subsequent designation (Boschma 1963 : 336).

REMARKS: As previously discussed (Cairns 1983b, 1984, 1985), *Lepidopora* is an extremely variable genus, undoubtedly polyphyletic, and probably close to the ancestral stock of the stylasterids. No single synapomorphy unites the species; rather, a combination of characters, each of which is also found in other genera, must be used to diagnose the genus viz., apically perforate dactylopore mounds, unridged gastrostyles, and long, axial dactylopore tubes. No other genus has this combination of characters.

The same variable characters that make *Lepidopora* difficult to define allow for relatively easy differentiation of the 15 valid species in the genus [eight species listed by Cairns (1986b); two described by Cairns (1986a); and five remaining species included herein]. Characters of particular value in discriminating species are — degree of alignment of dactylopores; coenosteal texture; gastrostyle shape; colony and branch shapes; presence or absence of gastropore lips; and presence or absence of dactylostyles.

DISTRIBUTION: Worldwide in distribution, occurring from 60–1874 m (Cairns 1991b).

### *Lepidopora sarmentosa* (Boschma, 1968) (Plate 1, a–g)

*Errina (Lepidopora) sarmentosa* Boschma, 1968c : 203–208, pl. 1, figs 1–4, text-figs 1–2; Dawson 1979 : 25; Vervoort & Zibrowius 1981 : 31.
*Lepidopora sarmentosa:* Cairns 1983a : 73, figs 1D–E, 6A–G, map 1; 1983b : 428.

MATERIAL EXAMINED: *Eltanin* Stn 1412, 2 col., USNM 60137; Stn 1857, 8 col., USNM 60135; Stn 1981, 3 male col., USNM 60136; Holotype NZOI H-50.

DISTRIBUTION: West of Antipodes Islands; Macquarie Ridge; South Tasmanian Rise; seamount north of Scott Island; 910–1665 m.

DESCRIPTION: Colonies small, delicate, and uniplanar, the largest colony examined (*Eltanin* Stn 1857) 3.45 cm tall and 4.15 cm broad, with a basal branch diameter of 4.15 mm. Terminal branches circular in cross section, do not anastomose, and rarely exceed 0.6 mm in diameter. Small branchlets originate from the larger main branch, which always supports a commensal polynoid polychaete gall-tube formed by the coral. Smaller branches therefore appear to originate from the worm tube instead of the main branch. Worm tubes elliptical in cross section (e.g., 6.5 x 4.5 mm in diameter) and tend to make branches appear flattened. One side of worm tube often formed from the union of two slender, closely adjacent branches, whereas the other (outer) side is invariably solid. Narrow edges of tube have lateral openings at regular intervals. Coenosteum white and, in general, reticulate-granular in texture; however, toward branch tips coenosteal strips are linear and parallel, about 50 µm wide. Low irregularly shaped granules 6-10 µm in diameter cover coenosteal strips. Exterior surface of worm tube sometimes covered with numerous small spines (papillae), up to 0.31 mm tall and 0.10 mm in diameter, which have perforated apices.

Gastropores circular, about 0.25 mm in diameter, and occur on both faces of branches as well as at axils. Dactylopore spines usually uniformly distributed but occasionally form short adcauline rows of 2-4 dactylopore spines beneath a gastropore. Gastropore tubes cylindrical, slightly constricted in region of gastrostyle tip, and lack ring palisades. The gastrostyle occupies most of the gastropore tube. Illustrated gastrostyle (Plate 1, e) has a cylindrical, unadorned basal main shaft, which abruptly expands into a thick crown of spines about two-thirds distance to its tip. Gastrostyle spines cylindrical and blunt, about 20 µm long and 5 µm in diameter. A short, relatively bare tip projects from the crown. Illustrated style 0.42 mm tall, the crown 0.18 mm in diameter (H : W = 2.3), and the basal main shaft 0.13 mm in diameter. Dactylopore spines short and conical, of uniform height throughout colony, 0.13–0.20 mm in diameter and about 0.10 mm tall, with an apical pore diameter of 40-60 µm.

Female ampullae superficial hemispheres about 0.7 mm in diameter, each having a lateral efferent pore about 0.12 mm in diameter. Male ampullae internal or expressed only as low coenosteal bulges 0.35–0.5 mm in diameter. Male efferent pores apical and only about 20 µm in diameter. Both male and female ampullae often clustered within or on outer worm tube coenosteum.

Types: Holotype (Plate 1, a, b): NZOI Stn F132, NZOI H-50, also a fragment of holotype deposited at the RMNH (Coel. 13756) (*see* Vervoort and Zibrowius 1981).

Type locality: NZOI Stn F132, 49°49'S, 177°32'E, off Antipodes Islands; 1335 m.

Remarks: Unfortunately, no additional specimens are reported herein. This description is based on specimens previously reported by Boschma (1968c) and Cairns (1983a); however, additional information is herein provided on the sizes of the male and female ampullae and their efferent pores. Otherwise, the description above is condensed from Cairns (1983a).

Among the New Zealand species of *Lepidopora*, *L. sarmentosa* superficially resembles *L. dendrostylus*, both species having commensal polychaete tubes paralleling their branches, and dactylopore spines that are often arranged in crescents beneath their gastropores. However, when closely compared, *L. sarmentosa* differs in having : 1) less robust branches and shorter dactylopore spines, 2) very differently shaped and shorter gastrostyle, 3) no dactylostyle, 4) granular, not imbricate, coenosteal texture, and 5) much smaller male and female ampullae, the male ampullae lacking tall, apical spines.

### *Lepidopora dendrostylus* n. sp. (Plates 2, a–f, 3, a–f)

Material examined: Types, q.v.

Distribution: Norfolk Ridge; Three Kings Ridge; Bay of Plenty, North Island; Chatham Rise; Campbell Rise; 190–1258 m.

Description: Colonies large, firmly attached, and heavily branched in plane of flabellum. Largest colony (holotype) 8 cm tall, 10.3 cm wide, and 15 mm in basal branch diameter. All colonies, even very small ones, live in a commensal relationship with a polynoid polychaete, which induces the colony to form a large, perforated tube along its larger branches. Presence of worm tube tends to make branch cross section rectangular in shape, the longer axis perpendicular to colony plane. Coenosteum white, composed of coenosteal strips approximately 0.10 mm wide and arranged in a linear or reticulate fashion. Strips composed of well-defined imbricate platelets, only the distal 20 µm of the slightly corrugated leading edges being exposed.

Gastropores circular, 0.17–0.21 mm in diameter, and uniformly distributed on branch surfaces; however, dactylopore spines often tend to group in short abcauline crescents beneath gastropores or to completely encircle a gastropore. In the latter case, the proximal dactylopore spines are usually more highly developed, the upper ones rudimentary, together resembling a cyclosystem or pseudocyclosystem with an adcauline diastema. Gastropore tubes cylindrical and slightly constricted near branch surface; no ring palisade. A uniquely shaped gastrostyle (Plates 2, e, f, 3, e) occupies about 90% of gastropore tube length, its sharp, slender tip easily visible in an intact gastropore tube. Gastrostyles supported by an unadorned cylindrical base, which supports a series of highly dissected, downward-projecting, imbricate fronds. Each frond appears to originate near the gastrostyle tip and grows downward as it enlarges to form a plate-like, dissected frond. Gastrostyle H : W ratio variable, ranging from 2–4. Dactylopore spines variable in height, ranging from flush to 0.6 mm tall, but invariably with a circular apical pore approximately 0.10 mm in diameter. The tall dactylopore spines give a distinctly spiny or prickly texture to the branches. Robust dactylostyles present, usually easily visible in an intact dactylopore spine. Each dactylostyle consists of a row of tall (about 0.10 mm), dissected platelets, very similar in size and shape to a gastrostyle frond.

Female ampullae large (1.0–1.2 mm in diameter) hemispheres, which often bear several dactylopore spines. Female efferent pores lateral, about 0.20 mm in diameter. Male ampullae largely internal (internal diameter 0.3–0.4 mm) but sometimes visible externally as a superficial mound 0.5–0.6 mm in diameter. Male efferent pore a tall spine very similar in size and shape to a dactylopore spine, but differing in lacking a terminal pore. Instead, each male efferent pore spine bears 1–3 subterminal pores 30–50 µm in diameter.

TYPES: Holotype: NZOI Stn F146, 1 male col., NZOI H-557, SEM stub 550A (USNM). Paratypes: NZOI Stn A910, 8 female col., NZOI P-786, 6 female col. and SEM stubs 549, 551, USNM 60251; Stn E636, 3 col., NZOI P-787; Stn E846, 3 branches, NZOI P-788; Stn E860, 3 col., NZOI P-789; Stn F146, 4 col. and branches, NZOI P-790, 4 col., USNM 85084; Stn Q40, 1 col., NZOI P-791, SEM stub 652A (USNM); Stn S53, 3 col. (1 in alcohol), NZOI P-792, 1 col. and SEM stub 550B, USNM 85085; Stn S571, 1 col., NZOI P-924; Stn S573, 1 col., NZOI P-793, SEM stub 652B (USNM).

TYPE LOCALITY: NZOI Stn F146, 53°00'S, 172°45'E, Campbell Rise; 435 m.

ETYMOLOGY: The species name *dendrostylus* (from the Greek *dendron*, tree + *stylos*, pillar) refers to the tree-like morphology of the gastrostyle, which resembles the snow-shedding branches of many coniferous trees.

REMARKS: *Lepidopora dendrostylus* is easily distinguished from the other 14 species in this genus by — having dactylostyles, having a uniquely-shaped gastrostyle, and having its male efferent pores elevated on tall apical spines. These characters (as well as the shape of the dactylostyles) are also unique within the Stylasteridae. It is one of three New Zealand species of *Lepidopora* that lives in association with polychaetes; comparisons to one of these, *L. sarmentosa*, are made in the account of that species.

## *Lepidopora microstylus* n. sp. (Plates 3, g–h, 4, a–f)

MATERIAL EXAMINED: Types, q.v.

DISTRIBUTION: Norfolk Ridge; off McCauley Island, Kermadec Ridge; 710–1258 m.

DESCRIPTION: Colonies small and bushy, attached by a short (0–3 mm), stout basal trunk, which supports a roughly spherical polynoid gall. Above the polychaete tube bolus no main vertical branches are formed; instead, numerous slender branches radiate in all directions from the worm tube, producing an almost spherical colony. Branches bifurcate infrequently and are long and slender (about 1 mm in diameter), gradually attenuating in diameter toward blunt branch tips. Holotype colony 17.0 mm tall, 22.5 mm wide, and 22.3 mm deep. Coenosteum white and reticulate-granular in texture, composed of strips 0.45–0.60 mm wide covered with small, very irregularly shaped granules.

Gastro- and dactylopores uniformly distributed on all branches. Gastropores circular and small (only about 0.18 mm in diameter), sometimes with a small abcauline lip. Gastropore tubes cylindrical in upper portion and of same diameter as gastropores; however, basally each gastropore tube expands into a wider (e.g., 0.35 mm in diameter) flattened chamber, which contains the gastrostyle. Gastrostyles unique and unusual in shape, more like a dactylostyle in construction, since they are basically lateral encrustations of the lower, inner gastropore tube, not a typical, free-standing, vertical gastrostyle structure. The gastrostyle is best appreciated by illustration (stereo view, Plate 4, a, c), being composed of a reticulum of interconnected, often bifurcating, spines; a H : W ratio does not apply to the gastrostyle of this species. Dactylopore spines short and conical, and of uniform height (about 50 µm) and width (0.13 mm in diameter, with a pore diameter of 65–70 µm); no dactylostyles.

Male ampullae internal, about 0.30–0.35 mm in diameter, communicating to branch surface by a slender efferent tube about 40 µm in diameter. Female ampullae unknown.

TYPES: Holotype: NZOI Stn T243, 1 male col., NZOI H-558. Paratypes: NZOI Stn E857, 3 col., NZOI P-794; Stn E860, 1 col., NZOI P-795, SEM stub 552 (USNM); Stn G3, 1 col., NZOI P-796; Stn T243, 1 male col. and SEM stub 655, USNM 85086.

TYPE LOCALITY: NZOI Stn T24, 30°05'S, 178°15'W, off McCauley Island, Kermadec Ridge; 1035 m.

ETYMOLOGY: The specific name *microstylus* (from the Greek *micros*, small + *stylos*, pillar) refers to the tiny gastrostyle that is characteristic of this species.

REMARKS: *Lepidopora microstylus* is distinguished from its congeners by its distinctively rudimentary gastrostyle, quite unlike any other within the genus or the family. Among the New Zealand species of *Lepidopora*, three (*L. sarmentosa, L. dendrostylus, and L. microstylus*) live with commensal polychaetes. The worm tube, or centralised bolus, of *L. microstylus* confers a bushy growth form to this species, contrasted with the uniplanar growth form of the other two species in which the polychaete tube is rectangular in cross section and follows the main branches. The growth form of *L. microstylus* is characteristic of several stylasterids that live with commensal polychaetes, such as *Errina macrogastra* Marenzeller, 1904, *Stenohelia robusta* Boschma, 1964d, and *Stenohelia concinna* Boschma, 1964d, all three of these species from the Galápagos Islands and figured by Cairns (1986b).

***Lepidopora symmetrica*** n. sp. (Plate 5, a–f)

MATERIAL EXAMINED: Types, q.v.

DISTRIBUTION: West of Three Kings Islands; 282 m.

DESCRIPTION: Unique holotype colony, corallum 23.1 mm tall, with equal, dichotomous branching — basal branch 2.75 mm in diameter, distal branches 1.70 mm in diameter. Branches circular in cross section, tapering gradually from base to tip. Central branch core very porous. No polychaete-induced corallum modifications. Coenosteum white, with a meandering linear-imbricate coenosteal texture. Coenosteal strips variable in width (32–94 µm) and separated by wide, shallow coenosteal slits, which are periodically penetrated by large, elliptical coenosteal pores up to 0.1 mm in greater diameter. Platelets broad, smooth, and slightly corrugated, only distalmost 20 µm of each platelet visible.

Gastro- and dactylopores uniformly distributed on all branch surfaces; dactylopores not concentrated near gastropores or aligned. Gastropores elliptical in shape, ranging from 0.32 x 0.16–0.20 mm in diameter, the greater axis parallel to branch axis. Gastropore tubes cylindrical and deep, slightly inclined toward branch tip, and lacking ring palisades and tabulae. Illustrated gastrostyle (Plate 5, e, f) 0.35 mm tall and 62 µm in diameter (H : W = 5.6); not ridged. Gastrostyles bear numerous large (up to 50 µm long and 8 µm in diameter), coarse, pointed spines. Dactylopore spines thin-walled, squat cylinders (not conical mounds as in most species of *Lepidopora*). Dactylopore spines 0.16–0.21 mm in diameter and variable in height (33–76 µm), having an apical pore diameter of 95–120 µm. Dactylostyles absent.

Ampullae unknown.

TYPE: Holotype: NZOI Stn E305, 1 branch, NZOI H-559, SEM stub 351 (USNM).

TYPE LOCALITY: NZOI Stn E305, 34°10'S, 171°55'E, west of Three Kings Islands; 282 m.

ETYMOLOGY: The species name *symmetrica* (from the Greek *symmetricos*, symmetrical) refers to the equal, dichotomous branching of the colony, which appears to produce a symmetrical branching pattern similar to that of various other stylasterids such as *Lepidopora cryptocymas* Cairns, 1985; *Sporadopora dichotoma* (Moseley 1876); and *Pliobothrus symmetricus* Pourtalès, 1868.

REMARKS: Ordinarily I would hesitate to base the description of a new species on one branch fragment; however, the characters of this specimen are so distinctive and it is so well preserved that an exception was made.

As previously discussed, the genus *Lepidopora* is extremely broadly defined and probably not monophyletic. The inclusion of *L. symmetrica* forces an even greater expansion of the generic definition to include thin-walled, cylindrical dactylopore spines (not conical as in most species), which is unique in the genus, but remarkably similar to those found in *Pliobothrus symmetricus* Pourtalès, 1868 from the North Atlantic (*see* Cairns 1986a). In fact, the colony shape, coenosteal texture, and arrangement of gastro- and dactylopores are virtually identical in these two species (the resemblance underlined by assigning the same species name), but *L. symmetrica* differs significantly in having gastrostyles.

The elongate, nonridged, coarsely spinose gastrostyle of *L. symmetrica* is characteristic of most of the species in the genus but only one other species, *L. eburnea* (Calvet 1903) from the northeast Atlantic shares with *L. symmetrica* the character of linear-imbricate coenosteal texture. *Lepidopora eburnea* differs in having gastropore lips and linearly arranged, conical dactylopore spines. *Lepidopora symmetrica* is easily distinguished from other New Zealand *Lepidopora* by its linear-imbricate coenosteum and its distinctive dactylopore spines (Table 2).

*Lepidopora cryptocymas* Cairns, 1985 (Plate 6, a–h)

*Lepidopora cryptocymas* Cairns, 1985 : 729–733, figs 1–11.

MATERIAL EXAMINED: NZOI Stn C527, 5 fragments, USNM 76361; Stn E306, 3 fragments, NZOI; Stn E845, 1 branch, NZOI; Stn E846, 6 col. and branches, NZOI, 4 col. and SEM stubs 548, 654, USNM 85087; Stn E850, 1 col. and 1 branch, NZOI; Stn E861, 4 col. and branches, NZOI, 1 col., branches, and SEM stub 547, USNM 85088; Stn E865, 4 col., NZOI; Stn I97, 1 col., NZOI; Stn P566, 2 worn fragments, USNM 72352 (incorrectly identified paratypes of *L. polystichopora*); Types, q.v.

DISTRIBUTION: Southern Norfolk Ridge; off Three Kings Islands; southern Kermadec Ridge; 168–544 m.

DESCRIPTION: Colonies uniplanar, largest corallum examined (NZOI Stn E861, Plate 6, a) 7.4 cm tall and 5.2 cm broad, with a basal branch diameter of 9.0 mm; however, a damaged colony from NZOI Stn E850 has an even larger basal branch diameter of 11.7 mm. Branching sparse, dichotomous, and equal, resulting in U-shaped axils. Branch diameter gradually decreases from base to blunt tips. Branch cross section circular to slightly elliptical, the greater axis of ellipse parallel to flabellar plane. Branch coenosteum light yellowish-brown up to a branch diameter of 2.5–3.0 mm; branches greater than 3.0 mm in diameter usually a darker chocolate brown, their inner core (2.5–3.0 mm) remaining a yellowish brown. Coenosteum composed of longitudinal strips 0.11–0.14 mm wide, which are delimited by circular to elongate coenosteal pores about 50 µm in diameter. Strips and inner surface of coenosteal pores also covered with broad, smooth, pointed spines 15–21 µm tall and about 17 µm in basal diameter. No indication of imbricate texture.

Dactylopores aligned in straight to slightly meandering longitudinal rows, 6 to 8 rows around the circumference of a larger branch. Dactylopore rows delimit longitudinal bands of coenosteum, each band composed of 6 to 9 coenosteal strips. Gastropores aligned midway on coenosteal bands defined by dactylopores, their centres 1.2–1.5 mm apart. Gastropores circular to slightly elliptical, 0.35–0.40 mm in diameter, their elongate tubes curving downward and running parallel to branch axis. Ring palisade and tabulae absent. Gastrostyles cylindrical, elongate, and unridged: invariably 0.10-0.11 mm in diameter and up to 0.75 mm tall (H : W = 7.5). Styles sparsely covered with simple, robust, cylindrical spines 45–61 µm tall and 11–15 µm in diameter; however, towards base of style, spines are much smaller, e.g., only 15–17 µm tall and about 2 µm in diameter. Spines of similarly small size and shape also cover the gastropore tube. Dactylopores circular, about 0.12 mm in diameter, and flush with coenosteal surface, not elevated or linked by ridges. Dactylopores spaced 0.2–0.6 mm apart.

Female ampullae internal and ellipsoidal in shape, about 1.0 x 0.6 mm in diameter. Each female ampulla located just distal to a gastropore, its efferent pore opening into gastropore tube via a slender efferent canal and pore, which penetrates the upper distal wall of the gastropore tube (Plate 6, f). Mature efferent pores about 0.15 mm in diameter. Male ampullae also internal, but spherical, and only 0.5–0.6 mm in diameter. Male efferent pores 40–50 µm in diameter, each opening into a shallow coenosteal depression about 0.12 mm in diameter and 0–40 µm deep, each located directly above an ampulla.

TYPES: The holotype (NZOI Stn E305) and most paratypes (NZOI Stns E305, P458, P544, P559, P561) are deposited at NZOI. Representative paratypes are also deposited at the USNM : NZOI Stns E305 (USNM 72342), P458 (USNM 72343), P559 (USNM 72345), and P561 (USNM 72346).

TYPE LOCALITY: NZOI Stn E305, 34°10'S, 171°55'E, west of Three Kings Islands; 282 m.

REMARKS: The additional NZOI specimens reported herein have allowed documentation of a broader geographic and bathymetric range for the species and providing additions to the original description, particularly regarding: maximum colony size, coenosteal colour, and gastrostyle dimensions.

The synapomorphy of multiple rows of linearly arranged dactylopores clearly unites *L. cryptocymas* and *L. polystichopora* and distinguishes them from the 13 other species of *Lepidopora*. Cairns (1985) hypothesised that they were sister species but offered five points of differentiation. To reiterate and expand, *L. cryptocymas* differs in : 1) having a circular-to-elliptical branch cross section, not polygonal, 2) having chocolate-brown coenosteum, not white, 3) lacking abcauline gastropore lips, 4) having larger, more robust gastrostyle spines, 5) having flush dactylopores, not elevated and linked by ridges, 6) having flush female efferent pores that open into the gastropore tube, not opening externally and covered by a lid, and 7) having flush or recessed male efferent pores, not elevated on small mounds.

### *Lepidopora polystichopora* Cairns, 1985

(Plates 7, a–h, 8, a–d)

*Lepidopora polystichopora* Cairns, 1985 : 733–735, figs 12–22 (not NZOI Stn P566, = *L. cryptocymas*).

MATERIAL EXAMINED: NZOI Stn E850, 1 female branch and SEM stub 544, USNM 85090; Stn E861, 2 male col. and several branches, NZOI, 1 col. and SEM stubs 545–547, USNM 85089; Stn G3, 1 small male col., NZOI, 1 col., USNM 85091; Types, q.v.

DISTRIBUTION: West and northwest of Three Kings Islands; Norfolk Ridge; 197–710 m.

DESCRIPTION: Colonies uniplanar, largest corallum (NZOI Stn E861, Plate 7, a) 8.1 cm tall with a basal branch diameter of 9 mm. Branching sparse, dichotomous, and equal, branches attenuating gradually toward blunt branch tips. Branch cross-section polygonal, each apex of polygon corresponding to a ridged row of dactylopore spines. Larger basal and intermediate-sized branches usually hexameral in cross section; distal branches usually four-sided (square) or compressed. Branch core quite porous. Coenosteum white but dried tissue brown. Original coenosteal texture apparently reticulate-imbricate, which is secondarily replaced on more mature branches by a linear-granular construction. Coeno--teal strips of imbricate texture about 0.10 mm in width and covered with narrow (4–28 µm), irregularly-shaped platelets. Linear-granular strips 0.10–0.12 mm wide, and delimited by circular to slightly elongate coenosteal pores 35–40 µm in diameter. These strips, as well as upper, inner surfaces of coenosteal pores and dactylopores, densely covered with smooth, robust, sharp spines 10–13 µm tall and about 7 µm in basal diameter.

Dactylopores arranged in straight longitudinal rows, 4 to 7 rows around circumference of branch, which delimit longitudinal bands each composed of 6 to 9 coenosteal strips. Gastropores aligned midway on coenosteal bands defined by dactylopores, their centres 1.2–2.0 mm apart. Gastropores circular to elliptical and 0.32–0.38 mm in diameter, some having a slight abcauline lip that alters the shape of the gastropore. Gastropore tubes cylindrical; ring palisade and tabulae absent. Gastrostyles elongate and unridged. Styles 90-110 µm in diameter and up to 1.1 mm tall, resulting in a H : W up to 12. Styles covered with elongate, tapered spines up to 36 µm long and about 6 µm in midheight diameter. Dactylopores circular, 0.08–0.10 mm in diameter, and elevated about 0.12 mm. On distal branches low ridges unite dactylopores, these ridges absent or reduced on larger-diameter branches. Low ridges of same size sometimes also link gastropores. Dactylopores spaced about 0.4 mm apart.

Female ampullae internal, 0.4–0.5 mm in diameter. Female efferent pores quite large (about 0.32 mm in diameter), each covered by a broad (about 0.52 mm wide), concave lid, which covers most of the pore. Orientation of lid is such that its free edge is directed proximally (adcauline), in the opposite direction of the gastropore lips, with which it might otherwise be confused. In addition to the lid, female efferent pores are further guarded by a dense cluster of bifurcating spines (Plate 8, d) that occur between the lid and the coenosteum. Male ampullae also internal and 0.4–0.5 mm in diameter, communicating to surface by a narrow efferent pore 35–50 µm in diameter, each pore elevated on a small mound about 0.16 mm in diameter and 0.07 mm tall. Male efferent pores located about midway between dactylopore rows, sometimes up to three between adjacent gastropores. Occasionally a male efferent pore opens into the upper gastropore tube.

TYPES: The holotype (NZOI Stn E305) and most paratypes (NZOI Stns E305, P458, P559, P561, P566) are deposited at NZOI. A fragment of the holotype (USNM 72347) and paratypes from NZOI Stns E305 (USNM 72348) and P566 (USNM 72352) are deposited at the USNM.

TYPE LOCALITY: NZOI Stn E305, 34°10'S, 171°55'E, west of Three Kings Islands; 282 m.

REMARKS: The additional NZOI specimens reported herein allow documentation of a broader geographic and bathymetric range for the species and provide additions to the original description, particularly regarding maximum colony size, original coenosteal texture, gastrostyle length, and nature of the female ampullae.

Comparisons to the morphologically and geographically similar *L. cryptocymas* are made in the account of that species; however, it should be noted that the elaborate lid covering the female efferent pores and the polygonal branch cross sections are unique (autapomorphic) characters within the Stylasteridae.

### **Adelopora** Cairns, 1982

Colonies uniplanar to bushy. Coenosteal texture replaced with a reticulate-granular texture. No coordination between gastro- and dactylopores; however, in some species gastropores are restricted to branch tips and axils. Gastropores cylindrical and relatively short; gastrostyles, ring palisades, and tabulae lacking; abcauline gastropore lip may be present. Gastropore covered by a moveable, sometimes hinged operculum. Dactylopores apically perforate mounds; dactylostyles lacking; dactylopore tubes long (axial). Female ampullae large superficial hemispheres, often with lateral efferent tubes. Male ampullae superficial or internal.

TYPE SPECIES: *Adelopora pseudothyron* Cairns, 1982b, by original designation.

REMARKS: *Adelopora* is readily distinguished from all other stylasterid genera by its free (not fixed), hinged opercula. Superficially, it resembles *Lepidopora*, or even *Pliobothrus*, but, in addition to having opercula, *Adelopora* differs in many other significant characters (*see* Cairns 1991). Although the hinged operculum is a very specialised character (synapomorphic for the species in the genus), *Adelopora* is grouped among the least-derived of the stylasterid genera (Cairns 1984).

The addition of three new species of *Adelopora* from the New Zealand region increases the number of species known in this genus to four, all of which are compared in Table 2. Characters found to be of particular value in discriminating species are hinge type, gastropore location, terminal branch diameter, operculum size and position, and ampullar size and position.

The articular edge of the opercula of two species (*A. pseudothyron* and *A. moseleyi*) have short nubs that fit into coenosteal depressions, such that even if a specimen was dead or bleached the operculum would swing open but remain locked in position. The opercula of *A. crassilabrum* and *A. fragilis* do not have this nub-and-socket locking morphology; instead, the opercula appear to be held in place by tissue, such that, if the specimen is dead or bleached, it is likely that the opercula will fall out. The former "locked in" type of articulation is herein termed **closed** (Plate 12, a, c), whereas the second type of free articulation is termed **open** (Plates 9, c–d, 10, d).

DISTRIBUTION: Subantarctic South Pacific seamounts; seamounts and ridges between New Zealand and New Caledonia; Lord Howe Seamount Chain; east of the Chesterfield Islands, off Brazil (Zibrowius 1988); 282–1169 m.

### *Adelopora crassilabrum* n. sp. (Plates 8, e–g, 9, a–f)

MATERIAL EXAMINED: Types, q.v.

DISTRIBUTION: Southern Norfolk Ridge and southern Three Kings Ridge off Three Kings Islands; 282–1169 m.

DESCRIPTION: Colonies from three stations were examined: those from the two shallower stations (NZOI Stns E305, E846) are more robust, with thicker branches (1.4 mm in branch tip diameter), have more robust gastropore lips, and more numerous gastropores. The more delicate deeper-water form (NZOI Stn E856), despite its much-smaller-diameter branches (0.6 mm in diameter), is considered to be conspecific based on copossession of all other characters. Colonies uniplanar, largest specimen examined (NZOI Stn E846) 39 mm tall and 23 mm broad, with a basal branch diameter of 4.4 mm. Branching dichotomous and equal, resulting in U-shaped axils; branches circular to slightly elliptical in cross section, gradually decreasing in diameter toward branch tips. Only one specimen (the holotype) shows evidence of an incipient commensal relationship with a polychaete. Coenosteum white and reticulate-granular in texture, having no evidence of an initial imbricate structure. Strips irregular in shape, approximately 80 µm wide, and covered with small, rounded granules 5–8 µm in diameter — altogether producing a relatively smooth, glossy texture.

Gastro- and dactylopores uniformly distributed on all branch faces of robust colonies; however, on small-diameter branches of delicate colonies, gastropores occur only on anterior face. Gastropores never occur at branch axils. Gastropores circular, 0.27–0.32 mm in diameter, and usually bordered by a broad, thick, triangular, abcauline lip; these are best developed on the robust branches of NZOI Stn E846. Gastropore tubes cylindrical, somewhat basally enlarged, and slightly curved. Dactylopore mounds conical, most highly developed near branch tips (0.12 mm tall) and almost flush on older, larger-diameter branches. Apical pore of dactylopore mounds approximately 40 µm in diameter and often accompanied by a smaller accessory pore on the same mound of approximately 13 µm diameter.

Gastropore opercula deeply recessed, often difficult to see in an intact gastropore, making this species easily mistaken for a species of *Lepidopora*. Opercula elliptical in outline, approximately 0.27 mm long and 0.22 mm wide, and highly concave beneath. Its proximal edge (point of articulation with colony) is also highly concave, produced by a linear series of 4 or 5 contiguous indentations (Plate 9, f). These indentations are moulded to fit over the curved edge of a cylindrical bar that projects from the inner edge of the gastropore tube (Plate 9, d). In the closed position, the operculum is usually tilted upward as much as 45°. Opercula, therefore, need only swing approximately 45° in order to allow the gastrozooid to emerge. A linear depression (groove) adjacent (inward) to the gastropore bar allows the operculum to open to its full extent before being checked by the upper proximal opercular lip. The opercular articulation of *A. crassilabrum* is of the open type and thus opercula often fall free of the parent corallum when bleached or handled roughly.

Female ampullae hemispherical and 0.9–1.0 mm in diameter, opening through a short efferent tube and terminal efferent pore approximately 0.09 mm in diameter. Male ampullae (?) composite, consisting of large (about 1.5 mm diameter) ridged structures having a series of efferent pores approximately 30 µm in diameter around its perimeter.

Types: Holotype: NZOI Stn E846, 1 ?male col., NZOI H-560. Paratypes: NZOI Stn E305, 1 worn branch, NZOI P-797; Stn E846, 1 col., NZOI P-798, 1 col. and SEM stubs 554–555, 656, USNM 85092; Stn E856, 2 branches, NZOI P-799, 1 branch and SEM stub 553, USNM 85093.

Type locality: NZOI Stn E846, 34°08'S, 171°58'E, west of Three Kings Islands; 343–417 m.

Etymology: The species name *crassilabrum* (from the Latin *crassus*, thick + *labrum*, lip) refers to the stout abcauline gastropore lips characteristic of this species.

Remarks: Two of the four described species of *Adelopora* have an open opercular articulation (*Adelopora crassilabrum* and *A. fragilis*) — *A. crassilabrum* differs from *A. fragilis* in virtually every other character listed in Table 2, including colony shape, coenosteal texture, gastropore location, gastropore tube shape, opercular position, and male and female ampullar shape and position.

### *Adelopora fragilis* n. sp. (Plates 10, a–g, 11, a, b)

Material examined: Types, q.v.

Distribution: Norfolk Ridge; Three Kings Ridge; east of Chesterfield Islands; 400–967 m.

Description: Colonies small and delicate, the largest specimen (holotype) only 18 mm tall, with a basal branch diameter of 2.3 mm. Branching uniplanar, dichotomous, and unequal; branches circular in cross section, gradually attenuating to very slender tips as small as 0.3 mm in diameter. Commensal polychaetes unknown in this species. Coenosteum white and linear-imbricate in texture, the strips 40–65 µm wide and separated by narrow slits about 5 µm wide. Platelets continuous across a strip and slightly corrugated, revealing only approximately 8–10 µm of their distal edge.

Dactylopores uniformly distributed on all branch surfaces but gastropores restricted to anterior side of branch axils, each gastropore flanked laterally by two branches, posteriorly by branch coenosteum, and anteriorly by a broad triangular lip. Gastropores assume size and shape of opercula, ranging from rectangular, to oval and triangular. Gastropore tubes cylindrical and relatively shallow (about equal to opercular width in depth). Dactylopore mounds abundant, up to 70 µm tall, with apical pores about 25 µm in diameter.

Opercula flush with coenosteum or slightly recessed, but always clearly visible. Opercular shape variable: rectangular (Plate 10, b), oval, or triangular with rounded edges (Plate 10, f, g); regardless, all opercula have a relatively straight articular edge (width) of 0.36–0.40 mm and a length of 0.40–0.55 mm. Opercula slightly concave beneath and distinctly thicker at articular edge than free edge. Articular edge of operculum concave, this concavity moulded around a bar that projects from the inner edge of the gastropore tube (Plate 10, d) and on which it pivots as the operculum opens and closes (i.e., open articulation as in *A. crassilabrum*). In closed position, operculum is horizontal.

Female ampullae large, smooth hemispheres 0.60–0.65 mm in diameter, usually clustered near gastropores (especially on gastropore lips) or on posterior branch surface opposite a gastropore. Female efferent pores 0.11–0.13 mm in diameter. Male ampullae internal and slightly ellipsoidal in shape (approximately 0.35 mm in greater diameter), and only visible in branch cross section.

Types: Holotype: NZOI Stn G3, 1 male col., NZOI H-561. Paratypes: NZOI Stn G3, 5 male branches,

TABLE 2. Characteristics of the four species of *Adelopora* (e.p. = efferent pore)

| Character | *A. crassilabrum* n. sp. | *A. fragilis* n. sp. | *A. moseleyi* n. sp. | *A. pseudothyron* Cairns, 1982 |
|---|---|---|---|---|
| Colony shape; terminal branch thickness | Uniplanar, robust; variable branch thickness: 0.6–1.4 mm | Uniplanar, small (delicate) 0.3 mm | Uniplanar, robust; 0.6 mm | Uniplanar to bushy (robust); 0.9 mm |
| Commensal polychaete | Absent (?) | Absent | Present | Absent |
| Coenosteal texture | Reticulate-granular (may be secondary texture) | Linear-imbricate | Primarily linear-imbricate, secondarily reticulate-granular | Linear-imbricate |
| Gastropore location and diameter; lip shape | Uniformly distributed, 0.27–0.32 mm; thick, triangular lips | Exclusively at branching axils, 0.35–0.55 mm; prominent triangular lips | Primarily on anterior surface (staggered on face and at axils), 0.2–0.3 mm; rounded lips | Exclusively at branch tips and axils, 0.4–0.65 mm; no lips |
| Gastropore tube | Elongate, curved, basally enlarged | Shallow | Elongate, basally enlarged | Elongate, cylindrical |
| Opercular articulation (hinge) | Open | Open | Closed | Closed |
| Opercular shape (length of articular edge); position | Elliptical (0.22-0.27 mm); tilted upward about 45° and deeply recessed | Variable: rectangular, oval, or triangular (0.36–0.40 mm), horizontal and flush or slightly recessed | Rectangular: rounded free edge (0.29-0.35 mm); horizontal | Rectangular with rounded free edge (0.55–0.64 mm); horizontal |
| Female ampullae | Smooth hemispheres, 0.9–1.0 mm, random placement, often with an e.p. | Smooth hemispheres, 0.6–0.65 mm, clustered near gastropores | Ridged hemispheres, 0.9–1.0 mm, both faces | Smooth hemispheres, 1.06–1.22 mm, lateral tube, random location |
| Male ampullae | Composite: large ridged hemispheres (1.5 mm) with several peripheral e.p. | Internal, approx. 0.3 mm | Unknown | Unknown |
| Distribution | Ridges between New Zealand and New Caledonia; 282–1169 m | Ridges between New Zealand and Chesterfield Islands; 400–710 m | Lord Howe Seamount Chain; 285–360 m | Subantarctic seamounts of South Pacific; 298–915 m |

NZOI P-800, 2 male branches and SEM stubs 556, 659, USNM 85094; Stn U594, 1 col., NZOI P-933; Stn U599, 4 female branches, NZOI P-801, 2 female branches and SEM stub 557, USNM 85095; Chalcal 1, *Coriolis* D5, 1 col. and SEM stubs 359–360, 369, USNM.

TYPE LOCALITY: NZOI Stn G3, 26°25'S, 167°15'E, Norfolk Ridge north of Norfolk Island; 710 m.

ETYMOLOGY: The species name *fragilis* (from the Latin *fragilis*, fragile, brittle) refers to the delicate nature of the slender branches of this species, colonies usually collected in many pieces.

REMARKS: Some transported fragments, not included in the type series, were also found at NZOI Stn G10, at 967 m depth. For comparisons to other species, *see* Remarks of *A. crassilabrum* and Table 2.

***Adelopora moseleyi*** n. sp. (Plates 11, c–g, 12, a–f)

MATERIAL EXAMINED: Types, q.v.

DISTRIBUTION: Lord Howe Island Seamount Chain; 285–360 m.

DESCRIPTION: Colonies uniplanar, attached by a thin encrusting base. Basal (primary) branch 4–6 mm in diameter, dividing in half at a height of about 15 mm, the resulting two secondary branches diverging at a right angle. Subsequent branching less regular and often unequal; branch tips approximately 0.6 mm in diameter. A commensal polynoid polychaete invariably present, but confined to one face of the two large secondary branches, causing the coral to form large, semi-enclosed tubes that are rectangular in cross section and up to 2.5 x 1.5 mm in diameter. Coenosteum white to light orange and linear-imbricate in texture. Strips 40–60 µm wide and covered with platelets of variable width, only the distal 10 µm of any platelet exposed. Linear-imbricate coenosteum secondarily covered with a granular coenosteum resembling a reticulate-granular texture. Altogether, branch coenosteum quite dense and robust. *Pedicularia* (an obligate commensal gastropod) deposits about 3.3 x 1.8 mm in size occur on some specimens.

Gastro- and dactylopores invariably more abundant on anterior face and virtually absent from coenosteum forming worm tube on posterior face. Gastropores slightly staggered on anterior face and commonly occur at branch axils as well. Gastropores circular and 0.2–0.3 mm in diameter, each covered by a hinged (closed-type) operculum. Outer (abcauline) rim of gastropore enlarged as a broad, rounded, lower lip, which serves to check the free opercular edge in a closed horizontal position. Gastropore tube elongate and cylindrical, but slightly enlarged basally, and strongly inclined toward the branch tip such that the tube is virtually parallel to branch axis. Dactylopores broad-based (up to 0.2 mm wide) mounds up to 0.11 mm tall, with a circular apical pore 30–40 µm in diameter.

Gastropore opercula variable in shape, but primarily rectangular, with a rounded free edge, a straight articular edge, a flat top, and a concave underside. Typical opercula measure 0.29–0.35 mm broad, 0.32–0.35 mm long, and 35–60 µm thick at their outer edges. Straight articular edge rounded and smooth, with terminal nubs up to 40 µm long, the edge and nubs articulating with a correspondingly smooth coenosteal groove and terminal sockets (Plate 12, c) — a closed-type opercular articulation.

Female ampullae superficial hemispheres 0.9–1.0 mm in diameter, occurring on both anterior and posterior branch faces. Female ampullae covered with a series of 8–10 low, rounded ridges, which radiate from its apex. Female efferent pores lateral, 0.18–0.21 mm in diameter, and sometimes accompanied by a short efferent tubule or partially covered by a short spine. Male ampullae unknown.

TYPES: Holotype: NZOI Stn P842, 1 female col., NZOI H-562. Paratypes: NZOI Stn I735, 1 female col., NZOI P-802, 1 female col. and SEM stub 558B, USNM 85096; Stn I741, 1 female col., NZOI P-803; Stn P842, 2 female col., NZOI P-804, 2 fragments and SEM stubs 558A, 657–658, USNM 85097.

TYPE LOCALITY: NZOI Stn P842, 32°34'S, 156°17'E, southwest of Lord Howe Island; 285–290 m.

ETYMOLOGY: This species is named in memory of Henry Nottidge Moseley, naturalist on board HMS *Challenger*, who described and beautifully illustrated many new species of deep-water stylasterids from around the world (Moseley 1879, 1881).

DISCUSSION: Only two species of *Adelopora* are known to have the closed type of opercular articulation (*A. pseudothyron* Cairns, 1982, and *A. moseleyi*), these two species sharing several other characteristics, such as coenosteal texture, opercular shape, dactylopore shape and size, and female ampullar shape and size (Table 2). *Adelopora moseleyi* differs, however, in having a uniplanar corallum, consistent association with a commensal polychaete, gastropores staggered on anterior branch faces (not restricted to axils), and a much smaller gastropore diameter and consequently smaller opercula.

### Lepidotheca Cairns, 1983

Gastro- and dactylopores usually uniformly distributed; however, in some species gastropores restricted to branch axils and in other species dactylopores arranged unilinearly. Coenosteum white; texture invariably linear-imbricate. Abcauline gastropore lips common. Gastropore tubes cylindrical and usually lack a ring palisade. Gastrostyles usually needle-shaped (H : W ratio 4–11) and unridged. Dactylopore spines U-shaped and thin walled, their dactylotomes facing upward (abcauline); dactylostyles absent. Ampullae superficial; male efferent pores apical.

TYPE SPECIES: *Errina (Inferiolabiata) fascicularis* Cairns, 1983a, by original designation (Cairns 1983b)

DISCUSSION: As noted by Cairns (1983b), *Lepidotheca* is most similar to *Inferiolabiata*, both genera having uniformly distributed, abcauline dactylopore spines; elongate, unridged gastrostyles; similar growth forms; and similar coenosteal textures. *Lepidotheca* is distinguished by lacking dactylostyles and by having thinner-walled and smaller dactylopore spines. Fourteen valid species are recognised in the genus: seven listed by Cairns (1983b); *L. pourtalesi* Cairns, 1986a; *L. brochi* Cairns, 1986a; *L. macropoma* Cairns, 1986b; and four new species described herein. Characters of value in discriminating species include location of gastropores; presence or absence of gastropore lips; branching mode and resultant corallum shape; and size and location of male and female ampullae (Table 3). A useful first-order discriminator within the genus is the location of gastropores — nine species have uniformly distributed gastropores, four have gastropores restricted to branch axils, and one (*L. brochi*) has gastropores confined to the anterior face.

DISTRIBUTION: Indo-West Pacific, Subantarctic; Galápagos; Caribbean; 85–2010 m (Cairns 1991b).

#### *Lepidotheca fascicularis* (Cairns, 1983)

(Plates 13, a–h, 14, a, b)

*Errina (Inferiolabiata) fascicularis* Cairns, 1983a : 117–121, figs 22 h, 29 a–k, 30 a–e (not *Eltanin* Stn 1416 (in part) and *Eltanin* Stn 1422, both = *Lepidotheca inconsuta*).

*Lepidotheca fascicularis*: Cairns 1983b : 444–446, figs 5A–I, 24E, 25E.

MATERIAL EXAMINED: NZOI Stn E305, 1 col., NZOI; Stn Q25, 2 col., NZOI; Stn S46, 1 branch, NZOI; Stn S53, 2 col., NZOI, SEM stub 559 (USNM); Types, q.v.; Reference Material — Syntypes of *Errina ramosa* Hickson and England, 1905 (ZMA 8204) and *Errina horrida* Hickson and England, 1905 (ZMA 7827).

DISTRIBUTION: Off Tierra del Fuego, Burdwood Bank, and South Georgia; New Zealand Region from Macquarie Ridge, Campbell and Bounty Plateaus, Chatham Rise, and off Three Kings Islands; 282–2100 m.

DESCRIPTION: Colonies of moderate size, very delicate, and uniplanar, the holotypic colony 46.7 mm tall and 56.0 mm wide, with a basal branch diameter of 2.8 mm. About half of colonies examined lived in association with a commensal polychaete, *Polyeura laevis* McIntosh, which induces the stylasterid to form elongate cylindrical tubes, and, in general, to form a more robust corallum. Branching dichotomous but unequal, resulting in small-diameter branches diverging from much larger-diameter branches; no branch anastomosis. Branches circular in cross section, gradually decreasing in diameter to very slender branch tips of about 0.45 mm in diameter. Coenosteum white and linear-imbricate in texture. Coenosteal strips of larger-diameter branches quite wide (0.25–0.38 mm) and very convex (called "cords" by Cairns 1983a), bordered by deep slits 20–30 µm wide. Towards branch tips the bordering slits are obscure and the strips less convex, making the boundaries of the strips less pronounced or not visible. Platelets variable in width: some extend entirely across a coenosteal strip, whereas others are quite slender (e.g., only 13 µm wide) and irregularly arranged, the latter condition common at branch tips (Plate 13, e).

Gastropores circular (0.15–0.22 mm in diameter) occurring primarily at branch axils but also occasionally on branch faces. Axial gastropores usually flanked on each flabellar face by a prominent triangular lip up to 0.2 mm tall (Plate 13, g); however, occasionally only one lip is present or they may be lacking altogether. Facial gastropores invariably bear one wide (0.34–0.47 mm) abcauline lip, about twice as broad as a dactylopore spine. Gastropore tubes long and slender, lacking a ring palisade but often having at least one tabula to stabilise the elongate gastrostyle. Gastrostyles needle-shaped, up to 1.31 mm long, and usually about 0.12 mm in basal diameter (H : W ratio 11), with a sharply pointed tip that terminates well below the coenosteal surface. Gastrostyles sparsely covered with tall, slender, sharp spines up to 32 µm tall. Dactylopore spines uniformly distributed over branch surfaces and ampullae, and are fairly uniform in size and shape: 0.13–0.20 mm tall and 0.16–0.19 mm wide, with a dactylotome (slit) width of 0.10–0.12 mm. Posterior edge of dactylopore spines inclined distally almost 45° from vertical, producing a triangular shape when viewed from the side.

Female ampullae large, smooth or spiny (latter shape caused by dactylopore spines) hemispheres approximately 0.9-mm in diameter, each mature ampulla having a lateral efferent pore 0.20–0.22 mm in diameter; however, mature ampullae are rare. Male ampullae of approximately same size (0.8–0.9 mm in diameter), hemispherical to slightly irregular in shape, and invariably spiny, caused by dactylopore spines. Each male ampulla has several (3–6) apical to subapical efferent pores 40–50 µm in diameter, each of which is usually partially covered by a short, curved spine. Both male and female ampullae scattered uniformly on all branch surfaces, often greater in diameter than the branch on which they occur.

TYPES: Holotype (Plate 13, a) and most paratypes (from 13 stations) deposited at the USNM. Paratypes from *Eltanin* Stn 1423 also deposited at the BM and RMNH (*see* Cairns 1983a : 120).

TYPE LOCALITY: *Eltanin* Stn 1423, 56°21'S, 158°28'E, Hjort Seamount; 1574–1693 m.

REMARKS: Of the 14 species of *Lepidotheca*, only four have their gastropores restricted to branch axils, the pores being flanked on either side by broad triangular lips, viz. *L. fascicularis*, *L. chauliostylus* n. sp., *L. horrida* (Hickson and England, 1905), and *L. ramosa* (Hickson and England, 1905). Comparisons to *L. chauliostylus* are made in the remarks of that species. *Lepidotheca ramosa* (off Timor, 520 m) and *L. horrida* (Philippines, 1089 m) are both very similar to *L. fascicularis* and all three may eventually prove to be synonymous; however, *L. ramosa* appears to differ in having its gastropores resticted to the anterior branch face adjacent to each axil (not in the axil) and thus flanked by only one abcauline lip instead of two. *Lepidotheca horrida* has larger gastropores (about 0.3 mm in diameter) and larger female ampullae (1.2–1.25 mm in diameter) with enormous, spongy efferent pores about 0.3 mm in diameter.

Paratypes from two *Eltanin* stations (1416, part; and 1422), originally referred to the "shallow water" form of this species (Cairns 1983a : 119–120), have been reidentified as *L. inconsuta* n. sp., which is discussed in the account of that species.

*Lepidotheca inconsuta* n. sp. (Plates 14, c–f, 15, a–c)

*Errina (Inferiolabiata) fascicularis* Cairns, 1983a : 117–121 (part, *Eltanin* Stns part of 1416 and all of 1422).

MATERIAL EXAMINED: Types, q.v.

DISTRIBUTION: Southern Macquarie Ridge; 787–1500 m.

DESCRIPTION: Colonies moderate in size, robust, and bushy in shape, undoubtedly caused by association with commensal polychaetes. Holotype colony 5.6 cm tall and 2.9 cm broad, with a basal branch diameter of 4.8 mm. Polychaete tubes large, with an internal diameter up to 4.5 x 2.8 mm. Branching dichotomous and unequal, slightly more robust than that of *L. fascicularis*. Coenosteum white and imbricate in texture; however, coenosteal strips and slits not present. Instead, coenosteum relatively smooth, the larger-diameter branches bearing large, aligned, but well-spaced, elliptical coenosteal pores occurring in the position of coenosteal slits. Platelets broad and corrugated.

Gastropores circular (0.25–0.36 mm in diameter) occurring uniformly on all branch surfaces but not at branch axils. Gastropores on distal branches each bordered by one broad abcauline lip; gastropores of larger-diameter branches unlipped. Gastropore tubes cylindrical, lacking a ring palisade. Gastrostyles consist of a massive, unadorned (smooth) basal main shaft up to 0.2 mm in diameter and 0.4–0.5 mm tall, which supports a very slender, rudimentary apical extension up to 0.2 mm tall and only 40–50 µm in diameter (H : W ratio of apical extension up to 5.3). Basal section usually firmly attached to internal coenosteum by coenosteal bridges, whereas distal portion free standing. Distal section bears small, irregularly shaped granules, not long enough to be considered as spines. The tiny distal gastrostyle and the relatively large gastropore diameter produce a relatively commodious gastropore tube. Dactylopore spines uniformly distributed on all branch surfaces, but less so on ampullae, and of about same size, shape, and orientation as those of *L. fascicularis* (*see* Table 3).

Female ampullae large (1.2–1.3 mm in diameter), relatively smooth hemispheres, each with a lateral efferent pore 0.18–0.21 mm in diameter. Male ampullae also large hemispheres (0.85–1.1 mm in diameter), each bearing several apical to subapical efferent pores 60–65 µm in diameter. Both types of ampullae uniformly distributed on branch surfaces.

TYPES: Holotype: *Eltanin* Stn 1422, 1 male col. and SEM stub 666, USNM 60144 (also a paratype of *Errina fascicularis*). Paratypes: *Eltanin* Stn 1416, 6 male branches and SEM stub 665B, USNM 85099 (also paratypes of *Errina fascicularis*, ex. USNM 60145); NZOI Stn C731, 4 female branches, NZOI P-805, 1 female branch and SEM stub 665A, USNM 85098.

TYPE LOCALITY: *Eltanin* Stn 1422, 56°19'S, 158°29'E, Hjort Seamount; 833–842 m.

ETYMOLOGY: The species name *inconsuta* (from the Latin *inconsutus*, unseamed) refers to the relatively smooth coenosteum of the species, which is not divided into coenosteal strips bordered by slits (seams).

REMARKS: *Lepidotheca inconsuta* was previously identified as the more robust, "shallow water" form of *L. fascicularis* in the original description of the latter species (Cairns 1983a). Although very similar, reexamination of these specimens in the context of the New Zealand revision indicated several consistent differences between the two taxa. The most conspicuous differences are that *L. inconsuta* lacks gastropores at branch axils, has significantly larger gastropores, and has much smaller gastrostyles (Table 3). Furthermore, the coenosteal texture of *L. inconsuta* is smoother (consistently without strips and slits); its ampullae are, in general, larger; and its branches are more robust.

### ***Lepidotheca chauliostylus*** n. sp.

(Plates 15, d–h, 16, a–g)

MATERIAL EXAMINED: Types, q.v.

DISTRIBUTION: Norfolk Ridge and Three Kings Ridge; 130–1169 m.

DESCRIPTION: Colonies small and very delicate, the holotype only 33.4 mm tall and 22 mm broad, with a basal branch diameter of 2.3 mm. Colonies primarily uniplanar; however, if a commensal polychaete is present, a calcareous tubular gall is secreted by the stylasterid causing the colony to be slightly bushy and more ramose. Branching dichotomous and unequal, resulting in numerous small-diameter branches originating from larger-diameter branches. Main branches circular to elliptical in cross section; distal branches quite compressed (flattened), about 0.4 mm wide. No branch anastomosis. Coenosteum white and slightly translucent. Coenosteal strips absent. Primary coenosteal texture imbricate, composed of slender (e.g., as narrow as 11 µm, Plate 15, h) to broad, corrugated platelets (Plate 15, g), which are secondarily overlaid with granules. Granules of secondary texture small and rounded (8–9 µm in diameter) and roughly aligned in rows, corresponding to the underlying platelet structure.

Gastropores restricted to branch axils; dactylopore spines variable in location depending on whether or not the colony lives in association with a polychaete. If no worm is present, dactylopore spines are uniserially arranged on branch edges; if a worm is present, dactylopore spines are located on branch edges but not in rows and often occur on branch faces as well. Gastropores circular, small (0.16–0.21 mm in diameter), and always bordered on both flabellar sides by a small (0.11–0.13 mm tall), triangular lip, unless an ampulla is present at that axil, in which case the ampulla overgrows the adjacent lip. In one male colony from NZOI Stn G3 and several from NZOI Stn E856, gastropores are slightly offset from branch axils and the outer gastropore lip is greatly enlarged into a hood-like structure up to five times the size of the opposing lip. Gastropore tubes cylindrical, each bearing a relatively well-defined ring palisade near the gastropore aperture, composed of coarse elements approximately 32 µm in diameter. Gastrostyles needle shaped, each with a sharp tip extending above coenosteal surface. Illustrated gastrostyle (Plate 16, f) 0.54 mm tall and 0.067 mm in diameter (tip only 19 µm in diameter), for a H : W ratio of 8.05. Gastrostyles appear to be unridged and bear few spines. Dactylopore spines uniform in height (0.11–0.12 mm) and width (0.14– 0.15 mm), their dactylotomes approximately 50– 60 µm wide. Dactylopore spines spaced 0.15– 0.20 mm apart when aligned on branch edges.

Female ampullae large smooth hemispheres about 0.75 mm in diameter, always occurring on branch faces adjacent to branch axils. Female efferent pores approximately 0.15 mm in diameter and positioned laterally on ampulla such that they face the gastropore. Male ampullae cylindrical, about 1 mm in diameter and 1 mm tall, with a flat to slightly concave top. Four to six efferent pores (27–30 µm in diameter) occur around the upper perimeter of the ampulla, each pore shielded by a semicircular hood, which opens toward the centre of the ampulla (Plate 16, d). Male ampullae also restricted to branch faces adjacent to branch axils, directly adjacent to gastropores. Worn male colonies, in which ampullae have been damaged or discharged, reveal large (1.0–1.2 mm in diameter) concave coenosteal depressions at each branch axil. Diameters of both male and female ampullae often greater than that of branch on which they occur, appearing gall-like in shape.

Types: Holotype: NZOI Stn E862, 1 col., NZOI H-563, SEM stub 563 (USNM). Paratypes: NZOI Stn E846, 1 branch, NZOI P-806; Stn E856, 10 male col., NZOI P-807, 2 col. and SEM stub 667, USNM 85100; Stn E862, 1 col., P-927; Stn G3, 4 branches, NZOI P-808, 2 branches and SEM stub 564, USNM 85101; Stn U567, 1 col., P-932; Stn U581, 1 col., P-930; Stn U582, 8 col., P-937; Stn U599, 2 male col., NZOI P-809.

Type locality: NZOI Stn E862, 32°28.0'S, 167°31.0'E, Norfolk Ridge; 130 m.

Etymology: The species name *chauliostylus* (from the Greek *chaulios*, prominent + *stylos* pillar) refers to the gastrostyles of this species, the tips of which actually extend above the coenosteal surface.

Remarks: Among the four species of *Lepidotheca* that have gastropores restricted to branch axils (*see* Remarks on *L. fascicularis*), *L. chauliostylus* is easily distinguished by several characters — its tendency to have laterally aligned dactylopore spines; ampullae occurring near branch axils; its uniquely shaped male ampullae; its exsert gastrostyle tips; and its diffuse ring palisade. The only other species to have laterally aligned dactylopore spines is *L. brochi* Cairns, 1986 (Lesser Antilles, 545–864 m), but this species differs in is gastropore placement, coenosteal texture, and branching pattern, as well as many other characters.

### *Lepidotheca cervicornis* (Broch, 1942)

(Plates 17, a–g, 18, a, b)

*Errina (Labiata) cervicornis* Broch, 1942 : 57–60, text-fig. 18, pl. 5, fig. 18.

*Errina cervicornis*: Boschma 1953 : 167; 1957 : 52; 1963 : 338.

*Lepidotheca cervicornis*: Cairns 1983b : 428, 446.

Material examined: NZOI Stn E291, 2 branches, 1 branch and SEM stub 562, USNM 85102; Stn E305, 2 branches; Stn P472, 3 branches; syntypes.

Distribution: Known only off North Cape and Three Kings Islands; 101–410 m.

Description: Colonies uniplanar and relatively small, the figured syntype (Plate 17, a) a complete colony only 16.5 mm tall and 28.7 mm broad, with a basal branch diameter of 3.9 mm and an encrusting base; another syntype is 28.7 mm tall and 4.8 mm in basal branch diameter. Branching dichotomous and equal; branches circular in cross section and gradually decrease in diameter to blunt tips about 0.9 mm in diameter. Coenosteum white and linear-imbricate in texture, the strips 90–140 µm wide and often slightly convex. Coenosteal strips delimited by shallow grooves which are periodically penetrated by circular to elongate coenosteal pores about 25 µm wide and 25–100 µm long. Platelets longitudinally ridged and variable in width, ranging from 13–140 µm wide. Approximately distal 12 µm of each platelet exposed.

Gastro- and dactylopores occur uniformly on all branch surfaces, but are usually absent from branch axils. Ratio of gastropores to dactylopores quite high, as much as 1 : 2. Gastropores circular, 0.21–0.23 mm in diameter, and almost always bordered by a tall abcauline spine resembling a dactylopore spine. According to Broch (1942), gastropores are only occasionally bordered by small abcauline lips and more rarely are flush with the coenosteum. Gastropore tubes long and cylindrical, having a diffuse ring palisade and tabulae as well if the gastrostyle is elongate. Gastrostyles cylindrical to needle shaped, up to 0.62 mm tall and 75–85 µm in diameter, with H : W ratios of 4.1–8.0. Gastrostyles bear low ridges on which tall (23–24 µm tall, 8 µm basal diameter), sharp, upward-curving spines occur. Dactylopore spines thin walled and slightly anteriorly inclined, up to 0.4 mm tall and 0.21 mm in width, with a dactylotome width of about 0.12 mm. Spines associated with each gastropore identical in shape to dactylopore spines, but usually taller, up to 0.6 mm. Very rudimentary lateral dactylostyles appear to be present in some dactylopore spines, these elements being about 25 µm tall and 9–10 µm in diameter.

Ampullae of one kind present in study material — prominent, relatively smooth hemispheres 0.7–0.8 mm in diameter (not 1.0 mm as stated by Broch 1942), which are uniformly distributed on all branch surfaces. Each ampulla covered with numerous (15–25), small (30 µm tall) projections, most of which stand adjacent to tiny (e.g., 9 µm) pores. Furthermore, many ampullae were in various stages of disintegration, proceeding from the apex downward, which reveals the thick, porous underlying wall structure of each ampulla. Eventually only large concave coenosteal craters remain. Broch (1942) interpreted these ampullae as female and suggested that the progressive dissolution of the ampullar wall was the method of larval release. The tiny pores covering the ampullae might then be interpreted as female efferent pores. On the other hand, the tiny pores may be male efferent pores. More specimens of both sexes are needed to resolve this issue.

TYPES: Four syntypes of *E. cervicornis*, including one whole colony, are deposited at ZMC (Plate 17, a).

TYPE LOCALITY: Two miles (3.2 km) east of North Cape, New Zealand; 55 fathoms (101 m).

DISCUSSION: Among the nine species of *Lepidotheca* that have uniformly distributed gastropores, only two have abcauline gastropore lips : *L. cervicornis* and *L. inconsuta*. The gatropore lips of *L. cervicornis* are unique in that they are quite tall and horseshoe-shaped in cross section, resembling a dactylopore spine in size and shape. *Lepidotheca cervicornis* is further distinguished from other species by having a ridged gastrostyle, a diffuse ring palisade (only *L. chauliostylus* is also known to have a ring palisade), and spongy, thick-walled ampullae which are frequently ruptured or persist only as concave coenosteal depressions.

### *Lepidotheca altispina* n. sp. (Plates 18, c–g, 19, a–f)

MATERIAL EXAMINED: Types, q.v. Reference Material: Types of *Lepidotheca pourtalesi* Cairns, 1986a (USNM).

DISTRIBUTION: Lord Howe Seamount Chain; southern Norfolk Ridge; Three Kings Ridge; Kermadec Ridge off McCauley and Curtis Islands; 445–1258 m.

DESCRIPTION: Colonies small, delicate, and primarily uniplanar, the complete holotype colony 32.4 mm tall and 40.0 mm broad, with a basal branch diameter of 3.1 mm. Branching dichotomous, equal (branch axils 90°), and relatively closely spaced initially, often resulting in a regular pattern of branch anastomosis in the lower corallum. Branches circular in cross section, having a highly porous central core, and decreasing gradually in diameter to very delicate branch tips about 0.6 mm in diameter. Coenosteum white, with a well-defined linear-imbricate texture. Strips 0.11–0.20 mm wide, longitudinally or diagonally arranged on branches, and separated by deep, well-defined slits about 20 µm wide. The wide strips and deep slits are characteristic of the species and easily distinguished even in worn specimens. Platelets broad (extending across the strip) and slightly corrugated, each platelet exposing approximately 25 µm of its distal edge. Unlike most other stylasterids among which the leading platelet edges are usually directed distally, the leading edges of all coenosteal platelets of *Lepidotheca altispina* are directed proximally, toward the colony base (termed **reversed polarity**).

Gastro- and dactylopores uniformly distributed on all branch surfaces, having no preference for branch axils. Gastropores circular and small (0.15–0.17 mm in diameter), inclined slightly anteriorly, and often have a slender groove anterior to the gastropore; no gastropore lips. Gastropore tubes cylindrical, covered internally with an imbricate texture in upper half; no ring palisade or tabulae. Gastropore tube occupied entirely by a needle-shaped gastrostyle, the tip of which extends to or slightly above coenosteal surface. Illustrated gastrostyle (Plate 19, d) 0.63 mm tall and 0.08 mm in basal diameter (apical diameter 19 µm), for a H : W ratio of 7.9. Gastrostyles unridged and sparsely covered with sharp spines up to 32 µm long. Dactylopore spines extremely tall (up to 0.50 mm), especially in relation to the slender branch diameter. Abcauline dactylopore spines thin walled (approximately 0.13 mm wide); dactylotomes about half this width. Dactylopore spines that are closely adjacent to other branches sometimes hooded or crested proximally.

Female ampullae large hemispheres 1.0–1.1 mm in diameter and usually covered with dactylopore spines of various sizes; no efferent pores were observed in the study material. Male ampullae primarily internal (internal diameter 0.36–0.39 mm), each with a low superficial relief 0.5–0.6 mm diameter and usually studded with 2 or 3 dactylopore spines. Male efferent pores usually obscure, but approximately 32 µm in diameter. Both male and female ampullae uniformly distributed on all branch surfaces.

TYPES: Holotype: NZOI Stn E856, 1 ?male col., NZOI H-564. Paratypes: NZOI Stn E856, 3 col. (1 in alcohol), NZOI P-810, 2 col. and SEM stubs 561, 660–661, USNM 85103; Stn E857, 2 branches, NZOI P-811; Stn E860, 3 col. (1 in alcohol), NZOI P-812, 1 col., USNM 85104; Stn P8, 1 col., NZOI P-813, 1 col., USNM 85105; Stn Q68, 1 col., NZOI P-814; Stn T235, 2 col., NZOI P-815; Stn T256, 1 col., NZOI P-816; Stn U582, 14 col., P-929.

TYPE LOCALITY: NZOI Stn E856, 32°11'S, 168°18'E, southern Norfolk Ridge; 1157–1169 m.

ETYMOLOGY: The species name *altispina* (from the Latin *altus*, high + *spina*, spine) refers to the tall,

TABLE 3. Characteristics of the six New Zealand species of *Lepidotheca*
(dpsp = dactylopore spines, e.p. = efferent pores, H:W = height-to-width ratio of gastrostyle, gp = gastropore, ds = dactylostyles)

| Character | *L. fascicularis* Cairns, 1983 | *L. inconsuta* n.sp. | *L. chauliostylus* n.sp. | *L. cervicornis* (Broch, 1942) | *L. altispina* n.sp. | *L. robusta* n.sp. |
|---|---|---|---|---|---|---|
| Colony size and shape | Moderate, uniplanar | Moderate, uniplanar to slightly bushy | Small (delicate) primarily uniplanar | Small, uniplanar | Small, uniplanar | Large, robust, |
| Commensal polychaete | Occasionally | Present | Occasionally | Absent | Absent | Absent |
| Branching characteristics | Unequal, non-anastomosing, tips 0.45 mm | Unequal, non-anastomosing, tips 0.8 mm | Unequal, non-anastomosing, tips 0.4 mm | Equal, non-anastomosing, tips 0.9 mm | Equal, anastomosing tips to 0.6 mm | Unequal, non-anastomosing, sparse, tips 1.0 mm |
| Coenosteal texture | Linear-imbricate: strips quite broad and slightly convex | Imbricate, but without strips and slits | Imbricate, but without strips, slightly translucent | Linear-imbricate: strips slightly convex | Linear-imbricate: deep coenosteal slits; polarity of platelets reversed | Linear-imbricate: strips not apparent; platelet polarity variable |
| Gastropore distribution and diameter; lips | Primarily at branch axils, 0.15–0.22 mm; usually 2 lips per gp | Uniform; large (0.25–0.36 mm); lips only on distal gp | Exclusively at branch axils, 0.16–0.21 mm; 2 prominent lips per gp | Uniform; 0.21–0.33 mm; tall abcauline lip | Uniform, small (0.15–0.17 mm); no lips | Uniform, 0.20–0.22 mm); no lips but always bordered by tall dpsp |
| Gastrostyle | Tip nonexsert; needle shaped (H:W = 11) | Tip nonexsert; rudimentary, needle shaped (H:W = about 5) | Tip exsert; needle shaped (H:W about 8) | Tip nonexsert; needle shaped (H:W = 4–8) | Slightly exsert tip; needle shaped (H:W = 7–8) | Tip not exsert; cylindrical (H:W up to 15) |
| Dactylopore spines: distribution, height, width; special structures | Uniformly distributed, 0.15–0.20 mm, 0.16–0.19 mm | Uniformly, 0.19 mm, 0.20–0.21 mm | Linear on branch edges or uniformly, 0.11–0.12 mm, 0.14–0.15 mm | Uniformly, 0.4 mm, 0.21 mm; rudimentary lateral ds | Uniformly, tall (0.5 mm), 0.13 mm | Uniformly (abundant) quite large (0.9 mm), 0.2 mm; pseudotabulae present |
| Female ampullae: shape, diameter, and distribution | Hemispherical, 0.9 mm, uniformly distributed | Hemispherical, 1.2–1.3 mm, uniformly | Hemispherical, 0.8 mm, adjacent to branch axils | Unknown | Hemispherical, 1.0–1.1 mm, uniformly | Hemispherical and ridged, large (1.31–1.4 mm) with large multiple e.p., uniformly |

| | | | | | | |
|---|---|---|---|---|---|---|
| Male ampullae: diameter, and distribution; location of e.p. | Hemispherical to irregular, 0.8–0.9 mm, uniformly distributed; several apical e.p. per ampulla | Irregular hemispheres, 0.9–1.1 mm, uniformly; 2–3 apical e.p. | Cylindrical (distinctive), 1 mm tall, adjacent to branch axils; e.p. in ring around top of ampulla | Hemispherical (spongy), often fractured; 0.7–0.8 mm, uniformly; e.p. apical and numerous | Primarily internal, 0.36–0.39 mm, uniformly; e.p. apical | Unknown |
| Other Characters | | | Diffuse ring palisade present | Diffuse ring palisade present | Dpsp quite tall in relation to branch diameter | Dpsp quite tall |
| Distribution | Subantarctic South America and New Zealand; 292–2100 m | South Macquarie Ridge; 787–1500 m | Ridges north of New Zealand; 130–1169 m | Off Three Kings Island; 101–410 m | Ridges and islands north of New Zealand; 445–1258 m | Southern Norfolk Ridge; 356 m |

slender dactylopore spines of this species, which confer a prickly aspect to the branches.

REMARKS: The characters listed in Table 3 clearly distinguish *L. altispina* from other *Lepidotheca* in the New Zealand region, but it is remarkably similar to *L. pourtalesi* Cairns, 1986a (Straits of Florida, 123–368 m), particularly regarding its colony size and branch diameter, arrangement of gastro- and dactylopore spines, size of gastropores, lack of gastropore lips, and coenosteal texture. Close comparison, however, reveals that *L. altispina* differs in lacking ring palisades, having equal branching that often results in branch anastomosis, and having even taller dactylopore spines.

*Lepidotheca robusta* n.sp. (Plates 20, a–g, 21, a–f)

MATERIAL EXAMINED: Holotype, q.v.

DISTRIBUTION: Southern Norfolk Ridge; 356 m.

DESCRIPTION OF HOLOTYPE: Colony robust and bushy, 6.3 cm tall and 7.5 cm broad, with a basal branch diameter of 9.7 mm and a broad encrusting base. Branching dichotomous, unequal, and relatively infrequent, resulting in long, slender distal branches. Branches circular in cross section, gradually decreasing in diameter to tips of about 1 mm. Coenosteum white and imbricate in texture, but coenosteal strips and slits not present. Platelets thin, flat, and variable in width, ranging from 5 to 45 µm wide. Polarity of platelets variable, i.e., alternating, as illustrated in Plate 20, g.

Gastro- and dactylopores uniformly distributed on all branch surfaces. Gastropores circular, 0.20–0.22 mm in diameter, and invariably proximally bordered by a tall, anteriorly inclined dactylopore spine, which makes a gastropore difficult to distinguish from a dactylopore. Gastropore tubes cylindrical and much greater in diameter than their slender gastrostyles; no ring palisades. Gastrostyles needle shaped and elongate, held in position by a series of transverse tabulae. Gastrostyles 50–70 µm in diameter, but variable in length, some as long as 1.0 mm (H : W up to 15). Basal part of elongate styles (portion below uppermost tabula) nonspinose and massive, up to 0.14 mm in diameter; only distal 0.3–0.4 mm of style (portion above uppermost tabula) spinose, sparsely covered with blunt, cylindrical spines up to 20 µm tall and 7 µm in basal diameter. Dactylopore spines very abundant and quite tall, with very thin walls; up to 0.9 mm tall and 0.2 mm wide, with a dactylotome width of about 0.14 mm. Dactylopore spines usually slightly anteriorly inclined. Dactylostyles absent but, at and below coenosteal level, dactylopore tubes contain a series of incomplete tabulae (herein termed **pseudotabulae**), each approximately 10 µm thick and spaced 50–70 µm apart (Plate 21, c, d). Pseudo-tabulae originate from opposing lateral and sometimes anterior edges of the dactylopore tube but never quite meet to form complete tabulae.

Female ampullae large superficial hemispheres 1.3–1.4 mm in diameter, each with 1–3 enormous, porous efferent pores 0.4–0.5 mm in diameter. Ampullae ornamented with ornate, serrate ridges and numerous dactylopore spines. Ampullae occur uniformly on all branch surfaces. Male ampullae unknown.

TYPES: Holotype: NZOI Stn I96, 1 female col., NZOI H-565, 1 small fragment of holotype and SEM stubs 565566, 662, USNM 85106.

TYPE LOCALITY: NZOI Stn I96, 32°10.8'S, 167°21.2'E, southern Norfolk Ridge; 356 m.

ETYMOLOGY: The species name *robusta* (from the Latin *robustus*, solid, strong) is an allusion to the robust nature of both the colony and the large dactylopore spines of this species.

REMARKS: *Lepidotheca robusta* belongs to the group of seven species of *Lepidotheca* that have uniformly distributed gastropores and that lack gastropore lips. The gastropores of *L. robusta* are invariably bordered by a dactylopore spine but not as intimately connected as those of *L. cervicornis*. Otherwise, it is very distinctive within the genus, having several unique characters: a non-polychaete-induced robust, bushy corallum with thick branches; large dactylopore spines; dactylopore pseudotabulae; and very large, ridged female ampullae with large efferent pores. These characters, especially the dactylopore pseudotabulae, may justify the establishment of a new genus, but more specimens are needed before that step should be taken.

Another peculiarity of this species (specimen) is that when the corallum was immersed in bleach (sodium hypochlorite), its white coenosteum became a light silver-grey in colour. When dried, the colour disappears. The specimen gave this reaction repeatedly with no diminution of the effect. It is not known if this colour reaction is characteristic of the corallum of this species or a result of post collection preservation.

## **Stephanohelia n. gen.**

Branching polychotomous, gastropores occurring exclusively at branch axils. Colonies irregular in shape; commensal polychaetes common. Coenosteum linear-imbricate. Gastrostyle massive, with a thick mid-section and pointed tip. Dactylopore spines inconspicuous, elliptical, and flush with coenosteum; no dactylostyles. Male ampullae superficial, each with several porous apical spines.

Type species: *Stephanohelia praecipua* n. sp., here designated.

Etymology: The genus name *Stephanohelia* (from the Greek *stephanos*, crown + *helios*, sun) is an allusion to the crown-like shape that the small distal branches make surrounding each gastropore, *helia* being a previously used stylasterid genus suffix that literally means sun and is interpreted here as an allusion to the gastropores. Gender feminine.

Remarks: The two characters that distinguish *Stephanohelia* from all other stylasterid genera (Cairns 1991) are its polychotomous branching and its inconspicuous, elliptical, flush dactylopores. It is perhaps most similar to *Lepidotheca*, both genera having linear-imbricate coenosteum, unridged gastrostyles, and gastropores at branch axils; however, *Lepidotheca* differs in having dichotomous branching and abcauline dactylopore spines. Furthermore, the gastrostyles of *Stephanohelia*, having broad midsections, and male ampullar spines, are unique among stylasterids.

Distribution: Southern Norfolk Ridge; northern Lord Howe Rise; off Chesterfield Islands; 318–793 m.

### *Stephanohelia praecipua* n.sp. (Plates 22, a–f, 23, a–c)

Material examined: Types, q.v.

Distribution: Same as that for genus.

Description: Colonies quite irregular in shape, composed of one or two main branches that give rise to several intermediate-sized branches and/or numerous tiny branchlets; larger branches sometimes anastomose. Holotype 32.5 mm tall and 22.7 mm wide, with a basal branch diameter of 3.5 mm; however, largest specimen (also from NZOI Stn E861) 61 mm tall and 34 mm wide. Colonies firmly attached by a thin encrusting base. Shape of colony strongly influenced by commensal polychaetes, which cause the coral to form flattened (1.0 x 0.55 mm internal diameter), laterally perforate tubes. Polychaete tubes do not form main branches, but are accessory to them and often occur in several different locations on a colony, indicative of several (up to at least four) different polychaetes. Small branchlets formed by polychotomous branching, each axil generating three to five (usually four) branchlets, all but one of which are short and unbranched, the remaining branchlet thickened and continuing to form the next axil (Plate 22, a, f). Terminal branchlets very slender and delicate, only 0.12–0.15 mm in diameter. Branch cross section circular. Coenosteum white and linear-imbricate in texture. Strips of main branches 65–90 µm wide and slightly convex; strips of branchlets narrower (30–40 µm) and highly convex to slightly ridged. Strips bordered by deep, discontinuous slits 5–6 mm wide. Platelets variable in width, often as wide as the strip, and smooth. Polarity of platelets variable but predominantly anterior.

Gastropores occur exclusively at branch axils; dactylopores occur only on branchlet faces and edges. Gastropores circular, 0.16–0.22 mm in diameter, and always nestled into a polychotomously formed axil of three to five branchlets. Gastropore tubes cylindrical, but with an expanded basal cavity; no ring palisade. Gastrostyles of very distinctive shape, consisting of a cylindrical basal main shaft, a greatly expanded midsection (up to 0.20 mm wide), and a slender apical tip that projects well above the branch coenosteum. Wide midsection virtually same dia-meter as gastropore, allowing little passage around the style to lower gastropore tube. Midsection densely covered with sharp, slender spines up to 15 µm tall, whereas upper stylifom process relatively smooth. Dactylopore spines quite small and inconspicuous — elliptical in shape (about 66 x 44 µm in diameter), essentially flush with coenosteum, and aligned on coenosteal slits on all branch surfaces. Adjacent ridged or convex strips sometimes give dactylopore spines the appearance of raised lateral edges, but both anterior and posterior dactylopore edges are flush.

Female ampullae unknown. Male ampullae superficial, irregularly shaped mounds 0.36–0.60 mm in diameter. Each ampulla bears 1–4 tall, apically porous spines, up to 0.16 mm tall and 60 µm in diameter. Coenosteal texture of ampullae more coarse than surrounding coenosteum (Plate 23, c).

Types: Holotype: NZOI Stn E861, 1 male col., NZOI H-566. Paratypes: NZOI Stn E859, 1 col., NZOI P-817, 1 col. and SEM stub 583, USNM 85107; Stn E861, 8 col., NZOI P-818, 3 col. and SEM stub 584, USNM 85108; Stn I739, 7 col., NZOI P-819; 20°48'S, 160°58'E (Fairway Reef, Chesterfield Islands), 500 m, 3 col., Northern Territories Museum C3100.

Type locality: NZOI Stn E861, 32°25'S, 167°35'E, southern Norfolk Ridge; 318–383 m.

Etymology: The species name *praecipua* (from the Latin *praecipuus*, peculiar, special) is applied to this species because of its peculiar branching mode and unusually shaped gastrostyles.

### Inferiolabiata Broch, 1951

Gastro- and dactylopores uniformly distributed on all branch surfaces. Colony growth often modified by commensal polychaetes. Coenosteum white and linear-imbricate in texture. Gastropores unlipped; gastropore tubes cylindrical, often having a ring palisade. Gastrostyles elongate (H : W = 3–10) and unridged. Abcauline dactylopore spines tall, often longitudinally ridged, and having an abruptly truncate tip. Well-developed dactylostyles usually present, often accompanied by lateral dactylostyles. Ampullae superficial.

Type species: *Errina labiata* Moseley, 1879, by original designation.

Remarks: As noted in the remarks for *Lepidotheca*, *Inferiolabiata* is very similar to that genus but differs in having dactylostyles (sometimes quite robust) and in having more robust, thicker-walled dactylopore spines. Only three species are attributed to *Inferiolabiata*, all of which are known from the New Zealand region. Characters of value in discriminating species include size and shape of male ampullae; location of male efferent pores; degree of development of dactylostyles; coenosteal texture; development of ring palisade; nature of female ampullae; and colony and branch shapes (Table 4).

Distribution: Circum-Antarctic and Subantarctic; New Zealand region; 87–2100 m.

### *Inferiolabiata labiata* (Moseley, 1879)

(Plates 23, d–h, 24, a, b)

*Errina labiata* Moseley, 1879 : 443–447, pl. 34, fig. 7, pl. 37, figs 9–11.
*Errina (Inferiolabiata) labiata*: Broch 1951b : 125.
*Inferiolabiata labiata*: Cairns 1983a : 111–113, figs 22D–E, 26A–I, 27A–C, map 8 (synonymy); 1983b : 428, 449–451, figs 1A–H, 25B, 28I (synonymy).

Material examined: NZOI Stn A745, 5 male col., NZOI, SEM stub 668 (USNM); Stn F127, 4 male col., NZOI, 1 col. and SEM stub 567, USNM 85109; Stn T39, 1 dead col., NZOI; *Eltanin* Stns 1851, 5 col., USNM 59972; 2143, 3 female col., USNM 60007. Other Material: specimens from 64 stations reported by Cairns (1983a), including syntypes.

Distribution: Widely distributed in Antarctica and the Subantarctic, including southeastern South America, Scotia Sea, Ross Sea, Scott Island, Balleny Islands, and Antipodes Islands; 87–2100 m.

Description: Colonies uniplanar to slightly bushy, the largest specimen from the New Zealand region (NZOI Stn F127) a colony fragment 5.3 cm long. Most, but not all, colonies strongly modified in growth form by a commensal polynoid polychaete, which induces the coral to produce a highly porous tube along its main branches. Worm tube up to 7 mm in diameter, often larger than typical branch diameter, and composed of delicate, flattened stylasterid branches that envelop the worm and fuse together on the opposite side. Branching dichotomous and unequal, but not frequent away from worm tube. Branches circular in cross section, gradually decreasing to blunt tips 1.8–3.0 mm in diameter. Coenosteum white and imbricate in texture, the strips arranged in a reticulate fashion on large-diameter branches and worm tube coenosteum but linear-imbricate on lesser-diameter, terminal branches. Strips variable in width and frequently change width along a branch, ranging from 0.09 mm to as much as 0.19 mm wide, and bordered by wide (30 µm), shallow coenosteal slits (grooves) that clearly delineate strips. Slits punctured periodically with elliptical coenosteal pores up to 70 µm long and the width of the slit. Platelets as broad as strip, often continuing across slit and onto adjacent strip. Approximately 40 leading platelet edges per mm. The coenosteal texture, along with the porous ampullae, give this species a decidedly coarse and porous aspect.

Gastro- and dactylopores uniformly distributed on all branch surfaces; however, in some specimens dactylopore spines are united laterally, forming short, horizontal tiers encircling part of branch. Gastropores circular, 0.28–0.33 mm in diameter. Gastropore tubes cylindrical, as much as 1 mm long, and bear a diffuse ring palisade. Elements of ring palisade up to 30 µm tall and 23 µm in diameter, similar to dactylostyle elements in size and shape. Gastrostyles needle shaped and unridged, the