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DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

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The Marine Fauna of New Zealand: Porifera, Demospongiae, Part 2

(Axinellida and Halichondrida)

by

PATRICIA R. BERGQUIST

New Zealand Oceanographic Institute
Memoir No. 51

1970

THE MARINE FAUNA OF NEW ZEALAND: PORIFERA, DEMOSPONGIAE, PART 2 (AXINELLIDA AND HALICHONDRIDA)

Halichondrida moorei Bergquist. Point Chevalier Reef. Intertidal. (Accompanying algae are *Colpomenia sinuosa* and *Corallina officinalis*.)

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FOREWORD

In the present volume the author continues her examination of the New Zealand marine sponges with a discussion of the systematics and ecology of two more orders of the Demospongiae. Material for this study has come from the author's own collections and those of the Dominion Museum, Wellington; Canterbury Museum, Christchurch; Zoology Department, University of Wellington; and N.Z. Oceanographic Institute.

The present monograph is a further contribution to studies of the marine fauna of New Zealand published in this memoir series. The preliminary editing of the manuscript was carried out by Miss B. Davison.

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

CONTENTS

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(Axinellida and Halichondrida)

by

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ABSTRACT

The New Zealand sponges belonging to the orders Axinellida and Halichondrida are described and discussed with respect to their systematics and general ecological characteristics. Thirty species belonging to 16 genera within the Axinellida are described—one genus (*Acanthoclada*) and 10 species are new. The Halichondrida are represented by five genera and 15 species, of which one is new.

INTRODUCTION

This second part of the Demospongiae of New Zealand deals with two orders, the Axinellida and the Halichondrida. Forty-five species are considered; of these, 11 are new and four are recorded for the first time from the New Zealand region. One new genus is described.

The Axinellida are particularly well represented in New Zealand waters. Thirty species belonging to 16 genera are assigned to the order. The systematics of axinellid sponges pose problems at all levels: the early literature is often inadequate, and the limits of the taxon Axinellida have been construed differently by almost every worker. For these reasons a definition is given in this paper of each family and genus described.

The classification used for other New Zealand Tetractinomorpha (Bergquist 1968) is basically that of de Laubenfels (1936). However, the adoption of an order Axinellida and the present arrangement of families within it does not follow de Laubenfels's classification, in which the Axinellida were a single family within the Halichondrida. The families here grouped into the Axinellida were in de Laubenfels's classification scattered throughout the Poecilosclerida, Epipolasida, and Halichondrida. Hallmann (1917 a, b) and Levi (1956) have argued for the separation of the Axinellida from the Halichondrida, and the definitions of the families adopted here are in the main those of Hallmann.

Levi has suggested many times that the Axinellida were a distinct order, but, rather than giving a formal definition of the group, he recognised one large order, the Clavaxinellida, which includes the Hadromerida, Epipolasida, and Axinellida. Bergquist (1967) has defined the order Axinellida.

Features of great significance in distinguishing the orders Halichondrida and Axinellida are the differences in reproduction and larval development. The Axinellida are oviparous, producing small eggs, which, after fertilisation, develop to free-swimming larvae outside the parent body.

The Ceractinomorpha, including the Halichondrida, are viviparous. Their larvae develop from large eggs and are incubated for varying periods within the parent body before release.

In using reproductive and larval characteristics to support the separation of the Axinellida from the Halichondrida and the alliance of the former group with the Tetractinomorpha, the comparison within the Tetractinomorpha is only with the Hadromerida and Epipolasida, where reproductive characteristics are now known for several genera. There is need for much more information on reproductive processes in all forms. At the time Levi proposed the alliance of the Axinellida with the Tetractinomorpha (1953), sexuality was unknown

in the Choristida proper and known for only four species of Homosclerophorida. Such information as is now available on sexual reproduction in the Choristida applies only to the development of *Stelletta* (Liaci and Sciscioli 1967) and does not include a description of the larva.

Sexual reproduction is known for the family Tetillidae (order Spirophorida) (Sollas 1888; Watanabe 1957). Larve almost ready to be released have also been discovered recently in *Tetilla australe* Bergquist. The larvae, which resemble miniature adults, are subcortical in position, and sperm balls are abundant towards the interior of the sponge. This suggests strongly that these larvae have a sexual origin, but without knowledge of early development stages it is impossible to be sure that they have not originated from gemmules. It is obvious that some species of Spirophorida, at least, among the Tetractinomorpha incubate their larvae to such an extent that the free-swimming stage is deleted, a tendency quite consistent with the unattached habit of some species of *Tetilla* and *Cinachyra* (Bergquist 1968).

The Halichondrida are represented by 15 species belonging to five genera. One species is new and all the genera are widespread. With the exception of *Acanthella cristagalli* and *Ciocalypta penicillus* the New Zealand Halichondrida are essentially intertidal or shallow-water species. Sponges belonging to this order are true Ceractinomorpha in having incubated stereogastrula larvae arising from large eggs.

In summary, all the evidence indicates that the Axinellida and the Halichondrida have life-cycle patterns that are so distinctive that it is reasonable to conclude that each group is of ordinal status.

ACKNOWLEDGMENTS

The author wishes to acknowledge the support of the University Research Grants Committee who have financially aided this project, and of the Marine Department for the generous provision of sea time on m.v. *Ikatere*.

The following persons have given substantial technical assistance, Mr J. Kerr (histologist), and Mrs C. A. Tizard (preparator).

COLLECTIONS EXAMINED

The data for most of the stations from which material is described in this bulletin were given in Part 1 of this series.

Details of additional stations are presented in the following supplementary station list.

CHATHAM ISLANDS EXPEDITION

Sta. 27 30 Jan 1954, 43°57.5′S, 176°44.5′E, Petre Bay, 45 fm, DL.

TH. MORTENSEN EXPEDITION

6 Dec 1914, Carnley Harbour, sandy clay, 45 fm.

LIST OF SPECIES DESCRIBED

Subclass **TETRACTINOMORPHA** Levi

Order **AXINELLIDA** Bergquist

Family AXINELLIDAE Ridley and Dendy

Genus **Homaxinella** Topsent, 1917
Homaxinella erecta (Brøndsted)

Genus **Axinella** Schmidt, 1862
Axinella globula Brøndsted
Axinella sinclarii (Gray)
Axinella brondstedi nom. nov.
Axinella australiensis sp. nov.
Axinella tricalyciformis nom. nov.
Axinella richardsoni sp. nov.
Axinella torquata Brøndsted

Genus **Pararhaphoxya** Burton, 1934
Pararhaphoxya pulchra (Brøndsted)

Genus **Phakellia** Bowerbank, 1862
Phakellia dendyi sp. nov.

Genus **Ceratopsion** Strand, 1929
Ceratopsion cuneiformis sp. nov.

Genus **Bubaris** Gray, 1867
Bubaris vermiculata (Bowerbank)
Bubaris elegans Dendy

Genus **Hymerhabdia** Topsent, 1892
Hymerhabdia oxeata (Dendy)

Genus **Thrinacophora** Ridley, 1885
Thrinacophora dubia Brøndsted

Genus **Pseudaxinella** Schmidt, 1875
Pseudaxinella australis sp. nov.

Family TRACHYCLADIDAE Hallmann

Genus **Trachycladus** Carter, 1879
Trachycladus stylifer Dendy

Family DESMOXYIDAE Hallmann

Genus **Parahigginsia** Dendy, 1924
Parahigginsia phakellioides Dendy

Genus **Acanthoclada** gen. nov.
Acanthoclada prostrata sp. nov.

Family SIGMAXINELLIDAE Hallmann

Genus **Biemna** Gray, 1867
Biemna novaezealandiae Dendy
Biemna flabellata sp. nov.
Biemna rhabderemioides Bergquist
Biemna stylotata (Brøndsted)

Family RASPAILIIDAE Hentschel

Genus **Raspailia** Schmidt 1862
Raspailia agminata Hallmann
Raspailia flaccida sp. nov.
Raspailia inaequalis Dendy
Raspailia topsenti Dendy
Raspailia compressa sp. nov.

Genus **Clathriodendron** Ledenfeld, 1888
Clathriodendron rubrum Kirk

Genus **Eurypon** Gray, 1867
Eurypon hispida sp. nov.

Subclass **CERACTINOMORPHA** Levi

Order **HALICHONDRIDA** Topsent

Family HALICHONDRIIDAE Gray

Genus **Halichondria** Fleming, 1828
Halichondria knowltoni Bergquist
Halichondria moorei Bergquist
Halichondria panicea (Pallas)
Halichondria punctata nom. nov.
Halichondria intermedia Brøndsted

Genus **Trachyopsis** Dendy, 1905
Trachyopsis halichondrioides Dendy

Genus **Ciocalypta** Bowerbank, 1864
Ciocalypta polymastia (Lendenfeld)
Ciocalypta penicillus Bowerbank

Family HYMENIACIDONIDAE de Laubenfels

Genus **Hymeniacidon** Bowerbank, 1861
Hymeniacidon hauraki Brøndsted
Hymeniacidon indistincta Brøndsted
Hymeniacidon perleve (Montague)
Hymeniacidon racemosa Brøndsted
Hymeniacidon spherodigitata sp. nov.
Hymeniacidon conica (Kirk)

Genus **Acanthella** Schmidt, 1862
Acanthella crista-galli (Dendy)

SYSTEMATICS

(i) *An asterisk (*) before a species name indicates species was not collected during this investigation.*
(ii) *Colour notations all refer to Munsell system.*
(iii) *Means of spicule measurements (given in parentheses following range of dimensions) are, unless otherwise stated, based on 15 measurements for each spicule type.*

Order **AXINELLIDA** Bergquist

These are Tetractinomorpha that have an axially condensed or plumoreticulate skeleton, usually rich in spongin B. The megascleres are monaxons, oxeas, styles or strongyles in all combinations. The spicules are frequently curved or contort.

Microscleres are often absent but a variety of forms can occur. Raphides and microxeas are the commonest; asterose and sigmoid types are found in the Astraxinellidae and Sigmaxinellidae respectively.

A stiff axial region, distinct from a softer extra-axial region, is typical although variations toward massive form are found. The surface can be smooth but is usually hispid with projecting spicules. The colour of the living sponge is characteristically dark brown, orange or yellow.

In the few species where reproductive processes have been recorded, the sponges are oviparous.

Axinellida are similar in many morphological features to such groups of Ceractinomorpha as the Clathriidae. Several families such as the Raspailiidae and the Sigmaxinellidae are difficult to place between the Poecilosclerida and the Axinellida. In placing these families in the Axinellida considerable importance has been attached to reproductive characteristics.

Family AXINELLIDAE Ridley and Dendy

Axinellida in which microscleres are absent.

Genus **Homaxinella** Topsent

Axinellidae of ramose form, with simple spiculation, styles or subtylostyles only.

Homaxinella erecta (Brøndsted). (Pls. 1a, b; 14a)

Hymeniacidon erecta Brøndsted, 1924, p. 479, fig. 32a–b.
Axiamon erecta, de Laubenfels, 1936, p. 130.
non *Axiamon erecta*, Bergquist, 1961a, p. 41, fig. 12.

NEOTYPE

Dom. Mus. Por. 14.

MATERIAL EXAMINED

Shag Rock, Waiheke 6–10 fm; Takatu Pt, 6 fm (Neotype); 10 miles south-east of East Cape 20 fm; Manukau Harbour, 6 fm.

DESCRIPTION

Ramose, either with thin whip-like branches arising from a small attachment base or of simple erect cylindrical form. The stalk is extremely hard and tough, the extremities softer, sometimes a little compressed. This sponge is always found attached to a shell, usually a living one, commonly *Tawera spissa* and *Atrina*.

DIMENSIONS: Height up to 20.0 cm; diameter of branches up to 4.0 mm; diameter of stalk 1.5–2.5 mm.

COLOUR: In life, dull yellow (rY 7/6) fading to yellow white or grey when preserved (rY 7/2 to rY 8/4).

TEXTURE: Firm and flexible. The axis is very tough and stringy; the ectosomal region relatively soft and easily torn.

SURFACE: The surface is hispid; less markedly so in the stiff axial stalk region than toward the extremities where the ectosomal tissues cling tightly to the axis. No pores or oscules have been observed.

SKELETON: The skeleton consists of an axial endosomal region, half the total diameter of the sponge, composed of a dense mass of spicules organised into interlocking fibres. Spongin B elements are present but surround only the central fibres. The spicule tracts curve outward from the central axis to the subdermal position, where they merge with a thin but definable dermal spicule layer. The ectosomal region is 0.25–0.5 mm in diameter, and somewhat disorganised interstitial spicules with no precise orientation tend to mask the plumose spicule tracts. The dermal spicules tend to be arranged at right angles to the axis, but in many areas they are almost parallel.

SPICULES:

MEGASCLERES:

STYLES TO SUBTERMINAL TYLOSTYLES. Usually straight, but wavy or strongly curved forms are common particularly in the axial region. A recurring modification of the styles is that the stylote end is reflected at approximately 45° to the axis.

SPICULE DIMENSIONS:

Locality	Styles
Little Barrier I., Hauraki Gulf, 30 fm	250–650 × up to 8.0
Takatu Pt, 30 fm (Neotype)	200–680 × 2.0–8.0 (390 × 4.5)
East Cape 20 fm	220–700 × 2.5–9.0 (320 × 5.0)

REMARKS

Homaxinella erecta is typical of the genus *Homaxinella* as defined by Topsent (1917). His suggestion of similarity between species of *Homaxinella* and species of *Hymeniacidon* is valid with respect to spiculation and the de-emphasis in *Homaxinella* of the axinellid skeletal arrangement. However, the axinellid pattern is still discernible in the ectosome, and the universal presence of a rigid axis argues for inclusion of *Homaxinella* in the Axinellida.

Homaxinella erecta was described originally by Brøndsted in *Hymeniacidon*, where clearly it does not belong. The single type specimen has been lost*, so the specimen described above, from Takatu Point, is nominated as neotype. This specimen is similar to Brøndsted's in all features mentioned in his description and was found only 10 miles from the type locality. The neotype specimen is lodged with the Dominion Museum (Wellington).

DISTRIBUTION

Little Barrier I., 30 fm.

Genus **Axinella** Schmidt

Axinellidae of variable form, always with some axial condensation and with extra-axial skeleton diverging in plumose fashion. Spiculation: oxeas, styles and strongyles together or separate. No special dermal spicules.

*Axinella globula Brøndsted

Axinella globula Brøndsted, 1924, p. 475, fig. 28.

DISTRIBUTION

East of North Cape, 55 fm.

*Axinella sinclarii (Gray)

Spongia sinclarii Gray, 1843, p. 295.
Axinella sinclarii, Dendy, 1897b, p. 317, pl. xxxiv, fig. g.

DISTRIBUTION

New Zealand, details unknown.

*Brøndsted's northern New Zealand collections were returned to the Zoological Museum in Copenhagen unlabelled and mixed with much undescribed material. I have re-examined these collections, but the type of *Hymeniacidon erecta* is not among them. The specimen is not listed in the Copenhagen museum, and all efforts to locate it there have failed.

*Axinella torquata Brøndsted

Axinella torquata Brøndsted, 1923, p. 147, fig. 25 a, b.

DISTRIBUTION

Carnley Harbour, 45 fm.

*Axinella brondstedi nom. nov.

Axinella verrucosa Brøndsted, 1923, p. 148, fig. 26 a, b.

REMARKS

Brøndsted (1923) described *A. verrucosa* as a new species from Campbell Island. This species name is preoccupied in *Axinella* by *Spongia verrucosa* Esper (Schmidt, 1862).

DISTRIBUTION

Carnley Harbour, 45 fm.

Axinella australiensis sp. nov. (Pls. 1c, d; 12d; 14b)

HOLOTYPE

Dom. Mus. Por. 18.

MATERIAL EXAMINED

East of Alderman I., 56 fm juvenile; Poor Knights Is., 25 fm (holotype).

DESCRIPTION

A tall, ramose sponge with cylindrical branches flattened at points of dichotomy and a thick, bilaterally compressed axis. The juvenile form is a perfect inverted cone rising from a short cylindrical stalk.

DIMENSIONS:

Locality	Height	Stalk Diameter	Branch Diameter
Poor Knights Is. (holotype)	35.0 cm	3.0–3.5 cm	1.0–2.5 cm
Alderman I.	1.5–2.0 cm	1.2 mm	2.0–5.0 mm (apical diameter)

COLOUR: In life, bright red (yR 4/4) to brick red (Y-R 5/8); in spirit, brown (Y-R 5/4).

SURFACE: The surface is hispid; projecting spicules are in tufts of 6–12 extending about half their length beyond the dermal membrane. In the juvenile specimen 4–12 ovoid oscules (0.5 × 1.0 mm maximum dimension) are arranged in a rosette around a central axis. In the mature sponge the oscules are distributed over the whole surface in groups of 2–10. When the dermal membrane collapses or is rubbed off these appear as stellate depressions.

Pores are grouped into small areas, 80–120 μ across, dispersed over the whole surface.

SKELETON: The axial portion, a system of fine interlacing spongin B fibres cored by oxeas and styles, is three-quarters of the total branch diameter. The fibres, 35.0–95.0 in diameter, rarely contain more than 8 spicules at any one point. Between the fibres a great deal of cellular tissue persists. The extra-axial region is fleshy; the fibres contain a low proportion of spongin to spicule.

The fibres, 300–400 μ apart, curve out from the axis and contain 1–8 spicules at any given point. They are interconnected by a series of short fibres, 1–2 spicules in diameter, which mask the basic plumose arrangement of the extra-axial skeleton. Just below the surface the arrangement of the skeleton becomes irregular and dermal tufts terminate most fibres. The dermal spicules are predominantly styles.

SPICULES:

MEGASCLERES:

(a) OXEAS, stout, centrally flexed spicules, sometimes twice angulate. The ends are faintly "stepped"; the axial canals frequently open at both ends.

(b) STYLES, curved in the proximal third, otherwise conventional with the same variation as the oxeas in termination and with prominent axial canals (open at one end). There are very fine styles present, interpreted as developmental forms.

SPICULE DIMENSIONS:

Locality	Oxeas (μ)	Styles (μ)
Poor Knights Is. (holotype)	140–400 × 3–16 (340 × 10)	120–320 × 1.5–16 (210 × 6.0)

REMARKS

Axinella australiensis is typical of the genus *Axinella* in spiculation, skeletal arrangement, and external form. It accords well with the view Vosmaer (1912) takes of *Axinella*.

The stellate pattern on the surface of dead specimens suggests that *A. australiensis* should be compared with *A. sinclarii* (Gray) and *A. stelliderma* Carter. *Axinella sinclarii* has flexuous strongyles and is best placed in *Phakellia*, although the sponge itself is poorly known and barely recognisable. *Axinella stelliderma* has styles only and has distinctive dermal tufts with one long, central style surrounded by shorter styles. This arrangement is characteristic of *Raspailia*, not of *Axinella*. There has been no detailed redescription of *A. stelliderma* and thus no recommendation is made as to its true generic position. It cannot, however, be confused with *A. australiensis*.

Axinella australiensis differs from all other species of *Axinella* recorded from the Southern Hemisphere in the combination of ramose form with a mixed spiculation and a stellate pattern of oscular channels.

Axinella tricalyciformis Bergquist nom. nov. (Pls. 2a, b; 14c)

Axinella lamellata Bergquist, 1961b, p. 188, figs 12a–c.

HOLOTYPE

Canterbury Museum. M. Invert. 3/63.

MATERIAL EXAMINED

CIE 27 Petre Bay, Chatham I., 45 fm (Holotype); B 176 Auckland Is., 46 fm; Dunedin Heads, 20 fm; Paterson Inlet, Stewart I., 20 fm; off Patea, 20 fm.

DESCRIPTION

An erect, stipitate sponge, which has the form of a slightly concave lamella when young. As it ages the two edges of the lamella grow together to form a closed funnel. Further growth produces a second and possibly a third enclosed funnel.

DIMENSIONS:

Locality	Height	Width (cm)	Stalk Diameter (mm)	Lamella Thickness (mm)
Petre Bay (holotype)	4.1 cm	2.8	6.0	3.0
Stewart I., 20 fm	6.0 mm	8.5	1.2	3.0
Patea, 30 fm	14.0 cm	16.0	3.5	4.0
Campbell Plateau,	12.0 cm	14.0	2.8	4.5

COLOUR: In life, dull yellow (Y–R–Y 6/5) to brown; in spirit, yellowish brown (Y–R–Y 5/4) to orange (Y–R–Y 7/6).

TEXTURE: Pliable, firm, incompressible.

SURFACE: The surface looks smooth, but under low magnification is seen to be minutely conulose and hispid. There is a concave exhalant and a convex inhalant surface. In the young specimen a single elevated osculum is visible.

SKELETON: The skeleton is made up of ascending, plumose fibres cored by oxeas and invested by spongin. The solid core of fibres passes from the stalk into the centre of the lamella and secondary fibres curve outward toward the surface. The fibres are 30.0–90.0 μ in diameter and may contain up to 30 tightly packed spicules but usually only 12–15. The aspiculous dermal membrane, 0.1 mm thick, is raised into small conules where the fibres intersect the surface. The terminal oxeas penetrate the dermal membrane.

SPICULES:

MEGASCLERES:

OXEAS; evenly tapered, usually strongly flexed but may be straight. Stylote forms are rare: thin developmental forms of the oxeas are common.

SPICULE DIMENSIONS: 300–520 × 10.0–14.0 μ, (392 × 13.2 μ); developmental forms 280–350 × 3.0–8.0 μ.

REMARKS

The original description of *Axinella tricalyciformis* (Bergquist 1961b) was based on a single specimen, which has proved to be a young form. The species is now known to be a relatively common southern New Zealand and subantarctic sponge. The description is expanded above to accommodate the mature specimens. Burton (1959a) published a reference to *A. lamellata* (Dendy) from Ceylon and Arabia which refers to a new transfer to *Axinella* of *Spongsorites lamellata* Dendy. De Laubenfels (1936) referred this species (misspelled *lamella*) to *Epipolasis*. From Dendy's description (1905) it is likely that Burton is correct in placing this species in the Axinellidae. Thus the species name *lamellata* is preoccupied in *Axinella*, and *tricalyciformis* is proposed to replace it (Bergquist, 1961b).

Axinella richardsoni sp. nov. (Pls. 2c; 10e)

HOLOTYPE

Dom. Mus. Por. 19

MATERIAL EXAMINED

VUZ 55 Cook Strait, 40–100 fm.

DESCRIPTION

The sponge is a low-growing, stalked, concave lamella slightly dissected into lobes.

DIMENSIONS: Height 4.5 cm; width of lamella 5.5 cm; thickness of lamella 5.0 mm; diameter of stalk 8.0 mm.

COLOUR: In life, dull orange (yR-6/8); in spirit, pale yellow (Y–R–Y 7/4).

TEXTURE: Lamella firm but compressible; stalk solid.

SURFACE: The surface is uneven and uniformly hispid. The concave side of the lamella is differentiated as an oscular surface. The oscules, 0.08–0.1 mm in diameter, are in stellate groups 2.0–3.0 mm apart. The pores occur on the convex surface.

SKELETON: The skeleton is a compact reticulum of spongin fibre cored by oxeas and styles. Primary ascending fibres are emphasised and are often cored by two or three rows of spicules. The connecting fibres and many of the ascending fibres contain only one spicule row.

Ascending fibres are 60.0–70.0 μ in diameter; connecting fibres rarely exceed 15.0 μ. A dermal membrane, 0.16 mm thick, is present.

SPICULES:

MEGASCLERES:

(a) STYLES; stout, sharply curved in the anterior third; occasionally irregularly curved; broadly rounded base.

(b) OXEAS, having a central flexure; evenly tapered toward both ends.

SPICULE DIMENSIONS:

Locality	Oxeas (μ)	Styles (μ)
Cook St., 40–100 fm	208–435 × 6.9–20.0 (360×15.0)	232–392 × 12.0–20.0 (282×17.0)

REMARKS

Axinella richardsoni differs from *A.* (*Thrinacophora*) *durissima* (Dendy) from Ceylon mainly in lacking trichodragmata and in being more definitely lamellate. No trichodragmata or loose raphides were seen on a spicule slide of the holotype of *A. durissima*. The shape and dimensions of the megascleres in the two species are very similar, the main difference being that in *A. richardsoni* the styles are more strongly and consistently flexed.

Genus **Pararhaphoxya** Burton

Axinellida with an axial core of sinuous strongyles mingled with curved oxeas and styles. Extra-axial spicules oxeas and styles.

Pararhaphoxya pulchra (Brøndsted). (Pls. 2d, 3a, 13b).

Sigmaxinella pulchra Brøndsted, 1923, p. 151, fig. 28.
Pararhaphoxya tenuiramosa Burton, 1934, p. 565, fig. 13.
de Laubenfels, 1954, p. 173, fig. 114.

MATERIAL EXAMINED

VUZ 55 Cook Strait, 40–100 fm; Cape Palliser, 56 fm; Carnley Harbour, 45 fm.

DESCRIPTION

An erect, stalked sponge, with cylindrical branches that often have bifid ends and deeply grooved surfaces. Some of the branches are anastomosed.

DIMENSIONS: Height 9.0 cm; diameter of stalk 7.0 mm; width at apex 6.0 cm; length of branches 0.4–4.5 cm; diameter of branches 3.0–7.0 mm (5.6 mm).

COLOUR: In life, bright orange (YR 6/8); in spirit, grey.

TEXTURE: Stiff and cartilaginous.

SURFACE: The surface is extremely hispid; raised into shaggy lumps in many places. Some areas appear smooth macroscopically due to loss of the extra-axial structures during dredging. No pores or oscules are visible.

SKELETON: The skeleton is composed of a dense axial core of interwoven spicules in which no separate fibres are discernible. A small amount of spongin B is distributed along the axis. The axial region makes up three-quarters of the diameter of each branch.

The extra-axial region is not densely packed with spicules. Towards the surface, groups of 2–3 oxeas orientated at right angles to the axis are the only skeletal elements. In the area immediately around the axis, groups of spicules diverge obliquely and pass toward the surface. There is, however, no regularity in the skeleton in this region. Many spicules lie without order around the axis. The dermal membrane, stretched between the groups of oxeas, is very fine. Over most of the surface it has broken down and a general hispid appearance is presented by the full depth of the ectosomal skeleton.

The axial spicules are sinuous strongyles, styles, and occasionally oxeas. The ectosomal spicules are oxeas with some styles.

SPICULES:

MEGASCLERES:

(a) OXEAS, stout spicules strongly flexed to irregularly wavy, evenly tapered to sharp points.

(b) STYLES, varying considerably in width. They are often as stout as the oxeas, but usually are much finer and evenly curved. Slightly less abundant than the oxeas.

(c) STRONGYLES, fine, contort, extremely abundant. Stylote modifications are frequent and oxeote forms occasional.

SPICULE DIMENSIONS:

Locality and Author	Oxeas (μ)	Styles (μ)	Strongyles (μ)
Brøndsted 1923 Carnley Harbour (as *Sigmaxinella pulchra*)	260–530 × 10	390–710 × 11–24 (480)	up to 1600 × 10
Brøndsted 1923 *S. pulchra* (holotype re-measured)	256–680 × 5.0–13.5 (435×11.0)	208–600 × 8.0–14.0 (450×10.0)	750–1650 × 2.5–10.0 (1050×6.0)
Burton 1934 Great Barrier Reef *P. tenuiramosa*	up to 600×6.0	up to 600×6.0	up to 1500 × 4.0–14.0
Cook St. 40–100 fm	339–765 × 10.0–16.0 (502×14.8)	325–697 × 4.0–16.0 (460×7.8)	1200–2500 × 2.0–8.0 (1880×5.0)

REMARKS

The specimens described by Brøndsted (1923) as *Sigmaxinella pulchra* do not belong in *Sigmaxinella*, but, with the two additional specimens described above, in *Pararhaphoxya* Burton.

In the type description of *Sigmaxinella pulchra*, three spicule types are recorded which, in fact, belong to a *Biemna* collected at the same time, preserved in the same container and described as *Sigmaxinella stylotata*. The sigmas, raphides (or microxeas), and the stouter styles described for *Sigmaxinella pulchra* are all contaminants from *Biemna stylotata*.

It is thus not surprising that Burton (1934) overlooked *Sigmaxinella pulchra* when he erected the genus *Pararhaphoxya* for *P. tenuiramosa* from Australia.

The only differences between the New Zealand and Australian specimens are that the former exhibit a greater range in all spicule categories and have a more diffuse extra-axial skeleton. The strong similarities in all other features argue against retaining the name *pulchra* for the New Zealand specimens only.

De Laubenfels's (1954) specimens from the central Pacific, assigned to *P. tenuiramosa*, show similar variation in spicule size. The spicules described* are on the whole shorter and finer than in the Australian specimen and the extra-axial spicules are described as "few".

DISTRIBUTION

Carnley Harbour, 45 fm; Great Barrier Reef, 20 fm; Caroline I., 4 m (2 fm).

Genus **Phakellia** Bowerbank

Axinellidae in which the axis is a dense mass of interwoven spicules; usually sinuous strongyles only very feebly organised into fibres. Spongin B development is sparse. The extra-axial skeleton is never dense, often merely individual spicules aligned at right angles to the axis. Spiculation: strongyles, styles, oxeas, no microscleres.

*Examination of one of de Laubenfels's specimens, USNM 23063, shows the range of spicule sizes to be very much greater than described.

Phakellia dendyi sp. nov. (Pls. 3b, c, d; 12b; 14d; 15a)

HOLOTYPE

Dom. Mus. Por. 24.

MATERIAL EXAMINED

Alderman I., 56 fm (Holotype); Cape Kari Kari, 30 fm; VUZ 55 Cook Strait, 40–100 fm.

DESCRIPTION

An erect, stipitate sponge with extremely conulose surface and fleshy, pseudokeratose appearance; ramose or lamellate.

DIMENSIONS

Locality	Height (cm)	Stalk Diameter (cm)	Height of Conules (mm)
Alderman I.	20.0	1.1	2.0–8.0
Cape Kari Kari	16.0	1.6	2.0–10.0
Cook St.	11.0	0.9	2.0–12.0

COLOUR: In life, bright orange red (RY-R 5/10 and RY-R 6/10); in spirit, pale yellow (Y 8/4) to chocolate brown (YR 5/4).

TEXTURE: Tough and incompressible particularly in the axial region, more flexible distally.

SURFACE: The surface, between conules, is very smooth with a skin-like dermal membrane (0.4 mm thick) stretched between the ends of the fibres. Spicules pierce the dermal membrane only near the tips of conules and on the hispid stalk. Some conules are simple, but multiple forms are more typical.

SKELETON: The axis is a dense interwoven mass of sinuous strongyles around which small quantities of spongin B are dispersed. Spicule tracts in the axial region are definable for only a very short distance before becoming obscured in the general spicule mass. All axial spicules are disposed longitudinally. Branches from the axis ramify throughout the sponge and terminate in the conules.

The extra-axial region is very thin, never more than 1.0 mm on either side of an axis 3.0–10.0 mm thick. The extra-axial spicules are predominantly styles and, less frequently, oxeas arranged (either singly or in groups of 2–15) at right angles to the axis. Cells laden with pigment are abundant in the ectosomal region and are concentrated in the dermal membrane.

In the region where the extra-axial spicules arise from the axis many styles occur in an irregular manner, overlying the axial strongyles.

SPICULES:

MEGASCLERES:

(a) STRONGYLES, sinuous, variable length and diameter. Occasional stylote modifications occur.

(b) STYLES, normal form, broadly rounded apically, and reaching their greatest dimension two-thirds of the distance from the head. Usually slightly curved; occasional strongylote modifications in the specimen from Alderman Island.

(c) OXEAS, straight or slightly curved. Rare in the specimen from Alderman Island.

SPICULE DIMENSIONS:

Locality	Strongyles (μ)	Styles (μ)	Oxeas (μ)
Cape Kari Kari	600–1450 × 9.0–14.0 (1180×11.0)	450–580 × 10.0–16.0 (512×14.0)	250–360 × 8.0–16.0 (295×10.0)
Alderman I.	650–1350 × 6.0–14.0 (1050×9.0)	400–650 × 7.0–20.0 (560×16.0)	290–320* × 11.0–13.0

*Four spicules only

REMARKS

Vosmaer (1912) contends that *Acanthella* Schmidt should be reserved for sponges with no distinction between axial and extra-axial regions. Species belonging to *Phakellia* Bowerbank have a well defined axial region and an extra-axial skeleton arranged more or less at right angles to the axial fibres.

This distinction was drawn with reference to the type species of each genus—*Acanthella acuta* Schmidt and *Phakellia strigosa* (Pallas) of which *P. ventilabrum* (Linne) is a synonym.

If this criterion of skeletal arrangement is used, some Pacific and Indian Ocean sponges described as *Acanthella* need to be referred to *Phakellia*. They are: *Acanthella carduus* (Lamarck) redescribed by Topsent (1930), *A. cavernosa* Dendy, and *A. vulgata* Thiele with its synonyms *A. aculeata*, *A. simplex*, and *A. insignis*.

All of the species described by Carter as *Acanthella*, or its synonym *Acanthellina*, are poorly documented, and it is difficult to be sure of their affinities. There is, however, sufficient data in the type description of *A. stipitata* Carter (1881) to exclude it from *Acanthella* (see Burton, 1934).

Acanthella stipitata Carter was understood by Dendy (1897a) to be the senior synonym for a variable species described under several names by Carter: *A. cactiformis*, *A. hircinopsis*, *Acanthellina parviconulata*, *A. rugolineata*. Dendy assigned his own material from Port Phillip Bay to *Acanthella stipitata*. This is obviously an incorrect assignation, since *A. stipitata* Carter possesses only stylote megascleres. *Acanthella cactiformis* Carter was equated by Burton (1934) with the specimens recorded by Dendy (1897a) as *A. stipitata*, and the whole group of specimens assigned to *Rhaphoxya* Hallmann. I have examined the holotype of *Acanthella cactiformis* Carter (Pl. 4a) (B.M.86.12.15.91) and agree with Burton that this species is a *Rhaphoxya;* the skeleton is lax, non-condensed, and composed of variously ended fine oxeas and styles. This sponge is, however, quite distinct from Dendy's Port Phillip specimens. I have re-examined several of these (R.N. 389: 465: 740); all can be equated with the specimens described above from New Zealand, and are correctly placed in *Phakellia* as *Phakellia dendyi*.

There are only very small differences between *P. dendyi*, and species such as *P. carduus* (Lamarck), *P. vulgata* (Thiele) and *P. cavernosa* (Dendy). For instance, *P. carduus* is distinct in lacking styles and in the form of oxeas; *P. cavernosa*, in lacking oxeas and in details of spicule dimension. *Phakellia vulgata* is poorly described but appears very variable in spicule dimensions and complement. It is retained as a separate species mainly because the arrangement of the skeleton is unknown.

It is possible that further study will show that all of the above species can be grouped as a single wide-ranging Indo-Pacific species, *Phakellia carduus* (Lamarck).

DISTRIBUTION

Port Phillip Bay, Australia.

Genus **Ceratopsion** Strand

Axinellidae of erect lamellate form with an axially condensed skeleton in which spongin B is sparse. Axial spicules are styles, additional spicules can be either long styles or flexuous strongyles*. Dermal spicules raphidiform oxeas or styles.

Ceratopsion cuneiformis sp. nov. (Pls. 4b, 15b; fig. 1)

MATERIAL EXAMINED

NZOI Sta. B 93 Three Kings, 30–60 fm.

HOLOTYPE

NZOI Type No. 38.

DESCRIPTION

A thin, erect sponge with a cylindrical stalk which expands into a paper-thin triangular lamella.

DIMENSIONS: Height 6.5 cm width (apically), 3.1 cm; diameter of stalk, 4.0 mm; thickness of lamella, 3.0 mm basally; 1.5 mm apically.

COLOUR: In life, pale yellow (rY 8/8); in spirit, white.

TEXTURE: Firm, elastic, incompressible.

SURFACE: The surface is granular with long styles and dermal spicules giving a hispid appearance; pores are distributed over both surfaces; no oscules visible.

SKELETON: The axial skeleton is a single broad tract of styles cemented by a small quantity of spongin. From both sides of the axial column extra-axial styles arise singly or in tufts of 2–4 and extend almost to the surface. The appearance is that of a single spicule tract echinated profusely by spicules of similar type.

At intervals along the axial column long styles arise and pass obliquely to the surface. These are surrounded at the point where they pierce the surface by groups of fine oxeote or stylote spicules. They may stand slightly out from the surface but most frequently are tangential. Fine oxeas occur occasionally in the extra-axial region.

*Only if *Ceratopsis clavata* Thiele is included. This seems doubtful.

SPICULES:

MEGASCLERES:

(a) smooth STYLES

(i) Very long, fine, evenly curved: tapering to a sharp point.

(ii) Shorter, stouter; strongly and often irregularly curved in the anterior third. These are the structural spicules.

(b) OXEOTE or stylote dermal spicules; usually toxiform. Oxeas predominate.

SPICULE DIMENSIONS:

Locality	Stout Styles (μ)	Long Fine Styles (μ)	Dermal Styles or Oxeas (μ)
Three Kings Is., 30–60 fm (holotype)	449–560 × 13.9–28.0 (490 × 20.0)	978–1699 × 7.0–12.0 (1450 × 10.0)	552–780 × 3.4–4.6 (670 × 3.0)

REMARKS

This species falls easily within the genus *Ceratopsion* as redefined by Hallmann (1917a). It is necessary to comment on one point in his definition, the interpretation of the dermal spicules described by Thiele (1898) as microxeas. The dimensions of these given by Thiele for the type species *C. expansa* are 1000 × 2–3μ, in *C. erecta* 1000μ. Only in *C. ramosa*, where they measure 70–80μ, are these spicules real microxeas. It would be less misleading if the term "microxeas" was replaced by "dermal oxeas".

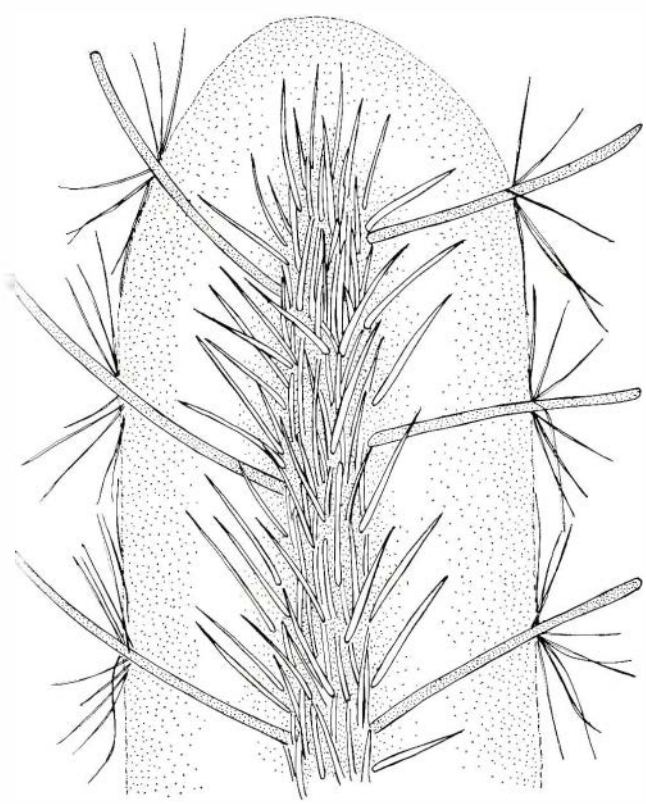


FIG. 1. *Ceratopsion cuneiformis* nov. sp. Diagrammatic longitudinal section of the lamella to show the skeletal arrangement. All long, extra-axial spicules are truncated in the diagram but are, in fact, styles.

Ceratopsion cuneiformis differs from other sponges in this genus in having a thin lamellate body, in details of spicule dimensions, and in having long echinating styles

Genus **Bubaris** Gray

Axinellida having an axial or basal concentration of vermiform strongyles associated with extremely long styles at right angles to the axis or substrate.

Bubaris vermiculata (Bowerbank). (Pl. 15c)

RESTRICTED SYNONYMY:

Hymeraphia vermiculata Bowerbank, 1866, p. 141.
Bubaris vermiculata Dendy, 1924, p. 351.
(For detailed synonymy see Dendy, 1924.)

MATERIAL EXAMINED

Three Kings Is., 30–60 fm NZOI Sta. 93.

REMARKS

As indicated by Dendy, New Zealand specimens of this cosmopolitan sponge are typical. They are always encrusting, with vermiform strongyles and large styles. My specimens are growing intermingled with *Discorhabdella incrustans*. It is necessary only to add spicule measurements.

SPICULE DIMENSIONS

Locality	Styles (μ)	Strongyles (μ)
Three Kings Is., 30–60 fm	800–1570 × 14.5–20.0 (1246 × 17.0)	230–280 × 8.0–12.0 (256 × 10.2)

DISTRIBUTION

Cosmopolitan (Dendy 1924).

*Bubaris elegans** Dendy

Bubaris elegans Dendy, 1924, p. 350, pl. X, fig. 5, pl. XIV.
Uplexoa elegans, de Laubenfels, 1936, p. 132.

REMARKS

This sponge is atypical in lacking flexuous axial strongyles but in all other respects conforms to the definition of *Bubaris*. Burton (1928) considered *B. elegans* a valid species of the genus. *Bubaris elegans* can be compared to *B. ligulata* Burton where the axial spicules, although strongyles, are not vermiform but flexed, as are the styles and oxeas of *B. elegans*. De Laubenfels (1936) proposed the genus *Uplexoa* for *B. elegans* and *B. oxeata* Dendy. This genus is determined by the presence of flexed oxeas, rather than flexuous strongyles, as auxiliary spicules. Considering the irregular occurrence of strongyles, oxeas, and even styles in axinellid and epipolasid species, it seems ill-advised to found a genus on this single characteristic, particularly without reference to type material.

DISTRIBUTION

Three Kings Is., 100 fm

Genus **Hymerhabdia** Topsent

Encrusting sponges with all spicules directed towards the surface. Spiculation typically very long styles in association with shorter styles and/or oxeas. Some or all of these spicules have contorted or reflexed bases. It is difficult to decide whether *Hymerhabdia* belongs to the Axinellidae or to the Halichondrida. It is included here because of strong similarities to *Bubaris*.

*Hymerhabdia oxeata (Dendy)

Bubaris oxeata Dendy, 1924, p. 349, pl. XIV, fig. 20, 21.
Hymerhabdia oxeata, Topsent, 1928, p. 41.
Uplexoa oxeata, de Laubenfels, 1936, p. 132.

REMARKS

No new material has been collected and nothing can be added to Dendy's description. The species is difficult to assign but seems to be related closely to *Hymerhabdia oxytruncata* Topsent. There is no question of its becoming the type species of a new genus *Uplexoa* as proposed by de Laubenfels (see discussion above). *Uplexoa* is thus recognised here as a synonym of *Hymerhabdia*.

DISTRIBUTION

Three Kings Is., 100 fm (*Terra Nova* Station).

Genus **Thrinacophora** Ridley

Axinellida with plumose skeleton and microscleres in the form of raphides.

Thrinacophora dubia Brøndsted

Thrinacophora dubia Brøndsted, 1923, p. 157, fig. 31 a–c.
Rhaphidectyon dubia, de Laubenfels, 1936, p. 102.

REMARKS

De Laubenfels referred *Thrinacophora dubia* to *Rhaphidectyon* because diactinal megascleres are absent and the raphides are the only microscleres. It is not possible to comment further on its classification until the type specimen or new material is examined.

DISTRIBUTION

Coleridge Bay, Carnley Harbour, 25 fm.

Genus **Pseudaxinella** Schmidt

Massive Axinellida with typical spiculation but semi-reticulate skeletal arrangement.

Pseudaxinella australis sp. nov. (Pls. 4c, 12c)

HOLOTYPE

Dom. Mus. Por. 26

MATERIAL EXAMINED

East of Little Barrier, 40 fm; Whangarei Harbour, 4 fm; Takatu Channel, 6 fm (Holotype); off Shag Rock, Waiheke, 27 fm.

DESCRIPTION

A massive, low-lying sponge, which thickly encrusts, and eventually encloses, dead shells of *Glycymeris laticostata*. When removed from the water it exudes great quantities of a sticky slime.

DIMENSIONS: Encrusting specimens: length up to 5.0 cm; width up to 4.2 cm; 0.8–1.5 cm thick.
Massive specimens: length 10.5 cm; width 9.0 cm; 2.0–5.5 cm thick.

COLOUR: In life, bright scarlet (RY–R 5/8); in spirit, pale yellowish (rY 8/4) to fawn (yY–R 6/2).

TEXTURE: Firm, incompressible, brittle.

SURFACE: The surface is extremely ridged and corrugated by stout ascending fibrous columns 1.0–2.5 mm in diameter perpendicular to the surface; the columns are up to 0.5 mm apart. The columns are rounded terminally and extremely hispid. A delicate dermal membrane is stretched between the ridges.
Oscules, only evident in larger specimens, are 1.0–4.0 mm in diameter and arranged in groups of 3–4.

SKELETON: The skeleton is made up of a series of stout ascending columns of oxeas and styles, which are very sparsely invested by spongin. In each column there is a thin, often unispicular core of oxeas surrounded and echinated by the styles. The oxeas increase in numbers in the surface layer of the sponge, where very fine styles also occur. The fibres range in diameter from 70.0–120.0 μ.

SPICULES:

MEGASCLERES:

(a) STYLES, stout, smooth with broadly rounded heads. They may be straight, gently curved, or sharply flexed anteriorly. Also, fine dermal styles usually with a sharp anterior flexure, occasionally oxeote.

(b) OXEAS, smooth, stout, often irregular, with a strong flexure centrally or slightly to one side of centre.

SPICULE DIMENSIONS:

Locality and author	Styles (μ)	Ectosomal styles (μ)	Oxeas (μ)
P. rosacea			
Bermuda, De Laubenfels	300–400 × 8.0–10.0 also 235×11.0	not present	300–320 × 8.0
P. australis			
Takatu Channel, 6 fm (holotype)	203–560 × 9.0–22.0 (402×15.0)	320–406 × 3.0–5.7 (367×4.0)	217–339 × 8.2–10.4 (260×9.6)

REMARKS:

Pseudaxinella australis is very similar to *P. rosacea* as redescribed by de Laubenfels (1950). It differs mainly

in the thickness of the styles and in having a special category of ectosomal styles.

The characteristic feature of *P. australis* is the presence of distinct ascending columns of plumose spicule tracts, which resemble, quoting de Laubenfels for *P. rosacea*, "an aerial view of a coniferous forest". Slime production and bright red colour are two further significant features in which *P. australis* and *P. rosacea* are similar. The small differences quoted above, in conjunction with geographic discontinuity, seem sufficient to warrant treating these sponges as distinct, but closely related, species.

Family TRACHYCLADIDAE Hallmann

Axinellida with microscleres of spiraster type, sometimes with the addition of short rhabds.

Genus **Trachycladus** Carter

Trachycladus stylifer Dendy. (Pls. 5a, 10c)

Trachycladus stylifer Dendy, 1924, p. 377, pl. XII, fig. 7, pl. XV, fig. 39–42.

MATERIAL EXAMINED

East of North Cape, 55 fm (Th. Mortensen 2/1/1915). Poor Knights Is., 15–20 fm.

DESCRIPTION

A much-branched sponge with a stout, cylindrical, basally expanded stalk. The branches are cylindrical and taper to points; the pattern of branching is extremely irregular, but no anastomoses are formed.

DIMENSIONS: Height 31.0 cm; width (with branches compressed) 13.0 cm; diameter of stalk 6.0–8.0 mm; height of stalk 6.0 cm; diameter of branches 2.0–5.0 mm.

COLOUR: In spirit, dark maroon (RY–R 3/4); in life, bright orange (yR 6/10).

TEXTURE: The stalk is hard and incompressible; the branches soft and velvety, easily broken.

SURFACE: The surface is extremely hispid owing to the plumose ectosomal styles, columns of which project from the central axis of each branch. In the terminal regions of the branches where the axis is attentuated the ectosomal styles give the sponge a furry appearance. No pores or oscules are visible, and there is no trace of the dermal membrane although numerous spinispirae are scattered over all other specimens. These undoubtedly result from the breakdown of the dermal crust in formalin.

SKELETON: The skeletal arrangement is very simple and conforms to Dendy's description. Each branch has a compact, central, more or less rigid axis made up of longitudinally disposed styles. This axis occupies approximately one-third of the diameter of each branch and gives off loose, oblique, plumose columns of styles that curve toward the surface. These columns are 580–1200 μ long. There is no visible spongin in the axis of the branches but there are traces in the stalk. Microscleres are abundant, particularly the spinispirae.

SPICULES:

MEGASCLERES:

(a) STYLES, relatively slender, slightly curved spicules with a rounded base. Occasional strongyles occur.

(b) OXEAS, present in the proportion of 1:50. They are wavy or centrally flexed, always sharply pointed.

MICROSCLERES:

(a) SPINISPIRAE, extremely abundant, completely spined. They are characteristically coiled in $1\frac{1}{2}$–2 complete turns, but may be simple C-shape or almost straight.

(b) MICRORHABDS, stout, often centrotylote spicules, smooth or faintly microspined and bluntly rounded at each end.

SPICULE DIMENSIONS, see Table 1.

REMARKS

The above description is of an intact specimen of *Trachycladus stylifer* in the Mortensen collections from the Copenhagen Museum. The material has been studied previously by Brøndsted (1924), but this specimen was undescribed. In the same bag of specimens were the types of *Latrunculia spinispiraefera*, *Lissoplocamia prima*, and *Merriamuim crelloides*, all liberally coated with spinispirae freed by the breakdown of the dermal crust of *Trachycladus stylifer*.

Brøndsted (1924, p. 480) described *Latrunculia spinispiraefera* from North Cape, noting the occurrence of spinispirae and stressing, on this ground, the close relationship of *Latrunculia* to the Spirasterellinae.

I have recorded *Latrunculia spinispiraefera* from the Chathams (Bergquist, 1961b, and 1967), Campbell Plateau, and Three Kings and have examined the holotype. Spinispirae are never a normal component. Those seen in preparations of the holotype are randomly

TABLE 1. Spicule Dimensions of *Trachycladus stylifer*.

Locality and Author	Styles (μ)	Oxeas (μ)	Spinispirae (μ)	Microrhabds (μ)
Dendy, Three Kings Is., 10 fm (holotype)	about 500×17.0	absent	12.0	up to 20.0×8.0
East of North Cape, 55 fm	439–520 × 11.5–18.0 (472×14.8)	250–560 × 13.0–18.0 (408×15.2)	8.0–12.0 (10.1)	13.0–16.0 × 4.6–6.0 (14.5×5.0)

distributed contaminants from *Trachycladus*. Measurements given by Dendy (1924), and Brøndsted (1924) for the spinispirae correspond perfectly. One important difference between my specimen and the holotype is that, in mine, oxeas are present as a minor component of the skeleton. This weakens Dendy's case for maintaining *T. stylifer* as a distinct species from *T. laevispirulifer* Carter from Australia and casts doubt on the validity of the several species defined by Hallmann (1917a). It is likely that all specimens of *Trachycladus* described so far will prove to be synonyms of *T. laevispirulifer*.

DISTRIBUTION

Three Kings Is., 100 fm.

Family DESMOXYIDAE Hallmann

Axinellida with microscleres in the form of spined or smooth microxeas.

Genus **Parahigginsia** Dendy

Parahigginsia phakellioides Dendy. (Pl. 15d)

Parahigginsia phakellioides Dendy, 1924, p. 375, p. XI, fig. 4, pl. XV, fig. 32, 33.

REMARKS

The holotype has been examined and Dendy's initial classification affirmed.

De Laubenfels (1936) referred *Parahigginsia* to his subfamily Rhaphidistinae on the assumption that the acanthoxeas were *Ancorina* type rhabds. This is not the case. The acanthoxeas are in every respect comparable to the acanthoxeas of *Higginsia*, and *Parahigginsia* and *Higginsia* fall naturally into the Axinellida.

DISTRIBUTION

East of North Cape, 70 fm.

Genus **Acanthoclada** gen. nov.

The genus *Acanthoclada* is proposed for an encrusting to massive sponge with skeletal construction like that of *Higginsia* but with the addition of echinating spicules (rhabdostyles). The skeleton is fibrous, lax, and reinforced along the fibres with small quantities of spongin B. All fibres are cored by long smooth styles to subtylostyles and echinated profusely by rhabdostyles. Dermal spicules are long centrally angulate oxeas. In addition there are two categories of spiny microscleres; a large "cladotoxa" and a small curved birotule, which can be oxeote.

Acanthoclada prostrata sp. nov. (Pls. 5b; 10a, f; 16a, b)

HOLOTYPE

Dom. Mus. Por. 27

MATERIAL EXAMINED

North Channel, 10 fm (Holotype); Takatu Pt, 6 fm.

DESCRIPTION

This sponge occurs as a thick slimy encrustation on dead shells of *Glycymeris laticostata* and *Chione stitchburyi*.

DIMENSIONS: Length, 2.5–6.0 cm; width, 1.0–3.0 cm; thickness 0.4–1.5 cm; surface conules 0.5–3.0 mm high; 0.2–1.0 mm wide.

COLOUR: In life, pale pinkish purple (RY–R 7/4) to dull orange (Y–R 6/10); in spirit, whitish.

TEXTURE: Firm, compressible, easily torn.

SURFACE: Granular, raised up into conules, which are pierced by bundles of dermal oxeas.

SKELETON: This is made up of ascending fibres 300–400 μ thick, cored by long more or less straight styles and echinated profusely by rhabdostyles. The long axial styles also project outward from the fibres. Spongin B is present as a thin investment around the fibres. The dermal membrane is 0.1–0.3 mm thick, is densely packed with the small birotule microscleres and contains many cladotoxas. The fibres terminate in stout bundles of oxeas, which raise the dermal membrane into conules and penetrate the apex of each one.

SPICULES:

MEGASCLERES:

(a) STYLES of two types:
  (i) long stout gently curved styles; often subtylote.
  (ii) RHABDOSTYLES: shorter, more slender; curved sharply near the anterior end.

(b) OXEAS, long, centrally angulate of variable width. Fine forms of these spicules resemble enormous toxas.

MICROSCLERES:

(a) "CLADOTOXAS", similar in general form to cladotylotes of *Acarnus* with a smooth curved shaft with one or many stout spines on one or both sides. The spines on the shaft may be reduced to one. At each end the shaft is expanded into a cladome bearing 3-8 sharp spines with no constant disposition. Cladotoxas occur throughout the sponge.

(b) BIROTULES, small, slightly curved spicules with spines distributed evenly over the shaft and with both ends expanded to form a nail-like head. The shaft edge of the head is encircled by a ring of backwardly directed spines.

SPICULE DIMENSIONS, see Table 2.

TABLE 2. Spicule Dimensions of *Acanthoclada prostrata*.

Locality	Oxeas (μ)	Subtylostyles (μ)	Rhabdostyles (μ)	Cladotoxas (μ)	Birotules (μ)
North Channel, 10 fm (holotype)	960–1320 × 1.2–9.2 (1206 × 7.2)	677–1850 × 9.2–18.5 (1420 × 14.8)	213–600 × 5.7–8.1 (420 × 7)	80–96 × 4.6–5.6 (90 × 4.9) incl. spines up to 11.5 wide Cladome 28–34 wide	52–72 × 3.4–3.8 (66) Clads 8–10

REPRODUCTIVE PRODUCTS

One specimen, collected 19.11.60, contains many roughly spherical eggs, 30–60 μ long and 25–45 μ wide with nucleii 9.0–20.0 μ. These eggs, each in a distinct cavity bounded by a fine membrane, are distributed from the base of the sponge to the surface. No segmentation stages are present, indicating that this sponge is oviparous.

REMARKS

This well characterised genus is difficult to assign to a family and is placed in the Desmoxyidae with some misgivings. The chief objection to this placement lies in the absence of oxeote microscleres. The overall skeletal pattern is, however, very similar to that of *Higginsia*. There is no trace of axial specialisation, but this axinellid characteristic is also de-emphasised in *Higginsia* and *Desmoxya*.

The presence in *Acanthoclada* of what appears to be an oviparous reproductive sequence supports its inclusion in the Axinellida.

Certain genera of Raspailiidae, e.g., *Endectyon* have cladotylote spicules like the cladotoxas described for *Acanthoclada*. In *Acanthoclada* these spicules are, from their size and disposition, obviously microscleres. The cladose spicules of *Endectyon*, however, are replacements for the echinating acanthostyles of more typical raspailiids.

Family SIGMAXINELLIDAE Hallmann

Axinellida with sigmoid microscleres; often with microxeas or microrhabds.

Genus **Sigmaxinella** Dendy

REMARKS

Four sponges from Carnley Harbour were described by Brøndsted (1923) as new species of *Sigmaxinella*. Re-examination of the holotypes of all four indicates that none belongs to *Sigmaxinella*. They are dealt with in greater detail under the appropriate genera, but, to summarise, they are reassigned as follows:

Sigmaxinella pulchra to *Pararhaphoxya pulchra*
Sigmaxinella stylotata to *Biemna stylotata*
Sigmaxinella florida–unrecognisable except as a fragment of *Rhizaxinella*
Sigmaxinella papillata to *Ciocalypta penicillus*

The sigmas and microxeas described by Brøndsted are foreign spicules in all except *Biemna stylotata*, which was the source of the contaminants.

Genus **Biemna** Gray

Sigmaxinellidae in which the form is massive to lamellate; usually with little axial condensation. The surface is usually conulose. Skeleton fibrous, sometimes plumoreticulate. Megascleres styles only. Microscleres invariably sigmas and microxeas, the latter frequently occurring in dragmata. Small commas and/or spheres may be added.

***Biemna novaezealandiae** Dendy

Biemna novaezealandiae Dendy, 1924, p. 346, pl. XIV, fig. 1–4
Burton, 1930, p. 519.

REMARKS

No new material has been collected. *B. novaezealandiae* is a well characterised species of *Biemna* differing from all other Southern Hemisphere species, except *B. incrustans* Kirkpatrick, in the large size of the megascleres (Table 3). The combination of large megascleres, encrusting form, and three categories of oxeote microscleres is distinctive. *Biemna thielei* Burton is very close to *B. novaezealandiae*, but its megascleres and sigmas are substantially smaller and it has "commas". The latter spicules are easily overlooked, however, and are thus of little value in assessing older species descriptions.

DISTRIBUTION

Three Kings Is., 100 fm.

Biemna flabellata sp. nov. (Pl. 5c; 17a)

HOLOTYPE

Dom. Mus. Por. 28.

MATERIAL EXAMINED

AUZ 056,140 fm (Holotype); Three Kings Is., 30–60 fm, NZOI Sta. B 93.

DESCRIPTION

An erect, stalked, lamellate sponge with distinct inhalant and exhalant surfaces. Two identical specimens

TABLE 3. Comparison of the Form and Spiculation of Some New Zealand Species of *Biemna* with Related Southern Hemisphere Species.

Authors and Species	Megascleres (μ)	Sigmas (μ)			Microxeas (μ)			Commas or Spheres (μ)	Body Form
Biemna chiliensis Thiele 1905	Styles 950 × 25	Large 46–55		Small 18	Raphides only 220–240			Spheres	Lamellate to digitate
Biemna megalosigma Hentschel 1912	Styles 576–704 × 15–29	Large 72–216	Med. 27–32	Small 15–18	Large (R)* 136–208		Small 40–112	Spheres 9.0	Massive, shaggy
Biemna novaezealandiae Dendy 1924	Styles 1070 × 32	Large 56–140		Small 20	Large (R) 120	Med. 96 × 3	Small 20	—	Encrusting
Biemna thielei Burton 1930	Styles 500 × 15	Large 70		Small 20	Large (R) 160	Med. 110 × 4	Small 80	Commas 12.0	Encrusting
Biemna trirhaphis Topsent 1897	Styles 350–500 × 15–18	Large 80	Med. 45	Small 18	(R) 150	Med. 170	Small 40	—	Massive
Biemna incrustans Kirkpatrick 1903	Styles 1085 × 31–33μ	27.5 × 2.7μ			60μ			—	Encrusting
Biemna stylotata Brøndsted 1923	Styles (2 sizes) 416–690 × 12–38 166–352 × 7–14	Large 48–86	Med. 28–38	Small 14–18	Large 180–240		Small 48–72	Spheres 6.0	Massive, shaggy
Biemna flabellata n. sp.	Styles 266–496 × 10–30	Large 27–40		Small 9–14	Large 90–140		Small 28–50	Spheres variable occurrence	Lamellate
Biemna pedonculata Levi 1963	Styles 350–550 × 30–50	Large 80–95 × 8–9 20–40 × 4–5	Med. 18–20	Small 9–10	(R) 100–130		Small 50–65	—	Lamellate

*R=Raphides

TABLE 4. Spicule Dimensions of *Biemna flabellata*.

Locality	Styles (μ)	Microxeas		Sigmas		Spheres (μ)
		Large (μ)	Small (μ)	Large (μ)	Small (μ)	
Three Kings Is., 30–60 fm	266–400 × 16.0–23.0 (332 × 19.9)	98–125 × 2.3–2.5 (114 × 2.4)	28–50 × 1.2 (33 × 1.2)	27–40 (32)	11.5–13.8 (12.2)	abs.
Three Kings Is., 140 fm (holotype)	280–496 × 10.0–30.0 (380 × 21.0)	96–140 × 2.0–2.5 (115 × 2.2)	26–45 × 1.2 (32 × 1.2)	28–40 (34)	9.6–15.0 (11.8)	up to 8.0

were collected at one station and two smaller ones at another.

DIMENSIONS: Height, 5–19cm; width of stalk, 0.5–2.8 cm; width of lamella 3.0–8.0 cm; thickness of lamella 2.0–8.0 mm.

COLOUR: In life, dull yellow (rY 7/8); in spirit, straw coloured (Y 7/4), or white.

TEXTURE: Soft and crumbly around the edge of the lamella, firm in centre and stalk region.

SURFACE: The surface is micro-hispid and feels rough. One surface has numerous oscules, 0.8–1.2 mm in diameter, flush with surface and spaced regularly 2.0–2.5 mm apart. The pores are small, 0.1–0.3 mm in diameter, and distributed over one surface.

SKELETON: The skeleton is a rectangular reticulation of fibres with a tendency to become plumoreticulate. Ascending fibres are prominent in the stalk region and in the centre of the lamella. The structural spicules are smooth styles. The primary fibres are 50.0–80.0μ in diameter with 3–5 spicule rows invested by spongin. There is no differentiation of dermal spicules. The microxeas and sigmas are particularly abundant interstitially and the former often lie in dragmata.

SPICULES:

MEGASCLERES:

STYLES, smooth, stout; broadly rounded at the proximal end and slightly curved.

MICROSCLERES:

(a) MICROXEAS, fusiform; two distinct size groups; larger ones may be raphide-like. It is impossible to decide whether they are raphides or developing microxeas.

(b) SIGMAS, very simple, comma-like; two distinct size groups.

(c) SPHERES.

SPICULE DIMENSIONS, see Table 4.

REMARKS (see also Table 3)

Biemna flabellata differs from most other species of *Biemna* in having a pronounced lamellate form. *Biemna chiliensis* Thiele has a similar habit but has bigger megascleres and lacks proper microxeas. *Biemna pedonculata* Levi is closely related to *B. flabellata*, differing in having sigmas and bigger microxeas. One specimen of *B. flabellata* had many spheres, two others had very few, and there appears to be none in the fourth.

Biemna rhabderemioides Bergquist. (Pl. 16c)

Biemna rhabderemioides Bergquist, 1961a, p. 40, fig. 10 a, b.

HOLOTYPE

Dom. Mus. Por. 11.

MATERIAL EXAMINED

Rangitoto I., under stones, mid tidal (holotype); MacGregors Bay, Whangarei Heads Peninsula, under stones, low tide; North Channel, 4–5 fm, on shell.

DESCRIPTION

This is an encrusting or cushion-like sponge found on the undersides of mid-to-low-tidal boulders and on shallow-water shell bottoms (e.g., *Tawera/Glycymeris* community).

DIMENSIONS: Length 2.0–4.0 cm; width 1.5–3.0 cm; thickness 1.0–2.0 cm.

COLOUR: In life, yellow (rY 8/6); in spirit, pale yellowish brown (ry 6/4)

TEXTURE: Firm, compressible.

SURFACE: The surface is minutely reticulate, conulose, and hispid. Oscules are small, 0.8–1.0 mm, are level with the surface and are fed by prominent subdermal channels.

SKELETON: This is an irregular reticulation of styles to subtylostyles. Near the surface short tracts of spicules arise and pass to the dermal membrane, where they subtend the surface conules. Spongin B is sparse. It is dispersed throughout the sponge and found in greatest concentration binding the ascending tracts just below the surface. There are no distinct echinating spicules, but styles like those in the reticulum occasionally occur in an echinating position.

The dermal membrane is thin, with only a few sigmas and some fine detritus.

The abundance of all microsclere categories is characteristic of the genus *Biemna*, and *B. rhabderemioides* is typical in this respect. Microxeas occur most frequently in trichodragmata, but individual spicules are dispersed throughout the sponge. There are two size categories of both microxeas and sigmas, and all occur throughout the sponge.

SPICULES:

MEGASCLERES:

STYLES TO SUBTYLOSTYLES, bent sharply in the proximal third.

MICROSCLERES:

(a) MICROXEAS, straight, narrow and fusiform; very abundant; two size groups.

(b) SIGMAS; of normal "C" shape, relatively stout; two sizes; very abundant.

(c) SPHERES, bean-shaped to spherical lumps of silica; constantly present but varying enormously in abundance.

SPICULE DIMENSIONS:

Locality	Styles (μ)	Microxeas (μ)	Sigmas (μ)	Spheres (μ)
Rangitoto I., (mid-tidal rocks)	300–560 × 10.0–16.0	40–58 × 1.6 (53 × 1.6) 80–120 × 1.0 (98.0 × 1.0)	42–50 (46) 12.0–16.0 (14.6)	4.0

REMARKS (see also Table 3)

Biemna rhabderemioides is distinct from other species of *Biemna* in having two categories of sigmas, two categories of microxeas and spheres as microscleres with styles as principal spicules. *Biemna megalosigma* Hentschel from Aru Island is close to *B. rhabderemioides* but differs in having three categories of sigmas, which are, in general, larger than those of the New Zealand species.

Burton's key (1930) to the species of *Biemna* cites *B. megalosigma* as having two categories of sigmas, yet his description states clearly that there are three. Hentschel's (1912) description mentions three types of sigmas.

In the type description of *B. rhabderemioides* Bergquist (1961a) a wrong figure (fig. 10b) was given. The correct figure is given here (Plate 16c).

Biemna stylotata (Brøndsted). (Pls. 5d, 16d)

Sigmaxinella stylotata Brøndsted, 1923, p. 150, fig. 27.

REMARKS

Hallmann (1917a) has raised valid arguments for restricting *Sigmaxinella* Dendy to ramose sponges of axinellid construction as in the type species of the genus, *Sigmaxinella australiana* Dendy. On these grounds alone *S. stylotata* must be removed to *Biemna*.

This species is reasonably well described by Brøndsted, and only a few points will be enlarged upon. Spicule dimensions are given in Table 5.

The skeleton is dense at the base of the sponge and has a centre 3.0 mm above the lower surface. From this level, short plumose spicule tracts pass downward to the lower surface where they expand into indistinct subdermal brushes. From the same point plumose tracts pass upward to the lateral and upper surfaces. The tracts are sparingly branched and have a considerable amount of spongin B distributed unevenly along their length.

TABLE 5. Spicule Dimensions of *Biemna stylotata*.

Locality and Author	Styles		Sigmas			Microxeas		Spheres (μ)
	Large (μ)	Small (μ)	Large (μ)	Medium (μ)	Small (μ)	Small (μ)	Large (μ)	
Carnley Harbour, Brøndsted, *S. stylotata*	455–676 × 20–33μ	190–403 × 8 0–17 0μ	—	> 40.0	—	up to 50		not recorded
Holotype remeasured	416–690 × 12.8–38 (560 × 26)	166–352 × 7.0–14 0 (240 × 11.0)	48 0–86 0 (64 0)	28 0–38 0 (32.0)	14.0–18 0 (16 0)	48 0–72 0 (56.0)	180–240 (225 0)	up to 6.0

The large styles form the skeletal columns and many of these spicules are echinating. The smaller styles are almost entirely interstitial.

Microscleres are abundant throughout the sponge. None of the oxeote microscleres lie in trichodragmata.

It is debatable whether the smaller styles are a second megasclere category, since there is some overlap in the width of small and large spicules. Because of their interstitial distribution, I believe they are distinct.

This species is very close to *Biemna megalosigma* Hentschel; the main differences are the absence of the very large sigmas and the presence of the smaller megascleres (see Table 3).

DISTRIBUTION

Carnley Harbour, 45 fm.

NOTE

Brøndsted (1923) recorded a specimen of *Biemna rhaphidophora* from Carnley Harbour. This sponge had tylostyles of two sizes, the skeletal arrangement of a *Suberites*, and sigmas and microxeas as microscleres.

It was collected in the same dredge haul as *Biemna stylotata* and the microscleres described for *B. rhaphidophora* are contaminants from that species. If the foreign microscleres are disregarded it is clear that *B. rhaphidophora* is a synonym of *Suberites affinis* Brøndsted, described from the same locality.

Burton (1930) proposed a new genus *Carnleia* for *Biemna rhaphidophora*; this genus is thus a synonym of *Suberites*.

Family RASPAILIIDAE Hentschel

Axinellida in which the typical skeleton is supplemented by dermal spicule brushes, usually of fine styles grouped around a long central style and by echinating acanthostyles or rhabdostyles. No microscleres.

In some species of *Raspailia* the echinating acanthostyles are of poecilosclerid type, and this has given rise to much uncertainty over the position of this family. It is desirable that many sponges hitherto classified as *Raspailia* be removed to other genera.

Genus **Raspailia** Schmidt

Characteristically ramose sponges with some axial condensation. The structural spicules are styles or subtylostyles, the echinating spicules acanthostyles. The dermal spicules, present in fans, are styles or oxeas typically grouped around one long central spicule.

Raspailia agminata Hallmann. (Pls. 6a, 13a, 18a, b)

Halichondria rubra var. *digitata* (err.), Lendenfeld, 1888, p. 80, pl. II, fig. 1.
Raspailia agminata Hallmann, 1914, p. 438, fig. 22. Bergquist, 1961b, p. 183, fig. 8a–c.

MATERIAL EXAMINED

CIE 6 Chatham Rise, 220 fm; wharf piles, Auckland Harbour; North Channel, 6 fm; low tide, Pt Chevalier.

DESCRIPTION

This sponge can be massive, somewhat conical, with several lateral finger-like projections; a thick mat with vertical cone-like projections; or a thick encrustation.

DIMENSIONS: Height 6.3 cm; width 4.3 cm. Projections: height 3.8–4.6 cm; width 1.0–1.6 cm.

COLOUR: In life, dark brown (Y 2/2); in spirit, (yY–R 6/4).

TEXTURE: Firm but compressible.

SURFACE: The surface is conulose in patches, otherwise smooth. Projecting spicules give an overall silver appearance. Oscules, 1.0–2.5 mm in diameter, are sometimes situated on the apex of the conical projections.

SKELETON: A plumose series of fibres composed of long subtylostyles, usually three or four only, invested with a fine layer of spongin B and echinated by acanthostyles. Towards the surface of the sponge the arrangement of the fibres is more plumoreticulate and the echinating spicules are less abundant. The terminal subtylostyles pierce the surface, which is distinctly hispid. The ectosomal oxeas are arranged in subdermal fans, the groups being sufficiently close to form a complete superficial palisade of oxeas. The oxeas are not arranged around a large central subtylostyle, nor is there any tendency

toward axial concentration. Interstitial spicules, oxeas, fine styles, and acanthostyles are abundant.

SPICULES:

MEGASCLERES:

(a) STYLES, long, relatively slender; curved in their anterior third.

(b) SUBTYLOSTYLES, similar size, shape, and function to the above, but far more abundant.

ACANTHOSTYLES: Strongly spined spicules, often acanthotylote.

OXEAS: Slender, slightly curved spicules, chiefly ectosomal. Developmental forms of the oxeas are abundant and simulate raphides and fine styles.

SPICULE DIMENSIONS:

Locality and Author	Styles and Subtylostyles (μ)	Oxeas (μ)	Acanthostyles (μ)
Hallmann 1914, Port Jackson, (holotype)	450–2800 × 28.0	245–400 × 6.0	80–190 up to 12.5 thick
Chatham Rise, 220 fm	930–2300 × 17.5–20.0 (1840 × 19.2)	300–640 × 3.0–6.0 (420 × 5.0)	90–120 × 5.0–7.0 (106 × 6.6) up to 11μ with spines

REMARKS

The massive form of this sponge is atypical in *Raspailia*. Spreading specimens with conical projections are comparable with *R. aculeata* (Johnston), as figured by Topsent (1925). In spiculation *R. agminata* is typical of the genus and extremely like *R. gracilis* (Lendenfeld) and *R. tenella* (Lendenfeld) from Port Jackson. The ramose habit of these species clearly distinguishes them from *R. agminata*.

DISTRIBUTION

Port Jackson (Australia).

Raspailia flaccida sp. nov. (Pls. 6b, 10b, 18c)

HOLOTYPE

Dom. Mus. Por. 29.

MATERIAL EXAMINED

Menzies Bay, Christchurch, 60 fm.

DESCRIPTION

This sponge is typically raspailid, composed of long thin cylindrical branches. The branching is irregularly dichotomous. The axis is stiff; the branches simple, and flaccid toward the tips.

DIMENSIONS: Height 23.0 cm; width of axis 2.0 cm; diameter of branches 6.0 mm basally, 2.4 mm apically.

COLOUR: In life, bright orange (rY–R 6/10); in spirit, dull yellowish brown (Y–R–Y 6/4).

TEXTURE: Pliable and rather hard if compressed; furry to the touch.

SURFACE: Hispid with projecting ectosomal oxeas. No pores of oscules are visible.

SKELETON: The axial skeleton, one half the diameter of each branch, is made up of plumoreticulate spongin B fibres cored by styles, and oxeas. Fine fibres, 3-4 spicules wide, branch toward the surface and form a distinct extra-axial region. The spicules in this region are predominantly styles, with raphides lying in poorly defined groups at the surface. The fibres are 48.0–120.0 μ in diameter and the enclosed spicules in 2–4 rows. The echinating spicules, acanthostyles and occasional acanthoxeas are more abundant in the extra-axial region. Connections between the radial spicule tracts are rare, and when they occur are only single spicules.

SPICULES:

MEGASCLERES:

(a) STYLES, smooth, relatively slender spicules that vary greatly in length and shape. They may be almost straight, curved, or strongly contorted. The stylote end often bears a single mucronate projection.

(b) OXEAS, slightly curved or contort, with a variety of terminations, often mucronate.

(c) ACANTHOSTYLES OR OCCASIONAL ACANTHOXEAS, acanthostyles in the form of rhabdostyles finely spined over the posterior two-thirds; the acanthoxeas are entirely spined and centrally flexed.

(d) RAPHIDES, very fine, slightly curved or toxiform.

SPICULE DIMENSIONS, see Table 6.

REMARKS

Raspailia flaccida is an atypical *Raspailia* in lacking dermal spicule tufts and in having occasional acanthoxeas. These peculiarities, in conjunction with the abundance of contort spicules (as variants of the megascleres), the presence of a dense spongin network, and of variously ended styles and oxeas, are sufficient to differentiate *R. flaccida* from species such as *R. freyeri* Schmidt and *R. radiosis* Topsent, which also have contort oxeas. *Raspailia*

TABLE 6. Spicule Dimensions of *Raspailia flaccida*.

Locality	Styles (μ)	Oxeas (μ)	Acanthostyles (μ)	Raphides (μ)
Menzies Bay, Christchurch, 60 fm (holotype)	314 × 600 × 9.8–14.2 (428 × 11.5)	464–790 × 9.8–14.2 (620 × 9.7)	121–145 × 5.7 (134 × 5.7)	up to 340 × 1.5

inaequalis Dendy is in general morphology like *R. flaccida*. In *R. inaequalis*, however, all spicules are much smaller, there are no fine dermal spicules, and the extra axial spicule columns are at right angles to the axis.

Raspailia inaequalis Dendy. (Fig. 2)

Raspailia inaequalis Dendy, 1924, p. 355, pl. XXI, fig. 1; pl. XIV, fig. 17–19.

REMARKS

No new material has been collected, but because of the uncertainty of its generic position the holotype (BM. 23.10.1.138) has been re-examined.

Dendy (1924) commented on the similarity between *Echinaxia frondula* Hallmann and *Raspailia inaequalis:* both lack dermal tufts of fine spicules. Dendy did not recognise *Echinaxia* as distinct from *Raspailia*. I agree on this point, but I am of the opinion that the genus *Raspailia* needs some revision.

Hallman (1917b) erected *Echinaxia* for *Axinella frondula* Whitelegge, a species with complex lamellate form, a semi-reticulate axial region, extra-axial fibres with a peculiar mode of origin from the axial region, and no cross-connections between the extra-axial fibres.

To admit *Raspailia folium* (Thiele) and *R. horsuta* Thiele to *Echinaxia*, Hallmann widened the concept of the genus to include ramose forms with greatly reduced extra-axial skeleton or with well developed extra-axial tracts and dermal tufts of long styles. The inclusion of these two species in *Echinaxia* makes it impossible to differentiate between *Raspailia* and *Echinaxia*. The latter genus, if it can be recognised at all, contains only one species, *E. frondula*, in which the extra-axial skeleton is reduced greatly.

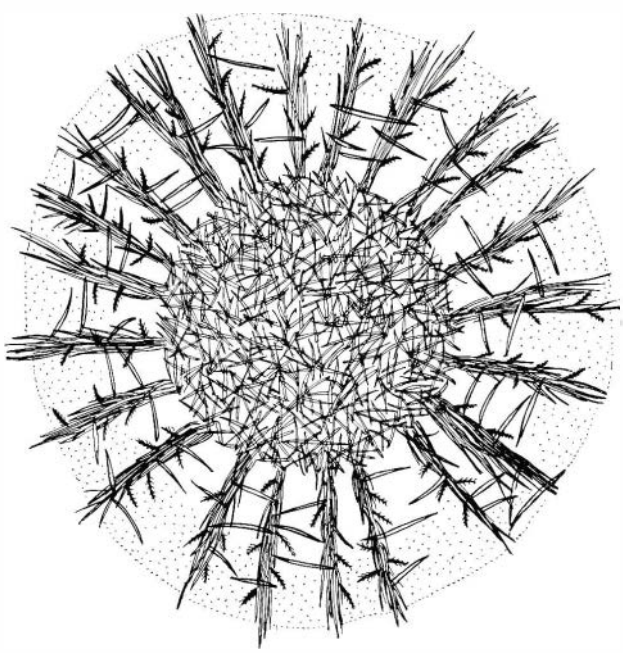


FIG. 2. *Raspailia inaequalis* Dendy. Diagrammatic transverse section of the holotype (B.M.23.10.1.138) to show the skeletal arrangement.

One point not easily dismissed is the presence in all the above-mentioned species of peculiar rhabdostylote acanthostyles. Topsent (1913b) erected *Raspaxilla* almost entirely because of the presence of such spicules, and it is difficult, within the concept of *Raspailia*, to think of these spicules as equivalent to the typical acanthostyles of such species as *R. viminalis* and *R. agminata*. (See also under *Raspailia topsenti*, p. 29).

Certain points of the skeletal morphology of *Raspailia inaequalis* are stressed here although the description given by Dendy is precise and accurate.

The extra-axial tracts arise at right angles to the axis and are plumose with echinating acanthostyles. There is no special development of tufts of styles to terminate the fibres; the terminal spicules do, however, extend for two-thirds of their length beyond the sponge surface.

DISTRIBUTION

East of North Cape, 70 fm.

Raspailia topsenti Dendy. (Pls. 6c, d; 7a; 10d; 18d; 19d. Fig. 3b)

Raspailia topsenti Dendy, 1924, p. 354, pl. XII, fig. 4; pl. XIV, fig. 14–16.
Raspaxilla topsenti, de Laubenfels, 1936, p. 102.
Axiamon novaezealandiae, Bergquist, 1961b, p. 187, fig. 11a–b.

MATERIAL EXAMINED

Poor Knights, 25 fm; Takatu Pt, 6 fm; North Channel, 5 fm; Rangitoto Channel, 7 fm; off Onetangi, 6 fm; Cook Strait, 50 fm; CIE 3 Mernoo Bank, 41 fm.

DESCRIPTION

A stiff, erect, dichotomously branched sponge distributed widely throughout New Zealand and common in shallow water in the Hauraki Gulf. In most specimens, some of the branches anastomose.

DIMENSIONS: A great number of specimens have been collected by dredging. They range from young specimens 5.0 cm high with a single dichotomy to large much-branched specimens 20.0 cm high and 15.0 cm wide. The axis is 1.0–1.5 cm in diameter; the branches 0.5–1.0 cm. in diameter.

COLOUR: In life, deep dull orange (yR 6/10); in spirit, light yellowish (Y 8/4) to pale red brown (Y–R 6/6).

TEXTURE: The whole body, except the hard woody axis, is firm but compressible.

SURFACE: A fine transparent dermal membrane stretches above the projecting ends of the extra-axial fibres. It is rarely intact after preservation, the surface becoming extremely hispid and velvety. In almost all specimens the oscules are visible, 0.4–0.8 mm in diameter, and of stellate form with branched channels draining into each. Pores approximately 0.1 mm in diameter are visible over the whole surface. In one specimen

(from Ti Point) the surface is relatively smooth and the oscules are aligned along the sides of the branches.

SKELETON: The axial skeleton is a very dense region of interlacing longitudinal spongin B fibres, 100.0–150.0μ in diameter, cored by stout styles arranged in 4–5 rows. One-third to half of the diameter of each branch is axial fibre. The extra-axial structures are soft and easily removed from the central portion.

Extra-axial spicule columns of stout styles arise from the axis and pass obliquely toward the surface. The origin and inner third of these columns is obscured by the great number of interconnections between adjacent tracts giving an almost reticulate appearance to the skeleton in this region. Toward the surface the individual fibres are more clearly defined. Feeble tufts of styles terminate the fibres and the dermal region contains brushes of slender styles or raphides.

These dermal spicule brushes vary in their constitution, number and arrangement from specimen to specimen. One specimen has a continuous palisade of raphide brushes (Ti Point), but usually they are sparse with 200–500 μ between tufts. Often a tuft is just one or two spicules lying tangentially in the dermal region.

The acanthostyles are rhabdostyles, and occur throughout the sponge, but are particularly abundant in the outer half of the extra-axial region.

Examination of the holotype confirms the skeletal arrangement described above.

SPICULES:

MEGASCLERES:

(a) STYLES smooth, stout, often curved sharply; oxeote and strongylote modifications occur.

(b) ACANTHOSTYLES small, spining only on the posterior half. They may be almost straight and curved sharply at the apex, but more commonly are flexed about one-third of the distance from the head.

(c) RAPHIDES OR FINE STYLES, long and slender: almost straight.

SPICULE DIMENSIONS:

Locality and Author	Styles (μ)	Acanthostyles (μ)	Raphides (μ)
Dendy, east of North Cape, 70 fm (type)	440 × 20.0	100 × 8.0	160 × 1.3
Cook St., 55 fm	217–392 × 11.0–17.0 (296 × 15.0)	82–106 × 5.7–6.9 (95 × 6.2)	120–290 × 1.1 (214 × 1.1)
Takatu Channel	260–400 × 12.0–18.0 (360 × 16.0)	80–120 × 5.7–7.0 (106 × 6.2)	130–260 × 1.3 (200 × 1.3)

REMARKS

Raspailia topsenti was referred by de Laubenfels (1936) to *Raspaxilla* Topsent. Dendy (1924) stated that *R. topsenti* was closely allied to *Raspaxilla phakellina* Topsent, but did not recognise *Raspaxilla* as being distinct from *Raspailia*.

Raspaxilla was based chiefly on the structure and arrangement of the rhabdostylote acanthostyles. It is not, as de Laubenfels contends, a genus lacking dermal spicules. *Raspaxilla phakellina* has long styles (1200–1400 μ) typical of a *Raspailia;* short fine dermal styles, tufted and grouped around longer spicules as in *Raspailia;* and is distinct only in having rhabdostyles and in lacking oxeas.

Raspailia topsenti lacks long styles and never has the dermal spicules grouped around a central style and therefore does not correspond in detail to the definition of *Raspaxilla*.

DISTRIBUTION

East of North Cape, 70 fm.

Raspailia compressa sp. nov. (Pls. 7b, 11a; Fig. 3a)

HOLOTYPE

Dom. Mus. Por. 30

MATERIAL EXAMINED

North-east of North Cape, 173° 04′ E, 34° 28′ S. 27 fm.

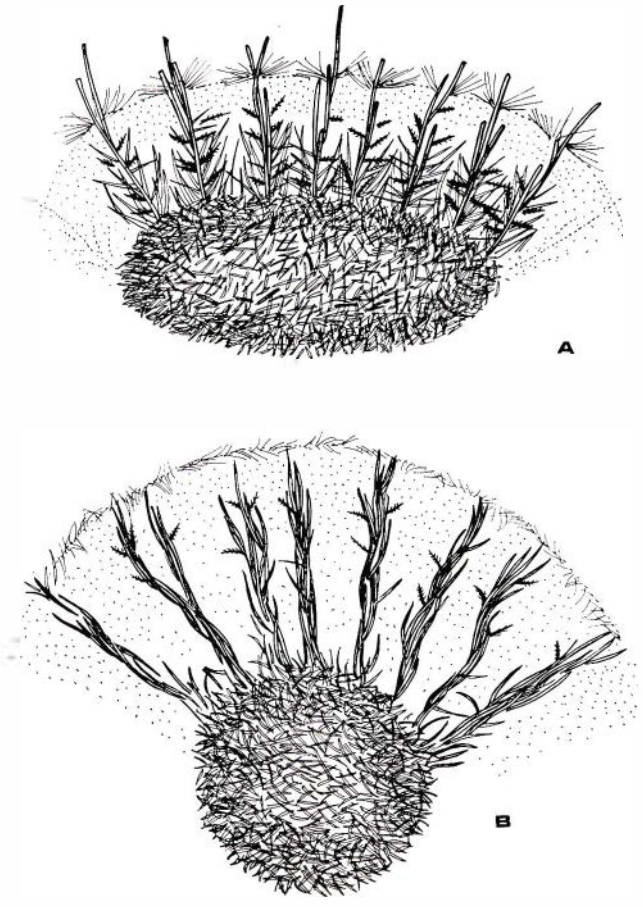


FIG. 3

A. *Raspailia compressa* nov. sp.
Diagrammatic transverse section to show the arrangement of the axial, extra-axial, dermal and auxiliary skeletal elements.

B. *Raspailia topsenti* Dendy
Diagrammatic transverse section to show the arrangement of the skeleton.

DESCRIPTION

A short, dichotomously branched sponge with flattened branches, oval in transverse section and tapering to points distally.

DIMENSIONS: Height 7.0 cm; Axis 5.0 mm–8.0 mm wide, 3.0 mm thick.

COLOUR: In life, bright yellow (Y 8/8); in spirit, grey-white (YG–Y 8/4).

TEXTURE: Firm and flexible.

SURFACE: The surface is extremely hispid, with the projecting long styles of the dermal spicule brushes. Below the level of these the general surface is hispid from projecting dermal styles and acanthostyles.

SKELETON: The axial skeleton is a dense interlacing mass of longitudinal spongin B fibres cored by short styles and making up half the diameter of each branch. Many spicules have a transverse or oblique disposition and give a pseudo-reticulate appearance to the axial column.

The extra-axial columns arise from the axis at about 70° but within a short distance are orientated at right angles. A few styles are present in the columns at their point of origin, but the echinating acanthostyles are profuse. The axis of each column is made up of one or two extremely long styles.

All extra-axial columns end in a tuft of acanthostyles approximately 300 μ below the surface. Long styles pass beyond this point, pierce the surface where they are surrounded by a tuft of fine dermal spicules (styles or oxeas), and extend for up to 600 μ beyond the surface.

There appear to be no acanthostyles in the axial region proper. They appear around the base of the extra-axial columns and constitute almost their entire spicule complement.

SPICULES:

MEGASCLERES:

(a) AXIAL STYLES or, occasionally, OXEAS; slightly curved to sharply flexed spicules.

(b) LONG EXTRA-AXIAL STYLES, straight or very slightly curved, occasionally strongylote.

(c) ACANTHOSTYLES, rhabdostyle type, spined in the distal half, sharply curved a third of the distance from the head. Straight forms are not infrequent.

(d) DERMAL OXEAS OR STYLES, almost fine enough to be raphides. Straight or slightly curved spicules.

SPICULE DIMENSIONS, see Table 7.

REMARKS

Partly spined, rhabdostylote acanthostyles are characteristic of the genera, *Aulospongus* Norman, *Echinaxia* Hallmann, and *Raspaxilla* Topsent. Four New Zealand species assigned to *Raspailia* have these spicules.

Aulospongus has a specialised tubular habit, and the acantho-rhabdostyles are arranged around the cylinder in a characteristic fashion. This can be regarded as a distinct genus close to *Raspailia*. *Aulospongus schoenus* de Laubenfels should be removed to *Thalysias*.

Raspaxilla was erected because of the presence of acantho-rhabdostyles in a sponge otherwise difficult to distinguish from *Raspailia*. *Raspailia compressa* corresponds closely in skeletal morphology with *Raspaxilla phakellina* except for the preponderance of acanthostyles in the extra-axial region, presence of oxeas, and the termination of the extra-axial columns some distance below the surface. Both species are atypical in *Raspailia* only because of the peculiar acanthostyles.

Echinaxia Hallmann lacks very long extra-axial spicules and has no oxeas or dermal brushes of fine spicules.

Echinaxia frondula and *Raspailia compressa* are similar in having a preponderance of acanthostyles in the extra-axial columns. This preponderance is particularly marked in *R. compressa*. It is notable that *Echinaxia frondula* is a flattened lamella and that *Raspailia compressa* has flattened branches.

On these features it appears impossible to separate *Raspaxilla* and *Echinaxia* from *Raspailia* on any grounds but acanthostyle morphology.

It would be desirable to examine the holotype of *Raspaxilla phakellina* Topsent before deciding to separate the four New Zealand *Raspailias* and *Echinaxia frondula* from *Raspailia*. For the present I regard *Raspaxilla* and *Echinaxia* as synonyms of *Raspailia*.

Raspailia compressa is distinct from other species of *Raspailia* possessing rhabdostyles, in the detailed structure of the extra-axial region, the preponderance of acanthostyles in the extra-axial columns, and in the large size of the acantho-rhabdostyles.

Genus **Clathriodendron** Lendenfeld

Raspailiidae with spicule complement similar to that of *Raspailia* (long subtylostyles, oxeas, acanthostyles) but having a reticulate spongin skeleton throughout, with no trace of axial condensation. Dermal spicules absent, interstitial spicules abundant.

TABLE 7. Spicule Dimensions of *Raspailia compressa*.

Locality	Axial Styles (μ)	Extra-axial Styles (μ)	Acanthostyles (μ)	Dermal Styles (μ)
North Cape 27 fm (holotype)	240–360 × 6.0–10 0 (290 × 9.0)	1020–1400 × 16–20 (1120 × 18.5)	220–360 × 6.5–9 0 (260 × 7.5)	260–300 × 2.0 (278 × 2 0)

TABLE 8. Spicule Dimensions of *Clathriodendron rubrum*.

Locality and Author	Styles (μ)	Tylostyles (μ)	Oxeas (μ)	Rods (μ)	Acanthostyles (μ)
Kirk, 1911, Denham Bay (holotype)	500 × 5.0	700 × 8.0	45.0	5.0	90 × 7.0
(Syntype)	2100–5400 × 7.0–12.0 (4200–18.8)	620–860 × 7.0–10.0 (740 × 9.0)	420–800 × 4.0–6.0 (550–5.2)	--	80–110 × 7.0–9.0 (94 × 8.2)

***Clathriodendron rubrum** Kirk

Clathriodendron rubrum Kirk, 1911, p. 580, fig. 6, pl. XXVII, fig. 1. Fell, 1950, p. 11.

REMARKS

I have examined the syntype slides, which, unfortunately, are very poor. The ascending fibres are 80.0–100.0 μ in diameter and the connecting fibres 50.0–70.0μ in diameter.

SPICULES

Most of the spicules are broken. The oxeas, much larger than indicated by Kirk, are definitely megascleres and of characteristic raspailid form. The small rods mentioned in the type description are foreign spicules belonging to an *Ancorina*.

SPICULE DIMENSIONS, see Table 8.

DISTRIBUTION

Denham Bay, Raoul Island.

Genus **Eurypon** Gray

Raspailiidae of permanently encrusting form in which the spicules tend to be tylote to subtylote. Because of the encrusting form the "echinating" spicules are usually vertical to the substrate.

Eurypon hispida sp. nov. (Pl. 12a)

HOLOTYPE

Dom. Mus. Por. 31.

MATERIAL EXAMINED

Leigh Reef, 20 fm.

DESCRIPTION

A thin encrustation, never more than 1.0 mm deep, over dead shells of *Glycymeris*.

COLOUR: In life, dull orange (rY–R6/6); in spirit, grey (rY 7/2).

TEXTURE: Brittle.

SURFACE: The extremely hispid, granular surface is the most notable macroscopic feature. The long stylote megascleres extend up to 800 μ beyond the surface. No inhalant or exhalant channels or apertures have been observed.

SKELETON: The skeleton is composed of a basal spongin B plate, in which are embedded vertical acanthostyles and large single subtylostyles. A few acanthostyles lie horizontal to the substrate, but this is likely to be an artifact of sectioning.

Fine styles or tylostyles are occasionally found in groups of 2–3 around the point where one of the large megascleres pierces the surface. These probably represent not a category of dermal megascleres, but developmental stages of the larger megascleres.

SPICULES:

MEGASCLERES:

(a) SUBTYLOSTYLES OR BULBOUS TYLOSTYLES, large, curved. Developmental forms have an extremely fine axis and a most pronounced tylote head. The tylote head is often asymmetric, having developed to one side of the axial filament. Incipient polytylote forms are found.

(b) ACANTHOTYLOSTYLES, strong spining around the axial end of the head and thus tending toward cladotylotes. The acanthostyles are straight or slightly curved, tapering along their whole length to a very sharp point.

SPICULE DIMENSIONS:

Locality	Subtylostyles or Tylostyles (μ)	Acanthostyles (μ)
Leigh Reef, 20 fm	304–1550 × 3.0–16.0 (1060 × 12.0)	70–352 × 3.0–12.0 (174 × 9.0)

REMARKS

De Laubenfels (1936) considered that the genus *Eurypon* Gray (type species, *Hymeraphia clavata* Bowerbank) differed from *Epicles* Gray (type species, *Hymedesmia radiata* Bowerbank) in having acanthose principal spicules. There is no basis in the literature for de Laubenfels's statement, and I consider *Epicles* a synonym of *Eurypon*. *Acantheurypon* Topsent, however, can be differentiated from *Eurypon* by its spined principal spicules.

Eurypon hispida is remarkably like the type species of the genus, *E. clavata*, differing only in having smaller main megascleres and in lacking dermal spicule brushes.

E. hispida is comparable to *E. bulboretorta* (Carter) from the Gulf of Manaar in having bulbous, asymmetric tylostyles. *Eurypon bulboretorta*, however, has tufts of fine

dermal oxeas. One further species needs mention, *E. graphidophora* (Hentschel) from South Australia. This differs from *E. hispida* in possessing dermal styles and in the morphology and size of the acanthostyles.

Discussion

The systematic position of the Raspailidae is difficult to define. Some authors (Hallman, 1914, 1917a; Levi, 1956) have argued their relationship to the axinellid complex, and certainly the habit, with frequent axial condensation, is like that of *Axinella*. The tufted arrangement of dermal spicules in some species, commonly of smaller oxeas around a long central style, is reminiscent of *Higginsia;* the presence of finely spined oxeas and styles in some species reinforces this comparison. Finally, Levi (1956) has established that *Raspailia pumila* is oviparous.

Other workers (Dendy, 1905, 1921; de Laubenfels, 1936) have been impressed with the presence of echinating acanthostyles of poecilosclerid type in many species of *Raspailia* and have used this to argue that the affinities of the group lie with the Ectyoninae (Dendy) or Myxilliformes and Microcioniformes (de Laubenfels, 1936).

Much detailed morphological evidence has been cited in support of both views. I think that much of the difficulty arises because it is almost impossible to derive a clear concept of *Raspailia* from the literature. There has been no extensive revision of the genus since 1912 and many new species have been described subsequently. It is clear that species allied to *Raspailia* (*Raspaxilla*) *phakellina* can be separated from *Raspailia* on the base of acanthostyle morphology. However, it is not clear that all such species could be transferred to the genus *Raspaxilla*.

This leaves within *Raspailia* species such as the type of the genus, *R. viminalis* Schmidt, which has acanthostyles of typically poecilosclerid form (here the comparison must be to the Clathriidae) in conjunction with tufted dermal spicules grouped around a long central style, long subtylostyles, moderate amounts of spongin B making up the axial fibres and ramose form.

There are other species, such as *Raspailia agminata*, which have no axial condensation, very little spongin fibre, and a modified arrangement of dermal spicules. The spiculation of *R. viminalis* and *R. agminata* is similar in detail.

Between these types are many species that are non-typical in one or two characters but conform in others. Because of the lack of information on the reproductive biology of almost all of the species concerned it is undesirable to subdivide the genus *Raspailia* at the present time. It is, however, true to say that the group fits most comfortably within the Axinellida, but each species must be viewed critically to ascertain whether it belongs in *Raspailia*.

Order **HALICHONDRIDA** Topsent

Family HALICHONDRIIDAE Gray

Genus **Halichondria** Fleming

Halichondria knowltoni Bergquist

Halichondria reticulata Brøndsted, 1924, p. 450, fig. 9.
Halichondria knowltoni Bergquist, 1961b, p. 186, fig. 10.

Material Examined

CI 26 Chatham Is., Waitangi Wharf. Can. Mus. M. Invert 4/63.

Description

Little can be added to the type description since my specimen is badly damaged.

Dimensions: 4.0 cm high; 3.5 cm long; 0.4 cm wide.

Colour: In life, biscuit (notation not given by collector); in spirit, yellow-white (rY 8/4).

Texture: Soft and spongy, easily torn.

Surface: Smooth with a marked dermal spicule reticulation.

Skeleton: Is very like that of the holotype; fibres are 60.0–168 μ (110.0 μ) in diameter.

Spicules:

megascleres:

(a) oxeas of two sizes: large, smooth slightly curved spicules forming the endosomal skeleton, and small similarly shaped spicules making up the dermal skeleton.

(b) small, similarly shaped spicules of the dermal skeleton.

spicule dimensions:

Locality and Author	Dermal Oxeas (μ)	Endosomal Oxeas (μ)
Brøndsted	140–360 × 6.0–10.0	165–540 × 8.0–15.0
*Wellington Harbour	(280 × 8.0)	(409 × 12.0)
Waitangi Wharf Chatham Is.	230–320 × 7.0–11.0 (295 × 8.4)	302–496 × 9.0–15.0 (420 × 12.7)

*Figures based on re-examination of type material.

Distribution

Wellington Harbour 5–10 fm.

Halichondria moorei Bergquist. (Frontispiece)

Halichondria moorei Bergquist, 1961a, p. 40, fig. 11 a, b.

Holotype

Dom. Mus. Por. 8.

Material Examined

Rangitoto I., Motutapu; Milford; Stanmore Bay; Gt Barrier; Russell; Westmere; Ladies Bay; Karaka Bay;

Parnell reef (all intertidal). Mt Maunganui, Bay of Plenty; Goat Island Bay, Leigh.

DESCRIPTION

A massive spreading sponge with marked surface reticulation and prominent oscules lying flush with the surface.

DIMENSIONS: Frequently greater than 35.0 cm long, 15.0 cm wide and up to 10.0 cm thick.

COLOUR: In life, pink-orange to dull yellow (rY 6/6), usually pink (rY–R 7/8).

TEXTURE: Soft and fleshy, rather fragile.

SURFACE: Irregularly wrinkled and folded, mamillate in some specimens. Oscules are up to 3.0 cm in diameter; pores are abundant and give a finely punctate appearance to the surface.

SKELETON: The endosomal skeleton is a confused mass of oxeas, which in patches tend to be radially disposed. The dermal skeleton is a tangential reticulation of oxeas not differentiated in size or form from the endosomal spicules. In the deeper parts of the sponge, traces of spongin B are found cementing groups of oxeas and surrounding reproductive structures.

SPICULES:

MEGASCLERES:

OXEAS, smooth, straight, not clearly divisible into two categories.

SPICULE DIMENSIONS:

Locality	Oxeas (μ)
Pt Chevalier (type)	300–800 × 5.0–17.0 (628 × 13.2)
Motutapu I.	339–750 × 6.2–17.3 (612 × 14.0)

REPRODUCTION

Developing embryos are present in most specimens from April to July. They are ellipsoid, 400.0–1600.0μ long, 110.0–400.0 μ in maximum diameter.

REMARKS

The distinctive characters of this species are the salmon pink to dull orange colour, combined with a mamillate surface.

Halichondria moorei is an extremely common sponge in the mid-tidal zone particularly in the inner Hauraki Gulf. At the type locality, Point Chevalier reef, it is a physiognomic species growing in crevices, under stones, and most abundantly around the edges of pools. It is associated most frequently with *Corallina officinalis* and *Hymeniacidon perleve*. The species is named after Dr Lucy B. Moore who first collected it.

Halichondria panicea (Pallas). (Pls. 7c, 19b)

RESTRICTED SYNONOMY

Spongia panicea Pallas, 1766, p. 388.

Halichondria panicea, Brøndsted, 1924, p. 451. Bergquist, 1961a, p. 41.

(For synonymy see Vosmaer 1932, p. 522. For segregation of *H. bowerbanki* synonyms see Hartmann, 1958, p. 24. For figures see Bowerbank, 1874, pl. XXXIX, XL.)

MATERIAL EXAMINED

Bay of Islands; Gt Barrier; Goat Island Bay; Narrow Neck, Pt Chevalier, Piha; Anawhata; Mayor I.; Menzies Bay (all intertidal) off Waiheke 6 fm; Rangitoto Channel 4 fm; Manukau Harbour 3–6 fm.

DESCRIPTION

This sponge varies considerably in form in New Zealand. Specimens from the east coast are massive or encrusting with delicate detachable dermal membrane and flush oscules. Specimens from more exposed stations on the west coast have a tough skin-like dermal membrane, with prominent, thick-lipped oscules raised and aligned along ridges. The latter specimens resemble that figured by Bowerbank (1874, pl. XL, fig. 3).

COLOUR: In life, yellow (rY 8/6) to dull orange (rY–R 6/8), or lemon yellow (gY 8/8) with khaki ridges (gY 8/4); in spirit, grey to white.

TEXTURE: Soft, easily torn.

SURFACE: Smooth or slightly corrugated with a characteristic dermal skeleton. Oscules are 0.8–2.0 mm in diameter.

SKELETON: The endosomal skeleton is made up of loose tracts of oxeas with no constant alignment. The clearly defined ectosomal region is composed of vertical tracts of smaller oxeas traversing extensive subdermal spaces and intersecting the dermal membrane where they fan out into brushes. The dermal membrane is 0.3–0.8 mm thick and has the characteristic skeletal arrangement figured by Hartman (1958, p. 35).

SPICULES:

MEGASCLERES:

(a) OXEAS of two sizes.

(b) STYLES, occasional in the ectosome and dermal membrane.

SPICULE DIMENSIONS:

Locality	Oxeas Dermal (μ)	Oxeas Endosomal (μ)	Styles (μ)
Milford	286–369 × 4.6–7.2 (297 × 5.1)	363–426 × 9.0–12.7 (387 × 10.2)	None present
Piha-Anawhata	290–350 × 3.4–5.7 (308 × 4.0)	305–387 × 5.7–11.5 (350 × 9.2)	170–290 × 4.0–6.2 (190 × 4.8)
Menzies Bay, Christchurch	318–470 × 4.0–5.7 (340 × 4.9)	342–490 × 5.7–9.2 (403 × 6.8)	193–314 × 4.6–5.2 (235 × 4.8)

REMARKS

Halichondria panicea is a common, intertidal species particularly on basalt and Waitemata sandstone substrates in sheltered northern localities. It is, however, more consistently found on loose shell substrates in shallow off-shore waters.

DISTRIBUTION

Arctic; Atlantic coasts of Europe and North America; Mediterranean; Azores; Antarctic; extreme south South America; Japan; Sea of Japan; New Zealand (Bay of Islands; New Plymouth, 8 fm).

***Halichondria punctata** nom. nov.

Halichondria incrustans Brøndsted, 1923, p. 117, fig. 1a, b.

REMARKS

De Laubenfels (1936, p. 133) indicated that *incrustans* is three times preoccupied in *Halichondria*. The name *H. punctata* is proposed to replace *H. incrustans* Brøndsted.

DISTRIBUTION

Port Ross; Auckland Is., intertidal.

***Halichondria intermedia** Brøndsted

Halichondria intermedia Brøndsted, 1923, p. 119, fig. 2.

REMARKS

Brøndsted was doubtful of the position of the species. As the type was unavailable for study, I cannot amplify the published description.

DISTRIBUTION

Carnley Harbour, 45 fm.

Genus **Trachyopsis** Dendy

Trachyopsis halichondrioides Dendy

RESTRICTED SYNONYMY:

Trachyopsis halichondrioides Dendy, 1905, p. 147, pl. X, fig. 10.
Halichondria rugosa, Bergquist, 1961b, p. 185, fig. 9a, b.

MATERIAL EXAMINED

CIE 3 Mernoo Bank, Chatham Rise, 41 fm.

REMARKS

This specimen was tentatively referred to *Halichondria rugosa*. Further study of the literature leaves little doubt that the sponge belongs in *Trachyopsis*. Whether *Trachyopsis* Dendy is a synonym of *Amorphinopsis* Carter as suggested by Burton (1959a) is debatable, but from the available evidence this is unlikely.

DISTRIBUTION

Indian Ocean; Phillipines; Australia.

Genus **Ciocalypta** Bowerbank

Ciocalypta polymastia (Lendenfeld). (Pls. 7d, 13c, 19a)

Stylotella polymastia Lendenfeld, 1888, p. 186, pl. IV, fig. 1.
Ciocalypta polymastia Hallmann, 1914, p. 353, fig. 7.

MATERIAL EXAMINED

North Channel 10 fm; Manukau Harbour, low tide to 6 fm. Kaipara Harbour, Maretahi Peninsula, low tide; Narrow Neck, Takapuna.

DESCRIPTION

The range in form is from a thick encrustation to a massive sponge, always with long finger-like projections from the upper surface. Encrusting forms are common on the rocky substrates of inner harbour reefs; massive forms on shell detritus of mud flats or offshore locations.

DIMENSIONS

Locality	Ostular Elevations Long (mm)	Ostular Elevations Short (mm)	Ostule Diameter (mm)
North Channel Kawau, 10 fm	30–38 × 8–12 (34×9)	2–10 × 2.5–5 (6.5×3.1)	2.5–3 (2.6)

COLOUR: In life, pale yellow (yY–R 7/10); in spirit, almost white.

TEXTURE: Firm, but compressible.

SURFACE: Smooth, but, on close examination, slightly hispid.

SKELETON: The skeletal arrangement is confused in the endosomal region; spicule tracts become definite nearer the surface. The dermal region contains tufts of small styles and some tangential styles. It is continuous over large subdermal cavities, between which tracts of large styles pass toward the surface. Small- and medium-sized spicules are abundant throughout the sponge but never in spicule tracts. Spongin B occurs in small quantities binding groups of spicules particularly near the base of the sponge.

SPICULES:

MEGASCLERES:

STYLES: three sizes, all of characteristic shape, the shaft tapering in the proximal quarter and often with a slight flexure (Hallmann, 1914, fig. 7).

SPICULE DIMENSIONS:

Locality	Subtylostyles Large (μ)	Subtylostyles Medium (μ)	Dermal Subtylostyles (μ)
North Channel, 10 fm	605–677 × 12.7–22.0 (635×16.2)	271–385 × 5.7–7.0 (328×6.5)	150–169 × 4.6 (159×4.6)

REMARKS

Australian and New Zealand specimens are alike in all details.

DISTRIBUTION

East coast of Australia (Lendenfeld).

Ciocalypta penicillus Bowerbank. (Pls. 8a, b; 19d; 20a)

RESTRICTED SYNONYMY:
Ciocalypta penicillus Bowerbank, 1864, p. 180, pl. XXX, fig. 360, 361. Dendy, 1896, p. 238.
Sigmaxinella papillata Brøndsted, 1923, p. 156, fig. 30.
Hymeniacidon novaezealandiae Brøndsted, 1924, p. 477, fig. 31.
Axinella colvilli Brøndsted, 1924, p. 474, fig. 27a, b.
Axiamon novaezealandiae De Laubenfels, 1936, p. 130.
Ciocalypta penicillus, Burton, 1959a, p. 264, Burton, 1959b, p. 50.

MATERIAL EXAMINED

Off Waiheke I. 8 fm; Shag Rock, 27 fm; Colville Channel, 20 fm; Bay of Plenty, 15 fm.

DESCRIPTION

A very distinctive sponge with lumplike base, which is produced above into many long fine, tapering fistules. It is often taken in dredge hauls in the Hauraki Gulf from muddy sand and shell deposits but usually only the broken fistules are obtained.

DIMENSIONS: See Table 9.

COLOUR: In life, pale yellow (rY 8/8); in spirit, greyish white.

TEXTURE: The base is firm but compressible and the fistules very crisp and delicate.

SURFACE: The surface is weakly hispid, and patterned with small irregular lumps with grooves between them, the lumps and grooves being less evident on the base than on the fistules. The grooves on the fistules are longitudinally disposed, and the ridges between may be up to 3.0 mm high. There are 4–6 ridges on each of the fistules, which are consequently star-shaped in section.

SKELETON: This is composed of dense columns of styles curving toward the surface. In the fistules these become a nearly solid axial core. The arrangement of spicule columns is obscured somewhat by spicules around and across the line of the columns. These interstitial and disoriented spicules are chiefly oxeas or smaller styles, but there are occasional short tracts of large styles at right angles to the main skeletal columns. The dermal layer is a dense, felted layer of tangential oxeas.

SPICULES:

MEGASCLERES:

(a) STYLES, of considerable size range, straight or slightly curved.

(b) OXEAS, always curved, often strongly flexed.

SPICULE DIMENSIONS:

Locality and Author	Oxeas (μ)	Styles (μ)
Brøndsted (*Axinella colvilli*), Little Barrier I., 30 fm	170–320 × 7.0–9.0	500–900 × 14.0–25.0
Waiheke I., 8 fm	164–370 × 6.9–10.0 (242 × 7.1)	314–860 × 10.0–25.0 (592 × 18.6)
Campbell Plateau	220–500 × 8.0–12.0 (372 × 10.2)	360–920 × 10.0–28.0 (682 × 20.0)

REMARKS

There are no noteworthy differences between New Zealand, Australian, and Northern Hemisphere specimens of this almost cosmopolitan sponge.

The synonymy of *Sigmaxinella papillata* Brøndsted with *Ciocalypta penicillus* requires some comment. The type description of *S. papillata* refers to sigmas and microxeas. These spicules are contaminants from *Biemna stylotata*. Two other of Brøndsted's species are synonyms of *Ciocalypta penicillus;* they are *Axinella colvilli* Brøndsted and *Hymeniacidon novaezealandiae* Brøndsted. *Hymeniacidon novaezealandiae* was referred to *Axiamon* Hallmann by de Laubenfels (1936), but there is no basis for this opinion.

Campell Plateau specimens differ from northern New Zealand specimens in having slightly larger spicules and a smoother surface. The longitudinal furrows on the fistules are just visible externally but do not cause grooving.

DISTRIBUTION

Cosmopolitan.

Family HYMENIACIDONIDAE de Laubenfels

Genus **Hymeniacidon** Bowerbank

Hymeniacidon hauraki Brøndsted. (Pls. 8c, d; 17b)

Hymeniacidon hauraki Brøndsted, 1924, p. 477, fig. 30.
Axiamon erecta Bergquist, 1961a, p. 41, fig. 12.

MATERIAL EXAMINED

Takatu Pt, 6 fm; North Channel 10 fm; Kawau I. 2 fm.

DESCRIPTION

A massive sponge with numerous fine conulose processes. Alive, and immediately after fixation, it produces great amounts of slime.

DIMENSIONS: See Table 10.

COLOUR: In life, bright orange (Y–R 6/12); in spirit, pale dull orange (yY–R 7/6).

TEXTURE: Soft and fleshy.

SURFACE: This is jagged, with irregular rows of conules, and hispid since each conule is lifted by a brush of dermal styles that pierce its tip. No pores or oscules have been observed.

SKELETON: The endosomal skeleton is a confused mass of styles slightly organised into ascending tracts. The dermal membrane, 0.1 mm thick, appears as a transparent skin-like film over extensive subdermal cavities. The conules are elevations of this membrane, each with a core of one to ten styles.

TABLE 9. Dimensions of *Ciocalypta penicillus*.

Locality and Author	Height (cm)	Height of Base (cm)	Width of Base (cm)	Length of Fistules	Diameter of Fistules (mm)	Dermal Membrane (mm)	Spines (mm)
Brøndsted, Little Barrier I.	9.5	—	—	55.0 mm	12.0	..	4.0
Waiheke I.	9.0	2.5	5.5	1.5–6 cm (4.3 cm)	2.0–6.0 basally	0.5	—
Campbell Plateau, 46 fm, B 176	5	2.0	5.0	1.9–4.5cm (3.2 cm)	4.0–8.0 basally	1.0	—

TABLE 10. Dimensions of *Hymeniacidon hauraki*.

Locality and Author	Height (cm)	Width (cm)	Length (cm)	Height of Processes (cm)	Diameter of Processes (mm)	Conule Height (mm)
Brøndsted, North Channel, (holotype)	4.5	—	—	—	—	1.0
Takatu Pt, 6 fm	2.5 and 9.0	2.0 and 4.8	2.0 and 11.0	0.5–2.5	2.0–4.0 (including conules)	up to 1.0

SPICULES:

MEGASCLERES:

STYLES, smooth, evenly curved, of uniform diameter throughout.

SPICULE DIMENSIONS:

Locality and Author	Styles (μ)
Brøndsted, North Channel (type)	400–800 × up to 14.0
Takatu Channel, 6 fm	605–847 × 5.7–15.0 (720 × 12.8)

DISTRIBUTION: North Channel, Kawau I. 10 fm.

***Hymeniacidon indistincta** Brøndsted

Hymeniacidon indistincta Brøndsted, 1923, p. 146, fig. 24.

DISTRIBUTION

Masked I., Carnley Harbour (low tide).

Hymeniacidon perleve (Montague) (Pls. 9a, d; 20b, c)

RESTRICTED SYNONYMY

Spongia perleve Montague, 1818, p. 86.
Hymeniacidon caruncula Bowerbank, 1866, p. 166.
Hymeniacidon sanguinea Bowerbank, 1866, p. 168.
Hymeniacidon perlevis, Burton, 1956, p. 135; Burton. 1959b, p. 47.

MATERIAL EXAMINED

Tom Bowling Bay; Spirits Bay; Russell; Stanmore Bay; Whangarei Heads; Gt Barrier; Rangitoto; Motutapu; Noises Is; Milford; Narrow Neck; Stanley Bay; Pt Chevalier; Ladies Bay; Cape Colville; Piha; Anawhata. (All intertidal).

DESCRIPTION

A thin or thickly encrusting sponge, which varies greatly in form according to habitat. In areas of considerable exposure (Tom Bowling Bay; Piha; Gt Barrier) it is spreading and smooth. In sheltered or moderately exposed localities, where it often occurs with *Corallina officinalis*, *Hymeniacidon perleve* has erect processes springing from a thin basal mat. The processes may be smooth or spiny. *Hymeniacidon perleve* is a common sponge in the intertidal region in the north of New Zealand.

DIMENSIONS: Length up to 6.0 cm, width up to 4.0 cm, thickness up to 1.8 cm. Processes 0.8–2.0 cm high, 0.1–0.25 cm wide.

COLOUR: In life, dull orange-yellow (rY 7/8) throughout, or brownish externally (Y–R–Y 5/4) and brick-orange internally (rY–R 5/8); in spirit, pale yellowish to white, or reddish (rY–R 7/6).

TEXTURE: Soft and fleshy.

SURFACE: Uneven owing to extensive subdermal cavities into which the dermal membrane sinks giving a characteristic wrinkled appearance. Oscules are elevated on low cones or on digitate processes and are 0.5–1.5 mm in diameter. The oscular cones, when present, are open down one side and rolled inward. The point of inrolling marks the entry of a single large channel from the subdermal spaces.

LARVAE: Larvae are found in mid-tidal specimens from February to April.

SKELETON: The endosomal skeleton is a confused mass of styles not organised into spicule tracts. The dermal membrane is thick (1.0 mm) and skinlike but contains no spicules.

SPICULES:

MEGSACLERES:

STYLES, smooth, straight, or slightly curved, with somewhat expanded, rounded heads. The spicules are narrow behind the head and widest in the middle.

SPICULE DIMENSIONS:

Locality and Author	Styles (μ)
H. caruncula Bowerbank	218×3.0
Pt Chevalier	189–329 × 4.6–9.2 (272×7.6)
Tom Bowling Bay, North Cape	220–314 × 1.6–5.7 (260×4.6)

REMARKS

The identification of this material as the cosmopolitan *H. perleve* and my selection of *H. perleve* as the correct specific name in preference to *H. sanguinea* or *H. caruncula* are based on advice received from Dr M. Burton. I have not seen the type of *H. perleve*, but Dr Burton has studied the Montague and Bowerbank types and states (pers. comm.) that Bowerbank's species are synonyms of *H. perleve*.

DISTRIBUTION: Cosmopolitan.

Hymeniacidon racemosa Brøndsted

Hymeniacidon racemosa Brøndsted, 1924, p. 476, fig. 29.

MATERIAL EXAMINED

Hen and Chickens Is., 30 fm; North Channel 10 fm.

REMARKS

Both specimens are fragments, consisting of the upper portions of delicate, anastomosing, somewhat flattened processes, which give no idea of the morphology of the whole sponge. The surface is slightly hispid; the dermal membrane 0.15 mm thick; the subdermal spaces well developed. The texture is elastic, the colour yellow (Y 7/8).

SPICULES:

MEGASCLERES:

STYLES, smooth, straight or slightly curved spicules, broadly rounded anteriorly, slightly narrowed behind the head.

SPICULE DIMENSIONS:

Locality and Author	Styles (μ)
Brøndsted	300×7.0–8.0
Three Kings Is., 65 fm (holotype)	
North Channel, 10 fm	220×450 × 5.7–10.4 (340×7.6)

DISTRIBUTION

Three Kings Is., 65 fms.

Hymeniacidon spherodigitata sp. nov. (Pls. 9b, c; 11b; 20d)

HOLOTYPE

Dom. Mus. Por. 32.

MATERIAL EXAMINED

North Channel, 8 fm.

DESCRIPTION

Three specimens, identical except externally, were collected. The holotype is subspherical, with short pointed processes arising obliquely all over the surface, and was growing upon a dead shell of *Glycymeris laticostata*. The other two specimens are roughly spherical, with stout pointed processes arising from their bases, and were growing attached to rocks. This sponge exudes a considerable amount of slime when removed from the water.

DIMENSIONS: See Table 11.

COLOUR: In life, bright red (rY–R 5/10) to (rY–R 6/10); in spirit, pale whitish yellow.

TEXTURE: Firm and elastic.

SURFACE: This is granular and shaggy with numerous projections. Oscules apparent in one specimen, are 1.0–3.6 mm in diameter, and are located near the apex of the digitate processes.

SKELETON: The skeleton is a confused mass of styles showing faint organisation into tracts in the subdermal region, where the spicules curve outward, obliquely to the dermal membrane.

TABLE 11. Dimensions of *Hymeniacidon spherodigitata*.

Habit	Height (cm)	Length (cm)	Width (cm)	Height of Processes	Width of Processes (mm)	Dermal Membrane (mm)
Spherical shaggy (holotype)	11.0	9.0	9.2	1.0–5.0 mm	1.0–3.0	0.3
Digitate	7.0	10.0	8.0	4.5–6.6 cm	3.0–7.0	0.25

SPICULES:

MEGASCLERES:

STYLES, smooth spicules, broadly rounded anteriorly and slightly to strongly curved. Otherwise, identical fine styles occur, but do not form a special dermal skeleton.

SPICULE DIMENSIONS:

Locality	Styles (μ)
North Channel, 8 fm (holotype)	556–750 × 11.5–18.0 (620 × 15.0)

REMARKS

This species is a typical *Hymeniacidon* in spiculation and in having fleshy, slimy texture. No other Australasian species have the latter character combined with a massive habit; nor are any other species of *Hymeniacidon* like this one in spicule dimensions, colour, and habit.

***Hymeniacidon conica** (Kirk)

Stylohalina conica Kirk, 1909, p. 539, pl. XXV, fig. 1–3.
Hymeniacidon conica, de Laubenfels, 1936, p. 139.

REMARKS

De Laubenfels (1936) pointed out that *Stylohalina* as defined by Kirk was indistinguishable from *Hymeniacidon*. Burton (1932, 1940) has referred species to *Stylohalina* but has not redefined the genus.

DISTRIBUTION

Perseverance Harbour; Campbell I. (intertidal).

Genus **Acanthella** Schmidt

***Acanthella crista-galli** (Dendy). (Pl. 13d)

Tedania crista-galli Dendy, 1924, p. 365, pl. XII, fig. 8.
Acanthella crista-galli, Burton, 1932, p. 346.

REMARKS

Burton (1932), in revising *Tedania*, suggested that *T. crista-galli* be removed to the Axinellidae. Dendy (1924) stated that the species approached very closely to *Acanthella* in skeletal disposition.

If, however, the type of *Acanthella* is *A. acuta* Schmidt, there is little resemblance beyond the possession of long styles, fleshy texture, and conulose surface. In *A. crista-galli* there is no trace of axial specialisation, very little spongin, and the skeletal tracts are poorly organised.

DISTRIBUTION

Spirits Bay, 11–20 fm.

REFERENCES

BERGQUIST, P. R. 1967: Additions to the Sponge Fauna of the Hawaiian Islands. *Micronesia 3:* 159–74.

BERGQUIST, P. R. 1961a: A collection of Porifera from Northern New Zealand with descriptions of 17 new species. *Pacif. Sci. 15 (1):* 33–48.
——— 1961b: The Demospongiae of the 1954 Chatham Is. Expedition. *Bull. N.Z. Dep. scient. ind. Res. 139 (5):* 169–206.
——— 1968: The marine fauna of New Zealand: Porifera, Demospongiae. Part 1. Tectractinomorpha and Lithistida. *Bull. N.Z. Dep. scient. ind. Res. 188.*

BOWERBANK, J. S. 1864: "A Monograph of the British Spongiidae I". Ray Society, London. 290 pp.
——— 1866: "A Monograph of the British Spongiidae II". Ray Society, London. 388 pp.
——— 1874: "A Monograph of the British Spongiidae III". Ray Society, London. 360 pp.

BRØNDSTED, H. V. 1923: Sponges from the Auckland and Campbell Is. Papers from Dr Th. Mortensen's Pacific Expedition 1914–16. *Vidensk. Meddr dansk naturh. Foren. Kbh. 77:* 117–67.
——— 1924: Sponges from New Zealand. Part I. Papers from Dr Th. Mortensen's Pacific Expedition 1914–16. *Ibid. 81:* 435–83.

BURTON, M. 1928: Report on some deep sea sponges from the Indian Museum collected by the R.I.M.S. *Investigator. Rec. Indian Mus. 30 (1):* 109–38.
——— 1930: Norwegian sponges from the Norman collection. *Proc. zool. Soc. Lond. (2):* 487–546.

BURTON, M. 1932: Sponges. "*Discovery*" *Rep. 6:* 237–392.
——— 1934: Sponges. *Scient. Rep. Gt Barrier Reef Exped. 14:* 513–614.
——— 1956: The sponges of West Africa. *Atlantide Rep. 4:* 111–47.
——— 1959a: Sponges. *Scient. Rep. John Murray Exped. 1933–34, 10 (5):* 151–281.
——— 1959b: Spongia. *Zool. Iceland 2 (3 and 4):* 1–71.

CARTER, H. J. 1881: Supplementary report on specimens dredged up from the Gulf of Manaar. *Ann. Mag. nat. Hist. 5 (7):* 361–85.

DENDY, A. 1895–1896: Catalogue of non-calcareous sponges, collected by J. Bracebridge Wilson in the Neighbourhood of Port Phillip Heads. Part II. *Proc. R. Soc. Vict. 2 (8):* 14–51.
——— 1897a: Ibid. Part III. *Proc. R. Soc. Vict. 2 (9):* 230–59.
——— 1897b: On the sponges described in Dieffenbach's "New Zealand . . .". *Trans. N. Z. Inst. 30:* 316–20.
——— 1905: Report on the sponges collected by Professor Herdman at Ceylon in 1902. Herdman Rep. Pearl Oyster Fisheries Gulf of Manaar. Suppl. XVIII: 57–246.
——— 1921: Report on the Sigmatotetraxonida collected by HMS *Sealark* in the Indian Ocean. *Trans. Linn. Soc. Lond. 18 (1):* 1–164.
——— 1924: Porifera. Part I. Non-Antarctic sponges. *Br. Antarct. Terra Nova Exped. 1910, 6 (3):* 269–392.

DENDY, A.; FREDERICK, L. M. 1924: On a collection of sponges from the Abrolhos Is., West Australia. *J. Linn. Soc. Zool. 35:* 477–519.

FELL, H. B. 1950: The Kirk collection of sponges (Porifera) in the Zoology Museum, Victoria University College. *Zool. Publs Vict. Univ. Wellington, 4.* 1–12, pl. 1.

GRAY, J. E. 1843: Radiata. *In* Dieffenbach, E., "Travels in New Zealand, with Contributions to the Geography, Geology, Botany, and Natural History of that Country". 2 vols. John Murray, London. (Vol. 2, p. 264, Fauna of New Zealand.)

HALLMANN, E. F. 1914: A revision of the monaxonid species described as new in Lendenfeld's "Catalogue of the sponges in the Australian Museum". *Proc. Linn. Soc. N.S.W. 39 (1):* 263–315. *39 (2):* 327–76; *39 (3):* 398–446.
——— 1917a: A revision of the genera with microscleres included, or provisionally included in the family Axinellidae; with descriptions of some Australian species. *Ibid. 41 (1):* 453–91; *41 (2):* 495–552; *41 (3):* 634–75.
——— 1917b: On the genera *Echinaxia* and *Rhabdosigma. Ibid. 42 (2):* 391–404.

HARTMAN, W. D. 1958: Natural History of the Marine Sponges of Southern New England. *Bull. Peabody Mus. nat. Hist. 12:* 1–155.

HENTSCHEL, E. 1912: Kiesel-und Hornschwamme der Aru-und Kei-Inseln. *Abh. senkenb. naturforsch. Ges. 34:* 291–448.

KIRK, H. B. 1909: Two sponges from Campbell Island. *In* Chilton, C. (Ed.) "The Subantarctic Islands of New Zealand", pp. 574–81, pl. XXVII.
——— 1911: Sponges collected at the Kermadec Island by Mr W. R. B. Oliver. *Trans. N. Z. Inst. 43:* 574–81.

KIRKPATRICK, R. 1903: Description of South African sponges. Part III. *Bull. Cape Good Hope Dep. Agric. 14. Mar. Invest. S. Afr. 11:* 233–64

LAUBENFELS, M. W. de 1936: A discussion of the sponge fauna of the Dry Tortugas in particular and the West Indies in general, with material for a revision of the families and orders of the Porifera. *Publs Carnegie Instn No. 467. Pap. Tortugas Lab. 30.* 225 pp.
——— 1950: The Porifera of the Bermuda Archipelago. *Trans. zool. Soc. Lond. 27 (1):* 1–154.
——— 1954: The sponges of the West Central Pacific. *Ore. St. Monogr. Stud. Zool. 7:* 1–306.

LENDENFELD, R. von 1888: "Descriptive Catalogue of the Sponges in the Australian Museum, Sydney". London. Pp. I–xvi and 1–260.

LEVI, C. 1953: Sur une nouvelle classification des Demosponges. *C. r. Acad. Sci. Paris, 236:* 853–5.
——— 1956: Etude des *Halisarca* de Roscoff. Embryologie et systematique des Demosponges. *Archs Zool. exp. gén. 93:* 1–181.

LIACI, L.; SCISIOLI, M. 1967: Osservationi sulla maturazione sessuale di un Tetractinellide: *Stelletta grubii* O.S. *Arch. zool. Ital. 52:* 169–76.

MONTAGU, G. 1818: An essay on sponges, with descriptions of all species that have been discovered on the coasts of Great Britain (1812). *Mem. Werner Soc. Edinb. 2:* 67–122, pls 3–16.

MUNSELL, A. 1942: "Book of Colour". Pocket edn. 2 vols. Munsell Color Co. Inc. Baltimore, Maryland.

PALLAS, P. S. 1766: "Reise durch verschiedene Provinzen des Russichen Reichs". Vol. 3, St. Petersburg.

SCHMIDT, E. O. 1862: "Die spongien des Adriatischen Meeres". Leipzig. 88 pp. 7 pls.

SOLLAS, W. J. 1888: Report on the Tetractinellida . . . *Rep. scient. Results explor. Voyage Challenger Zool. 25.* 458 pp. 44 pls., map.

THIELE, J. 1898: Studien uber Pazifische Spongien: I. *Zoologica Stuttg. 24:* 1–72.
——— 1905: Die Kiesel-und Hornschwamme der Sammlung Plate. *Zool. Jb. Suppl. 6:* 407–96.

TOPSENT, E. 1913b: Spongiaires de l'Expedition Antarctique Nationale Ecossaise. *Trans. R. Soc. Edinb. 49:* 579–643.
——— 1917: Spongiaires. *Deuxième Exped. Antarct. Fr.:* 1–88.
——— 1925: Etude de Spongiaires du Golfe de Naples. *Archs Zool. exp. gén. 63:* 623–725.

TOPSENT, E. 1928: Spongiaires de l'Atlantique et de la Mediterranean provenant des croisieres du Alb. I de Monaco. *Résult. Camp. scient. Prince Albert I. 74:* 1–376.
——— 1930: Eponges de Lamarck Conservees au Museum de Paris. *Archs Mus. natn. Hist. nat., Paris 5:* 1–56.

VOSMAER, G. C. J. 1912: On the distinction between the genera *Axinella, Phakellia, Acanthella* a.o. *Zool. Jb. Suppl. 15 (1):* 307–22, pl. 15 and 16.
——— 1932: "The Sponges of the Bay of Naples. Porifera Incalcaria". Ed. by G. S. Vosmaer-Roëll and M. Burton. The Hague. 1932–1935. 3 vols. pp. 828 pp.

WATANABE, Y. 1957: Development of *Tethya serica* Lebwohl, a tetraxonian sponge. I. Observations on morphological changes. *Nat. Sci. Rep. Ochanomizu Univ. 8:* 97–104.

PLATES

PLATE 1

A. *Homaxinella erecta* (Brøndsted). Takatu Point, 6 fm.
B. *Homaxinella erecta* (Brøndsted). Shag Rock, 6–10 fm.
C. *Axinella australiensis* nov. sp. Poor Knights Is., 25 fm. Holotype.
D. *Axinella australiensis* nov. sp. Alderman I., 56 fm. (Juvenile.)

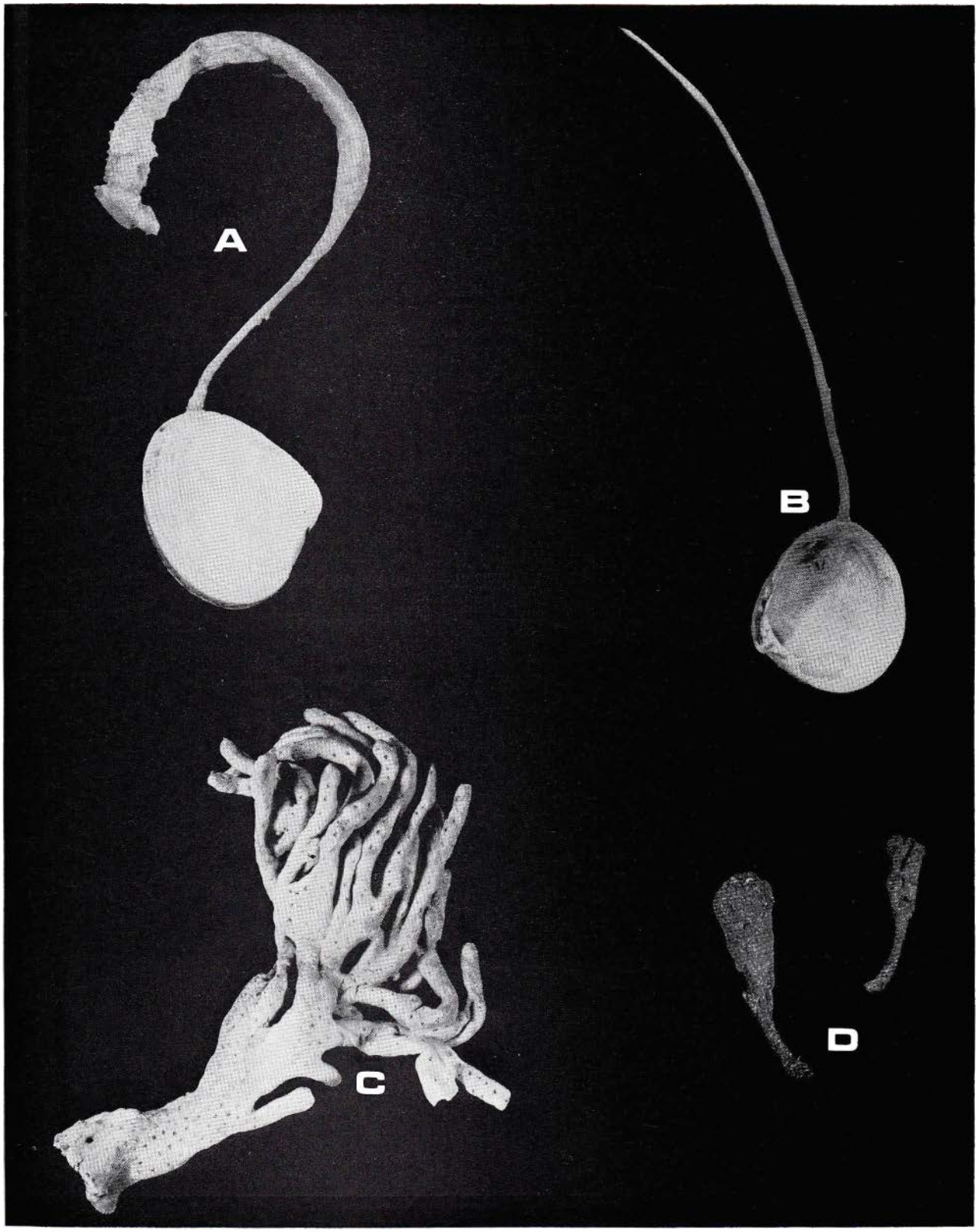


PLATE 3

A. *Pararhaphoxya pulchra* (Brøndsted). Carnley Harbour, 45 fm. Holotype (as *Sigmaxinella pulchra* Brøndsted.)
B. *Phakellia dendyi* nov. sp. Cape Kari Kari, 30 fm. Holotype.
C. *Phakellia dendyi* nov. sp. Alderman I., 56 fm. Paratype.
D. *Phakellia dendyi* nov. sp. Cook Strait, 40–100 fm. Paratype.

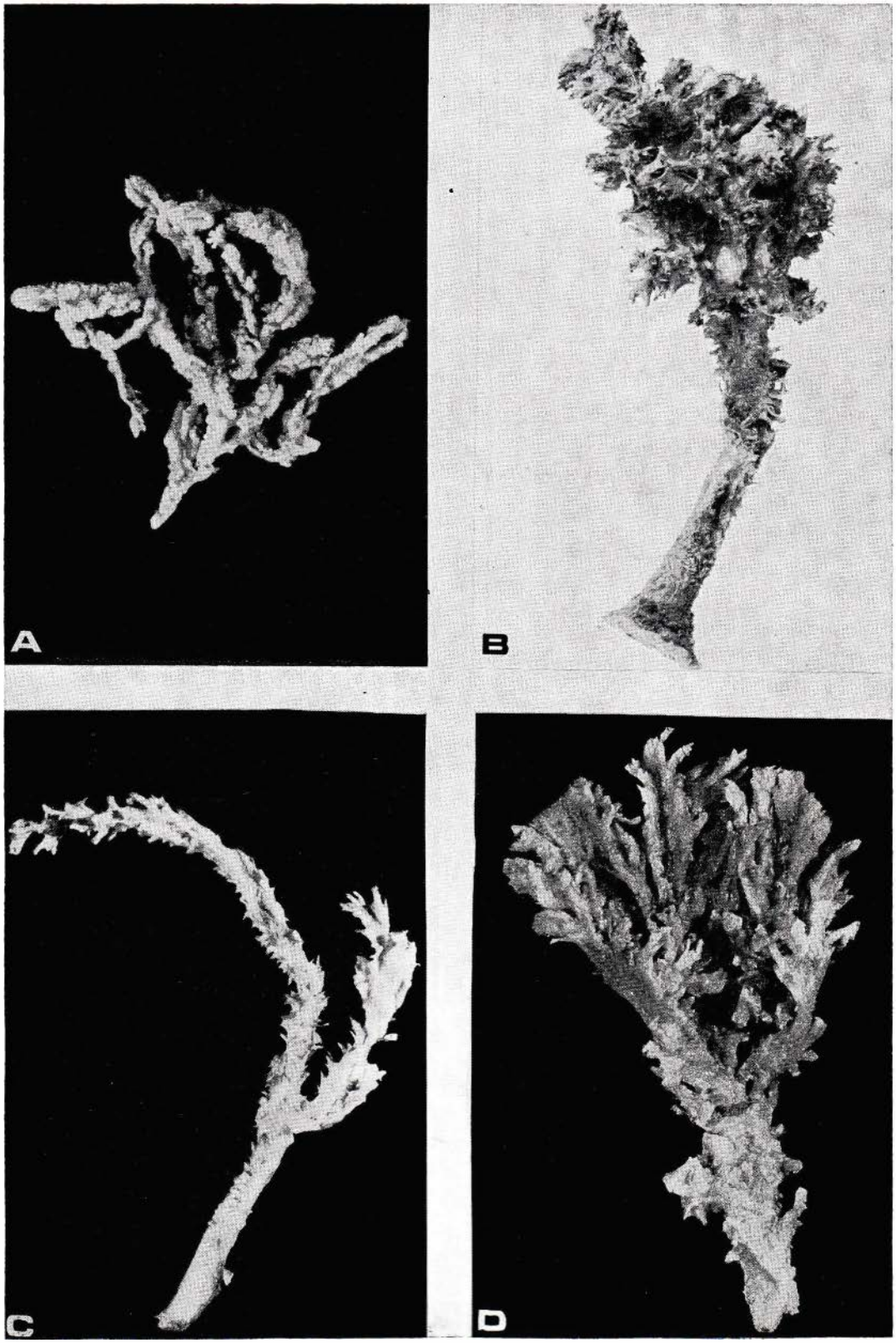


PLATE 4

A. *Rhaphoxya (Acanthella) cactiformis* (Carter). Holotype (B.M.86.12.15.91.)
B. *Ceratopsion cuneiformis* nov. sp. Three Kings Is., 30–60 fm. Holotype.
C. *Pseudaxinella australis* nov. sp. Takatu Point, 6 fm. Holotype.

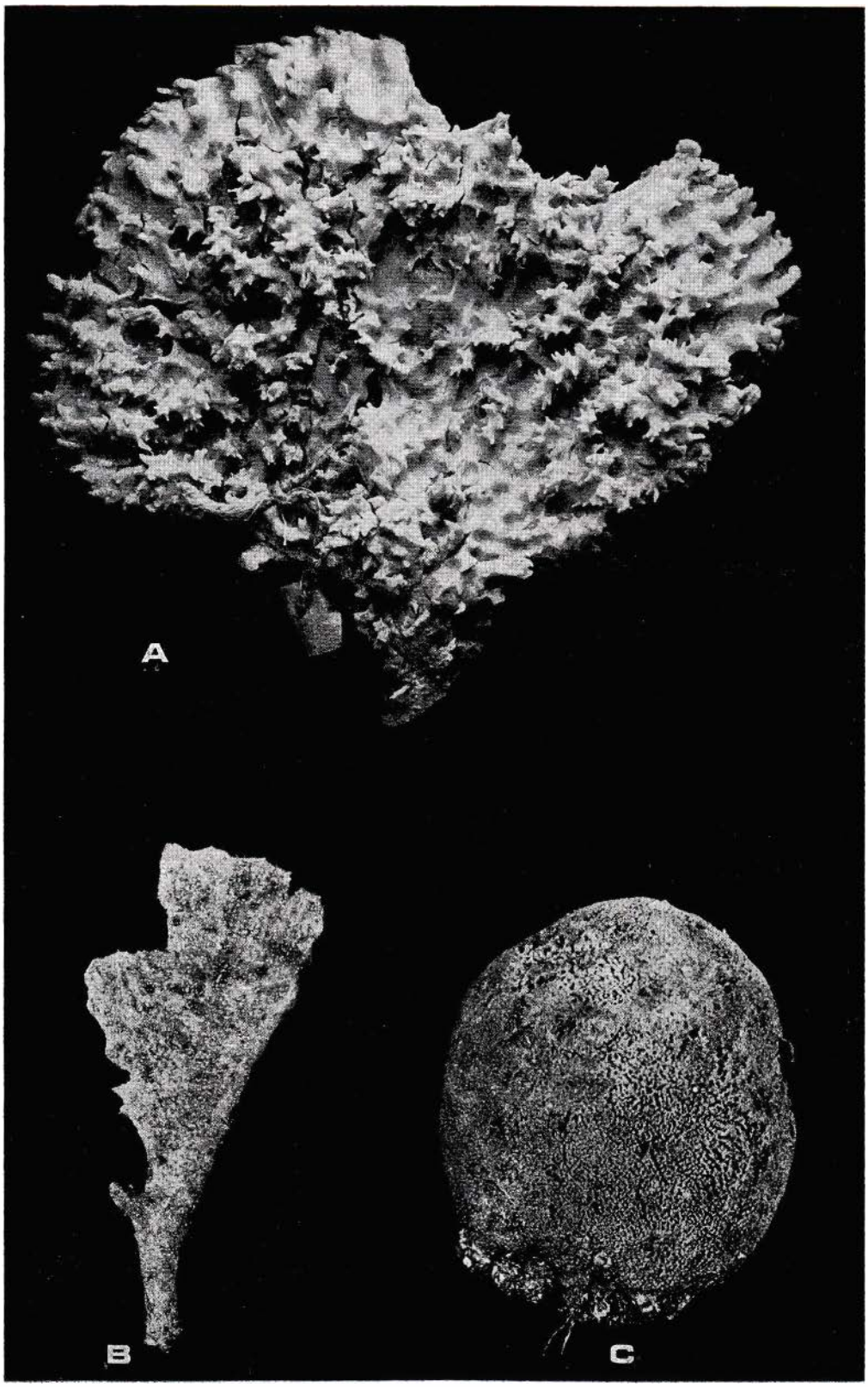


PLATE 5

A. *Trachycladus stylifer* Dendy. North Cape, 55 fm.
B. *Acanthoclada prostrata* nov. sp. North Channel, 10 fm. Holotype.
C. *Biemna flabellata* nov. sp. Three Kings Is., 30–60 fm. Paratype.
D. *Biemna stylotata* (Brøndsted). Holotype (as *Sigmaxinella stylotata* Brøndsted).

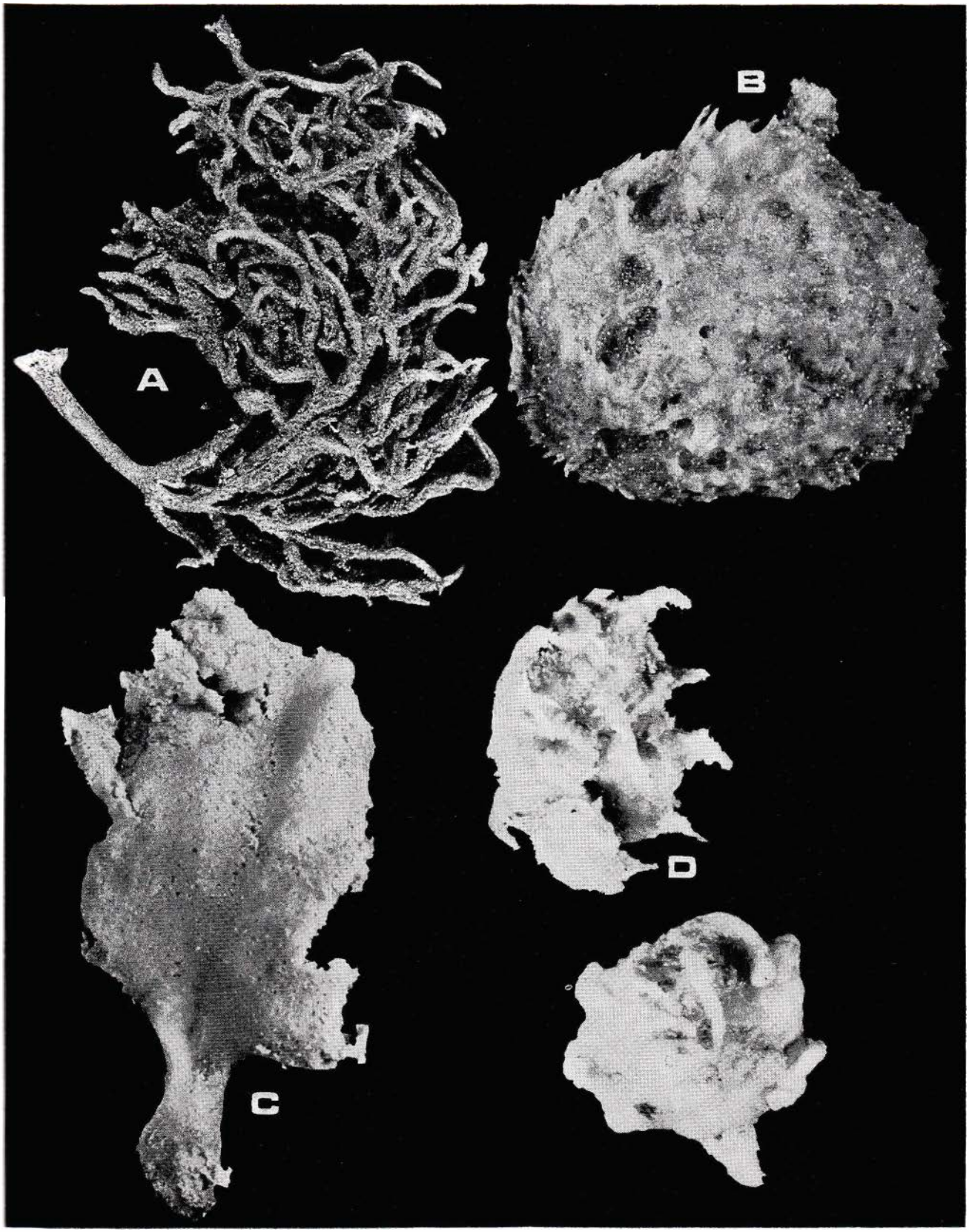


PLATE 6

A. *Raspailia agminata* Hallmann. Pt. Chevalier Reef.
B. *Raspailia flaccida* nov. sp. Menzies Bay, 60 fm. Holotype.
C. *Raspailia topsenti* Dendy. Ti Point, 3 fm.
D. *Raspailia topsenti* Dendy. Takatu Point, 6 fm.

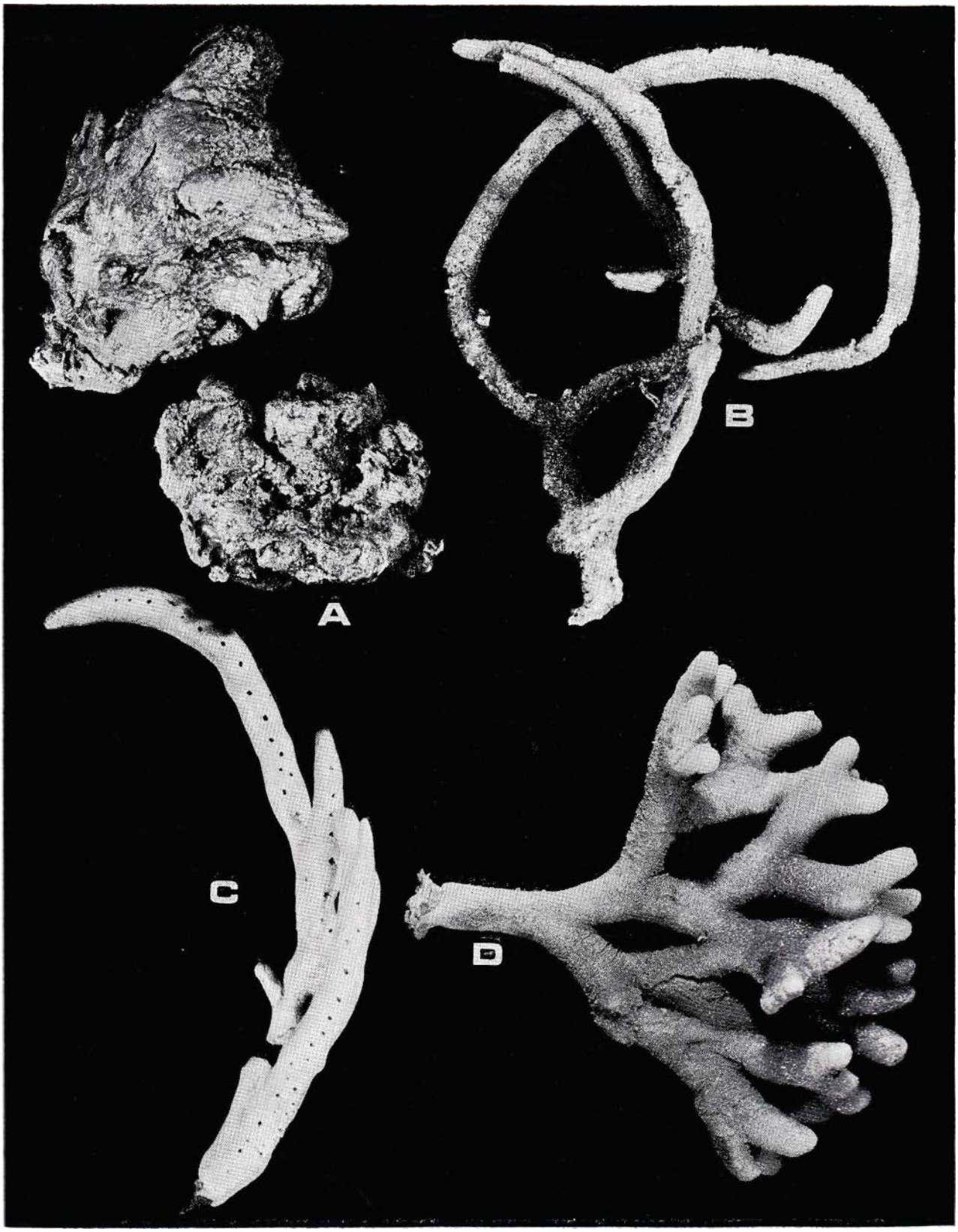


PLATE 7

A. *Raspailia topsenti* Dendy. Cook Strait, 50 fm.
B. *Raspailia compressa* nov. sp. N.E. of North Cape, 27 fm. Holotype.
C. *Halichondria panicea* (Pallas). Manukau Harbour, 3–6 fm.
D. *Ciocalypta polymastia* (Lendenfeld). North Channel, 10 fm.

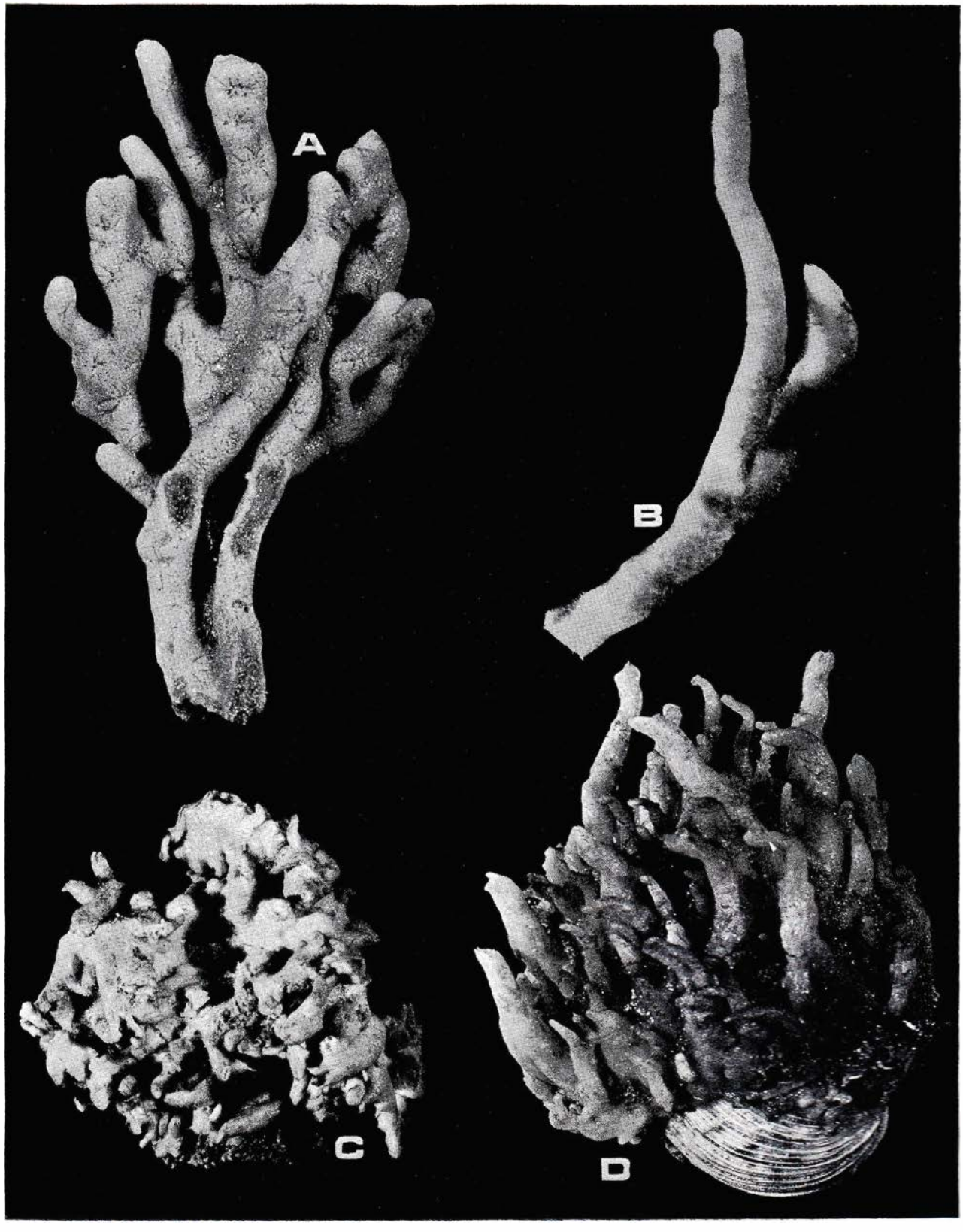


PLATE 8

A. *Ciocalypta penicillus* Bowerbank. Waiheke I., 8 fm.
B. *Ciocalypta penicillus* Bowerbank. Carnley Harbour, 45 fm. (Holotype of *Sigmaxinella papillata* Brøndsted.)
C. *Hymeniacidon hauraki* Brøndsted. North Channel, 10 fm.
D. *Hymeniacidon hauraki* Brøndsted. Takatu Point, 6 fm. Large specimen, cut in section.

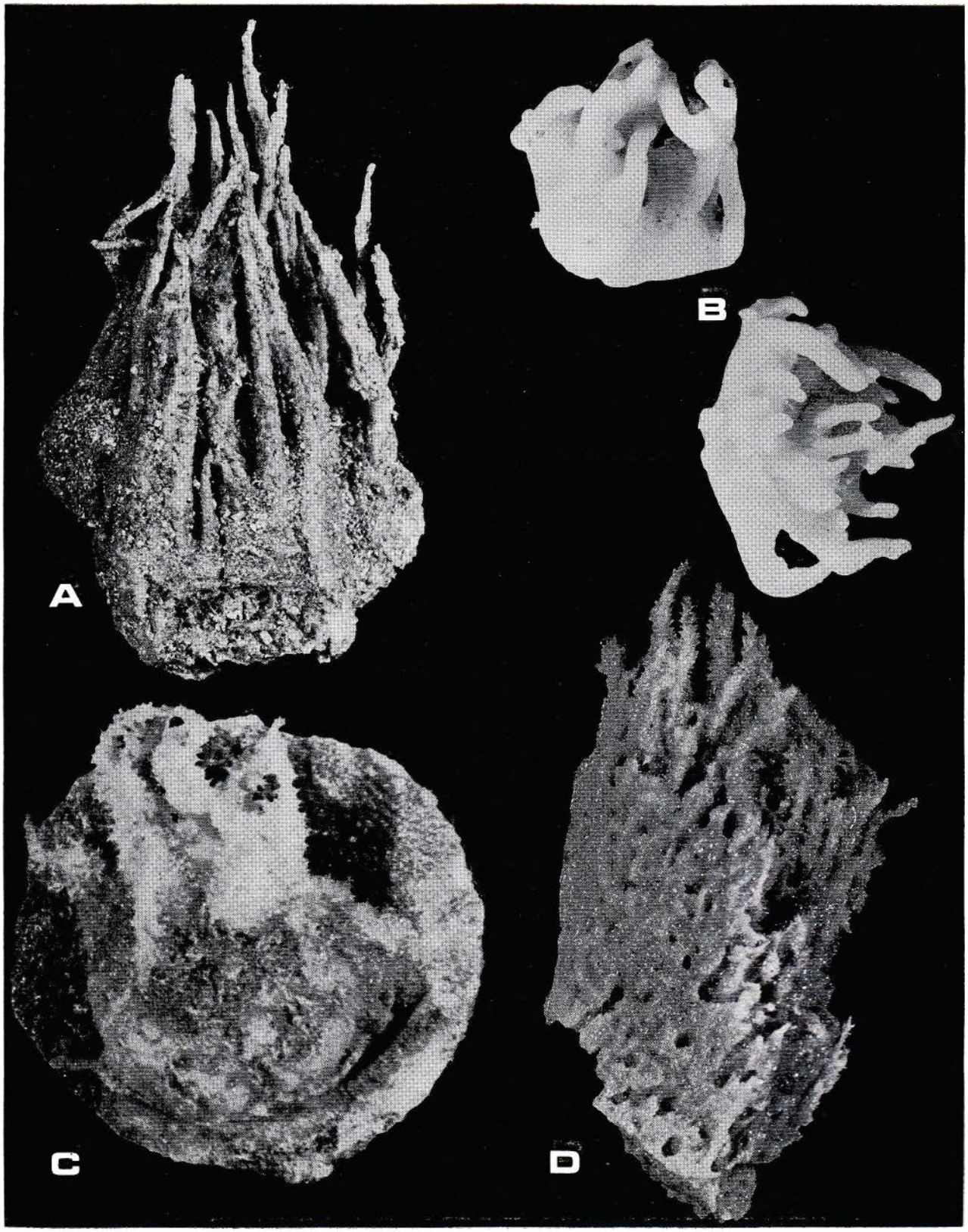


PLATE 9

A. *Hymeniacidon perleve* (Montague). Narrow Neck Reef. Coralline turf form.
B. *Hymeniacidon spherodigitata* nov. sp. North Channel, 8 fm. Holotype.
C. *Hymeniacidon spherodigitata* nov. sp. North Channel, 8 fm. Paratype.
D. *Hymeniacidon perleve* (Montague). Point Chevalier Reef.

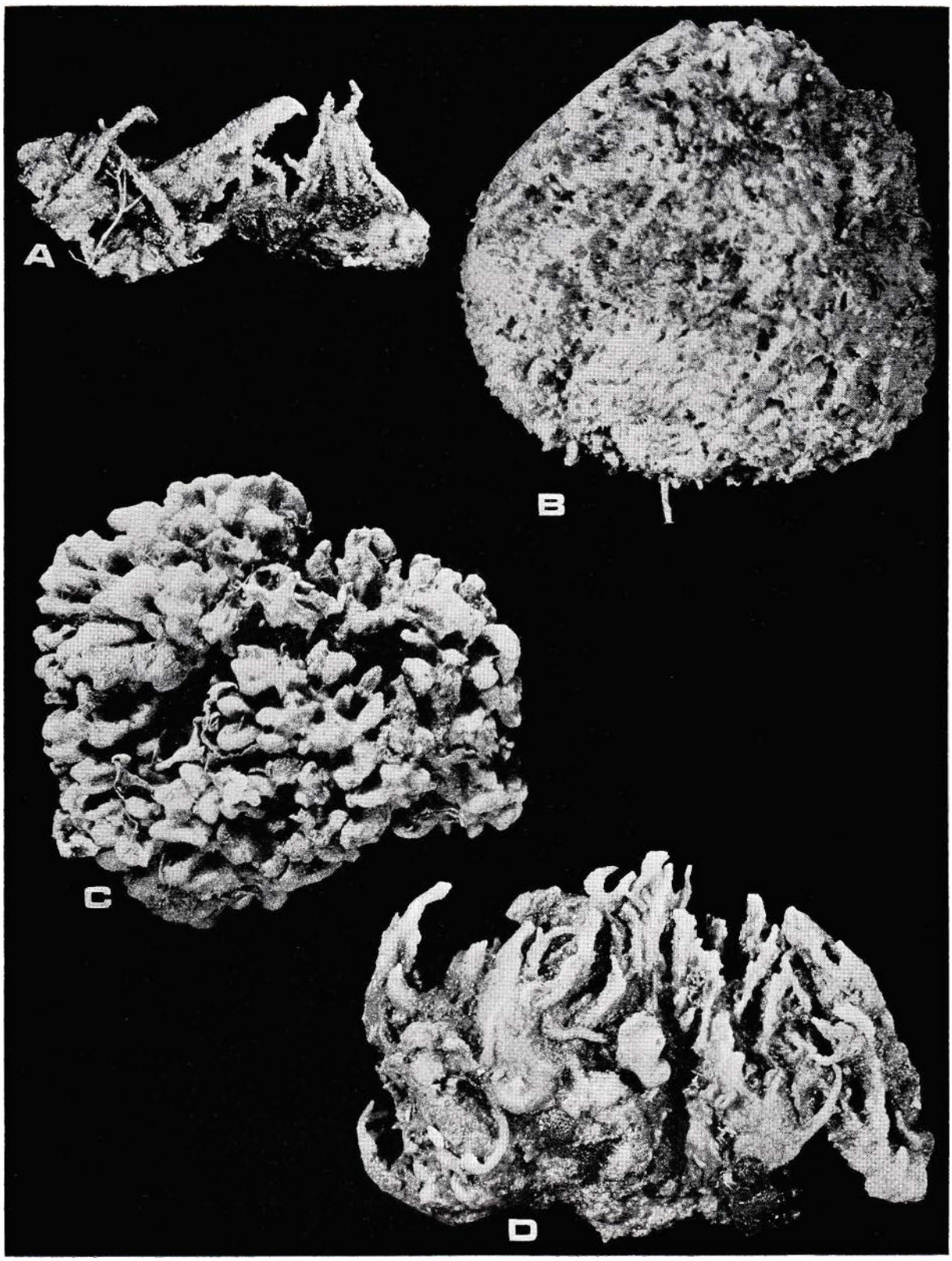


PLATE 10

A. *Acanthoclada prostrata* nov. sp. 1, cladotoxa; 2, birotule.
B. *Raspailia flaccida* nov. sp. 1, acanthostyle; 2, acanthoxea; 3, various terminations of the styles.
C. *Trachycladus stylifer* Dendy. 1, microhabd; 2, spinispirae.
D. *Raspailia topsenti* Dendy. Acanthostyles.
E. *Axinella richardsoni* nov. sp. Oxeas and styles.
F. *Acanthoclada prostrata* nov. sp. 1, rhabdostyles; 2, centrally flexed oxea; 3, structural style.

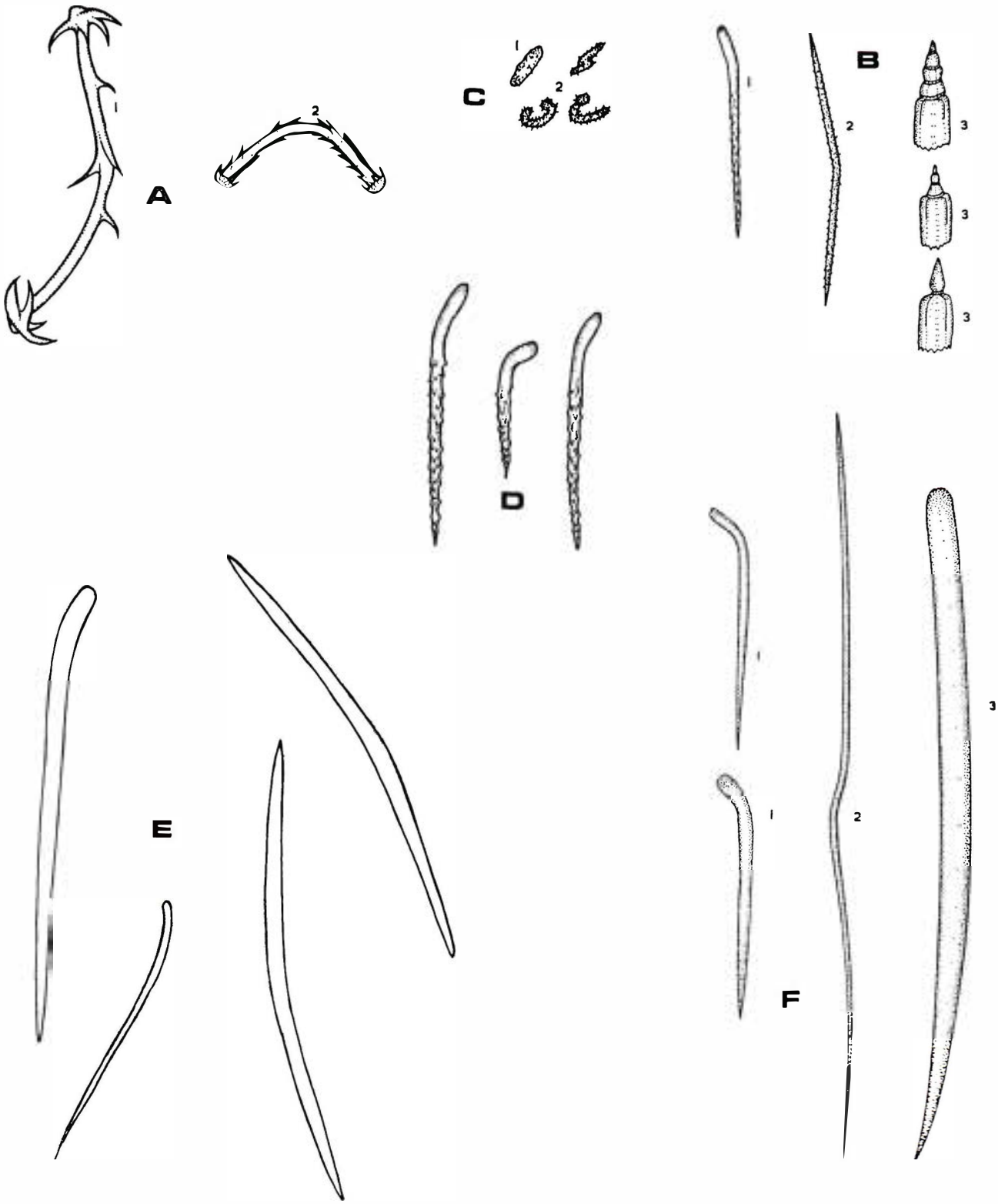


PLATE 11

A. *Raspailia compressa* n. sp. 1, extra-axial style; 2, axial style; 3, acanthostyles; 4, dermal oxea.
B. *Hymeniacidon spherodigitata*. Styles of various size categories.

PLATE 12

A. *Eurypon hispida* nov. sp. 1, acanthotylostyles; 2, enlarged view of head of acanthotylostyle; 3, subtylostyle; 4, bases of subtylostyles.
B. *Phakellia dendyi* nov. sp. Strongyles, styles, and oxea.
C. *Pseudaxinella australis* nov. sp. Oxeas and styles.
D. *Axinella australiensis* nov. sp. Oxeas and styles.

PLATE 13

A. *Raspailia agminata* Hallmann. Style, oxeas, and acanthostyle.
B. *Pararhaphoxya pulchra* (Brøndsted). Oxeas and strongyles.
C. *Ciocalypta polymastia* (Lendenfeld). Styles of various size categories.
D. *Acanthella crista-galli* (Dendy). Style and oxea.

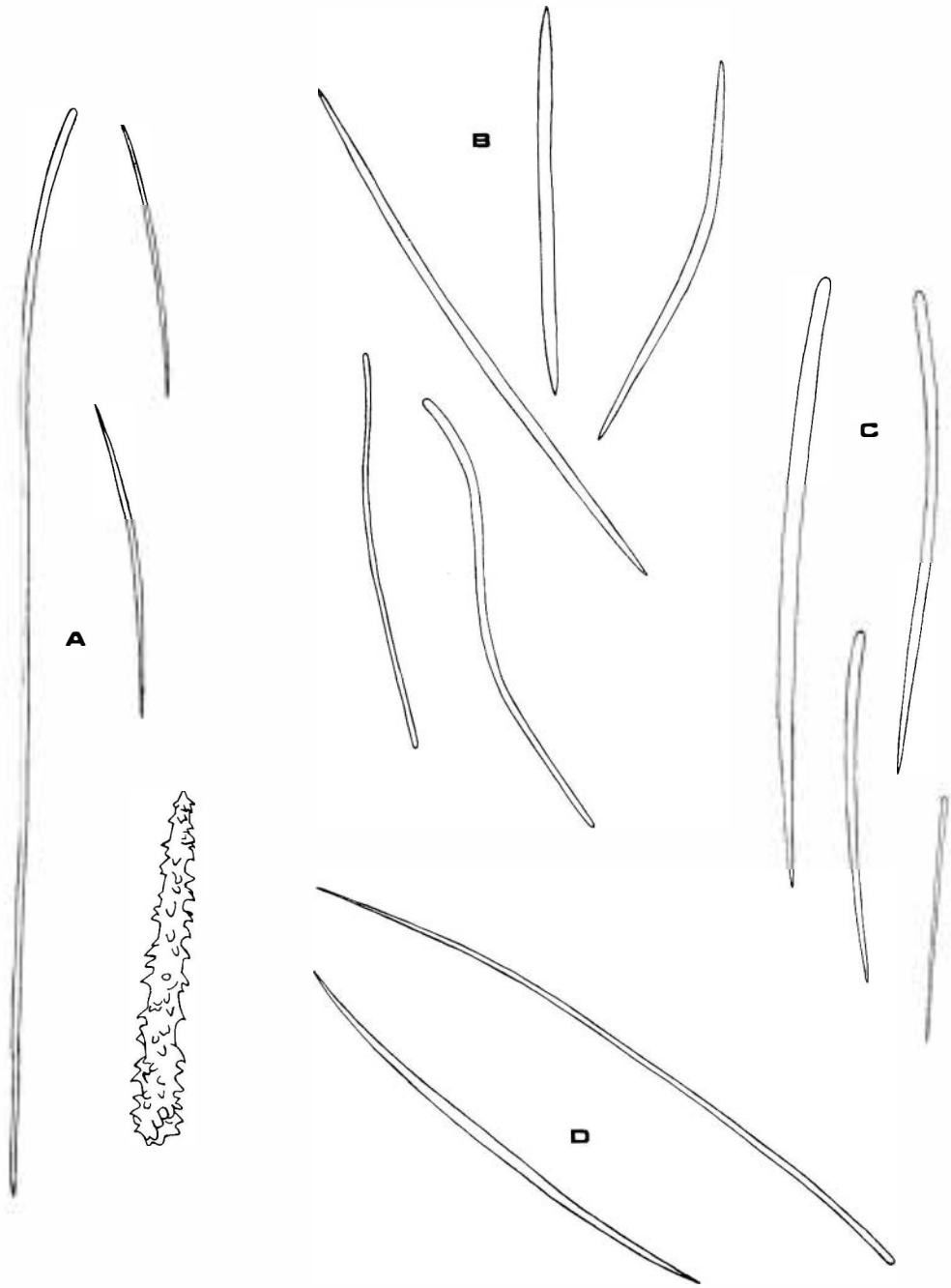
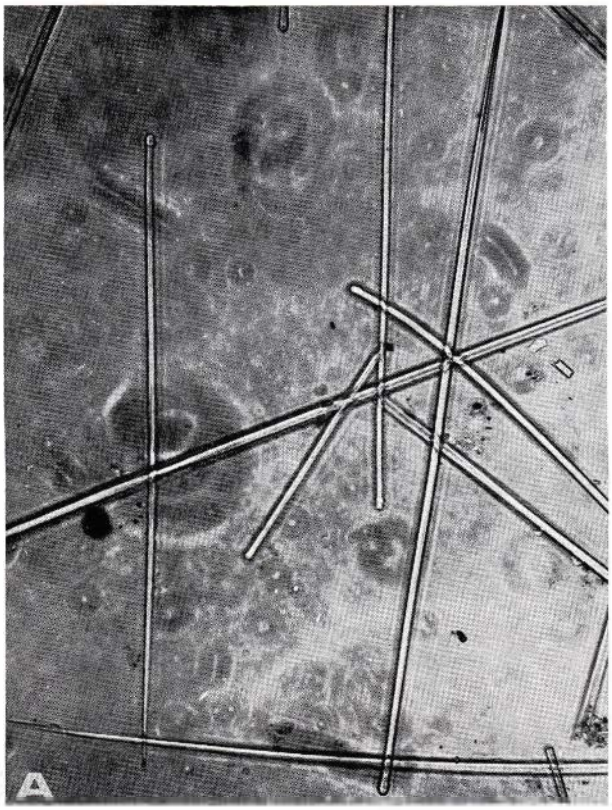
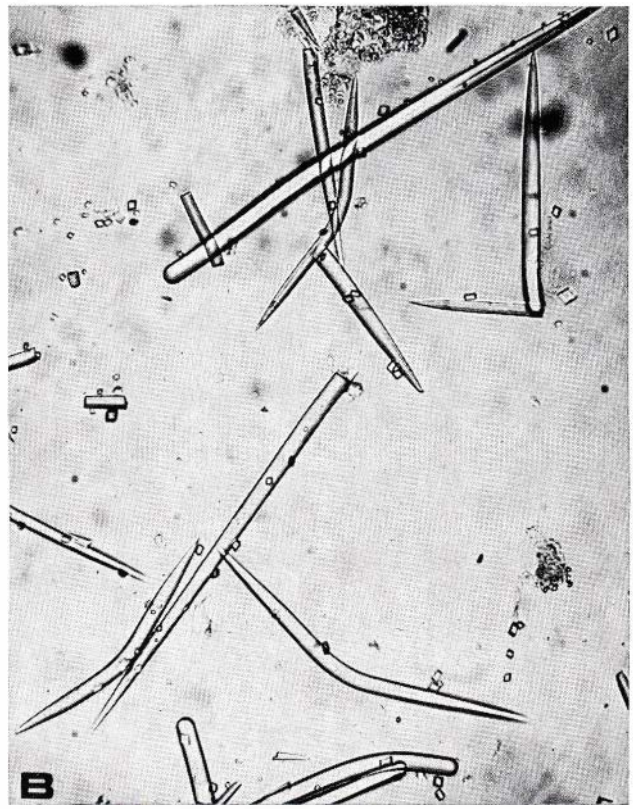
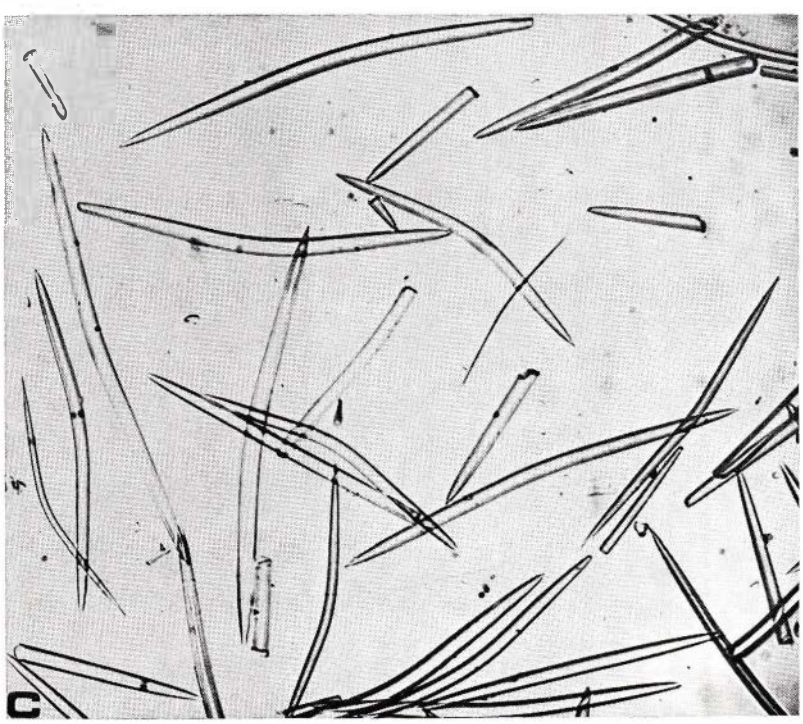


PLATE 14

A. *Homaxinella erecta* Brøndsted. Styles (×250).
B. *Axinella australiensis* nov. sp. Oxeas and styles (×100).
C. *Axinella tricalyciformis* Bergquist. Oxeas (×100).
D. *Phakellia dendyi* nov. sp. Styles and oxeas (×250).







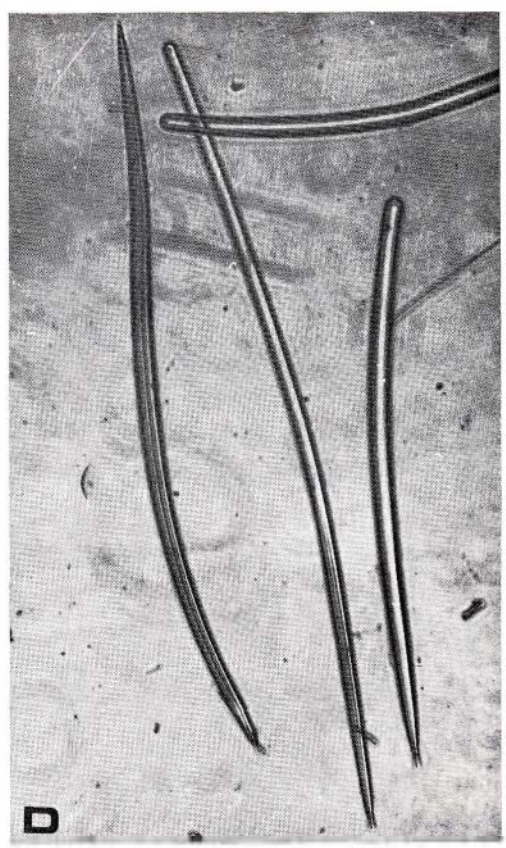
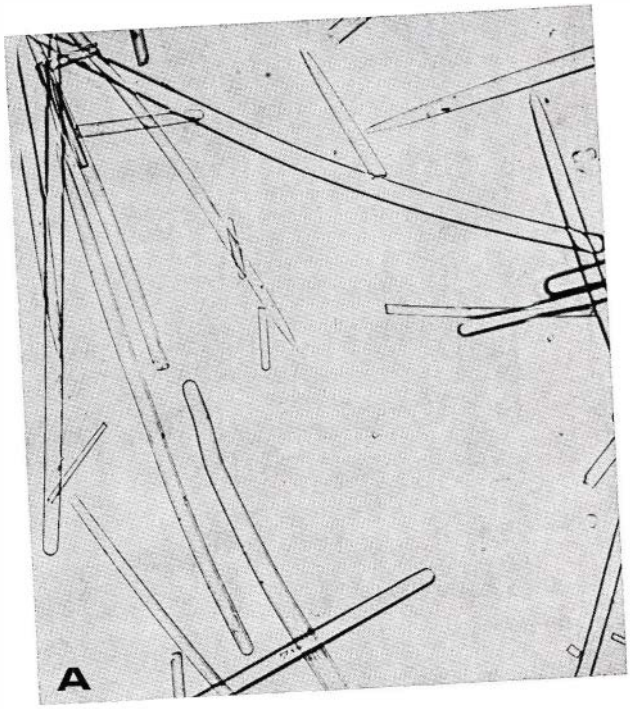
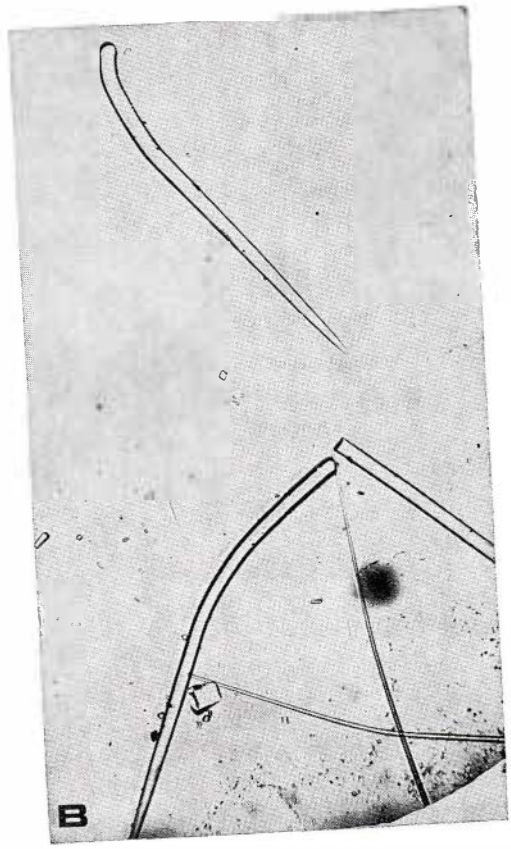
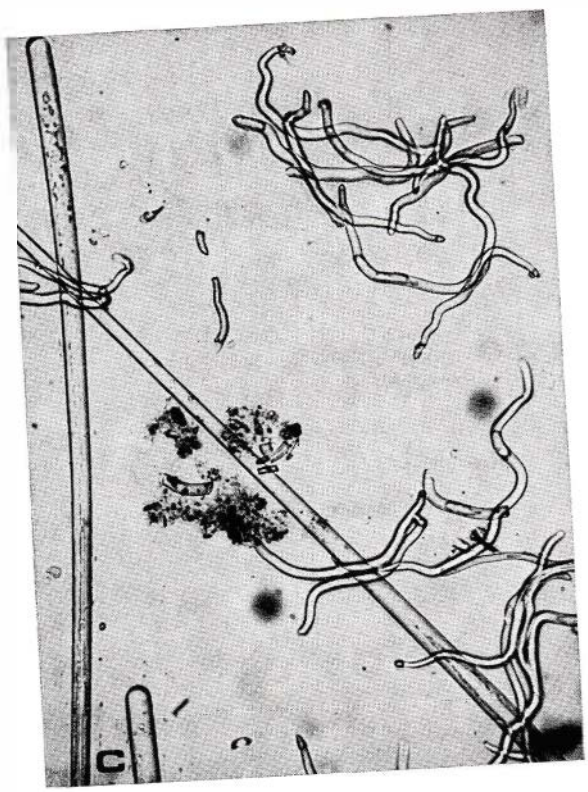


PLATE 15

A. *Phakellia dendyi* nov. sp. Alderman Is. Styles (×150).
B. *Ceratopsion cuneiformis* nov. sp. Styles and dermal spicules (×100).
C. *Bubaris vermiculata* Bowerbank. Styles and strongyles (×100).
D. *Parahigginsia phakellioides* Dendy. Oxeas (×250). From holotype.







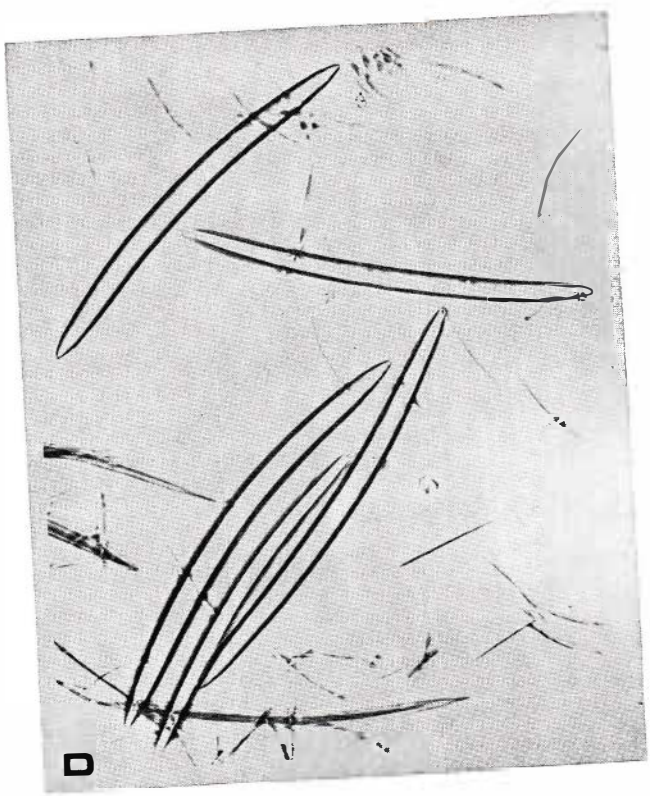
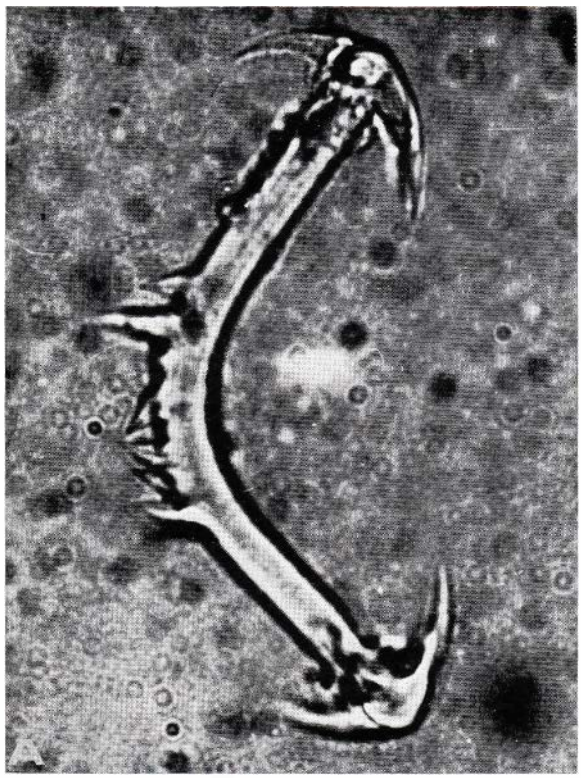
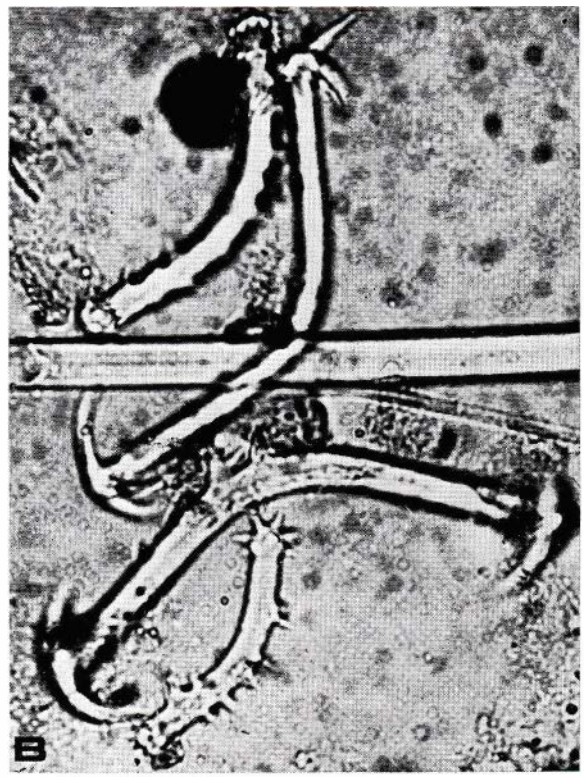
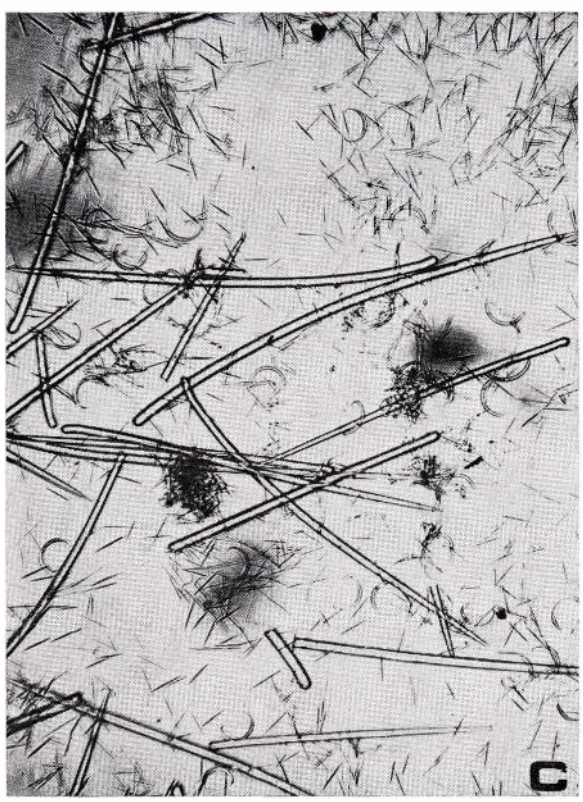


PLATE 16

A. *Acanthoclada prostrata* nov. sp. Cladotoxa (×400).
B. *Acanthoclada prostrata* nov. sp. Cladotoxa and birotules (×400).
C. *Biemna rhabderemioides* Bergquist. Styles, sigmas and microxeas (×100).
D. *Biemna stylotata* (Brøndsted). Styles and sigmas (×250).







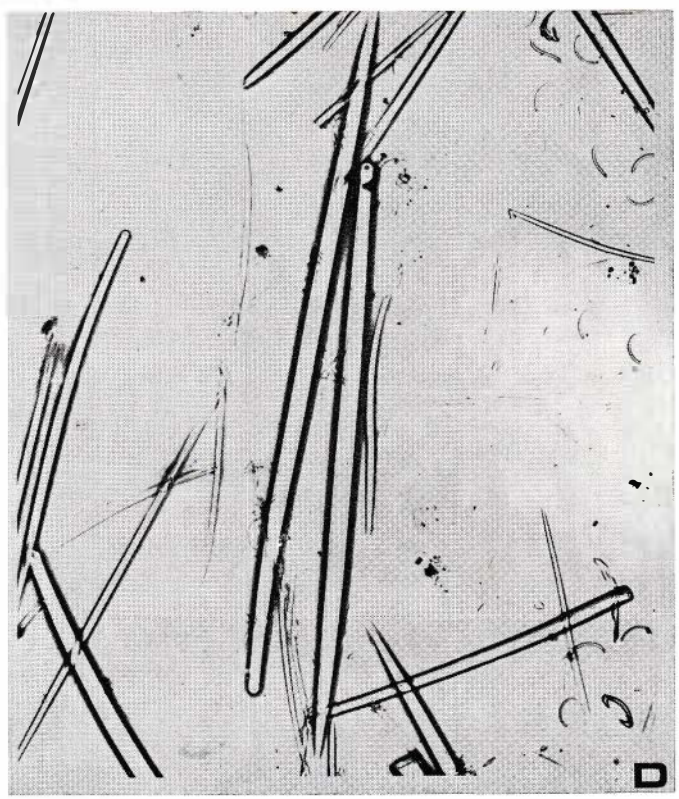
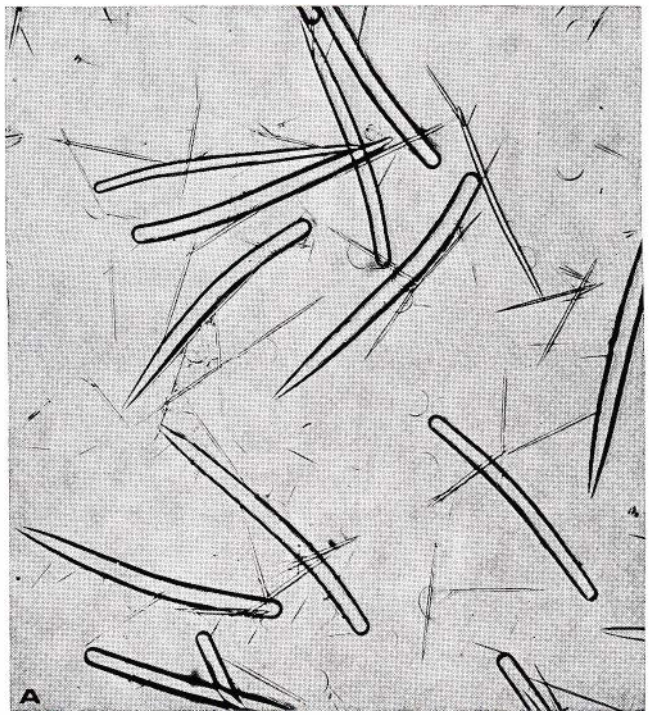


PLATE 17

A. *Biemna flabellata* nov. sp. Styles, sigmas and microxeas (×150).
B. *Hymeniacidon hauraki* Brøndsted. Styles (×150).



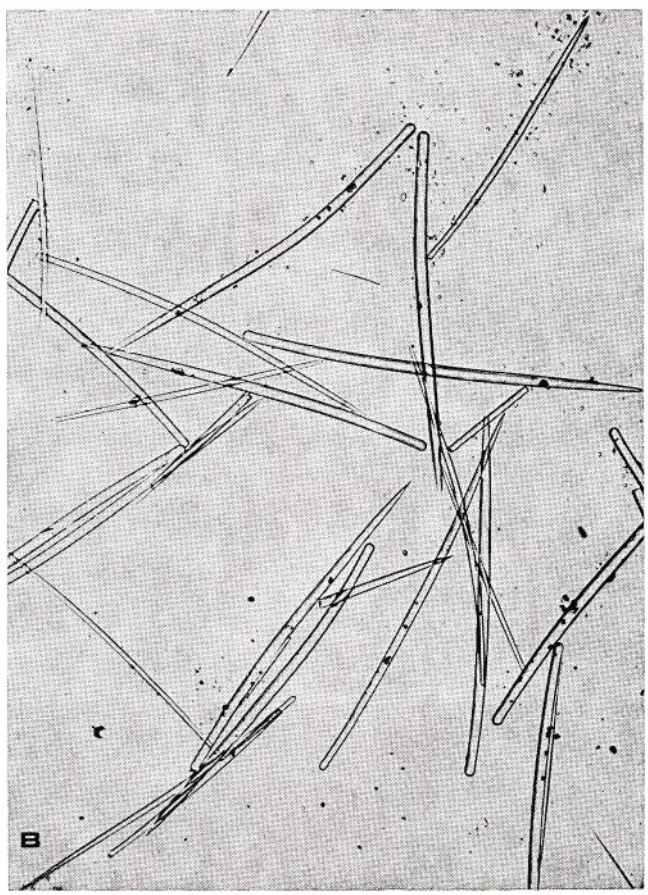
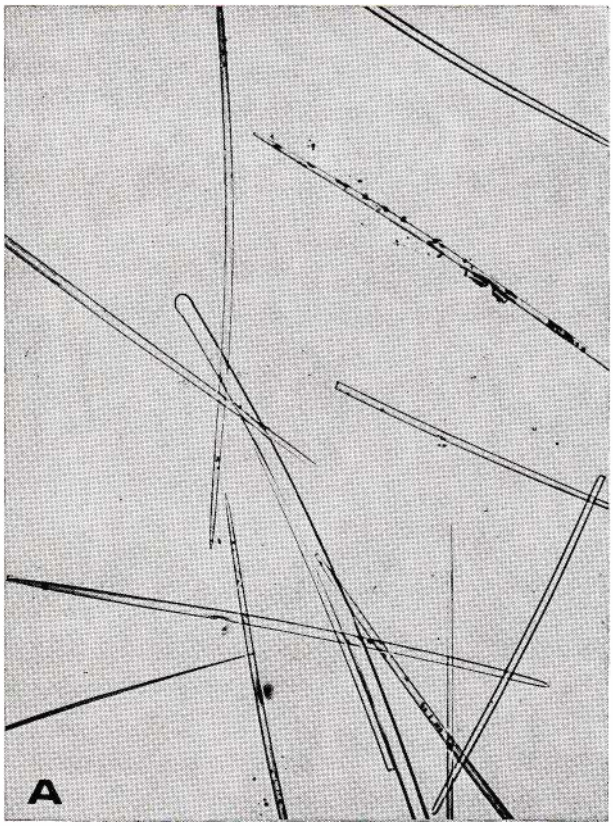
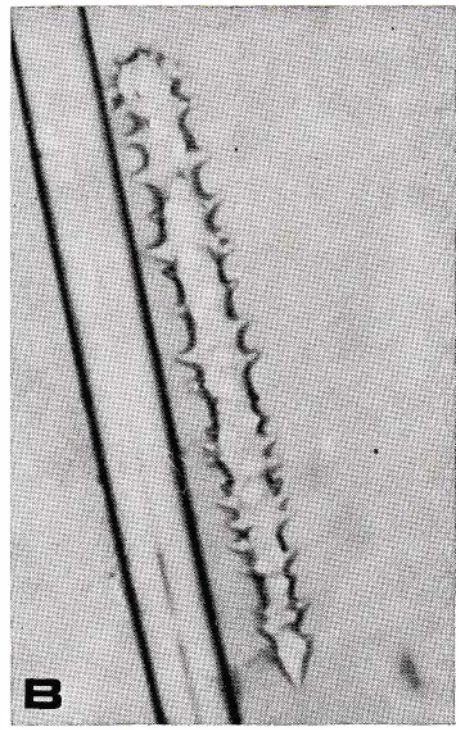
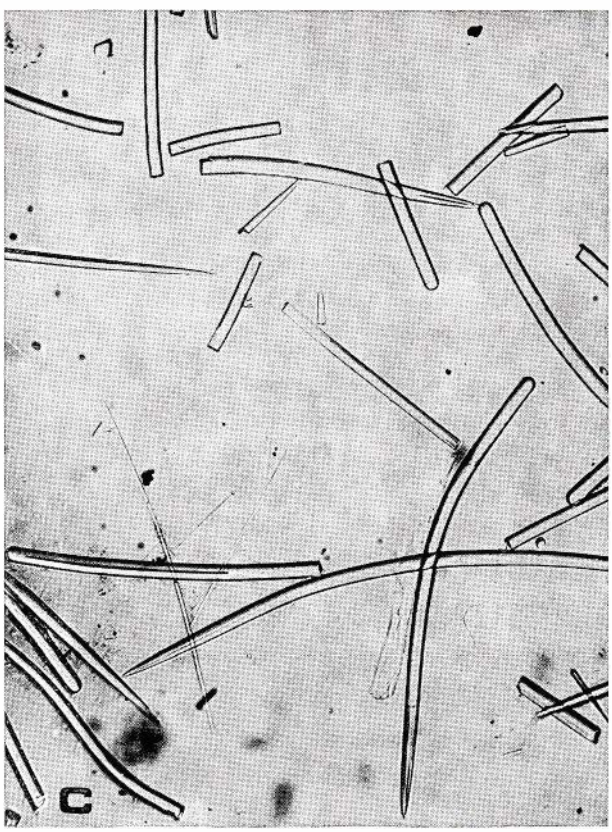


PLATE 18

A. *Raspailia agminata* Hallmann. Subtylostyle and oxeas (×100).
B. *Raspailia agminata* Hallmann. Acanthostyle (×100).
C. *Raspailia flaccida* nov. sp. Styles, oxeas, raphides (×150).
D. *Raspailia topsenti* Dendy. Styles and dermal raphides (×150).







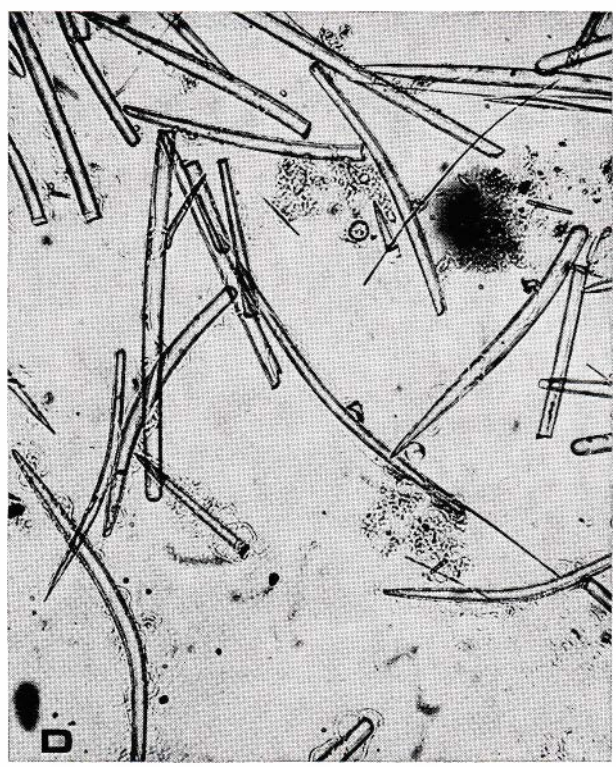
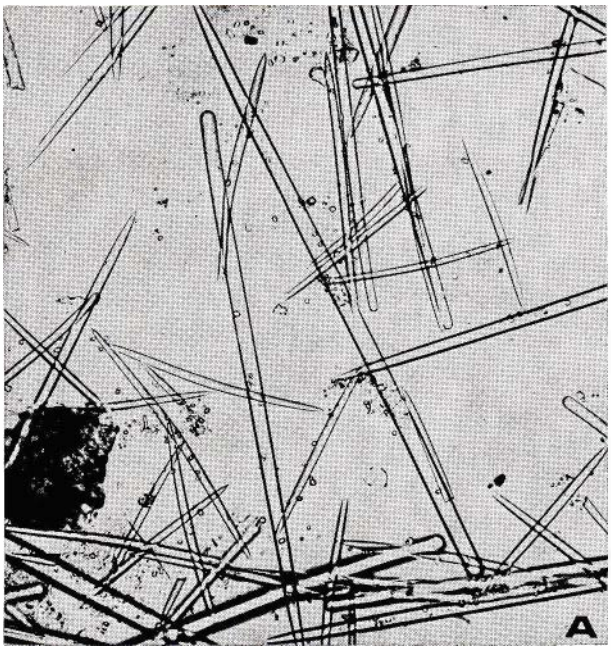
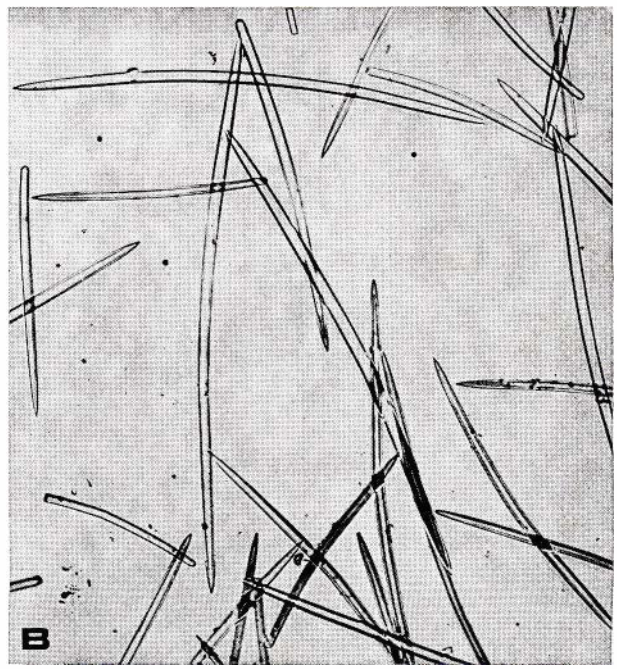
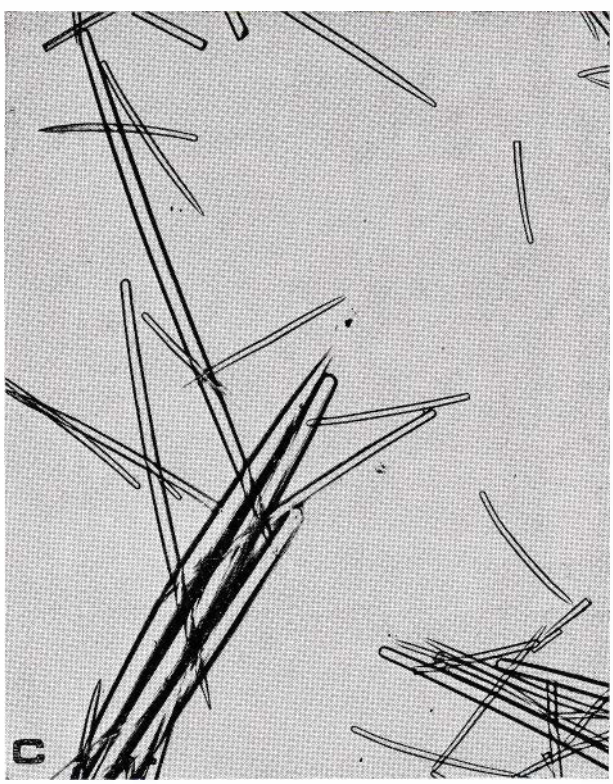


PLATE 19

A. *Ciocalypta penicillus* Bowerbank. Styles and oxeas (×150).
B. *Halichondria panicea* (Pallas). Oxeas and styles (×150).
C. *Ciocalypta polymastia* (Lendenfeld). Styles of three size categories (×150).
D. *Raspailia topsenti* Dendy. Styles and acanthostyles (×150).







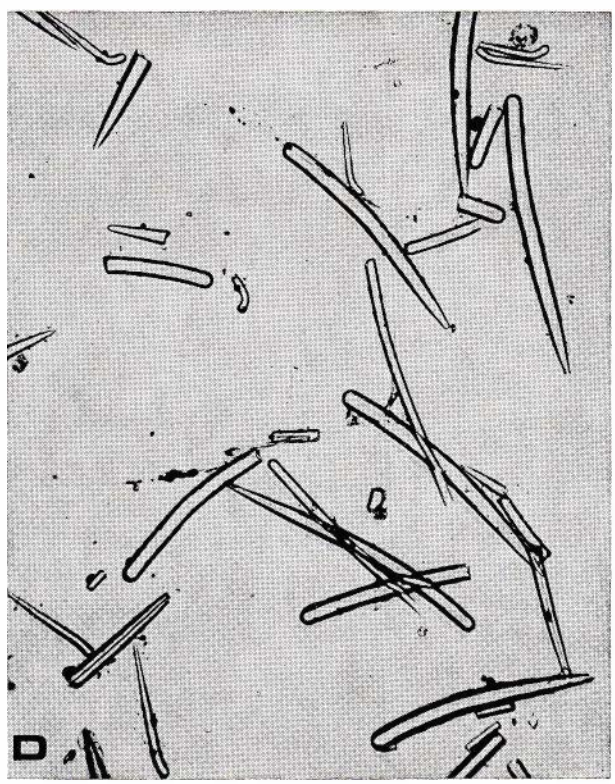
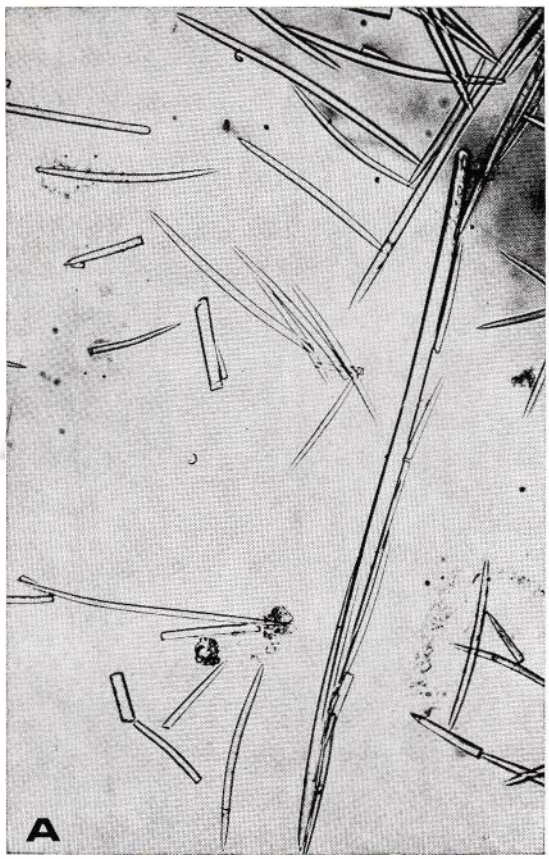
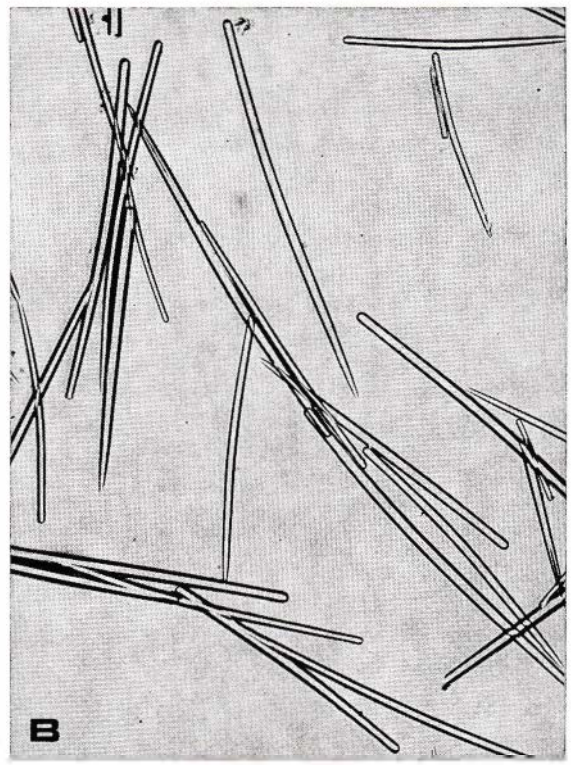
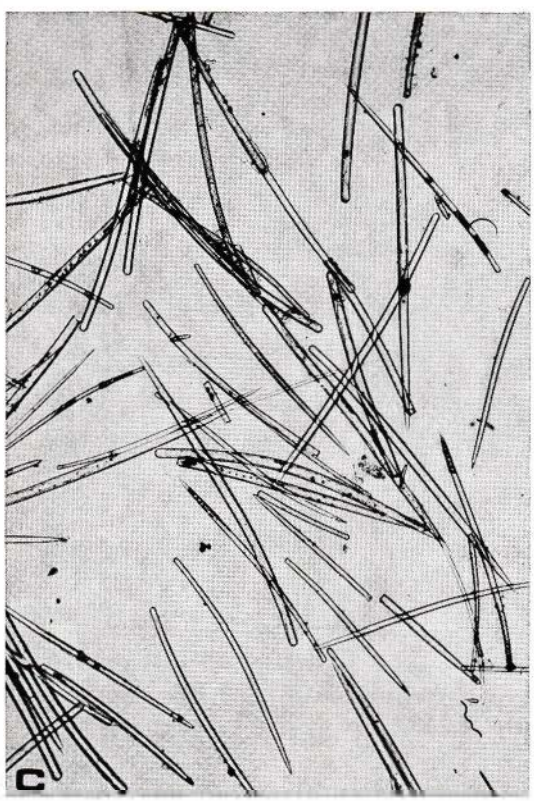


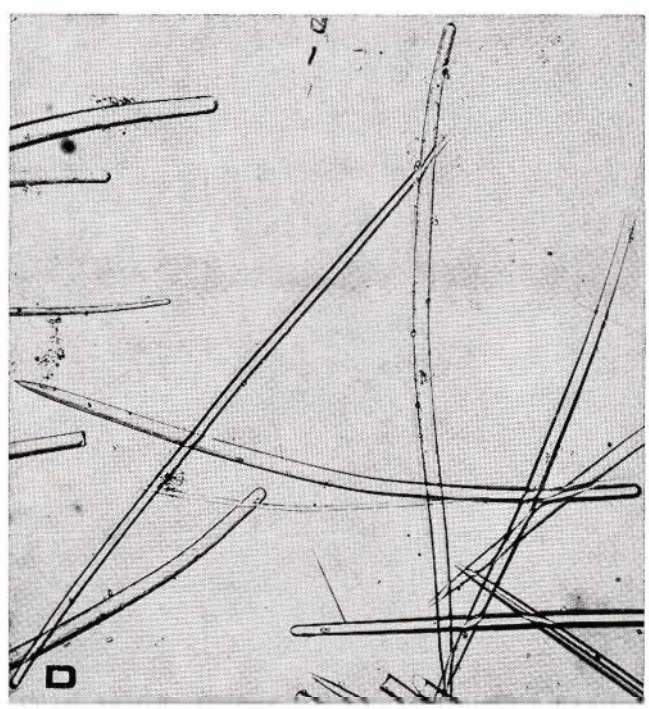
PLATE 20

A. *Ciocalypta penicillus* Bowerbank. Styles and oxeas (×150).
B. *Hymeniacidon perleve* (Montague). Styles (×150).
C. *Hymeniacidon perleve* (Montague). Styles (×150).
D. *Hymeniacidon spherodigitata* nov. sp. Styles (×150).









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