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The Marine Fauna of New Zealand:

Leptothecata (Cnidaria: Hydrozoa)
(Thecate Hydroids)

Willem Vervoort and Jeanette E. Watson

NIWA Biodiversity Memoir 119

COVER PHOTO: Endemic *Dictyocladium monilifer* (Hutton, 1873), Red Baron Caves, Poor Knights Islands.

Photo: Malcolm Francis, NIWA..

NATIONAL INSTITUTE OF
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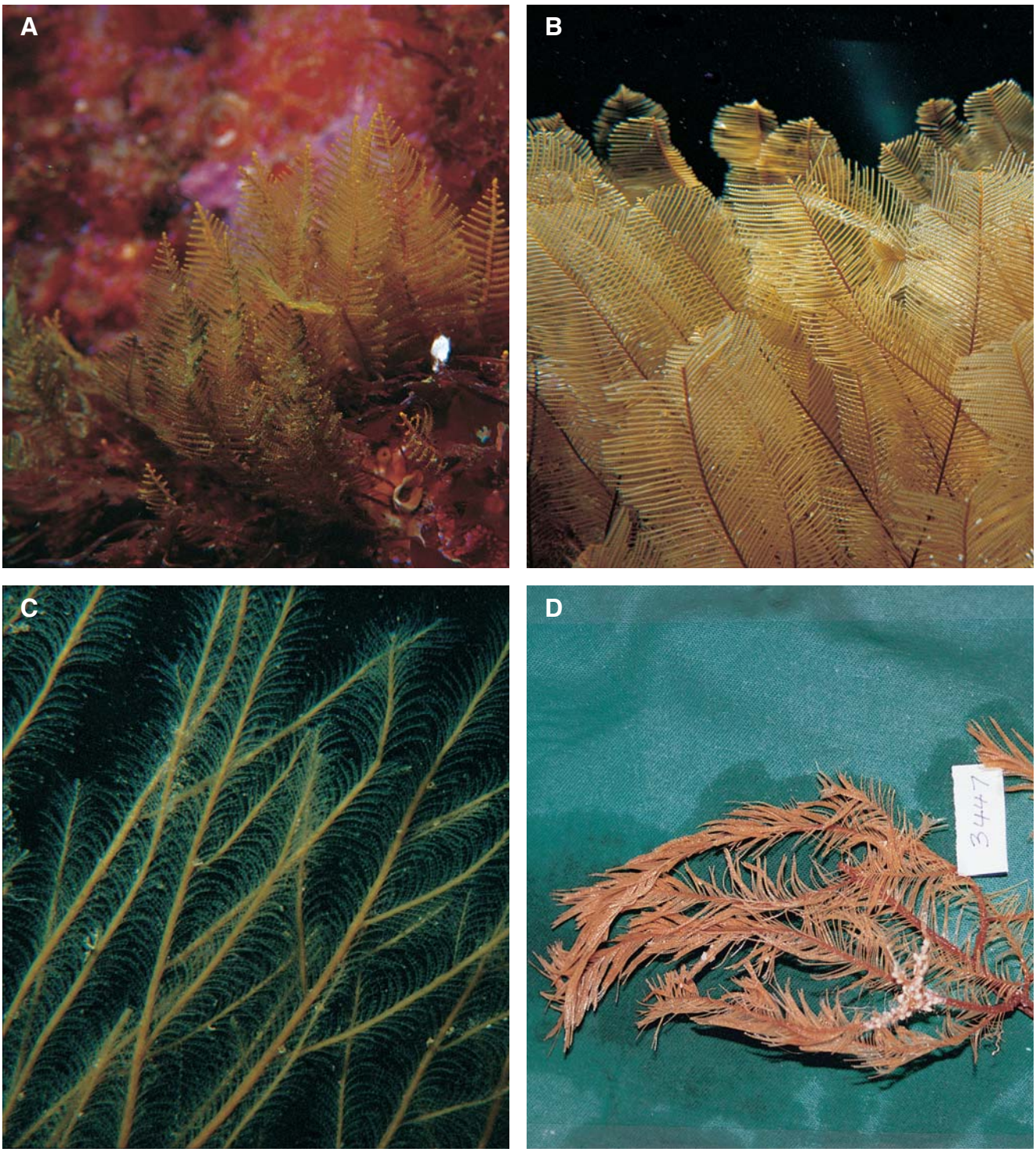

Frontispiece: A, *Synthecium* sp., Otamatiti Point, Cape Karikari. **B,** *Aglaophenia ctenata* (Totton, 1930). **C,** *Nemertesia elongata* Totton, 1930. **D,** *Wanglaophenia longicarpa* n. gen., n. sp., holotype specimen, Wanganella Bank, West Norfolk Ridge.

Photos: **A-C**, Malcolm Francis, NIWA; **D,** Jeanette Watson

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ABSTRACT

This memoir deals with the New Zealand Leptolida Leptothecatae (formerly named Hydroida Thecaphora, also referred to as Hydroida Leptomedusae and colloquially known as thecate hydroids), based on collections of the New Zealand Oceanographic Institute (now incorporated in NIWA — the National Institute of Water and Atmospheric Research), Wellington; the National Museum of New Zealand Te Papa Tongarewa, Wellington; the Otago Museum, Dunedin; and the Portobello Marine Biological Station of the University of Otago, Dunedin. About 300 species are discussed and where necessary described and figured. This group of animals was the subject of a thorough survey by Dr Patricia M. Ralph in the years 1957–1961 but largely based on shore-based collections, only a small portion of her material coming from deeper waters. The present survey covers a much wider area, extending into deep waters and dealing with a greatly increased number of species. In many cases the number of specimens studied was much larger than the comparatively modest number of samples at Dr Ralph's disposal, so our views in certain cases differ from hers. Nevertheless we have closely followed Dr Ralph's discussion, having access to the major part of her collections.

The number of new species in the extensive collections is considerable, some 45 being described. The taxonomic part of the present report is preceded by introductory paragraphs including an historical introduction, a paragraph highlighting the general structure of Leptothecatae and a glossary.

Keywords: Conica, Campanulinida, Lafoeida, Haleciida, Plumulariida, Proboscoida, Campanulariida, New Zealand, thecate hydroids, taxonomy, distribution, deep-water species, new species

INTRODUCTION

INTRODUCTORY REMARKS

The present paper is the result of two visits of two months each, in 1993 and 1995, to various New Zealand institutions to study their hydroid collections, the visits being largely financed by NIWA funds. As the collections were much more extensive than could be handled in four months, bearing in mind the necessity to make microslide preparations of the principal colonies, it was decided to inspect additional material sent on loan to our respective laboratories. The Ralph Collection of tubed material in possession of the National Museum of New Zealand, for instance, was completely studied in Leiden.

During our study of the New Zealand leptolid collections we also saw many Anthoathecatae. The present report exclusively deals with the Leptothecatae; the data on Anthoathecatae, many of which have not been published before, will hopefully form the basis of a future paper.

GENERAL REMARKS

The present paper deals with New Zealand leptothecate leptolids, Leptolida of the suborder Leptothecatae occurring in New Zealand waters. Leptothecatae form one of the subclasses of the superclass Hydrozoa of the phylum Cnidaria, the remaining subclasses being Anthoathecatae (or Athecatae/Anthomedusae, for New Zealand waters monographed by Schuchert 1997), Limnomedusae, Narcomedusae, Langiomedusae, Trachymedusae, and Actinulida. The gross taxonomy of the phylum Cnidaria, one of the major phyla of Metazoa, is as follows:

Phylum CNIDARIA
- Subphylum MEDUZOZOA
  - Superclass HYDROZOA
    - Class LEPTOLIDA
      - Subclass Anthoathecatae (= Athecatae, Anthomedusae)
      - Subclass Leptothecatae (= Thecatae, Leptomedusae)
      - Subclass Limnomedusae
      - Subclass Narcomedusae
      - Subclass Langiomedusae
      - Subclass Trachymedusae
      - Subclass Actinulidae
    - Class SIPHONOPHORA
  - Superclass SCYPHOZOA
  - Superclass CUBOZOA
- Subphylum ANTHOZOA

The medusa phases of Anthoathecatae, Leptothecatae, and Limnomedusae, as well as the Narco-, Langio-, and Trachymedusae are grouped together as 'Hydromedusae'; these have, for the New Zealand area, been treated by Bouillon and Barnett (1999).

For a full description of the structure and biology of Leptothecatae we refer to one of the many textbooks of invertebrate taxonomy. A very recent and up to date treatment is found in Bouillon (1995); though recently published, its literature references date from some years before the date of publication; additional references can easily be obtained from the *Zoological Records*. Cornelius's introduction to his two volumes on British Leptothecatae (Cornelius 1995a, b) also presents a complete survey of up to date information on this group of animals. The following paragraph lists some basic facts necessary to use the present volume at its full advantage.

Cnidaria are the most primitive phylum of the Eumetazoa, multicellular animals, mainly consisting of two cell layers, the 'ectoderm' or outer layer, and the 'endoderm' or inner layer, separated by an intermediate layer of varied thickness and composition, called mesoglea; it may contain cells and fibrillar elements. The endoderm, referred to as 'gastrodermis' covers the gastric or gastro-vascular cavity, of simple or more complicated structure. The ectoderm covers the outside of the body (epidermis) and is responsible for the secretion of a layer of muco-polysaccharids (periderm) or a chinitous supporting layer, the perisarc. There is usually a distinct mouth, leading to the gastric cavity, but no anus; waste products leave the body through the mouth. Though there are specilised cells (muscular, nervous, glandular, digestive, etc.) there are no real organs. Cnidarians are radially symmetrical but may become bilaterally symmetrical by secondary modification. They take their name from the presence of nematocysts or cnidocysts, organellae secreted by cnidoblasts present in epidermis and gastrodermis and transported in the mesoglea. They are typically gonochorists; the sexual products are produced in gonads that have, with a few exceptions, no genital duct: ova and spermatozoa are released in the water by bursting of the gonads. Though Cnidaria assume many different shapes they are typically develop along two major, homologous lines of construction, the polyp and the medusa, of which the polyp is usually sedentary and benthic, the medusae free-living and planktonic. Some Cnidaria are exclusively polypoid, others medusoid, others again have a life-history with a sedentary, asexual polyp phase followed by a free-living, sexual medusa phase. Both medusa- and polyp phase are characterised by the presence of tentacles, that may be lost secondarily.

The fertilised Cnidaria egg develops into a larva called planula, with a central mass of endoderm surrounded by a ciliated layer of ectoderm. The planula has a distinct polarisation along its longitudinal axis with an aboral pole for attachment to the substrate and an aboral pole for attachment to the substrate and an oral pole where the mouth will eventually develop. Many Cnidaria have developed a colonial life-style, others are solitary. Colonial Cnidaria may attain a considerable size (e.g., corals); in contrast, solitary Cnidaria can be very tiny and live interstitially between sand grains. The majority of Cnidaria live in the sea, some inhabiting brackish or fresh water. A few have a parasitic way of life.

The subphylum Anthozoa comprises polypoid Cnidaria, this being the adult and sexual phase. This polyp is hexamerously, octomerously or bilaterally symmetrical. In contradistinction the various groups of Medusozoa have a medusa in their life cycles, this being the sexual stage, typically in alternation with an asexual polyp phase; the medusae are produced either by direct metamorphosis (Cubozoa), by transversal segmentation or stobilation (Scyphozoa), or by lateral budding (Hydrozoa). Amongst the Hydrozoa the Siphonophora are a group of colonial animals adapted to pelagic life, the various 'individuals' showing considerable specialisation in various directions (floating, swimming, feeding, reproduction, etc.).

The Leptolida are animals with radial, tetramerous, or polymerous symmetry and typically with a life cycle in which a polyp phase (asexual) alternates with a medusa phase (sexual). The polyp reproduces asexually by budding, providing new polyps, 'frustules' (tissue fragments wrapped in perisarc that may survive adverse conditions and develop into polyps later on) or medusae. The medusa forms primarily the sexual phase, though it may also reproduce asexually by budding. A limited number of Leptolida have complete, non-reduced polyp and medusa phases, in which the polyp, solitary or colonial, develops from the planula, the medusa by budding from the polyp and the sexual products from the free-living medusa. Reductions, in the polyp and/or the medusa phase, may complicate the type of life cycle eventually found in a certain leptolid species, many occurring only as a polyp or as a medusa.

The Anthoathecatae and Leptothecatae have many characters in common. Their life cycle is principally a succession of the asexual polyp phase by the sexual medusa phase, with reductions of both the polyp or the medusa phase in the various species. In Anthoathecatae the number of species exclusively occurring as medusae is fairly large; in Leptothecatae the majority of species are exclusively polypoid; there is only a limited number of species exclusively occurring as medusae. In the polyps of Anthoathecatae the development of the perisarc is typically moderate, it may cover the stolon, the pedicel (or axis if the species is colonial) and the body of the hydranth up to and including the tentacle bases.

Occasionally calcification of the chitinous exoskeleton may occur. The gonads in the medusae develop on the manubrium, in certain species with extensions on the central parts of the radial canals. In Leptothecatae development of the perisarc is considerable, typically forming structures that protect the hydranth (hydrotheca), and reproductive organs called gonophores or blastostyles, producing free-living medusae, reduced medusae, or their derivatives (gonothecae).

A short description of the morphology of Leptothecatae best starts with the ciliated planula that has developed from the fertilised egg, either inside a gonotheca or in the surrounding seawater. The planula attaches by the aboral pole, forming a flat disk from which stolonal fibres, hollow perisarc tubes filled with a double layer of ectoderm and endoderm (coenosarc), will eventually develop. Development of the primary hydranth takes place on the oral side of the planula. The stolonal tubes or fibres attach the developing individual (or colony) to the substrate. It may later connect the various hydranths in a stolonal type of colony, rise from the substrate to form the axis of rhizocaulomic colonies, or support and anchor larger colonies that may develop from the primary hydranth. For attachment to a solid substrate the stolons may form an often anastomosing, flattened structure, the individual tubes frequently developing a flange for better grip. For anchoring of a colony in soft sediment the stolonal tubes may form a tangled network of fine tubules. The developing (primary) hydranth may remain solitary, but typically development of additional hydranths takes place, either by a process of budding from the stolon, in which case a stolonal colony develops (e.g., Campanulariidae like *Campanularia, Clytia, Orthopyxis, Silicularia*), or secondary hydranths develop from the pedicel or its ramifications.

The primary hydranth and later hydranths developing in a colony are composed of a body, enclosing the gastro-vascular cavity, and a hypostome surrounded by one or more whorls of tentacles. In the order Conica the hypostome (proboscis) is a conical or dome-shaped structure with the mouth at its end; in the order Proboscoida of Leptothecatae the hypostome is globular and opens in a wide, trumpet-shaped aperture. Tentacles in Leptothecatae are typically filiform, i.e., they are of almost the same diameter throughout and have no swelling at the end. Nematocysts are typically evenly distributed but may show concentrations in certain hydromedusae. In many Campanulariidae a characteristic arrangement of tentacles around the hypostome is in two closely approximated, alternate whorls (amphicoronate). The gastric cavity of the hydranth(s) extends in the coenosarc tubes that fill the pedicel, axis, or hydrocaulus and its ramifications and continues in the stolonal tubes.

Food is captured by the tentacles (typically with the aid of nematocysts), brought to the mouth, ingested, and digested in the gastro-vascular cavity. Products of digestion are transported in the system of coenosarc tubes by ciliated endoderm cells. Waste products stop at the bottom of the body of the hydranth where the gastric cavity ends and the coenosarc begins. Here a perforated disk of perisarc (diaphragm) separates the hydranth from the pedicel (or its derivatives); it is comparable in function with the sphincter observed in polyps of many Anthoathecatae. As indicated above the hydranth of Leptothecatae is protected by a variously-shaped perisarc structure, the hydrotheca.

In addition to the stolonal and rhizocaulomic type of colonies referred to above, colony formation also takes place by growth and differentiation of the pedicel (primary axis). This may develop into a real ramified axis or caulus becoming polysiphonic by apposition of secondary perisarc tubules, typically developing from the stolonal tubes. These grow upwards and communicate with the primary tube through small holes (pores). Growth may be monopodial with a terminal growth point replacing the primary polyp and with growth points at the end of all ramifications. Formation of hydranths always takes place under the point of actual growth. The type of colony developing in this way and becoming more complicated in structure by polysiphony, is a monopodial or racemose colony. It is a successful type of colony structure present in endlessly varied forms in the Plumularioidea and Sertulariidae. A second type of monopodial colony development occurs when the primary polyp is terminal, with a growth zone and a zone of budding beneath. The growth zone continually lengthens the axis; the budding zone gives rise to a secondary polyp, with a growing zone and a budding zone. The secondary polyp and its pedicel give rise to the first branch, lengthened by its growth zone under the terminal polyp. Typically no more budding takes place at the original budding zone, but a new zone of budding appears on the axis and on the branches. After some lengthening of the axis by the growing zone a second branch may develop. The branches continue growth and development of side branches in the same way as does the main axis. The arrangement of the branches in monopodial colony development is of major influence on their final shape. In a pinnate colony the branches are alternately arranged on both sides, pointing obliquely left or right and upwards. Pinnate branches may shift so as to become opposite or sub-opposite. In a verticillate colony three or more branches are placed in a verticil; the branches of two succeeding verticils may alternate (intercallate) to form a double number of vertical rows (e.g., *Nemertesia*). The branches may also be arranged in a spiral fashion or the primary axis may develop as a helicoid spiral with the branches arranged in a linear fashion (e.g., *Salacia buskii spiralis*). Colony shape is further influenced by the mode of branching which may be dichotomous with a distinct main stem and side branches, or by polysiphony which is development of a polysiphonic axis by apposition of secondary tubules. This may happen in such a way that the primary axis remains visible throughout the colony, all branches originating from the primary axis (e.g., Aglaopheniidae). In many others, side branches and hydrocladia are also produced by the secondary or accessory tubes (*Nemertesia*). In a third type of colony there is no distinction between primary and accessory tubes, all producing hydrocladia or branches (*Corhiza*).

Sympodial colony development takes place without a proper growing zone. The primary hydranth and its pedicel develop to a certain height then stop further growth. However, budding under the hydranth produces a second hydranth on its pedicel, that after a certain period of growth produces, by budding, a tertiary hydranth and pedicel, etc. Budding typically takes place at opposed sides and the resulting colony is distinctly geniculate (e.g., *Obelia geniculata*). The budding zones may remain active for some time and produce pedicellate hydranths that develop into branches, occasionally of considerable length as in various species of *Obelia*. This type of colony may also develop polysiphony (e.g., *Hartlaubella gelatinosa*).

The hydrotheca is a perisarc structure surrounding the hydrotheca from the diaphragm onwards in the form of a tube, a cup, a vase, or of a more complicated shape. As it serves to protect the hydranth it is usually big enough to accommodate it on retraction, an exception being the large polyps of the Haleciidae, where the hydrotheca is merely a basal ring of perisarc. The hydranth is attached inside the hydrotheca at the level of the diaphragm by means of organelles (desmocytes); which anchor the polyp on the perisarc. They are usually visible if looked for carefully, particularly in the Haleciidae. However, they tend to become invisible in permanent mounts. The hydrothecal rim usually has a species-specific structure; it may also be everted. During development of the hydrotheca it is closed by a membrane that is lost in many species during adult life. In others again it develops into a closing apparatus (the operculum) that, upon contraction of the polyp, folds over it for protection. Again the structure of the operculum is species-specific and is a useful aid in identification. It may occur in the shape of a hyaline extension of the hydrothecal border with strengthened strips or triangles, that fold like a triangular roof; or it may develop into a roof-like structure with three or four triangular flaps that fold very precisely over the hydrothecal aperture (e.g., *Sertularella, Symplectoscyphus*). In some genera of Sertulariidae the internal, gastrovascular wall of the hydranth folds to form an abcauline caecum. This is considered of taxonomic importance in the recognition of certain genera.

However, this character should be used with caution, as the caecum is usually invisible in stretched hydranths.

Besides normally developed hydranths which function to capture and digest food, there are two types of modified hydranths in Leptothecatae that need further discussion. The first type is the nematophore (or sarcophore), an elongated 'hydranth' without tentacles, mouth, or gastro-vascular cavity, but richly armed with nematocysts, particularly in the distal part, that may be swollen. They may be unprotected (as in certain species of Kirchenpaueriidae) or be protected by a nematotheca, a conical or wineglass-shaped perisarc structure, either one-chambered and typically movable (e.g., Lafoeidae), or two-chambered and movable (e.g., Plumulariidae, Halopteridídae), or fixed, (e.g., Aglaopheniidae). They serve to protect the colony and possibly also assist in the capture of food.

The gonophore or blastostyle is a second type of, usually modified, hydranth. It primarily serves the production, by budding, of the sexual phase, of the free living hydromedusa. Gonophore and hydromedusae are modified in many leptolid genera, primarily resulting in retention of the medusae, loss of its tentacles, closure of the velar opening, etc. This leads towards development of the sexual products in a part of the gonophore that has very little resemblance to the medusae from which it derives (sporosac).

The non-reduced, free living hydromedusa of the Leptohecatae, though being constructed along the same plan as the hydroid polyp, differs by being solitary and having a much developed, thick mesoglea (jelly). It is bell-shaped, hemispherical, watchglass- or lens-shaped, the convex side being the upper side. The shape is due to the development of the mesoglea, externally covered by the epidermis and internally by the gastrodermis, lining the stomach, the canals, and the inner side of the manubrium, both layers meeting near the mouth. The 'body' of the hydromedusa is usually indicated as umbrella or bell, the outside as the exumbrella, and the cavity enclosed by the bell as the subumbrellar cavity. The manubrium hangs down in the cavity, at the end of which is the mouth. The manubrium varies in length in the various species of hydromedusae; the mouth may be provided with differently structured lips. The stomach region may form a peduncle or gastric peduncle above the manubrium. The subumbrellar cavity is partially cut off from the surrounding water by a double layer of epidermis (velum) stretched like a diaphragm from the rim of the exumbrella inwards, leaving free a large central opening, the velar aperture. Contraction of umbrella forces water from the subumbrellar cavity through the velar aperture, resulting in upward movement of the hydromedusa. The exumbrella at its highest point may carry a remnant of its former attachment to the gonophore in the shape of an apical process, an apical canal, or an apical pore. The epidermis covering the exumbrella usually carries nematocysts, occasionally in special wart-like arrangements.

Four radial canals radiate from the stomach peripherally to join a ring or circular canal running parallel to the exumbrellar rim. The four (primary) radial canals give a tetra-radial symmetry to the medusa. The four radii of the four primary radial canals are described as perradii. In between lie the four interradii; per- and interradii divide the medusa in eight sectors, each of which can be divided into two sectors by (eight) adradii. Per-, inter-, and adradii are used to indicate the position of structural elements of the hydromedusa. Four radial canals is the basic situation but the number may considerably increase in certain species of hydromedusae by development of additional canals growing peripherally from the stomach and/or by ramification of the original radial canals. However, they need not necessarily all reach the circular canal.

Male or female gonads develop perradially, extending into the subumbrellar cavity. Sexual products (gametes: eggs and spermatozoa) are released into the surrounding water where fertilisation takes place, the fertilised egg developing into the planula.

Along the rim of the exumbrella occur a varied number of marginal tentacles. They are usually greatly extensile, trailing behind the hydromedusa and capturing food organisms as it moves through the water. Capture of food is by nematocysts which may be distributed over the tentacles or arranged in rings (moniliform tentacle). The point of insertion of the marginal tentacle at the exumbrellar rim is swollen into a marginal bulb. Marginal cirri are distributed between the marginal tentacles; they are smaller, composed of a single row of gastrodermal cells covered by epidermis and typically have no nematocysts. Spiral cirri are spirally coiled and have a terminal cluster of nematocysts. Flexile cirri have rings of nematocysts. Cordyli are small, club-shaped structures occurring along the bell margin in certain hydromedusae (e.g., Laodiceidae). Their function is probably sensory. Ocelli are photoreceptive structures occurring mostly in the marginal bulbs of the Anthoathecatae. They are described by Russell (1953) as comprising: "a small mass of pigmented gastrodermal cells lining a pit on a protuberance and associated with nerve cells". They either occur on the outer side of the bulb (abaxial) or on the inner side (adaxial). Statocysts are structures occurring at the borderline between velum and exumbrella and are of epidermal origin. They comprise a small pit or cavity (marginal vesicle) lined with sensory epithelium on which rests one or several tiny concretions (statoliths). They are either open or closed and register orientation and movement. They are characteristic of leptothecate hydromedusae and are rare in anthoathecate hydromedusae.

The reproductive phase of leptolids, the hydromedusa, develops by budding from the gonophore (sporosac). In Leptothecatae the gonophore is surrounded by a structure of perisarc called the gonotheca. It is provided with an opening for release of hydromedusae or sexual products. In many cases, the sexual structures are considerably reduced, resulting in retention of the hydromedusa and eventually to almost complete loss of medusoid structures. Depending upon the degree of reduction various types of gonophores (sporosacs) are distinguished. In the eumedusoid gonophore the hydromedusa is vestigial in development of marginal tentacles, sense organs, and mouth. In *Orthopyxis* the reduced hydromedusa (medusoid) is still released setting free its sexual products shortly after. In *Gonothyraea* the medusoid still retains tentacles but remains attached to the gonophore, the tentacles protruding from the gonotheca. The gonophore contains the fertilised eggs developing to the planula stage. In the cryptomedusoid, heteromedusoid, and styloid gonophores reduction has gone much farther. The acrocyst, observed in many species of *Sertularella* and some species of *Plumularia,* is a heteromedusoid gonophore with vestiges of the subumbrellar cavity. It allows development of fertilised eggs outside the gonotheca. In the styloid gonophore only the exumbrella is left and the subumbrella is finger-shaped (spadix); the gonads develop around the spadix and are surrounded by the remnants of the exumbrella. Fertilisation may take place outside the gonotheca (external fertilisation) or inside the gonotheca (internal fertilisation). Many Leptothecatae are dioecious, male and female gonophores being found on separate colonies. A minority are monoecious with female and male gonophores occurring on the same stem. Hydromedusae are either male or female. Besides sexual reproduction asexual reproduction by means of frustules or propagules is also widespread.

The gonothecae of various species differ widely in size and shape. Typically they all have a terminal opening permitting the release of hydromedusae, ovae, or spermatozoa. The opening may be circular, surrounded by a collar with a number of elevations or cusps, or be provided with a lid (operculum). Some gonothecae resemble large hydrothecae (e.g., *Modeeria*), or may be pot-shaped, slipper-shaped, conical, straight, or curved, etc. Their surface can be smooth, ribbed, ringed, provided with a spiral flange (as in many species of *Symplectoscyphus*) or have a rolled-in top. In some genera the gonothecae may contain a pair of small hydranths (e.g., *Halecium*) or have one or several nematothecae on the pedicel or gonothecal body (species of *Halopteris*). In certain species of *Diphasia* four big lateral cusps curve over the gonothecal aperture to form a brood-chamber, protecting the acrocyst with developing eggs. Corbulae (*Aglaophenia, Lytocarpia*) are modified hydrocladia forming a basket heavily armed with nematophores to protect the gonothecae. A phylactocarp (as in *Macrorhynchia*) is a less modified hydrocladium providing protection for a number of large gonothecae.

All Leptothecatae have cnidocysts or cnidae. A cnida is an intracellar organel in the shape of a capsule, containing a folded, reversible tubule and a poisonous liquid. The capsule is secreted by cnidoblasts dispersed in the epidermis and gastrodermis. These transport the cnidae to sites used for capture of food, for defence, or for attachment. These places are typically the tentacles, though dispersed cnidae may also occur in other places. There are three types of cnidae: nematocysts, spirocysts, and ptychocysts, of which only the nematocysts are discussed here. Though cnidae, and in particular nematocysts, have drawn scientific attention for quite a long time their detailed structure has only become known since the development of ultramicroscopical techniques. Nematocysts 'explode' after tactile or nervous stimuli. The tubule or thread in the capsule is everted; typically the 'stomocnidae' (i.e., cnidae of which the tubule is open at the end) force the end of the thread into the tissue of prey or predator, injecting poisonous fluid into the wound. The 'astomocnidae' have another function. The poison of the cnida kills or narcotises the prey, which is transported to the mouth by the tentacles. There are various types of 'stomocnidae', distinguished by the structure of the thread and its armature. This is best visible in the everted thread. Nematocysts are an important taxonomic character, particularly in Anthoathecatae. Their study frequently requires high optical magnifications and phase contrast or differential interference microscopy. In Leptothecatae the tiny hydranth needs to be extracted from the hydrotheca for examination of nematocysts.

Five types of nematocysts are of importance in Leptothecatae: atrichous isorhizas, basitrichous isorhizas, merotrichous isorhizas, macrobasic mastigophores, and microbasic euryteles. Euryteles only occur in exceptional cases among the Leptothecatae, differing in structure from those of Anthoathecatae, where they are much more commom. The structure of these nematocysts is briefly explained in the 'Glossary'.

AREA OF STUDY

The area covered is from 24° to 57°30′ S and 157°E to 167°W (CANZ 1997; Fig. 1). This is essentially the area covered by most New Zealand scientific charts. It extends from the Lord Howe Rise, South Fiji Basin, and northern edge of the Louisville Seamount Chain in the north to the Hjort Trench, Southwest Pacific Basin, and Subantarctic Slope in the south. The area includes Norfolk, Lord Howe, and Kermadec Islands in the north and Snares, Auckland, Campbell, Antipodes, and Bounty Islands to the south of New Zealand. Some material originates from southwestern Australia. Antarctic material has been excluded.

HISTORICAL REVIEW

A survey of the leptolid faunal list of New Zealand shows that several species with a wide geographical distribution were described long before the first five indigenous species were made known by Gray (1843). Only one, *Plumularia Banksii* [now *Monoserius banksii* (Gray, 1843), an enigmatic species], had a proper locality reference ("Inhabits Dusky Bay, New Zealand"), the remaining species being *Dynamene bispinosa* [= *Amphisbetia bispinosa* (Gray, 1843)]; *Dynamene abietinoides* [= *Stereotheca elongata* (Lamouroux, 1816)]; *Sertularia Johnstoni* [= *Symplectoscyphus j. johnstoni* (Gray, 1843)], and *Thuiaria Zelandica* {= *Crateritheca zelandica* (Gray, 1843)]. Busk (1852) doubtfully recorded *Stereotheca elongata* (as *Sertularia elongata*) from the Bay of Islands.

In the period following Gray's and Busk's papers additional species were added to the New Zealand faunal list from existing collections, mostly European, but additional and most important information was published by New Zealand naturalists collecting material along New Zealand shores and in New Zealand harbours. Kirchenpauer, studying collections in the Zoological Museum, Hamburg, Germany, added *Dynamena fasciculata* [1864, now *Amphisbetia fasciculata* (Kirchenpauer, 1864)], localities Sydney, Australia and "Neuseeland" (New Zealand), and *Aglaophenia huttoni* [1876, now *Gymnangium longirostre* (Kirchenpauer, 1872)].

Hutton (1873) published a list of New Zealand 'sertularians', based on material collected by himself and several contemporary naturalists, adding five new species, of which three [*Sertularia monilifera* = *Dictyocladium monilifer* (Hutton, 1873)], *Sertularia simplex* [= *Sertularella simplex* (Hutton, 1873)], and *Sertularia fusiformis* [= *Amphisbetia episcopus* (Allman, 1876a)] are still valid while two (*Sertularia sub-pinnata* and *S. delicaluta*) are relegated to the synonymy of *Symplectoscyphus j. johnstoni* (Gray, 1843). Additonal species recorded by Hutton are *Thuiara articulata* [= *Symplectoscyphus subarticulatus* (Coughtrey, 1875)], *Antennularia antennina* [= *Nemertesia antennina* (Linnaeus, 1758), a very doubtful record], *Plumularia pennatula* [= *Gymnangium longirostre* (Kirchenpauer, 1872)], and *P. banksii* [= *Halicornopsis elegans* (Lamarck, 1816)]. Subsequent corrections of Hutton's identifications were published by Coughtrey (1875, 1876a, b) and Ralph (1961a, b). Slides of Hutton's material first came in the possession of Coughtrey and were later deposited in the Canterbury Museum, Christchurch (Ralph's "Hutton types"). Unfortunately this most important slide collection must be considered lost (see page 13); however, it was studied and reported upon by Ralph, most of her conclusions being here accepted.

Coughtrey's contributions (1875, 1876a, b) are most important, being based on personal observations and those of his fellow naturalists. They do not exclusively pertain to descriptions of additional species but in many instances also include notes on substrate and living specimens. Though the nomenclature used has become obsolete by present standards and some of his identifications needed correction, his observations resulted in the addition of at least 15 species to the New Zealand faunal list. Amongst these six were new species [*Sertularia trispinosa* = *Amphisbetia trispinosa* (Coughtrey, 1875); *Thuiaria sub-articulata* = *Symplectoscyphus subarticulatus* (Coughtrey, 1875); *Plumularia incisa* = *Lytocarpia incisa* (Coughtrey, 1875); *Halecium delicatulum* Coughtrey, 1876a; *Hydrallmania* (?) *bicalycula* = *Salacia bicalycula* (Coughtrey, 1876a), and *Sertularella robusta* Coughtrey, 1876b]. One species, *Obelia* (?) *pygmaea* Coughtrey, 1876b, has not been recorded since Coughtrey's description and is currently considered doubtful. From existing collections Kirchenpauer (1876) contributed *Aglaophenia huttoni*, later on identified as *Gymnangium longirostre* Kirchenpauer, 1872).

Allman (1876a), from existing collections, described the following New Zealand species: *Sertularella integra*; *Sertularella episcopus* [now *Amphisbetia episcopus* (Allman, 1876a)]; *Desmoscyphus buskii* [currently considered a synonym of *Salacia bicalycula* (Coughtrey, 1876a)]; *Synthecium elegans*; *Thuiaria bidens* [now *Symplectoscyphus subarticulatus* (Coughtrey, 1875)]; *Thuiaria dolichocarpa* [now *Crateritheca zelandica* (Gray, 1843)]; *Thuiaria cerastium* [now *Dictyocladium cerastium* (Allman, 1876a)]; *Aglaophenia acanthocarpa*, and *Aglaophenia laxa*. The New Zealand species all originated from Busk's collection of hydroids collected by the *Rattlesnake* Expedition, in The Natural History Museum, London, and were probably collected in the Bay of Islands, New Zealand, where the ship spent a week (cf. Ralph, 1957: 312).

Thompson (1879) described New Zealand hydroids from an existing collection, the location of which is unknown, mentioning as new species *Sertularella exigua* [? *Sertularella simplex* (Hutton, 1873)]; *Sertularella ramosa* (? *Sertularella geodiae* Totton, 1930); *Sertularia insignis* [= *Crateritheca insignis* (Thompson, 1879], and *Pericladium novaezelandiae* [now *Crateritheca novaezelandiae* (Thompson, 1879), locality Pandora Bank, off Cape Maria van Diemen, depth 15 fms = 27 m], this being the only distinct locality given.

Allman (1885), studying existing collections which are now deposited in The Natural History Museum, London, added the following new species: *Campanularia carduella* (from the alga *Melanthalia abscissa*; the species has never been re-discovered or re-described); *Sertularella capillaris* [now *Symplectoscyphus j. johnstoni* (Gray, 1843)]; *Synthecium ramosum* (now *Synthecium elegans* Allman, 1872); *Sertularia unilateralis* [now *Amphisbetia bispinosa* (Gray, 1843)]; *Sertularia crinis* [now *Amphisbetia operculata* (Linnaeus, 1758)], and *Plumularia multinoda* [now *Plumularia setacea* (Linnaeus, 1758)].

Kirchenpauer (1884), describing Sertulariidae from collections in various German museums, added *Sertularella muelleri*, from the Chatham Islands, to the New Zealand faunal list; this species is now known as *Symplectoscyphus indivisus* (Bale, 1882).

Von Lendenfeld (1885a, b), in a study of Australian hydromedusae, introduced various new species from New Zealand waters, viz., *Eucope annulata* [= *Phialella annulata* (von Lendenfeld, 1885a), synonymised by Ralph with *Phialella quadrata* (Forbes, 1848)]; *Lafoea cylindrica* [= *Hebellopsis cylindrica* (von Lendenfeld, 1885a, a doubtful species]; *Obelia australis* [both medusa and polyp, synonymised here with *Obelia dichotoma* (Linnaeus, 1758)]; *Plumularia tripartita* [= *Plumularia setacea* (Linnaeus, 1758)]; *Sertularia simplex* (unidentifiable species), and *Diphasia symmetrica* [= *Amphisbetia bispinosa* (Gray, 1843)]. *Diphasia rectangularis* is a further new species described by von Lendenfeld (1885a), now identified as *Idiellana pristis* (Lamouroux, 1816), the latter being recorded as *Idia pristis* from "many parts of New Zealand coast" (cf. remarks on p. 143). *Sertularella polyzonias* (L., 1758) is also recorded as a New Zealand species; its occurrence in New Zealand waters has never been substantiated.

Allman (1888), in his report on 'Calyptoblastic' hydroids from the *Challenger* collections described two new species from off East Cape, 37°34′ S, 179°22′ E, depth 1280 m: *Cryptolaria gracilis* [now *Acryptolaria gracilis* (Allman, 1888)], and *Perisiphonia pectinata* [now *Cryptolaria pectinata* (Allman, 1888)]; types of these species are in the *Challenger* collection in The Natural History Museum, London.

Marktanner-Turneretscher (1890) working on the extensive hydroid collections in the Natural History Museum of Vienna, Austria, introduced various additional New Zealand species and added some locality records, mostly from the Auckland area. The new species are *Clytia* (?) *elongata* (re-described here from sterile New Zealand material), and *Sertularia huttoni* [= *Crateritheca insignis* (Thompson, 1879)]. The locality records concern *Halecium parvulum* (Bale, 1882); *Synthecium campylocarpum* Allman, 1888; *Plumularia campanula* [= *Halopteris campanula* (Busk, 1852)], and *Hebella scandens* [= *Hebellopsis scandens* (Bale, 1888)].

Hilgendorf (1898), working from the University of Otago, Dunedin, published observations on hydroids from the Dunedin area. Some of Hilgendorf's descriptions and drawings are difficult to interpret and his material seems to have become lost. His *Hemitheca intermedia* was originally introduced as a new genus and species of Anthoathecatae but was removed to Leptothecatae by Ralph (1958), who placed it in the family Haleciidae where it still stands as an enigmatic species of dubious characters; it has never been re-discovered. Hirohito (1983) doubtfully referred a second species to this genus as ?*Hemitheca* sp. Hilgendorf's *Obelia nigrocaulis* is almost certainly *Obelia longissima* (Pallas, 1766); *Calycella parkeri* is plainly *Gonothyraea loveni* and *Hypanthea asymmetrica* is *Silicularia rosea* Meyen, 1834. *Aglaophenia filicula* Allman, 1873, recorded from Taieri Beach and Martin's Bay, is currently considered a synonym of *Aglaophenia tubulifera* (Hincks, 1861b), a species of North Atlantic origin unknown from the New Zealand area; neither his description nor his figure make it possible to identify the species.

A second Hilgendorf paper (1911) concerns hydroids from the Kermadec Islands, listing amongst others, *Halecium tenellum* from Denham Bay, Sunday Island [Raoul Island] and *Aglaophenia* ? x from the same locality; the latter, judging from the drawings, could represent *Macrorhynchia phoenicea* (Busk, 1852)

Hartlaub (1901b), in a paper discussing Pacific hydroids, added the following New Zealand species: *Eucopella crenata* [now *Orthopyxis crenata* (Hartlaub, 1901b)]; *Thyroscyphus tridentatus* (Bale, 1894) [now *Parascyphus simplex* (Lamouroux, 1816)]; *Sertularella solidula* Bale, 1882 [now *Sertularella crassiuscula* Bale, 1924], and *Sertularella fusiformis* var. *nana* [= *Sertularella simplex* (Hutton, 1873)].

New Zealand faunal lists, based on compilations of literature references and synonymies, have been published by Farquhar (1896) and Hutton (1904); these will not be discussed in detail here.

Jäderholm (1917, 1926) described New Zealand material in existing Swedish collections, the locality references being usually vague. In his 1917 paper ten species are mentioned from New Zealand; in some the locality is narrowed down to "Auckland". Of those *Sertularella tenella* ("New Zealand") is now considered to represent *Sertularella robusta* Coughtrey, 1876b; his material of *Sertularella adpressa* Ritchie, 1911a ("New Zealand") may represent *Symplectoscyphus subarticulatus* (Hutton, 1873). Jäderholm (1926) listed *Campanulina humilis* [= *Opercularella humilis* (Bale, 1924)] from Perseverance, Campbell Island, and *Sertularia operculata* [= *Amphisbetia operculata* (Linnaeus, 1758)] and *Sertularella tenella* Coughtrey, 1876b, from Port Chalmers, Otago Harbour.

Bale (1924) published a most important paper on New Zealand leptolids, based on extensive collections, amongst which the first deep-water hydroids from the northern New Zealand area, taken 10 miles NW of Cape Maria van Diemen, at the northern tip of North Island, 50 fms (= 91 m) deep. Some of his results are discussed here. Amongst his new species are *Obelia nodosa* (Waitakere, Auckland; not re-discovered since Bale's record), *Obelia coughtreyi* [Taylor's Mistake near Christchurch; almost certainly *Obelia longissima* (Pallas, 1766)], *Campanulina humilis* [from the hull of the expeditionary vessel *Terra Nova*, evidently taken in Lyttelton Harbour where the vessel was docked, now known as *Opercularella humilis* (Bale, 1924)], *Sertularella edentula* (NW Cape Maria van Diemen, now *Tasmanaria edentula* (Bale, 1924)], *Sertularella columnaria* ["New

Zealand", now *Symplectoscyphus columnarius* (Briggs, 1914)], *Sertularella crassiuscula* ("New Zealand", from Hincks's collection in The Natural History Museum, London), *Thuiaria farquhari* [Lyttelton, now *Salacia farquhari* (Bale, 1924)]; *Plumularia setacea* var. *opima* (Tomahawk Beach, Dunedin, now *Plumularia opima* Bale, 1924); *Plumularia wattsii* Bale, 1887 (Port Chalmers, Otago Harbour), *Thecocaulus heterogona* (NW Cape Maria van Diemen, now *Halopteris crassa* (Billard, 1911), *Aglaophenia plumosa* Bale, 1882 (Quail Island, Lyttelton Harbour), *Thecocarpus chiltoni* (NW Cape Maria van Diemen, now *Lytocarpia chiltoni* (Bale, 1924)], and *Halicornaria rostrata* [NW Cape Maria van Diemen, now *Lytocarpia incisa* (Coughtrey, 1875)]. *Sertularella integra* Allman, 1876 and *Hemicarpus banksii* [now *Monoserius banksii* (Gray, 1843)] were re-described after the type material, but the condition of *Monoserius banksii* did not permit Bale to reach a definite conclusion (see our comment on p. 338).

Trebilcock's 1928 paper is a very important one on New Zealand leptolids. Trebilcock visited New Zealand in April and May, 1923 when he "spent a few days collecting Hydroids at Auckland, Island Bay (Wellington), New Brighton (Christchurch), St Clair (Dunedin), and Bluff". Nevertheless he recorded 17 new species and varieties, and established at least 8 new records. Though some of his new species and varieties inevitably dis-appeared in the synonymy of older species, many of his new species still stand, as the following list will show. *Orthopyxis formosa* (Auckland Harbour) and *O. delicata* (St Clair, Dunedin) are here considered to be conspecific with *Orthopyxis crenata* (Hartlaub, 1901). Trebilcock's *Perisiphonia quadriseriata* is believed to be conspecific with *Cryptolaria prima* Busk, 1857. Three species of *Halecium, H. lenticulare* (St Clair, Bluff, and Island Bay), *H. corrugatissimum* (St Clair) and *H. expansum* (St Clair) still stand, as do *Sertularella macrogona* [St Clair, now *Symplectoscyphus macrogonus* (Trebilcock, 1928)], *Sertularella procera* (Bluff and Stewart Island, now *Symplectoscyphus procerus*), and *Sertularella fusca* [Rock pools at St Clair, now *Symplectoscyphus fuscus* (Trebilcock, 1928)]. His *Sertularella robusta* var. *fluctículata* falls within the variational amplitude of *Sertularella integra* Allman, 1876, as defined here; *Thuiaria buski* var. *tenuissima* is here synonymised with *Salacia bicalycula* (Coughtrey, 1876); *Thuiaria spiralis* is here conceived as *Salacia bicalycula spiralis* (Trebilcock, 1928), and *Sertularia trispinosa* var. *inarmata* as *Amphisbetia trispinosa* (Coughtrey, 1875). *Thecocaulus minutus* is recognised as *Halopteris minutus* (Trebilcock, 1928) and *Thecocarpus formosus* var. *inarmatus* as *Lytocarpia incisa* (Coughtrey, 1875). New records concern *Hebella calcarata* [= *Hebellopsis scandens* (Bale, 1888)]; *H. corrugata* (now *Hebella costata corrugata* (Thornely, 1904); *Filellum serratum* (Clarke, 1879); *Sertularella rentoni* [= *Symplectoscyphus rentoni* (Bartlett, 1907)]; *Dynamena quadridentata* (Ellis & Solander, 1786); *Plumularia pulchella* [= *Monotheca pulchella* (Bale, 1882)]; *Plumularia setaceoides* Bale, 1882); and *Plumularia hyalina* [= *Monotheca hyalina* (Bale, 1882)]. Trebilcock's record of *Lineolaria flexuosa* Bale, 1884 probably put Ralph, who re-described the species from Australian material, on the wrong track; no representative of the leptolid family Lineolariidae has ever been recorded from New Zealand.

The expeditionary vessel *Terra Nova* on her way to the South polar regions, spent some weeks in New Zealand waters where some of her deep-water collecting gear was tried out in deeper New Zealand coastal waters. This resulted in a wonderful collection of New Zealand deep water leptolids, that were later studied and reported upon by Totton (1930). His paper is a fundamental one for our knowledge of the deep-water hydroid fauna around the northern part of North Island; the drawings illustrating Totton's report set a trend for future and more enlightening drawings of details of leptolid structures. No less than 26 new species of Leptothecatae were described, predominantly from deeper waters, many of which still stand as the following list of Totton's new species shows: *Ophiodissa armata* (= *Hydrodendron tottoni* Rees & Vervoort, 1987); *Tulpa diverticulata*; *Clytia compressa* [now in *Clytia hemisphaerica* (Linnaeus, 1767)]; *Billardia novaezealandiae*; *Stegolaria irregularis*; *Acryptolaria minima*; *Zygophylax unilateralis*; *Synthecium carinatum*; *Synthecium robustum* (= *Synthecium tottoni* Ralph, 1958), *Synthecium longithecum*; *Symplectoscyphus spiritualis* [here placed in *S. j. johnstoni* (Gray, 1843)]; *S. confusus*; *S. epizooticus*; *S. tuba*; *Sertularella geodiae*; *Antennella ritchiei* (now *A. quadriaurita* Ritchie, 1909); *A. serrata* (now *A. quadriaurita* Ritchie, 1909); *Halopteris constricta* (now *H. minuta* Trebilcock, 1928); *Plumularia diploptera* [currently brought to *P. setacea* (Linnaeus, 1758)]; *P. spirocladia*; *P. triangulata* [now *Kirchenpaueria bonnevieae* (Billard, 1906)]; *P. brachiata*; *P. tenuissima*; *Nemertesia elongata*; *Thecocarpus ctenatus* (= *Lytocarpia ctenata*), and *Halicornaria regalis* (here placed in *Gymnangium prolifer* (Bale, 1882). Additional records on New Zealand species are contained in the following papers and will not be discussed in detail here because their main contributions concern local faunas: Kulka (1950), Gordon and Ballantine (1977), Barnett (1985), and Watson and Vervoort (2000). A list of leptolid types in the National Museum of New Zealand was published by Hicks *et al.* (1991) and Dawson (1992) listed the New Zealand leptolid fauna from available literature.

Ralph's papers (1956, 1957, 1958, 1961a–d) were a fundamental contribution to New Zealand leptothecate leptolids, primarily in taxonomical aspects, but her papers also contain valuable historical, anatomical, and ecological information. Ralph as much as possible revised older material, amongst which was important material from Hutton's, Coughtrey's and Bale's collections of New Zealand hydroids, much of which has since been lost.

As our present paper largely comments on Ralph's results and follows her discussion fairly closely we refrain from a detailed review of her papers, these will, it is hoped, appear from the text we present below. For reasons of completeness we draw attention to Bouillon's (1995a) paper on Hydromedusae in the NIWA collections, and to Bouillon and Barnett's (1999) memoir on New Zealand Hydromedusae, both of which contain important references to Leptothecate medusae.

Information on some of the leptolids occurring along New Zealand coasts can be found in the following popular guides: Powell (1947, 3rd ed. 1987); Leslie (1968), Dell and Heath (1971), Doak (1971), Morton and Miller (1973, 2nd ed.). Several papers contain ecological details concerning New Zealand hydroids: Ralph and Hurley (1952), Batham (1956), Skerman (1958, 1959, 1960), Poore (1968), Ralph and Thomson (1968), Jillett (1971), Grange *et al*. (1981), Roper *et al.* (1983).

Papers of major importance for the taxonomy of leptolids and their medusae, also having influence on systematic questions relating to New Zealand species are: Broch (1929), Kramp (1956, 1961, 1965, 1968), Cornelius (1975b, 1979, 1982), and Schuchert (1997).

PRESENTATION

The arrangement of the various families follows Bouillon (1995b): his thorough and authoritative treatment of the Hydrozoa will be a hallmark for a long time to come. However, for the majority of hydrozoan taxa we have largely followed Cornelius (1992a, 1995a, b). The arrangement of genera and species in the families is alphabetical.

TECHNIQUE

The material studied has either directly been preserved in ethanol 80% or was preserved in that medium after previous fixation in 10% formalin. Temporary slides of fragments were studied in a mixture of equal parts glycerol-ethanol 80%; permanent slides were made following the method described by Medel and Vervoort (1998: 4). Besides Haemalum Mayer, Bengal Rose and Lignin Pink was also used for staining. Prolonged storage in formalin had unfortunately made some of the larger colonies extremely brittle and difficult to handle.

ABBREVIATIONS

AHM	Allan Hancock Museum of the University of Southern California, Los Angeles, U.S.A.
AMS	Australian Museum, Sydney, New South Wales, Australia.
BCPM	British Columbia Provincial Museum, Victoria, B.C., Canada.
IRSN	Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium.
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.
MNB	Museum für Naturkunde der Humboldt-Universität (Zoological Museum of Humboldt University), Berlin, Germany.
MOV	Museum of Victoria, Melbourne, Australia.
MUH	Museum of the University of Hamburg, Germany (Zoologisches Museum der Universität Hamburg), Germany.
NHM	The Natural History Museum [formerly British Museum (Natural History)], London, U.K.
NIWA	National Institute of Water and Atmospheric Research (incorporating the New Zealand Oceanographic Institute), Wellington, New Zealand.
NMNH	National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A.
NMNZ	National Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand.
NMW	Naturhistorisches Museum, Wien (Vienna, Austria).
NNM	Nationaal Natuurhistorisch Museum (National Museum of Natural History, formerly Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands.
PMBS	Portobello Marine Biological Station, University of Otago, Dunedin, New Zealand.
RSC	Ralph's slide collection in National Museum of New Zealand, Wellington.
RMNH	Rijksmuseum van Natuurlijke Historie (now Nationaal Natuurhistorisch Museum, National Museum of Natural History), Leiden, The Netherlands.
RSM	Royal Scottish Museum, Edinburgh, Scotland.
SAM	South African Museum, Cape Town, South Africa.
SBM	Santa Barbara Natural History Museum, Santa Barbara, California, U.S.A.
ZMA	Zoological Museum of the University of Amsterdam, The Netherlands.
ZMSP	Zoological Museum of the Russian Academy of Sciences, St Petersburg, Russia.
ZRS	Swedish Zoological State Museum, Stockholm
ZSBS	Zoologische Sammlung des Bayerischen Staates, München (Munich), Germany.

GLOSSARY

Only those technical terms are explained that are used in description of the various New Zealand leptothecate species. A very complete explanatory glossary is in Cornelius (1995a, b); an equally explanatory, well-illustrated glossary relating to New Zealand Hydromedusae is given in Bouillon and Barnett (1999). For a full introduction to Hydrozoa, with the exclusion of Siphonophora, see Bouillon (1995b).

abaxial – side turned away from axis.
abcauline – side turned away from stem (axis or caulus). Opposed to adcauline.
aboral – side opposed to that of mouth or oral side.
acrocyst – gelatinous, typically globular structure that can be brought outside the gonotheca and containing the developing eggs or planulae. This type of development is named extracapsulary as opposed to intracapsulary, which takes place inside the gonotheca and is the usual condition in Leptothecatae.
adaxil – side facing the axil.
adcauline – side confronting the stem (axis or caulus). Opposed to abcauline.
adradius, **adradial** – radii located between perradial and interradial radii. Most hydromedusae, in having four radial canals, four perradii, and four interradii, therefore have eight adradii.
ahydrocladiate – devoid of hydrocladia (ahydrocladiate stem or part of stem).
ahydrothecate – devoid of hydrothecae (ahydrothecate stem, branch or part of stem, branch).
amphicoronate – condition of a whorl of tentacles that are alternately directed up and down. In contracted condition such a whorl of amphicoronate tentacles may give the impression of two closely approximated whorls being present.
anisorhiza – type of nematocyst in which the thread becomes progressively thinner (cf. isorhiza).
annulus – part of tube-like structure set off by two circular constrictions perpendicular to length axis; hence annular, annulated.
alternate – placed in succession on left or right side of, for example, the axis or branch. Opposed to opposite. Subalternate and subopposite indicate conditions intermediate between strictly alternate and strictly opposite.
apex – top or tip, hence apical.
apical – at or near the top (of stem, branch, etc.)
apophysis, pl. **apophyses** – projecting part of elongated structure (e.g., internode), typically supporting another structure, for instance a hydrotheca or hydranth. Also named hydrophore.
arborescent – shaped or branched like a tree.
atrichous isorhiza – a type of isorhiza of which the thread has no or only slightly developed armature (barbs or spines).
axil – angle between two elements of a forked structure, usually between main stem and branch or between axis and hydrocladium; hence axillar.
axillar – situated in the axil.
axis – stem
basitrichous isorhiza – type of isorhiza in which the threat carries armature, in the form of spines, on its basal part.
bell – umbrella
bell cavity – subumbrellar cavity
binomen – species name as used in scientific biological nomenclature, being composed of a genus name followed by a species name. It is customary in zoological nomenclature, to cite, with the binomen, the name of the author who first introduced the species name and the year of its publication, separated by a colon. Name and year are hyphenated if the species has since been removed to another genus.
blastostyle – part of hydroid colony, usually a polyp or reduced polyp, bearing the sexual individual (hydromedusa) or its 'suppressed' derivatives (sporosacs or gonophores).
bulb – swelling at the periphery of the exumbrella, usually, but not always, preceding the development of a (marginal) tentacle, remaining visible as base of a tentacle as marginal bulb. Bulbs that do not give rise to a tentacle are called rudimentary bulbs. Some hydromedusae have compound bulbs, each bulb having a tentacle.
cauline – belonging to or attached to the caulus.
caulus, pl. **cauli** – main stem
cirri – small tentacle-like structures at the periphery of the exumbrella between marginal tentacles; without marginal bulbs. Spiral cirri are spirally coiled with a terminal cluster and scattered nematocysts. Flexile cirri do not coil and have rings of nematocysts. Lateral cirri are placed next to a tentacle bulb.
cladium – *see* hydrocladium
cnidome – inventory of all types of nematocysts (of a phase in the life history) of a cnidarian.
cnidocyst – *see* nematocyst
concretions – *see* statocyst
corbula – a modified, fertile hydrocladium, being a pod-like structure, composed of a central axis with pairs of lateral ribs folding over the gonothecae. The ribs are covered with nematothecae and may have a basal (modified) hydrotheca. A corbula is either open or closed and borne on a short pedicel composed of some (normal) hydrothecate internodes.
corbulacosta – *see* costa
cordylus, pl. **cordyli** – small club-shaped structure on bell margin situated between tentacles. They may be hollow or filled with endoderm and may have nematocysts. Function unknown.
cormoid – a single caulus with associated structures (hydrocladia, hydrothecae, gonothecae, corbulae), used in describing Aglaopheniidae.
costa, pl. **costae** – rib or gonohydrocladium, also used to describe modified hydrocladium or corbula in Aglaopheniidae.
crenulated – condition to describe rim of hydrotheca or mouth of hydromedusa having rounded cusps separated by sharp but shallow incisions.

cusp, pl. **cusps** – regular projection from a smooth edge or surface. 'Teeth' is often used in the same context, which word is better reserved for elements of the masticatory apparatus.

diaphragm – a thin sheath of perisarc at the base of a hydrotheca, typically suspended in internal ring of perisarc (annulus), frequently separating lumen of hydrotheca proper from that of basal chamber. It is perforated by a tiny hole or hydropore to permit passage of coenosarc.

eurytele – *see* mastigophore

excretory papilla – papilla situated between marginal tentacles (at the base of tentacular bulbs, rudimentary bulbs marginal warts, etc.), or on the radial canals. They represent an opening or pore connecting with cavity of bulbs or gastrovascular system and seem to have an excretory function.

excretory pore – opening of excretory papilla.

exumbrella – *see* umbrella

exumbrellar clasps or **spur** – upward growth of marginal tentacular bulbs clasping the exumbrellar margin.

fascicled – stem composed of bundle of tubes.

flexile cirri – *see* cirrus

gastric peduncle – cone-shaped projection of mesoglea into subumbrellar cavity and supporting the manubrium.

gonads – localised stretch of tissue in which the germ cells mature. This may be along the wall of the manubrium (typically in Anthoathecatae) or at the level of the radial canals (typically in Leptothecatae); exceptions, however, do occur.

gonochorist – a species is gonochoristic if the individuals are of separate sex, either male or female; consequently there are no hermaphroditic individuals.

gonocladium – a branch or modified hydrocladium bearing gonothecae.

gonohydrocladium – *see* costa

gonophore – *see* blastostyle

gonotheca, pl. **gonothecae** – in Leptothecatae the derivaties of the reproductive polyp (gonophore or blastostyle) are surrounded by a capsule of perisarc, the gonothecae, of characteristic shape. It may develop a lid, tear, or similar structure for the escape (or entrance) of sexual products.

heteromerous – term used to describe condition of axis or hydrocladium when composed of differing internodes, e.g., hydrothecate and ahydrothecate internodes.

hydranth – *see* polyp

hydrocaulus – caulus or main stem.

hydrocladium, pl. **hydrocladia** – a branchlet (cladium) off the main stem bearing hydrothecae and typically divided into internodes by means of nodes.

hydrophore – *see* apophysis

hydrorhiza – stolonal system of a leptolid or leptolid colony, consisting of tubes (branched, anastomosing, or single) attaching individual or colony to or in substrate**.** May have a considerable size.

hydrotheca, pl. **hydrothecae** – perisarc structure surrounding hydranth in leptothecates and large enough to accommodate hydranth in retracted condition. Shape of hydrotheca typically diagnostic in species identification.

hypostome – terminal region of hydranth containing the mouth. Usually conical in majority of leptothecates with exception of Campanularioidea where it is spherical.

interradial – radial axes located between the perradii (or radial canals in most hydromedusae; four interradii being present).

intertentacular web – a thin and transparent sheath of tissue at the tentacle bases; usually best visible in living specimens.

intra(hydro)thecal – inside the (hydro)theca.

isorhiza – type of nematocyst in which the thread is of uniform diameter, best visible in exploded condition (cf. anisorhiza).

lateral cirri – *see* cirrus

lenticular – shaped like a lens (the shape of the bell in certain hydromedusae).

lithocyst – *see* statocyst

mamelon – circular hole or raised, conical protrusion with circular aperture on (stem) apophysis in Plumularioidea, supposed to represent a modified or reduced nematatheca or nematotheca.

manubrium – median and contractile extension of the subumbrella into the subumbrellar cavity supporting the mouth; its lobe-like extensions may surround the mouth as its lips. Often supported by the peduncle, which is non-contractile.

marginal bulb – *see* bulb

marginal vesicle – *see* statocyst

marginal warts – small swelling of the umbrellar margin not carrying tentacles.

marsupium – medusoid structure that extrudes outside the gonotheca and into which development of planulae takes place. In contradistinction to metaconidium there are no remnants of tentacles.

mastigophore – type of nematocyst in which basal part of thread is thickened to form a shaft; there is no swelling at the end of the shaft as occurs in euryteles.

median – being placed in the middle (e.g., median or mesial nematotheca).

medusoid – sexual stage in life cycle of Leptothecatae, in appearance ranging from a free-living, non-reduced hydromedusae to a much reduced, derived stage that may or may not be attached to the polypoid stage.

merotrichous isorhiza – type of isorhiza in which the armature (barbs or spines) on the thread are found some distance from base.

mesial – *see* median

mesoglea – tissue layer between epidermis (ectoderm) and gastrodermis (endoderm); thin in the polyp phase and acting as a basement membrane, more voluminous in the medusa phase where it forms the jelly of a jellyfish, but also present there in tentacles and manubrium.

metaconidium – medusoid structure that can be placed outside the gonotheca and in which development of planulae takes place. There are typically several metaconidia per gonotheca and they possess tentacular filaments (e.g., in *Gonothyraea loveni*).

microbasic eurytele – a type of eurytele in which the shaft is three times as long as the capsule or shorter.

microbasic mastigophore – a type of mastigophore in which the shaft is short.

monomerous – being composed of uniform components, e.g. a hydrocladium is monomerously segmented if all composing parts of internodes, are identical, i.e., all either hydrothecate or ahydrothecate. Opposed to heteromerous, when hydrothecate or ahydrothecate internodes alternate. *See also* heteromerous.

nematocyst or **cnidocyst** – stinging organellae unique to phylum Cnidaria. Typically an extracellular capsule secreted by a cnidocyte and containing a coiled and folded tubule which on discharge is being everted and straightened. Its principal function is to penetrate the tissue of prey and to paralyse it, but they may also act in defence or have a function in attachment. Though small their detailed structure is of great taxonomic importance. The principal types of nematocysts are desmones, isorhizas, anisorhizas, euryteles, heteronemes, mastigophores, and stenoteles.

nematophore – modified polyp, typically without mouth or tentacles and richly armed with nematocysts. Some are differentiated into cnidostyle (or nematostyle), the apical portion bearing the nematocysts, and rest of the body termed sarcostyle. A nematotheca may surround the nematophore.

nematotheca, pl. **nematothecae** – perisarc structure surrounding or supporting the nematophore.

ocellus, pl. **ocelli** – photoreceptors found on marginal bulbs of tentacles in Hydromedusae, where they may be found on the outer side (abaxial) or on the inner side (adaxial).

operculum, pl. **opercula** – one or more flaps closing the aperture of hydro- or gonotheca. In hydrothecae of certain genera the (triangular) opercular flaps may be connected by a membrane. In many gonothecae there is one circular, deciduous operculum.

opposite – originating in pairs but on both sides of the axis; one ramification pointing left, the other right; typically continued along length of axis.

papilla, pl. **papillae** – agglomeration of tissue on outside of a certain structure.

pedicel – stalk (e.g., of hydro- or gonotheca).

pedicellate – provided with a pedicel.

peduncle – cone-shaped protrusion of mesoglea, with associated epi- and gastrodermis, into subumbrellar cavity and supporting the manubrium. Non-contractile, opening above into stomach, below into manubrium.

perradial – main radial axes (perradii) of a medusa, usually corresponding with the radial canals, i.e., four in most hydromedusae.

phylactocarp – modified hydrocladium bearing gonothecae, being either a corbula, a modified hydrocladium bearing the gonothecae, or an appendage of an otherwise normally developed hydrocladium bearing the gonothecae.

polymorphic – occurring in more than one form of shape, often used to indicate highly variable species. Polyps are polymorpic because they occur us true hydranths (with mouth and tentacles), as nematophores and as gonophores.

polysiphonic – *see* fascicled

proboscis – elongated part of the mouth.

rachis, pl. **rachis** – used here to indicate the 'axis'of a corbula from which spring the costae or corbulacostae.

radial canals – straight and narrow canals leading from stomach to peripheral circular or ring channel. Usually there are four such canals but in certain genera (*Aequorea*) their number may be considerably increased.

rhizocaulus, pl. **rhizocauli** – type of 'axis' formed by tubes that are a direct continuation of the hydrorhyza.

sarcopore – minute hole in perisarc permitting passage of a nematophore.

sarcostyle – *see* nematophore

spiral cirri – *see* cirrus

sporosac – *see* blastostyle

statocyst – small organ at or near umbrellar margin for detection of movement and posture, each with open or closed cavity containing one or several tiny concretions (statoliths) resting on the hairs of a layer of sensory cells registering their movement.

statoliths – *see* statocyst

stolon – tube of perisarc and filled with coenosarc uniting erect structures like separate hydranths, hydrothecae, gonothecae, or colonies. It may be unbranched, branched, or anastomosing; also called hydrorhiza when of more complex structure.

stolonal – relating to the stolon.

subalternate – *see* alternate

subopposite – *see* alternate

subumbrella – *see* umbrella

tendril – distal part of axis, branch, or hydrocladium developing as tube-like, stolonal structure and either serving asexual reproduction ('frustule') or extension of colony as it may give rise to new stems or hydrocladia. Also called 'apical stolon'.

trabecula, pl. **trabeculae** – a rib-like supporting or strengthening structure.

tooth, pl. **teeth** – *see* cusp

umbrella – body of medusa with exclusion of manubrium and tentacles. In hydromedusae globular, wineglass-shaped, disc-shaped. lens-shaped etc. Outer, generally convex, surface is the exumbrella; inner, usually concave surface is the subumbrella; hence subumbrellar cavity.

unicoronate – having a single corona or whorl (of tentacles). *See also* amphicoronate.

velum – tissue fold projecting inward from umbrellar margin into subumbrellar cavity like a diaphragm. The central hole or velar opening is of varied diameter in hydromedusae; moreover, it can be reduced by contraction of muscles in the velar ectoderm, thus reducing the volume of the subumbrellar cavity. It has an important role in locomotion.

zooxanthellae – unicellular algae living intracellulary in certain species of Leptolida (e.g., *Aglaophenia*), the animal profiting from the assimilation products of the algae. This is referred to as endosymbiosis.

LIST OF SPECIES

Class LEPTOLIDA
Subclass LEPTOTHECATA
Order **CONICA**
Suborder CAMPANULINIDA
Superfamily CAMPANULINOIDEA
Family **AEQUOREIDAE**

Aequorea australis Uchida, 1947
Aequorea forskalea Péron & Lesueur, 1810
Aequorea macrodactyla (Brandt, 1835)
[*Aequorea paracuminata* (W.J. Rees, 1938)]

Family **CAMPANULINIDAE**

Tripoma arboreum Hirohito, 1995
[*Calycella parkeri* Hilgendorf, 1898 = *Gonothyraea loveni* (Allman, 1859)]]
Opercularella humilis (Bale, 1924)

Family **LINEOLARIIDAE**

Lineolaria flexuosa Bale, 1884 (based on misinterpretation of species of *Filellum* Hincks, 1868)

Family **MALAGAZIIDAE**

Malagazzia carolinae (Mayer, 1900)
Octophialucium indicum Kramp, 1958

Family **PHIALELLIDAE**

Phialella falklandica Browne, 1902
Phialella quadrata (Forbes, 1848)
Plicatotheca anitae Calder & Vervoort, 1986

Superfamily LAODICEOIDEA
Family **LAODICEIDAE**

Laodicea indica Browne, 1905
Staurodiscus gotoi (Uchida, 1927)
Toxorchis polynema Kramp, 1959

Family **TIARANNIDAE**

Chromatonema rubrum Fewkes, 1882
Modeeria rotunda (Quoy & Gaimard, 1827)
Stegolaria irregularis Totton, 1930
Stegolaria operculata (Nutting, 1905)

Family **TIAROPSIDIDAE**

Tiaropsidium japonicum Kramp, 1932
Tiaropsidium roseum (Maas, 1905)
Tiaropsis gordoni Bouillon & Barnett, 1999

Superfamily EIRENOIDEA
Family **EIRENIDAE**

Eirene ceylonensis Browne, 1905
Eirene menoni Kramp, 1953
Eirene proboscidea Bouillon & Barnett, 1999
Eirene tenuis (Browne, 1904)
Eutima curva Browne, 1905
Eutima mira McCrady, 1857
Phialopsis diegensis Torrey, 1909

Superfamily LOVENELLOIDEA
Family **CIRRHOLOVENIIDAE**

Cirrholovenia polynema Kramp, 1959

Family **EUCHEILOTIDAE**

Eucheilota menoni Kramp, 1959
Eucheilota paradoxica Mayer, 1900
Eucheilota tropica Kramp, 1959
Eucheilota sp.

Family **LOVENELLIDAE**

Lovenella assimilis (Browne, 1905)
Lovenella sp.

Superfamily MITROCOMOIDEA
Family **MITROCOMIDAE**

Cosmetirella davisi (Browne, 1902)
Mitrocomella brownei (Kramp, 1930)
Mitrocomella frigida (Browne, 1910)
Mitrocomella niwai Bouillon & Barnett, 1999

Suborder LAFOEIDA
Superfamily LAFOEOIDEA
Family **CLATHROZOIDAE**

Clathrozoon sp.

Family **LAFOEIDAE–LAFOEINAE**

Acryptolaria angulata (Bale, 1914)
Acryptolaria conferta conferta (Allman, 1877)
Acryptolaria cornifornis Naumov & Stepan'yants, 1962
Acryptolaria crassicaulis (Allman, 1888)
Acryptolaria gracilis (Allman, 1888)
Acryptolaria cf. *longitheca* (Allman, 1877)
Acryptolaria minima Totton, 1930
Acryptolaria patagonica El Beshbeeshy, 1991
Cryptolaria exserta Busk, 1858
Cryptolaria pectinata (Allman, 1888)
Cryptolaria prima Busk, 1857
Filellum antarcticum (Hartlaub, 1904)

Filellum serpens (Hassall, 1848)
Filellum serratum (Clarke, 1879)
Filellum sp. 1
Filellum sp. 2
Filellum sp. 3
Lafoea dumosa (Fleming, 1828)
Lafoea gracillima (Alder, 1856) (currently considered a synonym of *Lafoea dumosa* (Fleming, 1820)

Family **LAFOEIDAE–HEBELLINAE**
Anthohebella parasitica (Ciamician, 1880)
Hebella costata corrugata (Thornely, 1904)
Hebella striata Allman, 1888
Hebellopsis cylindrica (von Lendenfeld, 1885) (doubtful species)
Hebellopsis scandens (Bale, 1888)

Family**LAFOEIDAE–ZYGOPHYLACINAE**
Zygophylax antipathes (Lamarck, 1816)
Zygophlyax binematophoratus sp. nov.
Zygophylax cervicornis (Nutting, 1905)
Zygophylax parapacificus sp. nov.
Zygophylax polycarpa sp. nov.
Zygophylax pseudafricanus sp. nov.
Zygophylax sibogae Billard, 1919
Zygophylax tizardensis Kirkpatrick, 1890
Zygophylax unilateralis Totton, 1930

Suborder HALECIIDA
Superfamily HALECIOIDEA
Family **HALECIIDAE**
Halecium beanii (Johnston, 1838)
Halecium corrugatissimum Trebilcock, 1928
Halecium delicatulum Coughtrey, 1876
Halecium expansum Trebilcock, 1928
Halecium fragile Hodgson, 1950
Halecium lenticulare Trebilcock, 1928
Halecium plicatocarpum sp. nov.
Halecium ralphae Watson & Vervoort, 2001
Halecium sessile Norman, 1866
Halecium tenellum Hincks, 1861
Halecium sp.
Hemitheca intermedia Hilgendorf, 1898 (doubtful species)
Hydrodendron mirabile (Hincks, 1866)
Hydrodendron tottoni Rees & Vervoort, 1987
Hydrodendron sp.

Suborder PLUMULARIIDA
Superfamily SERTULARIOIDEA
Family **SERTULARIIDAE**
Amphisbetia bispinosa (Gray, 1843)
Amphisbetia episcopus (Allman, 1876)
Amphisbetia fasciculata (Kirchenpauer, 1864)
Amphisbetia minima (Thompson, 1879)
Amphisbetia operculata (Linnaeus, 1758
Amphisbetia trispinosa (Coughtrey, 1875)
Crateritheca bidens sp. nov.
Crateritheca billardi (Bale, 1915)
Crateritheca insignis (Thompson, 1879)
Crateritheca novaezelandiae (Thompson, 1879)
Crateritheca zelandica (Gray, 1843)
Dictyocladium amplexum sp. nov.
Dictyocladium monilifer (Hutton, 1873)
Dictyocladium reticulatum (Kirchenpauer, 1884)
Dictyocladium thuja sp. nov.
Dictyocladium watsonae (Vervoort, 1993)
Diphasia subcarinata (Busk, 1852)
Dynamena quadridentata (Ellis & Solander, 1786)
Gigantotheca maxima gen. *et* sp. nov.
Gigantotheca raukumarai sp. nov.
Gonaxia australis sp. nov.
Gonaxia constricta (Totton, 1930)
Gonaxia grandis sp. nov.
Gonaxia immersa sp. nov.
Gonaxia intercalata sp. nov.
Idiellana pristis (Lamouroux, 1816)
Salacia bicalycula (Coughtrey, 1876), including *Salacia buski* (Allman, 1876)
Salacia bicalycula spiralis (Trebilcock, 1928)
Salacia desmoides (Torrey, 1902)
Salacia farquhari (Bale, 1924)
Salacia macer sp. nov.
Sertularella acutidentata acutidentata Billard, 1919
Sertularella areyi Nutting, 1904
Sertularella crassiuscula Bale, 1924
Sertularella diaphana Allman, 1885
Sertularella exigua Thompson, 1879
Sertularella fuegonensis El Beshbeeshy, 1991
Sertularella gayi gayi (Lamouroux, 1821)
Sertularella geodiae Totton, 1930
Sertularella integra Allman, 1876, including *Sertularella intricata* Billard, 1919 and *Sertularella richardsoni* Ralph, 1961
Sertularella leiocarpa (Allman, 1888)
Sertularella quadridens quadridens (Bale, 1884)
Sertularella ramosa Thompson, 1879
Sertularella robusta Coughtrey, 1876
Sertularella cf. *robusta* Coughtrey, 1876
Sertularella simplex (Hutton, 1873)
Sertularella sinensis Jaederholm, 1896
Sertuarella stolonifera sp. nov.
Sertularella vervoorti El Beshbeesy, 1991
Sertularella sp. 1
Sertularella sp. 2
Sertularia distans (Lamouroux, 1816)
Sertularia marginata (Kirchenpauer, 1864)
Sertularia tenuis Bale, 1884
Sertularia tumida Allman, 1877
Sertularia unguiculata Busk, 1852
?*Staurotheca megalotheca* sp. nov.
Stereotheca elongata (Lamouroux, 1816)

Symplectoscyphus amoenus sp. nov.
Symplectoscyphus candelabrum sp. nov.
Symplectoscyphus columnarius (Briggs, 1914)
Symplectoscyphus confusus Totton, 1930
Symplectoscyphus epizooticus Totton, 1930
Symplectoscyphus fuscus (Trebilcock, 1928)
Symplectoscyphus howensis sp. nov.
Symplectoscyphus indivisus (Bale, 1882)
Symplectoscyphus irregularis (Trebilcock, 1928)
Symplectoscyphus johnstoni johnstoni (Gray, 1843), including *Symplectoscyphus spiritualis* Totton, 1930
Symplectoscyphus johnstoni subtropicus Ralph, 1961
Symplectoscyphus johnstoni tropicus Vervoort, 1993
Symplectoscyphus macrogonus (Trebilcock, 1928)
Symplectoscyphus macroscyphus sp. nov.
Symplectoscyphus odontiferus sp. nov.
Symplectoscyphus paulensis Stechow, 1923
Symplectoscyphus procerus (Trebilcock, 1928)
Symplectoscyphus pseudodivaricatus Ralph, 1961
Symplectoscyphus pygmaeus (Bale, 1882)
Symplectoscyphus rentoni (Bartlett, 1907)
Symplectoscypus spiraliformis sp. nov.
Symplectoscyphus subarticulatus (Coughtrey, 1875)
Symplectoscyphus subdichotomus (Kirchenpauer, 1884)
Symplectoscyphus tuba Totton, 1930
Symplectoscyphus vanhoeffeni Totton, 1930
Symplectoscyphus sp. 1.
Symplectoscyphus sp.
Tasmanaria edentula (Bale, 1924)
Tasmanaria pacifica sp. nov.

Family **THYROSCYPHIDAE**
Parascyphus simplex (Lamouroux, 1816)
Symmetroscyphus australis sp. nov.
Thyroscyphus fruticosus (Esper, 1793)

Family **SYNTHECIIDAE**
Hincksella sibogae Billard, 1918
Synthecium brucei sp. nov.
Synthecium campylocarpum Allman, 1888
Synthecium carinatum Totton, 1930
Synthecium elegans Allman, 1872
Synthecium gordoni sp. nov.
Synthecium megathecum Billard, 1925
Synthecium protectum Jaederholm, 1903
Synthecium subventricosum Bale, 1914
Synthecium tottoni Ralph, 1958

Superfamily PLUMULARIOIDEA
Family **AGLAOPHENIIDAE**
Aglaophenia acanthocarpa Allman, 1876
Aglaophenia ctenata (Totton, 1930)
Aglaophenia difficilis sp. nov.
Aglaophenia digitulus sp. nov.
Aglaophenia hystrix sp. nov.
Aglaophenia laxa Allman, 1876
Aglaophenia plumosa Bale, 1882
Aglaophenia sinuosa Bale, 1888
Aglaophenia subspiralis sp. nov.
Carpocladus fertilis gen. et sp. nov.
Gymnangium ascidioides (Bale, 1882)
Gymnangium birostratum (Bale, 1914)
Gymnangium expansum (Jäderholm, 1904)
Gymnangium explorationis sp. nov.
Gymnangium hians (Busk, 1852)
Gymnangium humile (Bale, 1884)
Gymnangium japonicum Watson & Vervoort, 2001
Gymnangium longirostre (Kirchenpauer, 1872)
Gymnangium profiler (Bale, 1882)
Gymnangium tubulifer (Bale, 1914)
Lytocarpia alata sp. nov.
Lytocarpia brevirostris (Busk, 1852)
Lytocarpia chiltoni (Bale, 1924)
Lytocarpia epizoica sp. nov.
Lytocarpia formosa (Busk, 1851)
Lytocarpia howensis (Briggs, 1918)
Lytocarpia incisa (Coughtrey, 1875)
Lytocarpia phyteuma (Kirchenpauer, 1876)
Lytocarpia (?) *rigida* sp. nov.
Lytocarpia (?) *similis* sp. nov.
Lytocarpia spiralis (Totton, 1930)
Lytocarpia striata sp. nov.
Lytocarpia subdichotoma (Ralph, 1961)
Lytocarpia tenuissima (Bale, 1914)
Lytocarpia vulgaris sp. nov.
Lytocarpia sp.
Macrorhynchia philippina (Kirchenpauer, 1872)
Macrorhynchia phoenicea (Busk, 1852)
Monoserius banksii (Gray, 1843) (may be a synonym of *Monoserius pennarius* (Linnaeus, 1758)
Monoserius pennarius (Linnaeus, 1758)
Wanglaophenia longicarpa gen. *et* sp. nov.
Wanglaophenia rostrifrons sp. nov.

Family **HALOPTERIDIDAE**
Antennella kiwiana Schuchert, 1997
Antennella quadriaurita Ritchie, 1909
Antennella secundaria (Gmelin, 1791)
Antennellopsis integerrima Jäderholm, 1896
Corhiza scotiae (Ritchie, 1907)
Corhiza splendens sp. nov.
Halopteris campanula (Busk, 1852)
Halopteris crassa (Billard, 1911)
Halopteris infundibulum Vervoort, 1966
Halopteris minuta (Trebilcock, 1928)
Halopteris prominens sp. nov.
Halopteris pseudoconstricta Millard, 1975
Monostaechas quadridens McCrady, 1859

Family **KIRCHENPAUERIIDAE**

Halicornopsis elegans (Lamarck, 1816)
Kirchenpaueria bonnevieae (Billard, 1906)
Pycnotheca mirabilis (Allman, 1883)

Family **PLUMULARIIDAE**

Monotheca epibracteolosa Watson, 1973
Monotheca hyalina (Bale, 1882)
Monotheca pulchella (Bale, 1882)
Monotheca spinulosa (Bale, 1882)
Monotheca togata Watson, 1973
Monotheca sp.
Nemertesia antennina (Linnaeus, 1758)
Nemertesia ciliata Bale, 1914
Nemertesia cymodocea (Busk, 1851)
Nemertesia elongata Totton, 1930
Nemertesia pinnatifida sp. nov.
Nemertesia sp.
Plumularia anonyma sp. nov.
Plumularia brachiata Totton, 1930
Plumularia caliculata Bale, 1888
Plumularia congregata sp. nov.
Plumularia filicula Allman, 1877
Plumularia insignis Allman, 1883
Plumularia opima Bale, 1924
Plumularia setacea (Linnaeus, 1758), including *Plumularia diploptera* Totton, 1930
Plumularia setacea (Linnaeus), branched variety
Plumularia setaceoides Bale, 1882, including Ralph's (1961b) record of *Plumularia wilsoni* Bale, 1926
Plumularia spirocladia Totton, 1930
Plumularia tenuissima Totton, 1930
Plumuaria wattsii Bale, 1887
Plumularia sp.
Plumularia/Corhiza sp.

Order **PROBOSCOIDA**
Suborder CAMPANULARIIDA
Superfamily CAMPANULARIOIDEA
Family **CAMPANULARIIDAE**

Billardia hyalina sp. nov.
Billardia novaezaelandiae Totton, 1930
Campanularia carduella Allman, 1885
Campanularia hicksoni Totton, 1930
Clytia elongata Marktanner-Turneretscher, 1890
Clytia gigantea (Hincks, 1866)
Clytia gregaria (L. Agassiz, 1862)
Clytia hemisphaerica (Linnaeus, 1767)
Clytia malayense Kramp, 1961
Clytia rangiroae (A. Agassiz & Mayer, 1902)
Clytia simplex (Browne, 1902)
Clytia sp.
Gonothyraea loveni (Allman, 1859)
Hartlaubella gelatinosa (Pallas, 1766)
Obelia bidentata Clarke, 1875
Obelia dichotoma (Linnaeus, 1758)
Obelia geniculata (Linnaeus, 1758)
Obelia longissima (Pallas, 1766, including *Obelia australis* von Lendenfeld, 1885)
Obelia nigrocaulus Hilgendorf, 1898 (doubtful species)
Obelia nodosa Bale, 1924
Obelia pygmaea Coughtrey, 1875 (doubtful species)
Obelia sp. 1
Obelia sp.
Obelia spp.
Orthopyxis affabilis sp. nov.
Orthopyxis crenata (Hartlaub, 1901), including *Orthopyxis delicata* Trebilcock, 1928
Orthopyxis integra (Macgillivray, 1842)
Orthopyxis mollis (Stechow, 1919)
Orthopyxis sp.
Orthopyxis spp.
Silicularia rosea Meyen, 1834
Tulpa diverticulata Totton, 1930

Family **PHIALUCIIDAE**

Phialucium mbenga (A. Agassiz & Mayer, 1899)

SYSTEMATICS

Class LEPTOLIDA Haeckel, 1879
Subclass LEPTOTHECATA Cornelius, 1992a

Order **CONICA** Broch, 1909a
Suborder CAMPANULINIDA Hincks, 1868
Superfamily CAMPANULINOIDEA Hincks, 1868

Family **AEQUOREIDAE** Eschscholtz, 1829
Aequorea Péron & Lesueur, 1810

TYPE SPECIES: *Medusa aequorea* Forskål, 1775

Aequorea australis Uchida, 1947

Aequorea australis Uchida 1947: 307, fig. 8; Kramp, 1953: 290-294, fig. 7; 1965: 96-98; 1968: 99, fig. 270; Bouillon 1984b: 26; Bouillon & Barnett 1999: 78, fig. 67.

TYPE LOCALITY: South China Sea (Uchida 1947; location of type unknown).

DESCRIPTION: Diameter 11–25 mm, subhemispherical, with rather thin jelly. Diameter of stomach slightly less than that of umbrella. Radial canals 16–29; gonads about half as long as radial canals, nearer to margin than to stomach; 16–19 marginal tentacles and a varying number of small bulbs. Statocysts in about same number as tentacle bulbs with excretory papillae (Kramp 1961).

Polyp phase unknown.

RECORDS FROM NEW ZEALAND: Whangateau Harbour; Leigh Marine Reserve (Barnett 1985; Bouillon & Barnett 1999).

DISTRIBUTION: Indo-West Pacific, including South China Sea, Philippines, New Guinea, northern Australia, and Great Barrier Reef.

Aequorea forskalea Péron & Lesueur, 1810

Medusa aequorea Forskål 1775: 110.
Aequorea forskalea Péron & Lesueur 1810: 336; Russell 1953: 342–350, text-figs 220–221, pl. 21, fig. 3, pl. 32, figs 1–2; Bouillon 1999: 423, fig. 3.78; Bouillon & Barnett 1999: 78–79, fig. 70.
Aequorea aequorea: Kramp 1961: 203–204.

TYPE LOCALITY: Mediterranean.

MATERIAL EXAMINED:

PMBS: ?*Aequorea forskalea*. Aquarium jetty, 24.Dec.1951. *Aequorea* — up from Antarctic in summer. Big, Oxford blue jellyfish, heavy, foot across with a number of mushroom-like appen-dages. Tentatively identified from descriptions, by P. Ralph. (Taken from card register.)

DESCRIPTION: Medusa large, up to 400 mm diameter, disk-shaped, exumbrella thickest in middle and there occasionally biconvex, with large, circular stomach, occupying almost half of diameter, flat to funnel-shaped. Mouth provided with numerous lips. Number of radial canals considerable, up to 200 in adult state, but usually less, about 100. Each radial canal with double, filamentous gonad along major part of its length. Tentacles long, about half diameter of exumbrella or more, with conical bulb; number varied, but usually about half that of radial canals. Margin of umbrella with many statocysts, 5–10 between successive radial canals; tentacular bulbs elongated conical, with excretion pores on small papillae. Colour strongly variable, blue, brown, reddish, violet, milky white or colourless.

Polyp phase a tiny campanulinid that may be identical with *Campanulina paracuminata* Rees, 1938, from which species only the young medusa has been raised.

RECORDS FROM NEW ZEALAND: Portobello, Otago Peninsula. Also *Dana* Stn 3623, 27°21′ S, 175°11′ E, South Fiji Basin.

DISTRIBUTION: Widely distributed in temperate northern Atlantic and in Mediterranean. No previous New Zealand records besides this tentative record of a large Portobello specimen; record should be taken with much reserve as identification even of adult specimens of this genus is hazardous.

Aequorea macrodactyla (Brandt, 1834)

Mesonema (Mesonema) macrodactyla Brandt 1834: 221 (21 in reprint)
Aequorea macrodactyla: Bigelow 1919: 310, 313, pl. 43, fig. 7; Kramp 1953: 294–295; 1961: 207 (*cum syn.*); Dawson 1992: 12; Bouillon 1995a: 235; 1999: 423, fig. 3.79; Bouillon & Barnett 1999: 79, fig. 71.
Aequorea pensilis p.p. Russell 1953: 355–359, text-figs 220C–D, 225, pl. 33, figs 1–5.

TYPE LOCALITY: Tropical Pacific (Brandt 1835, as *Mesonema macrodactyla*; location of type unknown).

Description (after Kramp 1961): Umbrella up to 75 mm wide, central disk thick, lenticular, margin thick. Stomach about half as wide as umbrella, number of radial canals 60–100, may be up to 150, gonads extending along whole length of radial canals. Tentacles 10–30, rarely up to 40, 6–8 times as many small bulbs. Tentacular bulbs broad, each with distinct abaxial keel and with prominent excretory papilla; statocysts numerous.

Records from New Zealand: Cavalli Islands (Barnett 1985) and a number of *Dana* Stations in the Tasman Sea (Kramp 1965), Great Exhibition Bay, and north-eastern North Island.

Remarks and Distribution: Hydroid unknown, probably a campanulinid. The medusa is widely distributed over warm and moderately warm areas of Atlantic, Indian, and Pacific Oceans. Its presence in boreal waters of the eastern Atlantic has also been established (Russell 1953). For the fairly complicated synonymy of this species we refer to Bigelow (1919) and Russell (1953).

Aequorea paracuminata (W.J. Rees, 1938)

Campanulina paracuminata Rees 1938: 33–37, fig. 100; 1939: 439, 444; Teissier 1965: 19.
Aequorea paracuminata: Rees 1939: 444; M.B.A. 1957: 45; Teissier 1965: 19; Vervoort 1966: 106.

Type Locality: Plymouth waters, U.K. (Rees 1938; location of type unknown).

Description (after Rees 1938): Stems slender, 1.5–2.5 mm high, arising from branched, creeping stolon, imperfectly annulated over entire length, 0.05 mm in diameter, bearing 1 or 2 hydranths, 1 terminal, the other arising just below hydrotheca of terminal hydranth. Hydrotheca cylindrical, square below, tapering into fine point above where pleated segments of perisarc fold together. Perisarc on body of hydrotheca thin and longitudinally striated. Length of hydrotheca 0.38–0.42 mm, diameter 0.09–0.1 mm. Hydranth very extensible, reaching 1.1 mm long from base of hydrotheca. About 20 tentacles, arranged in 1 whorl around bluntly conical hypostome, united at their base by well-developed membranous web with large, bean-shaped nematocysts, about 0.015 mm long. Tentacles 0.6 mm long, with endodermal core of a single row of cells; nematocysts irregularly distributed.

Gonophores borne on stem just below hydranth; in fully developed condition large and cylindrical, with imperfectly ringed pedicel shorter than gonotheca itself, length 0.75–1.1 mm (including pedicel), diameter 0.3–0.4 mm. Gonophore producing a single (rarely 2) medusa bud enlarging distally "to form a distinct cap to the gonotheca". Fully developed medusa escaping from gonotheca "partially by its own effort and by partial collapse of the thin membranous gonotheca which regained its shape once the medusa came out".

"Medusa, pale bluish green, umbrella deep bell-shaped, a little higher than wide with a band of nemato-cysts confined to the lower middle part of the sub-umbrella and with an apical depression. Stomach short, quadrangular, with four simple lips. Two opposite marginal tentacles and two bulbs without tentacles; bulbs yellow with a single central strip of blue-black pigment. Marginal vesicles adradial, each with one concretion" (description of newly released medusa after Rees, 1939).

Records from New Zealand: Not recorded from New Zealand but listed here as the possible polyp phase of *Aequorea forskalea* Péron & Lesueur, 1810.

Remarks and Distribution: Found off Plymouth, U.K. 'on a clinker' and cultivated in the laboratory, producing medusae after one year. Only young medusa known.

Family **CAMPANULINIDAE** Hincks, 1868
Tripoma Hirohito, 1995

Type Species: *Tripoma arboreum* Hirohito, 1995

Description: Colony arborescent, stem and branches fascicled. Hydrothecae nearly tubular, pedicellate, operculum a membrane of 4 flaps, not demarcated from hydrothecal margin. Gonotheca cocoon-like, sessile, immersed in fascicular tubes of rhizocaulus, orifice terminal, sub-circular, operculum membranous; gonophore a fixed sporosac.

Remarks: The Campanulinidae encompasses stolonal and fasciculated genera and those with opercular structures consisting of a few to many membranous flaps that may or may not be clearly demarcated from the hydrothecal wall.

The stems of the New Zealand material are heavily fascicled and the margin of the hydrotheca has four membranous flaps, not demarcated from the wall of the hydrotheca. Two species of Campanulinidae fit the particulars of the New Zealand material: *Tripoma arboreum* Hirohito, 1995 and *Tetrapoma fasciculatum* (Hirohito, 1995). The reasons for sinking the latter into the former and to preserve for it the binomen *Tripoma arboreum* Hirohito, 1995, have been outlined by Watson and Vervoort (2000).

Tripoma arboreum Hirohito, 1995 (Fig. 1A–D)

Tripoma arboreum Hirohito 1995 (English text): 98, text-fig. 28a-e, pl. 6, fig. A; Watson & Vervoort 2000: 250–254, figs 1–2.
Tetrapoma fasciculatum Hirohito 1995 (English text): 95, text-fig. 27a-c, pl. 5, fig. D.

MATERIAL EXAMINED:

NZOI Stn E887, 2 colonies 80 and 60 mm high, polysiphonic, branched, more or less pinnate in 1 plane; very few hydrothecae intact. Gonothecae absent. RMNH-Coel.30020, slide 2165.

NMNZ: BS 886: About a 60 mm high colony on sponge; gonothecae present. NMNZ Co. 520. Some alcohol preserved material as RMNH-Coel. 27731, 2 RMNH-Coel. slides 2998.

TYPE LOCALITY: Sagami Bay, Japan (Hirohito 1995; location of type Showa Memorial Institute, Tokyo, Japan; holotype (NSMT-Hy R: 3009, alcohol preserved) and three microslide preparations, No. 6206, 6207, 6211).

REMARKS: Our material, colonies 60–80 mm high, conform to the description and dimensions of *Tetrapoma fasciculatum* Hirohito, 1995, now considered conspecific with *Tripoma arboreum* Hirohito, 1995. The gonothecae of the fertile colony are composed of interlocking fascicular tubes as figured by Hirohito. They are not, however, buried in the stem nor do they have a four-flapped operculum as described by him. The reproductive products escape by tearing of the distal end of the gonotheca. One colony is male, the gonophore is cream coloured (in preserved condition). The gonothecae are 1.43–2.06 mm long and 0.46–0.63 mm wide; the gonophore, in preserved state, is 0.98–1.00 mm long and 0.48 mm wide.

RECORDS FROM NEW ZEALAND: Tasman Sea to the north of North Island and Wanganella Bank, E slope; depth 437–197 m.

DISTRIBUTION: Previously known from Sagami Bay, Japan, and the Tasmanian Seamounts.

Calycella Hincks, 1861b

TYPE SPECIES: *Sertularia syringa* Linnaeus, 1767

Calycella parkeri Hilgendorf, 1898

Calycella parkeri Hilgendorf, 1898: 205–206, pl. 17, figs 3, 3a-d, pl. 18; Hutton 1904: 319; Stranks 1993: 4.

TYPE LOCALITY: On wharf piles, Dunedin Harbour. Syntype slide (MVF59297) in MOV (Stranks 1993).

REMARKS: Judging from Hilgendorf's description and drawings this is almost certainly *Gonothyraea loveni* (Allman, 1859), a conclusion we share with Ralph (1957).

Opercularella Hincks, 1868

TYPE SPECIES: *Campanularia lacerata* Johnston, 1847

In this genus the following species have been considered.

Opercularella antarctica Stechow, 1921b
Opercularella belgicae (Hartlaub, 1904)
Opercularella birulai Linko, 1912
Opercularella borealis Thompson, 1887
Opercularella denticulata (Clarke, 1907)
Opercularella grigoriewi (Mereschkowsky, 1878)
Opercularella humilis (Bale, 1924)
Opercularella indivisa (Fraser, 1948)
Opercularella lacerata (Johnston, 1847)
Opercularella nana Hartlaub, 1897
Opercularella panicula (G.O. Sars, 1874)
Opercularella producta (G.O. Sars, 1874)
Opercularella pumila Clark, 1875

There is no medusa phase in this genus.

Opercularella humilis (Bale, 1924) (Fig. 1E–G)

Campanulina humilis Bale 1924: 235, fig. 5; Jäderholm 1926: 3, fig. 2; Trebilcock 1928: 8, pl. 4, figs 3-3d.
Opercularella humilis: Rees 1939: 444 (*cum syn.*); Stepan'yants 1979: 42, pl. 7, fig. 5.
?Opercularella humilis: Pennycuik 1959: 175, pl. 2, figs 11–12; Ralph 1957: 846, fig. 8a-f; Gordon & Ballantine 1977: 100; Dawson 1992: 14.

MATERIAL EXAMINED:

NZOI Stns: C601, colonies up to 15 mm high developing on hydrocladia of *Symplectoscyphus columnarius* (Briggs, 1914); no gonothecae observed. Part in RMNH-Coel. slide 2799; **Q725**, with *Clytia* sp. on worm tube. [Slide 4202 JEW Colln]

NMNZ Ralph Collection: Loc. 267, NMNZ Co. 1115: Hydrothecae springing from stolon on *Symplectoscyphus j. johnstoni* (Gray, 1843), visible in one of RMNH-Coel. slides 3795.

TYPE LOCALITY: From hull of *Terra Nova* while ship in Lyttelton Harbour; type slide (no. 4) in Canterbury Museum, Christchurch, presumably lost.

DESCRIPTION (amended, based on material from NZOI Stn C601): The NZOI specimen is an arborescent, much branched colony, individual branches up to 5 mm long and bearing up to 10 alternate hydrothecae. We cannot

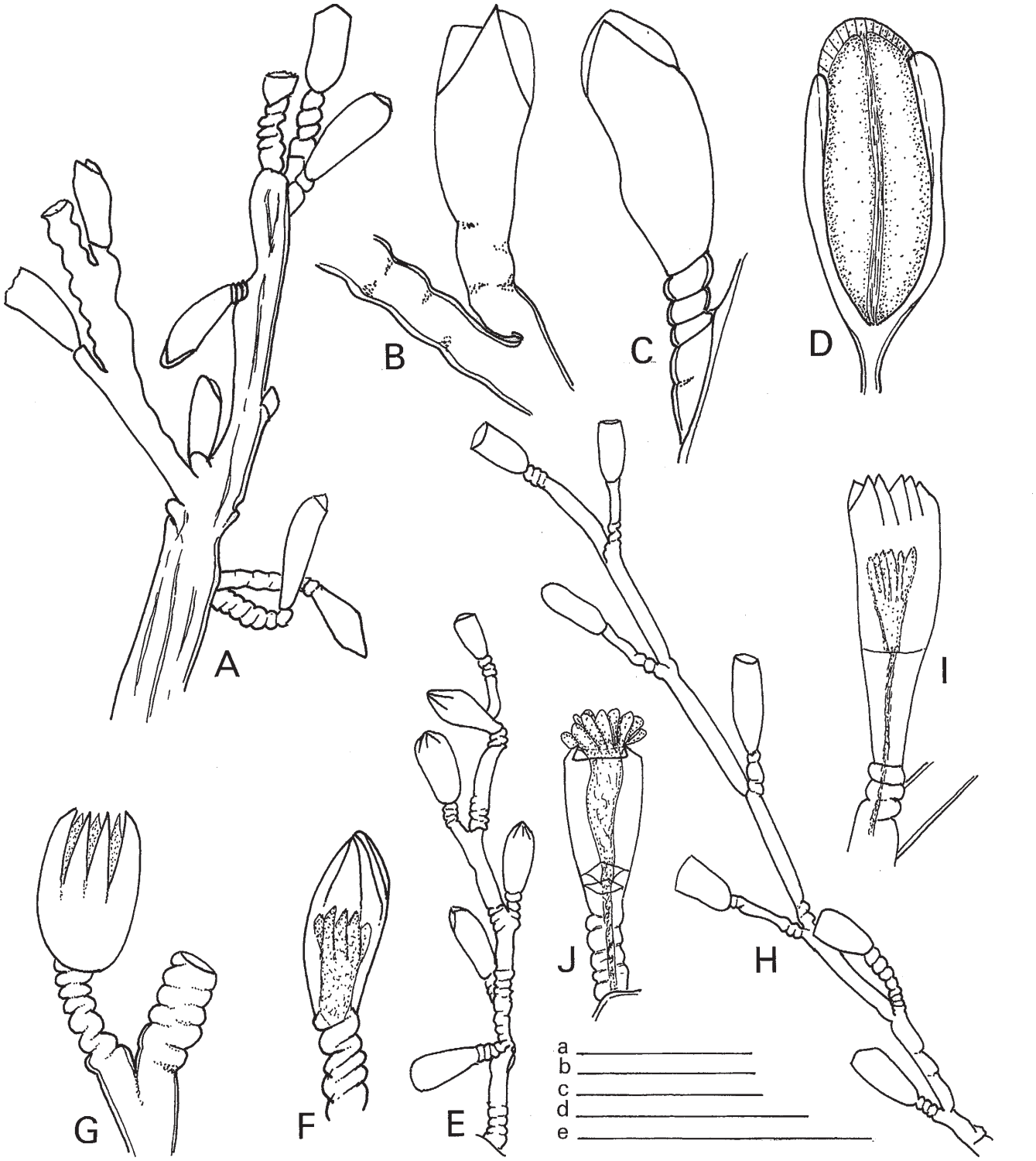

Fig. 1. A–D. ***Tripoma arboreum*** Hirohito, 1995. **A**, part of colony. **B, C**, hydrothecae. **D**, gonotheca (BS 886, slide 2998). **E–G**. ***Opercularella humilis*** (Bale, 1924). **E**, top part of colony. **F, G**, hydrothecae (NZOI Stn C601, slide 2799). **H–J**. ***Plicatotheca anitae*** Calder & Vervoort, 1996. **H**, top part of colony. **I, J**, hydrothecae (NZOI Stn P34, slide 2229). Scales: a, 0.5 mm (D); b, 0.25 (B, C); c, 0.3 mm (F, G); d, 1 mm (I, J); e, 1 mm (A, E, H). J.E.W.

distinguish whether the thick main stem of the colony consists of a mass of hydrorhizal tubes growing over the dead stem of another species, or whether the stem is a mass of fascicular tubes of *O. humilis*.

Hydrothecae exactly as described and figured by Trebilcock (1928) and Ralph (1957). The important point of difference with previous descriptions is the large size and long branches of the NZOI specimen, *O. humilis* formerly being regarded as a small species with pedicellate or only sparingly branched hydrothecae.

Gonotheca of *O. humilis* is unknown. The present material includes a small, bowl-shaped structure that may be a developing gonotheca.

Material from NZOI Stn Q725 consists of a few pedicellate hydrothecae on a worm tube. Dimensions are identical to those of NZOI Stn C601, but this material conforms to the accepted description of *O. humilis* with its simple, pedicellate hydrothecae. The colony from Ralph's collection, Loc. 267 is composed of a stolon with pedicellate hydrothecae about 260 μm long; it conforms with that from NZOI Stn Q725.

Records from New Zealand: Southwest Pacific near Chatham Islands, 43°20.00′ S, 175°12.00′ E, 124 m; off Kaikoura, 18 m; Tasman Sea off Greymouth, 42°25.50′ S, 171°05.50′ E, 37 m. Also recorded from Cape Rodney, North Island (Gordon & Ballantine 1977) and St Clair, Dunedin (Trebilcock 1928).

Distribution: Currumbin, Queensland coast Australia, on weed in rockpool (Pennycuik 1959) and Campbell Island (Jäderholm 1926).

Family **LINEOLARIIDAE** Allman, 1864
Lineolaria Hincks, 1861a

Type Species: *Lineolaria spinulosa* Hincks, 1861a

In this genus the following species have been considered.

Lineolaria flexuosa Bale, 1884
Lineolaria inarmata Blackburn, 1938
Lineolaria spinulosa Hincks, 1861a

Lineolaria flexuosa Bale, 1884

Lineolaria flexuosa Bale 1884: 62, pl. 1, figs 7–9; Bartlett 1907: 42; Stechow 1913b: 33; Trebilcock 1928: 8; Blackburn 1938: 321; 1942: 111; Ralph 1958: 325, fig. 8a-h; 1961c: 109; Gordon & Ballantine 1977: 100; Antsulevich 1987: 58; Dawson 1992: 16; Watson 1992b: 85, fig. 1C–D.

Material Examined:

PMBL: *Lineolaria flexuosa* Bale, 1884. Otago Canyon A. (Taken from card register; probably entered by P. Ralph; see Remarks below.)

Type Locality: Williamstown, Port Phillip Bay, Victoria, Australia, on algae. Stranks (1993) mentioned a probable syntype slide (MVF58794) in MOV and a second microslide from the Bale collection (MVF58795) and dry material under MVF60229.

Remarks: There are four slides labelled '*Lineolaria flexuosa*' in RSC, from localities 419, 534, 535, and 540. The slides are in poor condition, but seem to indicate that the New Zealand material inspected and mentioned by Ralph (1958) is *Filellum serratum* (Clarke, 1879) or *F. serpens* (Hassall, 1848) rather than a species of *Lineolaria*, a genus living on algae and seagrasses (for further details see Watson 1992b). From Loc. 419 there is a slide of *Synthecium subventricosum* Bale, 1914, with some indubitable specimens of *Filellum serpens* (Hassall, 1848).

Records from New Zealand: Recorded by Ralph (1958) from NW Cape Maria van Diemen and from Canyon A off Otago Peninsula; the accuracy of the identification is doubtful (see Remarks above).

Distribution: So far only known from southeastern Australia (Bale 1884; Watson 1992b).

Family **MALAGAZZIIDAE** Bouillon, 1984a
Malagazzia Bouillon, 1984a

Type Species: *Phialucium condensum* Kramp, 1953

Malagazzia carolinae (Mayer, 1900a)

Oceania carolinae Mayer 1900a: 7, pl. 3, fig. 9, pl. 4, figs 10–11.
Phialucium carolinae: Kramp, 1961: 185–186; 1968: 86, 164, 173.
Malagazzia carolinae: Bouillon 1995a: 224, 233–234, 235 (*cum syn.*); 1999: 427, fig. 3.107; Bouillon & Barnett 1999: 89–90, fig. 88.

Type Locality: Charleston Harbour, Carolina, U.S.A. (Mayer 1900a; location of type unknown).

Description: Umbrella 14–20 mm wide, 6–8 mm thick, not quite hemispherical, mesoglea fairly thick.

Stomach flask-shaped to quadrangular, rather long; mouth with 4 short, simple, slightly folded lips. Radial canals typically 4, occasionally up to 10, simple; gonads linear, along distal half of radial canals. Tentacles 16–36, well developed, with large, conical tentacular bulbs. Between successive tentacles 1–3 knob-like rudimentary bulbs (number depending upon age), median one largest; in addition 4–6 statocysts each with 2 concretions. Excretory papillae present on tentacular and rudimentary bulbs. Polymorphic species with unknown polyp phase.

RECORDS FROM NEW ZEALAND: Two records are given by Bouillon (1995a): NZOI Stns N416, 41°18′51″ S, 174°09′36″ E, 22 m; B707, 41°17′24″ S, 174°47′06″ E, 9 m; both localities in Cook Strait.

DISTRIBUTION: Indo-West Pacific; western Atlantic (Bouillon 1984a, b, 1995a).

Octophialucium Kramp, 1955

TYPE SPECIES: *Octophialucium medium* Kramp, 1955.

Octophialucium indicum Kramp, 1958

Octophialucium indicum Kramp 1958: 347, fig. 2a-b; 1961: 184; 1965: 72–73; 1968: 87, fig. 235; Navas Pereira & Vannucci, 1990: 126; Dawson, 1992: 16; Bouillon & Barnett 1999: 90, fig. 89.
Octophialucium indicum: Bouillon 1995a: 224, 235.

TYPE LOCALITY: Akyab Harbour, Burma, in surface plankton; holotype in Indian Museum, Calcutta, India.

DESCRIPTION (after Kramp 1961): Umbrella up to 17 mm wide, disc-shaped or lenticular, mesogloea thick. Stomach short, one-sixth width of umbrella, mouth with 8 pointed, crenulated lips; 6–11 radial canals (typically 8), continued inwards almost to centre of stomach; gonads along distal fifth (or less) of radial canals. Tentacles 19–28, with broadly conical bulbs with long excretory papillae; no abaxial exumbrellar clasps. Between successive tentacles 3–5 small, triangular bulbs with excretory papillae; 1 statocyst between successive marginal bulbs. Polyp phase unknown.

RECORDS FROM NEW ZEALAND: Wellington Harbour; Cook Strait; Pacific, east of northern part South Island (Bouillon & Barnett 1999).

DISTRIBUTION: Waters of Indian Ocean and Bay of Bengal bordering Indian continent and Burma; Mergui Archipelago; South China Sea.

Family **PHIALELLIDAE** Russell, 1953
Phialella Browne, 1902

TYPE SPECIES: *Phialella falklandica* Browne, 1902.

In this genus the following species have been considered.

Phialella annulata (von Lendenfeld, 1885b)
Phialella briggsi (Mulder & Trebilcock, 1915)
Phialella chilensis (Hartlaub, 1905)
**Phialella dissonema* (Haeckel, 1879)
**Phialella falklandica* Browne, 1902
**Phialella fragilis* (Uchida, 1938)
Phialella hyalina (von Lendenfeld, 1885b);
**Phialella macrogona* Xu, Huang & Wang, 1985
**Phialella parvigastra* (Mayer, 1900b)
Phialella quadrata (Forbes, 1848) [= *Phialella repens* (Allman, 1864)]
**Phialella zappai* Boero, 1987

[* = species of which only medusa phase is known]

Phialella falklandica Browne, 1902

Phialella falklandica Browne 1902: 282; Browne & Kramp 1939: 296, text-fig. 1, pl. 17, figs 2–4, pl. 19, figs 3–5; Kramp 1957: 34; 1959b: 152, 235, 237, 269, fig. 201; 1961: 179; 1968: 84, fig. 225; Dawson 1992: 14; Bouillon 1995a: 236; 1999: 429, fig. 3.119; Bouillon & Barnett 1999: 93–94, fig. 94.
Phialella spec. Benham 1909: 307, pl. 12, figs 3–6.

TYPE LOCALITY: Falkland Islands (Browne 1902; medusa only, type in NHM).

DESCRIPTION (after Kramp, 1961): Umbrella up to 17 mm wide, semi-globular, with thick walls. Stomach short, quadrangular, mouth with 4 lips with fimbriated margins; gonads occupying greater part of radial canals, hanging down in wavy folds. Tentacles about 60, bulbs large; statocysts on large, cushion-like bulbs, with 2 or more concretions. Polyp phase unknown.

RECORDS FROM NEW ZEALAND: Recorded by Benham (1909) from Auckland and Campbell Islands. Mentioned by Bouillon (1995a) and Bouillon and Barnett (1999) from Portobello waters on the authority of Mills (1982).

DISTRIBUTION: Falkland Islands; Patagonian coastal waters; Strait of Magellan; Callao, Chile; Peru.

Phialella quadrata (Forbes, 1848)

Thaumantias quadrata Forbes 1848: 43, pl. 9, fig. 2 (medusa).
Laomedea tenuis Allman 1859: 367-368 (hydroid).
Campanulina? repens Allman 1864: 376; Rees 1939: 435, 444, 445; Leloup 1947: 20, fig. 10; Ralph & Hurley 1952: 6, 8.
Thaumantias cymbaloides van Beneden, 1867: 88.
Eucope quadrata: Kramp 1933: 576, figs 40, 41; 1937: 102, fig. 44b.
Eucopium quadratum: Künne 1937: 6.
Phialella cymbaloides: Russell 1938: 157, figs 52–54.
Phialidium cymbaloideum: Rees, 1939: 440.
Thaumantias cymbaloideum: Rees 1939: 440 (*cum syn.*).
Phialella quadrata; Rees 1939: 441; 1941: 12; Kramp 1947a: 52, 55; Leloup 1947: 41, fig. 32; 1952: 219–220, fig. 133; Kramp 1955: 255; Spaul 1956: 20; Hamond 1957: 295, 310, 322, fig. 19; M.B.A. 1957: 45, 56; Ralph 1957: 848, fig. 9g-i; Skerman 1958: 224; Kramp 1959: 152, fig. 200; Skerman 1960: 620, 635; Kramp 1961: 180; Ralph 1961c: 108; Kramp 1962: 329; Bruce *et al*. 1963: 52, 58; Hamond 1963: 667; Russell 1963: 3, figs 7, 7a; Bodo 1965: 243; Fraser 1965: 2; Kramp 1965: 65–66; Rees & Thursfield 1965: 66; Teissier 1965: 19, 36; Wear 1965: 7, fig. 3F; Crothers 1966: 15; Kramp 1968: 84, fig. 226; De Pauw 1969: 201; Fey 1970: 395; Roberts 1972: 300 *et seq.*; Boyd 1973: 244, 255, 260; Boyd *et al*. 1973: 395; Fagetti 1973: 40, pl. 3, figs C, D; Fraser 1973: 18; Millard & Bouillon 1973: 43, fig. 5G–J; Schmidt 1973b: 159; Laverack & Blacker 1974: 21, 26; Hughes 1975: 291 *et seq.*; Skinner 1975: 193; Millard & Bouillon 1975: 7, fig. 2A–B; Schmidt 1976: 261; Withers & Thorp 1976: 603; Schmidt & Benovic 1977: 638; Bouillon 1978a: 125, 130; Evans 1978: 65; García Corrales *et al*. 1979: 30, fig. 17; Bouillon 1984b: 28, 104; Skinner 1984: 444; Chapman 1985: 618 *et seq.*; Fulton & Wear 1985: 47 *et seq.*; Bouillon *et al.* 1986: 141; Gili 1986: 131–132, fig. 4.15; Boero 1987: 476; Gili *et al.* 1987: 92; Cornelius 1988: 76; Llobet *et al*. 1988: 36, fig. 4L; Cornelius & Ryland 1990: 134, fig. 4.12; Dawson 1992: 14; Boero & Bouillon 1993a: 262; Watson 1994b: 149–151, fig. 1B–G; Bouillon 1995a: 224, 236; Bouillon *et al.* 1995: 59; Cornelius 1995a: 150, 177-180, fig. 39; Bouillon & Barnett 1999: 94, fig. 95.
Phialella repens: Rees 1939: 445.
Hypsorophus quadratus: Huvé 1952: 38, figs 4–7; Patriti 1970: 62, fig. 88.
Campanulina quadrata: Naumov 1960: 310–311, fig. 201.

MATERIAL EXAMINED:

NZOI Stn F12, colonies 10–15 mm high with developing and empty gonothecae on fragment of old hydroid stem. RMNH-Coel. slide 2851.

NMNZ, Ralph Collection: Loc. 25, NMNZ Co. 895, several up to 5 mm high stems from stolon on plant remains or sponge; no gonothecae. RMNH-Coel. slide 3592; **Loc. 131**, NMNZ Co. 985, several hydrothecae and an empty gonotheca on fragment of alga, together with *Sertularella simplex* (Hutton, 1873); **Loc. 205**, NMNZ Co. 1054, small 3 mm long colony fragment in RMNH-Coel. slide 3717a; **Loc. 266**, NMNZ Co. 1114, small colony at proximal part stem of *Obelia geniculata* (Linnaeus); no gonothecae. RMNH-Coel. slide 3793; **Loc. 382**, NMNZ Co. 1176, some colonies, with *Sarsia eximia* (Allman, 1859) on fragments of algae. RMNH-Coel. slide 3851; **Loc. 411**, NMNZ Co. 1199, numerous colonies about 8 mm high on fragments of algae. RMNH-Coel. slide 3881; **Loc. 452**, stained Canada Balsam slide in RSC as *Phialella quadrata*; no further data; **Loc 472**, 3 stained Canada Balsam slides in RSC as *Phialella quadrata*; no further data; **Loc. 518**, unstained slide in RSC as *Phialella quadrata* Forbes on *Sargassum*, with data: St Heliers.

PMBS: Otago Harbour, abundant (medusae) in plankton off PMBS wharf, 27.Aug.1964; most 6–7 mm diameter. Very similar to *Phialidium hemisphaericum*. Only 8 marginal vesicles, each with 2 or more continuous; 16 (or 32) tentacles. Identified by: P.M. Ralph. (Taken from card register.)

TYPE LOCALITY: *Thaumantias quadrata*: British Isles; *Laomedea tenuis*: town of Stromness, Orkney Islands, Scotland, on fronds of *Laminaria digitata*. No distinct type locality for *Campanulina*? *repens* indicated: United Kingdom.

DESCRIPTION (of medusa, after Kramp 1961): Umbrella hemispherical, up to 13 mm wide, with thick mesoglea. Stomach short, quadratic, with small base; mouth with 4 short, slightly folded lips. Gonads on distal third of radial canals, elongated oval. Tentacles 16–32, with small, globular basal bulbs; no ocelli. Statocysts on cushion-like swellings, with typically 2–4 and occasionally more concretions.

Hydroid a sympodial, flexuous, up to 15 mm high colony arising from a smooth, tubular stolon on other hydroids or on solid substrate, monosiphonic throughout, with irregular shoots; stems and pedicels ringed except for small smooth areas near ramifications. Hydrotheca small, shorter than pedicel, about 250 µm long, oblong-ovoid, with thin diaphragm; upper third forming conical roof composed of about 10 elongated triangular pliae not demarcated from rest of hydrotheca, interconnected by a thin opercular membrane. Hydranth long and thin, greatly extensible, with about 16 long tentacles not interconnected by a web. Gonothecae much bigger than hydrothecae, up to 650 µm long, ovoid, often terminally truncate, proximally gradually narrowing into a short pedicel with 2 or 3 rings, attaching gonotheca to stolon or to axis or ramification. 2 or 3 medusa-buds present. Perisarc thin, particularly on hydranth, colourless.

RECORDS FROM NEW ZEALAND: The polyp is generally considered a fouling organism, transported on hulls of ships and commonly found on pilings and moorings of harbours: Port of Lyttelton (Skerman 1958, 1960); Wellington Harbour (Ralph & Hurley 1957; Wear 1965); Perseverance Harbour, Campbell Islands (Roberts 1972). From there it has probably spread all around the New Zealand coasts.

Medusa first recorded from Otago Harbour (Russell 1953: 320, footnote); it commonly occurs in New Zealand coastal waters; localities have been specified by Bouillon (1995a).

Remarks and Distribution: Polyp with wide distribution in boreal and temperate eastern Atlantic, including Mediterranean (Boero & Bouillon 1993a) and Gulf of Guinea. Also known from Japan and Chile. Medusa widespread in the northeastern Atlantic, including Mediterranean; also found in the Gulf of Guinea.

Phialella hyalina (von Lendenfeld, 1885b) (= *Eucope hyalina* von Lendenfeld 1885b: 920, pl. 42, figs 16-18) is a poorly known medusa, listed by Ralph (1961c: 109) in a discussion of New Zealand hydroid distribution without distinct locality record. So far, the species is only known from the type locality (Port Jackson, Sydney Harbour); the type has been inspected by Kramp (1953: 311), who placed it in *Phialella*. The watch-glass shaped umbrella is 6 mm wide and thick at the centre. Stomach half as long as bell cavity, wide. Four large, oval gonads on distal third of radial canals. Tentacles 8, with nearly cylindrical bulbs; marginal vesicles large, each with three concretions (Kramp, 1963: 179). Polyp phase unknown.

Plicatotheca Calder & Vervoort, 1986

Type Species: *Plicatotheca anitae* Calder & Vervoort, 1986

This genus contains only a single species, *Plicatotheca anitae* Calder & Vervoort, 1986.

Plicatotheca anitae Calder & Vervoort, 1986 (Fig. 1H–J)

?*Opercularella* sp. no. 2 Vervoort 1966: 108, figs 8, 12b.
Opercularella sp. Millard 1975: 138, figs 45C, D.
Plicatotheca anitae Calder & Vervoort 1986: 2022–2023, figs 1–4; Gili *et al.* 1989b: 77, fig. 6B; Calder 1991: 4, fig. 1; 1993: 67 *et seq*.

Material Examined:

NZOI Stns: A911, about 10 monosiphonic colonies 20–25 mm high on shell fragments; hydrothecae fragile, no gonothecae, RMNH-Coel. 30021; **P34**, several colonies up to 20 mm high on a worm tube, RMNH-Coel. 29133, slide 2229; **U567**, 2 strongly polysiphonic colonies with fragile, easily damaged hydrothecae, RMNH-Coel. slide 2928.

Type Locality: Atlantic Ocean 2 km SE of Castle Roads, Bermuda, on coral rubble, 60–90 m, holotype in ROM, ROMIZ B298.

Records from New Zealand: South of Norfolk Island, 28°57.80′ S, 167°45.80′ E, 370 m; southern end of New Caledonia Trough, 35°00.30′ S, 169°9.70′ E, 1480–1050 m, and Chatham Islands region, South Pacific, 42°45.00 S, 178°15.00′ W, 497 m.

Remarks and Distribution: Material from NZOI Stns A911 and P34 is in full agreement with description by Calder and Vervoort (1986); the colonies from NZOI Stn U567 are much higher, with bigger hydrothecae, and are strongly polysiphonic. Initially recorded from the Indian Ocean off Durban, 29°55′ S, 31°20′ E (Vervoort 1966); the holotype is from the Atlantic off Bermuda (Calder & Vervoort 1986; Calder 1991). The geographical range of this primarily deep-water species is here considerably extended.

Superfamily LAODICEOIDEA Browne, 1907
Family **LAODICEIDAE** Browne, 1907
Laodicea Lesson, 1843

Type Species: *Thaumantias undulata* Forbes & Goodsir, 1851.

Laodicea indica Browne, 1905

Laodicea indica Browne 1905: 136, pl. 1, fig. 5, pl. 4, figs 7–11; Kramp 1961: 140; 1965: 52–54; Bouillon 1984b: 61–63 (*cum syn.*); 1995a: 224, 235; 1999: 426, fig. 3.100; Bouillon & Barnett 1999: 87, fig. 84.
Laodicea sp. Bouillon 1995a: 235.

Type Locality: Ceylon pearl oyster banks.

Description (after Kramp 1961, and Bouillon 1984b): Umbrella up to 25 mm wide, a flattened hemisphere, 2–4 times as wide as high. Stomach quadratic, short, with 4 short, slightly folded lips. 4 long, sinuous gonads along 4 radial canals, contiguous with stomach. Up to 180 marginal tentacles; basal bulbs weakly developed; tentacles without abaxial endodermal spur. Adaxial ocellus usually on each second tentacle; spiral cirri, usually 1 between 2 successive tentacles. Cordyli club-shaped, without nematocysts, usually 1 between successive tentacles. Polyps, cultivated by Bouillon (1984a) from medusae of Bismarck Sea, '*Cuspidella*' type, with sessile, tubular hydrothecae, provided with pyramidal opercum composed of about 10 acute, converging pliae set off distinctly from hydrothecal border. Hydranths with intertentacular web; no nematophores. Gonothecae as hydrothecae, but longer.

Records from New Zealand: *Dana* Stn 3626, 27°00′ S, 177°41′ W, South Fiji Basin; NZOI Stn N376, 36°28.90′ S, 173°34.00′ E, Tasman Sea off northern part of North Island, 500 m; Leigh Marine Reserve (Bouillon 1995a; Bouillon & Barnett 1999). Polyp not recorded from New Zealand waters.

Remarks and Distribution: This polymorphic species greatly resembles *Laodicea undulata* (Forbes & Goodsir, 1851), with which it is occasionally synonymised; the polyps are indistinguishable, as is the cnidome. The area of distribution of *Laodicea indica* s.s. is mainly the Indo-West Pacific, including the Great Barrier Reef and extending eastwards to New Zealand waters.

Staurodiscus Haeckel, 1879

Type Species: *Staurodiscus tetrastaurus* Haeckel, 1879.

Staurodiscus gotoi (Uchida, 1927)

Staurodiscoides gotoi Uchida 1927: 165, figs 1–2.
Staurodiscus gotoi; Kramp 1961: 147; Bouillon & Barnett 1999: 87, fig. 85.
Staurodiscus sp. Bouillon 1995a: 235.

Type Locality: Shimizu Bay, Japan.

Description (after Kramp 1961, and Bouillon & Barnett 1999): Diameter 15–25 mm, 20 mm high, dome-shaped. Manubrium short, quadrangular, with simple, folded lips; radial canals each with 3 or 4 pairs of lateral branches, not opposed to each other, proximal longer than distal; canals and branches with or without secondary diverticula, lateral branches blind, not quite reaching to ring canal. Gonads along primary radial canals and branches. 8–16 hollow marginal tentacles; up to 88 cordyli. Adaxial ocelli on base of marginal tentacles and most of cordyli.

Records from New Zealand: Whangateau Harbour, Leigh Marine Reserve; Wellington Harbour (Bouillon 1995a; Bouillon & Barnett 1999).

Distribution: Japanese waters, China Seas, northern New Zealand waters.

Toxorchis Haeckel, 1879

Type Species: *Toxorchis arcuatus* Haeckel, 1879.

Toxorchis polynema Kramp, 1959b

Toxorchis polynema Kramp 1959b: 34, 141, pl. 1, fig. 13, pl. 2, fig. 4; 1959c: 242; 1965: 56-57; 1968: 71; Bouillon 1984b: 73-76, figs 211a-b; 1995a: 235; Bouillon 1999: 426-427, fig. 3.105; Bouillon & Barnett 1999: 88, fig. 86.

Type Locality: Coastal waters off Angola, West Africa.

Description (after Kramp 1959b, 1968): Umbrella flat, about 17 mm wide. Stomach broad and flat, mouth with broad, crenulated lips. 4 groups of radial canals, each bifurcating twice inside cruciform base of stomach; 16 (4 x 4) canals leaving stomach, all running to ring canal. Gonads ribbon-like, along proximal three-quarters to two-thirds the length of radial canals. Tentacles up to 360, hollow, with endodermal roots extending into bell mesogloea; there are less cordyli and up to 80 adaxial ocelli of irregular distribution. Velum well developed. Polyp phase unknown.

Records from New Zealand: *Dana* Stns 3642 (46°43′ S, 176°08.5′ E, Bounty Trough, Southwest Pacific, about 500 m) and 3644 (44°40′ S, 173°39′ E, Canterbury Bight, about 100 m).

Remarks and Distribution: Described from the eastern tropical Atlantic off Angola (Kramp 1959b) and subsequently recorded from various localities in coastal areas of the Indo-West Pacific, including coastal waters of East Africa and Polynesian waters (Kramp 1965, 1968), also recorded from the Nicobar Islands (Kramp 1959c). Fragile medusae, in spite of its wide area of distribution known only from a limited number of specimens.

Family **TIARANNIDAE** Russell, 1940

Chromatonema Fewkes, 1882b

Type Species: *Chromatonema rubrum* Fewkes, 1882b.

Chromatonema rubrum Fewkes, 1882b

Chromatonema rubrum Fewkes 1882b: 305, text-fig. 41, pl. 1; Kramp 1961: 128–129; Bouillon 1995a: 224, 234, 236; Bouillon & Barnett 1999: 95, fig. 96.

Type Locality: New England, U.S.A. Whereabouts of holotype unknown.

Description (after Kramp 1961): Umbrella up to 27 mm wide and 22 mm high, apex evenly rounded, mesoglea thick. Manubrium broad, quadrangular, with 4 per-radial lobes extending for half or two-thirds distance towards bell margin; mouth with 4 short, slightly crenulated lips. 10–16 sac-like gonads on each side of stomach lobes. Tentacles 20–24, bulbs conical. Between 2 successive tentacles 2, rarely 1 minute, cordylus-like appendages with distal agglomeration of nematocysts. Polyp phase unknown.

Records from New Zealand: A single specimen mentioned by Bouillon (1995a): NZOI Stn N465, 47°40′10″ S, 167°12′00″ E, south of Stewart Island, 154 m. This is the only record from New Zealand waters.

Distribution: Atlantic Ocean; Atlantic and Indian Ocean sectors of Antarctic seas.

Modeeria Forbes, 1848

TYPE SPECIES: *Modeeria formosa* Forbes, 1848.

In this genus the following species have been considered [species known exclusively as medusa phase are marked *].

**Modeeria formosa* Forbes, 1848
Modeeria rotunda (Quoy & Gaimard, 1827)
**Modeeria sagamina* (Uchida, 1947) [may be identical with *M. rotunda* (Quoy & Gaimard, 1827)]

Modeeria rotunda (Quoy & Gaimard, 1827)

Dianaea rotunda Quoy & Gaimard 1827: 181, pl. 5a, figs 1–2.
Modeeria rotunda: Edwards 1963: 457–466, fig. 1; Rees 1966: 218; Edwards 1973: 573 *et seq*., figs 1–3; Hiscock 1974: 24; Millard 1975: 137, fig. 45A; 1977a: 4; 1977b: 106; 1978: 195 *et seq*.; Hirohito 1983: 6, 19; Bouillon 1984b: 101; Park 1988: 61–62, figs 5–6; Gili *et al*. 1989: 74, fig. 3c; Stepan'yants 1989: 412 *et seq*.; Altuna & García Carrascosa 1990: 78, fig. 43; Cornelius & Ryland 1990: 127, fig. 4.12; Antsulevich 1991: 41; Cairns *et al*. 1991: 21; El Beshbeeshy 1991: 51–53, fig. 9; Park 1992: 286; Ramil & Vervoort 1992a: 29–32, fig. 4a-b; Boero & Bouillon 1993a: 262; Branch & Williams 1993: 8, fig.; Altuna Prados 1995: 54; Bouillon *et al*. 1995: 77; Cornelius 1995a: 109–112, fig. 24; Hirohito 1995 (English text): 88–90, fig. 25a-c; Bouillon 1999: 429, fig. 3.122; Bouillon & Barnett 1999: 95–96, fig. 97.
Modeezia rotunda: Álvarez-Claudio & Anadón 1995: 238 (incorrect subsequent spelling).
Modeeria formosa Forbes, 1848: 70; Cockerell 1911: 80; Hartlaub 1913: 253–254, fig. 210; Edwards 1958: 1564; Kramp 1961: 129; Edwards 1963: 457–466, fig. 1; 1973: 573.
Campanularia fastigiata Alder 1860: 73–74, pl. 5, fig. 1; Cornelius & Garfath 1980: 279; Cornelius 1982: 123 (placed in synonymy of *Modeeria rotunda*).
Stegopoma fastigiatum: Kramp 1911: 383; Ritchie 1910c: 158; Broch 1912: 43–44, fig. 14; Linko 1912: 43-44; Stechow 1914: 135, fig. 9; Jäderholm 1919: 13, pl. 3, fig. 5; Stechow 1919: 72; 1923b: 8; Broch 1928: 66, fig. 58; Totton 1930: 155, fig. 11; Billard 1931b: 246; Kramp 1932b: 68; Leloup 1932: 150; Kramp 1935: 133, fig. 57B; Leloup 1935: 12; Perrier 1936: 25; Leloup 1937b: 4, 25; Kramp 1938: 67, 69; Fraser 1940a: 577-578, pl. 33, fig. 5; Leloup 1940b: 8; Vervoort 1941: 196, fig. 1; 1942: 285; Kramp 1943: 28, 43; Fraser 1944a: 178-179, pl. 32, fig. 153; Vervoort 1946b: 219, fig. 14; Berezina 1948: 58, pl. 15, fig. 20; Fraser 1948: 219; Picard 1951b: 261; Dawydoff 1952: 55; Deevey 1954: 270; Buchanan 1957: 362; Ralph 1957: 850, fig. 8n-o; Millard 1958: 175; Picard 1958: 191; Rossi 1958: 4; Vervoort 1959: 234, fig. 10; Yamada 1959: 44; Naumov 1960: 315–316, fig. 206; Ralph 1961d: 236; De Haro 1965: 108, 109, fig. 4; Rees & Thursfield 1965: 70; Monniot 1966: 827 *et seq*.; Vervoort 1966: 115; Millard 1967: 172; 1968: 253, 256; Vervoort 1968: 99; Hirohito 1969: 13, fig. 10; Rees & Rowe 1969: 13; Patriti 1970: 31, fig. 37; Jägerskiöld 1971: 64; Rossi 1971: 35, fig. 14; Christiansen 1972: 291; Vervoort 1972a: 42; Leloup 1974: 7, fig. 5; Millard 1975: 137, fig. 45A; Stepan'yants 1979: 44, pl. 8, figs 1A–B; Ljubenkov 1980: 49; Marinopoulos 1981: 176; Pantaleeva 1989: 98; Dawson 1992: 14.
?Stegopoma fastigiatum: Gravier-Bonnet 1979: 13, fig. 3A.
Stegopoma fastigiata: M.B.A. 1957: 45; Bruce *et al*. 1963: 52.
Calycella fastigiata: Crawshay 1912: 326; Neppi 1921: 20; Riedl 1959: 645; Redier 1971: 506.
Stegopoma (Calycella) fastigiatum: M.B.A. 1931: 74; Moore 1937: 44.

MATERIAL EXAMINED:

NZOI Stns: A502, *Modeeria rotunda* (Quoy & Gaimard, 1827). [Slide 4197 JEW Colln]; **B480**, Many hydro- and gonothecae on stalks of *Tubularia* sp. RMNH-Coel. slide 2773; **B488**, overgrowing *Symplectoscyphus columnarius* (Briggs, 1914); many hydrothecae, no gonothecae. 2 RMNH-Coel. slides 2781; **C601**, on *Halecium delicatulum* Coughtrey, 1876a; hydrothecae only. Part in RMNH-Coel. slide 2801; **K820**, on *Acryptolaria c. conferta* (Allman, 1877); hydrothecae only. RMNH-Coel. slide 2891; **P34**, on *Billardia hyalina* sp. nov., isolated hydrothecae with hydranths; **Q72**, young colony on *Lytocarpia brevirostris* (Busk, 1852). RMNH-Coel. slide 2907A; **Q85**, *Modeeria rotunda* (Quoy & Gaimard, 1827) [Slides 4413, 4413 JEW Colln] with *Clytia mollis* (Stechow, 1919) and *Hebellopsis scandens* (Bale, 1884) on *Symplectoscyphus j. johnstoni* (Gray, 1843)]; **S13**, *Modeeria rotunda* (Quoy & Gaimard, 1827) (J.E. Watson); **S50**, many large hydrothecae with distinct hydranths. No gonothecae observed; **S397**, hydrothecae arising from stolon on *Symplectoscyphus columnarius* (Briggs, 1914). RMNH-Coel. slide 4769.

NMNZ: BS 437, separate hydrothecae on *Sertularella sinensis* Jäderholm, 1896. NMNZ Co. 461, RMNH-Coel. slide 2977; **BS 519**, 41°02′ S, 174°33′ E, many hydrothecae on *Cryptolaria prima* Busk, 1857. No gonothecae; **BS 621**, separate hydrothecae on stem of *Dictyocladium monilifer* (Hutton, 1873). NMNZ Co. 479, RMNH-Coel. slide 2986.

NMNZ Ralph Collection: Loc. 150, NMNZ Co. 1010, separate hydrothecae on *Symplectoscyphus j. johnstoni* (Gray, 1843). Slide RMNH-Coel. 3674. Unstained slide in RSC as *Stegopoma fastigiatum* (Alder) with *Sertularella* and *Hebella*, no data; **Loc. 529**, unstained slide in RSC as *Stegopoma fastigiatum*, no data; **Loc. 566**, NMNZ Co. 1274, separate hydrotheca on *Salacia bicalycula* (Coughtrey, 1876). RMNH-Coel. slide 3949.

TYPE LOCALITY: *Dianaea rotunda*: Strait of Gibraltar (Quoy & Gaimard 1827); *Modeeria formosa*: Hebrides, Scotland, U.K. (Forbes 1848); *Campanularia fastigiata*: Inner Hauf, Shetland, United Kingdom (Alder 1860).

DESCRIPTION: Medusa with hemisphaerical umbrella, about as wide as high or wider; jelly thick, apex rounded. Velum about one-tenth of bell diameter. Manubrium broad, cruciform; perradial edges of stomach connected with subumbrella over their whole length. Mouth with 4 big, slightly crenulated lips. Gonads along interradial walls of stomach, folded transversally and extending outwards along perradii. Marginal tentacles 16 or more (up to 28), hollow, smooth, with large conical basal bulbs. 1–3 spindle-shaped, hollow cordyli between adjacent tentacles, set with distal cluster of nematocysts. No ocelli present. Colour of stomach, radial canals, gonads, and marginal tentacles in living animal red to violet. Diameter of adult medusa about 20 mm.

Hydroid a stolonal colony, typically epizootic on other hydroids, with spindle-shaped hydrotheca rising from a tubular, often anastomosing stolon. Size of hydranth variable, 0.6–2 mm; length of pedicel also varied, almost non-existent to surpassing that of hydrotheca, generally smooth; proximal part of hydrotheca either gradually tapering into pedicel or with rounded base. Distal part of hydrotheca with characteristic gabled roof formed by 2 pleated, semicircular opercular plates suspended between 2 triangularly produced stiff extensions of the hydrothecal wall. The pleated plates open by pressure from the hydranth inside to permit its passage. Hydranth not particularly long, with about 12 tentacles in unicoronate whorl around conical proboscis. Gonothecae of same general shape as hydrothecae but much bigger, pedicel varied in length; 4 medusa buds, apical most advanced in development.

Records from New Zealand: A common epizootic hydroid on other New Zealand hydroids in the area: 25°–53° S, 159.5° E–178° W, 65–457 m depth. Gonothecae found in June.

Remarks and Distribution: Size of hydrotheca and length of pedicel may vary greatly. In the young specimen from NZOI Stn Q72 the hydrothecae have a short pedicel and reach a total length of only 650 µm. The life history is discussed by Edwards (1973). Circumglobal in boreal, temperate, subtropical, and tropical seas.

Stegolaria Stechow, 1913a

Type Species: *Cryptolaria geniculata* Allman, 1888

In this genus the following species have been considered.

Stegolaria geniculata (Allman, 1888)
Stegolaria operculata Nutting, 1905
Stegolaria irregularis Totton, 1930

Free medusae may be produced but life histories insufficiently known.

Stegolaria irregularis Totton, 1930 (Fig. 2A–C)

Stegolaria irregularis Totton 1930: 154; Ralph 1957: 849, fig. 8j-m; 1961d: 236; Edwards 1973: 594; Gravier-Bonnet 1979: 16; Hicks *et al*. 1991: 7; Dawson, 1992: 14.

Material Examined:

NZOI Stns: B488, large, fragmented colony, no gonothecae; RMNH-Coel. slide 2780; **E640**, large colony about 150 mm high, width about 120 mm, many fragments, no gonothecae; 3 RMNH-Coel. slides 2240; **E803**, Colony about 80 mm high, width 60 mm, irregularly branched, no gonothecae; 3 RMNH-Coel. slides 2167; **E861**, 5 colonies, 60 x 60 mm, no gonothecae; 2 RMNH-Coel. slides 2189; **F109**, single colony of 50 x 50 mm in poor condition; **F145**, 5 colonies about 40 mm high on empty worm(?) tubes; **F150**, 2 colonies, 60 and 110 mm high, smaller with several gonothecae; RMNH-Coel. slide 2852; **G268**, mutilated colony, 60 mm high; **J665**, 60 mm high colony attached to stone and detached stem with some hydrothecae; **J975**, large, fan-shaped colony 80 x 80 mm and several smaller colonies and fragments, no gonothecae; RMNH-Coel. slide 2264; **K825**, 2 colonies about 60 mm high, no gonothecae; **Q25**, small colony, 25–30 mm high, no gonothecae; **R437**, 2 colonies, 60 x 50 mm, no gonothecae, and a few fragments; 2 RMNH-Coel. slides 2237; **S13** [Slide 4220 JEW Colln]; **U594**, colony about 80 mm high, no gonothecae; RMNH-Coel. slide 2930 of small branch; **V369**, branched colony, 45 mm high, attached in soft sediment by means of fibres; part in RMNH-Coel. slide 2933; **W257**, 2 fragments, 20 and 30 mm high.

NMNZ: BS 438, fragmented, large colony, about 150 x 150 mm, no gonothecae; NMNZ Co. 661; 2 RMNH-Coel. slides 3031; **BS 571**, many strongly branched colonies, up to 150 mm high, on antipatharian axis; no gonothecae.NMNZ Co. 401; **BS 630**, well developed, branched colony about 80 mm high and a much abraded fragment; no gonothecae; NMNZ Co. 427; 40°44.28' S, 176°52.47'E, 23.Jan.1995, 2 large, partly fragmented colonies; main axis thick, anchoring by means of broad disk. Hydrothecae in very bad condition. Egg capsule of dogfish attached to bigger colony. NMNZ Co. 646.

NMNZ Ralph Collection: Loc. 154, NMNZ Co. 1013: 30 mm long colony and 2 fragments, 1 in RMNH-Coel. slide 3679. Very few good hydrothecae. No gonothecae. Two stained Canada Balsam slides in RSC as *Stegolaria irregularis*, no further data. Also partly dried out slide under same name, no data.

Type Locality: Off North Cape, New Zealand, *Terra Nova* Stn 96.

Description: Strongly polysiphonic, irregularly branched colonies with thick axis and branches, composed of many intertwining tubes, only extreme distal part of branches monosiphonic. Branching, though irregular, typically more or less in 1 plane. Hydrothecae in monosiphonic parts of colonies initially biseriate, with short pedicel, tubiform, smoothly curving outwards, base of hydrotheca closely adpressed, to axis and partly covered by secondary tubules. Hydrothecae with operculum comparable to that of *Modeeria rotunda* (Quoy & Gaimard, 1827), i.e., 2 semicircular pleated plates suspended between 2 stiffened triangular portions of the hydrothecal wall. Perisarc initially hyaline and thin, firmer on older parts of colony and there honey to deep honey coloured. Hydranth [according to Ralph (1957: 849)] with 10–12 tentacles and with annular attachment to hydrotheca near its base.

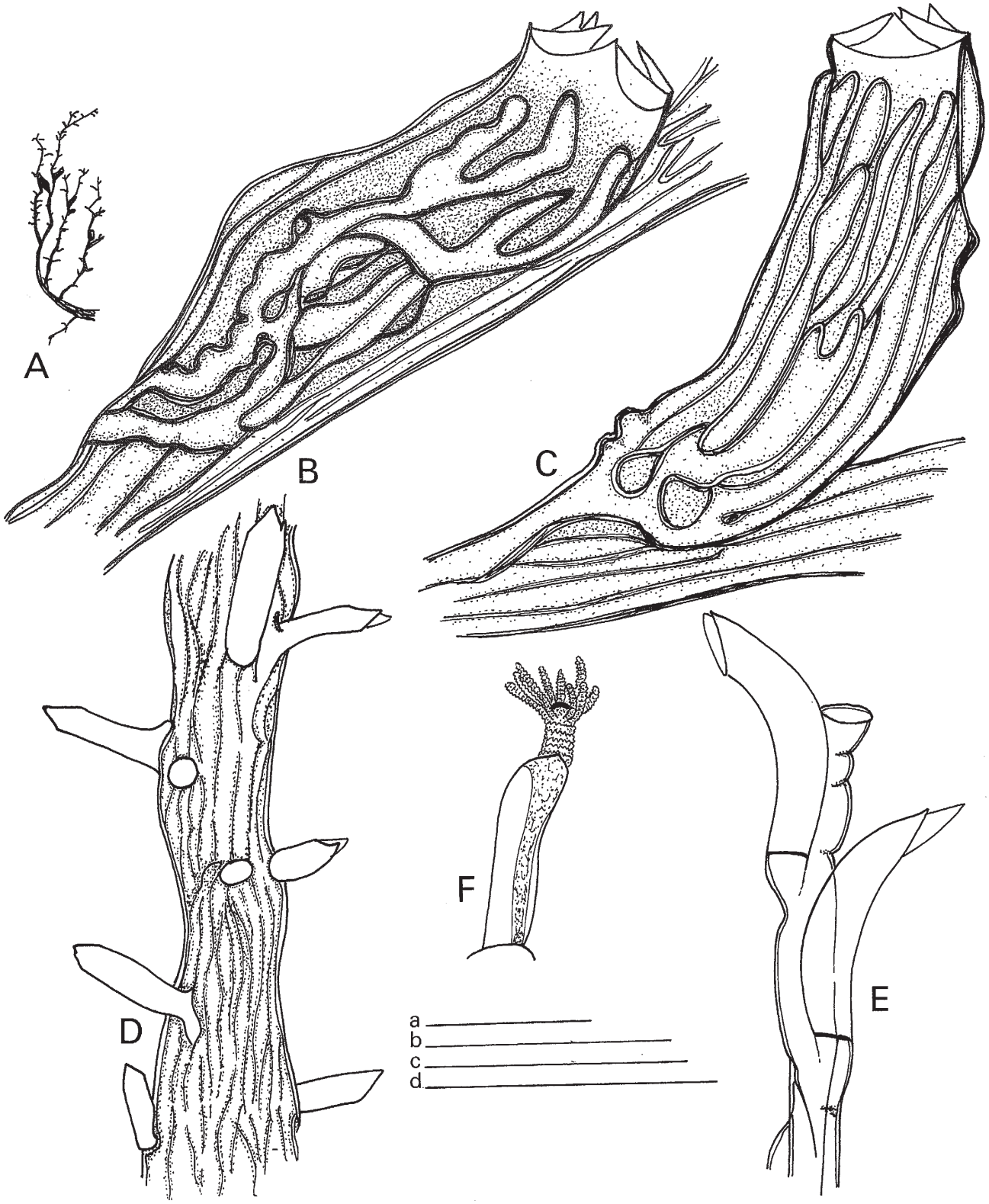

Fig. 2. A–C. ***Stegolaria irregularis*** Totton, 1930. **A**, colony, habitus. **B, C**, gonotheca, lateral view (NZOI Stn F150, slide 2852). **D–F.** ***Stegolaria operculata*** Nutting, 1905. **D**, part of stem. **E**, distal part of branch. **F**, hydrotheca and partly expanded hydranth (BS 438, slide 2975). Scales: a, 1.4 mm (D); b, 1.5 mm (E, F); c, 35 mm (A); d, 1 mm (B, C). J.E.W.

The gonotheca of *Stegolaria irregularis* has not previously been described. The material from NZOI Stn F150 is fertile, though the gonothecae are empty. These are large, cocoon-shaped, 2.0–2.4 mm long and 0.6–0.7 mm wide, adnate to the branch or standing out partially free of the branch. Perisarc thick and ornamented with fascicular tubes running up from the branch, these ending in blunt apices just behind the margin. Margin circular, slightly upturned with 4 low cusps and an operculum of many membranous segments separating to allow escape of the reproductive products. All gonothecae observed were empty.

RECORDS FROM NEW ZEALAND: Well distributed in deeper water around New Zealand in an area limited by 29°–53° S, 166° E–178° W, depth 145–812 m. Gonothecae were observed in February.

REMARKS: A slide in NMNZ contains a fragment of the paratype of this species: NMNZ Co. 207, portion of paratype, *Stegolaria irregularis* Totton, Stn 96, *Terra Nova*, B.M. (N.H.) '?type'. [*Terra Nova* Stn 96, 7 miles E. of North Cape, 128 m, 03.Aug.1911]. This is an unstained stem fragment with a side branch.

Stegolaria operculata (Nutting, 1905) (Fig. 2D–F)

?Cryptolaria operculata Nutting 1905: 947–948, pl. 3, fig. 4, pl. 4, figs 12–14; Ritchie, 1910a: 9–10.
Stegolaria operculata: Stechow 1913a: 137; 1913b: 29; Rees & Thursfield 1965: 88; Edwards 1973: 594; Gravier-Bonnet 1979: 14, fig. 3B-F; Hirohito 1995, (English text): 94, text-fig. 26d, e, pl. 5, fig. C.

MATERIAL EXAMINED:
NMNZ: BS 438, 100 mm high colony, irregularly branched, no gonothecae; NMNZ Co. 457; 3 RMNH-Coel. slides 2975.

TYPE LOCALITY: Between Molokai and Maui, Hawaiian Islands, 252 m.

RECORDS FROM NEW ZEALAND: The present locality, Nugent Island, 29°13′ S, 177°50′ W, northeast of Raoul Island, Kermadec Group, is outside New Zealand coastal waters on the Kermadec Ridge where the species was obtained at about 165 m depth.

REMARKS AND DISTRIBUTION: This material conforms to Nutting's (1905) description. Though no gonothecae have been observed in the present material its allocation to the genus *Stegolaria* Stechow, 1913a, seems beyond dispute. For a discussion of its relationship to *Stegolaria geniculata* (Allman, 1888) we refer to Vervoort (1985) and Ramil and Vervoort (1992a). Though the species was recently synonymised with *S. geniculata* by Ramil and Vervoort (1992) it is kept separate from the latter by Hirohito (1995). More and better preserved, fertile material is necessary to finally clarify the relationship between the two species. The present material is unfit for a detailed account.

Family **TIAROPSIDIDAE** Boero, Bouillon & Danovaro, 1987
Tiaropsidium Torrey, 1909

TYPE SPECIES: *Tiaropsidium kelseyi* Torrey, 1909.

Tiaropsidium japonicum Kramp, 1932a

Tiaropsidium japonicum Kramp 1932a: 370, text-figs 1, 24, 36, pl. 10, figs 1–2; 1961: 158; Bouillon & Barnett 1999: 97, fig. 98.

DESCRIPTION: Umbrella 18–34 mm wide, watch-glass-shaped, mesoglea thin, velum narrow. Stomach small, flattened, with short and broad slightly folded lips. Gonads linear, along full length of radial canals. Tentacles 8, hollow, each with abaxial and adaxial muscular furrows, bulbs large and swollen: nematocysts evenly distributed. Six or 7 small, pointed rudimentary tentacles each between 2 large tentacles. Lithocysts 16, each with dark brown basal ocellus; number of concretions unknown (Kramp 1961; Bouillon & Barnett 1999).

TYPE LOCALITY: Misaki, Japan.

REMARKS: Polyp phase of this species unknown, but described for two allied species: *Tiaropsidium mediterraneum* (Metschnikoff, 1886) (as *Camella vilaevelebiti* Hadzi, 1916) and *T. roseum* (Maas, 1905) (see below).

RECORDS FROM NEW ZEALAND: *Galathea* Stn 629, Hikurangi Trough, 41°46′ S, 175°48′ E, 1700 m.

DISTRIBUTION: Japanese and New Zealand waters.

Tiaropsidium roseum (Maas, 1905)

Tiaropsis roseum Maas 1905: 30, pl. 7, figs 45–47.
Tiaropsidium roseum: Kramp 1961: 159; Boero *et al.* 1987: 293–301, figs 1–5; Bouillon 1999: 430, fig. 3.123; Bouillon & Barnett 1999: 97, fig. 99.

TYPE LOCALITY: Malay Archipelago.

DESCRIPTION: Umbrella up to 15 mm wide, flattened, mesoglea thin, velum narrow. Manubrium quadrangular, short and broad, mouth with 4 short, crenulated lips. Gonads along radial canals, elongated to oval, slightly longer than one-third length of radial canal. 4 long, perradial marginal tentacles; 7 rudimentary tentacles in each quadrant, each with broad base and pointed tip; 8 statocysts with ocelli, each with about 15 concretions. The hydroid phase was found on algae and described by Boero *et al.* (1987). Colony stolonal; hydrotheca more or less tubular, about 0.3 mm high, with straight walls, attached to stolon by means of short pedicel with uneven or straight walls. Diaphragm thin. Operculum composed or 6 or 7 roughly triangular flaps, well demarcated from hydrothecal border; each flap with broad base and rounded tip. Polyps fully retractable into hydrotheca but quite extensible and then about 1 mm long. Hypostome rounded, surrounded by circlet of 14 amphicoronate tentacles, the elevated tentacles longer than those depressed. Nematocysts merotrichous isorhizae and microbasic mastigophores, the former at base of tentacles, the latter scattered over tentacles and hydranth column. Gonothecae arising from stolon, about 0.5 mm long, strongly compressed, with narrow base and wide apex, containing 1 medusa bud.

REMARKS: Ripe gonothecae occurred in August on colony kept in laboratory culture.

RECORDS FROM NEW ZEALAND: Chatham Rise, about 44° S, 178° E (Navas-Pereira & Vannucci 1991).

DISTRIBUTION: Caribbean, Mediterranean, and Indo-Pacific.

Tiaropsis L. Agassiz, 1849

TYPE SPECIES: *Tiaropsis multicirrata* (M. Sars, 1835).

Tiaropsis gordoni Bouillon & Barnett, 1999

Tiaropsis gordoni Bouillon & Barnett 1999: 98, fig. 100.

TYPE LOCALITY: Leigh Marine Reserve; holotype and para-types registered as H-719 and P-1170 respectively, in the NIWA collections, Wellington.

DESCRIPTION: Umbrella hemispherical or slightly higher, 3–8 mm wide; mesoglea thick, particularly in apical region; velum fairly large. Manubrium short, placed on well-developed, slender, cylindrical, gelatinous gastric peduncle, extending to or slightly beyond umbrellar margin, with 4 small perradial basal projections at entrance to each radial canal; mouth with 4 short pointed perradial lips with crenulated margins. 4 straight and narrow radial canals; circular canal narrow. Gonads small, short, oval with pointed tips, in middle of radial canals or slightly proximal in younger specimens. 50–100 small, smooth, hollow tentacles with conical basal bulbs. 8 large adradial open marginal vesicles each on cushion-like bulb with 1 large, black ocellus. Marginal vesicles each with about 12 concretions (Bouillon & Barnett 1999).

RECORDS FROM NEW ZEALAND: Leigh Marine Reserve (types).

DISTRIBUTION: Considered endemic to New Zealand by Bouillon and Barnett (1999).

Superfamily EIRENOIDEA Haeckel, 1879
Family **EIRENIDAE** Haeckel, 1879
Eirene Eschscholtz, 1829

TYPE SPECIES: *Oceania viridula* Péron & Lesueur, 1810.

Eirene ceylonensis Browne, 1905

Eirene ceylonensis Browne 1905: 140, pl. 3, figs 9–11; Kramp 1936: 249 (*cum syn.*); Rees 1939: 443; Kramp 1958: 352; 1961: 187–188; 1965: 74-75; 1968: 89–90, fig. 240; Bouillon 1984b: 27; Dawson 1992: 14; Bouillon 1995a: 235; Bouillon & Barnett 1999: 81, fig. 73.

Campanulina ceylonensis: Lloyd & Annandale 1916: 49–57, pls 5–7; Rees 1939: 443, 445.

TYPE LOCALITY: Ceylon pearl oyster banks.

DESCRIPTION (after Kramp 1961): Umbrella 15–22 mm wide. Peduncle long, narrow and cylindrical. Gonads extending from base of peduncle to near bell margin. Tentacles 100 or more, short, with excretory pore. No or very few young bulbs. About 100 lithocysts. The polyp phase has been described and figured by Lloyd and Annandale (1916), as *Campanulina ceylonensis*; according to Rees (1939) it is neither a *Campanulina*- nor a *Cuspidella*-like hydroid; it has provisionally been retained in the genus *Eirene*.

RECORDS FROM NEW ZEALAND: *Dana* Stn 3645, Pacific East of Christchurch, 42°32'S, 174°50'E.

REMARKS AND DISTRIBUTION: Widely distributed in tropical and subtropical waters of Indian and Pacific Oceans, including China Sea and Bismarck Sea (Kramp 1961).

Eirene menoni Kramp, 1953

Eirene menoni Kramp 1953: 286, pl. 2, fig. 6; 1961: 189; 1965: 76–77; 1968: 90, fig. 242; Bouillon 1984b: 27, 41, 103, fig. 7; 1995a: 224, 233, 235; Bouillon *et al.* 1995: 42; Bouillon & Barnett 1999: 81, fig. 74.

TYPE LOCALITY: Great Barrier Reef, Australia.

DESCRIPTION (after Kramp 1961, and Bouillon 1995a): Umbrella up to 20 mm wide, somewhat higher than hemispherical. Peduncle not particularly broad at base, narrowing towards its tip. Mouth with 4 prominent lips with folded margins; 4 interradial, dark green spots between bases of lips, fading in preserved animals. Gonads variable in height. Tentacles 40–54, no excretory papillae, no rudimentary bulbs. 1, occasionally 2 or 3 statocysts between tentacles, with a single concretion. Polyp phase unknown.

RECORDS FROM NEW ZEALAND: Three specimens from NZOI Stn N361, Pacific off Berghan Point, Doubtless Bay, North Island, 35°11.00′ S, 174°10.35′ E, 51 m depth (Bouillon 1995a).

REMARKS AND DISTRIBUTION: Species with a mainly Indo-West Pacific distribution, first and only records from New Zealand being those of Bouillon (1995a).

Eirene proboscidea Bouillon & Barnett, 1999

Eirene sp. Bouillon 1995a: 235.
Eirene proboscidea Bouillon & Barnett, 1999: 82, fig. 75.

TYPE LOCALITY: Whangateau Harbour, Leigh Marine Reserve. Holotype registered as H-717 in the NIWA collection, at Wellington.

DESCRIPTION (after Bouillon & Barnett 1999): Umbrella flatter than a hemisphere, 2.5 mm wide; mesogloea thin; velum narrow; gastric peduncle short and broad. Manubrium long, more than twice as long as peduncle; mouth with 4 folded lips. 4 straight radial canals and a narrow circular canal. Gonads on distal quarter of radial canals, only attached to radial canals over half their length; large, globular, with well-developed eggs. Tentacles 12, hollow, with large spherical to conical bulbs. No excretory papillae, no cirri, no rudimentary bulbs. 1, typically 2, statocysts between adjacent bulbs, with 2 concretions.

REMARKS: Remarkable amongst the species of *Eirene* by its small size at maturity and the very long manubrium.

RECORDS FROM NEW ZEALAND: Whangateau Harbour, Leigh Marine Reserve, one medusa.

Eirene tenuis (Browne, 1904)

Phialidium tenue Browne 1904: 730, pl. 64, fig 4, pl. 57, fig. 16.
Eirene tenuis: Kramp 1958: 351; 1961: 190; 1968: 91, fig. 247; Bouillon 1995a: 235; Bouillon & Barnett 1999: 82-83, fig. 76.

TYPE LOCALITY: Maldive Archipelago, Indian Ocean.

DESCRIPTION (after Kramp 1961): Umbrella 10–15 mm wide. Peduncle short and broad; gonads nearer to margin than to peduncle. Tentacles 25–32, bulbs long, broad, with small excretory papilla. Between tentacles 1–3 small, rudimentary bulbs and 2–4 statocysts.

Polyp phase unknown.

RECORDS FROM NEW ZEALAND: Recorded from Whangateau Harbour, Okahu Bay, Omaha Bay, Leigh Marine Reserve (Bouillon & Barnett 1999).

REMARKS AND DISTRIBUTION: Principally known from the Indian Ocean (Kramp 1961) and China Sea (He Zhenwu & Xu Renhe 1996); New Zealand record seems rather outside its typical area of distribution.

Eutima McCrady, 1859

TYPE SPECIES: *Eutima mira* McCrady, 1859.

Eutima curva Browne, 1905

Eutima curva Browne 1905: 138, pl. 3, figs 1–3; Kramp 1961: 195; 1965: 84–85; 1968: 95–96, fig. 259; Bouillon 1984b: 27, 45, 47; 1995a: 224, 233, 235; Bouillon & Barnett 1999: 83, fig. 77.

TYPE LOCALITY: Ceylon pearl oyster banks.

DESCRIPTION (after Kramp 1961, and Bouillon 1995a): Umbrella up to 20 mm wide, slightly flatter than hemisphere; jelly quite thick. Peduncle about as long as bell diameter, pyramidal above, prismatic below. 4 gonads, restricted to prismatic part of peduncle. 4 tentacles with lateral cirri, tentacle bulbs curved upwards over bell margin, with black pigment; 120–140 marginal warts with cirri, 8 statocysts.

RECORDS FROM NEW ZEALAND: One specimen from NZOI Stn 403, 41°37.20′ S, 175°18.40′ E, 21 m (Bouillon 1995a); also recorded by Mills (1982, unpubl.).

REMARKS AND DISTRIBUTION: Indo-West Pacific, including China seas and Great Barrier Reef (Kramp 1965).

Eutima mira McCrady, 1859

Eutima mira McCrady 1859: 190, pl. 11, figs 8–9; Kramp 1961: 198; Bouillon 1995a: 224, 235; 1999: 424, fig. 3.86; Bouillon & Barnett 1999: 83-84, fig. 78.
Octorchis orientalis Browne 1905: 139, pl. 3, fig. 4.
Eutima orientalis: Kramp 1961: 198; 1965: 84; 1968: 95.

TYPE LOCALITY: *Eutima mira*: South Carolina; *Octorchis orientalis*: Ceylon pearl oyster banks.

DESCRIPTION: Umbrella up to 30 mm wide, as high as broad. Peduncle long and slender, tapering apically, about twice as long as bell diameter; stomach small, flask-shaped. 4 simple, recurved lips, 8 gonads of which 4 along greater part of peduncle and 4 on subumbrella, extending from base of peduncle outwards. 4 long tentacles, with or without cirri and about 100 marginal warts, some with cirri; 8 marginal vesicles with 4–8 concretions each.

RECORDS FROM NEW ZEALAND: Leigh area (*Dana* Stn 3624, 36°31′ S, 174°50.5′ E, about 75 m; NZOI Stn N382, 39°15.00′ S, 173°43.40′ E, North Taranaki Bight, 25 m (Kramp 1965; Bouillon 1995a; Bouillon & Barnett 1999).

REMARKS AND DISTRIBUTION: *Eutima mira* McCrady, 1859 and *Octorchis orientalis* Browne, 1905, are here considered conspecific. The species occurs along the North American west coast and in the Indo-West Pacific, extending eastwards as far as New Zealand waters.

Phialopsis Torrey, 1909

TYPE SPECIES: *Phialopsis diegensis* Torrey, 1909.

Phialopsis diegensis Torrey, 1909

Phialopsis diegensis Torrey 1909: 23, fig. 9; Russell 1953: 333, text-figs 213–214, pl. 20, fig. 5; Kramp, 1961: 193–194; Bouillon & Barnett 1999: 84, fig. 79.

TYPE LOCALITY: San Diego, California, U.S.A.

DESCRIPTION (after Kramp 1961, and Bouillon & Barnett, 1999): Umbrella 20–30 mm wide, 3 or 4 times as high as wide, jelly moderately high in middle portion. Peduncle short, conical; stomach short, mouth short with crenulated lips. 4 radial canals; circular canal narrow. Gonads linear, from base of peduncle almost to bell margin. Tentacles 16–28, with elongated conical bulbs, with 3–9 triangular rudimentary bulbs, 3–9 scattered marginal cirri and 2–5 marginal vesicles with 2–6 concretions each between successive tentacles. No lateral cirri.

RECORDS FROM NEW ZEALAND: About 48°–49° S, 161°–162° E (Navas-Pereira & Vannucci 1990).

DISTRIBUTION: Atlantic and Pacific Oceans.

Superfamily LOVENELLOIDEA Russell, 1953
Family **CIRRHOLOVENIIDAE** Bouillon, 1984a
Cirrholovenia Kramp, 1959c

TYPE SPECIES: *Cirrholovenia polynema* Kramp, 1959c.

Cirrholovenia polynema Kramp, 1959c

Cirrholovenia polynema Kramp 1959c: 251, fig. 16a-c; 1961: 172–173; 1965: 68–69; 1968: 79–80, fig. 213; Bouillon 1984b: 27; 1995a: 224, 235; Bouillon & Barnett 1999: 80, fig. 72.

TYPE LOCALITY: Philippine Seas.

DESCRIPTION (after Kramp 1961, and Bouillon & Barnett 1999): Umbrella up to 12 mm wide, almost hemispherical or slightly higher, with fairly thick jelly; velum broad. Stomach square, short; mouth with 4 short, slightly crenulated lips. Gonads linear, along middle half of radial canals. Tentacles 32–40, placed on broadly conical or pear-shaped bulbs; up to 8 long, spirally coiled, marginal cirri between successive tentacles. There are about 48 marginal vesicles each with 1 concretion.

Polyp phase unknown but known for *Cirrholovenia tetranema* Kramp, 1959.

RECORDS FROM NEW ZEALAND: *Dana* Stn 3641, 43°40′ S, 176°36′ E, Southwest Pacific, Chatham Rise, about 100 m (Kramp 1965); NZOI Stn N404, 41°38.00′ S, 175°°18.80′ E, Southwest Pacific, Hikurangi Trough, 51 m.

REMARKS AND DISTRIBUTION: Coastal areas of the Indo-West Pacific, including the seas of the Philippines and the Malay Archipelago, the Central Pacific, New Caledonian, Australian, and New Zealand coastal waters.

Family **EUCHEILOTIDAE** Picard, 1958
Eucheilota McCrady, 1859

TYPE SPECIES: *Eucheilota ventricularis* McCrady, 1859.

Eucheilota menoni Kramp, 1959c

Eucheilota menoni Kramp 1959c: 248, fig. 14a-b; 1961: 175; 1968: 82–83, fig. 221; Bouillon 1984b: 57–58 (*cum syn.*); 1995a: 235; Bouillon & Barnett 1999: 85, fig. 80.

TYPE LOCALITY: Madras, India.

DESCRIPTION (after Kramp 1961, and Bouillon 1984b): Small, 2.5 mm wide, hemispherical medusa with fairly thick jelly and broad velum. Manubrium half as long as bell cavity; mouth with 4 simple lips. Lateral walls of manubrium and marginal bulbs with black pigment. Gonads globular, thick, in female with big ova, between middle and distal parts of radial canals. 4 large, hollow perradial tentacles with 2 or 3 pairs of lateral cirri; 4 big interradial and 16 small rudimentary bulbs without cirri. 8 adradial marginal vesicles with 1 concretion each. Wall of stomach with black pigment granules; perradial and interradial marginal bulbs with black pigment. Asexual reproduction by means of medusae buds developing on radial canals between middle and distal parts.

RECORDS FROM NEW ZEALAND: Leigh Marine Reserve (Bouillon & Barnett 1999).

REMARKS AND DISTRIBUTION: Closely resembling the medusa of *Lovenella assimilis* (Browne, 1905), not recorded from New Zealand. In *L. assimilis* the number of statocysts (marginal vesicles) is larger, being 12–20, there are no pigment spots and the gonads are located more distally along the radial canals and are longitudinally divided. It also reproduces asexually by means of buds along the radial canals. *Eucheilota menoni* occurs in coastal waters of India and the Indian Ocean, in Indonesian and in Philippine seas.

Eucheilota paradoxica Mayer, 1900b

Eucheilota paradoxica Mayer 1900b: 56, pl. 40, figs 134–135; 1910: 285, pl.37, fig. 3–3"; Kramp 1959b: 154, 231, 272, fig. 207 (*cum syn.*); 1961: 175; 1965: 67; 1968: 82, fig. 219; Bouillon 1984b: 27, 59–60 (*cum syn.*); 1995a: 224, 235; 1999: 425, fig. 3.95; Bouillon & Barnett 1999: 85, fig. 81.

TYPE LOCALITY: Florida.

DESCRIPTION (after Kramp 1961): Small, 4 mm wide medusa, higher than a hemisphere, occasionally with slight apical projection; mesogloea moderately thick. Manubrium small, flask-shaped, mouth with 4 simple lips. 4 narrow radial canals and narrow circular canal. Gonads along middle portion of radial canals, medusa buds on gonads or on hydranths developing on gonads. 4 large, hollow tentacles with large bulbs, each with a pair of lateral cirri; 4 or more rudimentary bulbs flanked by cirri. 8 marginal vesicles with 1 concretion each. Cnidome described by Bouillon (1984b: 59); polyp phase unknown.

RECORDS FROM NEW ZEALAND: NZOI Stns N360 (35°13.60′ S, 174°06.40′ E, North Cape area, 24 m) and N361 (35°11.00′ S, 174°06.40′ E, 24 m) (Bouillon 1995a); Whangateau Harbour, Leigh Marine Reserve (Bouillon & Barnett 1999).

REMARKS AND DISTRIBUTION: Western sub-tropical Atlantic waters; Japan; Indonesian waters; in the Indo-West Pacific apparently extending as far eastwards as the New Zealand coastal waters.

Eucheilota tropica Kramp, 1959c

Eucheilota tropica Kramp 1959c: 247, fig. 13; 1961: 175–176; 1965: 67–68; 1968: 83, fig. 222; Bouillon 1984b: 60–61, fig. 15 (*cum syn.*); 1995a: 235; Bouillon & Barnett 1999: 85-86, fig. 82.

TYPE LOCALITY: Coastal waters of the Nicobar Islands.

DESCRIPTION (after Kramp 1961 and Bouillon 1984b): Umbrella 2–15 mm wide; almost hemispherical, apical jelly thick, velum large. Manubrium short and broad, mouth with 4 simple, not very prominent lips, no peduncle. 4 radial canals and circular canal. Gonads elongated, slightly sinuous, along almost entire length of radial canals. 4, in adult stage 8, large perradial tentacles with elongated conical bulbs without black pigmentation and 2–5 pairs of lateral cirri; in each intertentacular segment up to 4 rudimentary bulbs without cirri and 1 statocyst; in adult stage there are consequently 32 rudimentary bulbs and 8 marginal vesicles with 1–3 concretions each. Polyp phase unknown.

RECORDS FROM NEW ZEALAND: Leigh Marine Reserve (Bouillon & Barnett 1999).

REMARKS AND DISTRIBUTION: Red Sea; coastal waters of Madras, India; Nicobar Islands; Philippine seas; Bismarck Sea. Also mentioned from the Malay Archipelago and Japan by Kramp (1965: 67, 1968: 83).

Eucheilota sp.

Eucheilota sp. Bouillon 1995a: 235; Bouillon & Barnett 1999: 86, fig. 83.

REMARKS: Unnamed species of *Eucheilota* listed by Bouillon and Barnett (1999) from Whangateau Harbour, Leigh Marine Reserve.

Family **LOVENELLIDAE** Russell, 1953
Lovenella Hincks, 1868

TYPE SPECIES: *Campanularia clausa* Lovén, 1835.

The following species have been considered.

[* = species of which only medusa phase is known].
**Lovenella annae* (von Lendenfeld, 1885a)
**Lovenella assimilis* (Browne, 1905)
**Lovenella bermudensis* (Fewkes, 1883)
Lovenella briggsi Mulder & Trebilcock, 1915
Lovenella chiquitita Millard, 1957;
**Lovenella cirrata* (Haeckel, 1879)
Lovenella clausa (Lovén, 1835)
Lovenella corrugata Thornely, 1908
Lovenella gracilis (Clarke, 1882)
Lovenella grandis Nutting, 1901b
**Lovenella haichangensis* Xu & Huang, 1983
Lovenella nodosa Fraser, 1938b
Lovenella producta (G.O. Sars, 1874)
Lovenella rugosa Fraser, 1938b

Lovenella assimilis (Browne, 1905)

Mitrocomium assimile Browne 1905: 137, pl. 1, fig. 3.
Lovenella assimilis: Kramp 1961: 177; 1968: 80, fig. 216, tab. 7; Bouillon 1984b: 76–77, tab. 9 (*cum syn.*); 1995a: 235; Bouillon & Barnett 1999: 89, fig. 87.

TYPE LOCALITY: Ceylon pearl oyster banks.

DESCRIPTION (after Kramp 1961, 1968): Umbrella 2.5 mm wide, higher than a hemisphere, with fairly thick jelly. Stomach short, cylindrical, with quadrangular base, no gastric peduncle, mouth with 4 small, simple lips. Gonads large, oval sacs, longitudinally divided, located close to ring canal. Tentacles 4, hollow, with big, conical to globular basal bulbs, each flanked by 3 or 4 pairs of lateral cirri; in each quadrant about 5 rudimentary bulbs of which median largest and about 5 marginal vesicles with 2 concretions each.

RECORDS FROM NEW ZEALAND: Whangateau Harbour, Leigh Marine Reserve (Bouillon & Barnett 1999).

REMARKS AND DISTRIBUTION: Coastal waters of Sri Lanka (Ceylon); Chefoo, China; Philippine seas.

Lovenella sp. (Fig. 3A–B)

MATERIAL EXAMINED:
NZOI Stn E136: 1 colony, 5 mm high, on *Sertularia unguiculata* Busk, 1852. All in RMNH-Coel. slide 2304.

DESCRIPTION: Sympodially built, monosiphonic colony about 5 mm high, snapped off at base; stem formed by successive internodes with distal hydrotheca on a short pedicel; following internode almost in line with preceding internode, basally with a few indistinct rings. Typically a second hydrotheca on a short, ringed pedicel springs from axil of apophysis and pedicel of internodal hydrotheca, that pedicel either fully ringed or with short, smooth intermediate portion. Hydrotheca conical, widening towards rim, slightly asymmetrical, with fine basal ring (or possibly diaphragm) for attachment of the hydranth. Hydrothecae small and fragile, only few in reasonable condition. Hydrothecal rim slightly everted, with 8–10 shallow embayments into which are fitted 8–10 acutely triangular opercular plates, folded to form a high, pointed roof. Presence of a connecting membrane could not be ascertained. Hydranths fully contracted, not well enough preserved for detailed study. No gonothecae present.

REMARKS: Smaller than any of the known species of *Lovenella* Hincks, 1868, though probably a very young colony. In size it approaches *Lovenella rugosa* Fraser, 1938, found growing on algae along the Pacific coast of Mexico though the hydrothecae in the latter, judged from Fraser's drawing, are almost twice as big. It may represent the hydroid phase of the only *Lovenella* so far known from New Zealand waters: *Lovenella assimilis* (Browne, 1905).

MEASUREMENTS of *Lovenella* sp. (in μm):

	NZOI Stn E136 slide 2304
Internode of axis, length	395 – 560
Diameter	73 – 84
Hydrotheca, total length, including opercular plates	280 – 290
Length from diaphragm onwards, including opercular plates	215 – 225
Height of opercular apparatus	73 – 85
Diameter at base	45 – 50
Diameter at rim	115 – 130

RECORDS FROM NEW ZEALAND: Chatham Shelf, 44°04.98′ S, 176°15.00′ W, 66 m, epizootic on *Sertularia unguiculata* Busk, 1852.

DISTRIBUTION: Found only in New Zealand waters.

Superfamily MITROCOMOIDEA Torrey, 1909
Family **MITROCOMIDAE** Torrey, 1909
Cosmetirella Browne, 1910

TYPE SPECIES: *Tiaropsis davisi* Browne, 1902.

Cosmetirella davisi (Browne, 1902)

Tiaropsis davisi Browne 1902: 281.
Cosmetirella davisi: Kramp 1932a: 360–362, figs 4, 34, 46 (*cum syn.*); 1961: 152; 1968: 72, 146, 148, 149, fig. 191; Bouillon 1995a: 224, 234, 236; 1999: 428, fig. 3.111; Bouillon & Barnett 1999: 90-91, fig. 90.

TYPE LOCALITY: Falkland Islands.

DESCRIPTION (after Kramp 1932, 1961, 1968, and Bouillon 1995a): Diameter of umbrella up to 60 mm, larger in subantarctic than in antarctic waters; almost hemispherical; stomach small, lips slightly folded. Gonads linear, sinuous, along half to two-thirds of radial canals. Number of tentacles variable, up to 180 may be present, highest number in subantarctic specimens. Marginal cirri absent; typically 8 open marginal vesicles, each with several concretions.

Polyp phase unknown.

RECORDS FROM NEW ZEALAND: One specimen from NZOI Stn N466, 47°30.50′ S, 167°15.70′ E, south of Stewart Island, 152 m (Bouillon 1995a).

REMARKS AND DISTRIBUTION: Circumpolar, antarctic and subantarctic species. Also recorded from South Africa, Chile and Brazil (Bouillon 1995a).

Mitrocomella Haeckel, 1879

TYPE SPECIES: *Tiaropsis polydiademata* Romanes, 1876.

Mitrocomella brownei (Kramp, 1930)

Trissocoma brownei Kramp 1930: 23, figs 9-11.
Mitrocomella brownei: Kramp 1932a: 341, figs 9, 37; Rees & Russell 1937: 75, figs 9–10; Russell 1953: 261, text-figs 150–155, pl. 15, fig. 4; Naumov, 1956: 558–561, fig. 1v; Kramp 1959b: 142, 215, 218, 224, fig. 169; 1961: 155; Bouillon 1995a: 236; 1999: 428, fig. 3.115; Bouillon & Barnett 1999: 91, fig. 91.

TYPE LOCALITY: South-western North Sea.

DESCRIPTION (after Kramp 1961): Diameter of umbrella 4–7 mm, watch-glass-shaped or nearly hemispherical, velum fairly broad. Stomach small and short, mouth with 4 small, simple lips; radial canals narrow. Gonads oval, swollen, near distal end of radial canals. Number of tentacles typically 16, in large specimens 20 or 24. 6–8 cirri between tentacles; 8 vesicles with 5–7 concretions each. Polyp phase reared by Rees and Russell (1937) and Naumov (1956), but not to maturity; it is a *Cuspidella*-like polyp, with a tubular hydrotheca arising from a stolon attached to other hydroids or other solid sub-strates. Operculum conical, pleated, composed of 5–7 triangular segments meeting in the centre and not dis- tinctly demarcated from the hydrotheca. Hydranth much extensible, hyaline, with conical hypostome surrounded by 8–12 amphicoronate tentacles. Gonotheca unknown.

RECORDS FROM NEW ZEALAND: Whangateau Harbour, Leigh Marine Reserve (Bouillon & Barnett 1999).

REMARKS AND DISTRIBUTION: This species is chiefly known from the boreal eastern North Atlantic and the Mediterranean (Villefranche). There are very few Pacific records.

Mitrocomella frigida (Browne, 1910)

Cosmetira frigida Browne 1910: 35; Vanhöffen 1912: 367, fig. 3.
Mitrocomella frigida: Kramp 1932a: 345, 346, text-fig. 23, pl. 10, figs 5–6; 1959b: 142, 227, 230, 235, 237, 267, 269, fig. 170; 1961: 156; Bouillon 1995a: 224, 234, 236; 1999: 428, fig. 3.115; Bouillon & Barnett 1999: 92, fig. 92.

TYPE LOCALITY: McMurdo Sound, Ross Sea, Antarctica.

DESCRIPTION (after Kramp 1961, and Bouillon 1995a): Umbrella with a diameter of 13–17 mm, almost hemispherical; mesoglea thin. Stomach short and broad; rim of mouth slightly folded, with indication of lips. Gonads linear, along greater part of radial canals, leaving both ends free, curtain-like, hanging down in large, vertical folds. Tentacles 32–72; about 8 marginal spiral cirri between successive tentacles; 8 open marginal vesicles.

RECORDS FROM NEW ZEALAND: One specimen from NZOI Stn N465, 47°40.70′ S, 167°01.20′ E, south of Stewart Island, 154 m.

REMARKS AND DISTRIBUTION: Mainly antarctic species (Ross Sea, South Georgia), also recorded west of Cape of Good Hope.

Mitrocomella niwai Bouillon & Barnett, 1999

Cosmetira sp. Bouillon 1995a: 236.
Mitrocomella niwai Bouillon & Barnett 1999: 92–93, fig. 93.

TYPE LOCALITY: Manukau Harbour (Barnett 1985). One specimen (holotype) registered as H-718 in the NIWA collection, at Wellington.

DESCRIPTION (after Bouillon & Barnett 1999): Umbrella flatter than hemisphere, 18 mm diameter; mesoglea thick at apex, thinning out near margin; velum broad. Manubrium small, narrow, short, base quadrangular; mouth with 4 pointed, narrow crenulated lips; no gastric peduncle. 4 straight, narrow radial canals; circular canal narrow. Gonads elongated, folded, on distal half of radial canals, divided longitudinally. Marginal tentacles 40–48, with rounded, conical basal bulbs; 2 or 3 straight cirri with scattered longitudinally arranged nematocysts between adjacent tentacles, total 80–142. Open marginal vesicles without ocelli, 4 in each quadrant. Polyp phase unknown.

RECORDS FROM NEW ZEALAND: Known only from the type locality, Manukau Harbour.

REMARKS: For a discussion of this species and its relationship to other New Zealand species of the Mitrocomidae we refer to the original description by Bouillon and Barnett (1999).

Suborder LAFOEIDA A. Agassiz, 1865
Superfamily LAFOEOIDEA A. Agassiz, 1865

Family **CLATHROZOIDAE** Stechow, 1921d
Clathrozoon Spencer, 1891

TYPE SPECIES: *Clathrozoon wilsoni* Spencer, 1891.

Clathrozoon sp.

MATERIAL EXAMINED:
PMBS: *Clathrozoon* sp. Aquarium Point, 26.Dec.1952, intertidal. Drawing of a medusa from Blueskin Bay (Mu 66-17). Tentacles and innards fawn, bell transparent. (Taken from card register.)

REMARKS: This is the only record of species of *Clathrozoon* from New Zealand. The type, *Clathrozoon wilsoni* Spencer, 1891, is well distributed in deeper southern Australian coastal waters and has also been recorded from Sagami Bay, Japan (Hirohito 1967, 1971, 1995).

Family **LAFOEIDAE** A. Agassiz, 1865
Subfamily **LAFOEINAE** A. Agassiz, 1865
Acryptolaria Norman, 1875
(= *Oswaldaria* Stechow, 1921a)

TYPE SPECIES: *Acryptolaria andersoni* Totton, 1930.

In this genus the following species have been considered.

Acryptolaria abies (Allman, 1877)
Acryptolaria andersoni Totton, 1930
Acryptolaria angulata (Bale, 1914a)
Acryptolaria arboriformis (Ritchie, 1911)
Acryptolaria conferta conferta (Allman, 1877)
Acryptolaria conferta minor Ramil & Vervoort, 1992
Acryptolaria corniformis Naumov & Stepan'yants, 1962
Acryptolaria crassicaulis (Allman, 1888)
Acryptolaria elegans (Allman, 1877)
Acryptolaria flabellum (Allman, 1888)
Acryptolaria gracilis (Allman, 1888)
Acryptolaria longitheca (Allman, 1888)
Acryptolaria minima Totton, 1930
Acryptolaria operculata Stepan'yants, 1979
Acryptolaria patagonica El Beshbeeshy, 1991
Acryptolaria pulchella Allman, 1888
Acryptolaria symmetrica (Nutting, 1905)
Acryptolaria tortugasensis Leloup, 1935

Acryptolaria angulata (Bale, 1914a) (Fig. 3C–F)

Cryptolaria angulata Bale 1914c: 166, pl. 35, fig. 1; 1915: 251; Stranks 1993: 7.
Acryptolaria angulata: Blackburn 1942: 111; Vervoort 1966: 117, fig. 17; Hirohito 1995 (English text): 102, text-fig. 29a, b, pl. 6, fig. B;
Cryptolaria rectangularis Jarvis 1922: 335, pl. 24, fig. 3.
Acryptolaria rectangularis: Millard 1967: 174, fig. 2B; 1968: 253, 261–262, fig. 2; 1973: 28; 1975: 171, fig. 57A–D; 1977b: 106; 1978: 188 *et seq.*; Gravier-Bonnet 1979: 17, fig. 4A; Millard 1980: 131, 138, fig. 4A; Cairns *et al*. 1991: 24.
Cryptolaria bulbosa Stechow 1932: 87.
Acryptolaria bulbosa: Yamada 1959: 49.

MATERIAL EXAMINED:
NZOI Stns: A910, single colony about 50 mm high, composed of stem and single branch, no coppiniae; **E719**, several tangled colonies about 50 mm high, no coppiniae. RMNH-Coel. slide 2244; **K825**, 1 colony, about 40 mm high, with coppinia; **K855**, bushy, densely tangled, fine colonies composed of several small polysiphonic stems and many anastomoses. Hydrothecae of peculiar shape (especially basal portion), directed outward, aperture slightly turned upwards. No coppiniae. 2 RMNH-Coel. slides 2274; some alcohol material as RMNH-Coel. 27730.

TYPE LOCALITY: *Cryptolaria angulata*: Great Australian Bight, 183 m, no further data (Bale 1914c); probable syntypes in MOV: MVF58335, 6 microslides, Stranks, 1993; slide 1919.10.14.47 in NHM probably also belongs to the type series. *Cryptolaria rectangularis*: Providence Island, north of Madagascar, 229 m (Jarvis 1922); whereabouts of type material unknown; a slide under this name from the Gardiner Collection in NHM. *Cryptolaria bulbosa*: Sagami Bay, Japan (Stechow 1932).

REMARKS: Alhough the species is only sparingly represented in the New Zealand collections we have seen a great amount of material of this species from all over its large area of distribution. Particularly the material from La Réunion that we have been able to study (courtesy of Dr Nicole Gravier-Bonnet), and much additional

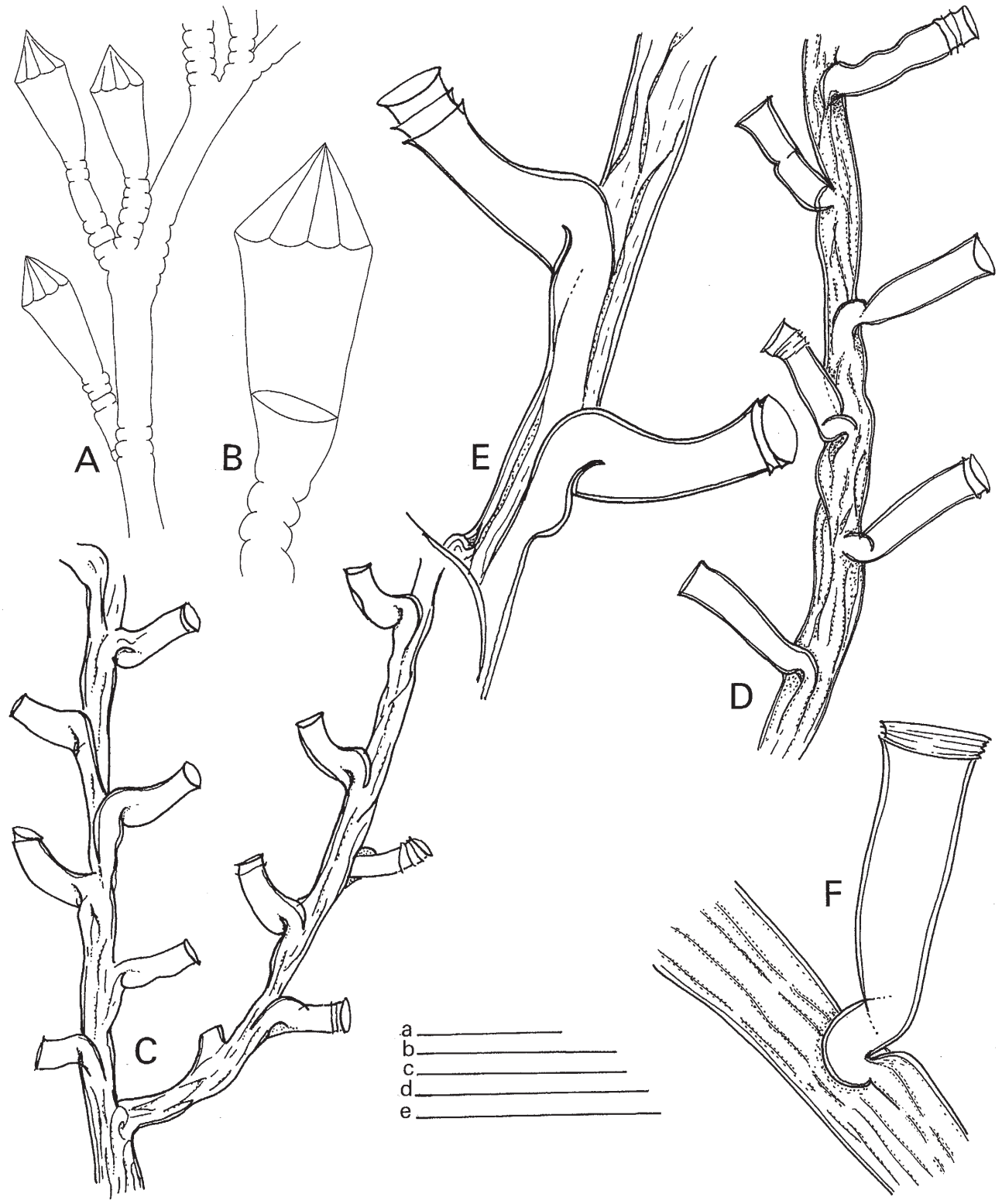

Fig. 3. A, B. ***Lovenella*** sp. **A**, part of colony. **B**, hydrotheca (NZOI Stn E136, slide 2304). W.V. **C–F.** ***Acryptolaria angulata*** (Bale, 1914). **C**, **D**, parts of colony. **E**, **F**, hydrothecae (C, E, NZOI Stn K855, slide 2274; D, F, NZOI Stn E719, slide 2244). J.E.W. Scales: a, 0.3 mm (A); b, 0.5 mm (F); c, 1 mm (C); d, 0.2 mm (B); e, 0.5 mm (E).

material from the New Caledonia area, has convinced us that *Cryptolaria angulata* Bale, 1914 and *Cryptolaria rectangularis* Jarvis, 1922 are inseparable; the species should therefore bear the oldest species name: *Acryptolaria angulata* (Bale, 1914).

Examination of the range of material also shows that, as the colony, and the hydrothecae age, the hydrothecae become longer with replications of the margin (up to 10 in our specimens) and curl upwards, the abcauline wall becoming conspicuously concave. This apparently results in downward collapse of the hydrotheca so that the notch in the adcauline wall is compressed and enclosed in the hydrotheca. At this stage, in order to strengthen the hydrotheca, a buttress develops at its base, to prop the hydrotheca up. This feature was noted by Stechow (1932: 87) in material from Sagami Bay, Japan. The range of material at our disposal distinctly shows the progressive development of this unusual feature from its complete absence through an incipient swelling, to full development in every hydrotheca in the New Zealand material from NZOI Stn K855.

Records from New Zealand: All far offshore: Chatham Rise, Hikurangi Trough, and near Kermadec Ridge, depth 145–913 m. Fertile material was found in July.

Distribution: Indian Ocean; Indian Ocean coast of South Africa; Great Australian Bight; Indo-West Pacific. The species is plentiful in moderately deep and deep waters around New Caledonia.

Acryptolaria conferta conferta (Allman, 1877) (Fig. 4A–C)

Cryptolaria conferta Allman 1877: 17-19, pl. 12, figs 6–10; Stechow 1913b: 30; Jarvis 1922: 335; Keller *et al.* 1975: 148.
Grammaria conferta: Broch 1913: 10; 1918: 17–18.
Cryptolaria conferta var. *australis* Ritchie 1911: 826–830, pl. 84, fig. 2, pl. 87, fig. 1: Jäderholm 1919: 7, pl. 2, fig. 1.
Oswaldaria conferta var. *australis*: Stechow, 1923b: 11.
Oswaldaria conferta: Stechow 1923d: 147; Leloup 1940b: 15; Picard 1958: 193; Marinopoulos 1981: 176.
Acryptolaria conferta: Totton 1930: 164, fig. 19a, b: Kramp 1932b: 68, fig. 32: Leloup 1937b: 4, 29, fig. 19; Fraser 1943: 90; 1944a: 210–211, pl. 40, fig. 189; Kramp 1947b: 8; Fraser 1948: 228; Rossi 1950: 201–202, fig. 4a; Deevey 1954: 270; Kramp 1963: 106; Millard 1964: 7, fig. 1A–C, E; Rees & White 1966: 273; Millard 1968: 253, 260–261; Vervoort 1968: 99; Patriti 1970: 30, fig. 33; Vervoort 1972a: 41, fig. 12a; Millard 1973: 28, fig. 4c; 1975: 169, fig. 56; 1977b: 106; 1978: 188 *et seq.*; Stepan'yants 1979: 51, pl. 9, fig. 4A–G; Millard 1980: 131; Blanco 1981: 275–276, figs 3–4; Hirohito 1983: 6, 19; Cairns *et al.* 1991: 24; Calder 1991: 33–35, figs 19, 20; El Beshbeeshy, 1991: 63–66 fig. 13; Park 1992: 287; Boero & Bouillon 1993a: 263; Calder 1993: 67 *et seq.*; Blanco *et al.* 1994: 8-9, figs 4–5; Altuna Prados 1995: 54; Bouillon *et al.* 1995: 51; Hirohito 1995 (English text): 104.
Acryptolaria conferta var. *australis*: Totton 1930: 163, fig. 19c-e; Ralph 1958: 315, fig. 4a-g; Yamada 1959: 49; Ralph 1961d: 236; Rees & Thursfield 1965: 82, 194; Millard 1967: 172; Smaldon *et al.* 1976: 14.
Acryptolaria conferta var. *conferta*: Ralph 1958: 317.
Acryptolaria conferta australis: Millard 1964: 9, fig. 1D, F–G; Vervoort 1966: 115, fig. 15; Rees & Vervoort 1987: 37–39, fig. 6e; Park 1991: 545, fig. 5A–D; Dawson 1992: 15.
Acryptolaria conferta conferta: Vervoort 1985: 282–283; Ramil & Vervoort 1992a: 41–43, fig. 7a, b.

Material Examined:

NZOI Stns: A740, 2 fragments about 8 mm in RMNH-Coel. slide 2727. In addition fragments of small colony. No coppiniae; **A744**, 1 colony in 2 parts and some fragments. No coppiniae; **A746**, fragments of a colony; **A910**, numerous colonies and fragments up to 50 mm high; hydrothecae small and slender, many partly worn coppiniae; **C703**, *Acryptolaria c. conferta* (Allman, 1877). [Slide 4179 JEW Colln]; **C734**, 30 mm long fragment, no coppiniae; **D7**, several mutilated colonies, up to 35 mm high, partly from dried out sample. Hydrothecae big; **D149**, branched colony, 55 mm high, no coppiniae; **D899**, large colony, 50 x 70 mm, no coppiniae; **E108**, several colonies, one with basally small stem of *Salacia bicalycula* (Coughtrey, 1876) in RMNH-Coel. slide 2298; **E822**, colony about 30 mm high, no coppiniae. RMNH-Coel. slide 3445; **G276A**, small colony 35 mm high; no coppiniae; **G307A**, large, tangled colony, 50 x 60 mm and many fragments; no coppiniae; **G696**, fragments of a colony; **G942**, colony 45 mm high, branched; no coppiniae; **J37**, *Acryptolaria c. conferta* (Allman, 1877). [Slide 4180 JEW Colln]; **J42**, *Acryptolaria c. conferta* (Allman, 1877) (J.E. Watson); **K820**, colony 60 x 70 mm with several coppiniae. Completely overgrown by *Modeeria rotunda* (Quoy & Gaimard, 1827); **K840**, colony about 45 mm high, attached to stone, snapped off during handling; **K855**, colony, about 50 x 50 mm in several pieces, axis thick, polysiphonic; no coppiniae; **P934**, tangled colony about 20 mm high and a number of fragments. [Slides 4214, 4215, 4410 JEW Colln]; **P946**, large, forked colony 65 x 55 mm with a large coppinia; **S159**, colony 35 mm high, several smaller colonies and some fragments. No coppiniae; **U547**, large, repeatedly branched colony with many corbulae, on bryozoans. Also smaller, 60 mm high colony. 2 RMNH-Coel. slides 2925. Condition poor; **U594**, 2 fine colonies, 60 x 60 mm, on bryozoans. No coppiniae. A few smaller frag-ments, 1 made up in RMNH-Coel. slide 2929.

NMNZ: BS 379, single, finely branched colony about 35 mm high without coppiniae; hydrothecae smoothly curved. NMNZ Co. 560.

NMNZ Ralph Collection: Loc. 503, NMNZ Co. 1240: fragment with small coppinia; **Loc. 508**, NMNZ Co. 1242: many mutilated fragments of several colonies, some with coppiniae, highest about 50 mm. RMNH-Coel slides 3921. Partly dried out slide in RSC as *Acryptolaria conferta* var. *australis*, no further data.

Ralph's Chatham Islands Expedition Collection: Stn 34, NMNZ Co. 1345. Basal part, about 10 mm high, with several hydrocladia and a fragment (made up in RMNH-Coel. slide 4415). No coppiniae.

Otago Museum, Dunedin, N.Z. : **Iv. 764**. A.29:11a: slightly fragmented colony or colonies about 60 mm high. No coppiniae. Resembles *Acryptolaria conferta minor* Ramil & Vervoort, 1992. Labelled: *Cryptolaria gracilis.* RMNH-Coel. 27244, slide 2661.

TYPE LOCALITY: *Cryptolaria conferta*: Off Cojima, Cuba, 823 m depth [Allman, 1877, (holo)type in MCZ]; *Acrypto-laria conferta minor*: 35°55.8′ S, 05°35.3′ W, Stn 153, BALGIM Expedition, 580 m depth (Ramil & Vervoort, 1992a; holotype in MNHN; paratypes in RMNH); *Crypto-laria conferta* var. *australis*: off Wata Mooli, coast of New South Wales, Australia, 28–143 m (Ritchie 1911; Rees & Thursfield 1965; (holo)type in AMS, Y255–256; part of type series and paratypes in RSM).

DESCRIPTION: Sympodially built, flabellate colony of irregular shape, typically with forked, polysiphonic axis and side branches, only ultimate branches monosiphonic, with occasional anastomoses, all roughly in one plane. Hydrothecae biseriate, smoothly tubular, alternately directed left or right, in plane of ramification; abcauline wall smoothly curved; free part adcauline wall typically shorter than adnate part, but length of hydrotheca may be greatly increased by repeated renovations. Axis in monosiphonic parts straight or slightly geniculate; secondary tubules developing from basal part of colony upwards rapidly cover axis and branches; tubules anastomosing with each other and with axis and branches; only apical parts of hydrothecae protruding from mass of tubules; colony stiff. Hydrothecal aperture with circular rim, occasionally slightly everted, parallel to axis. Perisarc firm, horn coloured, thinning out along walls of hydrotheca; collapsed hydrothecae frequent.

Gonothecae aggregated into ovoid coppiniae on stem or branches, amphora-shaped, closely packed and by compression hexagonal in cross section; neck elongated, with circular aperture with non-everted and slightly everted rim. Gonophore producing a globular marsupium or acrocyst outside the gonotheca containing the developing eggs or planulae. No protective ramules in corbula though an occasional hydrotheca may be present (Ramil & Vervoort 1992a, modified).

REMARKS: No distinction has been made between the nominal form and var. a*ustralis* Ritchie, 1911.

RECORDS FROM NEW ZEALAND: Widely distributed and of regular occurrence in waters of intermediate and great depths around New Zealand. Coppiniae occur in the months June, July, August, and September.

DISTRIBUTION: In moderate and deeper waters of all oceans, including the Mediterranean.

Acryptolaria corniformis Naumov & Stepan'yants, 1962 (Fig. 4D, E)

Acryptolaria corniformis Naumov & Stepan'yants 1962: 74, fig. 2; Gravier-Bonnet 1979: 22; Stepan'yants 1979: 51, pl. 9, figs 1–3.

MATERIAL EXAMINED:

NZOI Stn D176: colony about 80 x 80 mm high in three parts. NNM-Coel. slide 2844.

TYPE LOCALITY: Off Sabrina Coast, Antarctic [Naumov & Stepan'yants 1962; holotype in ZMSP].

REMARKS AND DISTRIBUTION: A specimen of this species was recognised from a locality in the Macquarie Gap, far outside New Zealand coastal waters. This species has so far only been recorded from Antarctic waters off Sabrina Coast, Indian Ocean sector of the Antarctic, at 289 m depth (Stn 44A, Soviet Antarctic Expedition in R.V. *Ob*).

The brief description of this species is based on a 20 mm long colony fragment; the species is said to be closely related to *Acryptolaria crassicaulis* (Allman, 1888), a better known species, with which it is synonymised by Gravier-Bonnet (1979) and Vervoort (1985). It is, by its authors, also compared with *Acryptolaria conferta* var. *australis*, from which is it said to differ by its larger dimensions, narrower angle of ramification of the hydrothecae, and the more pronounced difference between distal and proximal diameter of the hydrothecae (taken from the translation of Naumov and Stepan'yants's 1962 paper). Taking into consideration the great variability of *Acryptolaria conferta* over its vast area of distribution, additional information on *Acryptolaria corniformis* is badly needed.

Acryptolaria crassicaulis (Allman, 1888) (Fig. 5A–C)

Cryptolaria crassicaulis Allman 1888: 41, pl. 19, figs 3, 3a; Ritchie 1911: 833, pl. 87, fig. 4; Stechow 1913a: 144; 1913b: 11, 113, figs 86–87; Jäderholm 1917: 7, pl. 1, fig. 4; 1919: 8, pl. 2, fig. 2; Leloup 1932: 146, text-fig. 16, pl. 16, fig. 3; Stranks 1993: 7.

Acryptolaria crassicaulis: Yamada 1959: 49; Rees & White 1966: 273; Millard 1967: 172, fig. 2A; Leloup 1974: 8; Millard 1978: 188 *et seq.*; Gravier-Bonnet 1979: 18, fig. 34B–C; Vervoort 1985: 283-285, fig. 1; Ramil & Vervoort 1992a: 48–49, fig. 9d; Blanco 1994a: 162; 1994b: 188; Blanco *et al.* 1994: 9–10, fig. 6; Altuna Prados 1995: 54; Bouillon *et al.* 1995: 51; Medel & López-González 1996: 198.

Oswaldaria crassicaulis: Stechow 1921d: 256; 1923d: 147; Leloup 1940b: 15.

Cryptolaria crassicaulis var. *dimorpha* Ritchie 1911: 830-833, text-fig. 126, pl. 87, figs 5–6; Jarvis 1922: 335.

Acryptolaria crassicaulis var. *dimorpha*: Rees & Thursfield, 1965: 83; Smaldon *et al.* 1976: 14; Gravier-Bonnet 1979: 20.

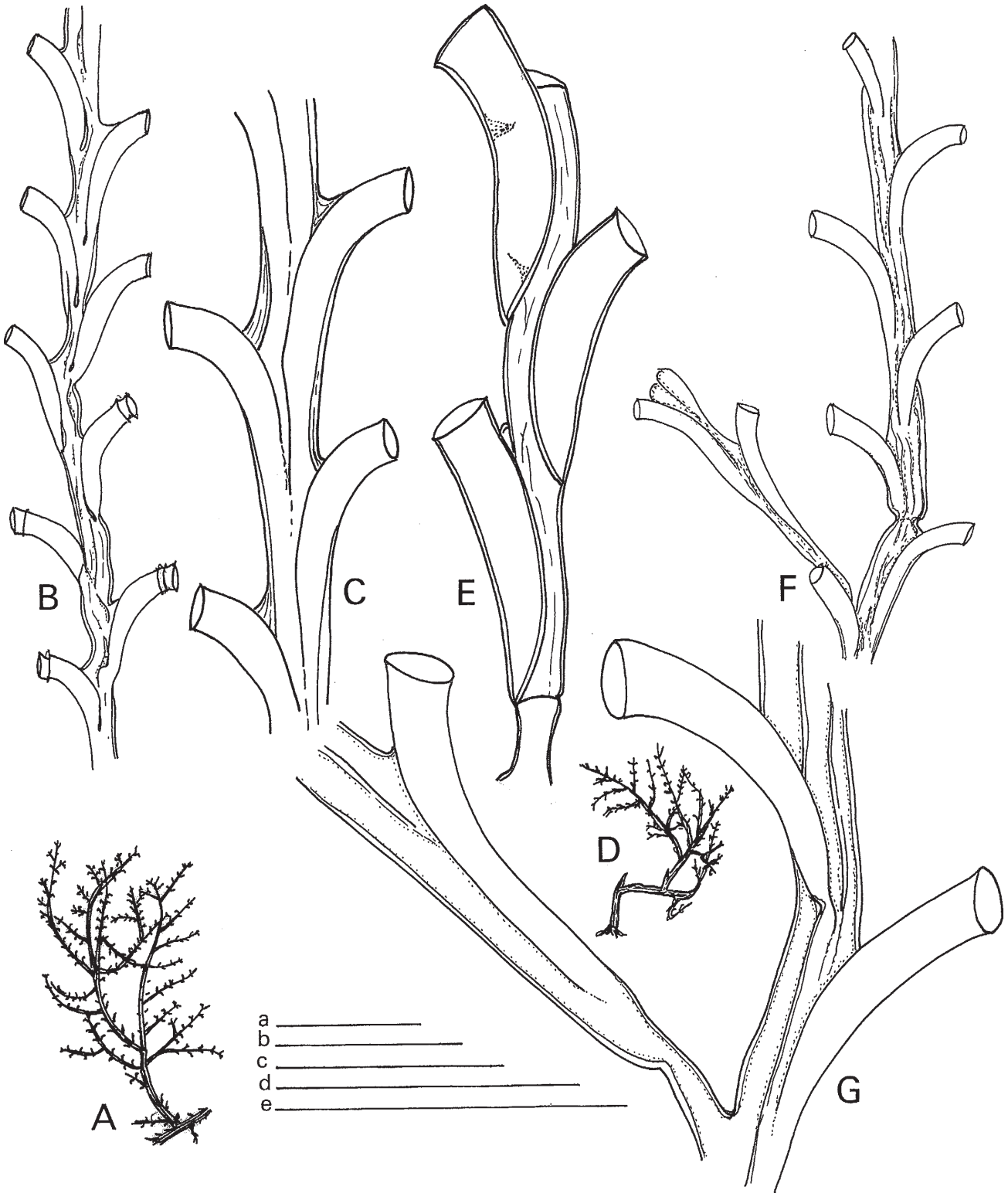

Fig. 4. A–C. ***Acryptolaria conferta conferta*** (Allman, 1877). **A**, colony, habitus. **B**, part of branch. **C**, hydrothecae (NZOI Stn U594, slide 2929). **D, E.** ***Acryptolaria corniformis*** (Naumov & Stepan'yants, 1962). **D**, colony, habitus. **E**, hydrothecae (NZOI Stn D176, slide 2844). **F, G.** ***Acryptolaria*** **cf.** ***longitheca*** (Allman, 1877). F, part of colony. **G**, hydrothecae (NZOI Stn E640, slide 2242). Scales: a, 1 mm (B); b, 20 mm (D), 1 mm (F); c, 0.5 mm (G); d, 40 mm (A); e, 1 mm (C, F). J.E.W.

MATERIAL EAMINED:

NZOI Stns: K842, colony about 40 x 40 mm on small stone, 2 coppiniae; much renovated hydrothecae. RMNH-Coel. slides 2271, 3443; **K851**, 4 small colonies about 35 mm high, without coppiniae, in bad condition.

TYPE LOCALITY: *Cryptolaria crassicaulis*: *Challenger* Stn 344, off Ascension Island, 07°20′ N, 14°28′20" W, 768 m (Allman 1888, (holo)type in NHM; part of type series in MOV (MVF58209, 2 microslides, Stranks 1993)). *Cryptolaria crassicaulis* var. *dimorpha*: Off Wollongong on the coast of New South Wales, Australia, 101–102 m (Ritchie 1911; holotype in RSM, Edinburgh, 1959.33.323–326; NHM, 1964.8.7.58–59, part of type series; AMS, Y306, Y307 & Y373, part of type series).

REMARKS: The reasons for sinking *A. crassicaulis* var. *dimorpha* Ritchie, 1911 into the synonymy of the species are discussed by Gravier-Bonnet (1979: 20); we concur with her opinion. Compared to *Acryptolaria c. conferta* the hydrothecae in *A. crassicaulis* are much bigger and wider, widening gradually from base onwards and with about one-third of the total hydrothecal length free. The present material is in agreement with descriptions and measurements by Gravier-Bonnet (1979) and Ramil and Vervoort (1992).

RECORDS FROM NEW ZEALAND: The present localities (NZOI Stns K842 and K851, from off the Kermadec Ridge) are north of New Zealand coastal waters; the species was found at intermediate depths (106–325 m).

DISTRIBUTION: This species has a wide distribution in deeper parts of the Atlantic, Indian, and Pacific Oceans, probably also penetrating into antarctic waters (Gravier-Bonnet 1979; Ramil & Vervoort 1992a). It has also been recorded off Wollongong on the coast of New South Wales, Australia, at a depth of 768 m (Ritchie 1911).

Acryptolaria gracilis (Allman, 1888) (Fig. 6D, E)

Cryptolaria gracilis Allman 1888: 42, pl. 20, figs 2, 2a; Hutton, 1904: 320; Stranks 1993: 7.

Acryptolaria gracilis: Ralph 1958: 314-315, fig. 3b-d; Dawson 1992: 15.

?Acryptolaria gracilis: Patriti 1970: 30, fig. 34.

MATERIAL EXAMINED:

NMNZ: 2 partly dried out slides in RSC with the locality references 78A and 78B as *Cryptolaria gracilis.* Also a tube in Ralph's preserved collection with the locality reference 78; NMNZ Co. 934. This tube contains unrecognisable remains of a species of *Acryptolaria*; the locality list contains the reference: "old museum specimens, A29 11A"; Ralph (1958: 315) probably refers to this material as: "a stem fragment from an unspecified locality in the hydroid collection of the Otago Museum, Dunedin".

TYPE LOCALITY: Off East Cape, New Zealand, see below.

REMARKS: The two slides in RSC have been inspected (Loc. 78A & B). Though these are in poor condition and un-stained, they are exactly as figured by Ralph (1958, fig. 3b-d); the free portion of the hydrotheca is short. Ralph's drawings have been made of a stem fragment from an unspecified locality in the hydroid collection of the Otago Museum (which we have been unable to retrieve), her description is based on Allman's original account of *Cryptolaria gracilis*.

Of this species we have seen the holotype, received on loan from NHM (*Challenger* Stn 169, off East Cape, New Zealand, 1280 m, no. 88.11.13.31, 23.Sept.1996). This is an irregularly branched colony about 45 mm high with a spread of about 50 mm; there is no distinct main stem and no coppiniae. Also some smaller colonies and some fragments, RMNH-Coel. slide 3467, from one of smaller colonies (paratype). This material is remarkable because of the greater distance between the hydrothecae which are only slightly bigger than those of *A. minima* Totton, 1930; the distal part curves gracefully away from the axis. There is also a slide with the label: "*Challenger*. *Cryptolaria* sp. (?) *gracilis*. (The only specimen of *Cryptolaria* from the locality. Note by R.E. Trebilcock.) Slide 88.11.13.37A. Found in bottle with *Grammaria insignis*". No further locality reference on the slide. In addition two slides no. 90.4.11.8A, labelled: "*Challenger*, *Cryptolaria gracilis* var. Stn 307, 147 fms, R.E. Trebilcock".

Measurements (in μm)

	Acryptolaria gracilis Paratype Slide 3467	*Acryptolaria conferta minor* BALGIM Exped. various slides	*Acryptolaria conferta conferta* BALGIM Exped. Stn DW132
Axial and hydrocladial hydrothecae, total length	860 – 895	705 – 850	1085 – 1195
Length free part adcauline wall, incl. renovations	345 – 395	300 – 665	540 – 715
Length without renovations	230 – 345	245 – 420	475 – 500
Length adnate adcauline wall	690 – 740	445 – 645	695 – 715
Diameter at base	65 – 85	65 – 110	150 – 175
Diameter at rim	195 – 230	160 – 205	215 – 240

We find this species, particularly after inspection of the holotype, to be quite near to *Acryptolaria c. conferta* (Allman, 1877) and we find it extremely difficult to define characters by which the two could be distinguished. They may well be conspecific. Comparison of the available measurements shows that *A. gracilis* is only slightly inferior to *A. c. conferta* in the dimensions of the hydrothecae; it is bigger, in all respects, than the Atlantic subspecies described by Ramil and Vervoort (1992a: 43–48, figs 8a-c, 9a-c) as *Acryptolaria conferta minor*. It does not appear unlikely that Allman based his species on a colony of *Acryptolaria c. conferta* with short hydrothecae. For measurements (in μm) see p. 46.

MEASUREMENTS of *Acryptolaria gracilis* according to Ralph (1958), material from unknown locality:

Hydrothecae, length adnate part	560 – 680
Length free part	160 – 250
Diameter at aperture	140 – 180
Distance between hydrothecae on branches	1140 –1250

DISTRIBUTION: Known only with certainty from the type locality: *Challenger* Stn 169, 37°34′ S, 179°22′ E, off East Cape, North Island, depth 1280 m. A second, doubtful record is from *Challenger* Stn 307, 269 m (see above).

Acryptolaria cf. ***longitheca*** (Allman, 1877)

(Fig. 4F, G)

Cryptolaria longitheca Allman 1877: 19-20, pl. 13, figs 4–5; Clarke 1879: 240, 244, pl. 2, figs 7-13; Fewkes 1881: 128; Stechow 1913b: 30.
Lafoea (Cryptolaria) longitheca: Bonnevie 1899: 63; Billard 1906: 178.
Oswaldaria longitheca: Stechow 1923d: 147.
Acryptolaria longitheca: Fraser 1943: 78, 90, pl. 16, fig. 5, pl. 17, fig. 5; 1944a: 212, pl. 41, fig. 192; Deevey 1954: 270; Vervoort 1968: 99; 1972: 45, fig. 12b-c.

MATERIAL EXAMINED:

NZOI Stn E640: Colony about 50 mm high, no coppiniae. RMNH-Coel. slide 2242.

TYPE LOCALITY: Double-Headed Shot Key, Florida, U.S.A., 576 m (Allman, 1877; holotype in MCZ).

REMARKS: A single colony of this mainly tropical Atlantic deep-water species was observed. The shape of the colony and of the hydrothecae is in accordance with the Atlantic material, though it is much smaller. This New Zealand material, composed of a single small, sterile colony, is therefore only doubtfully recorded; additional records are necessary for a reliable record of Pacific material.

MEASUREMENTS of *Acryptolaria* cf. *longitheca* (in μm):

	NZOI Stn E640 slide 2242	Temperate Atlantic (Vervoort 1972)
Hydrothecae		
total depth	1065 – 1195	1800 – 2080
Length adnate part	760 – 805	1050 – 1215
Length free part	370 – 565	900 – 980
Diameter at base	85 – 110	90 – 95
Diameter at rim	175 – 195	365 – 405

For a discussion of the difficulties to discriminate between this species and *Acryptolaria crassicaulis* (Allman, 1888) we refer to Vervoort (1972) and Ramil and Vervoort (1992a).

RECORDS FROM NEW ZEALAND: Raukumara Plain, east of Coromandel Peninsula, 37°15.20′ S, 176°51.20′ E, 130 m depth (doubtful record).

DISTRIBUTION: *Acryptolaria longitheca* was originally described from Double-Headed Shot Key, Florida, USA at 576 m (Allman 1877); additional records are from off Tortugas, Florida, 25°33′ N, 84°21′ W, 185 m (Clarke 1879); Dominica, 139 m, Martinique, 611 m, and Barba-dos, 188 m (Fewkes 1881); S of Florida Keys, 24°18′ N, 80°58.5′ W (given as 24°14′20″ N, 80°59′40″ W by Fraser 1944a), 593 m, and SW of Sand Key, Florida, 13°11′54″ N, 59°38′45″ W, 134 m (Fraser 1943, 1944a), and temperate Atlantic E of South Carolina, 32°24′ N, 74°21.5′ W, 4681 m (Vervoort 1972a).

Acryptolaria minima Totton, 1930

(Figs 5D–F; 6A–C, F)

Acryptolaria minima Totton 1930: 162, fig. 18a-b; Ralph 1958: 315, fig. 3e-f; Hicks *et al*. 1991: 7; Dawson 1992: 15.

MATERIAL EXAMINED:

NZOI Stns: D896, 2 colonies about 60 mm high, with some coppiniae; covered by *Folliculina* sp. 2 RMNH-Coel. slides 2294; **E864**, bushy colony, 80 mm high, no coppiniae. RMNH-Coel. slide 2193; **I15**, *Acryptolaria minima* Totton, 1930. [Slide 4178 JEW Colln].

NMNZ: BS 756, 2 colonies, 1 rather tangled, without coppiniae, and some fragments. Maximum height about 75 mm, stem polysiphonic, not thick, about 0.4 mm diameter. NMNZ Co. 741. Part as RMNH-Coel. 27629; 3 slides 3325.

NMNZ Ralph Collection: Loc. 524, NMNZ Co. 1001, fragments of larger colony, at least 50 mm high; largest fragment (forked stem) 25 mm high; 1 fragment with large coppinia. 3 RMNH-Coel. slides 3436. Reasonable slide in RSC as *Acryptolaria minima* Totton, no data.

TYPE LOCALITY: *Terra Nova* Exp., Stn 134, North Cape, New Zealand, 20–36.5 m (Totton 1930).

REMARKS: A portion of the paratype of this species is in NMNZ, bearing the following labelling: *"Acryptolaria minima* Totton, 1930, portion of Paratype, Co. 206. *Terra Nova* Stns 134 or 144, off North Cape, or Cape Maria van Diemen,1911". This is a partly dried out, unstained glycerine-jelly slide.

An unstained slide in Ralph's collection (Loc. 425) has the structure given in Ralph's (1958) figure 3e-f; in comparison to *A. gracilis* this is a compact species of which the (short) hydrothecae are closely packed and protrude even less.

In Ralph's tubed collection is also a specimen from Loc. 524, Cook Strait, Stn GUJ, 73–183 m, 23.Feb.1956, from Victoria University Zoology Department, now NMNZ Co. 1001 (also mentioned in Ralph, 1958: 315). This is a tangled colony with anastomosing branches, that must have been at least 5 cm high (exact height unknown because of crumbled condition), largest fragment a forked stem about 25 mm high. There is a coppinia on one of the branches, surrounding the branch like a socket, 8 mm long, maximal diameter 3.0 mm, gradually thickening from basal part onward, at top bifurcated (apparently as result of bifurcation of axis). Gonothecae flask-shaped, strongly adpressed, in section polygonal, at top narrowing into a short tubiform neck with circular, non-everted aperture; there are no protective tubules. Part of coppinia cut away to make slide of gonothecae. This material agrees closely with the holotype, that was received on loan (with paratypes), from the Natural History Museum, London (*Acryptolaria minima* Totton, 1930; *Terra Nova* Exped., Stn 134, North Cape, New Zealand, 20–37 m, 1929.10.10.3, 23.Sept.1996). The holotype is a 80 mm high bunch of branched stem; three main stems are attached to a flattened mass of hydrorhizal fibres, the spread is about 60 mm. There are several coppiniae on the stems, up to 20 mm long and 2.5 mm thick. Hydrothecae small and placed close together. Gonothecae in coppiniae composed of a large number of densely packed, flask-shaped bodies, hexagonal in cross section with a fairly long, slightly curved neck and slightly everted rim; some short tubes protrude from amongst the mass of gonothecae; some marsupiae are present. Three RMNH-Coel. slides 3466 from a fragment of the paratype; one is a small part removed from a coppinia.

Common to all this material are the closely packed, comparatively short, tubular hydrothecae with fairly thick perisarc; there are few collapsed hydrothecae. Variation in the length and diameter of the hydrothecae is insignificant as shown in the table of measurements. The hydrothecal rim, in all this material, is not everted and has few renovations. The distance between successive hydrothecae is also variable. The branches rapidly become polysiphonic; in the youngest branches, not yet covered by secondary tubules, the hydrothecae are slightly frontally directed.

The material from BS 756 differs from that of the remaining stations by the slightly longer hydrothecae, the greater length being principally due to the longer free hydrothecal portion. It approaches the material recorded here as *Acryptolaria* cf. *longitheca* in that hydrothecal length but differs by the packing of the hydrothecae; the material doubtfully referred to *A. longitheca* has widely spaced hydrothecae; the distance between consecutive hydrothecae being three times that found here.

RECORDS FROM NEW ZEALAND: An endemic New Zealand species, originally described from near North Cape, New Zealand (*Terra Nova* Stn 134), also found at *Terra Nova* Stn 144, off Cape Maria van Diemen, depths at those localities between 20 and 73 m. Ralph (1958) recorded the species from Cook Strait, 73–183 m depth.

MEASUREMENTS of *Acryptolaria minima* (in μm) :

	Terra Nova Stn 134 Slide 3466 Holotype	NZOI Stn D896 Slide 2294	Ralph's Loc 524 Slide 3436	NMNZ BS 756 Slide 3325
Hydrotheca, total length	715 – 825	650– 695	760 – 870	955 – 975
Length adnate adcauline wall	475 – 585	540 – 585	650 – 760	670 – 735
Length free adcauline wall	260 – 370	150 – 215	150 – 215	282 – 325
Length including renovations	505 – 585	325 – 370		
Diameter at base	85 – 110	105 – 150	110 – 235	110 – 195
Diameter at rim	175 – 195	175 – 215	175 – 240	175 – 195
Gonotheca, maximum diameter	185 – 220		205 – 220	
Length of funnel	120 – 150		110 – 150	
Diameter at rim	75 – 80		60 – 75	

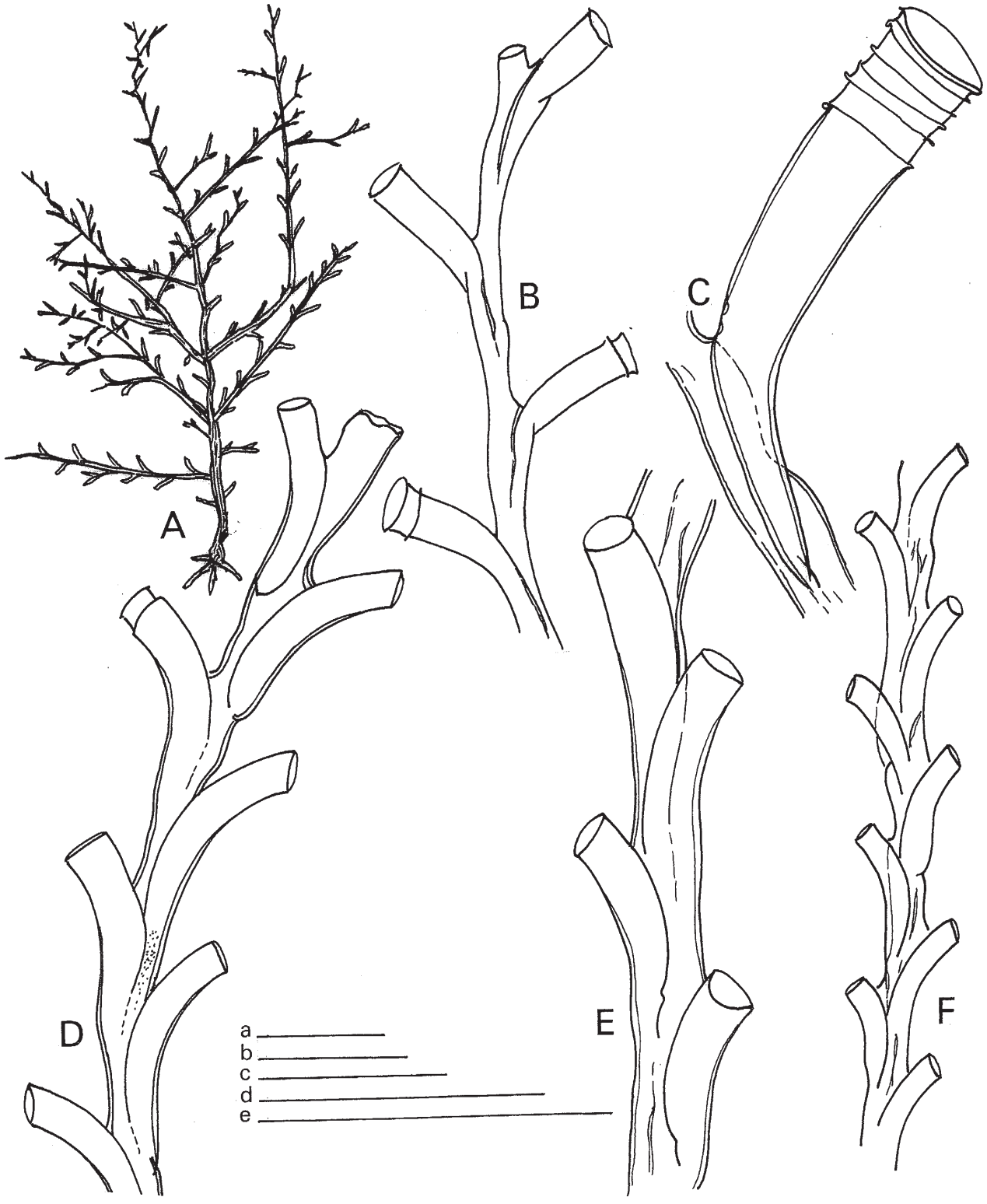

Fig. 5. A–C, ***Acryptolaria crassicaulis*** (Allman, 1888). **A**, colony, habitus. **B**, part of branch. C, hydrotheca (NZOI Stn K842, slide 2271). **D–F,** ***Acryptolaria minima*** Totton, 1930. **D**, part of branch (BS 756, slide 3325). **E, F**, parts of branches (Loc. 524, slide 3436). Scales: a, 5 mm (A); b, 1 mm (B); c, 1 mm (F); d, 1 mm (D); e, 1 mm (C, E). J.E.W.

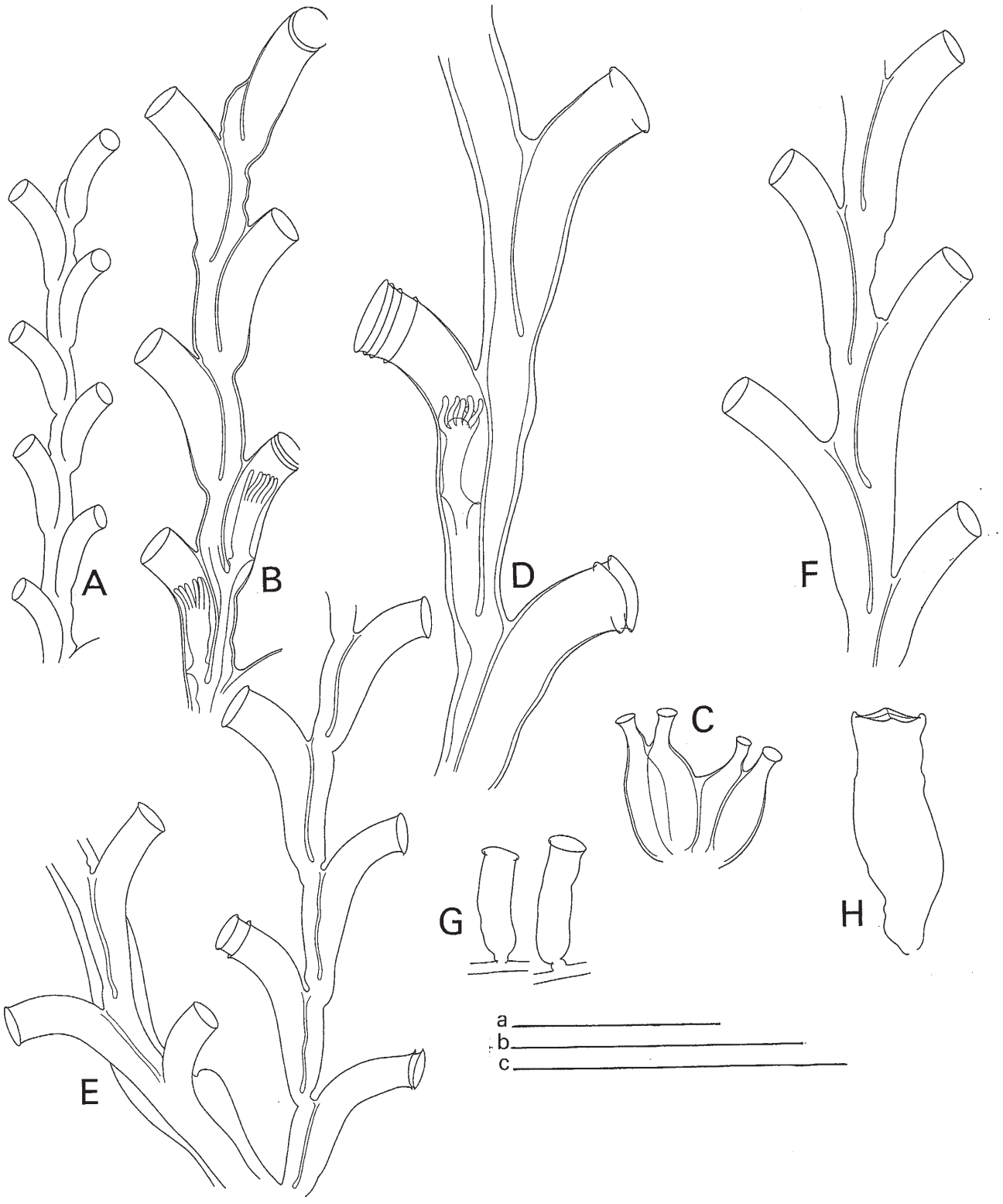

Fig. 6. A–C, F. ***Acryptolaria minima*** Totton, 1930. **A, B,** top part of branch. **C**, gonothecae (*Terra Nova* Stn 134, slide 3466). **F**, hydrothecae (BS 756, slide 3325); **D, E**. ***Acryptolaria gracilis*** (Allman, 1888). **D**, hydrothecae. **E**, part of colony (*Challenger* Stn 169, slide 3467). **G, H.** ***Hebellopsis scandens*** (Bale, 1888). **G**, hydrothecae. **H**, gonotheca (NZOI Stn 104, slide 2911). Scales: a, 2 mm (D); b, 2 mm (B, C); c, 2 mm (A, E, F, G, H). W.V.

Additional records from the Norfolk Ridge west of Three Kings Islands, from off Whananaki, and from the Chatham Islands region; depths at those localities being between 50 and 130 m.

DISTRIBUTION: Known only from New Zealand waters.

Acryptolaria patagonica El Beshbeeshy, 1991
(Fig. 7A–G)

Acryptolaria patagonica El Beshbeeshy 1991: 67-70, fig. 14.

MATERIAL EXAMINED:

NZOI Stns: D6, 8 colonies up to 40 mm high. Hydrothecae very large. 2 RMNH-Coel. slides 2813; **E719**, large colony about 60 x 70 mm, no coppiniae. In addition fragmentary colony, 60 mm high and a fragment; **I707**, 2 large colonies with strongly branched axis, up to 170 mm high and some fragments. No coppiniae. Attached to big stylasterids. 2 RMNH-Coel. slides 2886; **P946**, forked colony 60 x 70 mm, no coppiniae; twice the size of *Acryptolaria c. conferta*. RMNH-Coel. slide 2236; **U566**, 2 frag-ments about 20 mm high, on rock fragments. All in slide RMNH-Coel. slide 2927; **X484**, 3 colonies about 45 mm high and a number of fragments. RMNH-Coel. slide 2940; **X486**, big colony attached to coral fragment, about 100 mm high, very brittle and highly fragmented. No gonothecae; **X488**, 3 branched colonies attached to fragment of coral. No gono-thecae; **X514**, abundant colonies up to 150 mm high on old axis of antipatharian; no coppiniae. With *Hebella venusta* Allman, 1888 and *Filellum serratum* (Clarke, 1879). RMNH-Coel. slides 2943.

NMNZ: BS 630, irregularly branched colonies up to 80 mm high, large coppinia present on one stem. NMNZ Co. 426; 4 RMNH-Coel. slides 3439.

TYPE LOCALITY: Originally described from three localities on the Patagonian Shelf, 40°57′ S, 56°57′ W, 980 m; 43°42.7′ S, 59°34.8′ W, 680 m, and 49°32′ S, 66°30′ W, 98 m (El Beshbeeshy 1991). No type locality indicated and no holotype assigned; type series in Zoological Museum of the University of Hamburg, Germany.

DESCRIPTION (of BS 630 specimen): Colony fragment 55 mm high, branched, some branches intergrown; colony fertile. Lower stem heavily fasciculated, polysiphonic, tubes running almost to top of branches. Some colonies regularly branched, others irregularly. Hydrothecae tubular, facing forward, perisarc very thick. Margin circular, rim very slightly everted, margin replicated up to 7 times.

Coppinia on lower part of stem fragment, 250 mm long and 6.3 mm wide; gonothecae flask-shaped, closely adnate, with a simple, cylindrical neck with circular, non-everted opening.

REMARKS: The coppinia has not previously been described. Although the colony appears dead, there being no hydrothecae containing hydranths, the coppinia is packed with pale orange reproductive material, the sex of which could not be determined.

MEASUREMENTS of *Acryptolaria patagonica* (in μm):

	NMNZ BS 630 slide 3439	Patagonian Shelf (El Beshbeeshy 1991)
Hydrothecae total depth	1845 – 2060	1788 – 1902
Length adnate part	760 – 805	1050 – 1215
Length free part		
includ. renovations	975 – 1085	672 – 858
without renovations	715 – 1080	
Diameter at base	215 – 280	232 – 324
Diameter at rim	390 – 500	406 – 464
Gonotheca, maximum diameter	about 325	
Length of funnel	175 – 215	
Diameter at rim	75 – 85	

El Beshbeeshy (1991) distinguished *A. patagonica* from *A. operculata* Stepan'yants, 1979, by its forwardly facing hydrothecae and the absence of an operculum. We have examined a specimen of *A. operculata* and agree with this diagnosis.

The most significant character in this species, is the fact that the conspicuous hydrothecae are not in one plane, but point obliquely frontally. The structure of the colony, also reflected by the fragment from BS 630, is similar to that of *Acryptolaria c. conferta* (Allman, 1877) with quite irregularly branched stems and occasional fusions of branches; the ramification being roughly in one plane. The only coppina present is on the fragment; it is of the usual structure, being a closely pressed ring-shaped mass of gonothecae surrounding a stem and part of a branch. The gonothecae are flask-shaped, polygonal in cross section and apically rather abruptly narrowing into a short neck with a circular aperture. The hydrothecae are largely empty and have a crown of small bryozoans around the rim, indicating that those hydrothecae at least no longer possessed a hydranth. The gonothecae, on the contrary, are full of supposedly male sexual products. Gonothecal walls conspicuously fused, not possible to separate individual gonotheca in tease-preparation. Some of gonothecal apertures fairly long, some renovated. Between gonothecal mass no tubes but an occasional hydrotheca.

RECORDS FROM NEW ZEALAND: The present material originates from a number of deep water localities around New Zealand between 55.5°–39° S and 158.5° E–174.5° W, depths between 415 and 1060 m.

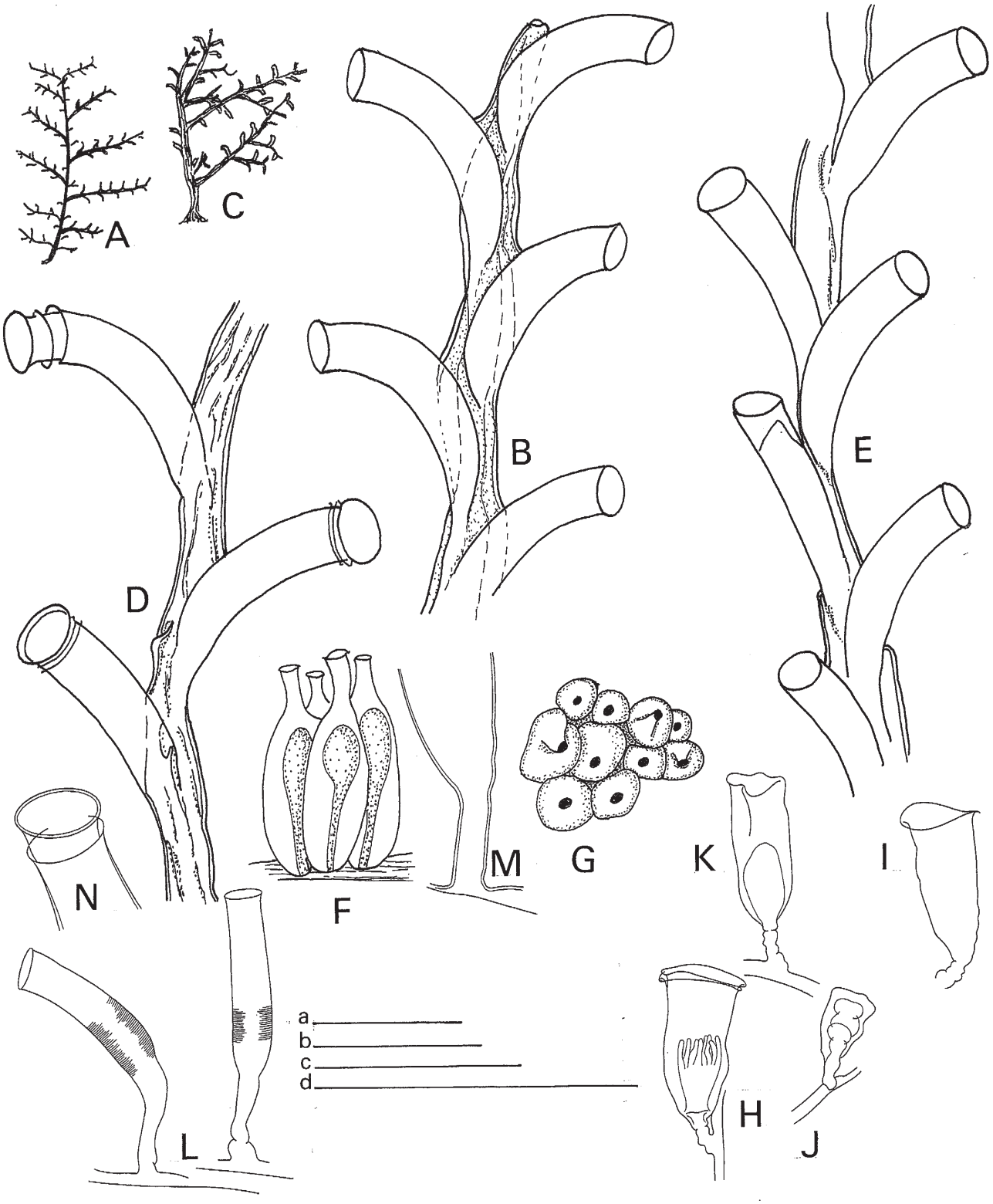

Fig. 7. A–G. ***Acryptolaria patagonica*** El Beshbeeshy, 1991. **A**, colony, habitus. **B**, top part of branch (NZOI Stn P946, slide 2236). **C**, colony, habitus. **D**, part of branch (NZOI Stn D6, slide 2813). **E**, part of branch. **F**, gonothecae, lateral view. **G**, gonothecae, view from above (BS 630, slide 3439) J.E.W. **H–K.** ***Anthohebella parasitica*** (Ciamician, 1880). **H, I**, hydrothecae. **J, K**, gonothecae (BS 679, slide 3576). **L–N.** ***Hebella striata*** Allman, 1888. **L**, hydrothecae. **M**, proximal part hydrotheca. **N**, distal part hydrotheca with renovation (NZOI Stn X514, slide 2943) W.V. Scales: a, 1 mm (B, D, E, M, N); b, 10 mm (A), 2 mm (L), 1 mm (H–K); c, 25 mm (C); d, 1 mm (F, G).

DISTRIBUTION: Previously known only from the Patagonian shelf. The species may be more widely distributed but may have been confused with *Acryptolaria c. conferta* (Allman, 1877).

Cryptolaria Busk, 1857

(= *Perisiphonia* Allman, 1888; *Eucryptolaria* Fraser, 1938c; *Euperisiphonia* Fraser, 1940a)

TYPE SPECIES: *Cryptolaria prima* Busk, 1857 by monotypy.

In this genus the following species have been considered.

Cryptolaria chazaliei (Versluys, 1899)
Cryptolaria exserta Busk, 1858
Cryptolaria pectinata (Allman, 1888)
Cryptolaria pinnata (Fraser, 1938d)
Cryptolaria prima Busk, 1857
Cryptolaria rigida (Fraser 1940a)
Cryptolaria spinosa Millard, 1980
Cryptolaria triserialis Fraser, 1913b

Lictorella adhaerens Fraser (1938b: 9, 48, pl. 11 fig. 54) was previously referred to *Cryptolaria* by Rees and Vervoort (1987: 50, 83). We have been able to study some material referred to that species by Fraser (1948: 232), collected at *Velero* Stn 1269-41, 1 mile WNW of Anacapa Island, California, 16.Mar.1941, 75–79 m (RMNH-Coel. slides 2634); this is plainly a species of *Zygophylax* Quelch, 1885a, in which genus it should stand as *Zygophylax adhaerens* (Fraser, 1938b).

Perisiphonia chazaliei Versluys (1899: 32–36, figs 2–4) was referred to *Zygophylax* by Clarke (1907: 15, pls 11–13). Versluys's very detailed description leaves no doubt that its proper place is in *Cryptolaria* Busk, 1857, where it should stand as *Cryptolaria chazaliei* (Versluys, 1899). Inspection of the syntypes (ZMA-Coel. 4104; van Soest, 1976: 81) may prove it to be identical with *Cryptolaria pectinata* (Allman, 1888); in this species both number and length of nematothecae varies greatly.

Eucryptolaria pinnata Fraser (1938d: 134, 140–141, pl. 20 fig. 9) is an ill-defined species, best placed in *Cryptolaria* Busk, 1857, where it should stand as *Cryptolaria pinnata* (Fraser, 1938d). Holotypes and paratypes are probably lost; the bottle supposed to contain these specimens being labelled: "R/V *Velero III* Sta. 792–39: Jan. 20, 1938; off Daphne Minor Island, Galápagos; 0º24'30" S, 90º22'40" W; 128–146 m; mud. Jar empty; whereabouts of specimen not known". Material may be available in BCPM (no. 976-318–1, Arai 1977).

Euperisiphonia rigida Fraser (1940a: 579, pl. 33 fig. 7) was referred to *Cryptolaria* by Rees and Vervoort (1987: 51), where it stands as *Cryptolaria rigida* (Fraser, 1940a). Though ill-defined this species shows characters of *Cryptolaria* (strong development of peripheral tubules and presence of nematothecae on those tubes) as well as of *Zygophylax* (presence of a nematotheca on the hydro-thecal pedicel). The type locality is the Yukatan Channel, 20°59'30" N, 86°23'45" W, 238 m; the type series is in NMNH (no. 43439).

Cryptolaria spinosa Millard (1980: 131, 140–142, fig. 3) though compared by Millard with *Cryptolaria exserta* Busk, 1858, in our opinion comes closest to *Cryptolaria pectinata* (Allman, 1888) in characters of the trophosome. The two species are widely different, however, in the structure of the gonotheca, that in *C. spinosa* has a short, rather wide terminal neck with a circular, everted aperture, quite different from the 'hood' observed in *C. exserta*, *C. pectinata,* and *C. prima*.

Cryptolaria triserialis Fraser (1913b: 170, pl. 3 figs 1–2); the description of this species is based on some sterile fragments, the longest 40 mm, from Durell Island, Chedabucto Bay, Canso, Nova Scotia (type locality), dredged at 37 m. The whereabouts of the type are unknown. We believe, with Stechow (1923d: 147), that this is a species of *Grammaria* Stimpson, 1854, rather than an *Acryptolaria*.

The three New Zealand species, *Acryptolaria exserta* Busk, 1858, *A. pectinata* (Allman, 1888) and *A. prima* Busk, 1857, are fully described by Ralph (1958) and from those descriptions appear easy to recognise. However, Ralph based her descriptions on a very limited material, the variability being much wider than appears from her accounts. Specimens of *A. pectinata* with nematothecae reduced in number and size, are sometimes difficult to separate from *A. exserta* (compare also Hirohito, 1995: 110). Full grown colonies of *A. prima*, by far the more ubiquitous species, present no problems, but small and developing, young specimens are occasionally quite difficult to place. Notes on the variability of the species are given below.

Cryptolaria exserta Busk, 1858

Cryptolaria exserta Busk 1858: 130, pl. 19, fig. 3; Stechow 1923d: 146; Blackburn 1942: 111; Ralph 1958: 322, figs. 5d-f, 6k; Yamada 1959: 49; Rees & Thursfield 1965: 83, 199; Rees & White 1966: 273; Hirohito 1983: 6, 19; Rees & Vervoort 1987: 48–49; Dawson 1992: 15; Hirohito 1995 (English text): 106–108, text-fig. 30a-c, pl. 6, fig. D.
Perisiphonia filicula Allman 1888: 44–45, pl. 22, figs 1–4; Ritchie 1911: 835; Smaldon *et al.* 1976: 15.
Perisiphonia exserta: Ritchie 1911: 834–837, pl. 87, fig. 3; Stechow 1913a: 144; 1913b: 12, 117; Briggs 1914: 285, 286, 290, 291; Bale 1915: 247; Jäderholm 1919: 8; Jarvis 1922: 335; Stechow 1923d: 146; Totton 1930: 162; Kramp 1947b: 8; Hodgson 1950: 1949: 12, figs 20–21.
Acryptolaria exserta: Stechow 1923b: 10; 1923d: 146.
[Not *Acryptolaria exserta* Norman 1875: 172–173, pl. 12, figs 1–2 (= *Acryptolaria andersoni* Totton, 1930)].

MATERIAL EXAMINED:

NZOI Stns: A910, colony about 100 mm high and fragments of 1 or several additional colonies. 1 stem fragment with much worn coppinia. Nematothecae almost completely absent (may be the result of damage as sample is worn and colonies full of dirt). RMNH-Coel. slide 2275; **D145**, Several colonies, about 40 mm high and some fragments. No coppiniae. RMNH-Coel. slide 2835; **D175**, fragmented colony about 100 mm high. No coppiniae; **D242**, *Cryptolaria exserta* (Busk, 1858). [Slide 4155 JEW Colln]; **E821**, several colonies up to 100 mm high, and some fragments. No coppiniae; 2 RMNH-Coel. slides 2174; **G290A**, 2 colonies, 35 and 50 mm, no coppinia. Smaller made up in RMNH-Coel. slide 2308; **G307A**, about 15 colonies, 30–60 mm high, and fragments; some coppiniae present. Some colonies as RMNH-Coel. 27733, 2 slides 3453; **Q25**, 80 mm high colony, with 1 side branch; coppiniae present on main stem.

NMNZ: T 16, probably deep water of Cook Strait: Several colonies about 60 mm high on *Antipatharia*. NMNZ Co. 390. 3 RMNH-Coel. slides 2950; **BS 630**, many colonies up to 70 mm high on sponge(!) and on other hydroids. No coppiniae. NMNZ Co. 425; **BS 697**, 2 colonies 35 and 70 mm high, without coppinia. NMNZ Co. 735. 1 colony made up in slide, RMNH-Coel. 27662, slide 3362; **BS 886**, 10 colonies, up to 100 mm high, spread 80 mm, many with coppiniae. NMNZ Co. 526.

NMNZ Ralph Collection: Loc. 173, NMNZ Co. 1030, fragments of larger colony of which only some branches and part of stem with coppinia are left. RMNH-Coel. slides 3696. 2 partly dried out slides in RSC as *Cryptolaria exserta* Johnston, no data.

TYPE LOCALITY: *Cryptolaria exserta*: Madeira; whereabouts of holotype unknown. *Cryptolaria filicula* Allman, 1888: Twofold Bay, Australia; holotype and slides of type series in NHM (no. 1888.11.13.33). For further information on type series of the two species we refer to Rees and Ver-voort (1987: 48–49).

REMARKS: Material from NZOI Stn A910 with much reduced number of nematothecae, probably as a result of wear; those that are present are cup-shaped. Free part of hydrotheca slightly longer than usually found. Development of perisarc considerable; wall of hydrothecae fairly thick, with distinct prominence at place of curvature of abcauline wall; hydrothecae occasionally with incomplete internal septum. Possibly a slightly aberrant specimen of this species.

Material from NZOI Stn E821 almost the same as that from NZOI Stn A910 but slightly less sclerotised; hydrothecal rim occasionally slightly everted. Nematothecae present in protected places, cup-shaped.

Material from NZOI Stn G290A is characterised by varied degree of sclerotisation, but hydrothecae protruding farther from peripheral fascicle of tubules, sometimes with one or two renovations. Few nematothecae.

Material from NMNZ BS 697 of *C. exserta* has the farthest protruding free hydrotheca, almost approaching the condition of *C. pectinata*. The thickening of perisarc at the place of curvature of the abcauline hydrothecal wall is considerable, though no (incomplete) hydrothecal septum has been observed.

RECORDS FROM NEW ZEALAND: The species occurs at isolated localities in deeper water around New Zealand, between 32.5° and 50.5°S and 167.5° E–176.5° W, including Cook Strait; depth distribution 159–549 m. Coppiniae have been found in January, March, and September.

DISTRIBUTION: The geographical distribution of *C. exserta* includes the Atlantic as well as the Pacific. In the Atlantic has been recorded from the Azores (Allman 1888; Rees & White 1966) and Madeira (Busk 1858); it probably also occurs in the Caribbean region. In the Pacific it has been collected in Australian waters (Ritchie 1911; Briggs 1914; Bale 1915; Blackburn 1942; Hodgson 1950) and in Japanese waters (Stechow 1913b; Yamada 1959; Hirohito 1995). Its distribution in the western Pacific is unclear.

Cryptolaria pectinata (Allman, 1888)

Perisiphonia pectinata Allman 1888: 45–46, pl. 21, figs 2, 2a, 2b; Farquhar 1896: 461; Versluys 1899: 35, 36; Pictet & Bedot 1900: 4, 18–22, 53, 55, pls 4–5; Hutton 1904: 320; Ritchie 1911: 835, 836, pl. 87, fig. 2; Totton 1930: 166; Kramp 1947b: 8–9; Hicks *et al*. 1991: 7; Stranks 1993: 7.

Acryptolaria pectinata: Stechow 1921f: 229; 1923d: 146; 1925b: 448–451, figs 20–21; Leloup 1940b: 9.

Zygophylax (Perisiphonia) pectinata Broch 1917: 13.

Cryptolaria pectinata: Ralph 1958: 320, figs 5g-j, 6g-j, 7c; Rees & Thursfield 1965: 84–85, 196; Rees & White 1966: 273–274; Millard 1973: 28; 1975: 174–175, fig. 58A–F; 1978: 191; Smaldon *et al.* 1978: 44; Millard 1980: 131; Rees & Vervoort 1987: 49–50; Vervoort 1987: 92; Park 1988: 59–61, figs 1–4; Gili *et al.* 1989b: 71, fig. 2; Cairns *et al.* 1991: 23; Park 1991: 545; Cornelius 1992b: 82 *et seq.*; Dawson 1992: 15; Park 1992: 287; Ramil & Vervoort 1992a: 52–54, fig. 10d; Álvarez-Claudio & Anadón 1995: 238; Bouillon *et al.* 1995: 51; Hirohito 1995 (English text): 109–110, text-fig. 30d-e, pl. 7, fig. A.

Lictorella reflexa Fraser 1948: 233, pl. 26, fig. 14.

MATERIAL EXAMINED:

NZOI Stns: D899, 7 colonies, up to 80 mm high, 1 forked, 2 with coppiniae on axis, 1 with coppiniae on side branches. 2 colonies as RMNH-Coel. 27729, slide 3441. Few nematothecae except for some branches; **E751,** 2 colonies with communal base, larger 60 mm high. Completely covered by fish slime;

E804, 2 fragmented colonies about 50 mm high, 1 with coppinia; **E820**, 1 colony, 18 mm high, in sample of *Cryptolaria prima* Busk, 1857. RMNH-Coel. slide 4365; **F80**, 2 branched colonies, about 100 mm high, no coppiniae. RMNH-Coel. slide 2849; **F924**, single stem with 2 side branches about 50 mm high; no coppinia; **K844**, 2 colonies, 50 and 55 mm high, larger with coppiniae; several fragments. 2 RMNH-Coel. slides 2894 of larger colony; **P34**, 10–15 colonies about 50 mm high, no coppiniae. Part as RMNH-Coel. 27728, slide 3440; **P82**, forked colony, about 80 mm high. No coppiniae; **P944**, small, 35 mm high stem, attached to stone. No coppiniae; **P946**, forked colony, 75 x 55 mm and a small colony, height 60 mm. No coppiniae; **Q135**, *Cryptolaria pectinata* (Allman, 1888). [Slide 4158 JEW Colln]; **Z2364**, 2 fragments about 25 mm long, both with coppinia. Additional fragment consisting largely of stem and coppinia. Dirty sample.

NMNZ: BS 166, 2 small colonies or colony fragments, length about 25 mm. NMNZ Co. 618; **BS 480**, branched colony, 50 x 50 mm; no coppiniae. NMNZ Co. 418. 2 RMNH-Coel. slides 2957; **BS 886(a)**, 8 colonies and colony fragments up to 80 mm high. Adult coppiniae. NMNZ Co. 525. 2 RMNH-Coel. slides 3000. 3 additional small colonies and some fragments as slides RMNH-Coel. 3450; **BS 886(b)**, 3 small colonies, about 20 mm high, basally with an actiniarian. No coppiniae. NMNZ Co. 549; **BS 886(c)**, single small colony about 40 mm high with 2 coppinia. NMNZ Co. 522; RMNH-Coel. slide 3647; **BS 894**, complete colony and several frag-ments; 1 stem with coppinia. Greatest length about 35 mm. NMNZ Co. 782; 3 RMNH-Coel. slides 3348.

NMNZ Ralph Collection: Loc. 30, NMNZ Co. 900, Completely fragmented colony; no coppinia. RMNH-Coel. slide 3597; **Loc. 507**, NMNZ Co. 1241, 2 fragments of a larger colony, 15 and 10 mm high, larger with big coppinia. Slide RMNH-Coel. 3920 of smaller fragment and part of coppinia. Partly dried out slide in RSC as *Cryptolaria pectinata* Allman, no data.

TYPE LOCALITY: *Perisiphonia pectinata*: *Challenger* Stn 169, 37°34′ S, 179°22′ E, off East Cape, New Zealand, 1280 m. Holotype in NHM (1888.11.13.34) (Allman 1888; see Rees & Vervoort, 1987: 49–50, for further details). In NMNZ there is a slide marked: "*Perisiphonia pectinata* Allman, 1888, Type BMNH. Portion of SYNTYPE, NMNZ Co. 205". This slide, in unknown mounting medium, contains two fragments of hydrocladia; it is referred to by Hicks *et al.* (1991: 7). The slide provides very little detail. *Lictorella reflexa*: Listed from a number of stations off the coast of California and in the Gulf of California; no distinct type locality being indicated. A bottle containing this species in the collection of the Santa Barbara Museum of Natural History is marked 'type' and originates from *Velero* Stn 1246–41, Ranger Bank, off Cedros Island, Mexico, 78–83 m depth. This locality is here formally indicated as the type locality.

REMARKS: NZOI Stns **F80**: Number and length of nematothecae reduced, although invariably tubiform. Hydrothecae with a considerable number of renovations and consequently projecting far beyond peripheral fascicles. **K844**: Very distinctly this species. Nematothecae tubular, occasionally of considerable length. Gonothecae with lengthened, acutely pointed hood; between the gonothecae project many, occasionally branched, accessory tubules. **P34**: Branches very thin and hydrothecae acutely curved, projecting far beyond peripheral fascicles. Number and length of nematothecae even more reduced than in Stn F80, though invariably tubiform. Hydrothecal rim with many renovations, everted.

NMNZ BS 886: Hydrothecal renovations strongly developed, occasionally as many as ten present, greatly lengthening free part of hydrotheca. Coppiniae with large bundles of strongly ramified tubules, protruding between gonothecae, some with a bifurcated, pointed apex.

RECORDS FROM NEW ZEALAND: Originally described from New Zealand (Allman, 1888, as *Perisiphonia pectinata)*. Present records show the species to occur in New Zealand waters in both deep water and shelf localities; it also extends far to the North. It has been collected between 26° and 49° S, 159° E and 177° W, at depths between 18.3 m (Dusky Sound, South Island) and 673 m (South Fiji Ridge). Coppiniae have been found in January, March, July, and October.

DISTRIBUTION: The geographical distribution includes areas in the Atlantic, Indian, and Pacific Oceans. In the Atlantic it has been recorded from various localities in deep water of the Bay of Biscay (Pictet & Bedot 1900; Álvarez-Claudio & Anadón 1995), Josephine, Seine, and Gorringe Banks (Jäderholm 1903; Leloup 1940; Kramp 1947b), Strait of Gibraltar (Ramil & Vervoort 1992a); off Tangier, Morocco (Kramp 1947b), Azores (Pictet & Bedot 1900; Rees & White 1966; Cornelius 1992b), Madeira (Stechow 1925b), and the coast of Guinea Bissau (Gili *et al.* 1989b). In the Indian Ocean it has been found off the coast of East Africa, between East London and Natal (Millard 1975, 1980). Pacific records include Korean waters (Park 1988, 1991, 1992) and Sagami Bay, Japan (Hirohito 1995). Depth records 49–1280 m.

Cryptolaria prima Busk, 1857

Cryptolaria prima Busk 1857: 173; Totton 1930: 161, 166; Ralph 1958: 322–325, figs 5a-c, 6a-f, 7a-b; Rees & Vervoort 1987: 47–48; Vervoort 1987: 92; Dawson 1992: 15.
Perisiphonia quadriseriata Trebilcock 1928: 4–6, pl. 2, fig. 2-2d; Stranks 1993: 7.

MATERIAL EXAMINED:

NZOI Stns: A431, *Cryptolaria prima* Busk, 1857 (J.E. Watson); **A433**, *Cryptolaria prima* Busk, 1857 (J.E. Watson); **A444B** (samples that have been dried out, now in alcohol and in very poor condition, marked: A 444x1, A 444x2, etc. Probably from a large sample): *Cryptolaria prima* Busk, 1857 (J.E. Watson); **B583**, single colony 55 mm high, no coppiniae.

RMNH-Coel. slide 2794; **B592**, single colony with side branch, 40 mm high, no coppiniae; **B658**,*Cryptolaria prima* Busk, 1857 [Slide 4156 JEW Colln]; **C60**, 2 colonies, about 50 mm high, and some fragments, 1 with coppinia; **C125**, *Cryptolaria prima*Busk, 1857 (J.E. Watson); **C623**, *Cryptolaria prima* Busk, 1857 (J.E. Watson); **C632**, fragments of a colony about 80 mm high, no coppiniae; **C645**, *Cryptolaria prima* Busk, 1857 (J.E. Watson); **C844**, dried out sample, containing fragments of *Cryptolaria prima* Busk, 1857; **C863**, 1 colony composed of 2 stems about 60 mm high, no coppiniae; **D100**, 1 colony, 140 mm, no coppiniae; **D114**, completely fragmented colony from dried out sample. Many coppiniae; **D127**, gear TAM: Many colonies, up to 50 mm high, basal parts with *Sertularella integra* (Allman, 1876) (with coppiniae), height about 15 mm; **D876**, large colony about 150 mm high, spread about 120 mm, in 2 parts, no coppiniae. RMNH-Coel. slide 2284; **D878**, 45 mm high fragment, no coppiniae; **D885**, 2 plumes, 1 45 mm high, other damaged. No coppiniae; **E820**, several colonies, up to 40 mm high, branched, a few with coppinia. RMNH-Coel. slide 2168; **G680**, large colony, about 270 mm high, attached to shell fragments, branched, no coppiniae. RMNH-Coel. slide 2861; **G686**, branched colony, 80 mm high, spread to 60 mm; **G707**, forked colony, about 190 mm high, no coppiniae. Stem with fish eggs; **Q35**, 1 colony about 80 mm high and a separate top part; **Q85**, *Cryptolaria prima* Busk, 1857 [Slide 4157 JEW Colln]; **Q341**, 120 mm high colony in 2 parts. Coppiniae present. 4 RMNH-Coel. slides 2918; **Q342**, single stem with coppinia, 75 mm high; **S13**, *Cryptolaria prima* Busk, 1857 (J.E. Watson); **S155**, 2 colonies on worm tube, 20 and 50 mm high. No coppiniae; **S206**, large colony, about 100 x 100 mm, composed of stem and 4 side branches. Many coppiniae, mainly on side branches, but also extending to main stem. RMNH-Coel. slide 2317.

NMNZ: ***Chiyo Maru* 2, Stn 10**, large colony composed of 2 stems with communal base, 250 mm long and sparingly branched in single plane; no coppinia. NMNZ Co. 705. 1 branch as RMNH-Coel. 27644, 3 slides 3334; **North of Kapiti** in 55 m, 5.Sept.1956, large, forked colony about 120 mm and 2 smaller unbranched stems; many coppiniae. NMNZ Co. 647; **J01/020/76**, 48°38′ S, 166°58′ E, 130 m, *James Cook*. Repeatedly forked colony, 160 mm high. No coppiniae. NMNZ Co. 488; **Kapiti Island**, 18 m, 13.Feb.1972, forked colony about 130 mm high, no coppiniae. NMNZ Co. 608; **BS 163**, small colony and a colony fragment, 20 mm long. No coppiniae. NMNZ Co. 620; **BS 180**, 2 fragments of a larger colony, no coppinia. NMNZ Co. 635; **BS 500**, 2 large, branched colonies, 200 and 130 mm high, no coppinia; several smaller colonies, also without coppiniae. NMNZ Co. 800. Smaller colonies as RMNH-Coel. 27739, slide 3477; **BS 510**, numerous colonies up to 80 mm high and many fragments; no coppiniae. NMNZ Co. 817, RMNH-Coel. slide 3495; **BS 511**, large, well branched colony, about 150 mm high, spread 120 mm. Many coppiniae. NMNZ Co. 385; **BS 512**, numerous fragments of several bigger colonies, partly attached to stones and shells; no coppiniae. NMNZ Co. 853; **BS 519**, numerous colonies up to 80 mm high, some with branched axes, branching always in single plane. Many corbulae present on hydro-cladia. With *Modeeria rotunda* (Quoy & Gaimard, 1827). NMNZ Co. 805; **BS 561**, 3 stems up to 80 mm high, no coppiniae. NMNZ Co. 677; **BS 621**, 2 colonies about 80 mm high, not branched, 1 coppinia on a hydrocladium. NMNZ Co. 474; **BS 815**, single forked colony about 100 mm high; no coppiniae. NMNZ Co. 670; **BS 840**, 3 large colonies, up to 170 mm high, with many coppiniae. NMNZ Co. 393. In addition several mutilated colonies up to 50 mm high; no coppiniae. NMNZ Co. 772. Top part of 1 stem as RMNH-Coel. 27717, slide 3417; **BS 869**, large colony, 230 mm high, spread about 150 mm, repeatedly branched in 1 plane, with many coppiniae on hydrocladia. NMNZ Co. 774. Removed one branch for RMNH-Coel. 27648, 2 slides 3339; **R.V. *Munida*, Stn 8**, 10 May 1990, numerous colonies and fragments. Many with coppiniae. Largest specimens about 200 x 200 mm, but many smaller. NMNZ Co. 542.

NMNZ Ralph Collection: Loc. 58, NMNZ Co. 917, fragments of large colony, of which largest about 40 mm. Coppinia present. Fragment and part of coppinia in RMNH-Coel. slides 3614. Unstained slide in RSC with label: *Cryptolaria prima* Busk, nematophores; **Loc. 72**, partly dried out slide in RSC as *Cryptolaria prima* (peripheral fascicle). Additional unstained slide labelled: *Cryptolaria prima*, axial tube, no further data; **Loc. 128**, NMNZ Co. 982, 3 branches without, and 1 branch with large coppinia. 2 RMNH-Coel. slides 3665. Poor, unstained slide in RSC as: *Cryptolaria prima*, axial tube main stem + also hydrocladia; no further data. Also additional Canada Balsam slide, no data. Unstained slide with label: *Cryptolaria prima*, young coppinia, no gonangiae, peripheral comm. to cover hydroth. apertures, no further data. Additional unstained slide with label: *Cryptolaria prima* Busk, axial tube, no further data; **Loc. 196**, partly dried out slide as *Cryptolaria prima* Busk, no data; **Loc. 197**, partly dried out slide in RSC as *Cryptolaria prima* Busk, no data; **Loc. 257**, NMNZ Co. 1105, about 45 mm high stem fragments with branches, many fragments of branches bearing coppiniae. RMNH-Coel. slides 3780; **Loc. 589**, NMNZ Co. 1299, frag-ments, consisting of a stem fragment with large (dirty) coppinia and some hydrocladia. RMNH-Coel. slide 3976 of 2 hydrocladia; **Loc. 623**, NMNZ Co. 1331, 2 hydrocladiate stem fragments 20 mm high, and some loose hydrocladia. No coppiniae. Part of stem fragment as RMNH-Coel. slide 4014. Unstained slide in RSC, no data.

PMBS: E. Otago, about 73 m, from Wellington to Otago, with coppiniae; trawled by R.V. *Taiaroa*. (Taken from card register).

Material Inspected: **(a)**. Mu 67-98, no further details. This rather mutilated specimen is not that figured in card register as there are no coppiniae. **(b)**. E. Otago continental shelf, probably 73–110 m, R.V. *Taiaroa*, 29–31.Jan.1951. Straw-coloured. Identified by P.M. Ralph. Looks very much like specimen on card. Carries a number of quite distinct coppiniae. RMNH-Coel. 27258, slide 2675.

Otago Museum: Iv. 770, single feather-shaped plume amongst colonies of *Symplectoscyphus subarticulatus* (Coughtrey, 1875).

Type Locality: *Cryptolaria prima*: Holotype, a dried specimen, in NHM (no. 1857.1.2.86), from an unknown New Zealand locality. *Perisiphonia quadriseriata*: Island Bay, Wellington, washed ashore; holotype ('by inference') in MOV (MVF52217, two microslide preparations, Stranks 1993: 7).

DESCRIPTION (Otago Museum specimen): Axis unbranched, side branches in 1 plane, opposite to sub-opposite, 20–30 mm long. Axis with 2 opposite rows of hydro-thecae; side branches (hydrocladia) with 4 rows of hydrothecae: 2 closely approximated rows on adcauline and 2 the same on abcauline side of hydrocladium. Hydrothecae deeply sunken, only occasionally slightly protruding from surface of hydrocladium, sometimes with renovation. No nematothecae observed, probably as a result of erosion. No coppiniae present.

RECORDS FROM NEW ZEALAND: This is a characteristic, endemic New Zealand species, widely distributed in deeper water all around New Zealand. The numerous localities specified above are from an area between 36°–51.5° S, 166° E–177° W, depths between 77 and 642 m. Ralph (1958: 324) referred to the particular abundance of this species at certain New Zealand localities and gave an estimate of the average number of planulae produced by a single colony. She mentions ripe coppiniae from the months February, July, August, September, and November. We have also seen coppiniae from material collected in January, April, June , and October.

Filellum Hincks, 1868

TYPE SPECIES: *Campanularia serpens* Hassall, 1848.

In this genus the following species have been considered.

Filellum adherens (Nutting, 1901a) [= *Lafoea adherens* Nutting, 1901a]
Filellum antarcticum (Hartlaub, 1904) [= *Lafoea antarctica* Hartlaub, 1904]
?*Filellum bouveri* Jullien, 1880
?*Filellum contortum* (Nutting, 1905) [= *Lafoëa contorta* Nutting, 1905]
Filellum disaggregatum Peña Cantero, García Carrascosa & Vervoort, 1998
Filellum parasiticum (Antsulevich, 1987) [= *Lineolaria parasitica* Antsulevich, 1987]
Filellum plicatum (Hartlaub, 1904) [= *Lafoea plicata* Hartlaub, 1904]
Filellum serpens (Hassall, 1848) [= *Campanularia serpens* Hassall, 1848]
Filellum serratum (Clarke, 1879) [= *Lafoëa serrata* Clarke, 1879]
Filellum undulatum Tang Zhican, 1998

The following species do not belong in *Filellum* but probably represent Protozoa.

Filellum expansum Levinsen, 1893
Filellum gabriellae Vannucci-Mendes, 1949
Filellum minimum García Corrales, Buencuerpo Arcas & Peinado de Diego, 1979
Reticularia annulata Watson, 1973 is an Anthoathecate.

Filellum antarcticum (Hartlaub, 1904)

Lafoea antarctica Hartlaub 1904: 11, pl. 2, fig. 2; 1905: 592; Vanhöffen 1910: 311–312, fig. 31a-c.
Reticularia antarctica: Totton 1930: 160–161, fig. 17; Briggs 1938: 26; Watson 1973: 163–164.
Filellum antarcticum: Stechow 1925b: 214; Millard 1964: 10; Naumov & Stepan'yants 1962: 74; Leloup 1974: 8; Millard 1975: 177, fig. 58g-h; Stepan'yants 1979: 49–50, pl. 8, fig. 7; El Beshbeeshy 1991: 74–76, fig. 16; Bouillon *et al.* 1995: 52; Zamponi *et al.* 1998: 12.

MATERIAL EXAMINED:
NZOI Stn I89: Many hydrothecae and two coppiniae on old hydroid stems (RMNH-Coel. slide 4768).
NMNZ: BS 480, abundant reptant colonies with coppiniae on *Symplectoscyphus subarticulatus* (Coughtrey, 1875). NMNZ Co. 417. A few fragments of host cleared in bleaching agent and later on stained (3 RMNH-Coel. slides 3469, 1 of coppinia). Additional colonies observed on *Salacia bicalycula* (Coughtrey, 1876) developing on *S. subarticulatus*; RMNH-Coel. slide 3470.

TYPE LOCALITY: Bellinghausen Sea (Hartlaub 1904). Whereabouts of holotype unknown, not in IRSNB (*fide* Bouillon *et al.* 1995).

REMARKS: The samples from NZOI Stn I89 and NMNZ BS 480 are the only specimens of *Filellum* with coppiniae; in the material from BS 480 forming compact, rounded muffs around the branches of the host, about 4 mm long and 2–2.5 mm thick. The gonothecae are exceedingly tightly packed; the 'accessory tubules' protrude between the gonothecae and form a dense and tight covering of the gonothecae, that cannot be seen from the exterior and only become visible after the coppinia has been cut into halves; they branch when becoming free from the gonothecae and fuse to form a dense 'blanket' over the gonothecal openings. Acrocysts are present in the space between gonothecae and the blanket of nematophorous tubules. The basal, adnate part of the hydrothecae of this material is longer that the free apical part.

The coppiniae from NZOI Stn I89 are characterised by delicate branching of the accessory tubules; there are no acrocysts. The structure of the coppinia agrees with the few descriptions of mature colonies of this species (Vanhöffen 1910; Millard 1975).

Coppiniae seem to be quite rare in species of *Filellum*; recent studies describe them as hermaphroditic. The coppinia of *Filellum antarcticum* differs fundamentally from that of *F. serpens* (Hassall, 1848) by the presence of a dense cover of accessory tubules enclosing all the gonothecae. Some hydrothecae may project through the blanket of tubules.

RECORDS FROM NEW ZEALAND: The present material comes from waters off Norfolk Island, 65 m depth and from Cook Strait, 5–6 miles south of Wellington Harbour, at 106–99 m depth and constitute the first records from New Zealand waters.

DISTRIBUTION: Bellinghausen Sea, Antarctica (Hartlaub 1904); additional Antarctic material originates from *Gauss* Stn, 65°21′ S, 86°06′ E, 350–400 m (Vanhöffen 1910), from off Enderby Land and Queen Mary coast, Antarctica (Naumov & Stepan'yants 1962), and from off Cape Adare, Ross Sea (Totton 1930). Subantarctic material comes from Burdwood Bank, South Atlantic (Vanhöffen 1910) and from a number of localities along the coast of southern Argentina (El Beshbeeshy 1991). Millard (1975) established the presence of *Filellum antarcticum* at Mossel Bay on the south coast of South Africa and doubtfully at the Agulhas Bank and off the coast of Natal. With the exception of Vanhöffen's and Millard's material identifications have been based on sterile specimens.

Filellum serpens (Hassall, 1848)

[Restricted bibliography, Pacific records mainly; see Cornelius (1975b, 1995a) for synonyms].

Campanularia serpens Hassall 1848: 2223.
Reticularia serpens: Verrill 1879: 17; Millard 1957: 203; Rees & Thursfield 1965: 87.
Lafoea serpens: Kramp 1911: 373, pl. 20, fig. 8.
Filellum serpens: Fraser, 1913a: 171; Billard 1914: 11–12, fig. 6; Fraser 1914a: 172, pl. 22, fig. 83; 1914b: 218, 222; Kudelin 1914: 461; Stechow 1919: 81; Fraser 1932: 51; 1935b: 144; 1936a: 125; 1937: 116–117, pl. 24, fig. 132; 1938b: 9, 47; 1938c: 110; 1938d: 134; 1939: 160 *et seq.*; 1948: 229; Leloup 1960: 220; Filatova & Barsanova 1964: 90; Naumov & Stepan'yants 1972: 34, 38; Stepan'yants 1972: 67; Vervoort 1972a: 49, fig. 13c; Cornelius 1975b: 378, fig. 32; Stepan'yants 1979: 49, pl. 8. fig. 9; Austin 1985: 56; Antsulevich 1987: 50; Wacasey & Atkinson 1987: 16 *et seq.*; Anonymous 1988: 155–156; Antsulevich 1991: 36; Cairns *et al.* 1991: 24; Watson 1994a: 66; Bouillon *et al.* 1995: 52; Cornelius 1995a: 254-256, fig. 58; Peña Cantero *et al.* 1998: 302-304.
Grammaria serpens: Kramp 1913: 20; Broch 1918: 16–17; Vervoort 1942: 287; 1946b: 194, fig. 82; Leloup 1947: 21, fig. 11; Vervoort 1959: 235, fig. 11.
Grammaria (Filellum) serpens: Broch 1927: 117, fig. 18; 1928: 63, fig. 53; Berezina 1948: 55, pl. 15, fig. 8.
Filellum serpens serpens: Naumov 1960: 281, figs 47, 170–171.
Coppinia arcta: Redier 1964: 132, 133.
Filellum ? *serpens*: Millard 1975: 177.

MATERIAL EXAMINED:

NZOI Stns: A444B, [samples that have been dried out, now in alcohol and in very poor condition, marked: A444 x 1, A444 x 2, etc. Probably from one large sample]: *Filellum* cf. *serpens* (Hassall, 1848) (J.E. Watson); **C118**, *Filellum* cf. *serpens* (Hassall, 1848) (J.E. Watson); **C633**, *Filellum* cf. *serpens* (Hassall, 1848). (J.E. Watson); **C921**, *Filellum* cf. *serpens* (Hassall, 1848) (J.E. Watson); **D874**, all over colony of *Symplectoscyphus subarticulatus* (Coughtrey, 1875); no coppiniae; **E312**, many hydrothecae on *Symplectoscyphus j. johnstoni* (Gray, 1843); no coppiniae. RMNH-Coel. slides 2117; **E759**, between bryozoans on unrecognisable hydroid stem; **E866**, on stem of *Corhiza scotiae* (Ritchie, 1907); **F143**, many hydrothecae on an unidentifiable hydroid stem; **G685**, many hydrothecae on *Salacia bicalycula* (Coughtrey, 1876) and *Symplectoscyphus subarticulatus* (Coughtrey, 1875); **G686**, isolated hydrothecae on old hydroid stem; **I14**, *Filellum* cf. *serpens* (Hassall, 1848) [Slide 4199 JEW Colln]; **J679**, many hydrothecae on stems of *Lytocarpia subdichotoma* (Ralph, 1961); **O184**, *Filellum* cf. *serpens* (Hassall, 1848). (J.E. Watson); **Q119**, *Filellum* cf. *serpens* (Hassall, 1848). (J.E. Watson); **Q135**, *Filellum* cf. *serpens* (Hassall, 1848). (J.E. Watson).

NMNZ: **Between Cape Reinga and Three Kings Is**, 28.Oct.1962, on stems of *Lytocarpia vulgaris* sp. nov. Many hydrotheca, without distinct striae on their basal (adnate) part. NMNZ Co. 1338; **BS 379**, many hydrothecae forming a dense cover on various hydroid stems. Where the hydrothecae are closely packed individual stolonal tubes cannot be distinguished; hydrothecae emerge from a brownish cover of the underlying hydroid stem. Coppiniae not observed. NMNZ Co. 556; **BS 561**, numerous hydrothecae on other hydroids, no coppiniae. NMNZ Co. 672; **BS 838**, many hydrothecae on old hydroid stems. NMNZ Co. 443; **BS 902**, on stem and hydrocladia of *Dictyocladium monilifer* (Hutton, 1873). NMNZ Co. 470; **R.V. *Munida*, Stn 8**, 45°41.85′ S, 170°58.72′ E, 10.May.1990: On stems of *Cryptolaria prima* Busk, 1857 and *Salacia bicalycula* Coughtrey, 1876.

NMNZ Ralph Collection: Loc. 419, NMNZ Co. 1204, abundant hydrothecae on *Synthecium subventricosum* Bale, 1914 and its gonothecae; smooth and perfectly hyaline.

TYPE LOCALITY: Dublin, on the Irish Sea; holotype, a herbarium specimen on *Abietinaria abietina* (L., 1758), in NHM, 1973.10.8.4 (Cornelius 1975b: 379).

REMARKS: The material listed above has not been prepared on slides (with the exception of that from NZOI Stn 312 and Ralph's collection, Loc. 419, NMNZ Co. 1204); the presence or absence of striae, therefore, could not unambiguously be recorded. As the material is infertile, it is doubtfully recorded under *Filellum serpens* (Hassall, 1848). The presence of this species in New Zealand waters is still to be proven by records of fertile colonies.

RECORDS FROM NEW ZEALAND: The difficulty of distinguishing sterile specimens of *Filellum serpens* (Hassall, 1848) from those of *F. serratum* (Clarke, 1879) makes it impossible to accurately provide distribution of the former in New Zealand waters; it probably occurs in suitable habitats (preferably stems and branches of other colonial hydroids) all around New Zealand in the same area where *F. serratum* has been recorded (32.5°–44° S, 167.5°–178.5° E). The material listed above under *Filellum serpens* has been found on *Corhiza scotiae* (Ritchie, 1907), *Lytocarpia subdichotoma* (Ralph, 1961); *L. vulgaris* sp. nov.; *Salacia bicalycula* (Coughtrey, 1876); *Symplectoscyphus j. johnstoni* (Gray, 1843); *S. subarticulatus* (Coughtrey, 1875), and *Synthecium subventricosum* Bale, 1914.

DISTRIBUTION: *Filellum serpens* is generally regarded as a cosmopolitan species. It can, however, only be recognised with certainty when fertile and thus may easily be confused with *Filellum serratum* (Clarke, 1879) and *Filellum antarcticum* (Hartlaub, 1904). It occurs on many species of hydroids and on bryozoans.

Filellum serratum (Clarke, 1879)

Lafoea serrata Clarke 1879: 242, pl. 4, fig. 25; Hartlaub 1905: 595, fig. Q[2]; Ritchie 1911: 818; Rees & White 1966: 274.
Grammaria (Filellum) serratum: Broch 1913: 10.
Filellum serratum: Stechow 1913a: 144; 1913b: 30, 111, fig. 85; Jäderholm 1919: 7; Stechow 1923b: 11; 1923d: 145; Hargitt 1924: 488; Trebilcock 1928: 4; Billard 1933: 6; Dollfus 1933: 126; Billard 1936: 3; Leloup 1937b: 5, 31; 1940b: 15; Fraser 1943: 90; 1944a: 216, pl. 44, fig. 199; Dawydoff 1952: 55; Deevey 1954: 270; Picard 1955: 193; 1958: 193; Yamada 1959: 51; Monniot 1966: 826 *et seq*.; Millard 1967: 175, fig. 2D; 1968: 253, 262; Vervoort 1968: 100; Hirohito 1969: 14; Clausade 1970: 717; Patriti 1970: 29, fig. 32; Schmidt 1972a: 42; 1972b: 1; Vervoort 1972a: 51, fig. 14a-b; Millard & Bouillon 1973: 8, 57; Leloup 1974: 8, fig. 9; Rho & Chang 1974: 137, pl. 2, figs 3–4; Millard 1975: 178, fig. 59A–C; Blanco 1976: 32, pl. 2, figs 1–3; Millard 1977b: 106; Rho 1977: 254, 415, pl. 72, fig. 65; Millard 1978: 192 *et seq*.; Por 1978: 116; García-Corrales *et al*. 1979: 10; Gravier-Bonnet 1979: 22, fig. 4D; Marinopoulos 1979: 120; Stepan'yants 1979: 50, pl. 8, figs 8A–B; Millard 1980: 131; Stepan'yants 1980: 116, 117, fig. 1; Hirohito 1983: 6, 20; Blanco 1984a: 14–15, pl. 8, fig. 20; 1984c: 261-262, fig. 7; Gili 1986: 168–169, fig. 4.14C; Izquierdo *et al*. 1986a: 84, fig. 2; Templado *et al*. 1986: 98; Antsulevich 1987: 51, fig. 12; Bandel & Wedler 1987: 39; Rees & Vervoort 1987: 39–40; Aguirrezabalaga *et al*. 1988: 227, fig. 4D–E; Altuna & García Carrascosa 1990: 54 *et seq*., fig.; Park 1990: 78; Cairns *et al*. 1991: 24; Calder 1991: 36–37, fig. 21; El Beshbeeshy 1991: 78–80, fig. 18; Park 1991: 545; Antsulevich 1992: 215; Cornelius 1992a: 257; 1992b: 98; Dawson 1992: 15; Park 1992: 287; Ramil & Vervoort 1992a: 354–355; Boero & Bouillon 1993a: 263; Branch & Williams 1993: 9, fig.; Calder 1993: 67 *et seq*.; Blanco *et al*. 1994: 15–16, figs 13–14; Altuna Prados 1995: 54; Álvarez-Claudio & Anadón 1995: 238; Bouillon *et al*. 1995: 52; Hirohito 1995 (English text): 110–112, fig. 31a-c; Park 1995: 11; Peña Cantero *et al*. 1998: 304–308, figs 1–2.
Grammaria serratum: Leloup 1938: 11.
Reticularia serrata: Ralph 1958: 312, figs 2j, 3a; Rees & Thursfield 1965; 87.

MATERIAL EXAMINED:

NZOI Stns: A746, isolated hydrothecae on *Salacia bicalycula spiralis* (Trebilcock, 1928); **B176**, reptant on several colonies of *Halecium beanii* (Johnston, 1838). RMNH-Coel. slide 2734; **B196**, reptant on a stem of *Halecium beanii* (Johnston, 1838). Basal part of hydrotheca with distinct striae.RMNH-Coel. slide 2735; **B482**, isolated hydrothecae on stems of *Halecium sessile* Norman, 1866. Striae distinctly present. RMNH-Coel. slide 2776; **C601**, covering distal portions of *Eudendrium* sp. RMNH-Coel. slide 2800 is of 1 branch of *Eudendrium* sp. with numerous hydrothecae; basal part of some hydrothecae with distinct striae; **D874**, isolated hydrothecae on *Symplectoscyphus j. johnstoni* (Gray, 1843); no coppiniae; **E108**, isolated hydrothecae on stem of *Corhiza scotiae* (Ritchie, 1907); no coppiniae. Hydrothecae big but distinctly ribbed basally; **E312**, on *Symplectoscyphus j. johnstoni* (Gray, 1843) and *Synthecium subventricosum* Bale, 1914. Hydrothecae quite hyaline; striae can only be seen under high magnification of hydrothecae in favourable position. RMNH-Coel. slide 2127; **E843**, many hydrothecae arising from stolon on unrecognisable hydroid and on bryozoans. 2 RMNH-Coel. slides 2182. Material shows great variation in size of hydrothecae; smallest and almost hyaline hydrothecae are found at end of branches. Striae not very distinct; many renovations; **J680**, with *Sertularella a. acutidentata* Billard, 1919, on stem of *Lytocarpia chiltoni* (Bale, 1924). RMNH-Coel. slide 2259; **J975**, with *Plumularia setacea* (Linnaeus, 1758) on stem of *Dictyocladium watsonae* (Vervoort, 1993a). RMNH-Coel. slide 2265; **P34**, on stem of *Dictyocladium watsonae* (Vervoort, 1993a). RMNH-Coel. 29134, 4 RMNH-Coel. slides 2228; **Q31**, on *Plumularia setacea* (Linnaeus, 1758) and *Obelia bidentata* Clarke, 1875. Hydrothecae quite hyaline; striae only visible at high magnification; 2 RMNH-Coel. slides 2320; **X488**, some hydrothecae on stalks of hydroids (*Eudendrium* ?). Hydrothecae of present specimen small and quite graceful; also dirty and as result striae distinctly visible. RMNH-Coel. slide 2942; **X514**, isolated hydrothecae, with *Hebella striata* Allman, 1888, on *Acryptolaria patagonica* El Besh-beeshy, 1991. 4 RMNH-Coel. slides 2943.

NMNZ: BS 512, fragment of *Symplectoscyphus subarticulatus* (Coughtrey, 1875) completely covered by stolons with hydrothecae. NMNZ Co. 855; **BS 519**, many hydrothecae on worm tubes and stems of hydroids; no coppiniae. NMNZ Co. 811; **BS 682**, hydrothecae on old stems of gorgonids and various other unidentifiable stems. RMNH-Coel slide 3482. Basal part of hydrotheca with distinct striae; retracted polyps present; **BS 886**, some hydrothecae on stems of *Synthecium megathecum* Billard, 1925, (RMNH-Coel. slide 3643), *Synthecium subventricosum* Bale, 1914 (RMNH-Coel. slide 3640) and *Lytocarpia subdichotoma* (Ralph, 1961) (RMNH-Coel. slide 2259); **BS 899**, isolated hydrothecae on *Dictyocladium thuja* sp. nov.; RMNH-Coel. slides 3384 and 3386.

NMNZ Ralph Collection: Loc. 450, NMNZ Co. 1220, densely covering fragments and colonies of *Symplectoscyphus j. johnstoni* (Gray, 1834). RMNH-Coel. slide 3896; **Loc. 585**, NMNZ Co. 1294, a few hydrothecae on *Dictyocladium reticulum* (Kirchenpauer, 1884). RMNH-Coel. slide 3971; **Loc. 587**, NMNZ Co. 1297, isolated hydrothecae and stolon on *Sertularella integra* Allman, 1876. Slide no. 3974; **Loc. 604**, NMNZ Co. 1313, numerous hydrothecae on *Symplectoscyphus j. johnstoni* (Gray, 1834); **Loc. 644,** NMNZ Co. 1333, isolated hydrothecae on *Sertularella integra* Allman, 1876. Island Bay, drift, on *Ecklonia*, H. Clark, 01.Aug.1957. RMNH-Coel. slide 4016.

TYPE LOCALITY: Caribbean near Havana, Cuba, depth 534 m (Clarke 1879); (holo)type in MCZ.

REMARKS: In our material the distinction between *Filellum serpens* (Hassall, 1848) and *Filellum serratum* (Clarke, 1879) has been made exclusively on the absence or presence of striae on the adnate part of the hydrothecae. Considering the degree of variation in diameter, length of free and adnate walls of the hydrothecae and striae on the fused hydrothecal wall, the presence of sterile colonies of *Filellum antarcticum* amongst material recorded here as *F. serpens* and *F. serratum*, is possible.

RECORDS FROM NEW ZEALAND: Previously recorded by Ralph (1958, as *Reticularia serrata*) from Stewart Island, Cook Strait, and Island Bay, Wellington; none of this material could be traced in Ralph's collection. Specimens of *Filellum* with striae on the basal (adnate) portion of the hydrotheca are not rare in New Zealand waters, occurring between 32.5°–44° S and 167.5°–178.5° E, at 62–944 m depth. They have been found on the following species of hydroids: *Eudendrium* sp., *Acryptolaria patagonica* El Beshbeeshy, 1992, *Dictyocladium dichotomum* Allman, 1888, *D. monilifer* (Hutton, 1873), *D. reticulum* (Kirchenpauer, 1884), *D. thuja* sp. nov., *Salacia bicalycula spiralis* (Trebilcock, 1928), *Symplectoscyphus j. johnstoni* (Gray, 1843), *S. subarticulatus* (Coughtrey, 1875), *Synthecium megathecum* Billard, 1925, *S. subventricosum* Bale, 1914, *Plumularia setacea* (Linnaeus, 1758), and *Obelia bidentata* Clarke, 1875.

DISTRIBUTION: As *Filellum serpens*, *F. serratum* is considered to be a cosmopolitan species but its proper identifications meets with the same difficulties as those discussed above for *F. serpens*.

Filellum sp. 1. (Fig. 8A, B)

MATERIAL EXAMINED:

NZOI Stn A738: completely covering *Symplectoscyphus j. johnstoni* (Gray, 1843); 2 RMNH-Coel. slides 2726.

NMNZ: BS 284, densely covering *Sertularella g. gayi* (Lamouroux, 1821). NMNZ Co. 456; 2 RMNH-Coel. slides 2974.

DESCRIPTION: Stem and branches of host covered by thick matting of partly adnate hydrorhizal tubules, completely obscuring the hydrothecae of the host. From this matting protrude the hydrothecae of *Filellum* sp. 1, differing from those of *F. serratum* by greater length of free portion, the thick perisarc and the frequent renovations; there are no striae on the adnate part of the hydrothecae. This material is dead and obscured by adhering debris and diatoms. The tubules form such a compact layer that at a first glance the presence of a bryozoan is suspected.

MEASUREMENTS of *Filellum* sp. 1 (in μm):

	NZOI Stn A738 slide 2726	NMNZ BS 284 slide 2974
Hydrotheca, diameter		
at rim	140 – 155	145 – 150
Length free part	225 – 310	365 – 1235
Length adnate part	310 – 335	250 – 310
Diameter of stolon	65 – 70	55 – 65

No coppinia were observed.

RECORDS FROM NEW ZEALAND: Recorded from Bounty Platform, 49°40.10′ S, 178°47.30′ E, 62 m (on *Symplectoscyphus j. johnstoni* (Gray, 1843)), and North Arm, Port Pegasus, Stewart Island, 46–49 m (on *Sertularella g. gayi* (Lamouroux, 1821)).

REMARKS: This material differs from that recorded as *Filellum* sp. 2 from NMNZ BS 389 and BS 834 by smaller diameter of the hydrothecae, but has almost identically matted rhizoidal tubules. There is some variation in the length of the free part of the hydrotheca; that variation is considerable in the material from BS 284.

The various species of *Filellum*, in the absence of coppiniae, are difficult and at times impossible to separate. Though the hydrothecae of all species agree in having an adnate and a free part, all vary intra- and inter-specifically in proportional length of the free part, structure of the perisarc, diameter of the hydrotheca, number of renovations, etc. Though we have been unable to trace descriptions of *Filellum* with a comparable development of the stolonal tubes we prefer not to describe this material as a new species because of absence of the coppinia. The coppinia is essential for confident specific identification of species of *Filellum*.

Filellum sp. 2 (Fig. 8C)

MATERIAL EXAMINED:

NMNZ: BS 389, on basis of *Lytocarpia chiltoni* (Bale, 1924). NMNZ Co. 503; no coppinia but basal part hydrothecae distinctly striated. RMNH-Coel. slide 3561; **BS 834,** covering stems of *Eudendrium terranovae* Watson, 1985. NMNZ Co. 747; partly in RMNH-Coel. slide 3374. Also on *Symplectoscyphus columnarius* (Briggs, 1914); 2 slides 3391, RMNH-Coel. 27691.

DESCRIPTION: This material differs from *Filellum* sp. 1 by the greater diameter of the hydrothecae, the thick and coarser perisarc, the repeated renovations, the comparatively long free part of the hydrotheca and the occasionally striated, fused basal part. They agree in the presence of a collar of partly fused stolonal tubules

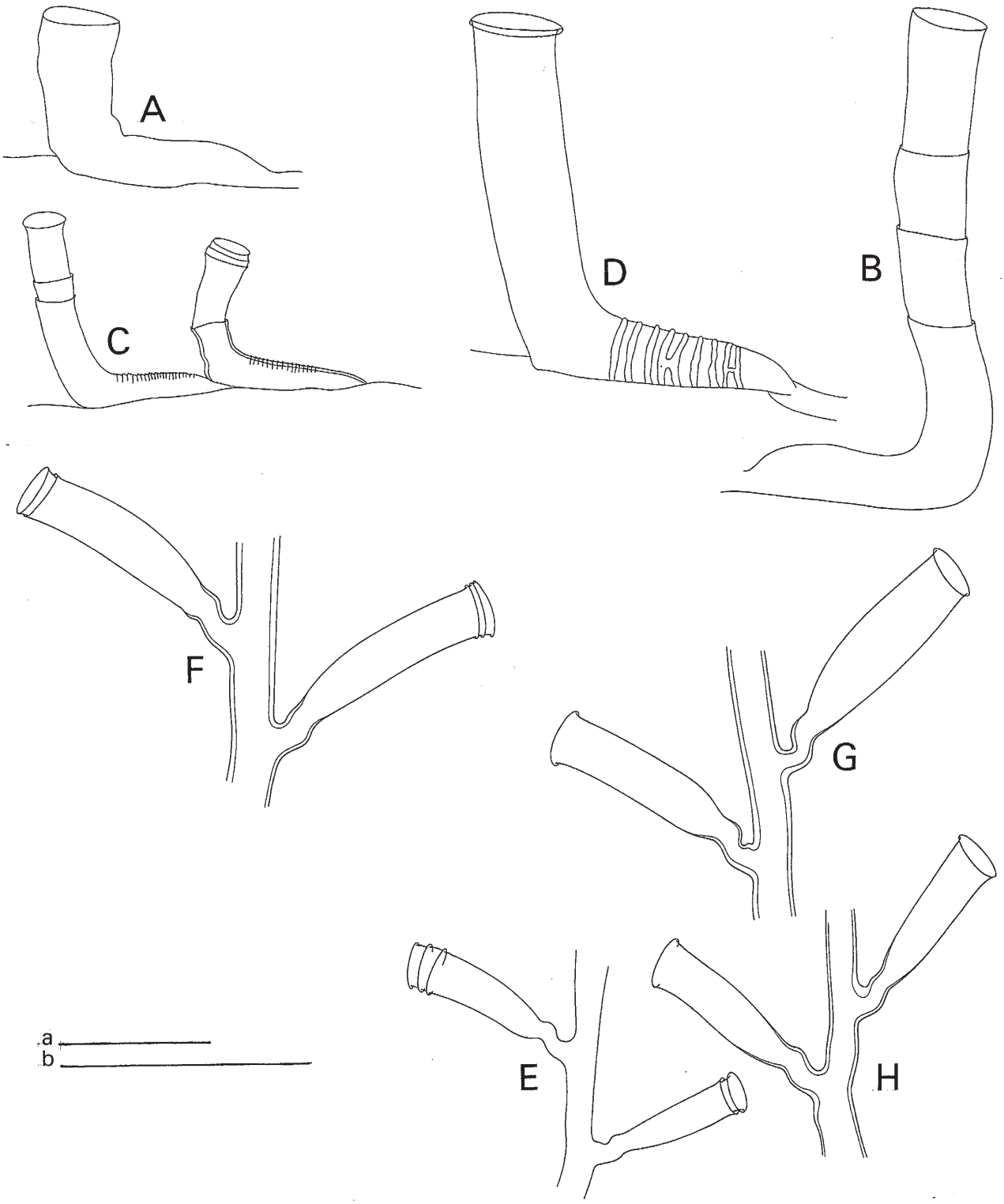

Fig. 8. A, B. ***Filellum*** sp. 1. **A**, hydrotheca (NZOI Stn A738, slide 2726). **B**, hydrotheca (BS 284, slide 2974). **C.** ***Filellum*** sp. 2, hydrothecae (BS 389, slide 3561). **D.** ***Filellum*** sp. 3, hydrotheca (BS 899, slide 3384). **E–H,** ***Lafoea dumosa*** (Fleming, 1828), parts of (monosiphonic) stem). **E**, NZOI Stn E312, slide 4357. **F**, NZOI Stn E856, slide 3446. **G**, BS 668, slide 3353. **H**, Loc. 525, slide 3933. Scales: a, 1 mm (C, E, F–H); b, 0.5 mm (A, B, D). W.V.

around stem and branches of the host. No coppiniae were seen. For reasons given above we refrain from giving a specific name to this material.

MEASUREMENTS of *Filellum* sp. 2 (in μm):

	NMNZ BS 389 slide 3561	NMNZ BS 834 slide 3391
Hydrotheca, diameter at rim	230 – 245	245 – 260
Length free part	655 – 1230	655 – 1065
Length adnate part	655 – 740	490 – 655
Diameter of stolon	165 – 195	145 – 165

RECORDS FROM NEW ZEALAND: Recorded from the Three Kings Islands region [between Palmer Rocks and Southeast Island, 82 m, on *Lytocarpia chiltoni* (Bale, 1914)] and Ranfurly Bank, 37°36.7′ S, 178°51.6′ E, 56–63 m, on *Eudendrium terranovae* Watson, 1985 and *Symplectoscyphus columnarius* (Briggs, 1914).

Filellum sp. 3 (Fig. 8D)

MATERIAL EXAMINED:

NMNZ: BS 899, hydrothecae rising from distinct, thick stolon on basal part of *Dictyocladium thuja* sp. nov. (RMNH-Coel. slide 3384).

DESCRIPTION: Large hydrothecae with free part perpendicular to adnate basal part with reticulate structure rather than ribbed (see Watson & Vervoort 2001). Free part of hydrothecae fairly uniform in length, with ruffled walls, without visible signs of renovation; rim distinctly everted, everted part thin and hyaline. Stolonal fibres thick and clearly visible.

MEASUREMENTS of *Filellum* sp. 3 (in μm):

	NMNZ BS 899 slide 3384
Hydrotheca, diameter at rim	210 – 225
Length free part	450 – 530
Length adnate part	365 – 390
Diameter of stolon	45 – 73

Lafoea Lamouroux, 1821

TYPE SPECIES: *Lafoea cornuta* Lamouroux, 1821 [= *Sertularia dumosa* Fleming, 1828].

In this genus the following species have been considered.

Lafoea adhaerens Nutting, 1905
Lafoea adnata Fraser, 1925
Lafoea arctica Stechow, 1921b
Lafoea benthophila Ritchie, 1909a
Lafoea coalescens Allman, 1877
Lafoea dumosa (Fleming, 1828) [= *Lafoea fruticosa* (M. Sars, 1850); *Lafoea gracillima* (Alder, 1856a); *Lafoea elegantula* Broch, 1903]
Lafoea gaussica Vanhöffen, 1910
Lafoea grandis Hincks, 1874
Lafoea intermedia Fraser, 1938b
Lafoea ochotensis Fenyuk, 1947
Lafoea regia Fraser, 1948
Lafoea. symmetrica Bonnevie, 1899
Lafoea weddelli Blanco, 1991

Lafoea dumosa (Fleming, 1828) (Fig. 8E–H)

[Restricted bibliography, Pacific records mainly; see Cornelius (1975b, 1995a) for synonyms.]

Sertularia dumosa Fleming, 1828: 83 (*nomen nudum*).
Campanularia dumosa Fleming, 1828: 548–549.
Campanularia fruticosa M. Sars 1850: 131, 138.
Campanularia gracillima Alder 1856a: 361, pl. 14, figs 5–6.
Lafoea capillaris G.O. Sars 1874: 115, pl. 4 figs 4–5.
Lafoea dumosa: Shidlovskii 1902: 162; Hutton 1904: 319; Linko 1911: 91–98, 241, fig. 16; Fraser 1913a: 153; 1913b: 171; Stechow 1913b: 30; Fraser 1914a: 174, pl. 23, fig. 86; Kudelin 1914: 460; Broch 1918: 7-9; Stechow 1919: 80, fig. A[1]; 1923b: 10; 1923d: 142; Broch 1927: 117, fig. 19; 1928: 64, fig. 1, 55A; Totton 1930: 158, fig. 14; Fraser 1932: 51; Broch 1933: 62; Fraser 1935b: 144; 1936a: 125; 1937: 119–120, pl. 25, fig. 137; 1938c: 110; 1939: 160 *et seq.*; Leloup 1940b: 14; Vervoort 1942: 285; Fraser 1943: 90; 1944a: 221–222, pl. 45, fig. 205, pl. 46, fig. 205; Fenyuk 1947: 3; Berezina 1948: 56, pl. 15, fig. 10; Fraser 1948: 229; Yamada 1959: 50; Leloup 1960: 221; Naumov 1960: 276-277, fig. 165; Filatova & Barsanova 1964: 18, 19; Redier 1964: 133; Ricketts & Calvin 1964: 415; Redier 1967: 389; Vervoort 1968: 100; Cornelius 1975b: 385, fig. 4 (*cum syn.*); Millard 1975: 185; 1977a: 15; 1977b: 106, 114; 1978: 195 *et seq.*; Millard 1980: 131; Hirohito 1983: 6, 21–22; Austin 1985: 56; Antsulevich 1987: 49, fig. 11B; Wacasey & Atkinson 1987: 16 *et seq.*; Cairns *et al.* 1991: 24; El Beshbeeshy 1991: 84–89, fig. 20; Dawson 1992: 16; Ramil & Vervoort 1992: 55-56; Boero & Bouillon 1993a: 263; Branch & Williams 1993: 10, fig.; Bouillon *et al.* 1995: 53–54; Cornelius 1995a: 261–263, fig. 60; Hirohito 1995 (English text): 126–128, text-fig. 36a-c, pl. 8, fig. A.
Lafoea elegantula Broch, 1903: 5-6, pl. 1, figs 5–6, pl. 2, figs 7–9.
Lafoea (?) dumosa: Ralph 1958: 310.
Lafoea gracillima: Ralph 1958: 310, figs 1y, 2a-c.

Material Examined:

NZOI Stns: A695, small colonies; no coppiniae, RMNH-Coel. slide 2707. Sample consisted largely of algae and has at some time dried out; **A696**, small colony, in RMNH-Coel. slide2711; **C440**, 5 colonies, up to 15 mm high, no coppiniae, 1 in RMNH-Coel. slide 2796; **D25**, young colonies, up to 10 mm high, on stones and shell fragments; **E312**, single about 10 mm high colony on *Synthecium subventricosum* Bale, 1914, also sepa-rate hydrothecae rising from creeping stolon, mixed with other hydroids. In RMNH-Coel. slides 2127 and 4357; **E640**, about 50 mm high colony, no coppiniae. RMNH-Coel. slide 2241; **E856**, well developed, branched colony about 40 mm high and with same spread, with coppinia. 2 RMNH-Coel. slides 3446; **Q85**, *Lafoea dumosa* (Fleming, 1828). [Slide 4181 JEW Colln]; **Q174**, 10 mm long fragment on bryozoans. All in RMNH-Coel. slide 2913; **S177**, much worn colony 120 x 50 mm; no coppiniae. Few damaged hydrothecae. Stem largely mono-siphonic, basally polysiphonic; hydrothecae fairly big. 1 RMNH-Coel. slide 3442; **W252**, Single branched, polysiphonic colony on small stone, height about 40 mm, spread 35 mm. In addition 2 monosiphonic, developing colonies on another pebble.

NMNZ: BS 668, 4 colonies, highest about 30 mm, attached to stones. Short hydrothecal pedicels and fairly big hydrothecae. NMNZ Co. 728. 1 colony as RMNH-Coel. 27653, slide 3353; **BS 899**, fragmentary colony with thick, polysiphonic stem; no coppiniae. NMNZ Co. 788. Branch as RMNH-Coel. 27685, slide 3385.

NMNZ Ralph Collection: Loc. 279, NMNZ Co. 1126, 2 fragments: a polysiphonic stem fragment, and about 50 mm upper part, no coppinia. Part of colony as RMNH-Coel. slide 3805. Unstained, partly dried out slide in RSC as *Lafoea gracillima*, no further data; **Loc. 523**, NMNZ Co. 1256, about 25 mm high colony and some fragments; no coppinia. RMNH-Coel. slide 3932 of fragment. Unstained, partly dried out slide in RSC as *Lafoea gracillima*, no further data; **Loc. 525**, NMNZ Co. 1257, 2 colonies about 5 mm high at base of colony of bryozoans. RMNH-Coel slide 3933. Unstained, partly dried out slide in RSC as *Lafoea gracillima*, no further data.

Ralph's Chatham Islands Expedition Collection: Stn 7, NMNZ Co. 1344, strongly fragmented remains of colony with only few hydrothecae left. RMNH-Coel. slide 4414.

Type Locality: *Campanularia dumosa* Fleming, 1828: Arbroath, Angas, Scotland (cf. Cornelius 1975b: 386, location of type unknown). *Campanularia fruticosa*: Lofoten, Norway (M. Sars 1850, location of type unknown). *Campanularia gracillima*: Deep water off Northumberland (Alder 1856, paratype a herbarium sheet in Hancock Museum, Newcastle-upon-Tyne, cf. Cornelius 1975b: 386–387). *Lafoea capillaris*: Oslo Fjord, (about 20 m) (G.O. Sars 1874, on *Nemertesia norvegica* (G.O. Sars, 1874); holotype most likely in Zoological Museum of the University, Oslo, Norway). *Lafoea elegantula*: North Atlantic, 74°07′ N, 19°04′ E, 90 m (Broch 1903, location of type unknown).

Remarks: We have followed Cornelius's concept in defining this species, including *Lafoea fruticosa* (M. Sars, 1850); *Lafoea gracilllima* (Alder, 1856); *Lafoea capillaria* G.O. Sars, 1874, and *Lafoea elegantula* Broch, 1903.

The only coppinia observed occurs on the material from NZOI Stn E856, Three Kings Basin, depth 1169 m, collected in April 1968. The coppinia is a muff-like structure around the main stem, about 10 mm long and 3.5 mm at its widest part, consisting of an agglomeration of many closely-set, bottle-shaped gonothecae, all or nearly all with a yellow, ball-shaped acrocyst; a few accessory tubes protrude from the mass of gonothecae, curving in various directions over the gonothecae with their acrocysts; they do not form a protective basket. Usually they are open at the end (probably as the result of damage), occasionally they terminate in a diminutive hydrotheca. Though the coppiniae of *Lafoea* are generally considered hermaphroditic there appeared to have been few, if any, male gonophores amongst the numerous female, acrocyst-bearing gonothecae.

The New Zealand material shows a certain variation in size of the hydrothecae; the hydrothecal pedicel invariably has one loose twist. The hydrotheca is slightly asymmetric as a result of the abcauline wall being weakly concave and the adcauline wall being weakly convex. There are usually one or two thecal renovations.

Records from New Zealand: The species is of regular occurrence in hauls made in sub-littoral to deep water around the New Zealand coasts, being found between 32°–54.5° S and 159°–79° E, the depth varying from 43 to 1169 m.

Distribution: Near-cosmopolitan, being widely distributed in Atlantic, Pacific, and Indian Oceans, penetrating both in arctic and antarctic regions, with a depth range from the sub-littoral zone into the deep-sea.

Lafoea gracillima (Alder, 1856)

[Restricted bibliography, Pacific records mainly; see Cornelius (1975b, 1995) for synonyms.]

Lafoea gracillima: Linko 1911: 103–110, fig. 118; Fraser 1913a: 153; Stechow 1913b: 11; Billard 1914: 10–11; Fraser 1914a: 175, pl. 24, fig. 88; Kudelin 1914: 460; Bale 1915: 255; Jäderholm 1919: 7, pl. 1, fig. 8; Stechow 1919: 81; 1923b: 10; Totton 1930: 158, fig. 15; Fraser 1937: 121–123, pl. 25, fig. 139; Briggs 1938: 25; Fraser 1944a: 224–225, pl. 46, fig. 207; Fenyuk 1947: 3; Fraser 1948: 230; Ralph 1958: 310, figs 1g, 2a-c; Yamada 1959: 50; Leloup 1960: 231; Ralph 1961d: 236; Ricketts & Calvin 1964: 415; Vervoort 1966: 125, fig. 28; Blanco 1967a: 246, 249, pl. 1, figs 1–4; Vervoort 1968: 100; Leloup 1974: 10; Wacasey & Atkinson 1987: 16 *et seq*.

Remarks: Considered conspecific with *Lafoea dumosa* (Fleming, 1828) by Cornelius (1975b); we have followed that author in this respect. The material recorded above under *Lafoea dumosa* agrees with Ralph's description of

Lafoea gracillima (Alder, 1856) in the development of the twisted pedicel. Hydrothecae without or with a short, smooth pedicel have only been observed in the material from NZOI Stn E312, arising direct from a stolon reptant on *Synthecium subventricosum* Bale, 1914.

Subfamily HEBELLINAE Fraser, 1912
Anthohebella Boero, Bouillon & Kubota, 1997

TYPE SPECIES: *Lafoea parasitica* Ciamician, 1880.

The genus, as defined by Boero *et al.* (1997) contains the following species.

Anthohebella brevitheca (Leloup, 1938)
Anthohebella najimaensis (Hirohito, 1995)
Anthohebella parasitica (Ciamician, 1880)
Anthohebella tubitheca (Millard & Bouillon, 1975)

Anthohebella parasitica (Ciamician, 1880)
(Fig. 7H–K)

Lafoea parasitica Ciamician 1880: 673, fig. 39.
Hebella parasitica: Marktanner-Turneretscher 1890: 213; Stechow 1913a: 144; 1913b: 11, 103, figs 75–78; 1919: 76; 1923b: 9; Billard 1927: 331; Leloup 1937b: 4, 28; 1938: 8, fig. 5; Picard 1952a: 347, 349; Yamada 1958: 51, 55; Picard 1958: 191; Yamada 1959: 45; Mergner & Wedler 1977: 16, pl. 2, fig. 15; García-Corrales *et al*. 1979: 16, fig. 6; Marinopoulos 1979: 120; Boero 1980: 133–136, figs 1–7; Flórez González 1983: 119; Aguirrezabalaga *et al*. 1984: 91; Bouillon 1984b: 105; Gili 1986: 172, fig. 4.27A, D; Isasi & Saiz 1986: 69; Izquierdo *et al*. 1986a: 85, fig. 3; Gibbons & Ryland 1989: 394–395, fig. 13; Bouillon *et al*. 1995: 53; Hirohito 1995 (English text): 122-123, fig. 34g-i; Medel & López-González 1996: 198; Watson 1996: 78.
Anthohebella parasitica: Boero, Bouillon & Kubota 1997: 24-25, fig. 13.
[Not *Hebella parasitica*: Vervoort & Vasseur 1977: 12–13, fig. 3 [= *Hebella dyssymetra* Billard, 1933].

MATERIAL EXAMINED:
NMNZ: BS 679, several hydrothecae and gonothecae on *Aglaophenia laxa* Allman, 1876. NMNZ Co. 840; RMNH-Coel. 27777, slides 3576.

TYPE LOCALITY: Rovinj in the northern Adriatic Sea (Ciamician 1880). Whereabouts of type unknown.

REMARKS: We have compared this material with undubitable material of this species from Cale S. Frencesc, near Blanes on the Mediterranean coast of Spain, growing on *Aglaophenia elongata* Meneghini, 1845 (RMNH-Coel. slides 1736), with which it agrees in shape and size of the hydrothecae. The few gonothecae present in the New Zealand material are quite young, as are some of the gonothecae of the Spanish material.

The development of the gonophore into a free medusa has been studied and described by Boero (1980). The mature medusa, which is about 1 mm high, is an Anthomedusa, the gonads developing on the manubrium. It has four radial canals, four perradial tentacular bulbs with tentacular rudiments and four smaller interradial bulbs without tentacular rudiments. Boero *et al.* (1997) placed this species in a separate genus *Anthohebella* Boero, Bouillon & Kubota, 1997, a thecate hydroid pro-ducing an Anthomedusa.

RECORDS FROM NEW ZEALAND: Ranfurly Bank, off East Cape, developing on *Aglaophenia laxa* Allman, 1876.

DISTRIBUTION: This species is widely distributed in tropical and subtropical parts of the Atlantic, Indian, and Pacific Oceans; it is of common occurrence in Mediterranean waters (Vervoort & Vasseur 1977). It has recently also been recorded from Fiji (Gibbons & Ryland 1989); it is recorded from the Australian west coast by Watson (1996) and has recently been found in the Beagle Gulf on the Australian north coast (Watson, in lit.). Possibly the record of this species from Moorea, French Polynesia, by Vervoort and Vasseur (1977: 12–13, fig. 3) relates to *Hebella dyssymetra* Billard, 1933, rather than to *Anthohebella parasitica*.

Hebella Allman, 1888

TYPE SPECIES: *Hebella striata* Allman, 1888.

In this genus the following species have been considered.

**Hebella costata* Bale, 1884
**Hebella costata corrugata* (Thornely, 1904) [= *H. corrugata* (Thornely, 1904)]
Hebella crateroides Ritchie, 1909b
**Hebella cylindrata* Marktanner-Turneretscher, 1890
Hebella (?) eximia Fraser, 1944a
Hebella furax Millard, 1957
**Hebella indica* Stechow, 1922
Hebella laterocaudata Billard, 1942b
**Hebella longa* Stechow, 1926
Hebella muscensis Millard & Bouillon, 1975
**Hebella parvula* (Hincks, 1853)
Hebella plana Totton, 1930
**Hebella pusilla* Stechow, 1923d
**Hebella ritchiei* Vervoort, 1959 [= *Lafoea tenellula* Ritchie, 1911]
Hebella striata Allman, 1888
**Hebella venusta* Allman, 1888
**Hebella westindica* Stechow, 1921f

Species marked * are considered doubtful in a recent review of the genus by Boero *et al.* (1997). We do not support all their conclusions as their proposed generic division is almost exclusively based on characters of the gonosome with exclusion of morphology of the trophosome.

Hebella costata corrugata (Thornely, 1904)

Campanularia corrugata Thornely 1904: 114, pl. 1, fig. 2.
Hebella corrugata: Stechow 1913a: 144; 1913b: 11, 105, figs 80–82; Broch 1914: 30, fig. 6; Jäderholm 1919: 11, pl. 2, fig. 6; Stechow 1923d: 139; Stechow & Müller 1923: 462, pl. 27, fig. 2; Hargitt 1924: 487; Trebilcock 1928: 4; Mammen 1965: 3, fig. 30; Yamada 1959: 46; Rees & Thursfield 1965: 72; Millard & Bouillon 1975: 9.
Croatella corrugata: Stechow 1923b: 9.
Scandia corrugata: Millard & Bouillon 1973: 8, 60, fig. 8D–F.
Hebella costata corrugata: Billard 1941: 15, figs 3–4.
Hebella costata (?) *corrugata*: Ralph 1958: 308–309, fig. 1v-x.

Remarks: This species was recorded from Island Bay, Wellington, by Trebilcock (1928); no new New Zealand records have been added by Ralph (1958), but a slide in RSC in NMNZ (Loc. 150, Mid-Strait Bank, Cook Strait) is identified as *Hebella costata corrugata* (Thornely, 1904); this slide, however, is so dried out that no details can be observed. A sample from the same locality in the alcohol collection contains some stems of *Symplectoscyphus j. johnstoni* (Gray, 1843) that have a few hydrothecae of a species of *Hebellopsis* Hadzi, 1913, that have smooth hydrothecal walls and are within the size range of *Hebellopsis scandens* (Bale, 1888) (RMNH-Coel. slide 3674). *Hebella corrugata* (Thornely, 1904) is a dubious species; its occurrence in New Zealand waters cannot be substantiated by material in the collections we have studied so far.

Hebella striata Allman, 1888 (Fig. 7L–N)

Hebella striata Allman 1888: 30, pl. 15, figs 3, 3a; Pictet & Bedot 1900: 12; Jäderholm 1903: 262, 275; Hartlaub 1905: 505, 506, 508, 554, 586, 587, 632, fig. K^2; Ritchie 1907a: 521, 522, 529, 530, pl. 1, fig. 7; Vanhöffen 1910: 272, 273, 313, 339; Jäderholm 1926: 4; Totton 1930: 156; Leloup 1960: 231; Rees & Thursfield 1965: 71; Vervoort 1972a: 62, fig. 17b-c; Leloup 1974: 9; Millard 1977: 14; Stepan'yants 1979: 54, pl. 9, fig. 8A–B; Boero 1980: 134; Blanco 1982: 153–154, fig. 1; El Beshbeeshy 1991: 59–62, fig. 12; Blanco 1994a: 161; 1994b: 190; Blanco *et al.* 1994: 24-26, figs 25–26; Bouillon *et al.* 1995: 53; Peña Cantero & García Carrascosa 1996: 21–22, fig. 3A–E.

Material Examined:

NZOI Stn X514: Isolated hydrothecae, with *Filellum ser ratum* (Clarke, 1879) on *Acryptolaria patagonica* (El Beshbeeshy, 1991). Both species with the host in 4 RMNH-Coel. slides 2943.

Type Locality: Port Famine, Estrecho de Magellanes, 53°38' S, 70°56' W, 18-27 m, (*Challeger* Stn 312, Allman 1888).

Remarks: Though there is some individual variation in the size of the hydrothecae they are generally larger than has previously been recorded (Vervoort 1972a: 650–960 μm; Millard 1977: 770–1100 μm; Stepan'yants 1979: 650–1000 μm; El Beshbeeshy 1991: 650–1044 μm; present material, Chatham Rise: 910–1730 μm, all measurements excluding the pedicel). The fine striation of the hydrothecal perisarc is almost lost in permanent slides.

Records from New Zealand: Deep water (940–944 m) off the Chatham Islands (first record).

Distribution: The chief area of distribution is in the seas around southern America and the adjacent (sub)antarctic seas (Vervoort 1972b; Blanco 1982; Peña Cantero & García Carrascosa 1996). The species is also known from Observatory Bay, Kerguelen (Vanhöffen 1910) and from some isolated subantarctic localities (Stepan'yants 1979).

Hebellopsis Hadzi, 1913

We have here accepted the criteria given by Calder (1991: 42) for the separation of the genera *Hebella* Allman, 1888, and *Hebellopsis* Hadzi, 1913 (type: *Hebellopsis brochii* Hadzi, 1913), the former having a perisarc ring of varied development at the bottom of the hydrotheca, the latter with a distinct and relatively thick diaphragm, demarcating hydrotheca from hydrothecal pedicel. Characters of the gonosome, unknown in many species, have been provisionally left out of consideration.

In this genus the following species have been considered.

Hebellopsis brochii (Hadzi, 1913)
**Hebellopsis communis* Calder, 1991
Hebella contorta Marktanner-Turneretscher, 1890
**Hebellopsis cylindrica* (von Lendenfeld, 1885b)
**Hebellopsis cylindrica* var. *elongata* (Billard, 1942b)
Hebellopsis dispolians (Warren, 1909) [= *Hebella thankasseriensis* Mammen, 1965]
Hebellopsis dyssymetra (Billard, 1933)
Hebellopsis dyssymetra minor (Billard, 1942b)
Hebellopsis dyssymetra monogona (Billard, 1942b)
Hebellopsis dyssymetra trigona (Billard, 1942b)
Hebellopsis dyssymetra undulata (Billard, 1942b)
**Hebellopsis expansa* (Fraser, 1938d)
**Hebellopsis hartemeyeri* (Stechow & Müller, 1923)
**Hebellopsis lata* (Pictet, 1893)
Hebellopsis scandens (Bale, 1888) [= *Hebella calcarata* auct.]
Hebellopsis sibogae Billard, 1942b.

For species with *, see the remark made under the list of species referred to *Hebella*.

Hebellopsis cylindrica (von Lendenfeld, 1885b)

Lafoea cylindrica von Lendenfeld 1885b: 912, pl. 40, figs 4–5; Farquhar 1896: 461; Hutton 1904: 319.
Hebella cylindrica: Bale 1913: 120, pl. 12, fig. 11; Jarvis 1922: 336; Stechow & Müller 1923: 462; Fraser 1944a: 206–207, pl. 39, fig. 184; Vervoort 1946a: 305; Vannucci 1951b: 115; Ralph 1958: 308, fig. 1t; De Haro 1965: 108, 109, fig. 3; Vervoort 1968: 100.
Hebellopsis cylindrica: Cairns *et al*. 1991: 24.

REMARKS: Originally described from the Bay of Islands, New Zealand, by von Lendenfeld (1885b) and since that description repeatedly mentioned in references but not actually re-discovered in New Zealand waters. The gonosome of this dubious species is unknown, the condition of the hydrothecal floor is described by von Lendenfeld as "a perforated disk, forming a ring near the base of the hydrotheca", which seems to suggest that a diaphragm was present. Bale (1913) observed that the hydrotheca of *H. cylindrica* lacks a chitinous floor at the base of the hydrotheca; he also remarked that the hydrothecae are twice the size of those of *Hebellopsis scandens* (Bale, 1888) with which it has been repeatedly synonymised. It seems best to consider *Hebellopsis cylindrica* (von Lendenfeld, 1885b) a *species incerta* and to remove its name from the list of New Zealand hydroids.

Hebellopsis scandens (Bale, 1888) (Figs 6G, H; 9A–I)

[Restricted bibliography, Pacific records mainly; see Calder (1991) and Boero *et al*. (1997) for synonyms.]

Lafoea calcarata auct. [not *Lafoea calcarata* (L. Agassiz, 1862) = *Laodicea undulata* (Forbes & Goodsir, 1851)].
Lafoea scandens Bale 1888: 758, pl. 13, figs 16–19; Stranks 1993: 7.
Hebella scandens: Hutton 1904: 319; Bale 1913: 117, pl. 12, fig. 10; Mulder & Trebilcock 1915: 54; Stechow 1919: 77, fig. Z; 1922: 146; Mammen 1965: 4, fig. 31; Rees & Thursfield 1965: 75; Vervoort 1966: 123; 1967: 31, figs 5–6; 1968: 100; Schmidt 1972a: 41; Millard & Bouillon 1974: 6; Millard 1975: 182, fig. 60F-G; Millard & Bouillon 1975: 59; Millard 1978: 193 *et seq*.; Watson 1979: 234; Boero 1980: 134; Millard 1980: 131; Gibbons & Ryland 1989: 395, fig. 14; Vervoort 1993b: 544–545; Watson 1994a: 66; Altuna Prados 1996: 53–60, figs 1-3.
Hebella Michaelseni Broch 1914: 32, text-fig. 7, pl. 1, fig. 2.
Phortis scandens: Stechow 1923d: 139.
Hebellopsis scandens: Hadzi 1925: 246; Vervoort 1941: 197; Calder 1991: 43–45, fig. 27.
Hebella spiralis Nutting 1927: 208–209, pl. 40, figs 4–6.
Hebellopsis sinuosa Vannucci-Mendes 1949: 237, pl. 2, fig. 24.
Hebella scandens var. *michaelseni*: Vervoort 1959: 238–239, fig. 13.
Hebellopsis besnardi Vannucci, 1950: 85, pl. 1, fig. 3.
Hebella urceolata Millard, 1964: 11–13, fig. 2A.

MATERIAL EXAMINED:

NZOI Stns: B238, gear DIS, on *Symplectoscyphus subarticulatus* (Coughtrey, 1875); hydrothecae slender, with many renovations. No gonothecae. RMNH-Coel. slide 2767; **B247**, hydrothecae from stolon on *Synthecium elegans* Allman, 1872, no gonothecae; diameter of hydrothecae intermediate. RMNH-Coel. slide 2768; **E820**, on stems of *Dictyocladium monilifer* (Hutton, 1873). RMNH-Coel. slides 2170; **I72**, hydrothecae arising from stolon on *Synthecium subventricosum* Bale, 1914; some gonothecae. RMNH-Coel. slide 2128; **I75**, plentiful on *Synthecium subventricosum* Bale, 1914, with *Orthopyxis affabilis* sp. nov. RMNH-Coel. slide 2095; **M763**, completely overgrowing *Synthecium elegans* Allman, 1872; no gonothecae. Diameter of hydrothecae intermediate. RMNH-Coel. slide 2896; **Q85**, *Hebellopsis scandens* (Bale, 1888). [Slide 4200 JEW Colln]; **Q104**, overgrowing *Synthecium elegans* Allman, 1872. Gonothecae present. RMNH-Coel. slide 2911.

NMNZ: BS 410, luxuriously developed colonies, completely covering *Dictyocladium monilifer* (Hutton, 1873). Many gonothecae. NMNZ Co. 637; **BS 486**, on *Dictyocladium monilifer* (Hutton, 1873); no gonothecae. NMNZ Co. 836. RMNH-Coel. slide 3514; **BS 519**, on hydrothecae of *Sertularella integra* (Allman, 1876). NMNZ Co. 807, RMNH-Coel slide 3485; **BS 621**, densely covering *Symplectoscyphus subarticulatus* (Coughtrey, 1875). Gonothecae present. Hydrothecae long and slender, with many renovations; empty gonotheca. NMNZ Co. 477. 2 RMNH-Coel. slides 2985; **BS 913**, on *Dictyocladium monilifer* (Hutton, 1873), with bryozoans. Dead and overgrown specimen; no gonothecae. Hydrothecae small, with narrow diameter. RMNH-Coel. slide 3343.

NMNZ Ralph Collection: Loc. 40, NMNZ Co. 909, on *Sertularella integra* Allman, 1876, with *Halecium delicatulum* Coughtrey, 1876a and *Orthopyxis crenata* (Hartlaub, 1901b). Hydrothecae long and slender; no gonothecae. RMNH-Coel. slides 3604; **Loc. 150**, NMNZ Co. 1010, on *Symplectoscyphus j. johnstoni* (Gray, 1843). 2 hydrothecae in RMNH-Coel. slide 3674. With hydrotheca of *Modeeria rotunda* (Quoy & Gaimard, 1827). Unstained slide in RSC as *Stegopoma fastigiatum* (Alder) with *Sertularella* and *Hebella*, no data. Also partly dried out slide as *Hebella calcarata* var. *contorta* (?), with data: Cooks Bank; **Loc. 188**, NMNZ Co. 1043, on *Synthecium elegans* Allman, 1872, fresh sample with well preserved hydranths; no gono-thecae. RMNH-Coel. slide 3710; **Loc. 205**, NMNZ Co. 1054, single hydrotheca on *Sertularella integra* Allman, 1876. No slide; **Loc. 265**, partly dried out slide in RSC as *Hebella calcarata* (L. Agassiz), no data; **Loc. 453**, NMNZ Co. 1221, on stem of *Synthecium elegans* Allman, 1872, no gonothecae. RMNH-Coel slide 3897. Partly dried out slide in RSC as *Hebella calcarata* (Agassiz), no data; **Loc. 475**, NMNZ Co. 1224, overgrowing *Synthecium elegans* Allman, 1872. Hydrothecae with retracted polyps. No polyps in hydrothecae of host; **Loc. 476**, NMNZ Co. 1225, plentiful on *Synthecium elegans* Allman, 1872. RMNH-Coel. slide 3901. Good, unstained slide in RSC as *Hebella calcarata*, no data; **Loc. 479**, NMNZ Co. 1228, on about 10 mm high fragment of *Synthecium subventricosum* (Bale, 1914); no gonothecae. Dead specimen with empty gonothecae.

RMNH-Coel. slide 3905; **Loc. 522**, NMNZ Co. 1255, small colonies on *Sertularella integra* Allman, 1876, *Symplectoscyphus j. johnstoni* (Gray, 1843), and *Dictyocladium monilifer* (Hutton, 1873), with hydranths. 2 RMNH-Coel. slides 3931. 2 unstained, partly dried out slides in RSC as *Hebella calcarata*, no data; **Loc. 545**, NMNZ Co. 1263, covering hydrocladia of *Synthecium elegans* Allman, 1872; 1 empty gonotheca. Fresh sample with polyps of both species. RMNH-Coel. slide 3938; **Loc. 573**, NMNZ Co. 1282, some hydrothecae on *Synthecium elegans* Allman, 1872; no gonothecae. Poorly preserved sample, no polyps. RMNH-Coel. slide 3960; **Loc. 579**, NMNZ Co. no. 1288, hydrothecae with hydranths arising from stolon on *Sertu-larella integra* Allman, 1876. RMNH-Coel. slide 3966; **Loc. 581**, NMNZ Co. 1290, on stem fragments of *Sertularella integra* Allman, 1876. No gonothecae. RMNH-Coel. slide 3967; **Loc. 593**, NMNZ Co. 1303, on *Synthecium megathecum* Billard, 1925, no gonothecae. RMNH-Coel. slide 3981.

Ralph's Chatham Islands Expedition Collection: Stn 3, a few hydrothecae from a stolon creeping on *Sertularella* sp. No slide. NMNZ Co. 1349.

Otago Museum, Dunedin: **Iv. 763**. A.52:49: Numerous hydrothecae and many gonothecae from stolon on *Synthecium elegans* Allman, 1872, completely covering that species. RMNH-Coel. slide 2657. Also numerous hydrothecae completely covering *Symplectoscyphus subarticulatus* (Coughtrey, 1875). RMNH-Coel. 27239, slide 2656. With *Orthopyxis mollis* (Stechow, 1919).

Additional Material: **Doubtful Sound**, 12 m, 11.April. 1994, leg. J.E. Watson: Hydrothecae from stolon reptant on *Salacia buskii* (Allman, 1876); no gonothecae observed (RMNH-Coel. 27857, slide 4037).

Type Locality: *Lafoea scandens*: Port Stephens and Port Jackson, New South Wales, on *Sertularella divaricata* var. *subdichotoma* Bale, 1888 [= *Symplectoscyphus pseudo-divaricatus* Ralph, 1961 ?] (Bale, 1888; no depth record, two probable syntypes in MOV, MVF58759, are labelled "New South Wales, Port Stephens" (Stranks 1993: 7), this locality here formally indicated as the type locality). *Hebella michaelseni*: off Angola, 11–17 m, on *Sertularella polyzonias* (Linnaeus, 1758) (Broch 1914, whereabouts of type unknown). *Hebella spiralis*: Philippine seas, 10°44'45" N, 125°12'30" E, 488 m. on sertularian hydroid (Nutting 1927, type in NMNH, 42175); *Hebellopsis sinuosa*: Ilha do Francês, Brazil, on *Sertularia marginata* Kirchen-pauer, 1864 (Vannucci-Mendes 1949, no depth record, holotype lost). *Hebellopsis besnardi*: Banco Jaseur, Brazil, on *Dynamena quadridentata* (Ellis & Solander, 1786) (Vannucci 1950, no depth record, holotype lost). See Migotto (1996) for details on *H. sinuosa* and *H. besnardi*). *Hebella urceolata*: Agulhas Bank, off south coast of South Africa, 34°03' S, 25°59' E, 84 m, on *Halecium beanii* (Johnston, 1838) (Millard 1964, holotype in SAM-H410).

Remarks: There is considerable variability in the shape of the hydrothecae and development of the perisarc in this species. The hydrothecal outline may vary between perfectly cylindrical with a rounded base, curving gracefully towards the short pedicel, and roughly cylindrical with very irregular outline, occasionally accentuated by development of many irregularly placed thecal renovations. Some colonies have transparent perisarc, in others it may be quite opaque. The diameter of the hydrothecae varies considerably, even in the same colony: some hydrothecae are fairly wide and short, others, usually but not exclusively in other colonies, have a diameter of about half that size and are distinctly tubiform. We have referred all these forms to the same species as there are no differences in the shape of the gonothecae. These have been observed in May, June, July, September, October, and November.

The species grows preferably on species of *Synthecium* (*S. elegans* Allman, 1872, *S. megathecum* Billard, 1925, and *S. subventricosum* Bale, 1914) and *Symplectoscyphus* [*S. j. johnstoni* (Gray, 1843) and *S. subarticulatus* (Coughtrey, 1875)], but it also occurs on *Dictyocladium monilifer* (Hutton, 1873), *Salacia bicalycula* (Coughtrey, 1876a) and *Sertularella integra* Allman, 1876. The life history of this species has recently been elucidated by Altuna Prados (1996). The gonophores liberate small, hemispherical medusae, that could not be reared to full sexual maturity, developed four radial canals and reached a size of about 1.2 mm height of the exumbrella, the exterior being covered with small warts and uniformly distributed microbasic mastigophores. They developed four perradial bulbs, three of which bear a tentacle; in addition there are four interradial, atentaculate bulbs and four adaxial ocelli. The short manubrium has a four-lipped mouth. Gonads started to develop along the radial canals.

The colonies from NZOI Stn E820 all have cylindrical hydrothecae that are within the size range of specimens recorded above, but the (single) gonotheca of these specimens is slightly aberrant, being conical with a flattened top and containing three developing medusa buds. It was, however, in a slide and may have been slightly compressed by pressure of the cover glass. There is, nevertheless, definitely no four-pointed terminal part with four triangular opercular flaps as normally observed in *Hebellopsis scandens*.

Records from New Zealand: On suitable habitats (usually other hydroids) all around New Zealand; its presence has been established between 29° and 46.5° S and 168°–174.5° E, depth range 0–340 m, but its range is probably more extended.

Distribution: Circumglobal in temperate, subtropical and tropical areas of Atlantic, Indian, and Pacific Oceans.

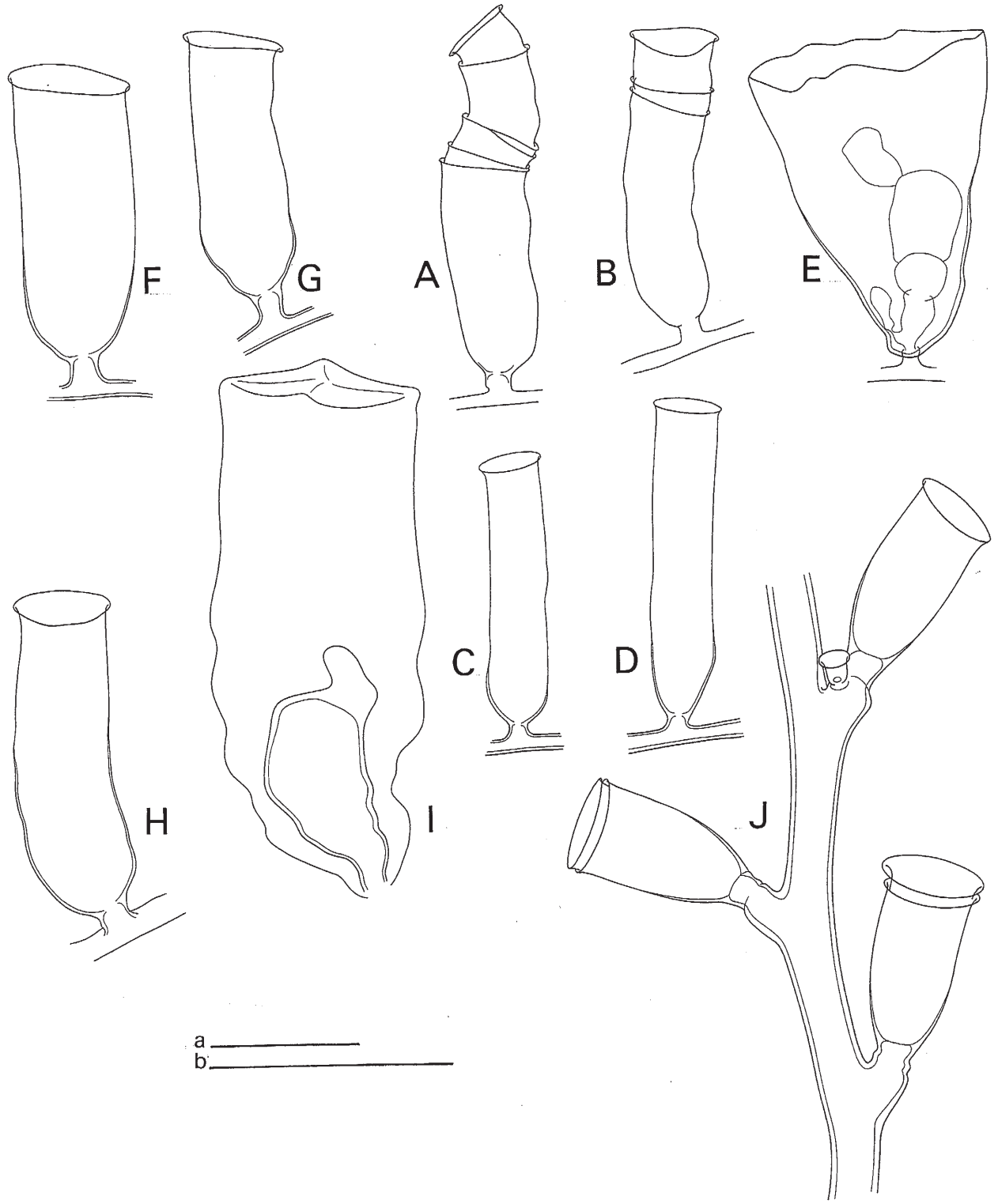

Fig. 9. A–I. ***Hebellopsis scandens*** (Bale, 1888). **A**, **B**, hydrothecae (NZOI Stn B238, slide 2767). **C**, **D**, hydrothecae. **E**, mature gonotheca (NZOI B247, slide 2170). **F**, **G**, hydrothecae (Loc. 479, slide 3905). **H**, hydrotheca. **I**, gonothecae with developing gonophore (Loc. 545, slide 3938). **J.** ***Zygophylax antipathes*** (Lamarck, 1816), part of monosiphonic branch with hydrothecae and a nematotheca (NZOI Stn P84, slide 2904). Scales: a, 1 mm (A, B, F–J); b, 0.5 mm (C–E). W.V.

Subfamily ZYGOPHYLACINAE Quelch, 1885a
Zygophylax Quelch, 1885a

TYPE SPECIES: *Zygophylax profundus* Quelch, 1885a, by monotypy.

Alhough Quelch, by naming the type species *Zygophylax profunda*, conceived the genus as being of feminine gender it is, in fact, masculine by reasons of the International Code for Zoological Nomenclature, being derived from a Greek word with the ending "lax".

In this genus the following species have been considered. (* = present name and/or generic designation)

Zygophylax abyssicolus (Stechow, 1926), gonosome described by Stechow (1926)
Zygophylax adhaerens (Fraser, 1938a), gonosome unknown (see remark on page 53)
Zygophylax africanus Stechow, 1923c, gonosome described by Millard (1975)
Zygophylax antipathes (Lamarck, 1816), gonosome described by Rees and Vervoort (1987)
Zygophylax arborescens (Leloup, 1931), gonosome described by Leloup (1931, 1932)
Zygophylax armatus (Ritchie, 1907a), gonosome described by Ritchie (1907a), and Millard (1980)
Zygophylax bathyphilus Leloup, 1940b, gonosome unknown
Zygophylax biarmatus Billard, 1905a [= *Z. inconstans* Millard, 1977b; *Z. halecioides* var. *annellatus* (Pictet & Bedot, 1900)], gonosome described by Broch (1918) and Ramil and Vervoort (1992a)
Zygophylax bifurcatus Billard, 1942, gonosome described by Rees and Vervoort (1987)
Zygophylax brevitheca Jäderholm, 1919, gonosome unknown
Zygophylax brevitheca var. *sibogae* Billard, 1942a, gonosome described by Billard (1942a)
Zygophylax brownei Billard, 1924a, gonosome described by Millard (1977b)
Zygophylax carolina (Fraser, 1911), gonosome unknown
Zygophylax cervicornis Nutting, 1905, gonosome described by Nutting (1905)
Zygophylax concinnus (Ritchie, 1911), gonosome described by Briggs (1922)
Zygophylax convallaria (Allman, 1877), gonosome described by Clarke (1879), Vervoort (1972a), and Hirohito (1995)
Zygophylax crassicaulis (Fraser, 1943), gonosome unknown
Zygophylax crassitheca Fraser, 1941, gonosome unknown
Zygophylax crozetensis Millard, 1977a, gonosome described by Millard (1977a)
Zygophylax curvitheca (Stechow, 1913a), gonosome described by Nutting (1927), and Hirohito (1995)
Zygophylax cyathiferus (Allman, 1888), gonosome described by Rees and Vervoort (1987)
Zygophylax echinatus Calder & Vervoort, 1998, gonosome described by Calder and Vervoort (1998)
Zygophylax elegans (Fewkes, 1881), insufficiently described species with known holotype
Zygophylax elegantulus Leloup, 1940b [= **Z. levinseni* (Saemundsson, 1911)]
Zygophylax elongatus Ramil & Vervoort, 1992, gonosome described by Ramil and Vervoort (1992a)
Zygophylax flexilis (Pictet & Bedot, 1900) [= **Lafoea dumosa* (Fleming, 1828)]
Zygophylax geminocarpa Millard, 1958, gonosome described by Millard (1958, 1975)
Zygophylax geniculatus (Clarke, 1894), gonosome unknown
Zygophylax halecioides var. *annellatus* Pictet & Bedot, 1900 [= **Z. biarmatus* Billard, 1905a]
Zygophylax inconstans Millard, 1977b [=**Zygophylax biarmatus* Billard, 1905a]
Zygophylax infundibulum Millard, 1958, gonosome described by Millard (1980)
Zygophylax junceoides Borradaile, 1905, questionable species
Zygophylax leloupi Ramil & Vervoort, 1992, gonosome described by Ramil and Vervoort (1992a)
Zygophylax levinseni (Saemundsson, 1911) [= *Z. elegantulus* Leloup, 1940b], gonosome described by Ramil and Vervoort (1992a)
Zygophylax millardae Rees & Vervoort, 1987, gonosome unknown
Zygophylax pacificus Stechow, 1920, gonosome described by Hirohito (1983, 1995)
Zygophylax pinnatus (G.O. Sars, 1874) [= *Z. halecioides* (Allman, 1874a)], gonosome described by Bonnevie (1899) and Broch (1909b)
Zygophylax profundus Quelch, 1885a, gonosome unknown, for synonymy see Ramil and Vervoort (1992a: 59, under *Z. biarmata* Billard, 1905a)
Zygophylax rectus Jarvis, 1922, badly described species with unknown gonosome
Zygophylax reflexus (Fraser, 1948) [*Lictorella reflexa* Fraser, 1948 = **Cryptolaria pectinata* (Allman, 1888)]
Zygophylax rigidus Fraser, 1948, gonosome described by Fraser (1948)
Zygophylax robustus (Verrill, 1873), imperfectly known species with designated neotype (see Rees & Vervoort 1987: 54), gonosome unknown
Zygophylax rufa (Bale, 1884), gonosome described by Vervoort and Vasseur (1977)
Zygophylax sagamiensis Hirohito, 1983, gonosome described by Hirohito (1983, 1995)
Zygophylax sibogae Billard, 1918, gonosome described by Hirohito (1983, 1995)
Zygophylax stechowi (Jäderholm, 1919), gonosome described by Hirohito (1995)
Zygophylax thyroscyphiformis (Marktanner-Turneretscher, 1890), questionable species with unknown gonosome
Zygophylax tizardensis Kirkpatrick, 1890b, gonosome described by Hirohito (1983, 1995)
Zygophylax tottoni Rees & Vervoort, 1987, gonosome unknown
Zygophylax unilateralis Totton, 1930, gonosome described by Rees and Vervoort (1987)
Zygophylax valdiviae Stechow, 1923, gonosome unknown

For a discussion of the synonymy of the various species see Rees and Vervoort (1987), and Ramil and Vervoort (1992a).

The part of the hydrotheca below the diaphragm is usually referred to in this genus as the hydrothecal pedicel. This is ambiguous as in other genera of thecate

hydroids with a distinct diaphragm, as for instance the Campanulariidae, that basal portion is named 'basal chamber' and considered an integral part of the hydrotheca. Moreover, there are species of *Zygophylax* with a distinct pedicel, as e.g., *Zygophylax binematophoratus* sp. nov. where a distinct pedicel composed of one or more internodes, separates the hydrotheca (with its basal chamber) from the apophysis.

Zygophylax antipathes (Lamarck, 1816) (Fig. 9J)

Sertularia antipathes Lamarck, 1816:
Zygophylax antipathes: Gravier-Bonnet 1987: 49, fig. 7.3; Rees & Vervoort 1987: 53, fig. 12d (*cum syn.*); Vervoort 1987: 91; Watson 1996: 78.
Zygophylax anthipathes: Bouillon *et al*. 1995: 54 (incorrect subsequent spelling).

MATERIAL EXAMINED:

NZOI Stns: P84, top part of a colony about 20 mm high, no coppiniae. All in RMNH-Coel. slide 2904; **P114**, single colony about 55 mm high with small coppinia at base of a small branch.

TYPE LOCALITY: "Australie" (no further details, Lamarck (1816)). See van Praët (1979) and Rees and Vervoort (1987) for details concerning the type series.

REMARKS: We have, for the time being, maintained the distinction between *Zygophylax antipathes* (Lamarck, 1816) and *Zygophylax rufa* (Bale, 1884) on account of differences in the structure of the coppinia and shape of the gonothecae, the general size difference (colony and hydrothecae), and general structure (colour and mode of branching) of the adult colonies (see Vervoort & Vasseur 1977).

MEASUREMENTS of *Zygophylax antipathes* (in μm):

	Zygophylax antipathes NZOI Stn P84 slide 2904	*Zygophylax rufa* Takapoto Vervoort & Vasseur (1977)
Diameter of branch (stem) at base	265	270 – 300
Hydrotheca, length*	260 – 320	255 – 295
Diameter at rim	125 – 160	120 – 135
Diameter at diaphragm	45 – 55	75 – 80
Pedicel, length*	30 – 45	160 – 205
Diameter at apophysis	35 – 60	65 – 80
Nematotheca, length	50 – 55	60 – 70
Diameter at rim	30 – 35	35 – 40

* The diaphragm is considered here to separate hydrotheca from pedicel.

RECORDS FROM NEW ZEALAND: The present record is from the Tasman Sea, near Lord Howe Island, 59 m depth.

DISTRIBUTION: Off Somerset, Cape York, Torres Strait, 15–22 m (Allman, 1888, as *Lictorella halecioides*); off Port Jackson and off Wata Mooli, coast of New South Wales, Australia, 66–95 m, (Ritchie 1911); Pearson Island, southern Australia, 18–45 m (Watson 1973); Australian west Coast (Watson 1996); Maldive and Laccadive Archipelago (Borradaile (1905) as *Lictorella halecioides*); deeper waters (174–298 m) around the Hawaiian Islands (Nutting (1905) as *Lictorella halecioides*); Izu Ôshima and Niijima, South of Sagami Bay, Japan, 23–92 m (Hirohito 1983); Gulf of Tongking, Viet-Nam, and Ream, Gulf of Siam, Cambodia, 10 m (Leloup 1937b). Possibly also Amirante, Seychelles (Millard & Bouillon 1973), no depth record.

Zygophylax binematophoratus sp. nov. (Fig. 10A–C)

MATERIAL EXAMINED:

NMNZ: BS 911, repeatedly branched colony about 120 mm high, no coppiniae (holotype, NMNZ Co. 403). 2 RMNH-Coel. slides 2955 (part of type series).

TYPE LOCALITY: 34°20.2′ S, 172°21.8′ E, SE of Three Kings Islands, 121 m.

DESCRIPTION (of holotype): Colony with distinct, strongly branched main axis, branches, secondary and lower order branches all in one plane, sub-opposite, all strongly polysiphonic, only terminal portions of ramifications monosiphonic; in those terminal parts division into internodes by means of distinct, transverse nodes is visible. Internodes with 1 or 2 apophyses, supporting hydrocladia or hydrothecae. Hydrocladia rapidly becoming branched by apposition of secondary tubes. Apophyses supporting hydrocladia with axillary hydrotheca placed on conspicuous protuberance and with 1 nematotheca on frontal side of colony; 1 hydrotheca between 2 (sub-opposite) hydrocladia (branches) on same side. Apophyses rapidly submerged by development of accessory tubules. Apophyses supporting hydrotheca in one plane with hydrocladia and branches, pointing obliquely upwards and laterally; hydrothecae directed laterally under an angle of about 45°.

Hydrothecae pedicellate, pedicel usually composed of a single, short internode, but sometimes up to 5 may be present. Hydrotheca tubular, slightly to distinctly asymmetric; both ad- and abcauline walls slightly convex at about half length. Adcauline wall occasionally with slightly increased tumescence, this combined with a slight tilt of the aperture in adcauline direction may give hydrotheca a striking, weakly S-shaped appearance.

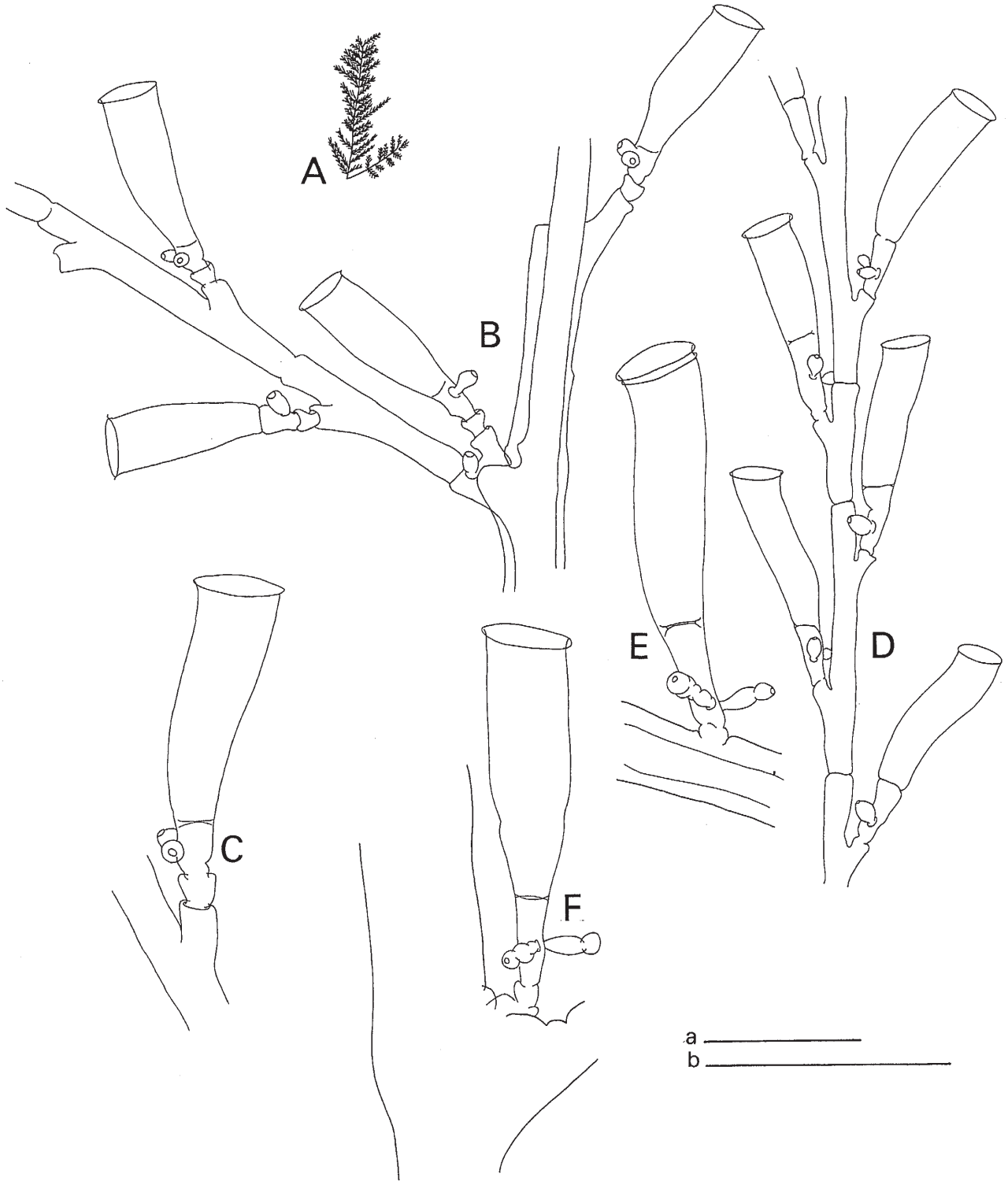

Fig. 10. A–C. ***Zygophylax binematophoratus*** sp. nov., holotype. **A**, colony, habitus. **B**, part of stem. **C**, hydrotheca and two nematothecae (BS 911, slide 2955). **D–F.** ***Zygophylax cervicornis*** (Nutting, 1905). **D**, monosiphonic part of stem. **E**, hydrocladial hydrotheca with nematothecae. **F**, hydrotheca in axil of hydrocladium (NZOI Stn I366, slide 2150). Scales: a, 40 mm (A), 1 mm (D), 0.2 mm (C); b, 0.5 mm (B, E, F). W.V.

Basal part of hydrotheca with distinct, fairly thick, sometimes slightly oblique diaphragm. Hydrothecal aperture circular, rim slightly but distinctly everted.

Nematothecae globular, shifted onto basal portion of hydrotheca, a pair occurring on each hydrotheca just below diaphragm, directed frontally and backwards. An additional nematotheca occurs on frontal aspect of apophyses supporting hydrocladia. A few nematothecae occurs on the accessory tubules. Nematothecae are easily detached but their insertions on hydrotheca, internode or accessory tubule always remains visible as a transparent circular cicatrice.

Gonosome not present.

Measurements of *Zygophylax binematophoratus* (in μm):

	NMNZ BS 911 slide 2955
Diameter of 35 mm long branch	500
Hydrotheca, length rim to diaphragm	245 – 260
Total length	285 – 310
Diameter at rim	65 – 90
Diameter in middle	75 – 80
Diameter at diaphragm	35 – 40
Diameter at base	15 – 26
Pedicel, length	30 – 53
Maximum diameter	35 – 38
Apophysis, length from insertion on branch onwards	42 – 46
Diameter	34 – 46
Nematotheca, length	31 – 33
Diameter	24 – 26

Remarks: This new species is remarkable by the almost exclusive occurrence of globular nematothecae on the basal part (chamber) of the hydrotheca (often referred to as the hydrothecal pedicel, though it forms part of the hydrotheca proper); the pair occurring there is directed frontally and backwards. This species has characters in common with *Zygophylax sagamiensis* Hirohito, 1983, particularly in the presence of one to several internodes supporting the hydrotheca and by the polysiphony of the ramifications. Nematothecae on the hydrotheca have been described as an occasional occurrence in some species of *Zygophylax*.

Records from New Zealand: Known from a single locality SE of Three Kings Islands, at 121 m depth.

Distribution: Known only from New Zealand.

Etymology: The specific name, *binematophoratus,* refers to the fact that a pair of nematothecae occurs on the basal part of the hydrothecae.

Zygophylax cervicornis (Nutting, 1905) (Fig. 10D–F)

Lictorella cervicornis Nutting 1905: 934, 946, pl. 4, fig. 1, pl. 10, figs 5-9; Stechow 1913b: 30.

Zygophylax cervicornis: Rees & Vervoort 1987: 69.

[Not *Lictorella cervicornis*: Fraser 1918a: 134, pl. 2, fig. 3; 1937: 123, pl. 26, fig. 141; 1938b: 9, 48; 1938d: 134; 1939: 160 *et seq.*; McCauley 1972: 412; Austin 1985: 56 [= *Zygophylax convallaria* (Allman, 1888)].

[Not *Zygophylax cervicornis*: Jäderholm 1919: 10; Stechow 1923a: 7; 1923b: 10; 1923c: 107; Leloup 1938b: 10; Yamada 1959: 48; Hirohito 1983: 6, 28–29, fig. 9; Cairns *et al.* 1991: 24; Bouillon *et al.* 1995: 55 [= *Zygophylax convallaria* (Allman, 1888)].

Material Examined:

NZOI Stn I366: 1 colony about 200 mm high, no coppiniae. Nematothecae on pedicels of hydrothecae. RMNH-Coel. 30018, 2 slides 2150.

Type Locality: Pailolo Channel, between the islands Molokai and Maui, Hawaiian Islands, Central Pacific [*Albatross* Stn 3859, depth 252 m]. Type series in NMNH, 22162.

Description: Colony 20 cm high, polysiphonic, base 2 mm thick, snapped off. Axis with a number of side branches and hydrocladia; branching strictly in 1 plane, lower order branches, that occur along the principal side branches, also arranged in that plane. Axis thinning out apically, as do the branches and the (polysiphonic) hydrocladia along the main stem, though polysiphonic until ultimate parts of branches and hydrocladia. In monosiphonic parts division into internodes of stem and hydrocladia distinctly visible, nodes transverse. Internodes with 1 or 2 apophyses, alternately arranged, pointing laterally and obliquely upwards, those of stem and branches bearing hydrocladia, those of hydrocladia bearing hydrothecae. Apophyses becoming rapidly submerged by accessory tubules; axil between stem and side branch or between branch and hydrocladium with axillary hydrotheca placed on conspicuous apophysis with frontal nematotheca; this apophysis becoming almost invisible by development of accessory tubules.

Hydrothecae tubular, long and slender; perisarc thin, resulting in many damaged or folded hydrothecae. Hydrotheca widening gradually from base onwards, with a minor sigmoid curvature; aperture circular, rim slightly everted, plane of aperture slightly tilted adcaudally and thus more or less facing hydrocladium or stem. Axillary hydrothecae identical in shape, but plane of aperture tilted abcaudally and thus facing away from axis. Hydrothecal rim occasionally with 2 or 3 renovations, diaphragm distinct, in lower fourth of hydrotheca, thin. Sometimes an additional internode, between the apophysis and hydrothecal base may be present.

Nematothecae, excepting axillary apophyses and those occurring sporadically on accessory tubules, proximal on hydrotheca, below diaphragm (on hydrothecal 'pedicel'), paired, pointing frontally and backward. Primary nematotheca globular, with small circular aperture; renovations of nematotheca frequent, resulting in elongated, annulated structures, sometimes of considerable length.

Gonosome not present.

MEASUREMENTS of *Zygophylax cervicornis* (in μm):

	NZOI Stn I366 slide 2150
Hydrotheca, length rim to diaphragm	365 – 375
Total length	515 – 560
Diameter at rim	105 – 115
Diameter in middle	115 – 120
Diameter at diaphragm	38 – 44
Diameter at base	24 – 31
Distance between two successive hydrothecae	310 – 435
Apophysis, length from insertion on branch onwards	44 – 50
Diameter	38 – 44
Nematotheca, length	50 – 185
Diameter	25 – 37

REMARKS: We have hesitated in identifying our species with Nutting's *Lictorella cervicornis*, having done so mainly because of resemblance of the hydrothecae and nemathothecae. Unfortunately the coppina, furnishing the most distinctive characters, is absent. Nutting's figures are indistinct without dimensions. From his pl. 4, fig. 1, it is deduced that the length of the hydrotheca ('pedicel' included) may be about 800 mm. There is general agreement in the overall shape of the hydrotheca, including its long 'pedicel'. The place of insertion of the nematothecae is open to dispute: in pl. 10, fig. 6 they are figured on the hydrothecal 'pedicel', in pl. 10, fig. 5 they seem to insert on the apophysis, though this is by no means certain. There is perfect agreement in the shape of the nematothecae (pl. 10, fig. 7), but in the present material such nematothecae also occur on the hydrothecal 'pedicels'; in Nutting's figures these nematothecae are more or less tubular or trumpet-shaped. The nematotheca figured on his pl. 10 fig. 7 may be one of the nematothecae found on the stem apophyses.

The present material has much in common with *Zygophylax binematophoratus* sp. nov. described above. That species has smaller hydrothecae with a shorter 'pedicel', there is also difference in the mode of curvature of the hydrotheca. The colony of *Zygophylax binematophoratus* is much more densely branched, with branches and side branches closely approximated, as a result of which the colony is fairly compact.

In *Zygophylax cervicornis* as defined here there is considerable distance between the various branches which gives the colony a different and much more diffuse appearance.

RECORDS FROM NEW ZEALAND: Southern Pacific east of North Cape, North Island, 705 m.

DISTRIBUTION: Since Nutting's (1905) record of this species from the Pailolo Channel, Hawaiian Islands, Central Pacific, the species has been mentioned several times. As far as could be checked, all those later records refer to *Zygophylax convallaria* (Allman, 1888); there are no reliable records or descriptions of *Z. cervicornis* since Nutting's original description. The present record, that we consider somewhat doubtful because of absence of the gonosome, is from the South Pacific east of North Cape, North Island, at a depth of 705 m.

Zygophylax parapacificus sp. nov. (Fig. 11A–D)

MATERIAL EXAMINED:

NMNZ: BS 886, numerous colonies up to 80 mm high, many with coppiniae (type series; a 80 mm high colony with coppiniae is the holotype; remaining colonies are paratypes); NMNZ Co. 523, 1 paratype as RMNH-Coel. 28869; 2 slides 3449; **BS 887**, colony 35 mm high. NMNZ Co. 701, made up in 2 RMNH-Coel. slides 3035 (not part of type series).

TYPE LOCALITY: 32°35.3′ S, 167°41.8′ E, to 32°34.0′ S, 167°39.0′ E, Wanganella Bank, Norfolk Ridge, E. slope, 437–422 m.

DESCRIPTION (of type series): Erect, about 80 mm high, ramified colonies attached to coral fragments. Axis strongly polysiphonic to within a few millimetres below apex. Branches formed by secondary tubules and developing from hydrocladia that become covered by secondary tubules; secondary and tertiary branching has been observed. Hydrocladia up to 8 mm long, sub-opposite, pinnately arranged along axis and side branches, in 1 plane with axis and ramifications. Younger parts of axis without nodes, as are also the hydrocladia, that spring from apophyses along axis and branches; there are 2 hydrothecae between each pair of sub-opposite apophyses. Hydrocladium and apophysis not separated by node; perisarc with slight constriction under insertion of axillary hydrotheca. Perisarc of axis, branches, and hydrocladia strong and thick, thinning out rapidly along walls of hydrotheca.

Hydrothecal rim with slight eversion, usually with minor tilt in adcauline direction. Renovations of hydrothecal aperture occur, normally restricted to 1 or 2. Diaphragm at base of hydrotheca strong, funnel-shaped, with large circular hole.

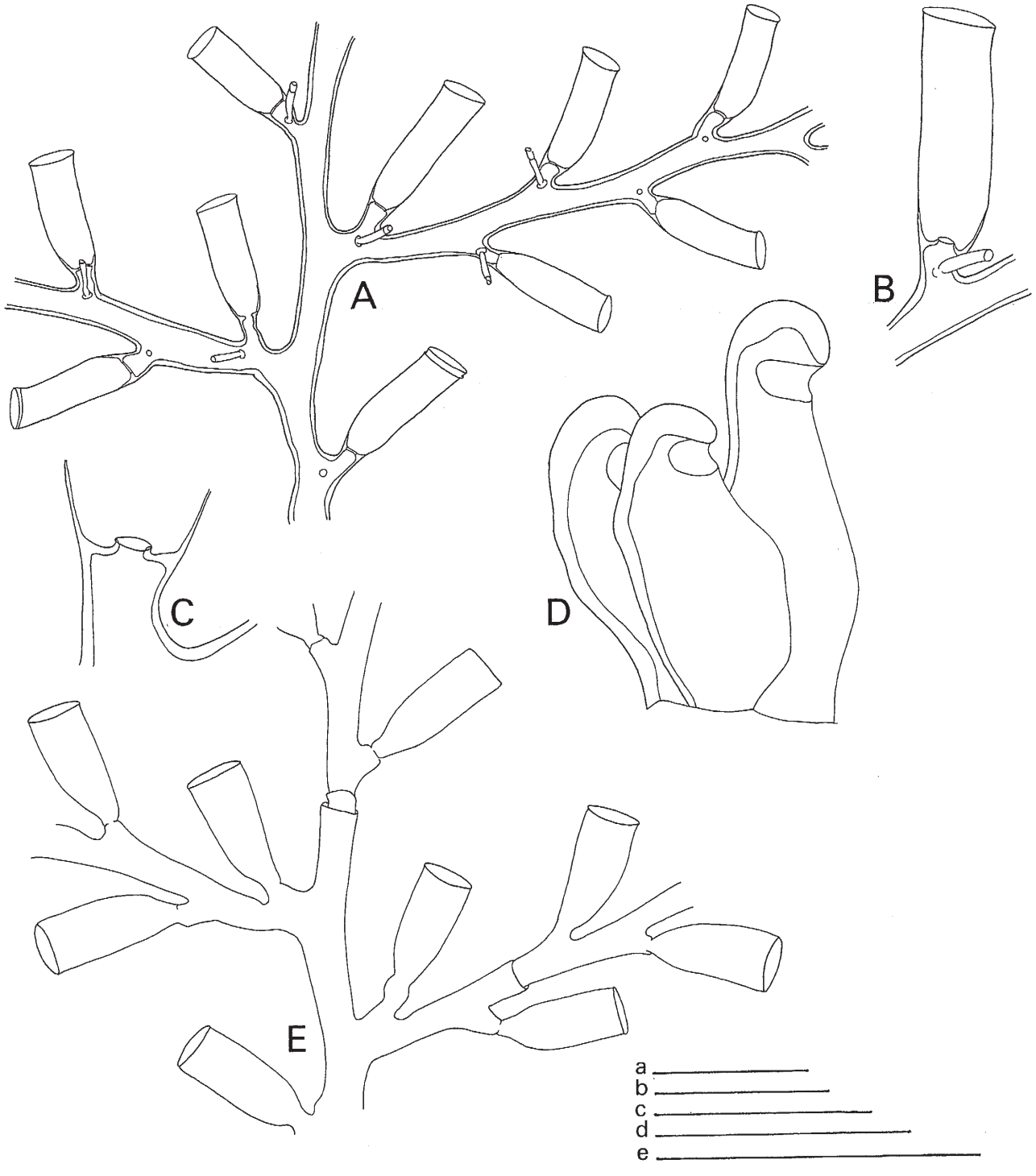

Fig. 11. A-D. ***Zygophylax parapacificus*** sp. nov., paratype. **A**, part of colony. **B**, hydrotheca. **C**, proximal part of hydrotheca showing upturned edge of diaphragm. **D**, gonothecae, lateral view (BS 886, slide 3449). **E.** ***Zygophylax polycarpa*** sp. nov., monosiphonic part of colony (BS 886, slide 3008). Scales: a, 1 mm (B); b, 1 mm (A); c, 2 mm (E); d, 0.5 mm (D); e, 0.4 mm (C). W.V.

Nematothecae present, a pair placed at base of hydrothecal insertion, 1 pointing frontally, the other backwards. A much reduced number of nematothecae occurs on the secondary tubules. Nematotheca long, tubiform, occasionally with 1 or 2 renovations.

Gonosome a coppinia, shaped as a dense cluster of orange-yellow gonothecae in a collar around stem or branch, rising direct from the secondary tubules; no nematophorous branches have been observed. Gonothecae adherent, but not completely fused and easy to separate. Each gonotheca barrel-shaped with a latero-terminal, oval opening; 'back' of gonothecae strongly sclerotised, orange-yellow, increasing in thickness apically where it forms a distal hood. Each gonotheca contains a globular mass of tissue which might represent a developing embryo.

MEASUREMENTS of *Zygophaylax parapacificus* (in μm):

	NMNZ BS 886 slide 3449	NMNZ BS 887 slide 3035
Hydrocladium, diameter at base	110 – 125	110 – 110
Hydrotheca, length margin-insertion	515 – 555	575 – 620
Length margin-diaphragm	435 – 470	490 – 515
Diameter at rim	165 – 170	180 – 185
Diameter at diaphragm	80 – 105	100 – 110
Diameter at insertion	65 – 87	76 – 87
Nematotheca, length	100 – 170	87 – 115
Diameter at rim	26 – 35	43 – 48
Gonotheca, length	470 – 530	
Diameter	185 – 195	

REMARKS: This new species has much in common with *Zygophylax pacificus* Stechow, 1920, a species known only from Japanese waters [Sagami Bay (Stechow 1913b, as *Zygophylax biarmata*) and Hirohito (1988, 1995)]. No exact measurements have been given with the descriptions of that species, but judging from Hirohito's most accurate drawings the hydrothecae must be 0.6–0.7 mm long, considerably smaller than in the present new species. The hydrothecae of *Zygophylax parapacificum* sp. nov., are larger and more elongated and graceful than those of *Z pacificus*. The funnel-shaped diaphragm of *Z. parapacificum* is a striking feature that would not have escaped Stechow's or Hirohito's attention. The nematotheca in *Z. parapacificum* are long and tubiform, being placed at the base of the hydrothecal insertion ('pedicel'). Those of *Z. pacificus*, again judging from Hirohito's drawings, are small and cup-shaped, inserting on the adcauline side of the hydrothecal 'pedicel'. The gonothecae of *Z. pacificus*, finally, though 'hooded', do not possess the distinctive thickened 'back' found in the new species.

RECORDS FROM NEW ZEALAND: Known only from a restricted area at Wanganella Bank, NW of Three Kings Islands, about 32.5° S 167.5° E, depth 422–572 m.

DISTRIBUTION: Known exclusively from New Zealand.

ETYMOLOGY: The specific name, *parapacificus*, is an allusion to the general resemblance of the new species with *Zygophylax pacificus* Stechow, 1920.

Zygophylax polycarpa sp. nov. (Figs 11E, 12)

MATERIAL EXAMINED:

NZOI Stns: C763, large, fragmented colony about 300 mm high; no coppiniae. Completely dead and overgrown with small algae. 3 RMNH-Coel. slides 4366; **E312,** large, about 150 mm high, fragmented colony composed of strong, repeatedly branched main stem and many side branches. 1 main branch with large coppinia composed of densely packed, flask-shaped gonothecae without accessory tubules. Holotype H-758 in NIWA collection; 5 RMNH-Coel. slides 2321 part of type series. Also large, fragmented colony about 150 mm high; with large coppinial mass on thicker stem. Paratype P-1227 in NIWA collection; RMNH-Coel. slide 2123 part of type series; **F922**, forked colony, about 120 mm high, no coppiniae. Overgrown by diatoms; in poor state, no nematothecae observed. In addition many colonies up to 200 mm high, some with coppiniae. RMNH-Coel. slide 2199. N.B. Only the material from NZOI Stn E312 is part of the type series.

NMNZ: BS 393: Several about 120 mm high plumes, basal parts fused and invested by bryozoans. No coppiniae. NMNZ Co. 570; 2 RMNH-Coel. slides 3013; **BS 886**, large, 250 mm high colony and a fragmented colony. No coppiniae. NMNZ Co. 516. Also single pinnate colony, 120 mm high, attached to coral and basally invested by Actiniaria. NMNZ Co. 547. Some smaller colonies, about 20 mm high, in 2 RMNH-Coel. slides 3008; **BS 899**, fragmentary colony about 100 mm high with only few hydrothecae; no coppiniae. NMNZ Co. 786. Slide of small branch with some hydrocladia and a separate hydrocladium, RMNH-Coel. 27683, 2 slides 3383; **BS 905**, single stem, 80 mm high, no coppiniae. NMNZ Co. 695; **BS 911**, 2 colonies 120 and 150 mm high, no coppiniae. NMNZ Co. 404.

TYPE LOCALITY: Southwest Pacific, NNW of Three Kings Islands, 34°00.00′ S, 171°47.50′ E, 119 m.

DESCRIPTION (of the type series): Colonies strong and erect, composed of a thick, polysiphonic main stem with several side branches that bear a few secondary branches and 10–20 mm long hydrocladia. Axis, side branches, and hydrocladia in one plane; hydrocladia sub-opposite and pinnately arranged; in monosiphonic parts, 2 alternate hydrothecae occur between 2 succeeding pairs of sub-opposite hydrocladia. These may be placed on one internode. Only distal parts of axis and branches monosiphonic, polysiphony resulting from development of many thick secondary tubules.

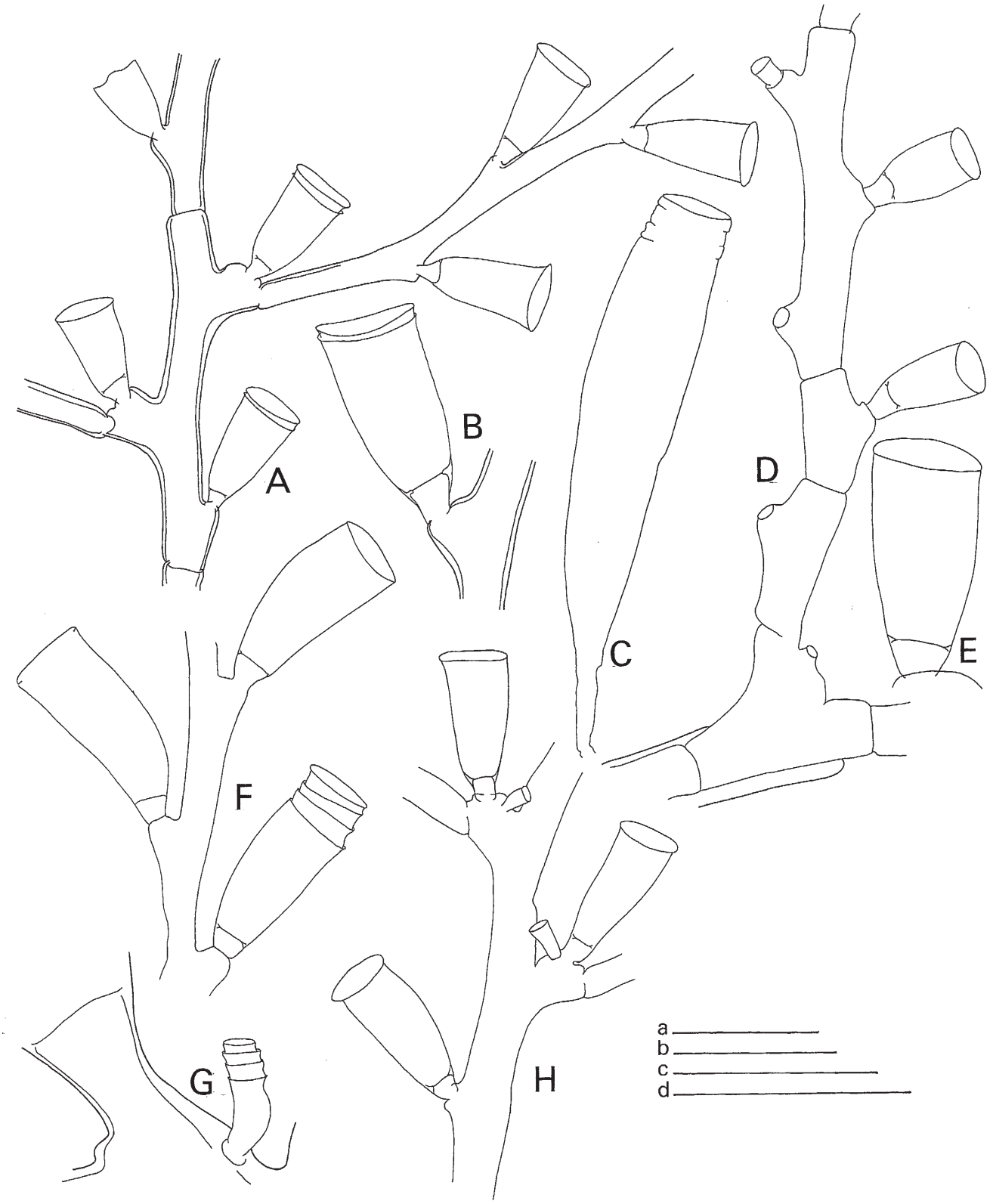

Fig. 12. ***Zygophylax polycarpa*** sp. nov. **A**, monosiphonic part of stem. **B**, hydrotheca. **C**, gonotheca (NZOI Stn E312, holotype; A, B, slide 2123; C, slide 2321). **D**, proximal part of hydrocladium. **E**, hydrotheca (BS 393, slide 3013). **F**, part of hydrocladium. **G**, proximal part hydrotheca and nematotheca near insertion of hydrotheca on hydrocladium (BS 886, slide 3008). **H**, monosiphonic stem fragment showing position of nematothecae (BS 899, slide 3383). Scales: a, 1 mm (B, E); b, 1 mm (A, D, F, H); c, 2 mm (C); d, 0.5 mm (G). W.V.

Monosiphonic parts of colonies divided into internodes by means of slightly oblique nodes, usually bearing hydrothecae and apophyses; length of internodes varied in both axes and hydrocladia. Axial internodes usually have a hydrotheca and 2 apophyses in alternate arrangement; the apophyses are quite big, support a hydrocladium and have an axillary hydrotheca. Axial hydrothecae placed on a much smaller apophysis. Hydrocladia with a varied number of internodes; nodes occasionally completely absent; hydrothecae alternate, arranged on small apophyses and to a varied extent frontally exposed.

Hydrothecae deep tumbler-shaped, almost symmetrical; adcauline and abcauline walls slightly convex, usually slightly more so on adcauline side, narrowing towards base; rim slightly everted, occasionally renovated once or twice. Diaphragm thin, suspended in ring-shaped perisarc thickening and delimiting a small basal chamber ('pedicel'). Only remnants of hydranths are present.

Nematothecae not observed in holo- and paratype, but see comments on other specimens.

Perisarc of axis strong, with a thickening under each hydrocladial apophysis, rapidly thinning out along walls of hydrocladia. Perisarc of hydrothecae notably thin; many hydrothecae are damaged or collapsed. Accessory tubules with thick perisarc, rapidly obscuring apophyses of monosiphonic parts, occasionally also bearing some hydrothecae.

Gonosome a coppinia composed of aggregated, separate and loosely packed gonothecae forming a broad, up to 50 mm long collar around the basal part of main stem (holotype) or first side branch (paratype). There are no nematothecae-bearing branches, but in the paratype some long hydrocladia with hydrothecae project from the mass of gonothecae. Each gonotheca is an elongated club-shaped body about 4 mm long, with almost smooth walls, apical portion indistinctly ringed or annulated, apex with circular lid. Gonothecae springing directly from accessory tubules; all empty.

The material from BS 393 consists of up to 120 mm high colony fragments, remarkable by their rigid structure, being composed of a main axis and alternately disposed side branches reaching a maximum length of about 30 mm, axis and branches strictly in 1 plane. The material is dead, incrusted by algae, with only a few hydrothecae in good conditon and without nematothecae. Younger parts of stems and branches monosiphonic; thick accessory tubules present in remainder of colony. In monosiphonic parts division into internodes visible in stems and branches; nodes transverse or occasionally slightly oblique. Internodes with 1 to many large apophyses, depending on the development of nodes, some hydrocladia being undivided. No nematothecae observed; gonosome not present.

The colonies from NMNZ BS 886 are remarkable by the considerable size of the hydrothecae that are almost biserially arranged in 1 plane. The colonies, unfortunately, are sterile and fairly heavily overgrown by algae and diatoms; some of the hydrothecae, nevertheless, have remnants of hydranths. They have been considered to belong here on account of the colony structure. Occasional tube-shaped nematothecae occur on some of the hydrocladial apophyses.

The colony from NMNZ BS 899 slightly differs from the above descriptions by the long and slender hydrothecae and by the presence of occasional nematothecae on some of the axial apophyses. The material is sterile but was taken alive as well preserved, contracted hydranths are present in some of the hydrothecae.

REMARKS: We have not been able to identify this material with any known species. It has affinities with *Zygophylax cyathiferus* as described and figured by Allman (1888) and Rees and Vervoort (1987), particularly in the arrangement of the hydrothecae on the frontal aspect of the colony, its rigid habit, the general shape of the

*MEASUREMENTS of *Zygophylax polycarpa* sp. nov. (in μm):

	NZOI Stn E312 slide 2123	NMNZ BS 339 slide 3013	NMNZ BS 886 slide 3008	NMNZ BS 899 slide 3383
Monosiphonic part of axis, length internode	1690 – 2000	660 – 1190	1500 – 2485	1155 – 1500
Diameter	160 – 215	150 – 225	175 – 195	210 – 225
Hydrocladia, length internode	160 – 215	150 – 225	175 – 195	210 – 225
Diameter at first node	125 – 135	165 – 195	175 – 210	150 – 160
Hydrotheca, distance margin-insertion	475 – 495	515 – 525	815 – 1065	600 – 625
Distance margin-diaphragm	375 – 385	400 – 415	750 – 875	535 – 550
Diameter at rim	250 – 260	250 – 300	290 – 350	260 – 290
Diameter at diaphragm	100 – 155	125 – 135	150 – 190	115 – 125
Diameter at base	50 – 65	87 – 100	87 – 100	66 – 76
Gonotheca, length	3950 – 4045			
Maximum diameter	625 – 690			

tumbler-shaped hydrothecae, and shape and arrangement of the apophyses. It is, nevertheless, considerably larger, particularly in the size of the hydrothecae, while in some colonies the frontal aspect of the hydrothecae is minimal in the younger parts.

RECORDS FROM NEW ZEALAND: Restricted to the seas surrounding the Three Kings Islands and the western slope of northern New Zealand; depth 91–163 m.

DISTRIBUTION: Known only from New Zealand.

ETYMOLOGY: The name has been derived from poly = many, and carpos = fruit, referring to the large number of gonothecae.

Zygophylax pseudafricanus sp. nov. (Fig. 13A–F)

MATERIAL EXAMINED:

NZOI Stns: D39, fragments of large colony from dried out sample. Height about 150 mm. May belong here. RMNH-Coel. slide 2818. Not part of type series; **G927**, bushy colony, about 50 x 50 x 50 mm, composed of stem and couple of branches with many fusions. Stem and part of branches invested by a large mass of coppiniae (Holotype, H-759 in NIWA collection). Branch and 3 slides are part of type series (RMNH-Coel. 28870, 3 slides 2882).

TYPE LOCALITY: SW. Pacific, 49°41.30′ S, 167°16.50′ E, 520 m.

DESCRIPTION (of type series): Colony composed of polysiphonic main stem and many ramifications in various directions, giving holotype colony a bushy appearance. Ramifications may develop from secondary tubules or from polysiphonic hydrocladia, those on stem and ramifications mostly in 1 plane. Axis and side branches, as well many of hydrocladia polysiphonic, only distal parts monosiphonic. Hydrocladia, and consequently side branches developed as the result of polysiphony, sub-opposite; 2 hydrothecae between each pair of side branches or apophyses. In monosiphonic parts few nodes observed, most resulting from regeneration after damage; hydrocladia largely unsegmented. Hydrocladia and hydrothecae inserted on distinct apophyses; apophyses of hydrocladia enlarged by rounded protuberance bearing axillary hydrotheca and a pair of nematothecae one of which may be shifted onto base of hydrocladium.

Hydrothecae widely spaced, with apophyses facing frontal colony and placed in 2 planes that meet at an acute angle. Hydrothecae of many shapes but, almost tubular, widening very gradually from base; margins straight or slightly thickened, occasionally slightly curved laterally in upper third; rim circular and slightly everted, with occasional renovations. Base with thin diaphragm; basal chamber ('pedicel') small, at one-eighth of hydrothecal height, occasionally duplicated or triplicated. Hydrothecae deciduous on many hydrocladia.

Nematothecae largely deciduous; very few present. They occur on hydrothecal and hydrocladial apophyses and on accessory tubules, though always few in numbers. Hydrothecal apophyses with a pair of nematothecae, 1 frontal and 1 on back. Nematothecae elongated oval, sometimes renovated and tubiform; when absent a circular cicatrice remains.

Perisarc generally thin, particularly along walls of hydrothecae, many of which are collapsed or damaged.

Gonosome a coppinial mass, covering most of basal part of stem and basal ramifications, forming a layer of closely packed, adhering, hexagonal gonothecae. Gono-theca compressed oval in outline, narrowing apically and terminating in a hooded structure with lateral, oval aperture; hood slightly sclerotised. A few hydrocladia with hydrothecae and nematothecae projecting from the mass of gonothecae. No planulae or acrocysts observed.

MEASUREMENTS of *Zygophylax pseudafricanus* sp. nov. (in μm):

NZOI Stns	G927 slide 2882	D39 slide 2818
Monosiphonic part of axis, distance between hydrocladia of a pair	495 – 560	475 – 495
Distance between 2 hydrocladia on same side	1255 – 1500	1445 – 1500
Hydrocladia, diameter at base	38 – 49	61 – 68
Hydrotheca, length margin-insertion	325 – 340	225 – 325
Distance margin-diaphragm	250 – 275	210 – 265
Diameter at rim	62 – 75	75 – 81
Diameter at diaphragm	37 – 44	46 – 49
Diameter at base	26 – 32	32 – 37
Gonotheca, length	440 – 450	
Maximum diameter	125 – 150	

REMARKS: The colonies, by their paucity of hydrothecae and thin, curved branches superficially resemble an antipatharian. Shape and size of hydrothecae as well as their arrangement along stems and hydrocladia resemble those of *Zygophylax africanus* Stechow, 1923. However, the hydrocladia in *Z. pseudafricanus* have conspicuous, widely spaced apophyses supporting the hydrothecae; a nematotheca occurs on each side of the hydrothecal insertion. The structure of the coppinia is quite different. In *Z. africanus* the coppinia is protected

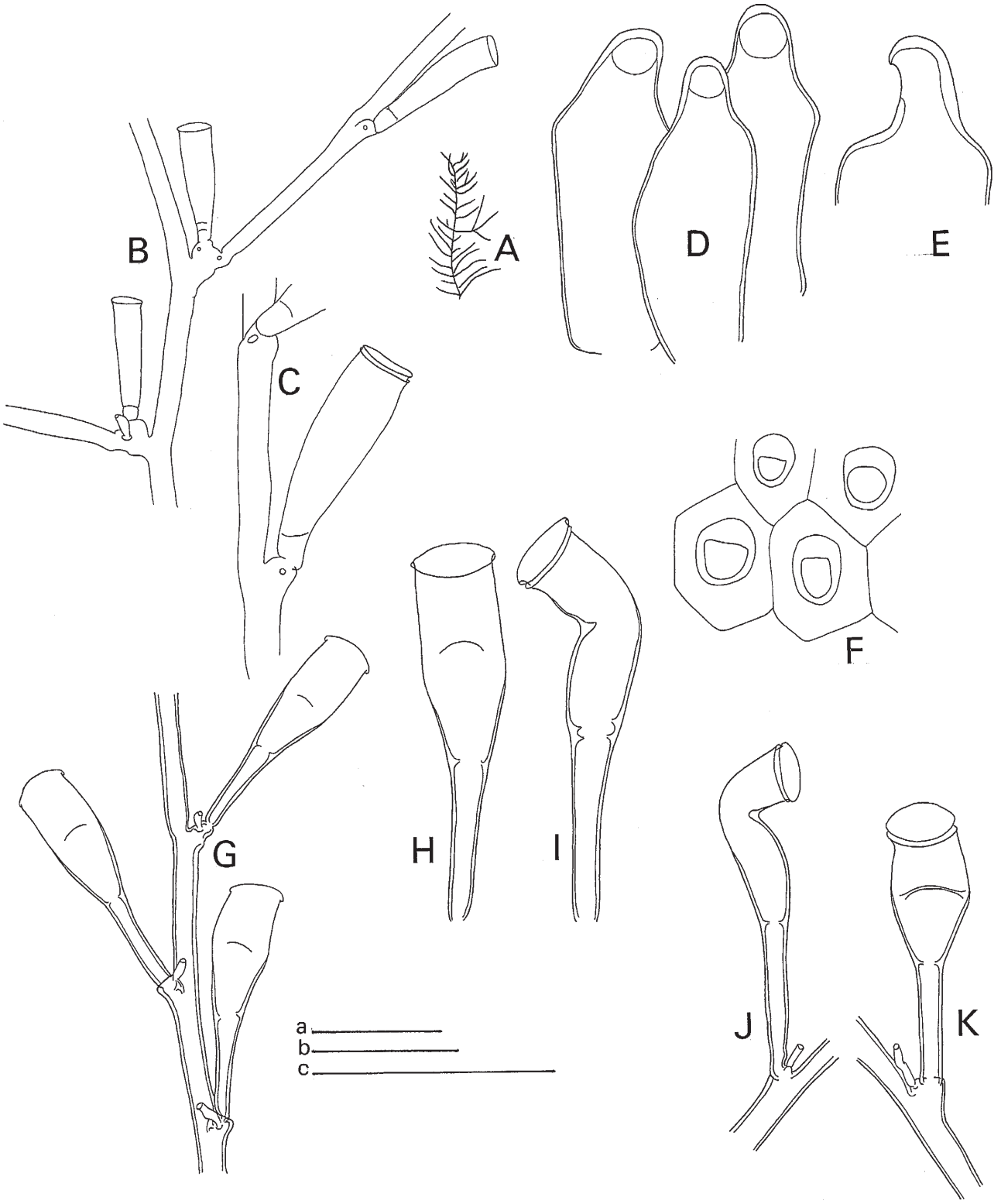

Fig. 13. A–F. ***Zygophylax pseudafricanus*** sp. nov. **A**, colony, habitus. **B**, part of stem with two hydrocladia. **C**, hydrotheca. **D**, gonothecae, frontal view. **E**, distal part gonotheca, lateral view; **F**, gonothecae, seen from above (NZOI Stn G927, holotype, slide 2882). **G-K.** ***Zygophylax sibogae*** Billard, 1919. **G**, part of stem with three hydrothecae. **H**, **I**, hydrothecae, lateral view in two positions (NZOI Stn E803, slide 2166). **J**,**K**, hydrothecae, their insertion on hydrocladium and nematothecae, lateral view in two positions (NZOI Stn F868, slide 2207). Scales: a, 40 mm (A); b, 1 mm (B, G); c, 0.5 mm (C–F, H–K). W.V.

by nematophorous tubules, while the individual gonothecae have a distal structure composed of two diverging horns, each with a lateral opening. The gonotheca in *Z. pseudafricanus* terminally supports a hooded structure with a single, lateral, oval aperture.

RECORDS FROM NEW ZEALAND: So far known from two southern localities, near Auckland Islands, 50°58.00′ S, 165°45.00′ E, 549 m, and the Campbell Rise, 53°32.8′ S, 172°16.60′ E, 580 m, outside New Zealand coastal waters. The colony with coppinia was collected in January.

DISTRIBUTION: Observed only in New Zealand.

ETYMOLOGY: The specific name, *pseudafricanus*, expresses the resemblance of this new species with *Zygophylax africanus* Stechow, 1923, being a combination of the Greek *pseudes* = lie, and the specific name *africanus*.

Zygophylax sibogae Billard, 1918 (Figs 13G–K, 14A, B)

Zygophylax sibogae Billard 1918: 21, fig. 1; Totton 1930: 167, fig. 21; Ralph 1958: 311, fig. 2e-i; Millard 1964: 21-22, fig. 5G–H; 1975: 198–200, fig. 65A–C; Rees & Vervoort 1987: 72–73 (*cum syn.*); Vervoort 1987: 91, fig. 10.8; Dawson 1992: 16; Altuna Prados & Álvarez-Claudio 1995: 10–15, figs 5–6; Álvarez-Claudio & Anadón 1995: 239; Hirohito 1995 (English text): 144–147, text-fig. 45a-d, pl. 9, fig. D; Watson & Vervoort 2001: 159–161, fig. 5a–d.

MATERIAL EXAMINED:

NZOI Stns: E719, 2 colonies, 60 and 80 mm high, no coppiniae; **E803**, about 15 colonies up to 100 mm high, attached to stones and with basal tuft. No coppiniae. RMNH-Coel. slide 2166; **E822**, some colonies attached to stem of *Gymnangium japonicum* Watson & Vervoort, 2001; no coppiniae. RMNH-Coel. slide 3607; **E865** (dried up sample), 7 colonies, 25–50 mm, no cop-piniae; **F868**, small, 20 mm high colonies on *Gigantotheca raukumarai* sp. nov.; no coppiniae. RMNH-Coel. slide 2207; **J975**, fragment 15 mm high, made up in RMNH-Coel. slide 2268.

NMNZ: BS 682, several colonies on old gorgonid stems, no coppiniae. NMNZ Co. 803, 1 RMNH-Coel. slide 3481.

NMNZ Ralph Collection: Loc. 503, NMNZ Co. 1240 fragments of a large colony or colonies, longest about 35 mm, with very young coppinia. RMNH-Coel. slide 3919. A slide from Loc. 503 occurs in RSC. Although unstained and partly dried out it shows all the details of this species.

TYPE LOCALITY: Not specified by Billard (1918): "... récoltées par l'expédition hollandaise du "Siboga" dans la partie orientale de l'Archipel indien". The type locality is specified on the type slide (MNHN No. L219) as being *Siboga* Stn 254, Banda Sea near Kei Islands, 05°40′ S, 132°26′ E, 310 m, trawl. Additional, probably syntype material, is in ZMA.

REMARKS: We have little to add to the existing descriptions (Ralph 1958: 331; Millard 1975: 198–200) of this characteristic species. Hydrothecae in the pinnately arranged hydrocladia are frontally directed; inserting on apophyses arranged in two rows alternately directed obliquely frontally and left or right; the planes in which they are placed meet at a very sharp angle. Hydrothecae curved 'like a cobra's hood', curvature occurring in middle of hydrotheca and curved portion directed backwards. This curious arrangement of the hydrothecae is partly lost in the slides. Shape of hydrotheca and length of pedicel varied, usually longer (up to 1.5 times) than hydrothecal height, but sometimes slightly smaller. Re-entrant angle at hydrothecal adcauline wall rounded to quite sharp, usually (but not always) with thickened strip of perisarc, in some colonies of considerable extension and thickness, visible in empty hydrothecae as a crescent-shaped structure. Diaphragm distinct, with large circular hole, occasionally funnel-shaped and directed upwards. Renovations of hydrothecal rim frequent but reduced to one or two, occasionally including renovation of the diaphragm. Nematothecae preferentially on accessory tubules and on apophyses, irregularly tube-shaped. In the colonies from NZOI Stn E822, RMNH-Coel. slide 3607, nematothecae occur occasionally on basal part of hydrothecal pedicel, in that from NMNZ BS 682, RMNH-Coel. slide 3481, the hydrothecal pedicel is slightly shorter than the height of the hydrotheca and several hydrocladia end in tendrils. The colonies in Ralph's collection, Loc. 503, have the hydrothecal pedicel slightly shorter than the height of the hydrotheca. Billard's material in MNHN was studied in 1989 (W.V.) and a drawing of one hydrotheca in lateral aspect from Billard's syntype slide no. L219 is reproduced here. The re-entrant angle at the adcauline hydrothecal wall is rounded, giving the hydrotheca the shape of a saxophone.

The coppinia in Ralph's material is too young to be of taxonomic value.

RECORDS FROM NEW ZEALAND: Norfolk Ridge north of Three Kings Islands; Three Kings Islands region; Ranfurly Bank off East Cape; Raukumaru Plain, Bay of Plenty; SW slope of South Island off Fiordland; depth 129 to about 924 m. General picture emerging from records by Totton (1930), Ralph (1958), and present records: sparingly distributed in deep water around New Zealand from 32.5°–47° S, 165.5°–178.5° E.

DISTRIBUTION: Besides New Zealand and Indonesian records also known from Agulhas Bank off southeast coast of South Africa, 80 m (Millard 1964, 1975); from Sagami Bay, Japan, 100–144 m (Hirohito 1995); and recently also from the Bay of Biscay off Basque coast of Spain, about 44° N, 06° W, 540–1120 m (Altuna-Prados

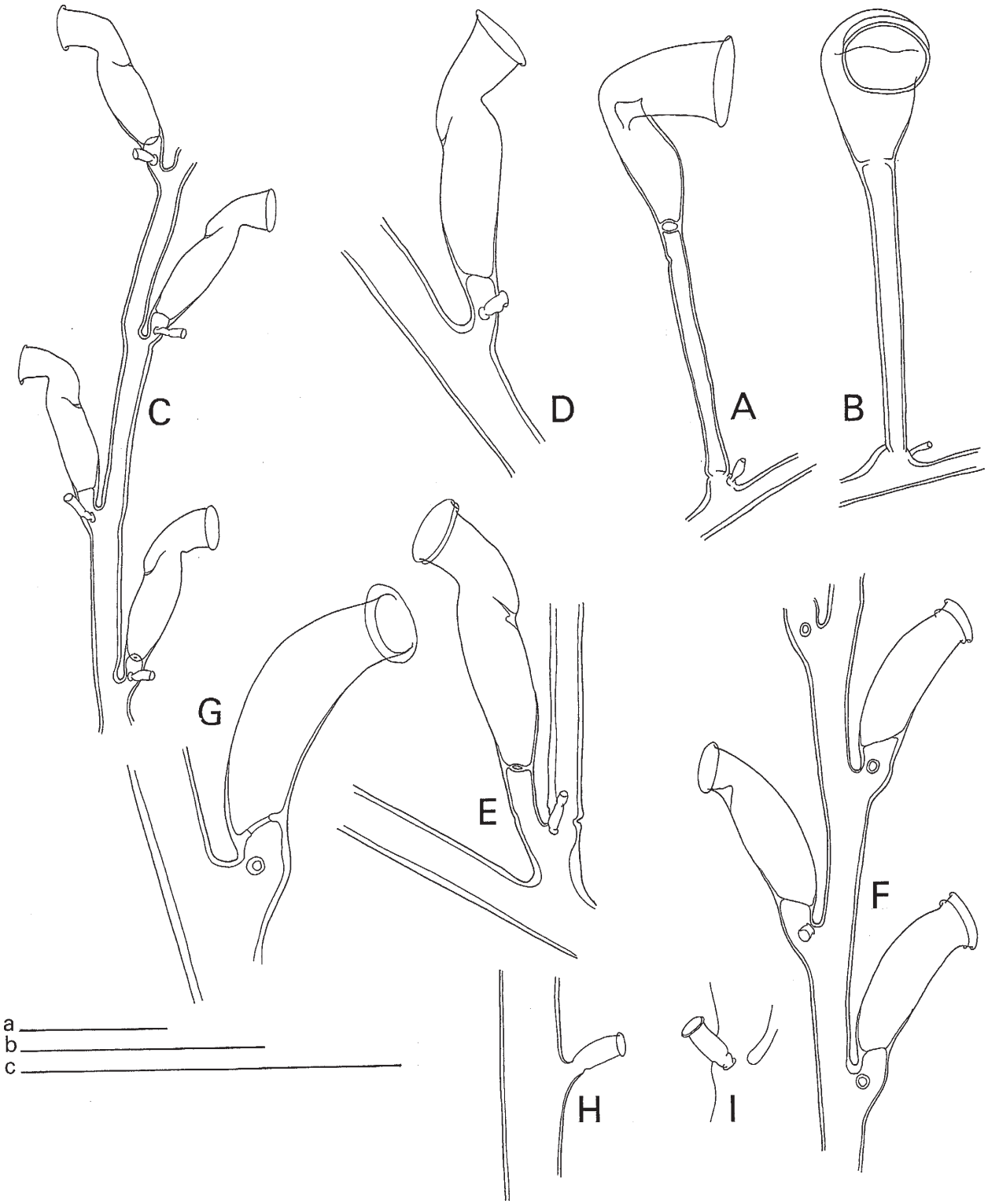

Fig. 14. A, B. ***Zygophylax sibogae*** Billard, 1919, hydrothecae (NZOI Stn J975, slide 2268). **C–E.** ***Zygophylax tizardensis*** Kirkpatrick, 1890. **C**, part of hydrocladium. **D, E**, hydrothecae and nematothecae (NZOI Stn P114, slide 2906). **F–I.** ***Zygophylax rigidus***(Fraser, 1948). **F**, part of hydrocladium with hydrothecae. **G**, hydrotheca. **H, I**, nematothecae (*Velero* Stn 1081-40, slide 2639). Scales: a, 1 mm (C); b, 0.5 mm (A, B, D–F); c, 0.5 mm (G–I). W.V.

MEASUREMENTS of *Zygophylax sibogae* (in μm):

	NZOI Stn E803 slide 2166	NZOI Stn F868 slide 2207	NZOI Stn J975 slide 2268
Length of hydrothecal pedicel*	230 – 385	210 – 365	340 – 385
Height of hydrotheca*	340 – 385	230 – 300	245 – 260
Diameter of pedicel at apophysis	35 – 43	32 – 37	22 – 35
Diameter of hydrotheca at diaphragm	64 – 68	30 – 46	43 – 55
Diameter of hydrotheca at rim	125 – 133	99 – 106	140 – 150
Distance between apophyses on a hydrocladium	495 – 575	410 – 545	575 – 690
Nematotheca, length	85 – 105	43 – 51	43 – 64
Diameter at rim	21 – 26	17 – 18	17 – 21

* The diaphragm is here considered to separate pedicel from hydrotheca

& Álvarez-Claudia 1995; Álvarez-Claudia & Anodon 1995); and from the Tasmanian Seamounts, 620–800 m (Watson & Vervoort 2001).

Zygophylax tizardensis Kirkpatrick, 1890b

(Fig. 14C–E)

Zygophylax tizardensis Kirkpatrick 1890b: 12–13, pl. 3 fig. 3; Jäderholm 1903: 277; Clarke 1907: 16; Stechow 1913a: 144; 1913b: 11, 117; Jäderholm 1919: 10; Stechow 1923b: 10; Dawydoff 1952: 56; Yamada 1959: 48; Hirohito 1983: 6, 33–34, fig. 13; Rees & Vervoort 1987: 66–67; Vervoort 1987: 91, fig. 10.9; Hirohito 1995 (English text): 150, fig. 47a-d, pl. 10, fig. B.

MATERIAL EXAMINED:

NZOI Stns: F867, 45 mm high pinnate colony, no coppiniae; **P114**, 2 colonies 35 and 50 mm high, both branched and without coppiniae. RMNH-Coel. slide 2906.

TYPE LOCALITY: Tizard Reef, China Sea, 64 m (Kirkpatrick 1890b); type series in NHM [1889.8.21.2, see Rees & Vervoort (1987) for further details.

REMARKS: This species has been fully described by Hirohito (1995); the New Zealand colonies agree with that description. The following notes have been taken from the NZOI Stn P114 specimens. Stem and principal branches strongly polysiphonic, only younger hydrocladia and distal parts of branches are monosiphonic. Branches and hydrocladia pinnately arranged; hydrothecae placed in same plane, alternately directed left and right. In younger, monosiphonic parts of colonies they are completely free from axis, diverging at an angle of about 20º; in older parts of colony they become rapidly covered by secondary tubules from which only distal part protrudes. There is no distinction between apophysis, pedicel and basal part of hydrotheca; a tubular nematotheca is typically found on that part.

MEASUREMENTS (in μm):

	Z. tizardensis NZOI Stn P114 slide 2906	*Z. rigidus* *Velero* Stn 1081–40, slide 2639
Diameter of hydrocladium at base	54 – 100	54 – 57
Hydrotheca, height*	365 – 450	215 – 260
Diameter at rim	100 – 110	65 – 80
Maximal diameter	80 – 87	72 – 76
Diameter at diaphragm	50 – 53	38 – 43
Distance between 2 successive hydrothecae	430 – 470	275 – 285
Pedicel/apophysis, length	65 – 76	49 – 53
Diameter at insertion	34 – 46	49 – 55
Nematotheca, length	43 – 64	38 – 43
Diameter	17 – 21	13 – 17

* The diaphragm is here considered to separate hydrotheca from pedicel/apophysis

Hydrotheca of peculiar shape, with apical portion suddenly and sharply curved outward. Both adcauline and abcauline wall of basal part hydrotheca convex; abcauline wall strongly curving outward at about one-quarter its length, re-entrant angle not thickened. Adcauline wall with crescent-shaped internal perisarc thickening; usually with concavity in hydrothecal wall just above that crescent. Hydrothecal rim circular, distinctly though not broadly everted and occasionally renovated once or twice. Diaphragm distinct, straight and with large circular opening. Hydrothecal aperture of all hydrothecae, with exception of axillary ones, frontally directed. Axillary hydrothecae with lengthened 'pedicel'; nematotheca shifted onto that part of apophysis supporting hydrocladium. Axillary hydrotheca normally developed, facing axis. Nematothecae of irregular, tubular appearance, sometimes lengthened by repeated renovations,

occurring at locations indicated above and on accessory tubules that rapidly cover axis and branches, leaving terminal portion of finer ramifications free and monosiphonic.

We have been able to compare the New Zealand colonies with the type series of *Lictorella rigida* Fraser, 1948 [= *Zygophylax rigidus* (Fraser, 1948)] in AHM, now in SBM, originating from *Velero* Stn 1081–40, N. of Isla Partida, Gulf of California, 84–139 m (see Rees & Vervoort 1987: 83–84, for further details; part of type series as RMNH-Coel. 2639, 3 slides). The two species are distinctly related, but certainly different. Though agreeing in general colony structure they differ in morphology of hydrothecae and nematothecae. The hydrothecae are smaller and banana-shaped, narrowing considerably basally and more moderately distally; they are occasionally fairly strongly curved. The hydrothecal rim is circular and strongly everted and the hydrotheca is considerably narrowed just under the rim; a crescent-shaped perisarc thickening may be present on the abcauline side just below the narrowing. The hydrothecal 'pedicel' is quite short, massive and fully confluent with the apophysis; the diaphragm is distinct and oblique. Nematothecae occur in profusion on the secondary tubules; a pair is also found on front and rear of the complex 'pedicel-apophysis'. Primary nematotheca cup-shaped with slightly everted rim; renovations of nematothecae occur frequently and may lead towards greatly lengthened and much deformed, tubular structures (fig. 14F–I).

The gonosome of this species is still undescribed. The species is only known from the type locality in the Gulf of California; it has never been rediscovered.

Records from New Zealand: Found at two widely differing localities, viz. NZOI Stn F867, off East Cape, North Island, 307–400 m, and NZOI Stn P114, Tasman Sea near Lord Howe Island, 85 m.

Distribution: The species is known only from the type locality in the Gulf of California; it has never been rediscovered. Additional records so far are chiefly from Japanese seas: Sagami Bay [Stechow 1913a, b, 70–80 m; Jäderholm 1919, 366–732 m; Hirohito 1995, 90–180 m], Bonin Islands, 146–165 m (Jäderholm 1919), and Niijima, 65–94 m (Hirohito 1983). The species occurs plentifully in hydroid samples from the New Caledonia area (unpublished observations).

Zygophylax unilateralis Totton, 1930 (Fig. 15A–C)

Zygophylax unilateralis Totton 1930: 167, fig. 20, pl. 1, figs 1–2; Ralph 1958: 311, fig. 2d; Rees & Vervoort 1987: 77 (*cum syn.*); Dawson 1992: 16.

Material Examined:

NZOI Stns: G875, colonies up to 50 mm high, no coppiniae. On axis of *Monoserius pennarius* (Linnaeus, 1758). 3 RMNH-Coel. slides 2880; **J975**, 80 mm high fragment of larger colony, no coppiniae. RMNH-Coel. slide 2267.

Type Locality: *Terra Nova* Stn 91, off Three Kings Islands, 549 m; type series in NHM (BMNH 1929.10.28.77, cf. Rees & Vervoort, 1987: 77).

Description (of NZOI Stn J975 material): Colony about 80 mm high, with polysiphonic axis, basally about 1.5 mm diameter. Axis with side branches and hydrocladia that may become polysiphonic by addition of accessory tubes and that may re-branch. In monosiphonic parts of colony axis divided into internodes with 2 or more hydrothecae and 1 or more apophyses; division into internodes becomes rapidly obscured by develop-ment of accessory tubules that may carry hydrothecae and some nematothecae. In monosiphonic parts of the colony there are 2 hydrothecae between each pair of sub-opposite hydrocladia or branches; this structure is obscured in polysiphonic parts.

Apophyses distinct, almost monoserially arranged; however, they are placed in 2 rows in planes that meet at a sharp angle; they point obliquely upwards and laterally and each supports a hydrotheca and 1 frontally placed nematotheca. A hydrotheca also occurs in the axil of each hydrocladium; nematotheca of that hydrotheca placed at base of hydrocladium. Nodes vague, division of hydrocladium into internodes consequently indistinct; 2 or more apophyses.

Hydrothecae frontally directed, fairly long and slender, widening gradually from base onward, with thin, ring-shaped diaphragm in lower third, smooth walled or slightly undulated, usually with minor constriction at junction with diaphragm. Abcauline and adcauline walls curved, abcauline wall slightly concave, adcauline wall distinctly concave. Rim circular and slightly everted; plane of aperture tilted in abcauline direction, facing laterally and outwards. Renovations frequent, usually 2 or 3 on each hydrotheca. Part of hydrotheca under diaphragm, by presence of a constriction in many hydrothecae, more distinctly a 'pedicel' than in many other species of *Zygophylax*. One or 2 internodes may occur under each hydrotheca.

Nematothecae rare, on apophyses, base of hydrocladia and accessory tubules, originally inflated, ovoid, with circular aperture. By renovation they may become irregularly tubiform.

Perisarc moderately thick on stem and hydrocladia, rapidly thinning out along walls of hydrotheca, which collapse easily. Hydranths deteriorated; number of tentacles could not be counted.

Gonosome not present.

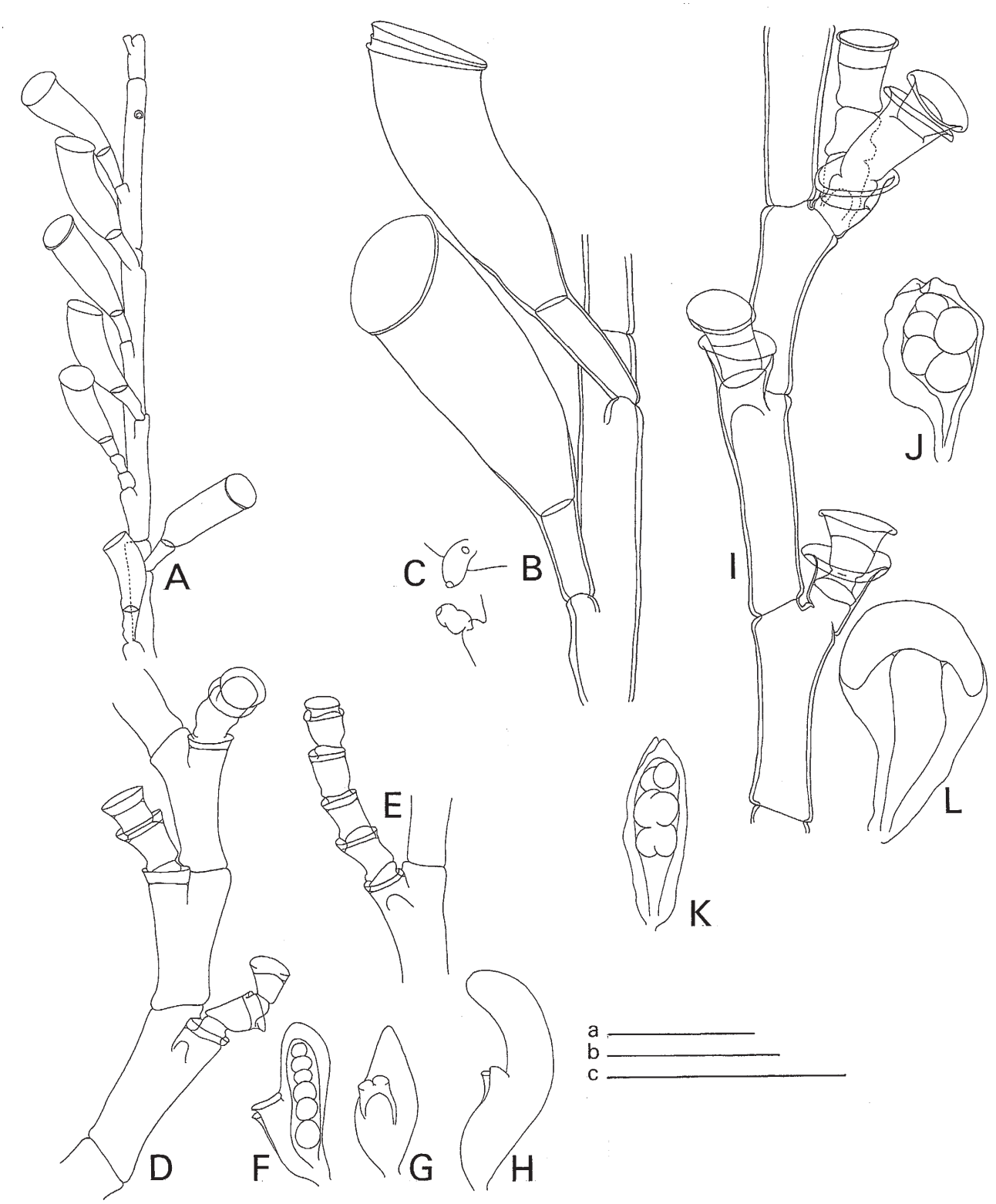

Fig. 15. A–C. ***Zygophylax unilateralis*** Totton, 1930. **A**, part of stem. **B**, hydrothecae, lateral view. **C**, nematothecae (NZOI Stn J975, slide 2267). **D–H.** ***Halecium beanii*** (Johnston, 1838). **D**, hydrocladium with hydrothecae (NZOI Stn B197, slide 2739). **E**, repeatedly renovated hydrotheca (Loc. 396, slide 3864). **F**, **G**, female gonothecae, lateral and frontal views (NZOI Stn B196, slide 2735). **H**, female gonotheca, lateral view (NZOI Stn B568, slide 2784). **I–L,** ***Halecium delicatulum*** Coughtrey, 1876. **I**, top part of stem (Loc. 392, slide 3858). **J, K**, mature female gonothecae (NZOI Stn B235, slide 2764). **L**, developing female gonotheca (NZOI Stn B236, slide 2766). Scales: a, 1 mm (D, E); b, 1 mm (A, F, G, H, J, K); c, 0.5 mm (B, C, I, L). W.V.

MEASUREMENTS of *Zygophylax unilateralis* (in μm):

NZOI Stns	J975 slide 2267	G875 slide 2880
Diameter of monosiphonic hydrocladium at base	87 – 105	65 – 72
Hydrotheca, length (rim-insertion)	565 – 690	385 – 450
Diameter at rim	125 – 175	87 – 95
Maximum diameter	125 – 135	100 – 105
Diameter at diaphragm	65 – 76	38 – 46
Distance diaphragm – pedicel	150 – 185	105 – 135
Diameter at insertion	38 – 50	29 – 35
Distance between 2 successive hydrothecae on hydrocladium	300 – 320	
Nematotheca, length	64 – 66	38 – 55
Diameter	38 – 43	29 – 35

REMARKS: Species well characterised by the disposition, size and shape of the hydrothecae. The material from NZOI Stn J975 is slightly larger than that recorded by Totton (1930) and redescribed by Ralph: hydrothecal length is stated to be 560 μm (pedicel included), diameter 200 μm compared with 740–910 μm and 165–230 μm respectively for the present specimens.

The colonies from NZOI Stn G875, from Australian waters off Cape Leeuwin, differ from the New Zealand material principally by the smaller size of the hydrothecae, (see table of measurements), and in this respect come closer to the material described by Totton. The colonies are dead and have no hydranths; nematothecae occur in profusion and are of an ovoid type also observed in the few nematothecae present in the colonies from NZOI Stn J975.

RECORDS FROM NEW ZEALAND: Of the present material, the second and third records of this rare species, one record comes from the same area in New Zealand as the type specimens (NZOI Stn J975, 35°40.00′ S, 175°23.00′ E, 205 m).

DISTRIBUTION: A third record of this species comes from the southeastern Indian Ocean off Cape Leeuwin, Australia, NZOI Stn G875, 34°56.50′ S, 115°03.30′ E, 155 m.

Suborder HALECIIDA Hincks, 1868
Superfamily HALECIOIDEA Hincks, 1868

Family **HALECIIDAE** Hincks, 1868

Halecium Oken, 1815

TYPE SPECIES: *Sertularia halecina* Linnaeus, 1758 (by subsequent designation, Naumov, 1960, cf. I.C.Z.N. 1982).

The following species have been considered.

Halecium amphibolum Watson, 1993
Halecium annulatum Torrey, 1902
Halecium antarcticum Vanhöffen, 1910
Halecium argenteum Clarke, 1894
Halecium banyulense Motz-Kossowska,1911 [= *H. muricatum* var. *banyulense* Motz-Kossowska, 1911]
Halecium beanii (Johnston, 1838) [= *H. edwardsianum* (d'Orbigny, 1846); *H. scutum* Clark, 1877; *H. boreale* von Lorenz, 1886]
Halecium beringi Naumov, 1960
Halecium bermudense Congdon, 1907
Halecium birulai Spasskii, 1929
Halecium brashnikowi Linko, 1911
Halecium bruniense Watson, 1975
Halecium bachananae Blackburn, 1937b
Halecium capillare (DE Poutalès, 1869)
Halecium conicum Stechow, 1919 [= *H. minutum* Motz-Kossowska, 1911; not *H. minutum* M. Sars, 1857]
Halecium corrugatissimum Trebilcock, 1928
Halecium corrugatum Nutting, 1899
Halecium crenulatum Hincks, 1874
Halecium crinis Stechow, 1913a
Halecium curvicaule von Lorenz, 1886
Halecium cymiforme Allman, 1888
Halecium cymosum Fraser, 1935a
Halecium delicatulum Coughtrey, 1876a [= *H. flexile* Allman, 1888; *H. gracile* Bale, 1888; *H. parvulum* Bale, 1888; *H. balei* Fraser, 1911; *H. parvulum* var. *magnum* Millard, 1957]
Halecium delicatulum macrothecum Leloup, 1960
Halecium densum Calkins, 1899
Halecium dichotomum Allman, 1888
Halecium diminutivum Fraser, 1940a
Halecium dubium Fraser, 1941
Halecium dufresnae Millard, 1977a
Halecium dyssymetrum Billard, 1929a
Halecium exiguum Fraser, 1948
Halecium expansum Trebilcock, 1928
Halecium fasciculatum Fraser, 1938a
Halecium fastigiatum Allman, 1888
Halecium filicula Allman, 1877
Halecium flabellatum Fraser, 1935b
Halecium flexile japonicum Leloup, 1938b
Halecium flexum Fraser, 1948
Halecium fragile Hodgson, 1950
Halecium fraseri Ralph, 1958
Halecium fruticosum Fraser, 1943
Halecium galeatum Billard, 1937
Halecium gracile Verrill, 1873
Halecium groenlandicum Kramp, 1911 [= *H. polytheca* Linko, 1911]
Halecium halecinum (Linnaeus, 1758) [= *H. geniculatum* Norman, 1867]

Halecium halecinum minor Leloup, 1932
Halecium harrimani Nutting, 1901c [= *H. robustum* Nutting, 1901a]
Halecium humile Pictet, 1893
Halecium incertum Naumov & Stepan'yants, 1962
Halecium inhacae Millard, 1958
Halecium insolens Fraser, 1938b
Halecium interpolatum Ritchie, 1907a
Halecium irregulare Bonnevie, 1899
Halecium jaederholmi Vervoort, 1972
Halecium kofoidi Torrey, 1902
Halecium kuekenthali Marktanner-Turneretscher, 1895
Halecium labiatum Billard, 1933
Halecium labrosum Alder, 1859 [= *H. annulatum* Stechow, 1919; *H. reflexum* Stechow, 1919; *H. undulatum* Billard, 1922b]
Halecium laeve Kramp, 1932b
Halecium lamourouxianum (d'Orbigny, 1846)
Halecium lankesteri (Bourne, 1890) [= *H. robustum* Pieper, 1884]
Halecium lenticulare Trebilcock, 1928
Halecium lightbourni Calder, 1991
Halecium linkoi Antsulevich, 1980
Halecium liouvillei Billard, 1934
Halecium lucium Antsulevich, 1979
Halecium luteum Watson, 1975
Halecium macrocephalum Allman, 1877
Halecium magellanicum Hartlaub, 1905
Halecium marsupiale Bergh, 1887
Halecium mediterraneum Weismann, 1883
Halecium minor Fraser, 1935a
Halecium minutum Broch, 1903
Halecium mirabile Shidlovskii, 1902
Halecium mirandum Antsulevich & Regel', 1986
Halecium muricatum (Ellis & Solander, 1786) [= *H. filiforme* Alder, 1862]
Halecium muricatum f. *abyssale* Broch, 1918
Halecium mutilum Allman, 1876b
Halecium nanum Alder, 1859 [= *H. marki* Congdon, 1907]
Halecium nanum altum Stechow, 1921d
Halecium nullinodum Fraser, 1935a
Halecium ochotense Linko, 1911
Halecium ornatum Nutting, 1901a
Halecium ovatum Totton, 1930
Halecium pallens Jäderholm, 1904a
Halecium patagonicum (d'Orbigny, 1846)
Halecium perexiguum Hirohito, 1995
Halecium petrosum Stechow, 1919
Halecium planum Bonnevie, 1899
Halecium profundum Calder & Vervoort, 1998
Halecium pulchellum (DE Pourtalès, 1869)
Halecium pusillum M. Sars, 1857
Halecium pygmaeum Fraser, 1911
Halecium pyriforme Hirohito, 1995
Halecium regulare Fraser, 1938b
Halecium repens Jäderholm, 1907
Halecium reversum Nutting, 1901c
Halecium scalariforme Billard, 1929c
Halecium scandens Nutting, 1905
Halecium schneideri Bonnevie, 1899
Halecium secundum Jäderholm, 1904a
Halecium septentrionale Marktanner-Turneretscher, 1895
Halecium sessile Norman, 1867 [= *H. plumosum* Hincks, 1868; *H. articulosum* Clark, 1875]
Halecium sibogae Billard, 1929c
Halecium sibogae marocanum Billard, 1934
Halecium simplex Pictet, 1893 (gonosome unknown)
Halecium siphonatum (DE Pourtalès, 1869) (insufficiently known species)
Halecium speciosum Nutting, 1901a
Halecium tehuelchum (d'Orbigny, 1846) (obscure species with unknown gonosome)
Halecium telescopicum Allman, 1888
Halecium tenellum Hincks, 1861b [= *H. geniculatum* Nutting, 1899; *H. washingtoni* Nutting, 1901c]
Halecium tensum Fraser, 1941 (gonosome unknown)
Halecium tenue Fraser, 1938d
Halecium textum Kramp, 1911 (gonosome unknown)
Halecium tortile Bonnevie, 1898
Halecium tortum Fraser, 1938b (gonosome unknown)
Halecium vagans Fraser, 1938b (gonosome unknown)
Halecium vasiforme Fraser, 1935a
Halecium wilsoni Calkins, 1899

N.B. *Halecium billardi* Motz-Kossowska, 1911 [= *Hydranthea margarica* (Hincks, 1862];
Halecium billardi var. *exiguum* Motz-Kossowska, 1911 [= *Hydranthea margarica* (Hincks, 1862)].

Halecium beanii (Johnston, 1838) (Fig.15D–H)

[Restricted bibliography, mainly Indo-Pacific records, for detailed synonymy see: Ralph (1958), Rees & Vervoort (1987), Ramil & Vervoort (1992a)and Medel & Vervoort (2000)].

Halecium beani(i): Shidlovksii 1902: 230; Linko 1911: 64–68; Fraser 1913b: 168; Stechow 1913a: 144; 1913b: 9, 85; Broch 1918: 38–39, fig. 13; Stechow 1919: 33; 1923b: 5; Stechow & Müller 1923: 460, pl. 27, fig. 1; Broch 1927: 114–115; 1928: 60, fig. 49B; Fraser 1937: 102, pl. 20, fig. 108; 1938b: 9, 41; 1938c: 110; 1938d: 133; Vervoort 1942: 282; Fraser 1939: 159 *et seq*.; Leloup 1940b: 6; Vervoort 1946a: 296; Berezina 1948: 54, pl. 15, fig. 5; Fraser 1948: 221; Chu & Cutress 1955: 9; Buchanan 1957: 357; Millard 1957: 188; 1958: 168; Bousfield & Leim 1959: 14; Vervoort 1959: 224, fig. 6; Yamada 1959: 32; Naumov 1960: 447–449, figs 19zh, z, 336; Leloup 1960: 230; Ralph 1961d: 236; Rees & Thursfield 1965: 105; Millard 1966a: 464, fig. 9A–F; 1966b: 489; Vervoort 1966: 103, fig. 3; Blanco 1968: 201, pl. 1, figs 11–13; Millard 1968: 253, 256; Day *et al.* 1970: 12; Patriti 1970: 22, fig. 18; Morton & Miller 1973: 152; Day 1974: 85; Leloup 1974: 10, fig. 7; Cooke 1975: 91, pl. 2, fig. 1; Cornelius 1975b: 390, fig. 5; Millard 1975: 144, fig. 47A–E; Watson 1975: 161, figs 5–6; Blanco 1976: 30, pl. 1, figs 4–7; Cooke 1977: 87, fig. 15; Mergner & Wedler 1977: 12, pl. 1, fig. 7; Millard 1978: 193 *et seq*.; Gosner 1979: 84, pl. 14; Stepan'yants 1979: 108, pl. 16, fig. 6; Millard 1980: 130; Bouillon 1984b: 105; Austin 1985: 55; Gili *et al.* 1989: 77–78, fig. 7A; Stepan'yants 1989: 416 *et seq*.; Cornelius & Ryland 1990: 137, fig. 4.14; Park 1990: 76, fig. 3a-c; Cairns *et al.* 1991: 22; El Beshbeeshy 1991: 29–32, fig. 3; Park 1991: 544; Dawson 1992: 14; Park 1992: 286; Boero & Bouillon 1993a: 263; Watson 1994a: 66; Bouillon *et al.* 1995: 44; Cornelius 1995a: 276–278, fig. 62; Hirohito 1995 (English text): 17–18, text-fig. 3d-f, pl. 1, fig. A; Park 1995: 10; Zamponi *et al*. 1998: 12; Medel & Vervoort, 2000: 8–12, fig. 1 (*cum syn*.).

Halecium beanii p.p. Ralph 1958: 332, fig. 10a, b, f-k (not fig. 10e = *Halecium ralphae* Watson & Vervoort, 2001).
Halecium cf. *beani*: Stephenson *et al.* 1937: 374.
(?)*Halecium beani*: Schmidt, 1972a: 42.

MATERIAL EXAMINED:

NZOI Stns: A433 (dried out sample) ?*Halecium beanii* (Johnston, 1838) (J.E. Watson); **B176**, several colonies up to 30 mm high; no gonothecae. RMNH-Coel. slide 2734. With *Filellum serratum* (Clarke, 1879); **B196**, several colonies up to 40 mm high on worm tubes. With female gonothecae of usual type, with a pair of hydranths halfway concave side. RMNH-Coel. slide 2735. With *Filellum serratum* (Clarke, 1879); **B197**, many colonies about 40 mm high on worm tubes. Some gonothecae present, same type as in NZOI B196. RMNH-Coel. slide 2739; **B567**, 2 stems about 20 mm high on bryozoans; **B568**, colony with abundant female gonothecae. RMNH-Coel. slide 2784. With *Plumularia setacea* (Linnaeus, 1758); **G292**, 2 colonies, 35 and 20 mm high, without gonothecae. Bigger colony made up in RMNH-Coel slide 2307. Internodes very long; **Q341**, large mutilated colony, at least 150 mm high, with thick, forked, main axis. No gonothecae. Internodes fairly long. RMNH-Coel. slide 2917); **T88**, *Halecium beanii* (Johnston, 1838) (J.E. Watson) (dried out and rehabilitated). [Slide 4234 JEW Colln].

NMNZ: BS 195, large, 160 mm high colony with several side branches, no gonothecae. Dirty colony, covered by fish slime. NMNZ Co. 464; **BS 519**, young colony, about 8 mm high, from amongst other hydroids. No gonothecae. In RMNH-Coel. slide 3489. (Slide missing, not given a NMNZ collection number).

NMNZ Ralph Collection: Loc. 396, NMNZ Co. 1187, 2 bushy, strongly polysiphonic colonies 20 mm high, without gonothecae, smaller in RMNH-Coel. slide 3864 (after some bleaching). Living colonies but rather dirty. Stained Canada Balsam slide in RSC as *Halecium beanii* Allman, no data. indicated: male.

TYPE LOCALITY: Near Scarborough, Yorkshire, England, in deep water (cf. Cornelius 1975b; holotype, a herbarium sheet, in NHM, 1847.9.18.181, 181a).

REMARKS: We have little to add to the description by Ralph of this well known, widely distributed species. We have found additional material of a species of *Halecium* with female gonothecae of the type figured by Ralph (1958, fig. 10e); the differences of these gonothecae with the female gonothecae of indisputable specimens of *Halecium beanii*, abundantly present in our material, are so considerable that we have separated this material specifically and refer it to *Halecium ralphae* Watson & Vervoort, 2001.

It should be pointed out that *H. beanii* can only with complete confidence be separated from *Halecium halecinum* (Linnaeus, 1758) in the presence of female gonothecae. These are abundantly present in the material from NZOI Stns B196, B197, and B568, and are fully identical with gonothecae from Atlantic specimens. The remaining colonies have been listed here because so far the occurrence of *H. halecinum* in New Zealand waters has never been recorded. This sterile material varies in the length of the internodes, as does also material of this species from northern localities: the internodes are slender in the colonies from NZOI Stn Q341 and quite long in those from NZOI Stn G292.

Ralph, in her discussion of the female gonotheca of *H. beanii* states (1958: 332): "aperture lateral, carried on a short neck, 2 small hydranths projecting through the aperture". In the New Zealand specimens there are distinctly two apertures in the middle of the concave gonothecal wall, each provided with a small hydranth. Although the female gonotheca is distinctly 'mitten-shaped' there is some variability in the curved part projecting above the above mentioned apertures (cf. fig. 15f–H). The material from Ralph's Collection Loc. 396 is characterised by extreme renovation of the hydrothecae; occasionally as many as six renovated hydrothecae are present (fig. 15E).

RECORDS FROM NEW ZEALAND: The species was mentioned from a number of localities by Ralph (1958): off Devonport, Auckland; Woodpecker Bay, South Island; several localities at the Chatham Islands, up to 475 m depth. Vervoort (1966: 103) recorded fertile colonies between Rangitoto Island and Devonport, 10 m depth. Additional records are now available from Admiralty Bay, North Island; Lee Edge, Tasman Sea, and Cook Strait, with depths varying between 29 and 500 m.

DISTRIBUTION: *Halecium beanii* is a cosmopolitan species, occurring in all the world oceans, with the exception, perhaps, of purely Antarctic waters ("Evidently one of the most widespread of coastal invertebrates", Cornelius, 1995a: 276).

Halecium corrugatissimum Trebilcock, 1928

Halecium corrugatissimum Trebilcock 1928: 7, pl. 3, fig. 1-1f; Morton & Miller 1973: 152; Ralph 1958: 329, fig. 9 c-f; Patriti 1970: 25, fig. 24; McInnes 1982: 163; Dawson 1992: 14.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 554, rather bad slide as *Halecium corrugatissimum*, no data.

TYPE LOCALITY: St Clair, Dunedin, substrate unknown [Trebilcock 1928; syntype in MOV, MVF57890, microslide (Stranks 1993)].

REMARKS: There are three slides labelled *Halecium corrugatissimum* in RSC, one from Loc. 554 (Devonport, Auckland) that is well recognisable; the second has no

locality number but originates from Glendowie, Oct. 1949; this slide is useless. Ralph's figure 9c is from the specimen in the first slide. The third slide contains the gonothecae (not numbered, H4, TS Beach, 2.6.1950). The species was compared by Trebilcock with *Halecium speciosum* Nutting, 1901; the differences are enumerated by Ralph (1958: 329–331). The species is not represented in the present collections.

RECORDS FROM NEW ZEALAND: The following records are listed in Ralph (1958): off Glendowie, Auckland, drift; Devonport, Auckland; St Clair, Dunedin; Goat Island, Otago Harbour, and reef, Portobello Marine Biological Station.

DISTRIBUTION: Exclusively a New Zealand species.

Halecium delicatulum Coughtrey, 1876a (Figs 15I–L, 16A–E)

[For detailed synonymy see: Ralph (1958); Rees & Vervoort (1987), and Ramil & Vervoort (1992).]

Halecium delicatulum Coughtrey 1876a: 299: 1876b: 26, pl. 3, figs 4–5; Stechow 1913a: 144; 1913b: 9, 79; 1923b: 5; Bale 1924: 235; Ralph 1958: 334, figs 11e, h-n, 12 a-p; Pennycuik 1959: 173; Yamada 1959: 31; Leloup 1960: 218, fig. 1; Naumov & Stepan'yants 1962: 94, figs 16–17; Rees & Thursfield 1965: 106; Millard 1966a: 464, fig. 10L; Ralph 1966: 158; Blanco 1968; 203, pl. 1, figs 14–18, pl. 2, figs 1–3; Millard 1968: 253, 256; Day *et al*. 1970: 12; Patriti 1970: 23, fig. 21; Blanco & Bellusci de Miralles 1972: 7, figs 3–5; Naumov & Stepan'yants 1972: 34, 52; Stepan'yants 1972: 72; Vervoort 1972a: 27, figs 4–5; 1972b: 341, fig. 2a; Morton & Miller 1973: 152, fig. 54, no. 10; Watson 1973: 166; Leloup 1974: 10; Millard 1975: 145, fig. 47F–L; Watson 1975: 159; Gordon & Ballantine 1977: 100; Millard 1977a: 7, fig. 1C–D; 1978: 193 *et seq*.; Stepan'yants 1979: 105, pl. 20, fig. 4A–V; Watson 1979: 234; Altuna *et al*., 1984: 129–130, fig. 2a-c; Hirohito 1983: 5, 11; Rho & Park 1983: 41–42, pl. 2, figs 1–3; Aguirrezabalaga *et al*. 1984: 90; Blanco 1984c: 262, figs 1–6; 1984d: 271, figs 3–5; Rees & Vervoort 1987: 25–28, fig. 5; Staples & Watson 1987: 218; Aguirrezabalaga *et al*. 1988: 222; Ramil Blanco & Iglesias Diaz 1988: 72–73, fig. 2; Gili *et al*. 1989: 78, fig. 7B; Altuna & García Carrascosa 1990: 54 *et seq*., fig.; Genzano 1990: 38–40, figs 2–5; El Beshbeeshy 1991: 32-37, figs 4a, 4b; Park 1991: 544; Roca *et al*. 1991: 70: 14; Genzano & Zamponi 1992: 40–42, fig. 17; Park 1992: 286; Ramil & Vervoort 1992a: 82–85, fig. 20a-c; Branch & Williams 1993: 11, fig.; Genzano 1994: 5; Watson 1994a: 66; Altuna Prados 1995: 54; Bouillon *et al*. 1995: 45; Hirohito 1995 (English text): 20–22, text-fig. 5a-c, pl. 1, fig. C; Park 1995: 10; Genzano 1996a: 290 *et seq*.; Medel & Vervoort 2000: 12–13 (*cum syn*.)

Halecium flexile Allman 1888: 11, pl. 5, figs 2, 2a.

Halecium gracile Bale 1888: 759-760, pl. 14, figs 1–3 (not *Halecium gracile* Verrill 1873: 729).

Halecium parvulum Bale 1888: 760–761, pl. 14, figs 4-5.

MATERIAL EXAMINED:

NZOI Stns: B235, 2 polysiphonic stems about 40 mm high, many female gonothecae. RMNH-Coel. slide 2764; **B236**, polysiphonic stem about 75 mm high, with 1 branch, bearing hydrocladia with female gonothecae. RMNH-Coel. slide 2765; **B237**, gear DD, basal part of stem about 45 mm, with developing female gonotheca. RMNH-Coel. slide 2766 of fragment; **B237**, gear DIS, 2 stem fragments about 30 mm high and some branches; **B238**, fragments of larger colony; **B487**, developing colony on *Salacia bicalycula* (Coughtrey, 1876), no gonothecae. RMNH-Coel. slide 2779; **C601**, large, flabellate colony about 100 mm high, spread about 80 mm. Condition mediocre, yet distinctly this species; densely covered by *Modeeria rotunda* (Quoy & Gaimard, 1827). Part in RMNH-Coel slide 2801; **D876**, developing colony on *Sertularella g. gayi* (Lamouroux, 1821), no gonothecae. RMNH-Coel. slide 2288; **G70**8, about 5 colonies, in poor condition, up to 35 mm high, on shells. No gonothecae; **I75**, fragments found between *Synthecium subventricosum* Bale, 1914; **U547,** dirty sample on worm tube, stolons covering tube, giving rise to many young hydrothecae that are almost like *Filellum* sp. Some colonies up to 30 mm high, also attached to same stolons; hydrothecae in poor condition and without hydranths. Some female gonothecae present.

NMNZ: BS 682, small, up to 12 mm high colonies on old axes of gorgonids; no gonothecae. NMNZ Co. 804; RMNH-Coel. slides 4399; **BS 886**, juvenile colonies up to 10 mm high on sponges and *Zygophylax polycarpa* sp. nov. NMNZ Co. 551; 2 RMNH-Coel. slides 3009.

NMNZ Ralph Collection: Loc. 40, NMNZ Co. 909, a few colonies on *Sertularella integra* Allman, 1876, with *Hebellopsis scandens* (Bale, 1888), and *Orthopyxis crenata* (Hartlaub, 1901a). RMNH-Coel. slides 3604; **Loc. 280**, NMNZ Co. 1127, small bunch of monosiphonic colonies about 15 mm high, no gonothecae, dirty, *Clytia hemisphaerica* (Linnaeus, 1767) on axis (RMNH-Coel. slide 3806); mixed with *Sertularella simplex* (Hutton, 1873); no gonothecae (RMNH-Coel. slide 3807); **Loc. 282**, NMNZ Co. 1129, detached, monosiphonic colonies and fragments, longest about 12 mm; no gonothecae. RMNH-Coel. slide 3810; **Loc. 343**, NMNZ Co. 1168, 12 mm high, monosiphonic colonies with many male gonothecae. RMNH-Coel. slide 3845. Poor, partly dried out, slide in RSC as *Halecium delicatulum* (male) and *Sertularella*. No data; **Loc. 344**, NMNZ Co. 1169, small colony with many male gonothecae, RMNH-Coel. slide 3846. Poor, partly dried out slide in RSC as *Halecium delicatulum* (male) and *Sertularella*. No data; **Loc. 364**, NMNZ Co. 1173, many about 12 mm high stems from stolon on brown alga. Many ripe female gonothecae. Aberrant colony with greatly lengthened and articulated hydrophores. Many gonothecae develop directly from end of such structures without visible sign of hydrotheca. RMNH-Coel. slide 3848. Stained Canada Balsam slide in RSC as *Halecium delicatulum* Coughtrey, no data; **Loc. 392**, NMNZ Co. 1183, several small, about 6 mm high monosiphonic colonies on sponge. No gonothecae. RMNH-Coel slide 3858. Stained Canada Balsam slide in RSC as *Halecium delicatulum* (monosiphonic), with data: Woodpecker Bay; L**oc. 556**, unstained slide in RSC as *Halecium delicatulum*, young female gonothecae, no data.

PMBS: *Alert* Stn 54.13. [off Otago Heads, 503–549 m, 02.Mar.1954]. (Taken from card register).

TYPE LOCALITY: Upper Harbour, Dunedin, New Zealand, found on sponges (Coughtrey 1876a, b).

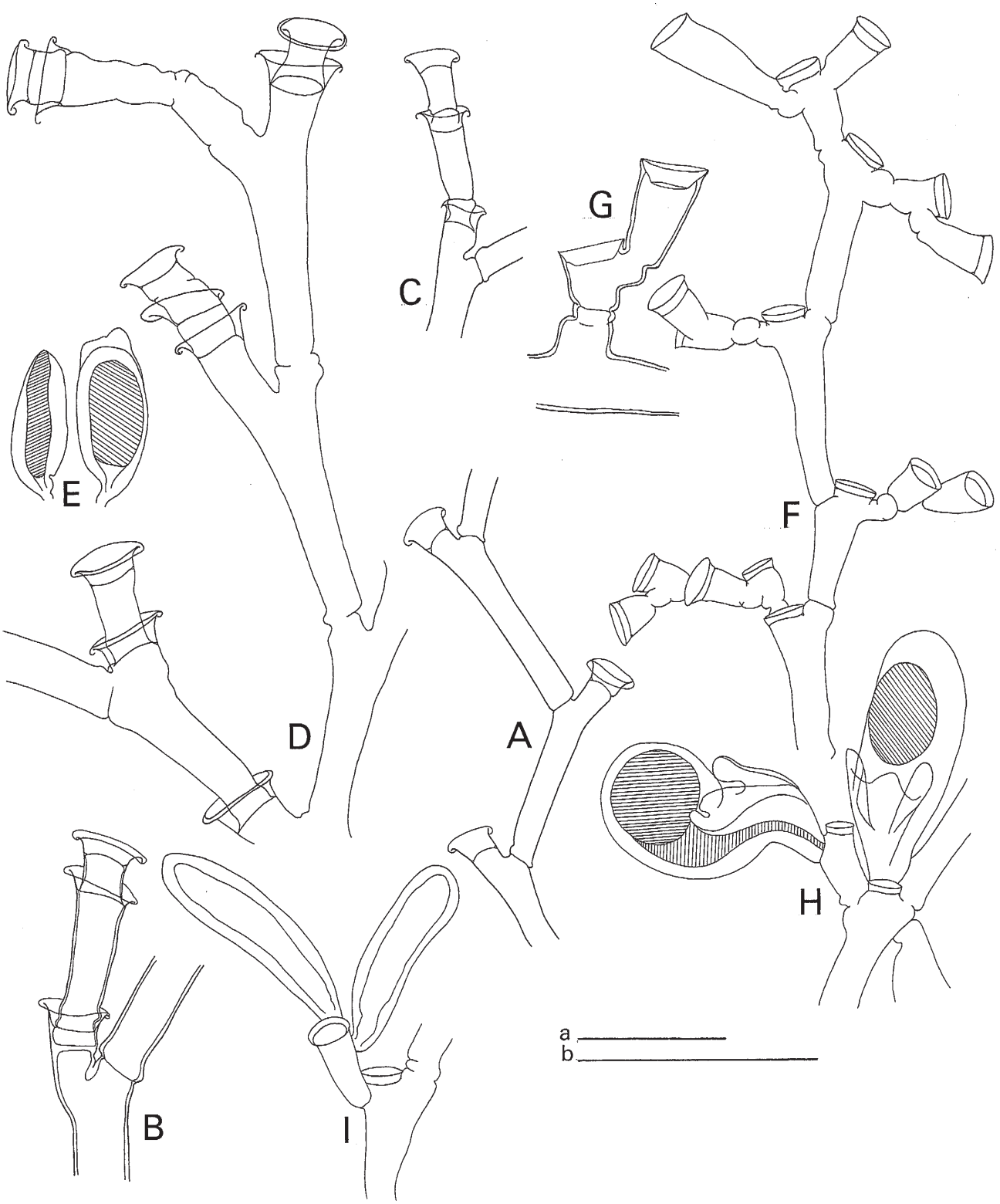

Fig. 16. A–E. ***Halecium delicatulum*** Coughtrey, 1876. **A**, top part of stem. **B, C**, repeatedly renovated hydrothecae (BS 682, slide 4399). **D**, part of stem with renovated hydrothecae (Loc. 280, slide 3806). **E**, male gonothecae, lateral view (Loc. 343, slide 3845). **F–I,** ***Halecium expansum*** Trebilcock, 1928. **F**, part of stem. **G**, lateral budding of hydrotheca. **H**, female gonothecae, lateral and frontal views. **I**, male gonothecae, lateral view (Loc. 157, slide 3681). Scales: a, 1 mm (A, C, F–I); b, 0.5 mm (B, D, E). W.V.

REMARKS: Synonymy and variability of New Zealand material of this species have been discussed at length by Ralph (1958: 334–338) and we have little to add to those remarks. The species occurs as both monosiphonic and polysiphonic colonies; the polysiphonic colonies are generally considered to be older specimens developing from monosiphonic colonies, though both are found with gonothecae. The species is primarily characterised by the length of the primary hydrophores, though that length is subject to considerable variability: in certain colonies the hydrophore is almost sessile and the rim of the hydrotheca touches the internode supported by the apophysis of the hydrophore-bearing internode. In other colonies the hydrophore is quite long and may face away from the internode. The species is furthermore characterised by the strongly everted hydrothecal rim, though that eversion is usually more prominent in the monosiphonic than in the polysiphonic colonies.

In the specimen from Ralph's collection, Loc. 364, the primary hydrotheca occurs at the end of an articulated, long hydrophore (Ralph's figures 11l), often supporting additional hydrophores that have the character of side branches. The hydrophore in this particular colony often supports a (female) gonotheca developing from its tip.

Halecium fraseri Ralph, 1958 (: 338–340) is not the name of a New Zealand species but one substituted by Ralph for *Halecium flexile* as described by Fraser [1914a: 165, pl. 20 fig. 71, not *Halecium flexile* Allman, 1888 = *Halecium delicatulum* Coughtrey, 1876].

RECORDS FROM NEW ZEALAND: Norfolk Island area; Ranfurly Bank, off East Cape; various localities in the Auckland area; Wellington Harbour; Cook Strait; French Passage; Port Nelson; Woodpecker Bay; Bellona Trough, Tasman Sea; Otago Heads; Bluff; Foveaux Strait, off Stewart Island, and Chatham Islands area.

Depth records of the New Zealand material vary between 25 and 2250 m depth; gonothecae were observed in January, February, April, and May. The species is likely to occur in suitable habitats (wharf piles, stones, algae, bigger hydroids) all around the New Zealand coasts.

DISTRIBUTION: *Halecium delicatulum* is usually conceived as a species with circumglobal distribution in tropical, subtropical, and boreal waters. It is sometimes claimed to be conspecific with both *Halecium antarcticum* Vanhöffen, 1910, and *H. mediterraneum* Weismann, 1883, the first reported from isolated localities in Antarctic waters, the second from many localities distributed over the Mediterranean.

Halecium expansum Trebilcock, 1928 (Fig. 16F–I)

Halecium expansum Trebilcock 1928: 7, pl. 3, figs 2–2c, pl. 4, figs 2-2b; Ralph 1958: 340, figs 12q, 13a; Dawson 1992: 14; Stranks 1993: 6.

?*Halecium expansum*: Leloup 1932: 145, pl. 17, fig. 2; Bouillon *et al.* 1995: 45.

Halecium sessile p.p. Ralph 1958: 331–332, figs 9h-i, 10c-d.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 157, NMNZ Co. 1015, numerous colonies up to 8 mm high on *Ecklonia* holdfast, with many gonothecae. RMNH-Coel. slides 3681. 4 slides in RSC, as *Halecium sessile* Norman, 1866, all from Loc. 157 and in fairly good condition (stained Canada Balsam slides, with indication of male and male gonangia). Ralph's figure 9i is from one of those slides; **Loc. 449**, slide without data, easily recognisable as *Halecium expansum* Trebilcock, 1928; corresponding with Ralph's (1958) fig. 13a. No material from that locality in present collection.

TYPE LOCALITY: St. Clair, Dunedin, "growing on roots of algae in rock-pools" (Trebilcock 1928, syntype in MOV, MVF58891, 1 microslide).

DESCRIPTION (of material from Loc. 157): Stems delicate, about 6–8 mm high, monosiphonic, sympodially built, composed of internodes becoming gradually shorter apically. Basal internodes with terminal apophysis supporting next internodes; hydrotheca budded distolaterally; apophysis becoming gradually more laterally displaced and stem becoming geniculate. Regularity of stem structure interrupted by development of 2 apophyses on both sides of hydrotheca, both apophyses supporting a succession of internodes. Internodes with a few indistinct rings or perisarc undulations basally and just under hydrotheca and apophysis. Hydrothecae on stem internodes completely sessile, occasionally completely obscured by development of apophyses at level of hydrothecal diaphragm, shallow, with diverging walls, not everted. Hydrothecal diaphragm distinct, funnel-shaped and directed downward, with large, circular opening to permit passage of coenosarc; no desmocytes observed. Additional hydrotheca developing by budding from wall of internode directly below hydrothecal diaphragm or from walls of additional hydrothecae, occasionally forming a string of hydrothecae supported by a short hydrophore which itself may be supported by 1 or a few short, ring-shaped internodes. Occasionally, and particularly towards distal part of stem, there are hydrophores of considerable length; these usually do not bear additional hydrothecae.

Perisarc fairly strongly developed, particularly towards hydrothecal diaphragm which appears to be suspended in a ring of perisarc (fig. 16G). No desmocytes were observed.

Hydranths badly preserved in the present sample, but probably large, with about 16 long tentacles.

Gonothecae occur abundantly in the present sample, male as well as female gonothecae being present, though not occurring on the same colony fragment. They tend to aggregate around the internodal hydrotheca, inserting just below the apophysis or apophyses. Female gono-thecae of very characteristic appearance, more or less kidney-shaped and with a short, narrowed basal portion attached to internode, indented on 'ventral' side and with a large, slit-like opening flanked on each side by gutter-shaped flap supporting a hydranth. 'Dorsal' side of female gonotheca broadly rounded. Frontal view shows gonotheca to be distinctly laterally compressed (fig. 16H). In young female gonothecae interior filled with a banana-shaped spadix; 1 single egg per gonotheca ultimately fully develops, filling the apical portion of the gonotheca.

Male gonotheca about as long as female, elongated club-shaped, narrowing basally where attached to internode (or occasionally to additional hydrophore, fig. 16I). Interior of male gonotheca almost completely filled with developing mass of spermatocytes.

Remarks: The material agrees in detail with Ralph's description of *Halecium expansum* and shows only minor differences with Trebilcock's original description. The structure of the strings of hydrothecae in the material from Loc. 157 and the build of the colony is exactly as figured by Ralph (1958, fig. 9h-i, as *H. sessile*); her figure of the female gonotheca (of *H. sessile*, fig. 10c) is that of a kidney-shaped gonotheca with a single large egg and a flap at the 'ventral' margin rather than a tube (as occurs in *H. sessile* and in *H. beanii*, Ralph's fig.10k). The material from Loc. 449 is figured by Ralph (1958, fig. 13a) with distinct desmocytes in the hydrothecae. This detail could not be found in her slide from Loc. 449 in RSC, nor does it occur in our material from Loc. 157. Desmocytes intermediary in the attachment of the base of the hydranth to the lateral hydrothecal wall are probably present in all Haleciidae (as well as in some other hydroid families) but may easily become obscured in permanent mounts.

Although our material is in general agreement with Trebilcock's description, particularly in the development of the hydrothecal diaphragm, we failed to observe the chains of hydrothecae figured by Trebilcock (1928, pl. 4, fig. 2b), however, other details of hydrothecal development (Trebilcock's pl. 3 figs 2a, 2b, 2c, pl. 4, figs 2 and 2a) agree fully with our observations (fig. 16F, G).

Measurements of *Halecium expansum* (in μm):

Ralph's Loc.	157, slide 3681 (part of Ralph's *H. sessile*)	449, taken from description of *H. expansum*
Height of stem	6080	6000
Stem internodes, length	340 – 785	310
Diameter above apophysis	95 – 115	93
Primary hydrotheca, depth	24 – 28	31
Diameter at rim	110 – 140	160
Diameter of hole in diaphragm	45 – 85	
Additional hydrotheca, depth	23 – 30	31
Diameter at rim	125 – 135	160
Diameter of hole in diaphragm	53 – 57	62
Additional hydrophore, length	110 – 340	187
Female gonotheca, total length, including basal portion	730 – 815	
Width in lateral view	395 – 420	
Width in frontal view	255 – 280	
Male gonotheca, total length, including pedicel	620 – 675	
Maximum diameter	155 – 185	

Records from New Zealand: Reef at the Portobello Marine Biological Station, growing on the ascidian *Cnemidocarpus cerea* (Ralph's Loc. 499, see above) and from Brother Islands, Cook Strait, 3.5–9 m, M. Davidson, 10.May.1951 (Ralph's Loc. 157, as *H. sessile*).

Distribution: The species is recorded by Leloup (1932: 145) from floating *Sargassum* from the Gulf Stream, a record given as an "extremely doubtful locality". Leloup's description and his figures (pl. 17 fig. 2) are inconclusive; the material, now in the collections of the 'Institut Royal des Sciences naturelles de Belgique' under no. IG.9739, should be carefully checked. It is excluded from consideration here.

Halecium fragile Hodgson, 1950

Halecium fragile Hodgson 1950: 15, figs 25–27; Ralph 1958: 340, fig. 11a-d; Green 1976: 21; Dawson 1992: 14; Watson 1994a: 66; Watson & Vervoort 2001: 165–167, fig. 8a–e.
Halecium ?fragile: Watson 1979: 234.

Material Examined:
NMNZ Ralph Collection: Loc. 557, unstained slide in RSC as *Halecium fragile*. No further data.

Type Locality: Originally described from D'Entrecasteaux Channel, Tasmania (Hodgson 1950).

Remarks: There is one slide of this species in RSC, Loc. 557, Motuihi Channel, Auckland, on *Synthecium elegans* Allman, 1872; it is well recognisable and agrees with Ralph's descriptions and figures. The gonothecae of this species are described by Medel and Vervoort (2000).

Records from New Zealand: Ralph's record from Motuihi Channel, Auckland, is the only record of this species from New Zealand.

DISTRIBUTION: Besides Hodgson's record from Tasmania this species is doubtfully recorded from a temperate water reef near Sydney, New South Wales, at 23 m depth by Watson (1979). Also known from central eastern Bass Strait, Australia at 36 m depth (Watson 1994a) and the Tasmanian seamounts, 1110 m depth (Watson & Vervoort 2001).

Halecium lenticulare Trebilcock, 1928

Halecium lenticulare Trebilcock 1928: 6, pl. 3, figs 3–3d, pl. 4, figs 1–1b; Ralph 1958: 331, fig. 9g; Dawson 1992: 15.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 224, dried out slide in RSC as *Sertularella simplex* + *Halecium lenticulare*, no data. On label: "somewhat gibbous, granuled". Slide useless; **Loc. 298**, dried out slide in RSC as *Sertularella simplex* + *Halecium lenticulare*, no data. Slide useless; **Loc. 497**, partly dried out slide in bad condition; no gonothecae observed.

TYPE LOCALITY: Bluff Harbour in the extreme south of South Island [holotype in MOV, MVF57889, 1 microslide; possible paratypes MVF57942 (2 microslides)]. Also a spirit sample, MVF57938, registered as a possible holotype (Stranks 1993).

REMARKS: One slide in RSC from Loc. 497 is the only fair specimen we have seen. It is not in the present collection, though Ralph records as much as 23 complete stems; this material must be considered lost.

RECORDS FROM NEW ZEALAND: The material in RSC originated from Taylor's Mistake, Christchurch and from Palliser Bay, Cook Strait. Additional material recorded by Trebilcock (1928) originated from St Clair, Dunedin and Island Bay, Wellington.

DISTRIBUTION: Known only from New Zealand.

Halecium plicatocarpum sp. nov. (Fig. 17)

MATERIAL EXAMINED:

NZOI Stns: E849, 1 colony, 70 x 45 mm, many gonothecae (holotype, H-760 in NIWA collection). RMNH-Coel. slide 2186 with 20 mm long fragment is part of type series; **E860**, 1 colony, 50–40 mm high, with many male gonothecae (paratype, P-128 in NIWA collection). 2 RMNH-Coel. slides 2164 are part of the type series. Fragment of paratype as RMNH-Coel. 28553.

TYPE LOCALITY: Southwest Pacific, WNW of Three Kings Islands, 33°55.00′ S, 171°32.00′ E, 216 m.

DESCRIPTION (of holotype): Colony irregularly built, with forked, polysiphonic stem about 70 mm high, branches with a spread of about 45 mm, also mainly polysiphonic with exception of upper parts of colony, rather stiff. Distal parts of colony monosiphonic, composed of irregular array of internodes separated by oblique nodes, with 1 or more apical apophyses, supporting either hydrothecae or small branches. Internodes slender, occasionally irregularly wrinkled or indistinctly ringed basally or along length of internode, with thick perisarc. Apophyses of varied length, occasionally only indistinctly developed. In older parts of colony internodes become covered by fairly thick secondary tubules running upwards along length of stem, also covering side branches or developing side branches that become divided into internodes with one or more apophyses.

Primary hydrothecae placed on a long, usually articulated hydrophore or pedicel, renovated several times (usually 3 or 4 times). Hydrothecae gradually widening towards circular rim and with strongly everted margin; hydrophores supporting renovated hydrothecae of varied length, attached to diaphragm of preceding hydrotheca. No desmocytes have been observed. Hydranths present but badly preserved, of medium size.

Gonothecae, presumably male, abundant, inserting on internodes or secondary tubules in proximal parts of colony; large, slightly laterally compressed, on a short pedicel, composed of 2 ribbed valves fitting together like shells of a lamellibranch. Each valve with 5 or 6 more or less concentric ribs, each produced into a short, blunt apex, those of largest rib of each valve sheltering a depression with circular orifice, flanked by the 2 processes through which contents of gonotheca can escape. Each gonothecae is filled with an egg-shaped body of uniform structure, probably developing spermatocytes.

REMARKS: This new species is characterised by the structure of the hydrothecae with their long, articulated pedicels (hydrophores), with repeated renovations and strongly everted rim, and by the curiously ribbed gonothecae. One of the gonothecae in the slide has the top of one of its ribs drawn out into a curved, horn-shaped process.

We have hesitated about the identity of the paratype. In the specimens from NZOI Stn E860 the colony is better developed, fan-shaped, with a strong, much forked stem and numerous renovations of the hydrothecae on a single pedicel, resulting in tiers of closely packed, shallow hydrothecae with strongly everted margins that give this specimen a quite different superficial appearance. The internodal apophyses usually have a short hydrotheca with non-everted rim, from its diaphragm springs an articulated pedicel forming the beginning of a series of strongly renovated hydrothecae, the eversion of the rim usually increases apically;

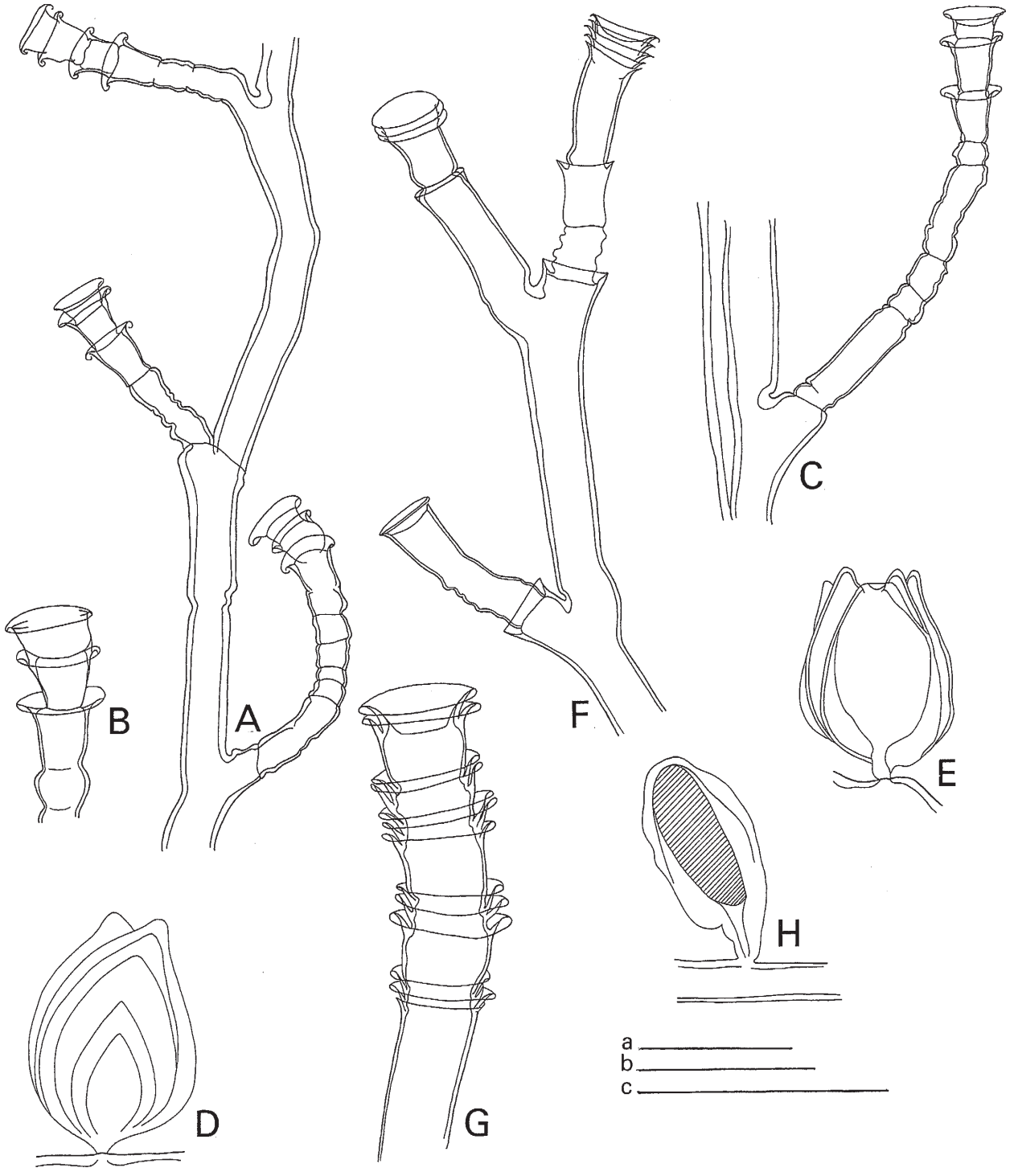

Fig. 17. ***Halecium plicatocarpum*** sp. nov. **A**, part of stem. **B, C**, renovated hydrothecae. **D, E**, female gonothecae, lateral views from different angles (NZOI Stn E849, holotype, slide 2186). **F**, part of stem. **G**, repeatedly renovated hydrotheca. **H**, male gonotheca (NZOI Stn E860, paratype, slide 2164). Scales: a, 1 mm (A, C, F); b, 1 mm (D, E, H); c, 0.5 mm (B, G). W.V.

MEASUREMENTS of *Halecium plicatocarpus* sp. nov. (in μm):

	NZOI Stn E849 slide 2186
Diameter basal part of axis	420 – 435
Internodes of monosiphonic part, length	655 – 1235
Diameter	110 – 125
Primary hydrotheca, length of pedicel (hydrophore)	330 – 660
Diameter of pedicel	85 – 95
Diameter of hydrotheca at rim	165 – 195
Diameter of diaphragm	85 – 105
Height (diaphragm-rim)	17 – 28
Male (?) gonotheca, length	1140 – 1235
Diameter in lateral view	820 – 835
Diameter in frontal view	925 – 990

the uppermost hydrotheca typically showing a diaphragm in the shape of an inverted cone, to which remains of a hydranth are attached. There are no desmocytes. The specimen bears many (male?) gonothecae of which many are identical to those described above for *Halecium plicatocarpum*, with a distinct pattern of elevated ribs on the surface of the 'valves'. In some gonothecae, that are apparently in a more advanced stage of development, the patterns of raised ribs is obscure, the gonotheca having an irregular, sac-shaped appearance with the indication of some carinae only. They nevertheless have a circular aperture at the top hidden between two scarcely raised 'lips'.

RECORDS FROM NEW ZEALAND: Known from one locality in the Three Kings Islands area, 33°55.00′ S, 171°32.00′ E, 216 m depth and a locality in the Three Kings Basin, 32°21.00′ S, 167°41.00′ E, 1246 m depth; the (male?) gonothecae occurred in March.

ETYMOLOGY: The specific name *plicatocarpum* refers to the presence of ribs on the gonotheca; plicatum indicating the presence of folds.

Halecium ralphae Watson & Vervoort, 2001
(Fig. 18A–G)

Halecium beanii p.p. Ralph 1958 fig. 10e.
Halecium sessile p.p. Hirohito 1995, fig. 7g.
Halecium ralphae Watson & Vervoort, 2001: 162–165, fig. 7a–d.

MATERIAL EXAMINED:

NZOI Stn: Q11, single colony, 80 mm high, base invested by sponge. Abundant ripe female gonothecae. RMNH-Coel. 28552, 2 slides 2318.

NMNZ Ralph Collection: Loc. 550, NMNZ Co. 1339, fragments of a colony or colonies about 50 mm high with male and female gonothecae. Much deformed by storage in narrow tube. RMNH-Coel. slides 4396. Mixed with *Clytia gigantea* (Hincks, 1866). Stained Canada Balsam slide in RSC as *Halecium beanii* Allman.

TYPE LOCALITY: Southwest Pacific, Chatham Rise, 43°44.10′ S, 179°31.62′ W, 300 m.

DESCRIPTION (of NZOI Stn Q11 material): Colony flexuous, composed of polysiphonic, about 80 mm high main stem and side branches, limp when taken out of fluid. Stem composed of primary tube covered by secondary tubules that also cover the principal branches. Branching irregularly pinnate, roughly in 1 plane. Primary axis and monosiphonic parts of colony segmented, segments (internodes) slender, nodes slightly oblique and inclined in opposite directions. Primary hydrotheca placed almost at end of node on conspicuous hydrophore, almost perpendicular to length axis of internode, slightly tilted downwards, shallow, without desmocytes. Various hydrophores of branch of hydrocladium not exactly opposite but slightly turned frontally. Hydrocladia springing from internodes just under insertion of primary hydrotheca on hydrophore, usually placed on distinct apophysis; they may develop into branches by growth of secondary hydrocladia and being covered by secondary tubules. Perisarc of internodes fairly thick, with distinct bulge a short distance under hydrotheca; perisarc of ultimate internodes thin and transparent. Secondary hydrophores and hydrothecae may develop direct from diaphragm of primary hydrotheca, occasionally with a short intermediate internode. Those secondary hydrophores usually carry a hydrotheca inserting on a conspicuous pedicel under the secondary hydrotheca, occasionally they support a hydrocladium.

Female gonothecae abundant, large, more or less disk-shaped to oval in outline, attached by means of a distinct pedicel to secondary or tertiary hydrophores or (occasionally) direct to internodes immediately below primary hydrophore, each with a pair of lateral openings for a pair of hydranths (no longer present in this material). Apertures of supplementary hydranths protruding laterally, as can distinctly be seen in gonothecae in frontal view. Each gonotheca contains 5 large eggs (or developing planulae), in a circle around the remnants of a spadix. The exact shape of this curious gonotheca is best seen in figure 18C. In a single instance a female gonotheca was seen to develop directly from within a hydrotheca (fig. 18C).

The colony fragments from Ralph's collection, Loc. 550, differ by the presence of many renovated hydrothecae, some with as many as 4 renovations. Many male gonothecae are present, usually inserted in pairs on both sides of primary hydrophores but occasionally inserted

singly. Male gonotheca elongated club-shaped, covered with hyaline perisarc, apex rounded, base narrowing into scarcely perceptible, short pedicel. Interior of gonotheca filled with a strand of developing sperm cells.

According to Ralph male and female gonothecae occurred on the same colony in the Chatham Islands material, the males at the distal end of the shoot, the females proximally. Owing to the fragmented state of the colonies in Ralph's material this could not be checked. Ripe gonothecae of both sexes were found in March; ripe female gonothecae were also observed in January.

REMARKS: This species has a colony structure comparable to that of *Halecium beanii* (Johnston, 1838), though the gonothecae here are principally supported by the primary and secondary hydrophores. It is immediately distinguishable by the large, curiously shaped female gonothecae, that set it apart from the remaining described species of *Halecium*.

We have identified part of the material described and figured by Ralph (1958: 332– 334) as *Halecium beanii* as *Halecium ralphae* Watson & Vervoort, 2001. It seems beyond dispute that the gonotheca figured by Ralph (1958, fig. 10e) from Chatham Island material does not belong to a female colony of *H. beanii*. Though a certain amount of variability does occur amongst the female gonothecae of that species in many North Atlantic colonies that were inspected, we never found the structure figured by Ralph from the Chatham Island material. However, Ralph's figure closely resembles the female gonotheca found in our material. Fortunately one of the Chatham Island samples mentioned by Ralph (localities nos 550, 551, and 552) survives in her collection (no. 550); this material, besides the characteristic female gonothecae also has ripe male gonothecae.

Part of the Sagami Bay material described and figured by Hirohito (1995, fig. 7g) may also belong here. The female gonotheca in that material is not described in detail, but the ripe gonotheca figured has many charac-ters in common with the Chatham Island specimens.

RECORDS FROM NEW ZEALAND: So far only known with certainty from the Chatham Islands area (various localities, not specified by Ralph), depth 475–512 m. The specimen described above originates from the Chatham Sill, 300 m depth.

DISTRIBUTION: The species may also occur in Japanese waters (Sagami Bay; Hirohito 1995, as *Halecium sessile* p.p.) and has been recorded from the Tasmanian seamounts, 700–987 m (Watson & Vervoort 2000).

Halecium sessile Norman, 1867 (Fig. 18H–M)

Halecium sessile Norman 1867: 196; Ritchie 1911: 812, pl. 87, figs 8, 9; Billard 1912: 462; Stechow 1913a: 144; 1913b: 9, 86, fig. 54; Fraser 1918: 332, 353; 1921: 165, fig. 66; Stechow 1923b: 5; Prenant & Teissier 1924: 25; Billard 1927: 329; Hargitt 1927: 506; Broch 1928: 60; Teissier 1930: 184; Billard 1933: 20; Dollfus 1933: 129; Kramp 1935: 148, fig. 62B; Philbert 1935b: 25; Perrier 1936: 21, fig; Kramp, 1938: 68; Vervoort 1941: 195; Kramp 1943: 41; Fraser 1944a: 201, pl. 37, fig. 178; Teissier 1950: 13; Picard 1951a: 110; 1951b: 260; 1952a: 349; 1958: 192; Pennycuik 1959: 174, pl. 3, fig. 3; Yamada 1959: 33; Burdon-Jones & Tambs-Lyche 1960: 7; Redier 1965: 371; Rees & Thursfield 1965: 109; Teissier 1965: 21; Rees & White 1966: 275; Vervoort 1966: 100, fig. 1; Redier 1967: 386; Vervoort 1968: 95; Fey 1970: 397; Patriti 1970: 21, fig. 17; Jägerskiöld 1971: 62; Christiansen 1972: 298; Schmidt 1972a: 42; 1973a: 283; Campbell 1974: 146, fig. 5; Hirohito 1974: 6, fig. 1; Cornelius 1975b: 406, fig. 11; Millard

MEASUREMENTS of *Halecium ralphae* (in μm):

	NZOI Stn Q11 slide 2328	Ralph's Loc. 550 slide 4396	Tasman Seamounts (Watson & Vervoort 2001)
Length of stem internode	665 – 815	630 – 665	
Diameter at node	160 – 175	150 – 185	
Length of hydrocladial internode	665 – 850	705 – 750	360 – 704
Diameter at node	95 – 140	110 – 150	64 – 96
Height of primary hydrotheca (diaphragm-rim)	30 – 37	30 – 37	20 – 36
Diameter at diaphragm	148 – 155	140 – 148	
Diameter at rim	162 – 170	163 – 165	130 – 160
Length of secondary hydrophore (bottom-diaphragm)	295 – 355	210 – 60	256 – 472
Height of secondary hydrotheca	15 – 19		29 – 35
Diameter at rim	133 – 163	133 – 155	
Female gonotheca, length (including pedicel)	1195 – 1365		
Breadth	760 – 975		800 – 848
Maximum diameter	420 – 540		
Male gonotheca, length		1110 – 1180	
Maximum diameter		185 – 260	

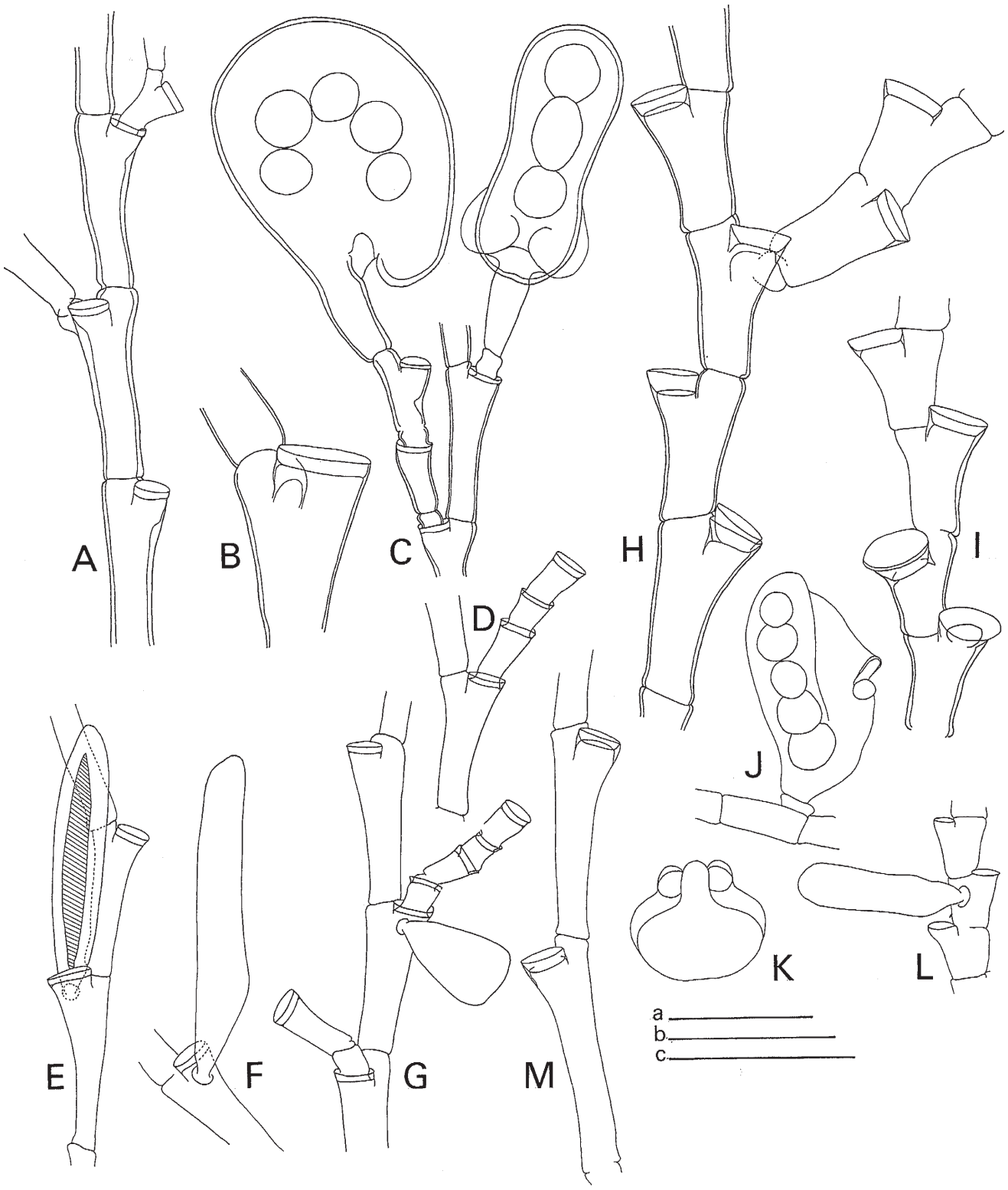

Fig. 18. A–G. ***Halecium ralphae*** Watson & Vervoort, 2001. **A**, part of stem. **B**, hydrotheca. **C**, two mature female gonothecae, in lateral and frontal aspects (NZOI Stn Q11, slide 2318). **D**, repeatedly renovated hydrotheca. **E, F**, mature male gonothecae. **G**, part of stem with renovated hydrothecae and developing gonotheca (Loc. 550, slide 4396). **H–M.** ***Halecium sessile*** Norman, 1867. **H, I**, parts of stem. **J**, mature female gonotheca, lateral view. **K**, female gonotheca, seen from top (NZOI Stn B482, slide 2776). **L**, male gonotheca, lateral view (NZOI Stn G694, slide 2864). **M**, top part of stem (NZOI Stn I667, slide 2884). Scales: a, 1 mm (A, C–I, M); b, 1 mm (J, K, L); c, 0.25 mm (B). W.V.

1975: 154, fig. 48K–M; 1978: 193 *et seq.*; Watson 1979: 234; Stepan'yants 1980: 116; Castric & Michel 1982: 84, fig.; Hirohito 1983: 5, 11; Aguirrezabalaga *et al*. 1987: 111; Staples & Watson 1987: 218; Aguirrezabalaga *et al*. 1988: 224, fig. 7A–F; Altuna & García Carrascosa 1990: 54 *et seq.*, fig.; Cornelius & Ryland 1990: 137, fig. 4.15; Cairns *et al.* 1991: 22; Castric-Fey & Chassé 1991: 523; Dawson 1992: 15; Ramil & Vervoort 1992a: 85–86, fig. 20d; Boero & Bouillon 1993a: 263; Watson 1994a: 66; Altuna Prados 1995: 54; Bouillon *et al*. 1995: 47; Cornelius 1995a: 292-295, fig. 68; Hirohito 1995 (English text): 27–29, fig. 7e-h.

Halecium sessile p.p. Ralph 1958: 331–332 (not figs. 9h-i, 10c-d = *Halecium expansum* Trebilcock, 1928).

MATERIAL EXAMINED:

NZOI Stns: B482, fragment 25 x 15 mm with female gonothecae. RMNH-Coel. slide no. 2776. With *Filellum serratum* (Clarke, 1879); **G694**, 15–20 mm high colonies on small stone. Male gonothecae present. 3 RMNH-Coel. slides 2864; **I667**, 1 colony composed of 2 stems about 20 mm high, no gonothecae. Specimen with slender internodes. RMNH-Coel. slide 2884; **Q116** (dried out sample): *Halecium* cf. *sessile* Norman, 1867 (J.E. Watson).

TYPE LOCALITY: Deep water of the Minch, Hebrides, U.K. (Norman 1867).

DESCRIPTION (of NZOI Stn B482 specimen): Stem height about 25 mm, polysiphonic in lower part, distally monosiphonic, with several polysiphonic side branches. Higher part of stem and side branches with forking, subopposite monosiphonic branches. Colony fairly stiff, not collapsing when out of fluid. Monosiphonic parts a succession of internodes, nodes distinct, oblique sloping alternately, internode below node with ring-shaped expansion. Internodes distally sharply widening to form a large hydrophore (apophysis) supporting a shallow hydrotheca. Hydrothecal rim circular, varying from almost at right angle to internode axis to distinctly inclined downwards. Part of internode projecting above hydrothecal rim quite short; in many internodes the node lies below the hydrothecal rim. Length of internode varied, short in older parts of colony, longer in youngest parts; hydrothecae alternately directed left and right in younger parts of colony to distinctly frontally directed in older parts. Hydrotheca with strong diaphragm to which remnants of large hydranth attached; diaphragm with circular perisarc ring. Some hydrothecae have cup-shaped, renovated, secondary hydrotheca attached to diaphragm of primary hydrotheca (fig. 18H). No desmocytes have been observed, either in the primary or secondary hydrothecae.

Branching of monosiphonic axes takes place by budding from hydrophore directly under diaphragm of primary hydrotheca, a distinct foramen present.

Female gonothecae abundantly present, inserted on the internodes under diaphragm of primary hydrotheca, forming a string of gonothecae almost along entire branch. Gonothecae big, more or less kidney-shaped, fairly swollen, with 'ventral' side protruding and with a large aperture covered by slightly thickened lip and flanked by a pair of distinctly everted tubes from each of which protrudes a small hydranth. Lateral walls of gonotheca with longitudinal carina or perisarc strip; number of ova 5–7. Gonothecal base narrowed, pedicel composed of a single short internode.

Male gonothecae (on material from NZOI Stn G694), springing in same fashion from internodes, bodies cylindrical, elongated, slightly laterally compressed, with rounded apex and narrowed basal part. They are almost completely filled with developing spermatocytes, leaving only a narrow, hyaline, peripheral zone.

MEASUREMENTS *Halecium sessile* (in μm):

NZOI Stns	B482 slide 2776	I667 slide 2884
Length of stem internode	530 – 590	820 – 985
Diameter at node	155 – 170	100 – 115
Length internode of branches	420 – 530	655 – 820
Diameter at node	140 – 150	84 – 95
Primary hydrotheca, depth	39 – 56	34 – 39
Diameter at rim	180 – 190	115 – 125
Diameter at diaphragm	125 – 135	100 – 115
Secondary hydrotheca, depth	73 – 84	
Diameter at rim	170 – 180	
Female gonotheca, length	1230 – 1310	
Maximum diameter	655 – 690	
Male gonotheca, length*	900 – 1015	
Maximum diameter*	260 – 270	

* taken from NZOI Stn G694, slides 2864

REMARKS: Length of internodes is variable, longest in the youngest parts. In the colony from NZOI Stn I667, from a depth of 648 m, the internodes are extremely long and slender, usually with a distal part projecting above the hydrothecal rim. The hydrothecal aperture is usually distinctly tilted downwards and in some hydrothecae distinct desmocytes are present. This last phenomenon could not be conclusively proved as the material is rather dirty and remnants of big hydranths are present. In several respects (length of internodes, position and direction of the hydrothecae and size of the hydranths) this material comes near *Halecium macrocephalum* Allman, 1877, a poorly known species of which the gonothecae are unknown. As in the New Zealand material from NZOI Stn I667 several primary hydrothecae bear cup-shaped secondaries comparable to those found in the fertile colonies from NZOI Stns B482 and G694, we have referred this material to *Halecium sessile* Norman, 1867, but with some hesitation.

The depth records of the material referred to *H. sessile* vary between 19 and 648 m. Female gonothecae were found in June, male gonothecae in January.

RECORDS FROM NEW ZEALAND: The species has previously been recorded by Ralph (1958), but her material from Loc. 157 (Cook Strait) is here re-described as *Halecium expansum* Trebilcock, 1928, while her material from off Doubtless Bay (Loc. 189) has not been re-discovered. The species is here doubtfully recorded from Cook Strait; indubitable specimens have been found off Stewart Island and on the Bounty Platform.

DISTRIBUTION: The exact geographical distribution of this species cannot be accurately given because of difficulties in the identification of sterile colonies. It is generally considered a near-cosmopolitan species, occurring in all oceans, with the exception of the polar seas (Vervoort 1966). In the eastern Atlantic it is widely distributed (Ramil & Vervoort 1992a; Cornelius 1995a); it also occurs along the Atlantic coast of the United States (Fraser 1944a). Pacific records include both the eastern Pacific (Torrey 1902, 1904) as well as the Indo-West Pacific with the following records: Gulf of Suez (Billard 1933), various localities along the Australian east coast (Ritchie 1911; Pennycuik 1959; Watson 1979), Bass Strait (Watson 1994a), off Sirun Island, Philippines (Nutting 1927), Malay Archipelago (Billard 1933), Amoy, South China Sea (Hargitt 1927) and various localities in Japanese waters (Stechow 1913b; Hirohito 1974, 1983, 1995).

Halecium tenellum Hincks, 1861b (Fig. 19A, B)

[Restricted bibliography; mainly Indo-Pacific records; for synonymy see Cornelius (1975b).]

Halecium tenellum Hincks 1861b: 252, pl. 6, figs 1–4; Hilgendorf 1911: 540; Linko 1911: 26–29, 240, fig. 5; Fraser 1913b: 169; Ritchie 1913b: 10, 14; Broch 1918: 46–50, fig. 20; Jäderholm 1919: 5, pl. 1, fig. 3; Stechow 1919: 41, fig. J–K; 1923b: 5; Jäderholm 1926: 3; Hargitt 1927: 507; Broch 1927: 115; 1928: 61; 1933: 17; Fraser 1937: 110–111, pl. 23, fig. 121; Leloup 1937b: 4, 17, fig. 8; Fraser 1938b: 9, 44; 1938c: 110; 1938d: 133; 1939: 159 *et seq.*; 1940b: 497; Leloup 1940b: 7; Fraser 1948: 225; Dawydoff 1952: 54; Day *et al.* 1952: 404; Buchanan 1957: 357; Hamond 1957: 307, fig. 14; Millard 1957: 193, fig. 5; Vervoort 1959: 229, fig. 8; Yamada 1959: 31; Leloup 1960: 220, 230; Naumov 1960: 454–455, fig. 344; Mammen 1965: 9, figs 35–36; Rees & Thursfield 1965: 109; Vasseur 1965: 52, 70; Millard 1966a: 471, fig. 11C–F; Vervoort 1966: 102, fig. 2; Millard 1968: 253, 258; Vervoort 1968: 95; Day *et al.* 1970: 12; Patriti 1970: 24, fig. 21; Blanco & Bellusci de Miralles 1972: 5, figs 1–2; Hirohito 1974: 8–9, fig. 2; Leloup 1974: 11; Millard & Bouillon 1974: 5, 22; Rho & Chang 1974: 136, pl. 1, figs 1–4; Vasseur 1974: 158; Cornelius 1975b: 409, fig. 12; Millard 1975: 156, fig. 50F–L; 1977a: 11; 1977b: 106; Rho 1977: 252, 414, pl. 71, no. 63; Millard 1978: 193 *et seq.*; Gosner 1979: 84; Stepan'yants 1979: 104, pl. 20, fig. 5A–V; Millard 1980: 130; Hirohito 1983: 5, 11; Austin 1985: 55; Stepan'yants 1985: 137; Antsulevich 1987: 106; Gili *et al.* 1989: 81, fig. 10A; Cornelius & Ryland 1990: 140, fig. 4.15; Cairns *et al.* 1991: 23; Calder 1991: 22–24, fig. 14; El Beshbeeshy 1991: 40–44, fig. 6; Park 1991: 544; Dawson 1992: 15; Park 1992: 286; Ramil & Vervoort 1992a: 90–91, fig. 21f, g; Boero & Bouillon 1958: 263; Medel & Vervoort 2000: 23–25 (*cum syn.*).

Halecium (?) *tenellum*: Ralph, 1958: 340, fig. 11f-g.

Halecium geniculatum Nutting 1899: 744–745, pl. 63, fig. 1a-d. [Not *Halecium geniculatum* Norman, 1867 = *Halecium halecinum* (Linnaeus, 1758)].

Halecium washingtoni Nutting 1901c: 789.

MATERIAL EXAMINED:

NZOI: Stn I89, a few colonies on old hydroid stems, mixed with *Monotheca pulchella* (Bale, 1882) and other hydroids. No gonothecae. RMNH-Coel. slides 4766, 4767.

NMNZ Ralph Collection: Loc. 447, the specimen referred to by Ralph (1958) is still in her slide collection, a well kept, stained slide with a fine though small specimen. There is very little to distinguish this specimen from *H. corrugatissimum* mentioned above; the internodes are slightly less 'corrugated' or ringed, but this character is likely to be variable.

TYPE LOCALITY: Salcombe Bay, Devon, England, on *Cellaria fistulosa* (Linnaeus, 1758) (Bryozoa) (Hincks 1861; Cornelius 1975; syntypes in NHM (1899.5.1.168).

REMARKS: More material of this species may be hidden amongst material recorded as juvenile *Halecium delicatulum* Coughtrey, 1876, which it greatly resembles. No gonothecae have been observed to confirm the presence of *H. tenellum* in New Zealand waters.

RECORDS FROM NEW ZEALAND: Doubtfully recorded from New Zealand by Ralph (1958): Goat Island, Otago Harbour (Ralph's Loc. 447); this material has been checked. Additional (doubtful) record from southeast of Norfolk Island, 29°25.30′ S, 168°00.20′ E, 65 m depth. As all material recorded so far was sterile there is no definite proof of the occurrence of this species in New Zealand.

DISTRIBUTION: Probably worldwide at suitable habitats (on colonial hydroids and bryozoans) in Atlantic, Indian, and Pacific Oceans. An accurate picture cannot be given as *H. tenellum* is easily overlooked and can only be definitely identified if fertile.

Halecium sp. (Fig. 19C, D)

MATERIAL EXAMINED:

NZOI Stns: D1, 35 mm high colony inpoor condition; **D90**, 2 mutilated colonies 40 and 70 mm high, strongly polysiphonic but in poor condition; **D131**, gear DCMB, mutilated speci-

men from dried out sample; **D145**, large mutilated colony, height about 150 mm. RMNH-Coel. slide 2833; **I75**, unidentifiable colonies, with *Monostaechas quadridens* (McCrady, 1859). RMNH-Coel. slide 2131; **I707**, unidentifiable specimen about 40 mm high, attached to bryozoans; **V366**, mutilated, strongly polysiphonic colony about 60 m high, only some hydrothecae are present; cirriped attached to stem. RMNH-Coel. slide 2932; **V370**, branched, polysiphonic colony in poor condition; **V373**, colony, 50 x 60 mm, on shell; no gonothecae. RMNH-Coel. slide 2936; **W252**, strongly abraded colony, 50 mm high; **W257**, mutilated stem about 120 mm high; no gonothecae.

NMNZ: BS 389, mutilated specimen bearing some colonies of *Synthecium elegans* Allman, 1872.

NMNZ Ralph Collection: Loc. 526, NMNZ Co. 1258, unrecognisable species of *Halecium* on *Salacia bicalycula* (Coughtrey, 1876); **Loc. 552**, NMNZ Co. 1340, basal parts of a larger colony of which only axis and hydrorhizal stolons left; **Loc. 562**, unrecognisable species of *Halecium* on worm tube. No slide.

REMARKS: The above material, all sterile, could not confidently be identified. Some of it, undoubtedly, belongs to *Halecium beanii* (Johnston, 1838), but in absence of the gonothecae, this cannot be ascertained. The colonies from NZOI Stns V366, V370, V373, and D145 are of uniform structure. They agree with deep water material from the *Galathea* Expedition referred to *Halecium beanii* by one of us (Vervoort 1966: 103, fig. 3), to which it conforms in the length of the internodes and structure of the hydrotheca (cf. fig. 19C, D).

Hemitheca Hilgendorf, 1898

TYPE SPECIES: *Hemitheca intermedia* Hilgendorf, 1898

Hemitheca intermedia Hilgendorf, 1898

Hemitheca intermedia Hilgendorf 1898: 202, pl. 16, figs 2, 2a; Stechow 1913b: 23, fig. 3; Bale 1924: 228; Finley 1928: 257; Ralph 1958: 328, fig. 9a-b; Dawson 1992: 15.

TYPE LOCALITY: Dunedin wharf, on submerged piles (Hilgendorf 1898); no type specimen is known to exist.

REMARKS: For a discussion of this questionable species and genus we refer to Ralph (1958: 326–328, fig. 9a-b). The characters of the genus *Hemitheca* are far from clear; it was originally assigned to the Anthoathecatae by its founder but recognised as belonging to Leptothecatae by Stechow (1913) who placed the genus in Haleciidae. A second species was briefly described by Hirohito (1983: 12, fig. 1) as ?*Hemitheca* sp. from Niijima, off Sagami Bay, Japan. The relationship of this second species with Hilgendorf's *Hemitheca intermedia* is quite obscure.

RECORDS FROM NEW ZEALAND: Beyond the original record from submerged piles in Dunedin Harbour no additional material has been discovered.

DISTRIBUTION: Known only from a doubtful New Zealand record.

Hydrodendron Hincks, 1874

TYPE SPECIES: *Halecium gorgonoide* G.O. Sars, 1874.

For a review of the species in this genus see Rees and Vervoort (1987: 12–23). In that review *Ophiodes parasitica* G.O. Sars, 1874, was incorrectly transferred to *Hydrodendron* as *Hydrodendron parasiticum* (G.O. Sars, 1874); the species should stand as *Ophinella parasitica* (G.O. Sars, 1874) and belongs in Kirchenpaueriidae (details in Cornelius (1995a: 138)). To the species listed in the review referred to above the following should be added: *Hydrodendron blackburni* (Watson, 1973) (= *Ophiodissa blackburni* Watson, 1973: 166, figs 10–12); *Hydrodendron violaceum* Hihohito 1995, and *Hydrodendron stechowi* Hirohito, 1995.

Hydrodendron was recently subdivided into two subgenera by Hirohito (1995: 32), viz. *Dendrophiodissa* Hirohito, 1995, with the sole species *Hydrodendron (Dendrophiodissa) stechowi* Hirohito, 1995, and *Hydrodendron* Hincks, 1874, with the remaining species.

Hydrodendron mirabile (Hincks, 1866b) (Fig. 19E, F)

Ophiodes mirabilis Hincks 1866b: 422–423, pl. 14, figs 1–5; 1868: 231–233, pl. 45, fig. 2.

Ophiodissa mirabilis: Stechow 1919: 42; Cornelius 1975b: 414–417, fig. 14.

Hydrodendron mirabile: Rees & Vervoort 1987: 13, 20; Cornelius 1995a: 309–311, fig. 73; Medel & Vervoort 2000: 26–28 (*cum syn.*).

Ophiodes caciniformis Ritchie 1907b: 500, pl. 23, figs 11–12, pl. 24, fig. 1; Babic 1913: 473, fig. 7.

Ophiodissa caciniformis: Fraser 1944a: 203–204, pl. 38, fig. 181; 1944b: 37; Vervoort 1959: 218, figs 1–2; 1968: 95; García-Corrales *et al.* 1978: 16, fig. 5; Masunari 1983: 84; Vervoort 1987: 88.

Diplocyathus caciniformis: Leloup 1935: 10; 1939a: 418, fig. 1; 1939b: 4, fig. 3.

Phylactotheca caciniformis: Pennycuik 1959: 174.

Hydrodendron caciniformis: Millard 1957: 186, fig. 3; Ralph 1958: 342, figs 13b, c, 14a; Mammen 1965: 34; Millard 1966b: 490, fig. 1; Berrisford 1969: 394; Millard 1975: 158, fig. 51; Day *et al.* 1970: 12; Hirohito 1974: 9–12, fig. 3; Smaldon *et al.* 1976: 17; Millard 1978: 194 *et seq.*; Rho & Park 1980: 16–17, pl. 1, figs 1–4; Antsulevich 1983: 1144, fig. 1B; Rees & Vervoort 1987: 20; Park 1991: 544; Bouillon *et al.* 1995: 47.

Hydrodendron caciniforme: Rees & Thursfield 1965: 111, 198; Park 1992: 287.

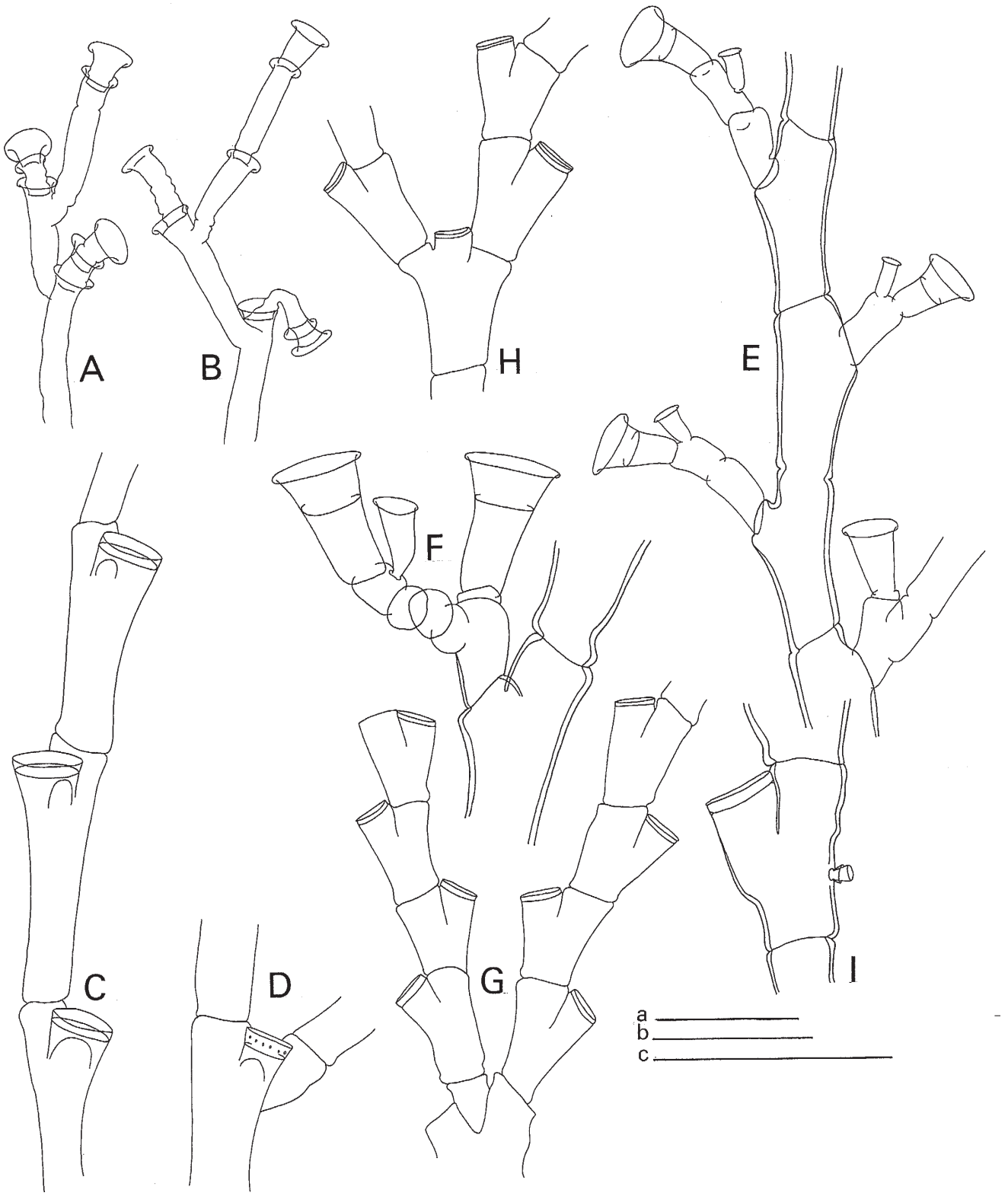

Fig. 19. A, B. ***Halecium tenellum*** Hincks, 1861, parts of stem with repeatedly renovated hydrothecae (NZOI Stn I89, slide 4767). **C, D.** ***Halecium*** sp. **C**, part of stem. **D**, stem fragment with ramification and axillary hydrotheca (NZOI Stn V373, slide 2936). **E, F.** ***Hydrodendron mirabile*** (Hincks, 1866). **E**, part of stem. **F**, stem fragment with ramification bearing hydrothecae and a nematotheca (BS 904, slide 2963). **G–I.** ***Hydrodendron tottoni*** Rees & Vervoort, 1987. **G, H**, stem fragments with ramification. **I**, hydrocladial internode with hydrotheca and nematotheca (PMBS, Mu 67-41, slide 2677). Scales: a, 1 mm (E, I); b, 1 mm (G, H), c, 0.5 mm (A–D, F). W.V.

MATERIAL EXAMINED:

NZOI Stns: E283, large, branched colony about 90 mm high, invested by sponge. No gonothecae. 4 RMNH-Coel slides 2113; **F922**, dirty colony about 30 mm high on unrecognisable hydroid stem. No gonothecae. Part as RMNH-Coel. slide 2201.

NMNZ: BS 769, large, fan-shaped colony about 120 mm high, branching mainly in 1 plane; no gonothecae. NMNZ Co. 834; 3 RMNH-Coel. slides 3510; **BS 904**, big colony, about 200 mm high, branched, no gonothecae; with epizootic *Plumularia setacea* (Linnaeus, 1758). NMNZ Co. 436; 3 RMNH-Coel. slides 2963; **BS 905**, a large number of about 120 mm high stems, some in poor condition. With epizootic *Plumularia setacea* (Linnaeus, 1758). NMNZ Co. 688; 3 RMNH-Coel. slides 3033.

NMNZ Ralph Collection: Loc. 416, partly dried out slide in RSC, as *Ophiodissa caciniformis* (Bale), no locality record.

ADDITIONAL MATERIAL: Bauza Island, Doubtful Sound, 20 m: Mutilated colony several centimetres high with a 2.5 mm thick axis; no gonothecae or scaphus. RMNH-Coel. 30019 slides 4363.

TYPE LOCALITY: *Ophiodes mirabilis*: Swanage Bay, Dorset, England, location of the type material is unknown; a neotype, from Lower ledges of Capstone, Ilfracombe, Devon, England in in NHM, 1899.5.1.169 (Cornelius 1975b). *Ophiodes caciniformis*: Porto Praya, Santiago, Cape Verde Islands; lectotype in Royal Scottish Museum, Edinburgh (1959.33.192; Rees & Thursfield 1965); a paralectotype slide is in NHM (1964.8.7.92).

REMARKS: We have followed Cornelius (1975b, 1995a) in considering *Ophiodes mirabilis* Hincks, 1866b and *Ophiodes caciniformis* Ritchie, 1907b conspecific, and Rees and Vervoort (1987) in designating the species to the genus *Hydrodendron* Hincks, 1874, where it should stand as *Hydrodendron mirabile* (Hincks, 1866b). The species has been completely described by Ralph (1958) from New Zealand material and more recently from Sagami Bay colonies by Hirohito (1995). All our material consists of erect, well developed colonies with a thick, polysiphonic axis bearing more or less pinnately arranged hydrocladia, growing from stem internodes or secondary tubes. Such hydrocladia frequently develop into side branches by re-branching, becoming invested by accessory tubules. Some of the colonies reach a considerable size (200 mm), but none has been found with gonothecae. Hydrophore and hydrotheca tumbler-shaped, widening gradually towards a distinctly everted and slightly tilted rim. Diaphragm thin at about two-thirds of length of hydrophore plus hydrotheca. No desmocytes visible, possibly due to the mounting medium. Nematothecae abundant, beaker-shaped with slightly everted rim, on pedicel of hydrophore or directly on hydrophores. Perisarc of stem and branches is quite thick, in contradistinction to that of hydrophores, hydrothecae and nematothecae, where it is thin.

RECORDS FROM NEW ZEALAND: Previously only recorded by Ralph (1958): 10 miles NW of Cape Maria van Diemen (no further data). The present records extend the area of distribution in northern New Zealand waters: off Three Kings Islands; off North Cape; Ranfurly Bank, East Cape, and King Bank, NE of Three Kings Islands. In addition there is a record from Bauza Island, Doubtful Sound. The depths records at these localities vary between 20 and 128 m. No gonothecae were found.

DISTRIBUTION: The species is circumglobal in tropical, subtropical, and temperate oceans, being recorded from the Mediterranean, the Atlantic coasts of Europe, the South Atlantic, West Indies, west coast of Africa, South Africa, the Indian Ocean, Australia, and New Zealand (Hirohito 1995).

Hydrodendron tottoni Rees & Vervoort, 1987 (Fig. 19G–I)

Ophiodissa armata Totton 1930: 142, fig. 2b.
Hydrodendron armata: Ralph 1958: 341, figs 13d-i, 14b-d.
Ophiodes armatus: Stepan'yants 1979: 110, pl. 21, figs. 2A–B.
Hydrodendron tottoni Rees & Vervoort 1987: 21–22; Dawson 1992: 15.

MATERIAL EXAMINED:

NZOI Stns: A431 (dried out sample), *Hydrodendron tottoni* Rees & Vervoort, 1987 (J.E. Watson); **B666**, *Hydrodendron tottoni* Rees & Vervoort, 1987 (J.E. Watson). [Slide 4217 JEW Colln]; **F924**, fragmented colony and a detached branch. RMNH-Coel. slide 4398.

NMNZ Ralph Collection: Loc. 521, NMNZ Co. 1254, 2 fragments, about 10 mm high, with polyps and nematophores. 1 made up in RMNH-Coel. slide 3930 after some bleaching. Material probably originates from a large, about 80 mm high colony with thick (about 8 mm diameter) stem in separate vial. Of this colony 2 additional RMNH-Coel. slides 3930. Dead material without polyps or gonothecae; well preserved polyps and nematophores in bleached slide. Unstained, partly dried out slide in RSC as *Ophiodissa armata*; no further data; **Loc. 624**, NMNZ Co. 1332, fragments of a small colony only; no gonothecae. RMNH-Coel. slide 4015. Partly dried out slide in RSC as *Hydrodendron armata*, no locality record.

PMBS: Saunders Canyon; Three Kings Islands and Cook Strait. Identified by: P.M. Ralph. (Taken from card register).

MATERIAL INSPECTED: **Mu 64-10, Hyd. 28**: Material in tube consists largely of *Symplectoscyphus j. johnstoni* (Gray, 1843) (with gonothecae), mixed with a few fragments of *Amphisbetia bispinosa* (Gray, 1843). No *H. armatum* was found; **Mu 67-41, Hyd 16**: Mutilated colony or colonies. RMNH-Coel. 27260, slide 2677.

TYPE LOCALITY: Sea off Three Kings Islands, depth 549 m; (dried) holotype in NHM (1929.10.10.15; Totton, 1930, as *Ophiodissa armata*).

DESCRIPTION (of material from Ralph's Loc. 521): Colony robust, about 80 mm high with a thick, strongly and irregularly branched axis, basally about 5 mm in diameter. Branching in all planes, occasionally pseudo-dichotomous. In older parts of the colony hydranths completely absent and hydrothecae heavily abraded. Structure best observed in youngest, monosiphonic parts of colony, where axis and hydrocladia are composed of short, thick internodes, separated by slightly oblique septa, alternately sloping upward or downward. Perisarc of internodes thick; base and distal part of internode with annular swelling. Branching of hydrocladia takes place from an apophysis just under a hydrotheca or from an apophysis on an internode. Hydrophores distal on internode, gradually widening and alternately directed left or right. Hydrotheca very shallow, separated from hydrophore by a distinct, diaphragm. Rim of hydrothecae tilted downward at various angles; a strong downward tilt being quite characteristic for this species. Normally plane of hydrothecal aperture just reaches level of internode but variable. Hydrothecal rim not perfectly flat but curved downward laterally to a varied degree. Renovations of hydrotheca common, close-set; when occurring in numbers, adcauline wall of hydrotheca slightly but distinctly everted. Desmocytes not observed.

Nematothecae scarce; when present, on internodes opposite base of hydrophore, cup-shaped and small, occasionally renovated.

The gonothecae in this species are aggregated into a scapus, not present in our material, but described, from New Zealand colonies, by Ralph (1958).

REMARKS: The material from Saunders Canyon (Mu67–41, Hyd. 16) although well preserved has only a few nematothecae. The slanting hydrothecal rim is a characteristic feature in this species, but the degree of tilt varies within and among colonies. Ralph (1958: 342) speculates that this species may be conspecific with *Hydrodendron arboreum* (Allman, 1888), a species so far exclusively known from Antarctic and subantarctic waters. In this species the hydrophore seems to be considerably elongated, placing the hydrothecal diaphragm a considerable distance above the node. We have been unable to compare indubitable material of this species with *H. tottoni* and prefer, at least for the present, to keep both taxa separate.

RECORDS FROM NEW ZEALAND: Additional material is mentioned by Ralph (1958) from Cook Strait, depth 73–183 m, Ralph's Loc. 521, referred to above); from the Tasman Sea off North Island; off North Cape; off Cape Colville, Coromandel Peninsula, and Saunders Canyon, off Otago Peninsula. The depth records at the localities given above varies between 73 and 512 m.

DISTRIBUTION: *Hydrodendron tottoni* is an endemic New Zealand deep water species.

Suborder PLUMULARIIDA Hincks, 1868
Superfamily SERTULARIOIDEA Lamouroux, 1812

Family **SERTULARIIDAE** Lamouroux, 1812

Amphisbetia L. Agassiz, 1862

TYPE SPECIES: *Sertularia operculata* Linnaeus,1758.

Amphisbetia bispinosa (Gray, 1843) (Fig. 20A–D)

Dynamena bispinosa Gray 1843: 294.
Sertularia bispinosa: Hilgendorf 1898: 206, pl. 19, figs 1, 1a; Mulder & Trebilcock 1914a: 6; Jäderholm 1917: 15; Briggs 1918: 34, 37; Bale 1924: 248; Trebilcock 1928: 22; Blackburn 1942: 113; Vervoort 1946a: 319; Powell 1947: 6, figs 9, 9a; Leslie 1968: 16, fig. 5.
Sertularia bispinosa?: Bartlett 1907: 42.
Amphisbetia bispinosa: Stechow 1921d: 258; 1923d: 199; Ralph 1961a: 779-781, fig. 10a-e; 1961c: 109; Rees & Thursfield 1965: 142; Dell & Heath 1971: 54, fig. 160; Morton & Miller 1973: 152, fig. 54 no. 6; Dawson 1992: 18; Bouillon *et al.* 1995: 63.
Sertularia unilateralis Allman 1885: 139, pl. 13 figs 5–7; Bale 1924: 248.

MEASUREMENTS of *Hydrodendron tottoni* (in μm):

	Off Three Kings Islands (Totton 1930)	Cook Strait (Ralph 1958)	Mu67–41, Hyd. 16 Saunders Canyon, slide 2677
Length of hydrocladial internode	600 – 760	500 – 600	695 - 890
Diameter at base	180 – 210	180	280 - 325
Approximate depth of hydrophore			305 - 350
Hydrotheca, height (diaphragm-rim)	20 – 50	31	52 - 59
Diameter at rim		160 - 180	305 - 350
Nematotheca, length			74 - 89
Diameter			59 - 67

MATERIAL EXAMINED:

NZOI Stns: B176, 2 fragments; dirty sample, no gonothecae. RMNH-Coel. slide 2732; **B661**, *Amphisbetia bispinosa* (Gray, 1843) J.E. Watson); C178, *Amphisbetia bispinosa* (Gray, 1843) (fragments) J.E. Watson). [Slide 4189 JEW Colln]; **D127**, 1 colony with gonothecae, about 60 mm high. RMNH-Coel. slide 2303; **Q725**, *Amphisbetia bispinosa* (Gray, 1843) (J.E. Watson); **S364**, *Amphisbetia bispinosa* (Gray, 1843) J.E. Watson); **S392**, *Amphisbetia bispinosa* (Gray, 1843) J.E. Watson).

NMNZ: Zone 2, 4F. Nth Otago, Oct.1962. No. 1092: Large bunch of 120–150 mm long stems, densely interwoven. Many gonothecae with moderately developed lateral spines. NMNZ Co. 500; **BS 756**, bundle of dichotomously branched stems, up to 60 mm high, on shell fragment; no gonothecae. NMNZ Co. 742; 2 RMNH-Coel. slides 3326; **French Pass**, 27.Feb.1990, abundant about 80–120 mm long, dichotomously branched colonies, with many gonothecae. NMNZ Co. 466; 2 RMNH-Coel. slides 2979.

NMNZ Ralph Collection: Loc. 5, NMNZ Co. 884, several fragments about 50 mm high, no gonothecae. No hydranths observed. 2 RMNH-Coel. slides 3583; **Loc. 9**, NMNZ Co. 887, 2 fragments, about 25 mm long, without gonothecae. Dead specimens. RMNH-Coel. slide 3586. Reasonable slide in RSC as *Sertularia bispinosa* with data "vascular"; **Loc. 106**, NMNZ Co. 961, fragment with 2 gonothecae, length about 25 mm. RMNH-Coel. slide 3652; **Loc. 122**, NMNZ Co. 976,2 fragments with gonothecae about 10 mm high and some smaller pieces. RMNH-Coel. slide 3660. Good slide in RSC as *Sertularia bispinosa*, no data, on label: (uni); **Loc. 124**, NMNZ Co. 978, part of colony about 40 mm high, with gonothecae. RMNH-Coel. slide 3662. Reasonable slide in RSC as *Sertularia bispinosa*, no further data, on label: (uni); **Loc. 136**, NMNZ Co. 989,2 colony fragments with gonothecae, 25–30 mm long. RMNH-Coel. slide 3702. Reasonable slide in RSC; no data, on label: (uni) small branch; **Loc. 204**, NMNZ Co. 1053, 2 stems about 50 mm high and some fragments. No gonothecae. Fairly dirty sample. RMNH-Coel. slide 3715; **Loc. 228**, NMNZ Co. 1073, fragment of 25 mm length with 1 gonotheca. RMNH-Coel. slide 3736; **Loc. 230**, NMNZ Co. 1075, several colonies up to 30 mm high with many gonothecae; also fragments. RMNHCoel. slide 3739; 3 reasonable slides in RSC; no data, on label: (uni); Loc. 236, NMNZ Colin 1081, bunch of colonies about 40 mm high with many gonothecae, also some fragments. Specimen with well preserved hydranths and gonothecae. RMNH-Coel. slide 3751; **Loc. 254A**, NMNZ Co. 1102, several up to 50 mm high, dichotomously branched stems with gonothecae, and some fragments. Specimen with well preserved hydranths. RMNH-Coel. slide 3776; **Loc. 275**, NMNZ Co. 1122, 3 fragments without gonothecae, of which largest about 40 mm high. Very dirty sample. RMNH-Coel. slide 3801; **Loc. 337**, NMNZ Co. 1164, sample consists of algae with some colonies of *Sertularella simplex* (Hutton, 1873) attached. Some detached colonies of *Amphisbetia bispinosa* (Gray, 1843). All in poor condition. No slide; **Loc. 391**, NMNZ Co. 1182, 2 bunches of about 30 mm high colonies with gonothecae and mussel spat, mixed with *Amphisbetia trispinosa* (Coughtrey, 1875). RMNH-Coel. slide 3856A.

PMBS: Little Papanui, on *Perna canalicula* [= *Perna canaliculus* (Gmelin, 1791)] shells. Low spring tide, abundant. Colour brownish. Identified by: P.M. Ralph, 1963. (Taken from card register).

MATERIAL INSPECTED:

Little Papanui, outer Otago Peninsula, *Durvillea* zone, on *Perna canalicula* [= *Perna canaliculus* (Gmehn, 1791)], 14.May.1953. Sample contains a number of about 35 mm high rather stiff colonies, no gonothecae observed. RMNH-Coel. 27261, slide 2678.

TYPE LOCALITY: *Dynamena bispinosa*: New Zealand (Gray, 1843); holotype probably in NHM. *Sertularia unilateralis*: not specified by Allman (1885: 139, New Zealand and Australia).

REMARKS: We follow Ralph (1961a: 781) in considering *Sertularia bispinosa* Gray, 1843 and *Sertularia unilateralis* Allman, 1885 conspecific, although our material does not contain specimens in which the forks of the dichotomy are markedly different in size and thickness of perisarc. Ralph's material from Tolaga Bay (Loc. 9) in the present collection and to which she refers in her description (Ralph 1961a: 781) is too fragmentary to demonstrate this peculiarity. The various colonies present do show variability in the thickness of the perisarc, probably related to water movements. There is also a certain degree of variability in shape and length of the abcauline marginal cusps, which typically are apically rounded and slightly unequal in size. They are almost completely abraded in some specimens. The variability in length of the characteristic kite-shaped, strongly compressed gonotheca recorded by Ralph is confirmed in our material; the spines vary between almost completely absent and about 0.3 mm length. The gonotheca is closed by a circular operculum, shed in empty gonothecae; the interior of the low collar around the aperture has a roughly toothed lamella.

RECORDS FROM NEW ZEALAND: A very characteristic New Zealand species (Hilgendorf 1898; Powell 1948; Leslie 1968; Dell & Heath 1971; Morton & Miller 1973), recorded from coastal areas between 37° and 50.5° S,

166.5° and 176° E, at depths varying between 0 and 248 m. The species needs a firm support, usually shells of bivalves, but it also occurs on algae and fixed substrata. Gonothecae were observed in nearly all months with the exception of June, July, and August.

DISTRIBUTION: Also recorded from Lord Howe Island (Briggs 1918) and from Victoria, Australia (Mulder & Trebilcock 1914a; Jäderholm 1917; Blackburn 1942); an additional Australian record is given by Bouillon *et al.* (1995): Indian Ocean, Australia.

Amphisbetia episcopus (Allman, 1876a) (Fig. 20E, F)

Sertularia fusiformis Hutton 1873: 257; Coughtrey 1875: 285; Pfeffer 1890: 483, 568.
[Not *Sertularia fusiformis* Hincks, 1861b = *Sertularella fusiformis* (Hincks, 1861b)]
Sertularella episcopus Allman 1876a: 263, pl. 13 figs 5–7; Ridley 1881: 105; Bale 1887: 103; Hartlaub 1905: 658-659, fig. W[4].
Amphisbetia episcopus: Stechow 1921d: 258; 1923d: 199; Ralph 1961a: 782, fig. 11a-c; 1961c: 109; Dawson 1992: 18; Vervoort 1993: 193.
Sertularia episcopus: Bale 1924: 245; Trebilcock 1928: 22.
Sertularia longicostata Coughtrey 1876b: 300 (replacement name for *Sertularia fusiformis* Hutton, 1873).

MATERIAL EXAMINED:

NMNZ: On red algae attached to holdfast, **Lyall Bay**, J. Macken, 31 July.1954: Many 8–13 mm high stems detached from substratum, some forked. Gonothecae present. NMNZ Co. 626; 2 RMNH-Coel. slides 3023.

NMNZ Ralph Collection: Loc. 93, NMNZ Co.949, 2 stems about 20 mm long, with gonothecae. RMNH-Coel. slide 3638; **Loc. 167**, NMNZ Co.1025, several stems up to 12 mm high on fragments of algae; with some gonothecae, rather heavily overgrown. RMNH-Coel. slide 3694; a fair and a poor slide in RSC as *Sertularia episcopus* Allman, no data; **Loc. 299**, NMNZ Co.1142, 3 fragments of algae amongst which 2 fragments of *Amphisbetia episcopus* (Allman, 1876a). RMNH-Coel. slide 3825; **Loc. 303**, NMNZ Co.1145, colony about 8 mm high, with gonothecae; stolon attached to calcareous red alga, and some fragments. No slide. No tissue, dead specimen. 3 good slides in RSC as *Sertularia episcopus*, no data; **Loc. 591**(?), NMNZ Co. 1301, single about 10 mm high stem with a single gonotheca. RMNH-Coel. slide 3978; **Loc. 664**, NMNZ Co.1335, fragment; RMNH-Coel. slide 4019.

TYPE LOCALITY: *Sertularia fusiformis* Hutton, 1873: Lyall Bay, Wellington, New Zealand (Hutton 1873). Holotype lost, not found in searches in 1995 and 1997. Syntypes in MOV, MV F59287, two microslides (Stranks, 1993). *Sertularella episcopus*: New Zealand, from the Busk collection (Allman 1876a; no further details, location of holotype unknown).

REMARKS: We have seen Ralph's material of this species and some additional material from Lyall Bay and can add little to her accurate description. The hydrothecae, in all specimens, are not exactly in one plane but tend to face the front of the colony; the development of the strongly sclerotised marginal cusps is much varied: in some specimens these are almost absent and the thick hydrothecal rim has a pair of small knobs whereas in other specimens a pair of distinct cusps has developed. These cusps are not symmetrically placed at the margin, the one facing the front of the colony usually being smaller. The rounded internal projection at the adcauline side of the rim is only visible when the hydrotheca is in favourable position; an abcauline thickening has not been observed. The hydrothecal floor (diaphragm) has a distinct circular aperture for passage of the coenosarc. The entire hydrothecal wall is strongly sclerotised, particularly near its rim.

The large, almond-shaped gonothecae are thin-walled and inserted with a short, curved pedicel on the short internode just below a hydrotheca at the front of the colony. Each has, on the narrow side, a pair of nearly parallel, raised sclerotised ridges that at the top of the gonotheca form a pair of slightly elevated lips at the base of which is a small, circular foramen. The mature gonotheca opens between the ridges to shed the sexual products; this is the case in the material from Ralph's Loc. 93 (exact locality unknown).

The material from Cook Strait [RMNH-Coel. slide 3978, Ralph's Loc. 591(?), not mentioned in her paper (1961a)] is the only material in her collection taken alive. There are well preserved but strongly contracted hydranths with a large abcauline caecum. The gonotheca is well preserved and has a developing mass of sperm cells. All other specimens we studied have empty hydrothecae and gonothecae; the hydrothecae encrusted.

RECORDS FROM NEW ZEALAND: Living specimens are known only from Cook Strait, date and depth unknown. Drifted specimens were found at Lyall Bay, near Wellington; Makara Beach, Palliser Bay, and the Kaikoura coast, usually on algae. Living gonothecae were collected in February.

DISTRIBUTION: Outside the (restricted) New Zealand area the species has only been recorded from Trinidad Channel, SW Chile, 0-55 m, on corals, etc. (?) (Ridley 1881) and from Magellan Strait (Pfeffer 1890). These records are quite old and badly need confirmation.

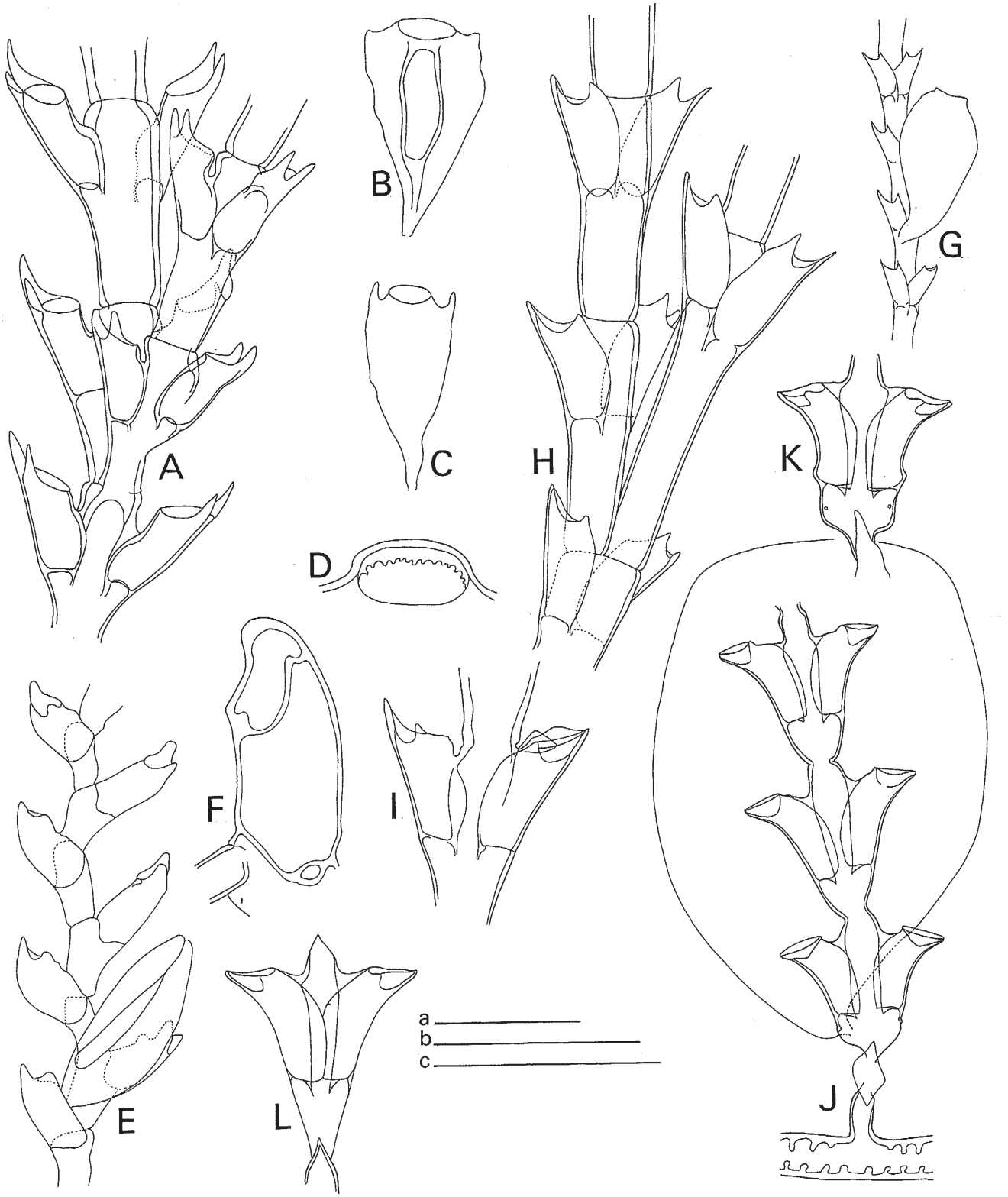

Fig. 20. A–D. ***Amphisbetia bispinosa*** (Gray, 1843). **A**, part of stem with ramification. **B, C**, gonothecae. **D**, inside of gonothecal aperture (A, Loc. 5, slide 3583; B, Loc. 236, slide 3751; C, D, NMNZ, French Pass, slide 2979). **E, F.** ***Amphisbetia episcopus*** (Allman, 1876). **E**, part of stem. **F**, hydrotheca (Loc. 93, slide 3638). **G–I.** ***Amphisbetia fasciculata*** (Kirchenpauer, 1864). **G**, part of colony with gonotheca. **H**, part of stem with ramification. **I**, pair of hydrothecae (PMBS, Mu 66–62, slide 2683). **J–L.** ***Amphisbetia minima*** (Thompson, 1879). **J**, part of stem with stolon and gonothecae. **K**, proximal pair of hydrothecae. **L**, pair of hydrothecae from distal part of stem (Loc. 178, slide 3700). Scales: a, 1 mm (A, F, H–J); b, 2 mm (B, C, E, G); c, 0.5 mm (D, K, L). W.V.

Amphisbetia fasciculata (Kirchenpauer, 1864)
(Fig. 20G–I)

Dynamena fasciculata Kirchenpauer 1864: 12, fig. 7; Stranks 1993: 16.
Amphisbetia fasciculata: Stechow 1923d: 200; Ralph 1961a: 779, fig. 9a-e; Morton & Miller 1973: 154; Dawson 1992: 18.
Sertularia fasciculata: Bale 1924: 246.
Sertularia ramulosa Coughtrey 1875: 283; Farquhar 1895: 200; Bale 1924: 246.
Amphisbetia ramulosa: Stechow 1923d: 200.

MATERIAL EXAMINED:

NZOI Stns: B216, 2 fragments attached to shell, 20 and 25 mm length. No gonothecae; **B219**, gear GLO, colonies up to 80 mm high on shells. No gonothecae; **B221**, gear GLO: dried out sample. Some fragments without gonothecae; **B222**, gear DD/GLO, 1 fragment, 10 mm. No gonothecae. RMNH-Coel. slide 2746; **B222**, gear DD, 1 colony fragment 100 mm long with gonothecae. RMNH-Coel. slide 2756; **B223**, gear DD/GOL, 1 fragment, 80 mm long, with gonothecae; **B223**, gear GLO, 3 colonies up to 50 mm high, with gonothecae, on rubbish; **B226**, gear GOL, 2 fragments 20–30mm with gonothecae; **B226**, gear DD, fragments of about 10 colonies. No gonothecae; **B226**, gear DIS, fragments only; **B228**, gear GOL, fragments of several colonies with gonothecae; **B228**, gear DD, several colonies about 40 mm high, attached to shells; **B228**, gear DIS, numerous colonies attached to shells and small stones. Gonothecae present; **B229**, fragment of 30 mm, no gonothecae; **B231**, fragment 35 mm high, on shell; **B242**, fragment of about 10 mm, no gonothecae; **B248**, gear DIS, some fragments of about 40 mm length; **B248**, gear GLO, single fragment of 40 mm length; **B253**, 3 colonies 60–80 mm on small stone; **B254**, 1 small colony fragment, about 40 mm long, no gonothecae; **B256**, several about 100 mm long colonies attached to stone and some detached colonies about 150 mm long, all with gonothecae; **C177**, *Amphisbetia fasciculata* (Kirchenpauer, 1864) (J.E. Watson); **C180**, *Amphisbetia fasciculata* (Kirchenpauer, 1864) (J.E. Watson); **D127**, gear DCMB, some small colonies, about 40 mm high, on stones and shells. No gonothecae. Also colony with gonothecae, about 60 mm high. RMNH-Coel. slide 2303; **G692**, 2 fragments about 100 mm long, 1 with gonothecae. RMNH-Coel. slide 2871; **G694**, colony fragment about 300 mm long, no gonothecae; **J15**, strongly fragmented sample, many fragments with gonothecae; **O159**, *Amphisbetia fasciculata* (Kirchenpauer, 1864) (J.E. Watson); **O164**, *Amphisbetia fasciculata* (Kirchenpauer, 1864) (J.E. Watson).

NMNZ Ralph Collection: Loc. 67, NMNZ Co.926, several fragments with gonothecae. Largest fragment repeatedly dichotomously branched. Material very brittle; probably dried out. RMNH-Coel. slide 3620; **Loc. 413**, NMNZ Co.1200, fragments of larger colony (according to register up to 110 mm length), without gonothecae. RMNH-Coel. slide 3882; **Loc. 513**, NMNZ Co.1247, strongly fragmented material, no gonothecae. RMNH-Coel. slide 3924. Fair slide in RSC as *Sertularia fasciculata*, with data: main stem and branches, excellent; **Loc. 661**, fair slide in RSC as *Sertularia fasciculata*, with data: Reef, MBSP; **Loc. 662**, fair slide as *Sertularia fasciculata*, with data: Paraparaumu Beach, 22.10.1950.

PMBS: Aquarium Point, Ship Channel, up to about 5 ft high (longest New Zealand thecate hydroid); long internodes. Identified by P.M. Ralph. (Taken from card register).

MATERIAL INSPECTED: Aquarium Point, PMBS, rocky shore, below low tide, 02.Oct.1952, 9 a.m. Colourless. Vial contains what appears to be a large colony; **Mu 66-62, Hyd. 24**, colonies about 35 mm high with many gonothecae, attached to small twig (?).Also number of 10–15 mm long fragments with gonothecae. RMNH-Coel. 27266, slide 2683; **Mu 66-65, Hyd. 21** (half this piece to P.M. Ralph), several fragments of a large colony richly bearing gonothecae. Second sample with smaller fragments; **Mu 67-41, Hyd. 2** (half of this specimen to P.M. Ralph), 10–15 mm long fragments with gonothecae. Also about 50 mm long fragment with long stem internodes and gonothecae, as well as some smaller fragments.

TYPE LOCALITY: *Dynamena fasciculata*: Kirchenpauer lists the species from Sydney, New South Wales, Australia, and from New Zealand. Sydney is the first listed locality and should therefore be considered the type locality; however, no further Australian records of the species are known. Description and figures, apparently, are based on the New Zealand (South Island) material. Holotype probably lost. *Sertularia ramulosa*: "Chiefly in upper harbour, Dunedin, festooned from rock to rock, or between branches of a dead floating tree" (Coughtrey 1875: 284); probable syntypes in MOV, MV F59291, 2 microslides (Stranks 1993).

REMARKS: This species is readily recognised by the greatly varying length of the internodes, that in fully developed specimens may form a distinct main stem reaching a length of 100 cm or more. The branches may also have long basal internodes. Though the mode of branching is dichotomous in both *A. fasciculata* and *A. operculata* (Linnaeus, 1758) the resulting colonies are quite different, those in *A. operculata* being loosely interwoven, dichotomously branching shoots without a trace of a main stem or principal axis. Hydrothecae and gonothecae of the two species are similar though there are differences in development of the marginal cusps of the hydrothecae and size and shape of the gonothecae.

In well preserved material of *A. fasciculata* (e.g., that from Blueskin Bay, RMNH-Coel. slide 2683) there is distinct evidence of a very thin and fragile three-flapped operculum that is either shed early or deteriorates in dead material. It is composed of a fixed abcauline flap spread between the two marginal cusps and two more or less triangular flaps attached in the sinuses between the marginal cusps and a point of the adcauline hydrothecal rim opposite the internodal wall.

Gonothecae pear-shaped, swollen, narrowing basally into a short pedicel and inserting on the internodes just below a hydrotheca; usually they are arranged in a row along a succession of internodes. The circular opening is at the end of a short neck and in developing gonothecae it is closed by a circular operculum. The inside of the collar has a dentate lamella.

RECORDS FROM NEW ZEALAND: Associated with large algae. Living colonies have been collected in the waters around Stewart Island and in the canyons off Otago Peninsula. Additional living material originates from Hauraki Gulf and from the Tasman Sea off Mt Taranaki (Egmont). The species is transported as detached colonies or attached to algae by sea currents and deposited on many New Zealand beaches, particularly those of the South Island and less commonly on North Island. Gonothecae present in January, May, October, and November. The depth distribution (of living material) probably extends from the sublittoral region down to about 50 m, though colonies are transported into deeper waters by currents.

DISTRIBUTION: Probably a New Zealand species; no reliable records are known from outside the New Zealand area.

Amphisbetia minima (Thompson, 1879) (Fig. 20J–L)

Synthecium gracilis Coughtrey 1875: 286, pl. 20 figs 26–31.
Sertularia pumila Coughtrey 1876a: 29; 1876b: 301 [not *Dynamena pumila* (Linnaeus, 1758)].
Sertularia minima Thompson 1879: 104, pl. 17, fig. 3; Bale, 1884: 89, pl. 4, figs 9–10, pl. 19, figs 12–13; 1887: 109; Marktanner-Turneretscher 1890: 231; Allman 1885: 138; Farquhar 1896: 462; Bartlett 1907: 42; Hilgendorf 1911: 541; Ritchie 1911: 845; Bale 1915: 269; Briggs 1918: 34, 37; Bale 1924: 248; Trebilcock 1928: 23, pl. 7, figs 5, 5a; Leloup 1932: 160; Blackburn 1938: 319; Cotton & Godfrey 1941: 4, fig; Blackburn 1942: 114; Hodgson 1950: 23, figs 41–42; Pennycuik 1959: 197; Schmidt 1972a: 42.
Nemella minima: Stechow 1921d: 259; 1923d: 202.
Nemella (Amphisbetia) minima: Stechow 1923d: 199.
Amphisbetia minima: Stechow 1925a: 230, fig. K; Millard 1957: 221; 1958: 183; Ralph 1961a: 774–775, fig. 8a-h; 1961d: 236; Macnae & Kalk 1962: 114; Millard 1964: 25; Rees & Thursfield 1965: 143; Millard 1966b: 491; Ralph 1966: 159; Berrisford 1969: 394; Shepherd & Watson 1970: 140; Miller & Batt 1973: 41; Watson 1973: 179; Millard & Bouillon 1974: 7; Millard 1975: 250, fig. 82H–K; Gordon & Ballantine 1977: 100; Millard 1978: 188; Stepan'yants 1979: 62, pl. 11, fig. 2A–V; Morton & Miller 1973: 152, fig. 54 no. 11; McInnes 1982: 163; Staples & Watson 1987: 218; Harris 1990: 229, fig. 11.4b-d; Dawson 1992: 18; Bouillon *et al.* 1995: 63; Watson 1994a: 67.
Dynamena minima: Naumov & Stepan'yants 1962: 89, fig. 12.
Sertularia pumiloides Bale, 1882: 21-22, 45, pl. 12, fig. 2.
Sertularia crinoidea Allman 1886: 141, pl. 16, figs 1–2.

MATERIAL EXAMINED:

NZOI Stns: E146, epizootic on stems of *Lytocarpia vulgaris* sp. nov.; many gonothecae present; height up to 8 mm; **I80**, small colonies on algae between bryozoans, height several millimetres. No gonothecae.

NMNZ: Denham Bay Beach, Sunday Islands (Raoul), Kermadec, 14 Oct.1908, det. J. Macken: 2–3 mm high stems on leaf of plant. Gonothecae present. NMNZ Co.624.

NMNZ Ralph' Collection: Loc. 7, NMNZ Co.885, 2 thalli of algae, about 50 mm long, covered on upper surface with 3–4 mm long, unbranched stems rising from stolons. No gonothecae observed. Several stems in 2 RMNH-Coel. slides 3584; **Loc. 8**, NMNZ Co.886, several stems rising from stolons on bryozoans, about 3–4 mm high, no gonothecae. Dead specimens. 2 RMNH-Coel. slides 3585; **Loc. 52**, NMNZ Co.912, fragments of colonies attached to fragment of algae, no gonothecae. RMNH-Coel. slide 3610; **Loc. 178**, NMNZ Co.1034, numerous colonies with gonothecae on fronds of algae. RMNH-Coel. slide 3700; **Loc. 181**, dried out slide in RSC as *Sertularella simplex intermedia* + *Amphisbetia minima*. No further data; **Loc. 213**, NMNZ Co.1060, fragmentary colonies, no gonothecae. Poor slide in RSC as *Sertularella macrogona* and *Amphisbetia minima*, no data; **Loc. 233**, NMNZ Co.1078, some stems of *Amphisbetia minima* (Thompson, 1879). Mixed with *Plumularia setaceoides* Bale, 1882 and *Orthopyxis integra* (Macgillivray, 1842). RMNH-Coel. slides 3746 and 3748. Poor slide in RSC as *Plumularia setaceoides, Campanularia, S. minima* with data: short, broad stem internodes; **Loc. 259**, NMNZ Co.1107, many stems 6–8 mm high rising from stolon creeping on seagrass leaf; some gono-thecae present. RMNH-Coel. slide 3782; **Loc. 261**, NMNZ Co. 1109, several up to 6 mm high stems on leaf of seagrass; no gonothecae. RMNH-Coel. slide 3785; **Loc. 263**, NMNZ Co. 1111, partly decomposed algae with many about 4 mm high stems without gonothecae arising from stolonal fibres, together with *Plumularia setaceoides* Bale, 1882, and *Sertularella simplex* (Hutton, 1873). No slide; **Loc. 269**, NMNZ Co.1006, several small colonies, with *A. laxa* Allman, 1876a. RMNH-Coel. slides 3461; **Loc. 272**, NMNZ Co.1119, numerous colonies up to 8 mm high arising from stolons reptant on fragments of algae. No gonothecae. RMNH-Coel. slide 3798; **Loc. 273**, NMNZ Co. 1120, numerous colonies up to 8 mm high, partly detached from stolon reptant on algae, with some gonothecae. RMNH-Coel. slide 3799. Good, stained slide in RSC as *Sertularia minima* Thompson, large, no data; **Loc. 281**, NMNZ Co.1128, fragments of algae with small colonies; some gonothecae; with *Orthopyxis crenata* (Hartlaub, 1901). RMNH-Coel. slide 3808; **Loc. 366**, NMNZ Co. 1174, many about 8 mm high stems arising from stolon on brown algae; many gonothecae. RMNH-Coel. slide 3849; **Loc. 477**, NMNZ Co. 1226, fair number of about 8 mm high stems from stolon on thick fragments of brown algae; no gonothecae. RMNH-Coel. slide 3902; **Loc. 502**, NMNZ Co.1239, many unbranched stems arising from stolon reptant on brown algae, highest about 7 mm; no gonothecae. RMNH-Coel. slide 3918; **Loc. 509**, NMNZ Co.1243, fair number of stems up to 8 mm high, arising from stolon on alga, some gonothecae. RMNH-Coel. slide 3922; **Loc. 628**, poor slide in RSC as *Sertularia minima*, with data: Russell, 21.8.50, Sa1.; **Loc. 629**, poor slide in RSC as *Sertularia minima*, with data: Taylor's Mistake., 16.12.1950, Sa1.; **Loc. 630**, poor slide in RSC as *Sertularia minima* var., with data: Great. Barrier, Nov. 1950, Sa2.

PMBS: Little Papanui, on *Mytilus canaliculus* [= *Perna canaliculus* (Gmelin, 1791)]. (Taken from card register).

TYPE LOCALITY: *Synthecium gracilis* Coughtrey, 1875 (= *Sertularia pumila* cf. Coughtrey, 1876a): "found on very delicate seaweeds after a severe storm on beach at Timaru" (Coughtrey 1875: 287), possible syntype in MOV, MV F59293, microslide (Stranks 1993).

Sertularia minima: Gulf St. Vincent, Adelaide, Australia (Thompson 1879). *Sertularia pumiloides*: Queenscliff, Victoria, Australia (Bale 1882, as *S. minima* var. *pumiloides*), probable syntype in MOV, MV F58979, microslide. *Sertularia crinoidea*: Cape of Good Hope (Allman 1885).

N.B. The oldest available name for this species is *Amphisbetia gracilis* (Coughtrey, 1875) but according to the provisions of Article 23.9 of the fourth edition of the 'International Code of Zoological Nomenclature' it has here been substituted by the junior species name *Amphisbetia minima* (Thompson, 1879). The species name *Amphisbetia gracilis*, though nomenclatorially correct, has apparently never been used.

REMARKS: The material inspected agrees with Ralph's description of this species. No branched specimens observed; the longest stem measured c. 6 mm and had 13 internodes each with a pair of opposite hydrothecae, that are fully separate in the basal internodes but become frontally adnate in higher internodes. There is a great deal of variability in the length of the internodes, which normally slightly increase in length distally. There is also much difference in development of the perisarc amongst colonies from various localities, possibly related to degree of exposure to wave action. The lateral hydrothecal cusps are usually unequal, those facing the front of the colony being smaller. The internodes may form a rigid row or may be connected by oblique joints, imparting flexibility to the stem. There is always a well marked oblique joint at the base of the stem, between the apophysis on the stolon and stem, occasionally there are one or two intermediate internodes with oblique joints. The stolonal tubes usually have internal perisarc pegs, but sometimes are internally smooth. Specimens attached to foliaceous algae have stolonal tubes with a flange of perisarc on each side over the whole length of the tube for better attachment to the flexible surface.

The basalmost internode usually has a pair of circular holes some distance below the hydrothecal base, occasionally raised on a minor funnel. Other colonies have a single hole or none at all; if present they are, in our material, always restricted to the basalmost internode. Ralph refers to these pores as 'nematothecae', butin all our fairly substantial material we failed to observe the presence of nematophores with nematocysts, though in some cases a substance has been 'secreted' through the pore, diffusely staining our slides. The holes may represent glandular pores.

Gonothecae profuse in our material, always one per stem, inserted on basal internode just under the hydrotheca. The shallow collar surrounding the gonothecal aperture invariably has small internal cusps.

Two species have been described that resemble *A. minima* quite closely. *Amphisbetia furcata* (Trask, 1857) is chiefly known from the temperate and subtropical eastern Pacific but has also been recorded from southwestern Australia (Stechow 1925a); *Amphisbetia pacifica* Stechow, 1931, is known from Japanese and Korean waters and has recently been re-described by Hirohito (1995) from Sagami Bay material. As far as can be judged from available descriptions and figures the three might very well be conspecific; the differences with *A. minima* that can be inferred from those descriptions are well within the range of variability known to occur in that species. However, in the absence of material for comparison we refrain from drawing definite conclusions; it might however, eventually influence the correct name of the New Zealand material.

MEASUREMENTS of *Amphisbetia minima* (in μm):

	Ralph's Loc. 178, slide 3700	New Zealand (Ralph 1961a)
Length of internode	420 – 505	450 – 500
Diameter at node	57 – 85	50 – 100
Hydrotheca, length	280 – 325	250 – 350
Width (measured across back of teeth)	85 – 100	about 100
'Nematotheca', length	0 – 25	30
Diameter	17 – 20	10
Gonotheca, length	1515 – 1595	1500 – 1750
Greatest diameter	1030 – 1035	1000
Diameter of aperture	410 – 445	430 – 500
Height of collar	33 – 49	10 – 30

RECORDS FROM NEW ZEALAND: Common on algae and solid substrate in the littoral zone all around New Zealand, records from the area between 29° and 47° S, 168° E and 177° W, frequently transported by sea currents on algal holdfasts and deposited on beaches. Living specimens have been found as deep as 664 m (NZOI Stn E146, on *Lytocarpia vulgaris* sp. nov.), but usually in much shallower waters. Gonothecae occur in material collected in March, October, and November; Ralph (1961) mentioned the presence of gonothecae from August to March.

DISTRIBUTION: Temperate and southern waters of the southern hemisphere: Suez (Thornely 1908); South Africa (Allman 1885; Millard 1957, 1975); Moçambique (Millard & Bouillon 1974); Australia (Bale 1884; Bartlett 1907; Ritchie 1911; Bale 1915, 1924; Stechow 1925a; Blackburn 1942; Pennycuik 1959; Watson 1973, 1994a); Tasmania (Hodgson 1950); Lord Howe Island (Briggs 1918); Kermadec Islands (Hilgendorf 1911); Falkland Islands (Jäderholm 1905); Chile (Jäderholm 1910).

Amphisbetia operculata (Linnaeus, 1758)

(Fig. 21A–C)

Sertularia operculata Linnaeus 1758: 808; Busk 1852: 387; Marktanner-Turneretscher 1890: 231; Farquhar 1896: 462; Bartlett 1907: 42; Briggs 1914: 286, 295; Bale 1915: 274; Jäderholm 1917: 15; Warren 1919: 116, text-fig. 6, pl. 12, figs 6–8; Bale 1924: 246; Fraser 1938d: 135, 136; Cotton & Godfrey 1941: 4, fig.; Blackburn 1942: 113; Fraser 1948: 249; Hodgson 1950: 22, figs 36–37; Day *et al.* 1952: 404; Millard & Harrison 1954: 176; Dakin *et al.* 1960: 129, fig. 14f.

Amphisbetia operculata: Day & Morgans 1956: 301; Millard 1957: 221; 1958: 183; 1961: 204; Ralph 1961a: 775–779, fig. 8i-k; Millard 1964: 25; Grindley & Kensley 1966: 6; Ralph 1966: 159; Millard 1968: 254, 266; Day *et al.* 1970: 14; Leloup 1974: 25; Millard 1975: 251, fig. 83A–E; Watson 1975: 167; Millard 1978: 188; Stapels & Watson 1987: 218; Dawson 1992: 19; Watson 1994a: 67; Medel & Vervoort 1998: 12–13.

Odontotheca operculata: Stechow 1919: 102.

Dynamena operculata: Naumov 1960: 330–331, text-fig. 220, pl. 7, fig. 1.

N.B. Indo-Pacific records chiefly.

Material Examined:

NZOI Stn G659: small colony; no gonothecae. RMNH-Coel. slide 2858.

NMNZ: Opoutama Beach, Mahia, A.N. Baker 6 Sept.1970: Single dichotomously branched stem, 80 mm high, no gonothecae. NMNZ Co.563; **BS 180**, Colony and colony fragments, about 50 mm high, dichotomously branched, no gonothecae. NMNZ Co.633.

NMNZ Ralph Collection: Loc. 110, NMNZ Co.965, 4 colony fragments with gonothecae, 2 smaller in RMNH-Coel. slide 3654.

PMBS: Port Chalmers and Auckland Islands. Identified by P.M. Ralph. (Taken from card register).

Material Inspected: **Mu. 66-38, Hyd. 30**, fragments 15–20 mm long of a larger colony. Stem internodes of normal length; gonothecae present. RMNH-Coel. 27251, slide 2668. Also sample of which other half identified by P.M. Ralph composed of number of stems attached to small twig. Gonothecae not observed, but may have been present.

Type Locality: No distinct type locality specified (Linnaeus 1758); type material probably lost.

Remarks: The species is readily distinguished from *A. fasciculata* (Kirchenpauer, 1864) by the absence of long internodes, larger gonothecae, and details of the hydrothecae. Although the colonies in *A. operculata* result from dichotomous branching of the shoots the resulting colony is quite different from that of *A. fasciculata.* That species also has dichotomous branching but the resulting colony has a distinct though monosiphonic main stem. Fragmentary juvenile material of *A. fasciculata* may easily be confused with *A. operculata*, particularly if the long internodes are not yet developed. The hydrothecal rim in *A. operculata* is distinctly thickened, culminating in the development of a pair of usually asymmetrical, marginal cusps, slightly curved inward at the apex. In *A. fasciculata* the hydrothecal rim is not thickened except for the marginal cusps,which tend to be more triangular in outline than those of *A. operculata*. The mature gonothecae of *A. operculata* are larger than those of *A. fasciculata* (1.25–1.80 mm against 0.90–1.25 mm).

A careful comparison of the New Zealand material of *A. operculata* with colonies from the Eastern temperate Atlantic (cf. Medel & Vervoort 1998: 12–13, RMNH-Coel. slides 1964, 1973–1977) shows the material to be conspecific. The Atlantic material also has the thickened hydrothecal rim and the asymmetrical, slightly inwardly curved marginal cusps. It also has remnants of a three-flapped operculum; that this detail has not been observed in the New Zealand material which may be due to the poor state of preservation.

Records from New Zealand: There are few reliable records. Jäderholm (1917) records the species from 'New Zealand'; a second record (Jäderholm 1926) is from Port Chalmers near the Otago Peninsula. Living material so far has only been seen from off Wellington Harbour, (274 m, present record) and from the Taiaroa region, Otago Peninsula (present record, 40 m). An additional record of dead material comes from the Canterbury Bight, 44°25.00′ S, 171°18.00′ E, depth 18 m. Ralph (1961a: 777) also lists the Auckland Islands as a locality record, apparently on the authority of Marktanner-Turneretscher (1890): this record, however, refers to *Amphisbetia bispinosa* (Gray, 1843). No dates can be given for the presence of gonothecae in New Zealand material.

Distribution: Generally considered a near-cosmopolitan species, with a distinct preference for coastal waters but absent from the Arctic and Antarctic. In the Atlantic it occurs as far north as about 60° N and as far south as about 55° S. It is absent from the western Atlantic and does not occur in the Caribbean. It has been recorded from Argentine coasts (Genzano 1990) and from some widely spread localities in the Pacific (Cornelius 1995b). The colonies primarily develop on large algae and these, as well as detached colonies, may be carried over large distances by sea currents.

Amphisbetia trispinosa (Coughtrey, 1875)

(Fig. 21D–G)

Sertularia trispinosa Coughtrey 1875: 284, pl. 20, figs 14–16, 19; Ridley 1881: 104; Hilgendorf 1898: 207, pl. 20, figs 7, 7a-b; Hartlaub 1905: 668–669; Bartlett 1907: 42; Jäderholm 1917: 16; Bale 1924: 248; Trebilcock 1928: 22, pl. 5, fig. 3; Batham 1956: 456; Stranks 1993: 18.

Odontotheca trispinosa: Levinsen 1913: pl. 5, figs 11–15.

Amphisbetia trispinosa: Stechow 1923d: 200; Ralph 1961c: 109; 1961d: 236; Dawson 1992: 19; Bouillon *et al.* 1995: 64.
Amphisbetia trispinosa var. *trispinosa*: Ralph 1961a: 782–783, fig. 10g-h.
Sertularia trispinosa var. *inarmata* Trebilcock 1928: 22–23, pl. 5, fig. 4.
Sertularia trispinosa inarmata: Stranks 1993: 16.
Amphisbetia trispinosa var. *inarmata*: Ralph 1961a: 783, fig. 10f; Dawson 1992: 19.

Material Examined:

NZOI Stns: B215, small colonies up to 50 mm high on worm tubes. RMNH-Coel slide 2752; **B258**, fragment about 15 mm long. RMNH-Coel. slide 2771; **B264A**, many small colonies, up to about 20 mm high and many fragments, with some gonothecae, on worm tubes and small stones; **D62**, single colony, about 20 mm high, with gonothecae, and a fragment. RMNH-Coel. slide 2820; **D81**, 1 fragment, 18 mm high, no gonothecae; **G656**, many colonies, up to 40 mm high on branches; gonothecae present. RMNH-Coel. slide 2856; **G683**, 15 mm high fragment, with 3 gonothecae. RMNH-Coel. slide 2862; **G694**, fragment 35 mm long with many gonothecae. Horns on gonothecae very long. RMNH-Coel. slide 2863.

NMNZ: Opoutama Beach, Mahia, A.N. Baker 6 Sept.1970: Luxuriously developed colonies, about 50 mm high on a worm tube. Many gonothecae. NMNZ Co.564. 2 RMNH-Coel. slides 3012.

NMNZ Ralph Collection: Loc. 37, NMNZ Co.907, 3 top parts of colonies 20–25 mm long, with (empty) gonothecae; dead specimen. 2 RMNH-Coel. slides 3602. Partly dried out slide in RSC as *Sertularia bispinosa*, condition good. No data; **Loc. 122**, NMNZ Co.977, top parts of 2 colonies 25 and 15 mm high, with gonothecae. Smaller made up in RMNH-Coel. slide 3661; **Loc. 179**, NMNZ Co.1035, fragments of a colony mixed with algae; no gonothecae. RMNH-Coel. slide 3701. Poor slide in RSC as *Sertularia trispinosa*, no data; **Loc. 184**, NMNZ Co. 1039, many fragments of larger colony or colonies, with many gonothecae. Rather heavily overgrown. RMNH-Coel. slide 3705; **Loc. 214**, NMNZ Co.1061, fragments, up to 50 mm high, of a larger colony; gonothecae present. RMNH-Coel. slide 3724; **Loc. 264**, NMNZ Co.1112, many detached stems and stem fragments, with many gonothecae. RMNH-Coel. slide 3789; **Loc. 391**, NMNZ Co.1182, 2 bunches of about 30 mm high colonies with gonothecae and mussel spat. With *Amphisbetia bispinosa* (Gray, 1843). RMNH-Coel. slide 3856B; **Loc. 404**, NMNZ Co.1194, single 15 mm high fragment without gonothecae; made up in RMNH-Coel. slide 3875; **Loc. 407**, NMNZ Co. 1197, colony fragments of about 30 mm length and many fragments; all with gonothecae. RMNH-Coel. slide 3879 of small fragment; **Loc. 422**, NMNZ Co.1207, stems about 30 mm high, some with empty gonothecae. Dead material, in poor condition. RMNH-Coel. slide 3890; **Loc. 484**, NMNZ Co.1233, fragments up to 30 mm high from larger colony; with many gonothecae. RMNH-Coel. slide 3912; **Loc. 667**, partly dried out slide in RSC as *Sertularia trispinosa*, with data: Dunedin, 1950, Sa4.

PMBS: **Aquarium Point**, PMBS, usually abundant on stalks of *Pyura pachydermatina* (Kulka). Colour pale straw yellow. Identified by R. Kulka and P.M. Ralph, 1955, 1963. (Taken from card register).

Material Inspected: Aquarium Point, PMBS, low spring tide, on stalks of *Pyura pachydermatina*, abundant, 02April. 1953, pale straw yellow. Sample consists of about 100 mm long stalk covered by 30–40 mm high stems of this species; gonothecae present.

Otago Museum, Dunedin, N.Z: **Iv. 752. A.52:54**, 2 tufts about 30 mm high invested by algae; both tufts with gonothecae. RMNH-Coel. 27249, slide 2666.

Type Locality: *Sertularia trispinosa*: New Zealand (Coughtrey 1865; type locality not specified). According to Stranks (1993: 19) a possible syntype ('by inference', one microslide) from Bale's collection is in MOV (MV F59292), the locality reference given is Timaru, New Zealand. A possible holotype of Trebilcock's *Sertularia trispinosa* var. *inarmata* from Trebilcock's collection is in MOV (MV F59344), locality reference: Island Bay, New Zealand, April-May 1923 (1 microslide; holotype 'by inference').

Remarks: This species resembles *Amphisbetia bispinosa* (Gray, 1843) in general appearance but can easily be distinguished by the three spines at the hydrothecal rim. The abcauline cusp is usually best developed; the adcauline cusp may be quite small. The third cusp occurs at the frontal embayment of the hydrothecal rim and also varies in size. It can be difficult to observe because of strong development of the abcauline cusp. Gonothecae occur in profusion; they are flattened, 'kite'-shaped, and usually have a well developed though blunt spine at the lateral 'shoulders'. Aperture terminal and at the end of a low collar with internally dentate hyaline lamella. Development of the spines quite varied, even in the same colony: smooth and almost smooth gonothecae occurring together with gonothecae with well developed spines. We therefore sink Trebilcock's *Sertularia trispinosa* var. *inarmata* in the synonymy of *Amphisbetia trispinosa* Coughtrey, 1875.

Records from New Zealand: First recorded from New Zealand by Coughtrey (1865) without accurate locality; further records are by Hilgendorf (1898, Taieri Beach), Jäderholm (1917, no accurate locality) and Trebilcock (1928, Island Bay, Wellington). The species is well distributed around South Island and Stewart Island between about 42°–50.5° S, 166°–172° E and has also been recorded from the Chatham Islands (Ralph 1961d). It occurs on solid substrate (shells, pebbles, worm tubes, ascidians, large algae) and is occasionally covered with mussel spat. It is probably distibuted by water currents. In the waters around South Island it dominates along the eastern coasts but has also been recorded from Cook Strait and Woodpecker Bay. Its depth distribution reaches from the littoral zone down to a depth of about 160 m. Gonothecae present in January, March, May, July, and November.

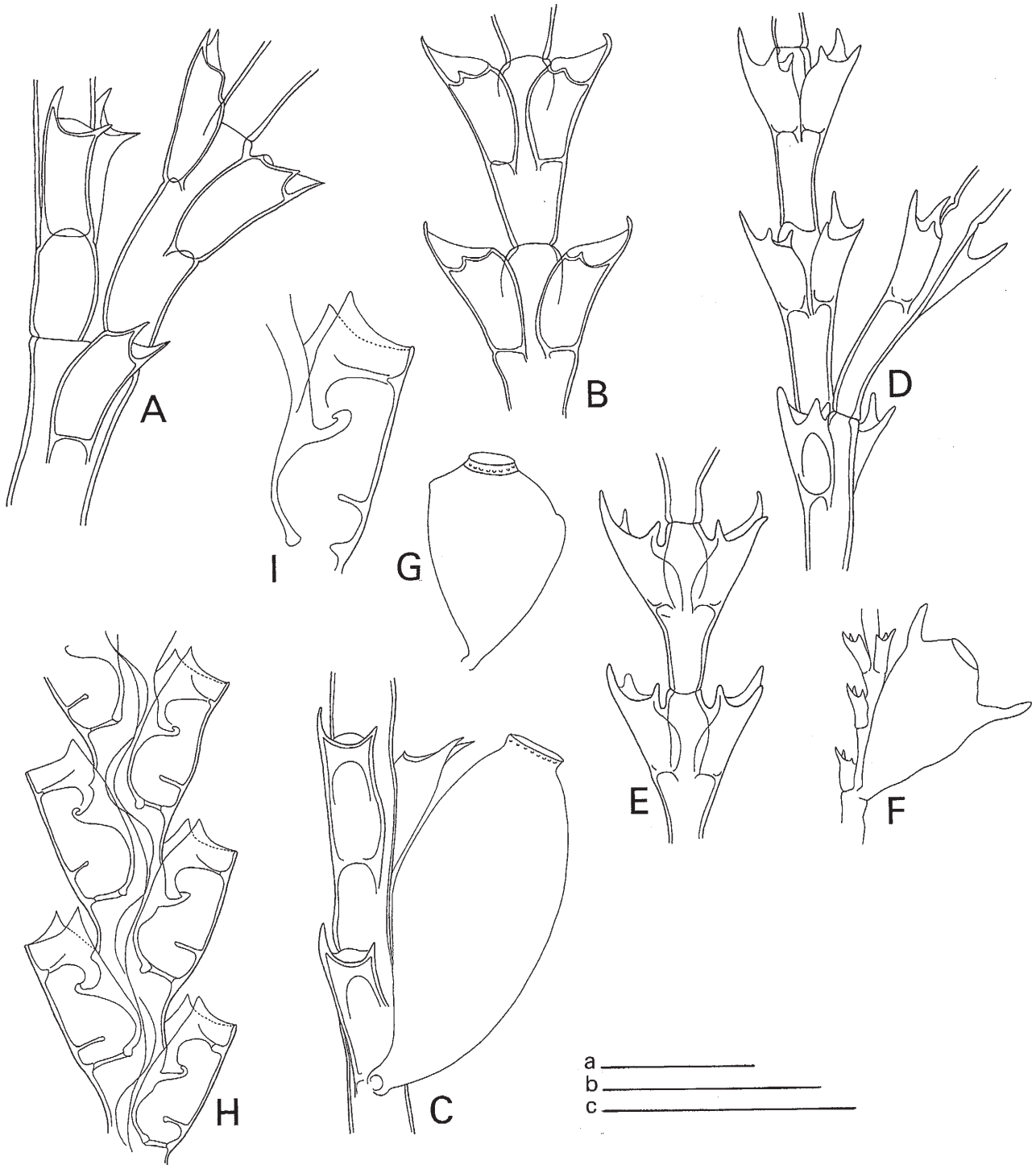

Fig. 21. A-C. ***Amphisbetia operculata*** (Linnaeus, 1758). **A**, part of stem with ramification. **B**, two pairs of hydrothecae, frontal view. **C**, part of stem with gonotheca, lateral view (Loc. 110, slide 3654). **D–G.** ***Amphisbetia trispinosa*** (Coughtrey, 1875). **D**, part of stem with ramification. **E**, two pairs of hydrothecae, frontal view. **F**, part of stem with gonotheca. **G**, gonotheca (D, E, NZOI Stn B215, slide 2752; F, Loc. 407, slide 3879; G, Loc. 214, slide 3724). **H, I.** ***Crateritheca bidens*** sp. nov. **H**, part of hydrocladium. **I**, hydrotheca (NZOI Stn E840, slide 3473). Scales: a, 1 mm (A-E); b, 2 mm (F, G); c, 0.5 mm (H, I). W.V.

DISTRIBUTION: A southern Pacific species also recorded from South Australia (Bartlett 1907) and the Strait of Magellan (Ridley 1881; Hartlaub 1905). Both records need confirmation.

Crateritheca Stechow, 1921d

TYPE SPECIES: *Pericladium novae-zelandiae* Thompson, 1879.

SPECIES:

Crateritheca acanthostoma (Bale, 1882) [= *Sertularia acanthostoma* Bale, 1882; ?*Dynamena pluridentata* Kirchenpauer, 1864]
Crateritheca billardi (Bale, 1915) [= *Sertularia billardi* Bale, 1915]
Crateritheca crenata (Bale, 1884) [= *Sertularia crenata* Bale, 1884]
Crateritheca insignis (Thompson, 1879) [= *Sertularia insignis* Thompson, 1879]
Crateritheca novaezelandiae (Thompson, 1879) [= *Pericladium novae-zelandiae* Thompson, 1879]
Crateritheca zelandica (Gray, 1843) [= *Thuiaria zelandica* Gray, 1843]

Crateritheca bidens sp. nov. (Fig. 21H, I)

MATERIAL EXAMINED:

NZOI Stn E840: Top part of a larger colony about 45 mm long (holotype H-761 in NIWA collection). RMNH-Coel. slide 3473.

TYPE LOCALITY: Southwest Pacific north of Three Kings Islands, 33°52.00′ S, 172°16.00′ E, 757 m.

DESCRIPTION of holotype): Specimen consists of a monosiphonic stem about 45 mm long, evidently top part of a larger colony, basally about 400 μm thick. Stem and hydrocladia in one plane; stem with 2 rows of opposite hydrothecae, no division into internodes; distal part of stem with pairs of short, opposite apophyses supporting hydrocladia; , 3 or 4 hydrothecae between each pair of apophyses. Hydrocladia 15 mm long, separated from apophyses by well marked, straight node; hydrocladiate hydrothecae densely packed, alternate first hydrotheca in hydrocladium directed basally. Hydrocladia curving between hydrothecae, with raised ridge set with hyaline frill, following curvature resulting from packing of hydrothecae. Hydrotheca cylindrical with slightly swollen basal portion, their long axes at an angle of about 30° to long axis of hydrocladium; marginal cusps slightly overlapping succeeding hydrotheca; adcauline wall for about two-thirds its length adnate, remainder open; abcauline wall slightly but distinctly convex, rather thick, with 2 internal projections, one short below margin, the second a long ridge some distance above base of hydro-theca, apparently serving as attachment for hydranth. Adcauline wall with strong internal hook projecting into hydrothecal cavity; a series of ledges runs from hook towards distal projection on inside of abcauline wall. Hydrothecal floor wide, with firm diaphragm. Hydrothecal rim produced into 2 lateral cusps; no free adcauline wall between cusps; hydrotheca open. Perisarc fairly thick, particularly on front of hydrotheca.

Gonothecae absent.

MEASUREMENTS of *Crateritheca bidens* (in μm):

	NZOI Stn E840 Slide 3473
Diameter at base of stem	305
Diameter of hydrocladium (at apophysis)	85 – 115
Hydrotheca, depth	295 – 340
Greatest diameter	165 – 180
Diameter at rim (measured in lateral view)	130 – 140

REMARKS: Colony structure and morphology of the hydrotheca place this new species in *Crateritheca* Stechow, 1921, where it is distinguished by the bidentate hydrothecal rim and the development of ridges inside the hydrotheca. Although hydrothecae with internal ridges are characteristic of *Crateritheca* no knownspecies is similar to this new species. The system of ledges is complex, particularly in the distal part of the hydrotheca: with the available material it was impossible to decide whether the ledges are free or are thickened strips of internal perisarc. The floor of the hydrotheca was obscured by tissue remnants adhering to the proximal abcauline ridge precluding accurate observation. It is possible that a more complex system of ridges may exist around the hydrothecal diaphragm.

RECORDS FROM NEW ZEALAND: Known only from one locality north of Three Kings Islands, 33°52.00′ S, 172°16.00′ E (type locality), 757 m.

DISTRIBUTION: Endemic to New Zealand.

ETYMOLOGY: The species name *bidens* refers to the bidentate condition of the hydrothecal rim, the Latin noun *bidens, bidentis*, meaning two-pronged pickaxe.

Crateritheca billardi (Bale, 1915) (Fig. 22A–F)

Sertularia elongata? Billard 1910: 22–25, fig. 8.
Sertularia billardi Bale 1915: 261, 262.

MATERIAL EXAMINED

NMNZ: BS 386, 4 colonies of which longest 110 mm, hydrocladia 8–15 mm long, some gonothecae on largest colony;

with some colonies of *Salacia farquhari* (Bale, 1924) attached to stem and hydrocladia. NMNZ Co.717. Basal part of stem and some hydrocladia for RMNH-Coel 27659, 2 slides 3359a.

TYPE LOCALITY: Australia (Bowerbank Collection), holotype in NHM 2000.889.

DESCRIPTION: Stem monosiphonic, fairly rigid, composed of a succession of internodes separated by indisctinct straight nodes. About 5 basal internodes irregular in length and athecate, longer than following thecate internodes; nodes gradually becoming more distinct distally. Thecate stem internodes each with a pair of opposite hydrothecae, every second thecate internode with a pair of short, opposite apophyses just below a pair of hydrothecae. First apophysies on thecate internode following distal thecate internode. Hydrocladia up to 15 mm long, of more or less uniform length along whole stem. Hydrocladia divided into internodes by distinct, slightly oblique nodes; first hydrocladial internode with one, basally directed hydrotheca, remaining internodes with a pair of sub-opposite hydrothecae. Shape of hydrotheca best described by reference to figure 22D, abcauline wall straight, adcauline wall adnate with internode for more than half its length, free adcauline wall concave, heavily sclerotised and with 'comma'-shaped projection into hydrothecal cavity, basally with rounded knob bordering hydrothecal floor. Abcauline wall moderately sclerotised, thickening continued into unpaired, median abcauline cusp; internally abcauline wall with a pair of hyaline, semi-circular strips. Aperture of hydrotheca oval, with 4 pairs of fairly acute lateral cusps, a thickened abcauline median cusp and an adcauline knob or blunt cusp. Hydrothecal floor with a conspicuous diaphragm. No hydranths observed but in some hydrothecae there are remains of tissue, usually on inside of the abcauline wall, where an inwardly projecting plug of tissue may be present. Gonothecae of indeterminate sex , occur sparingly on the largest colony, arranged in a frontal row on colony. Gonotheca cigar-shaped, lacking ornamentation, narrowing on both ends, pointing obliquely upwards. Apex with a single small, circular opening, slightly laterally displaced; base narrowing into an extremely short pedicel attaching gonotheca to internode just below the hydrothecal base.

REMARKS: Billard (1910: 22-25), when describing material of *Sertularia elongata* Lamouroux, 1816, from the Bowerbank collection in the British Museum (Natural History) (now The Natural History Museum), London, noticed a tuft of aberrant specimens, which he described and figured as *Sertularia elongata?* Lamouroux, 1816 (Billard 1910: 23, fig. 8). The sample originated from Australia, but no other locality reference was given.

MEASUREMENTS of *Crateritheca billardi* (in μm):

	NMNZ BS 386 Slide 3359a
Length stem internode with apophyses	740 – 825
Length stem internode without apophyses	660 – 820
Diameter at node	245 – 280
Length of apophysis	135 – 165
Length first hydrocladial internode	330 – 360
Length hydrocladial internode with pair of hydrothecae	410 – 460
Diameter at node	115 – 165
Hydrotheca, total depth	400 – 410
Diameter at rim	210 – 230
Gonotheca (sex unknown), length	2800 – 2820
Maximum diameter	310 – 360

Bale (1915: 261) applied to these specimens the name of *Sertularia billardi*; this is a valid name in spite of the fact that Bale gave neither a description nor a figure. The species is here re-established and recorded for the first time since Billard's introduction. The type in the NHM, a dry specimen, has the number NHM 2000.889. There are two slides (719 and 720) of this species in Billard's slide collection in MNHN, labelled: "*Sertularia elongata*(?) Lamouroux. Coll. Bowerbank du British Museum, 77.5.21.111. Billard, 19.i.1909".

RECORDS FROM NEW ZEALAND: Known with certainty from only one locality, Middle South East Bay, Great King Island, Three King's Islands, 42-46 m, sledge dredge, 18.Feb.1974.

DISTRIBUTION: Originally found in a hydroid sample from the Bowerbank collection in The Natural History Museum, stated to originate in Australia. Although the accompanying species, *Stereotheca elongata* (Lamouroux, 1816) is a common Australian species, *C. billardi* has never been re-recorded from Australian waters; this causes us to strongly doubt the locality record.

Crateritheca insignis (Thompson, 1879) (Figs 22G–I, 23A, B)

Sertularia insignis Thompson 1879: 109, pl. 19, figs 1, 1a; Hodgson 1950: 29, fig. 52.
Levinsenia insignis: Bale 1915: 261.
Crateritheca insignis: Ralph 1961a: 760, 761, figs 3l-m, 4a-d; 1961d: 236; Dawson 1992: 19.
Sertularia huttoni Marktanner-Turneretscher 1890: 233, pl. 4, fig. 7.
Stereotheca huttoni: Bale 1924: 252.

MATERIAL EXAMINED:

NZOI Stns: C178, *Crateritheca insignis* (Thompson, 1879) (J.E. Watson); **C180**, *Crateritheca insignis* (Thompson, 1879) (J.E. Watson); **C763**, colony 25 mm high, no gonothecae.

RMNH-Coel. slide 2099; **E282**, many colonies about 50 mm high, no gonothecae; **E312**, many colonies up to 60 mm high; no gonothecae; **I341**, about 80 mm high, pinnate colony; no gono- thecae; **N369**, 3 colonies about 100 mm high and some smaller colonies on shells, with gonothecae. RMNH-Coel. slide 2214.

NMNZ: BS 398, single pinnate colony, 40 mm high, no gonothecae. NMNZ Co.606; **BS 679**, numerous colonies up to 80 mm high, with many small colonies of bryozoans; no gonothecae. NMNZ Co.873; **BS 769**, numerous colonies up to 80 mm high, detached from substratum and partly with small epizootic colonies of bryozoans. NMNZ Co.832; RMNH-Coel. 27748, slide 3513. Numerous colonies from second bottle, NMNZ Co.865; **BS 834**, 3 about 45 mm high stems on basal tuft of *Nemertesia elongata* Totton, 1930. NMNZ Co.746. No slide. Numerous colonies up to 60 mm high from second bottle, mixed with bryozoans; no gonothecae. NMNZ Co.751; RMNH-Coel. 27690, 2 slides 3390; **BS 835**, numerous colonies up to 100 mm high, densely covered by bryozoans and mussel spat; no gonothecae. NMNZ Co.585; **BS 838**, numerous colonies up to 80 mm high, no gonothecae. Heavily overgrown by globular bryozoans. NMNZ Co.761; RMNH-Coel. 27705, 2 slides 3405; **BS 840**, 7 developing colonies on bryozoans; no gonothecae. NMNZ Co. 397, 2 RMNH-Coel. slides 2965; **BS 911**, 2 colonies 120 mm long and 2 smaller colonies (40 mm) at base of 1 colony. Main stem unbranched, with about 20 mm long hydrocladia, some of which bear gonothecae. No hydranths in hydrothecae, but large eggs can be seen in gono-thecae. NMNZ Co. 793; RMNH-Coel. 27646, 2 slides 3337. (These specimens scarcely take any stain, even eggs in gonothecae are unstained.)

NMNZ Ralph Collection: Loc. 627, partly dried out slide in RSC as *Stereotheca insignis*, with data: 11.1.50, rest unreadable (= *huttoni*).

Ralph's Chatham Island Expedition Collection: Stn 31, remnants of a large colony or several colonies; many detached hydrocladia; no gonothecae. NMNZ Co.1347; RMNH-Coel. slide 4417. Partly dried out slide in RSC as *Crateritheca insignis*, with data: Chatham Strait, Stn 31, 31 Jan.54.

TYPE LOCALITY: *Sertularia insignis*: Georgetown, Tasmania (Thompson 1879), whereabouts of type unknown. *Sertularia huttoni*: New Zealand (Marktanner-Turneretscher, 1890, no further specification; holotype probably in NMW.

DESCRIPTION (based on all specimens): Colony composed of strong, erect stem, up to 70 mm long, with pinnately arranged, opposite hydrocladia up to 15 mm long, basally with a few thick stolonal fibres attaching colony to solid substrate. Stem monosiphonic but basally heavily sclerotised, composed of internodes with 2 pairs of opposite hydrothecae, nodes straight, only visible in younger parts of colonies. Hydrocladia spring in pairs from the internode just under superior pair of hydrothecae; additional nodes may be present in which case the stem appears to have a regular alternation of thecate internodes with and without a pair of hydrocladia. Hydrocladium divided into internodes by distinct nodes, number of hydrothecae varying from one (basal internode) to several sub-opposite pairs. Hydrotheca elongate, widening proximally, gracefully curved upwards, about half of adcauline wall adnate, rather varied in mode of curvature and shape of free portion. Aperture circular, rim in young hydrothecae with 7 sharp cusps, 1 abcauline and 3 pairs laterally, of which adcauline pairs smallest. Hydrothecae with well developed cusps usually distal in youngest hydrocladia; older cusps abraded or absent; in hydrothecae on basal internodes of older colonies rim almost completely smooth. Hydrothecae with complex pattern of internal cristae, usually difficult to observe through fairly strong perisarc covered by encrusting diatoms. In all hydrothecae a pair of internal cristae along free adcauline wall is distinctly visible. Cristae are highly elevated distally and gradually diminish in height proximally; however, in one of the older colonies the shape is reversed (fig. 23B). In addition there is a pair of elongated, low internal cristae along the abcauline wall, visible externally as 2 longitudinal ridges. Less visible is a pair of small cristae flanking the hydropore, in many hydrothecae reduced to a pair of rods on the hydrothecal floor. A pair of internal hyaline lamellae is visible in many hydrotheca at the base of abcauline wall. Some colonies have strongly contracted hydranths with about 10 tentacles ; no evidence of a caecum.

MEASUREMENTS of *Crateritheca insignis* (in μm):

	NZOI Stn C765 slide 2099	NMNZ BS 911 slide 3337	New Zealand (Ralph 1961a)
Stem internode, length	1650 – 1730	3135 – 3545	
Diameter at node	360 – 495	545 – 575	
Hydrocladial internode, length	410 – 800	1900	
Diameter at node	115 – 150	135 – 150	
Hydrotheca, total depth	510 – 580	580 – 615	400 – 620
Diameter at rim	180 – 230	180 – 265	200 – 250
Female gonotheca, length		2395 – 2475	
Maximum diameter		300 – 445	
Male gonotheca, length			4000 – 5000
Maximum diameter			800 – 1000

The colonies from BS 911 richly bear female gonothecae. These large, torpedo-shaped structures are borne on a hydrocladium, arranged parallel to one another, inserted on the internodes just under basal hydrotheca of a sub-opposite pair. Gonotheca gradually narrowing basally; apex rounded, with blunt projection. No aperture visible; gonothecae contain 5–7 egg-shaped bodies.

Remarks: Although this is undoubtedly Thompson's (1879) *Sertularia insignis* the above description differs in some respects from that given by Ralph (1961a), particularly inthe development of cristae and lamellae in or on the hydrothecae. The "two abcauline intrathecal folds" are most difficult to observe and seem to be absent from many hydrothecae. The "two dependent folds on the abcauline side of the hydropore" are occasionally absent or replaced by minor perisarc rods or elevated parts of the diaphragm. The pair of folds inside the free part of the adcauline hydrothecal wall are invariably present, even in older and strongly abraded hydrothecae. A pair of slender lamellae on the inside of the abcauline hydrothecal wall is usually distinctly visible, but the "lateral ridges" on the abcauline wall of the hydrotheca have not been found, however the lamellae mentioned above are usually distinctly visible though the perisarc, even in specimens with a dense cover of encrusting diatoms.

Female gonothecae occurring in the specimens from NMNZ BS 911 are filled with eggs in various stages of development. These gonothecae are considered to be immature as no aperture is visible. The gonothecae described by Ralph (1961: 761, fig. 3m), referred to as doubtfully female, must in fact be male. Development of stems or branches from gonothecae, as described by Ralph, has not been observed.

There is no reasonable doubt that this is the species described by Marktanner-Turneretscher (1890) from New Zealand as *Sertularia huttoni* even though his specimen was sterile. This species both has the same characteristic colony structure and curiously curved hydrothecae of the present material which precludes confusion with other sertulariids.

Records from New Zealand: The present localities are concentrated around the northern part of North Islands, viz., the Three Kings area; off North Cape; Ranfurly Bank, Bank, off East Cape; Russell, Bay of Islands; Anawhata, Auckland and the Tasman Sea off Mt Taranaki (Egmont), an area restricted between 34° and 39.5° S, 171.5° and 179° E. The bathymetrical range is between 0 and 119 m, though the first record may relate to drifted specimens. Ralph (1961a) also mentioned the species from the Chatham Islands; this record should be confirmed. Developing female gonothecae were collected in February.

Distribution: Although described from Tasmania there are no other reliable Tasmanian or Australian records. The species may be endemic to the New Zealand area.

Crateritheca novaezelandiae (Thompson, 1879)
(Fig. 23C–E)

Pericladium novae-zelandiae Thompson 1879: 112, pl. 19, fig. 3.
Selaginopsis novae-zelandiae: Thompson 1879: 113; Farquhar 1896: 465.
Crateritheca novaezelandiae: Stechow 1921d: 259; 1923d: 203; Totton 1930: 207; Ralph 1961a: 758, fig. 3a-c; Dawson 1992: 19.

Material Examined:

NZOI Stns: C763, 5 large colonies, the largest 350 mm, no gonothecae; **I340**, fragment, no gonothecae. RMNH-Coel. slide 2135; Spirits Bay, tip of North Island (with *Nemertesia elongata* Totton, 1930 and *Gonaxia* sp. nov. (J.E. Watson).

NMNZ: BS 389, large pinnate stem about 310 mm high and several regenerating colonies on a boulder; no gonothecae. NMNZ Co.501; **BS 392**, mutilated colony composed of 3 plume-shaped parts on communal base, 2 are detached; length about 200 mm; no gonothecae present. NMNZ Co.578; **BS 398**, 1 large plume, about 200 mm high and several basal fragments; no gonothecae. NMNZ Co.599. In addition large, ramified colony about 450 mm high, with some young gonothecae. Basal part of stems with bryozoans bearing *Plumularia anonyma* sp. nov. NMNZ Co.721. RMNH-Coel. 27669, slide 3369; **BS 840**, several regenerating colonies. NMNZ Co.396; **BS 904**, 2 large pinnate colonies, about 200 mm high, branches (hydrocladia) up to 50 mm; no gonothecae. NMNZ Co.431. 2 RMNH-Coel. slides 2961; **BS 905**, 1 large colony, about 300 mm high, with many gonothecae. NMNZ Co.687.

NMNZ Ralph Collection: Loc. 625, 2 reasonable, unstained slides in RSC as *Crateritheca novaezelandiae*, no further data. Good slide as *Crateritheca*, no data.

Type Locality: Pandora Bank, off Cape Maria van Diemen, New Zealand, 27 m (Thompson 1879). Syntypes in NHM and NMNH, no. 54283.

Description (mainly based on specimen from NMNZ BS 398): Large, robust, erect colonies with a thick main stem of about 3 mm diameter, basal part with thick stolonal fibres, attaching colony to firm substrate and usually covered by bryozoans. Stems unbranched, first 5 cm of lenth devoid of hydrocladia, rest of stem with up to 30 mm long pinnately arranged, alternate or subopposite hydrocladia, inserted on main stem below a hydrotheca. Both stems and hydrocladia with longitudinal rows of hydrothecae separated by low, thin, sinuate crests of perisarc. Initially 4 rows on hydrocladia, first hydrotheca on abcauline side, hydrothecae of neighbouring series alternating; number of rows may increase to 6 on hydrocladia. On main stem there may be as many as 8–10 rows of hydrothecae. Hydrothecae squarish, adcauline wall entirely adnate, abcauline wall parallel

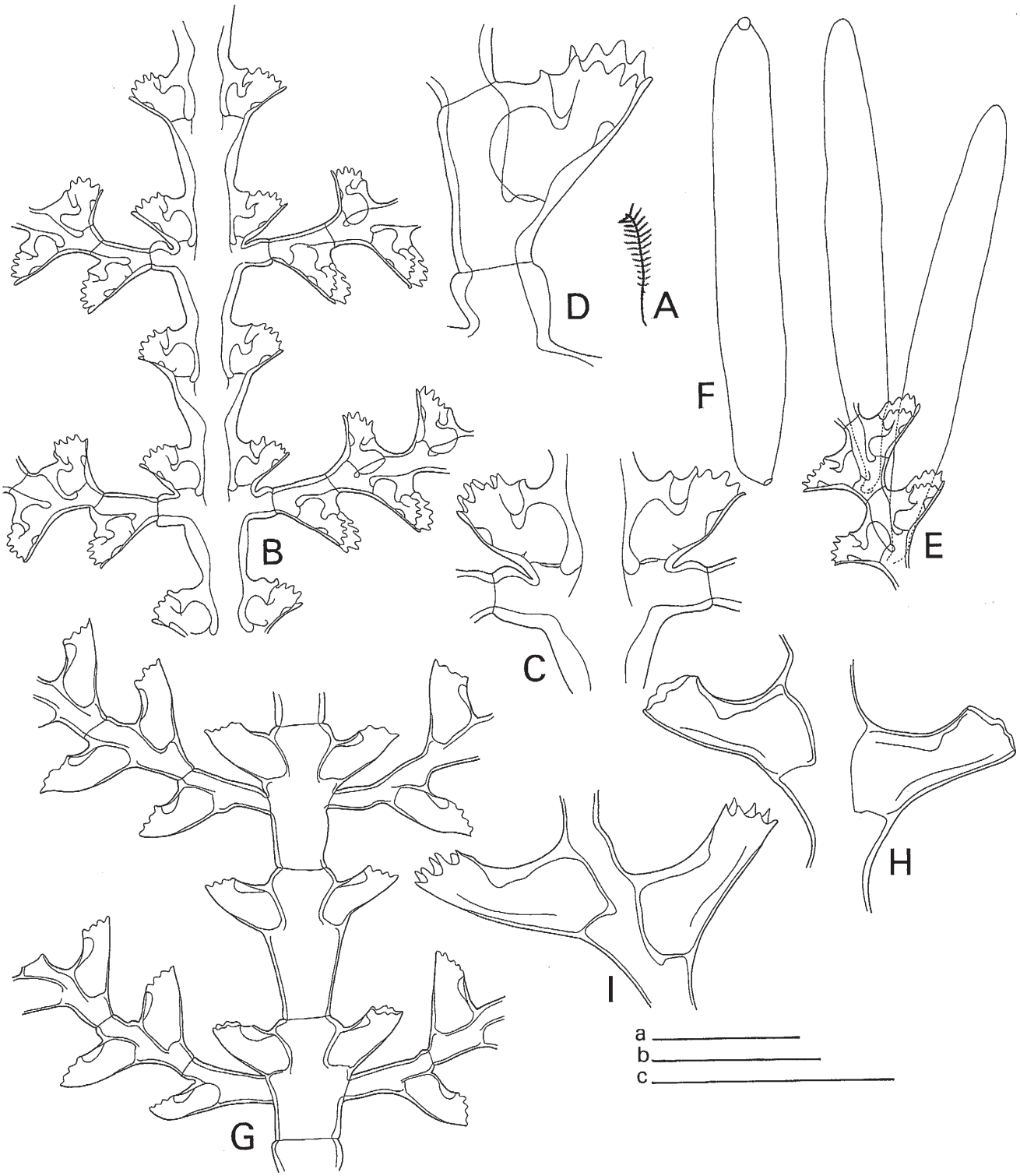

Fig. 22. A–F. ***Crateritheca billardi*** (Bale, 1915). **A**, colony. **B**, part of stem with hydrocladia. **C**, part of stem with apophyses and axillary hydrothecae. **D**, proximal hydrocladial internode with hydrotheca. **E**, part of hydrocladium bearing gonothecae. **F**, detached gonotheca (A–E, BS 386, slide 3359a; F, holotype, NHM 2000.889). **G-I.** ***Crateritheca insignis*** (Thompson, 1879). **G**, part of stem with hydrocladia. **H**, pair of hydrocladial hydrothecae from proximal part of stem. **I**, pair of hydrocladial hydrothecae from distal part of stem (G, NZOI Stn C763, slide 2099; H, I, BS 769, slide 3513). Scales: a, 35 mm (A), 1 mm (C, H, I); b, 1 mm (B, E, F, G): c, 0.5 mm (D). W.V.

to adcauline wall in lower two-thirds of hydrotheca, above that point curving outward. Hydrotheca laterally elongate, rim with rather prominent median cusp and 3 pairs of blunt lateral cusps separated by rounded embayments. Median cusp fairly heavily sclerotised, thickening spreading laterally, internally with a pair of rounded hyaline flaps at point of curvature, externally with a pair of undulated hyaline perisarc frills, running downward. Adcauline hydrothecal border terminating in a pair of strong, curved hooks projecting into hydrothecal cavity. Interior of hydrotheca with a pair of hyaline lamellae at the abcauline wall close to hydrothecal base, shape varied: irregular, rounded or almost completely absent and only visible as low carinae. Hydropore surrounded by a pair of semi-circular hyaline plates, at times quite low and difficult to see.

All hydrothecae in the material from NMNZ BS 398 have a fully retracted, well preserved hydranth at the bottom of the hydrotheca. There is no trace of a caecum; 14-16 tentacles.

Several developing gonothecae occur on one of the stems, inserted on the hydrocladium just under a hydrotheca. The largest strongly resembles that described for *Crateritheca zelandica* (Gray, 1843) by Ralph (1961: 760, fig. 3i), being an elongate, cylindrical structure, narrowing gradually basally into a short pedicel, apically cut off squarely with deepened margin; perisarc thick, notably in basal half and of rough texture. In the basal half there is a thin strand of tissue widening into a globular mass that could be a developing egg. Apex of gonotheca contains a squarish body possibly a developing planula.

Remarks: The description of the present specimen differs in minor details from Ralph's account, the most important of which is the fact that the spines projecting into the hydrothecal cavity do not border a gully as Ralph's figure (1961, fig. 10c) seems to suggest.

Measurements of *Crateritheca novaezelandiae* (in μm):

	NMNZ BS 398 slide 3369	New Zealand (Ralph 1961a)
Diameter of stem at base	2280	
Diameter of hydrocladium	730 – 735	
Hydrotheca, depth	350 – 360	400
Diameter at base	145 – 195	93 – 120
Lateral diameter at rim	240 – 250	250 – 310
Gonotheca, length*	5320	
Maximum diameter	960	

* immature gonotheca, sex probably female

The longitudinal cristae bordering the hydrothecae are not mentioned by Ralph. The gonotheca is here described for the first time; its structure emphasises the close relationships of the present species with *Crateritheca zelandica* (Gray, 1843), a species in which the hydrothecae are strictly biserially arranged.

Records from New Zealand: Known only from a restricted area off the northern part of North Island (34°–37.5° S, 172°–179° E, Three Kings Islands region, Spirits Bay, Ranfurly Bank, King Bank, 73–105 m depth). Fertile specimens are only known from February.

Distribution: Endemic to New Zealand.

Crateritheca zelandica (Gray, 1843) (Figs 23F–J, 24A)

Thuiaria zelandica Gray 1843: 294; Quelch 1883: 247.
Thuiaria zelandica var. *valida* Quelch 1883: 249.
Crateritheca zelandica: Totton 1930: 206, text-fig. 49, pl. 3, figs 1–3; Ralph 1961a: 758–760, fig. 3d-k; Dawson 1992: 19.
Thuiaria dolichocarpa Allman 1876a: 270–271, pl. 19, figs 3–4, 4a; Thompson 1879: 110; Stranks 1993: 15.
Thuiaria hippisleyana Allman 1885: 146, pl. 19, figs 1–3.

Material Examined:

NZOI Stns: E388, 1 colony 80 mm high, 5 hydrocladia, no gonothecae. RMNH-Coel. slide 2111; **F924**, single pinnate stem 100 mm high, no gonothecae; **F933**, stem fragment about 30 mm long and many detached hydrocladia. No gonothecae; **I340**, fragment with a single gonotheca. RMNH-Coel. slide 2136; **I371** (dried out sample), several stems, 1 complete and pinnate, with many gonothecae.

NMNZ: Opoutama Beach, Mahia, A.N. Baker, 6 Sept.1970: Top part of plume, about 40 mm long and some young, regenerating colonies; no gonothecae. NMNZ Co.565; **BS 390**, 1 stem, 130 mm long, pinnately arranged hydrocladia; no gonothecae. NMNZ Co.537; 2 RMNH-Coel. slides 3006; **BS 394**, 2 pinnate plumes, rising from communal base, 170 mm long; female gonothecae on 1 stem. NMNZ Co.589, 2 RMNH-Coel. slides 3017; **BS 769**, 3 stems with communal basal filaments, about 80 mm high and bearing several pairs of opposite hydrocladia 10–15 mm long; no gonothecae. Evidently young colonies. NMNZ Co.829; RMNH-Coel. slide 3508. In addition 2 colonies about 80 mm high, no gonothecae. NMNZ Co.871. RMNH-Coel. 27751, slide 3531. Also bunch of stems rising from communal mass of fibres; only some hydrocladia present. NMNZ Co.842, RMNH-Coel. slide 3517A. Also stems with some colonies of *Parascyphus simplex* (Lamouroux, 1816. NMNZ Co. 843, 2 RMNH-Coel. slides 3517 and *Sertularella* cf. *robusta* Coughtrey, 1876b; RMNH-Coel. slide 517B; **BS 838**, several stems with *Monotheca hyalina* (Bale, 1882) and *Antennella kiwiana* Schuchert 1997, no gonothecae. RMNH-Coel. 27704, 2 slides 3404; **BS 840**, 2 stems about 110 mm high; hydrocladia only present at top 20 mm (NMNZ Co.773). 1 hydrocladium as RMNH-Coel. 27718, slide 3418.

NMNZ Ralph Collection: Loc. 319, NMNZ Co.1155, 1 complete colony about 80 mm high with about 12 mm long hydrocladia and a smaller, imperfect stem; no gonothecae. 3 RMNH-Coel. slide 3834. Perfect, stained slide in RSC as *Crateritheca zelandica*, no data. Dried out slide as *Crateritheca zelandica*, no data; **Loc. 622**, NMNZ Co.1330, fragments of colony composed of parts of stem and loose hydrocladia. RMNH-Coel. slide 4013. Dried out slide in RSC as *Crateritheca zelandica*, no data.

TYPE LOCALITY: *Thuiaria zelandica*: North Island, New Zealand (Gray 1843), holotype in NHM (Billard 1910). *Thuiaria dolichocarpa*: "Northern Island, New Zealand, Busk collection" (Allman 1876a); *Thuiaria hippisleyana*: Australia (no further specification). Holotypes of *Thuiaria dolichocarpa* Allman, 1876a, and *T. hippisleyana* Allman, 1885, are in NHM although Stranks (1993: 15) mentions a holotype slide of *T. dolichocarpa* (MV F59302) in the collection of MOV.

MEASUREMENTS of *Crateritheca zelandica* (in μm):

NMNZ	BS 769 slide 3508 slide 3531	BS 394 slide 3017
Diameter of stem at base	1825	
Length of internode of stem	1565 – 3460	**
Diameter at node	295 – 410	460
Length hydrocladial internode	4000 – 4350	**
Diameter at node	230 – 245	**
Hydrotheca, total depth	360 – 445	330 – 360
Diameter at rim	195 – 230	210 – 230
Female gonotheca, length*	2890	1975 – 2395
Maximum diameter	610	530 – 560

* gonototheca from NZOI Stn I340
** Only one node observed

DESCRIPTION: Strongly built, heavily sclerotised colonies up to 11 cm high with monosiphonic, thick stem and pinnately arranged, opposite hydrocladia along upper part of stem, basal portion free of hydrocladia. Stem divided into internodes by means of straight nodes, only visible in upper parts of stem, internodes with a varied number of opposite hydrothecae (usually 4 or 5) and a pair of short apophyses under first or second pair of hydrothecae, supporting hydrocladia up to 20 mm long. Hydrocladia densely packed with sub-opposite almost overlapping hydrothecae. Hydrothecae squarish, fairly deeply embedded in hydrocladium, apical part slightly turned away from hydrocladial axis; aperture tilted downwards. Hydrothecae initially with 3 pairs of rounded lateral cusps, and a low but reinforced abcauline cusp flanked by deep lateral sinuses. From age or wear the marginal cusps tend to disappear, becoming less visible proximally along the hydrocladia and become almost invisible in lower cauline hydrothecae, resulting in a roughly undulated rim. The lateral sinus is reinforced on both sides by curved sclerotised plates that produce a gully with upturned margins in median plane; in lateral aspect the walls of the gully appear the same. Adcauline wall of hydrotheca fully adnate with hydrocladium; abcauline wall sclerotised, basally undulated. Base of hydrotheca with thick diaphragm with large circular hydropore. Inside of abcauline wall with a pair of hyaline, longitudinal lamellae. Exterior of hydrocladium with sclerotised, undulated, longitudinal ridges. At least 2 of such ridges occur on each lateral surface of basal part of hydrotheca, together with a longitudinal ridge on each side of hydrocladium occupying free space between hydrothecae and adcauline basal part of hydrothecae. There is no evidence to support the suggestion that additional internal ridges are present inside hydrotheca, nor are any elevations of perisarc visible near hydropore. Tissue remnants visible in most specimens obscure observation and may easily be mistaken for internal projections.

Gonothecae occur in some of specimens; these have been described and figured by Totton (1930: 206–207) and Ralph (1961a: 760, fig. 3h-k). The torpedo-shaped gonotheca figured by Ralph (1961a, fig. 3j, k) is probably the female gonotheca; this shape of gonotheca occurs plentifully in the well-preserved material from NMNZ BS 394 and contains 5 or 6 globular bodies which may be eggs. The much larger male gonotheca is not represented in our material. The female gonotheca narrows considerably basally and is attached with a scarcely perceptible pedicel to the hydrocladium at the base of a hydrotheca. Gonothecae occur in rows, all oriented in the same direction; present in November and February.

REMARKS: There is wide variability in this species with regards to the degree of sclerotisation and shape of the hydrothecal border, so much so that all specimens inspected, though agreeing in general appearance, differ in details, particularly in the development of the marginal cusps of the hydrothecae. In young specimens, though the perisarc is already fairly thick, the ridges on hydrotheca and hydrocladium are weakly developed; in older specimens they are a very striking feature. The hydrothecal rim is distinctly cusped; the cusps stand out clearly and are fairly acute, with rounded tip; the lateral sinus are small and shallow. In older hydrothecae the cusps tend to disappear almost completely and the lateral sinus deepen.

RECORDS FROM NEW ZEALAND: Living specimens were obtained at Ranfurly Bank, East Cape, about 37.5° S, 178° 50′ E, between 34 and 54 m, and off Three Kings Islands, 34° 11′ S, 172° 10′ E, 91 m.

Further specimens, from off Three Kings Islands (Totton 1930, 183 m), off Cape Maria van Diemen (Totton 1930, 64–73 m), off Hokianga Harbour, 27 m (Thompson 1879), Port Waikato, Auckland Harbour, 73 m (Ralph 1961a) and Manukau Harbour, no depth records (Ralph 1961a). Drifted specimens also known from Muriwai Beach, Tolaga Bay, and Opoutama Beach, Hawke Bay (Ralph 1961a). Totton (1930) mentions dried specimens in NHM collection originating from Palliser Bay. Available evidence indicates that the species lives in the extreme north of New Zealand waters (Three Kings Islands), bordering the northern promontory of North Island and Ranfurly Bank, off East Cape. The sturdy colonies are likely to be transported over considerable distances.

DISTRIBUTION: Besides New Zealand only recorded from Australia (Allman 1885, as *Thuiaria hippisleyana*), no accurate locality being specified. There are no further, more recent records and the occurrence of this species in Australian waters is open to doubt.

Dictyocladium Allman, 1888

TYPE SPECIES: *Dictyocladium dichotomum* Allman, 1888 [= *Sertularella reticulata* Kirchenpauer, 1884].

The genus *Dictyocladium* is briefly discussed by Vervoort (1993a: 105). The type of this genus is Allman's *Dictyocladium dichotomum* from Bass Strait; Allman's description is cursory and the illustrations stylised and incorrect as far as the insertion of the gonotheca is concerned. It seems to have escaped the attention of previous investigators that this species is conspecific with Kirchenpauer's *Sertularella reticulata* from Bass Strait, redescribed after Kirchenpauer's original material by Hartlaub (1901a). *Dictyocladium dichotomum* is certainly congeneric with *Thuiaria cerastium* Allman, 1876a, a species synonymised with *Sertularia monilifera* Hutton, 1873, by Bale (1924). The latter, after inspection of fragments of the types of *S. monilifera, T. cerastium* and *D. dichotomum* united the three species as *Selaginopsis monilifera*, following Billard (1910) in generic allocation. *Selaginopsis moniliferum* was subsequently and correctly referred to *Dictyocladium* Allman, 1888, by Totton (1930: 201–202); however, Totton was not convinced of the fact that *Dictyocladium dichotomum* Allman, 1888, represented "only one sex of *moniliferum*", this primarily because of differences in the morphology of the gonothecae. Ralph (1961a: 791), when discussing New Zealand material of *Dictyocladium*, was still in doubt, expressing the impossibility to reach a definite conclusion by stating that "... it still cannot be said with certainty if the broadly ovate gonothecae with eight widely spaced folds are female and the narrowly elongate, ovate gonothecae with from 17 to 20 narrowly spaced folds are male". All New Zealand material inspected by Ralph, amongst which was the type slide of *Sertularia monilifera* Hutton, 1873, (Canterbury Museum slide no. 33), was referred by her to *Dictyocladium moniliferum* (Hutton, 1873).

The material of *Dictyocladium* available for this study is considerable, originating from a vast area around New Zealand and from shallow as well as deep water localities. After separating two evidently undescribed, new species (*Dictyocladium amplexum* sp. nov. and *D. thuja* sp. nov.) and a species previously classified in *Symplectoscyphus* [*D. watsonae* (Vervoort, 1993a)], a large material remains answering more or less the description (and figures) of Ralph (1961a: 790–791, fig. 13f-i). The presence of many fertile colonies in this material and a careful comparison of the characters with existing descriptions has convinced us that Ralph's description of *D. moniliferum* is based on a composite material, comprising two species that have hitherto been confused and united, one of which represents Hutton's species, which should stand as *Dictyocladium monilifer* (Hutton, 1873) [= *Thuiaria cerastium* Allman, 1876a], the other *Dictyocladium reticulatum* (Kirchenpauer, 1884) [= *Dictyocladium dichotomum* Allman, 1888]. The trophosomes of both species are much alike but the gonothecae are quite distinctive. Further details are given under the discussion of each species.

Dictyocladium amplexum sp. nov. (Fig. 24B, C)

MATERIAL EXAMINED:

NMNZ: BS 396, delicately built colony; free part of hydrotheca long. No gonothecae (NMNZ Co.595); **BS 886**, fragmentary colony with gonothecae, about 50 mm high (NMNZ Co.529, holotype). 2 RMNH-Coel. slides 3001 are part of type series.

TYPE LOCALITY: Wanganella Bank, Norfolk Ridge, E slope, 32°35.3′ S, 167°41.8′ E to 32°34.0′ S, 167°39.0′ E, 437–422 m.

DESCRIPTION (of holotype): Colony flaccid, monosiphonic, composed of pseudo-dichotomously branched, slender ramifications; number of ramifications reduced, about 10 mm between 2 successive branches, terminal branches 30–40 mm long after last ramification. Branches thin, with 2 rows of alternate to sub-opposite hydrothecae lying in 1 plane, spacing between hydrothecae on 1 side wide, about half depth of hydrotheca. Only occasionally subdivision of branch into internodes, these visible by occurrence of a few, usually oblique, nodes.

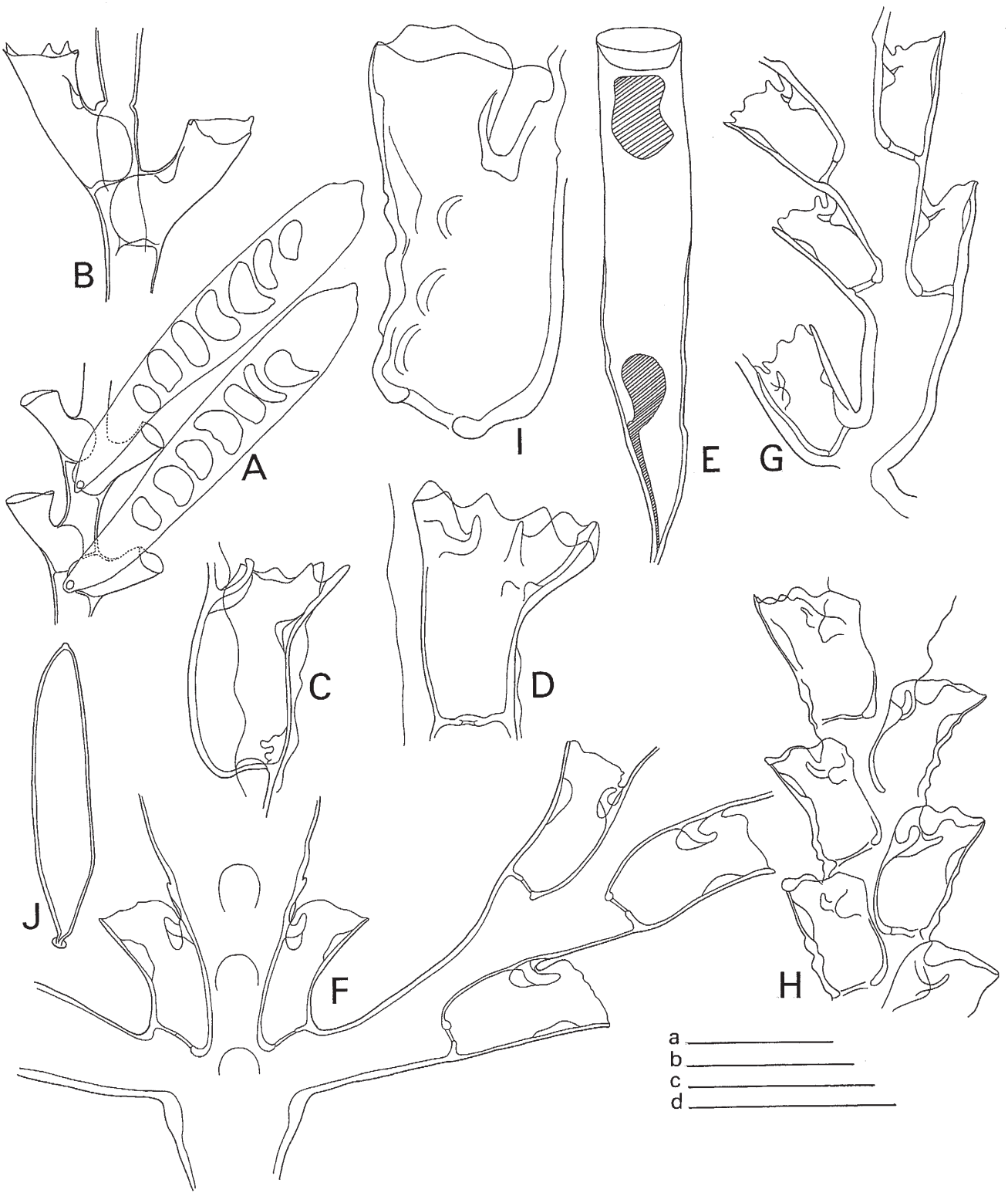

Fig. 23. A–B. ***Crateritheca insignis*** (Thompson, 1879). **A**, part of hydrocladium with female gonothecae. **B**, hydrocladial hydrothecae (BS 911, slide 3337). **C–E.** ***Crateritheca novaezelandiae*** (Thompson, 1879). **C**, stem hydrotheca. **D**, hydrocladial hydrotheca. **E**, gonotheca (C, D, NZOI Stn 340, slide 2135; E, BS 398, slide 3369). **F–J.** ***Crateritheca zelandica*** (Gray, 1843). **F**, part of stem with proximal parts of two hydrocladia. **G**, insertion of hydrocladium on stem with axillary hydrotheca. **H**, part of hydrocladium. **I**, hydrocladial hydrotheca. **J**, gonotheca (F, BS 390, slide 3006; G, Loc. 319, slide 3834; H, BS 769, slide 3508; I, BS 769, slide 3531; J, NZOI Stn I340, slide 2136). Scales: a, 1 mm (B, F-H); b,1 mm (A); c, 0.25 mm (C, D, I); d, 2 mm (E, J). W.V.

Hydrothecae tubular, typically with apical portion curving outwards almost perpendicularly, occasionally smoothly curved. Adcauline wall adnate for about two-thirds of its length, typically with perisarc peg protruding into hydrothecal cavity just below region of curvature; hydrothecal base with perisarc peg on adcauline side, foramen located on abcauline side. Abcauline wall with slight concavity at region of curvature; free part of hydrotheca thin, easily collapsible and typically strongly renovated. Renovated part of hydrotheca quite fragile, occasionally as long as or slightly longer than free part. As far as condition of material permits observation, the primary hydrothecal rim seems to have 3 rounded marginal cusps: 1 adcauline and 2 lateral near abcauline side. There are remnants of an operculum, probably 3-flapped. With increasing number of renovations contour of hydrothecal rim becomes quite vague and development of cusps is difficult to observe, but 3 broadly rounded marginal cusps still appear to be present.

Perisarc on branches generally fairly thick, yellowish, thinning out considerably along free part of hydrothecae.Gonothecae seatedon a tubercle on inside of base of branch resulting from pseudo-dichotomous ramification. Gonotheca elongate ovoid, with a prominent spiral ridge with broad, downwardly directed, hyaline flange, curving basalwards from top of gonotheca in 7 or 8 coils; gonotheca with short, cylindrical apical tube, almost completely concealed in first spiral curve of helix. Gonotheca deeply constricted between spiral coils, attached to branch by a very short, scarcely perceptible pedicel. All gonothecae empty; sex could not be ascertained.

No tissue remnants have been observed.

REMARKS: This species of *Dictyocladium* Allman, 1888, is distinct by its pseudo-dichotomous branching and insertion of the gonotheca. The colony is non-reticulate, the hydrothecae have a strongly curved free part, resembling that of *Zygophylax tizardensis* Kirkpatrick, 1890, and a very characteristic, deeply furrowed gonotheca. Although gonothecae were prsent in material collected inJanuary it should be borne in mind that the material was probably already dead when collected.

RECORDS FROM NEW ZEALAND: Known only from the Three Kings Islands region and from Wanganella Bank, Norfolk Ridge, depth 225–437 m.

ETYMOLOGY: The specific name is taken from the Latin verb *amplector*, *exus*, to enfold, to embrace, referring to the broad, encircling frill of the gonotheca.

MEASUREMENTS of *Dictyocladium amplexum* (in μm):

	NMNZ BS 886 slide 3001
Diameter of branch (measured at node)	280 – 310
Hydrotheca, length adnate adcauline wall	515 – 610
Length free part, without renovations	245 – 310
Length free part, including renovations	330 – 790
Diameter at base	180 – 210
Diameter at rim, non-renovated hydrotheca	115 – 135
Gonotheca, total length	2130 – 2165
Maximum diameter, including keel and flange	1235 – 1480
Maximum diameter between two keels	740 – 910
Height of apical funnel	165 – 195
Diameter of funnel at rim	135 – 165

Dictyocladium monilifer (Hutton, 1873)

(Fig. 24D, H)

Sertularia monilifera Hutton 1873: 257; Coughtrey 1875: 282; 1876a: 30; 1876b: 301; Stranks 1993: 17.

Selaginopsis monilifera: Bale 1924: 237; Trebilcock 1928: 9, pl. 4, fig. 4.

Selaginopsis monolifera: Kulka 1950: 81, fig. 11 (incorrect subsequent spelling).

Dictyocladium moniliferum: Totton 1930: 202-203, fig. 47; Ralph 1961a: 790–791, fig. 13f-i; 1961d: 236; Vervoort 1993a: 105; Dawson 1992: 19.

Dictyocladium moliniferum: Bouillon *et al*. 1995: 64 (incorrect subsequent spelling).

Thuiaria cerastium Allman 1874b: 179; 1876a: 271, pl. 18, figs 3–4.

MATERIAL EXAMINED:

NZOI Stns: A444B, *Dictyocladium monilifer* (Hutton, 1873) (J.E. Watson); **B482**, fragments of 1 or several large colonies, no gonothecae; **B487**, fragments of some colonies, with gonothecae; **B488**, fragments of several colonies, with gonothecae; **B571**, many colonies attached to shells of lamellibranchs and many fragments; many gonothecae; **B658**, *Dictyocladium monilifer* (Hutton, 1873) (J.E. Watson); **C118**, *Dictyocladium monilifer* (Hutton, 1873) (J.E. Watson); **C125**, *Dictyocladium monilifer* (Hutton, 1873) (J.E. Watson); **C259**, single fragment, 20 mm high, no gonothecae; **C763**, fair colony, about 80 mm high, with gonothecae; **D20**, 50 mm long fragment with gonothecae; **D138**, 40 mm long fragment; no gonothecae; **D139**, many fragments, partly with gonothecae, from colonies originally attached to calcareous rock fragments; **D148**, fragments of larger colony only. No gonothecae; **D874**, small colony, 25 x 30 mm high, some gonothecae, part as RMNH-Coel. slide 2290; **D876**, 2 colonies, 40 x 30 mm high and fragments, no gonothecae; **D877**, 3 colonies, about 50 mm high on small stones. Many, presumably female, gonothecae; **D896**, fragmentary colony 20 x 30 mm high, no gonothecae; **E108**, numerous colonies with gonothecae from dried out sample; **E109**, 2 colonies, 50 and 55 mm high, no gonothecae; **E278**, mutilated colony about 60 mm high; no gonothecae;

E820, several colonies, some anastomosing, about 80 mm high and many fragments. No gonothecae. Some colonies intimately associated with *Hebellopsis scandens* (Bale, 1888) and *Sertularella integra* (Allman, 1876a); **E864**, tangled colonies and fragments, some about 50 x 50 mm, no gonothecae. RMNH-Coel. slide 2191; **E865**, tangled colonies with gonothecae; **F83**, *Dictyocladium monilifer* (Hutton, 1873). (J.E. Watson); **K819**, 2 or 3 detached colonies, 35 mm high, some, presumably male gonothecae; these elongate, ovoid, with 18–25 turns of spiral ridge; ridge low, no frill. RMNH-Coel. slide 2269; **N369**, fragment 15 x 30 mm with gonothecae and 3 additional colonies with stem and some gonothecae, about 50 mm high; **O153**, *Dictyocladium monilifer* (Hutton, 1873) (J.E. Watson); **O184**, *Dictyocladium monilifer* (Hutton, 1973) (J.E. Watson); **O329B**, completely fragmented sample composed of parts of hydrocladia and of gonothecae; **Q174**, colony fragment about 50 mm high and in poor condition. No gonothecae.

NMNZ: 4.5 miles E **Tory Channel,** Cook Strait, several dichotomously branched stems, up to 40 mm high, no gonothecae. NMNZ Co.640; **BS 389**, several fan-shaped colonies with characteristic dichotomous branching; height up to 60 mm; gonothecae present. NMNZ Co.507; **BS 396**, a fair number of colonies, some with well defined stem. No gonothecae. NMNZ Co.594; **BS 410**, about 10 reticulate colonies, developing on lamellibranch; no gonothecae. NMNZ Co. 636; **BS 486**, fragmented colony about 50 x 50 mm, reticulate, without gonothecae, on bryozoans, with *Hebellopsis scandens* (Bale, 1888). NMNZ Co.836; 1 RMNH-Coel. slide 3514; **BS 512**, fragments about 20 mm high of 1 or several colonies; no gonothecae. NMNZ Co.851; **BS 561**, 1 forked colony, 50 mm high, no gonothecae. NMNZ Co.679; **BS 621**, several small, up to 50 mm high colonies, some unbranched. Gonothecae present. On sponges, etc. On some stems *Modeeria rotunda* (Quoy & Gaimard, 1827). NMNZ Co.478; 2 RMNH-Coel. slides 2988; **BS 679**, 5 colonies on bryozoans and some fragments; maximum height about 30 mm; no gonothecae. NMNZ Co.875; **BS 837**, developing colonies up to 20 mm high on stone; no gonothecae. NMNZ Co.682; **BS 838**, single colony fragment, about 25 x 25 mm, with globular bryozoans and some gonothecae. NMNZ Co.767; RMNH-Coel. slides 4424; **BS 862**, large fan-shaped colonies up to 70 mm high, densely interwoven with bryozoans and calcareous algae; gonothecae present. NMNZ Co.684; **BS 899**, bunch of highly interwoven colonies with gonothecae. Intimately associated with bryozoans and *Symplectoscyphus j. johnstoni* (Gray, 1843). NMNZ Co.450; 3 RMNH-Coel. slides 2969; **BS 902**, 4 colonies, largest 50 x 50 mm, all with gonothecae and densely covered by *Filellum serpens* (Hassall, 1848). NMNZ Co.470; **BS 905**, single colony with gonothecae, 40 x 40 mm. NMNZ Co.692; additional reticulate colony, about 50 x 50 mm, with many gonothecae. NMNZ Co.693; 2 RMNH slides 3034; **BS 912**, single fan-shaped colony with gonothecae, 50 x 35 mm. NMNZ Co. 582; **BS 913**, small colony fragments about 45 x 45 mm, with bryozoans and *Hebellopsis scandens* (Bale, 1888). Apparently dead and overgrown specimen; no gonothecae. NMNZ Co.795; RMNH-Coel. slide 3343.

NMNZ Ralph Collection: Loc. 104, NMNZ Co.959, 3 fragments, largest about 15 mm long and with damaged gonotheca. RMNH-Coel. slide 3651; **Loc. 116**, NMNZ Co.971, remnants of a totally fragmented colony with many gonothecae. RMNH-Coel. slides 3658; **Loc. 522**, NMNZ Co.1255, small colony with *Hebellopsis scandens* (Bale, 1888). With *Sertularella integra* Allman, 1876a and *Symplectoscyphus j. johnstoni* (Gray, 1843). RMNH-Coel. slides 3931, after bleaching; **Loc. 734**, good slide in RSC as *Dictyocladium moniliferum*, with data: Russell.

PMBS: Blueskin Bay, hydrothecae appear to be arranged in 4 longitudinal rows in this genus. Identified by E.J. Batham. Endemic for New Zealand. (Taken from card register).

TYPE LOCALITY: *Sertularia monilifera*: Lyall Bay (Hutton 1873). Holotype according to Ralph (1961a: 791) in Canterbury Museum, Christchurch (slide 33), but probably now lost. Additional possible syntype in MOV, MV F594289 (microslide, Stranks, 1993: 17). *Thuiaria cerastium*: "Northern Island, New Zealand, Busk collection" (Allman 1876a); holotype presumably in NHM, but a holotype microslide (MV F59303) is mentioned by Stranks (1993: 15) from MOV ("ex Bale Coll., ex BMNH").

DESCRIPTION (mainly based on material from NZOI Stn D874): Colony flexuous, bushy, composed of several pseudo-dichotomously branching stems, weakly polysiphonic basally and developing into a reticulate structure with many anastomoses, several centimetres high and wide. Pseudo-dichotomous branching exclusively in monosiphonic parts of stems; resulting branch rebranching, on internal side basally with rounded knob with thin perisarc from which gonotheca may develop; length of stem or branch between 2 successive branches 8–12 mm. Nodes of quite irregular occurrence. Axes and branches set with sub-opposite to alternate pairs of hydrothecae; between each 'pair' torsion of the stem (or branch) has occurred, resulting of arrangement of the hydrothecae in 2 planes meeting at a very acute angle (about 20°); each second hydrotheca on same side in same plane. Hydrothecae have a slight tendency to crowd under a bifurcation; this character is extremely variable in the colonies.

Hydrotheca with slightly swollen, almost tubular basal portion, sunken into internode; basal pair of hydrothecae with distinct abcauline swelling. Distal, free part of hydrotheca smoothly curving away from branch or stem, initially free part of adcauline wall about half as long as adnate part or shorter. Rim of aperture with 3 distinct cusps: 1 adcauline, 2 lateral; adcauline cusp may be slightly upturned. Many hydrothecae have a complete primary operculum composed of 3 triangular flaps attached in the embayments between the marginal cusps, closing to form a triangular roof. Renovations do occur, but never as copiously as in other species of this genus; they are rather widely spaced and quite regular.

Perisarc of colony yellowish and rather thick, hydrotheca sturdy; adcauline wall of hydrotheca fairly thick; hydrothecal base thick; foramen in diaphragm on abcauline side. Many hydrothecae have contracted hydranths or tissue remains indicating that colonies were alive when collected. Retracted hydranths have a small abcauline caecum.

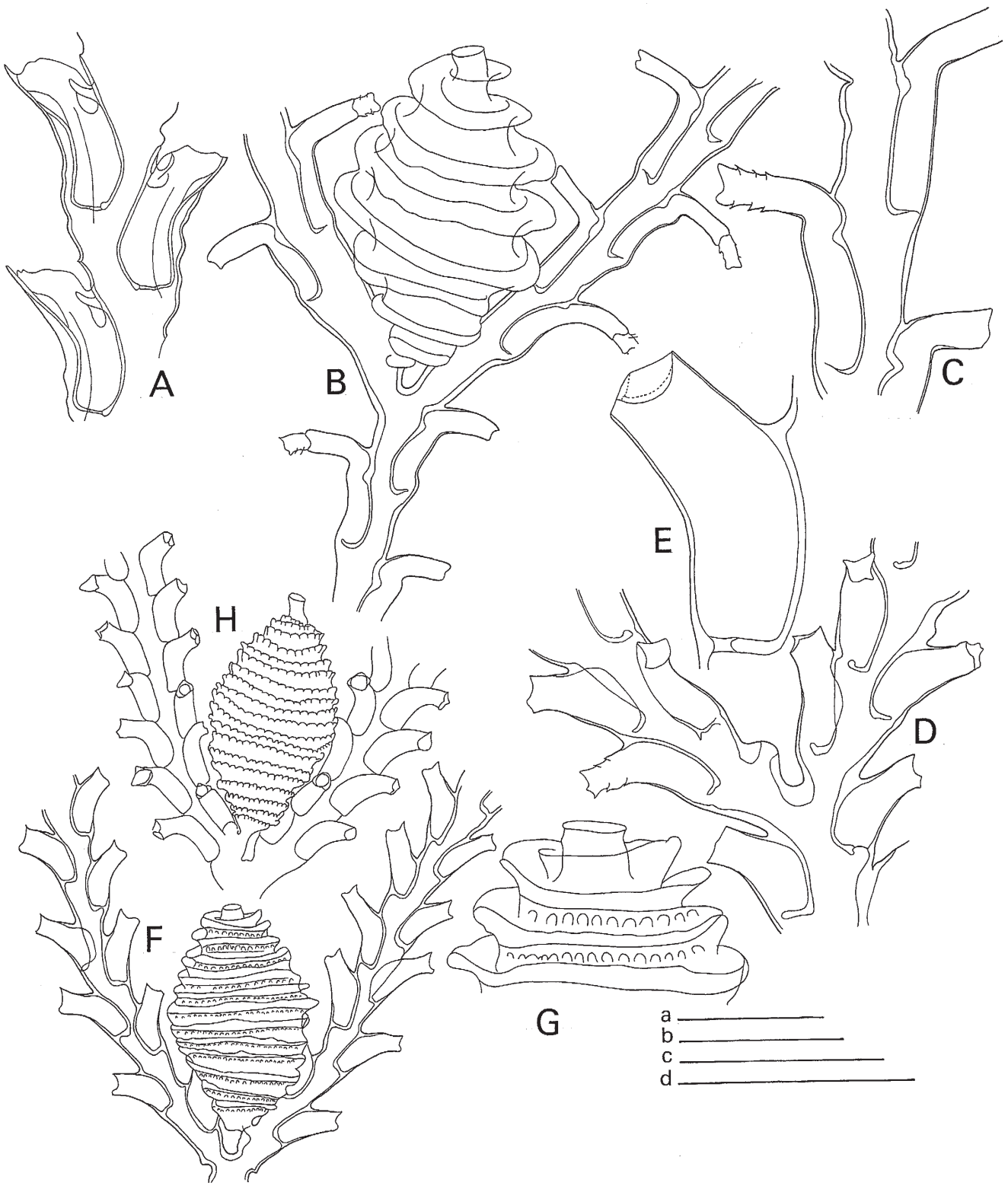

Fig. 24. A. ***Crateritheca zelandica*** (Gray, 1843), part of hydrocladium (BS 390, slide 3006). **B, C.** ***Dictyocladium amplexum*** sp. nov. **B**, part of stem with gonotheca. **C**, part of hydrocladium (BS 886, holotype, slide 3001). **D.** ***Dictyocladium monilifer*** (Hutton, 1873), part of colony with bifurcation. **E–G.** ***Dictyocladium reticulatum*** (Kirchenpauer, 1884). **E**, hydrocladial hydrotheca. **F**, part of stem with female gonotheca. **G**, distal part of female gonotheca. **H**. ***Dictyocladium monilifer*** (Hutton, 1873), part of stem with male gonotheca (D, H, NZOI Stn D874, slide 2290; E–G, NZOI Stn E267, slide 2106). Scales: a, 1 mm (A, C, D, G); b, l mm (B, H); c, 2 mm (F); d, 0.5 mm (E). W.V.

MEASUREMENTS of *Dictyocladium monilifer* (in μm):

	NZOI Stn D874 slide 2290	NMNZ BS 899 slide 2969	NMNZ BS 905 slide 3034
Diameter of stem under pseudo-dichotomous ramification	320 – 410		
Hydrotheca, length adnate adcauline wall	305 – 320		
Length free adcauline wall (without renovation)	115 – 195		
Length including renovations	255 – 280		
Total depth	355 – 395		
Diameter at rim	90 – 115		
Female gonotheca		1895 – 1905	2050 – 2070
Maximum diameter		990 – 1025	1285 – 1290
Length apical funnel		195 – 245	295 – 300
Diameter at rim		210 – 200	240 – 260
Male gonotheca, total length	1615 – 1670		
Maximum diameter	855 – 925		
Length apical funnel	180 – 190		
Diameter at rim	130 – 135		

Anastomoses common; occurring from a terminal stolon entering a hydrotheca (NZOI Stn E864) or because a stolon develops from a hydrotheca or gonotheca entering another hydrotheca (NZOI Stn K819).

Two types of gonothecae occur, differing in size and morphology. The smaller gonothecae are almost globular, slightly elongate and characterised by the presence of a fairly long, slender apical tube. This type of gonotheca has a thin spiral keel descending from top to base in 18–20 whorls, leaving the apical tube completely free. The keel has a narrow frill with U-shaped perisarc trabeculae of almost uniform width along the whole extent of the keel. These gonothecae may be male. The second type is larger and more elongate but has an similar long and free apical tube, though slightly widening apically. The spiral keel has about 25 whorls between apex and base; the frill is equally narrow. Both types of gonothecae occur on separate colonies, inserting by means of a very short pedicel on the swelling on the inside of a pseudo-dichotomous branch.

REMARKS: This species generally resembles *Dictyocladium reticulatum* (Kirchenpauer, 1884), with which it has been confused. Ralph's description of *Dictyocladium monilifer* (Hutton, 1873) and her figures partly relate to that species and partly to *D. dichotomum*. Both species are quite different in morphology of the gonothecae. Sterile material normally can be separated because *Dictyocladium monilifer* is a small species, with smaller hydrothecae, a finer colony with thin axes and branches, and few renovated and collapsed hydrothecae. As pointed out above no figure of the gonotheca was presented by Hutton and his description of this structure fits both *Dictyocladium monilifer* and *D. reticulatum*. Ralph, who had access to Hutton's types, probably bearing gonothecae, considers *Sertularia monilifera* Hutton, 1873, and *Thuiaria cerastium* Allman, 1876a, conspecific; Allman's drawing of the gonotheca is unmistakable and identical with the (female) gonotheca of specimens here referred to Hutton's species. Two slides in NHM from Busk collection (99.7.1.6043: *Thuiaria cerastium*, New Zealand North Island, and 99.7.1.6045 from same locality) have the following pencil remark on label: "*Dictyocladium dichotomum*!" Both slides are in poor condition. They have the type of gonothecae figured by Allman.

RECORDS FROM NEW ZEALAND: Species widely distributed in New Zealand waters between 29° and 50.5° S and 164° E and 177° W, depth 4–668 m, this area including the Three Kings Islands, the Chatham Islands region and Stewart Island, but apparently not reaching the Auckland Islands. Gonothecae were observed in January, February, March, June, July, October, and December, so probably occurring throughout the year.

DISTRIBUTION: This species is most likely restricted to New Zealand waters. There is a single record from outside that area, viz., that by Bouillon *et al.* (1995), mentioning alcohol preserved specimens in the collection of the Institut Royal des Sciences Naturelles de Belgique, Brussels (IG.23383) from Baie du U.S. Glacier, Antarctic, Stn 220, 01.Feb.1965, deposited by E. Leloup. We strongly doubt the correctness of the identification of this antarctic material, nor have we been able to check the locality.

Dictyocladium reticulatum (Kirchenpauer, 1884)
(Fig. 24E–G, 25A–C)

Sertularella reticulata Kirchenpauer 1884: 40, pl. 15, figs 4, 4a, 4b; Hartlaub 1901a: 35.

[Not *Sertularella reticulata* Naumov 1960: 346–347, text-fig. 238, pl. 5 (= *Sertularella erratum* sp. nov.)].

Dictyocladium reticulatum: Hartlaub 1901a: 92–93, pl. 3, figs 23–28.

Dictyocladium dichotomum Allman 1888: 77, pl. 36 fig. 2; Levinsen 1893: 184; von Campenhausen 1896a: 104; Hartlaub 1901a: 35, 93; Nutting 1904: 8; Hartlaub 1905: 617; Jäderholm 1905: 29; Hickson & Gravely 1907: 21; Vanhöffen 1910: 332; Stechow 1923c: 108; 1923d: 169.

Selaginopsis dichotoma: Billard 1910: 16 -17, fig. 5; Bale 1915: 266.

MATERIAL EXAMINED:

NZOI Stns: A733, isolated fragments, no gonothecae. RMNH-Coel. slide 2724; **B175**, fragments of a larger colony, 1 gonotheca. RMNH-Coel. slide 2730; **B176**, several fragments; **E267**, 25 mm high fragment with gonotheca. RMNH-Coel. slide 2106 only.

NMNZ: BS 482, colony remarkable by considerable renovations of hydrothecae that lengthen their free part. No gonothecae. With *Filellum serratum* (Clarke, 1879) and other epizooids. May belong here. NMNZ Co.860, RMNH-Coel. slide 4421.

NMNZ Ralph Collection: Loc. 585, NMNZ Co.1294, completely fragmented colony without gonothecae. With *Filellum serratum* (Clarke, 1879) and a hebellid. RMNH-Coel. slide 3971. Poor slide in RSC as *Dictyocladium moniliferum*, no data; **Loc. 617**, NMNZ Co.1326, fragments of a larger colony with gonothecae, some colonies as large as 20 x 15 mm. RMNH-Coel. slide 4009. Poor slide in RSC as *Dictyocladium moniliferum*, no data.

TYPE LOCALITY: *Sertularella reticulata*: Bass Strait (Kirchenpauer, 1884); holotype probably lost. *Dictyocladium dichotomum*: Stn 162, *Challenger* Expedition, Bass Strait, 69-73 m (Allman 1888); holotype in NHM; syntypes, 2 microslides, in MOV, MV F59322 (Stranks 1993).

DESCRIPTION: Colony reticulate from pseudodichotomous branching and subsequent fusion by tendrils entering hydrothecae; resulting reticulate colony monosiphonic and flabellate, occasionally several centimetres high and wide. Branch basally with rounded knob on inside of angle, from this knob the gonotheca may develop. Division into internodes occasionally visible, internodes of varied length, absent in older colonies. Hydrothecae sub-alternate to alternate; between each (sub)alternate pair torsion of the stem has occurred, resulting in 4 rows of hydrothecae in 2 planes, each second hydrotheca on same side in same plane; planes meeting at a very sharp angle in young colonies, meeting almost perpendicularly in older colonies. In older colonies stems typically thick and circular in cross section, with hydrothecae closely approximated. In some colonies the hydrothecae in stem or branch between pseudodichotomous ramifications are more widely spaced proximally than distally and tend to crowd under the point of ramification (cf. Allman 1888, pl. 36 fig. 2a). Hydrothecae fairly large, curved, basal portion normally slightly inflated, distal portion slightly narrowing towards rim and curving away from stem. Adnate part adcauline wall almost straight, thick; free part normally shorter than adnate part; by repeated renovation of hydrotheca it may become much longer. Abcauline wall of hydrotheca typically concave. Perisarc of colony thick, yellowish, thinning out considerably along free part of hydrotheca, so that hydrotheca is easily damaged; repeated renovations frequent. Only few hydrothecae have a complete operculum; in such hydrothecae there are 3 marginal cusp: one adcauline, sharp and typically slightly upturned, and 2 rather blunt lateral cusps placed close to the abcauline midline; marginal embayments shallow. Operculum, where complete, 3-flapped. Renovations frequent; in older colonies greatly lengthening the hydrotheca, which may eventually become almost tubular and collapsible.

Gonothecae of 2 types occur, attached by means of a short pedicel to rounded knob on inside of pseudodichotomous ramification. First type, probably female, egg-shaped, with a strongly sclerotised, spiral fold, descending in 12 or 13 coils from apex to base, gradually diminishing in height and fading out basally.

MEASURMENTS of *Dictyocladium reticulatum* (in μm):

	NZOI Stn B175 slide 2730	NZOI Stn E267 slide 2106	NZOI Stn A773 slide 2724
Diameter of stem under pseudo-dichotomous ramification	410 – 445	345 – 360	575 – 660
Hydrotheca, length adnate adcauline wall	445 – 530	445 – 495	495 – 530
Length free adcauline wall (without renovations)	230 – 245	330 – 360	all renovated
Length free adcauline wall (including renovations)	295 – 305	no renovations	575 – 655
Total depth	460 – 575	575 – 625	825 – 990
Diameter at rim	180 – 195	165 – 195	165 – 180
Female gonotheca, total length		2230	
Maximum diameter		1400	
Length apical funnel		245	
Diameter at rim		210	
Male gonotheca, length	2115		
Maximum diameter	1240		
Length apical funnel	210		
Diameter at rim	165		

Spiral fold with a short hyaline frill, best visible apically, gradually disappearing basally. Spiral fold reinforced by closely packed, vertical trabeculae . Apical whorls of spiral fold wide, concealing tubular aperture. Gonotheca of second type, possibly male, islenderer, the spiral fold makes 10 or 11 coils and with a very narrow, almost invisible hyaline frill. Spiral folds are reinforced by widely spaced trabeculae. Some of the presumed male gonothecae contain a compact mass of developing spermatocytes.

Remarks: Material in the present collections answering Ralph's description of *Dictyocladium moniliferum* (Ralph, 1961a: 790–791, figs 13f-i) can be separated into two groups on characters of the hydrothecae and gonothecae. The first group with comparatively large hydrothecae, and gonothecae approaching the type figured for *Dictyocladium dichotomum* by Allman (1888, pl. 36 fig. 2a, reduced number of coils and a prominent keel) has been identified with Allman's species; the second type, with smaller hydrothecae and a most characteristic gonotheca, in which the spiral keel has a large number of coils and is much less prominent, is regarded here as *Dictyocladium monilifer* (Hutton, 1873). Both have reticulated colonies; in both it is possible to find two types of gonothecae that are supposed to be of female and male sex. Our reasons for identifying the first group with Allman's *Dictyocladium dichotomum* are based on the assumption that the arrangement of the hydrothecae, though schematised in Allman's pl. 36 fig. 2a, is correct with regard to grouping of the hydrothecae. This is borne out by the material from NZOI Stn E267 and Ralph's localities 585 and 617; in this material there is a distinct tendency towards concentration of the hydrothecae in groups of four under pseudo-dichotomous branching. The gonothecae, particularly the male ones, agree much better with the kind figured by Allman for *Dictyocladium dichotomum*, than with the type typically met with in *Dictyocladium monilifer* (Hutton, 1873) as described and figured by subsequent authors; that gonotheca was not figured by Hutton and was only briefly described ("Ovarian cells ovate, with strong moniliform cross ribs, and with an entire edged tubular crown".) This shape of gonotheca, observed in the second kind mentioned above, had previously been described and figured by Allman as *Thuiaria cerastium* (Allman 1876a: 271, pl. 18, fig. 4). Billard (1910: 16–17, fig. 5), who studied Allman's type of *Dictyocladium dichotomum*, mentioned the trabecular reinforcements of the gonothecal keel. It is necessary to substitute Allman's species name '*dichotomum*' by '*reticulatum*', Kirchenpauer's *Sertularella reticulatum* being evidently conspecific and originating from the same locality (Bass Strait). Naumov (1960: 346–347) claimed to have rediscovered Kirchenpauer's species in the Bering Sea and North Pacific; however, his descriptions and figures leave no doubt that he is dealing with another species with a smooth, ovoid gonotheca, a hydrothecal rim with four cusps and a roof-shaped, four-flapped operculum. We provisionally relegate this species to the genus *Sertularella* Gray, 1848, as *Sertularella erratum* sp. nov.

The following slides have been inspected in NHM: Slide 88.11.13.65, *Challenger* Stn 162, Bass Strait, as *Dictyocladium dichotomum*, with the gonotheca as figured by Allman in the *Challenger* report (marked 'type'). Another slide under the same number marked as 'schizotype', also from Bass Strait, stained light green, is in perfect condition. A third slide originates from Bale's collection, off South Cape, Tasmania, 75 fms, 1914, 19.10.14.3; this is an unstained slide showing few details.

Records from New Zealand: Totton (1930) mentions specimens in the British Museum (Natural History) (now The Natural History Museum), London, originating from Wellington. The present records are from north of Cape Maria van Diemen, North Island; Cook Strait; Paterson Inlet, Stewart Island; Lee Edge, near Auckland Island, about 50.5° S, 166.5° E and Bounty Platform, 49.5° S, 179° E. There is a doubtful record from Kapiti Channel, 40°51′ S,174°58′ E. Depth ranges vary between 33 and 121 m; gonothecae were found in April and October, those from April only containing sexual products.

Distribution: Besides Bass Strait this species has also been recorded from South Cape, Tasmania (Totton 1930).

Dictyocladium thuja sp. nov. (Fig. 25D–G)

Material Examined:

NMNZ: BS 398, 1 colony with distinct stem, 60 x 50 mm, no gonothecae. NMNZ Co. 605. In addition small colony of reticulate structure, about 50 mm high and with gonothecae, overgrown by *Sertularella integra* Allman, 1876a. NMNZ Co. 720; RMNH-Coel. 27668, slides 3368 and 4425 (not part of type series); **BS 899**, small colonies, up to 45 mm high, on old hydroid stem, presumably of *Lafoea dumosa* (Fleming, 1828). Holotype, NMNZ Co.789. On same stem also juvenile colonies, those as NMNZ Co.787 (paratypes). 1 of smaller colonies as RMNH-Coel. 27684, slide 3384; 2 small colonies as RMNH-Coel. 27686, 3 slides 3386 (all parts of type series). On stem of host *Filellum serratum* (Clarke, 1879).

NMNZ Ralph Collection: Loc. 243, NMNZ Co.1087, Bale's material of *Thecocarpus rostratus* [= *Lytocarpia incisa* (Coughtrey, 1875)], also containing fragments of *Dictyocladium thuja* sp. nov., 1 with a single gonotheca (RMNH-Coel. slides 3761a and 3761b) (not part of type series).

Type Locality: Middlesex Bank, NW of Three Kings Islands, 33°59.8′ S, 171°46,8′ E, 143–163 m.

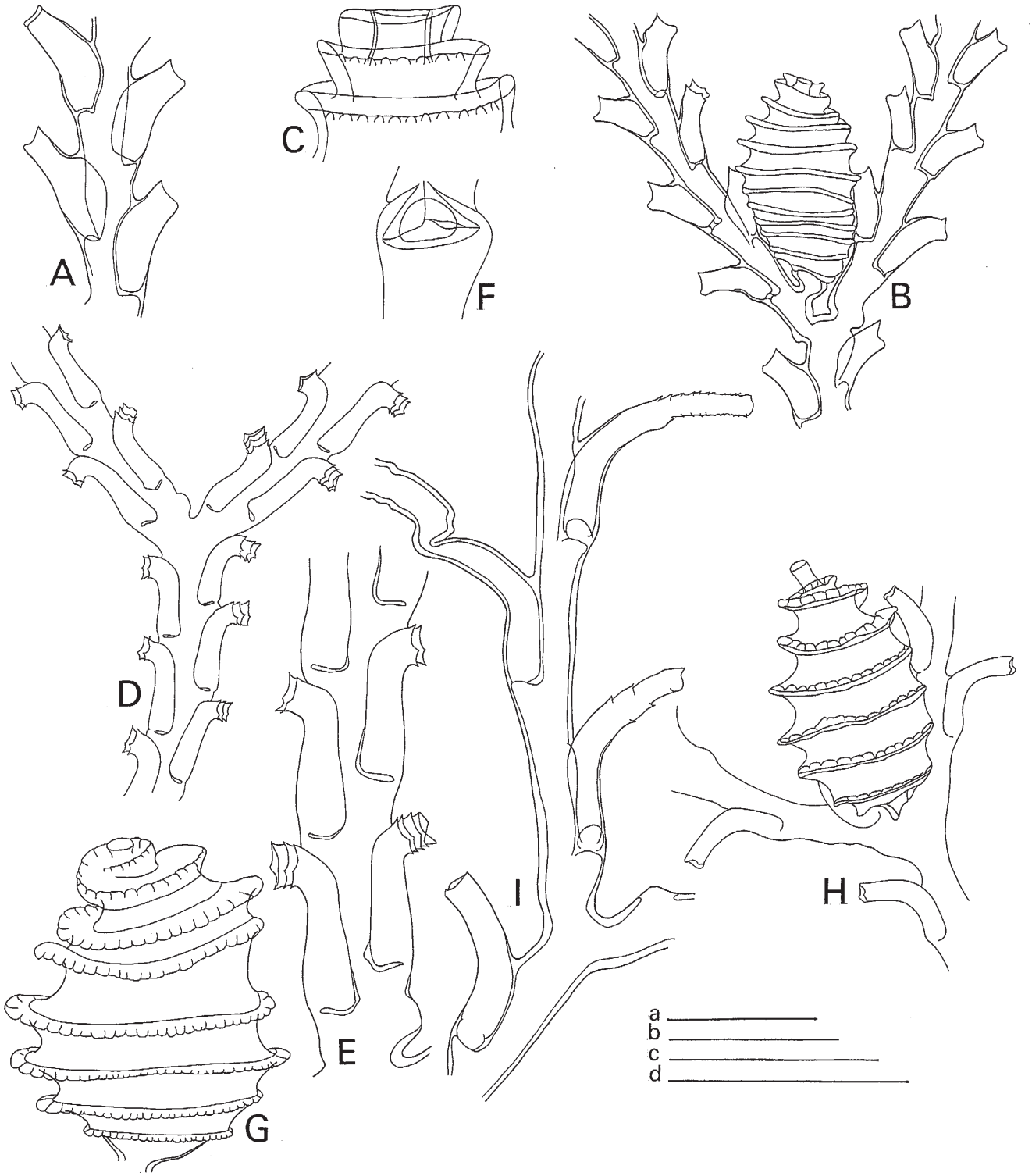

Fig. 25. A–C. ***Dictyocladium reticulatum*** (Kirchenpauer, 1884). **A**, part of hydrocladium (NZOI Stn E267, slide 2006). B, part of stem with ramification and male gonotheca. **C**, distal part male gonotheca (NZOI Stn B175, slide 2730). **D–G.** ***Dictyocladium thuja*** sp. nov. **D**, part of stem with ramification. **E**, part of hydrocladium with hydrothecae. **F**, hydrothecal aperture with operculum seen from above. **G**, gonotheca. (D–F, BS 899, holotype, slide 3384; G, Loc. 243, slide 3761). **H, I,** ***Dictyocladium watsonae*** (Vervoort, 1993). **H**, part of stem with ramification and presumed male gonotheca. **I**, part of stem and hydrocladium with much renovated hydrothecae (NZOI Stn P34, slide 2228). Scales: a, 1 mm (C, E, I); b, 1 mm (D, G, H); c, 2 mm (A, B); d, 0.5 mm (F). W.V.

DESCRIPTION (of material from BS 899): Colony about 60 mm high, with fairly distinct main stem, basally slightly polysiphonic, frequently pseudo-dichotomously branched, rather stiff, ultimate ramifications short, several millimetres long; no anastomoses present. Stem and branches of uniform diameter, nodes seldom present, hydrothecae arranged in sub-opposite pairs, minor torsion of stem between consecutive pairs resulting in arrangement of hydrothecae in 2 planes meeting at acute angle (about 20°), each second hydrotheca on same side in same plane. Hydrothecae almost completely sunken into stem or branch, only curved apical portion free; pairs closely approximated, members of a pair touching base of succeeding pair and in certain parts even slightly overlapping.

Hydrotheca tubular with outwardly curved, short apical part; basal part of hydrotheca slightly swollen; hydrotheca strongly and sharply curved at apex; base thickened on adcauline side, open on abcauline side.Apical part of hydrotheca projecting only slightly beyond branch, but may become lengthened by repeated renovation of hydrothecal aperture. Hydrothecal rim with 3 distinct, acute cusps, 1adcauline and 2 laterals, all slightly but distinctly curved outwards. Oprculum present in only some of the primary apertures, composed of 3 triangular hyaline plates, attached in embayments between the marginal cusps. Most hydrothecae with frequent, short renovated apertures, these occasionally considerably lengthening free part of hydrotheca. Operculum also frequently renovated resulting in a plug of opercular plates projecting from hydrothecal aperture.

Perisarc thin but apparently quite strong as little deformation is evident.

Only one gonotheca observed (from Ralph's Loc. 243), springing, as in other species of *Dictyocladium*, from a swelling on the inside of the 'branch' resulting from a pseudo-dichotomous bifurcation. Gonotheca ovoid, greatest diameter slightly below middle, strongly constricted between a spiral keel descending from summit to base in 7 or 8 whorls. Keel fairly sharp, with a scalloped frill strengthened by U-shaped perisarcal trabeculae. Frill broadest at apex, gradually narrowing and almost disappearing on last whorl at base of gonotheca. aperture of gonotheca at end of a slightly widening funnel, almost completely hidden by first whorl of frill.

REMARKS: There is some variability in the arrangement of the hydrothecae. In Ralph's specimen from Loc. 243 the hydrothecae are even more closely packed than in her figured specimen, in some instances the apex of a hydrotheca overlaps the succeeding hydrotheca on the same side for about one-quarter of its length. In this material nodes occur fairly regularly and the perisarc is quite thick.

MEASUREMENTS of *Dictyocladium thuja* (in μm):

	NMNZ BS 899 slide 3384	Ralph's Loc. 243 slide 3761
Diameter of stem direct under ramification	385 – 495	
Hydrotheca, length adnate adcauline wall	480 – 525	
Length free part (without renovations)	61 – 80	
Length free part (including renovations)	115 – 245	
Maximum diameter in basal part	140 – 165	
Diameter at primary rim	115 – 120	
Diameter at end renovated part	80 – 95	
Total depth	515 – 540	
Gonotheca, sex indeterminate, total length		1895
Maximum diameter		1485
Length apical tube		245
Diameter tube at rim		165

RECORDS FROM NEW ZEALAND: Restricted to a small area between North Cape and Three Kings Islands, 34°–34.5° S, 171.5°–172.5° E, depth 87–163 m. A fragment also occurs in a sample of *Lytocarpia incisa* (Coughtrey, 1875) in Ralph's collection, marked "Bale's material", collected 10 miles NW of Cape Maria van Diemen, North Island and apparently overlooked by Ralph as the locality does not occur in her discussion of *Dictyocladium monilifer*.

DISTRIBUTION: Not found outside New Zealand waters.

ETYMOLOGY: The name has been coined to indicate the resemblance of the branches with the twigs of the conifer genus *Thuja*.

Dictyocladium watsonae (Vervoort, 1993)
(Fig. 25H, I)

Symplectoscyphus watsonae Vervoort, 1993a: 274–275, fig. 66d-e.

MATERIAL EXAMINED:

NZOI Stns: J975, several bushy colonies with gonothecae. All hydrothecae greatly lengthened by renovation. Gonothecae with 7 or 8 turns of broad, spiral band. With *Plumularia setacea* (Linnaeus, 1758) and *Filellum serratum* (Clarke, 1879). RMNH-Coel. slide 2265; **P34**, several small colonies up to 30–35 mm high, with some gonothecae. With *Filellum serratum* (Clarke, 1879). RMNH-Coel. 29134, 4 RMNH-Coel. slides 2228.

NMNZ Ralph Collection: Loc. 243, NMNZ Co.1087, 15 mm high fragment without gonotheca (RMNH-Coel. slide 3761c).

TYPE LOCALITY: New Caledonia, 23°08.65′ S, 167°10.99′ E, 650–680 m (Vervoort 1993a; holotype in MNHN (Hy. 1123)).

DESCRIPTION (of material from NZOI Stn P34): Bushy colonies composed of pseudo-dichotomously branched stems, anastomoses between ramifications frequent. Stems weakly polysiphonic basally; ramifications occasionally scorpioid, but more frequently fairly regularly pseudo-dichotomously with long, flexuous terminal branches; anastomoses occur by formation of tendrils at end of ramifications, entering hydrothecae of neighbouring branches; connection strengthened by sclerotisation of walls of tendril and hydrotheca. Branches typically without nodes, thin, hydrothecae alternate to sub-opposite, all arranged in one plane.

Hydrothecae tubular, basally only slightly swollen, gracefully curving laterally, free adcauline wall as long as or only slightly shorter than fused part; free part of hydrotheca thin and easily collapsible. Rim of hydrotheca with 3 rounded and often faint cusps, the more prominent on abcauline side, the 2 lateral cusps small. Tendency to renovation considerable; some hydrothecae thus greatly lengthened; renovations close, in many instances walls of hydrotheca folded or collapsed. No marginal cusps visible on prolonged renovations so that aperture may appear irregularly rounded, occasionally with part of the rim thickened. No operculum visible on such renovated hydrothecae; in primary hydrotheca only remnants of operculae present.

No hydranths seen; hydrothecae and stems devoid of tissue. Perisarc strong and yellowish on stems and branches, thinning out rapidly along free part of hydrothecae.

Four gonothecae observed, inserting, as is usual in this genus, at a basal swelling on the inside of the 'branch' of the pseudo-dichotomous branching. Gonotheca elongate ovoid, with deep constrictions set off by a slender spiral keel, descending from apex to base in about 7 whorls. Keel with irregularly shaped hyaline frill strengthened with U-shaped trabeculae, clearest apically gradually fading proximally. Apical whorl of frill surrounding a conspicuous apical tube cylindrical to vase-shaped, gradually widening from base to apex; no operculum. Although empty this type of gonothecae is thought to be male because in morphologically similar material from NZOI Stn J975, there is an egg-shaped, larger gonotheca in which the spiral keel makes 8 or 9 turns and has a broader hyaline frill. This gonotheca, which has a similar apical funnel, is thought to be female. Both types of gonothecae are attached by means of a short pedicel.

MEASUREMENTS of *Dictyocladium watsonae* (in μm):

NZOI	Stn P 34 slide 2228	Stn J975 slide 2265
Diameter of stem just under ramification	230 – 280	
Hydrotheca, length adnate adcauline wall	330 – 380	
Free adcauline wall (without renovations)	280 – 310	
Free part, including renovations	495 – 740	
Greatest diameter (in basal part)	135 – 150	
Diameter at (primary) rim	100 – 155	
Diameter at end renovated part	84 – 115	
Total depth (excluding renovations)	530 – 560	
Male gonotheca, total length	1690 – 1730	
Greatest diameter	955 – 990	
Length apical tube	195 – 210	
Diameter tube at apex	105 – 115	
Length of pedicel	80 – 85	
Female gonotheca, total length		2050 – 2145
Greatest diameter		1240 – 1350
Length apical tube		250 – 295
Diameter of tube at apex		195 – 210

REMARKS: This species was described from a fragment with gonotheca taken at the Norfolk Ridge due south of New Caledonia; the present localities take the species further south along the Norfolk Ridge to the waters surrounding Norfolk Island and those bordering North Cape, New Zealand. The original specimen, described as a species of *Symplectoscyphus* Marktanner-Turneretscher, 1890, did not demonstrate the pseudo-dichotomous branching characteristic of *Dictyocladium* Allman, 1888, but the very distinctive hydrothecae with their distal part prolonged by repeated renovation are identical with those of the present material now referred to the same species. Nevertheless, its transfer to *Dictyocladium* is necessary, where it should stand as *Dictyocladium watsonae* (Vervoort, 1993). The gonothecae in the present male specimen have the same scalloped hyaline, spiral frill as the specimen from New Caledonia, though in the present material the gonotheca is wider. However, the only complete gonotheca observed in the New Caledonian specimen originated from a hydrotheca which may have influenced its ultimate size. The four male gonothecae observed in the material from NZOI Stn P34 all insert at the swollen portion at the inside of the branch resulting from a pseudo-dichotomous branching.

RECORDS FROM NEW ZEALAND: Norfolk Island and the waters off North Cape, depth 205–370 m.

DISTRIBUTION: Restricted to the Norfolk Ridge and southern part of Three Kings Ridge, 205–680 m.

Diphasia L. Agassiz, 1862

TYPE SPECIES: *Sertularia rosea* Linnaeus, 1758.

Diphasia subcarinata (Busk, 1852) (Fig. 26A, B)

Sertularia sub-carinata Busk 1852: 387, 390.
Diphasia subcarinata: Bale 1884: 102, pl. 4, fig. 1, pl. 19, fig. 18; Kirkpatrick 1890a: 604; Bartlett 1907: 42; Ritchie 1911: 850–851; Bale 1914a: 7–8; 1915: 264; Cotton & Godfrey 1941: 4, fig.; Blackburn 1942: 112; Hodgson 1950: 20, figs 34–35; Pennycuik 1959: 156, 191; Ralph 1961a: 764–765, fig. 5a-b; 1961d: 109; Redier 1964: 136; Ralph 1966: 159; Shepherd & Watson 1970: 140; Watson 1973: 170; Dawson 1992: 19; Watson 1994a: 67.
Diphasiella subcarinata: Stechow 1921d: 257; 1923d: 162; Rees & Thursfield 1965: 123.

MATERIAL EXAMINED:
NMNZ Ralph Collection: Loc. 482, NMNZ Co.1231, several about 10 mm high, unbranched, monosiphonic cauli arising from stolonal tube. No gonothecae. RMNH-Coel. slide 3911; **Loc. 631**, 2 good slides in RSC as *Diphasia subcarinata*, no data.

TYPE LOCALITY: Bass Strait, 82 m (Busk 1852, location of holotype unknown).

DESCRIPTION (of material from Loc. 482): Unbranched, flexuous cauli rising from creeping stolon, detached from substratum. Stolon a tube, circular in cross section, with some apophyses supporting cauli by means of oblique hinge-joint. Cauli 8–11 mm high, monosiphonic throughout, composed of internodes each with a pair of opposite hydrothecae; nodes invisible in lower parts of caulus, becoming distinct after 7th–9th pair of hydrothecae as oblique hinge-joints. Pairs of hydrothecae not touching either on front or back of internode. Hydrothecae more or less tubular, basally rounded and narrowing, curved outwards, occasionally rather abruptly; adcauline wall adnate for about two-thirds of its length, length of free adcauline wall variable, even in the same caulus, base of adcauline wall with distinct thickening ('heel'); diaphragm rather wide. Abcauline wall of hydrotheca smoothly to rather abruptly curved, internally thickened. Aperture of hydrotheca distinctly asymmetrical; rim with 3 rounded cusps; adcauline cusp more or less in median plane, but often displaced; 2 abcauline cusps of unequal development; larger cusp may occur on front or back of internode. Shape of hydrothecal aperture also influenced by presence of distinct median carina, forming a blunt median, abcauline knob in sinus between abcauline marginal cusps and running downwards along front of hydrotheca almost until insertion on preceding internode, but gradually becoming less visible.

MEASUREMENTS of *Diphasia subcarinata* (in μm):

	Ralph's Loc. 482 slide 3911	New Zealand (Ralph 1961a)
Stolon, diameter	215 – 220	
Stolonal apophysis, length	850 – 990	
Diameter at base	150 – 165	
Diameter just under joint	269 – 280	
Internode, length	625 – 705	700 – 900
Diameter (where no hinge-joint is present)	100 – 165	
Hydrotheca, length adnate adcauline wall	395 – 480	530 – 620
Length free adcauline wall	295 – 430	430 – 560
Total depth	655 – 890	930 – 990
Diameter at rim (measured in median plane)	340 – 455	370 – 450
Diameter hydrothecal pair at base	340 – 455	370 – 450

Operculum a single apparatus composed of a single, large, hyaline flap adcaudally attached, crumpled in many hydrothecae. Many hydrothecal margins are renovated, some as many as 4 times.

Presence of contracted hydranths indicates that the material was taken alive. There is no abcauline caecum.

Gonothecae absent.

REMARKS: The material in the present collection consists of some small unbranched, apparently young, cauli without gonothecae. It fully answers Ralph's description; the median carina on the hydrothecae is quite obvious.

RECORDS FROM NEW ZEALAND: Two New Zealand localities are listed by Ralph (1961a), both at the Otago Peninsula: east of Otago Heads and north of Taiaroa, depth about 73 m. No material from the second locality occurs in Ralph's collection, but there is a sample from Cook Strait, 82 m, and a slide from east of Otago Heads that are undoubtedly this species. *Diphasia subcarinata* is furthermore listed in an enumeration of Chatham Island hydroids (Ralph 1961d).

DISTRIBUTION: This is mainly an Australian species, known from Torres Strait (Kirkpatrick 1890a), Queensland (Pennycuik 1959), New South Wales (Bale 1884; Ritchie 1911), Victoria (Bale 1884; Ralph 1966), South Australia (Bale 1884; Shepherd & Watson 1970; Watson 1973); Great Australian Bight (Bale 1914a, 1915); Bass Strait (Busk 1852; Bale 1884; Watson 1994a), and Tasmania (Bale 1884; Hodgson 1950). Depth records vary between 10 and 181 m.

Dynamena Lamouroux, 1816

TYPE SPECIES: *Sertularia pumila* Linnaeus, 1758 (subsequent designation by Broch, 1918).

Dynamena quadridentata (Ellis & Solander, 1786) (Fig. 26C)

Sertularia quadridentata Ellis & Solander 1786: 57 (no. 33), pl. 5, figs g, G; Lamarck 1816: 121.
Pasythea (Sertularia) quadridentata: Lamouroux 1812: 183.
Pasythea quadridentata: Lamouroux 1816: 156, pl. 3, fig. 8a, B; Bale 1884: 112, pl. 7, fig. 3; Stechow 1912: 360; Billard 1924a: 55; Gravely 1927: 14, pl. 2, fig. 6; Hargitt 1927: 509, pl. 1, fig. 2; Nutting 1927: 226.
Pasythea quadridentata: Fraser 1912: 372, fig. 36.
Pasya quadridentata: Stechow 1922: 148; 1923d: 166; Fraser 1938b: 9, 50; 1938c: 110; 1938d: 134; 1939: 160 *et seq*.; 1943: 92; 1944a: 252–253, pl. 53, fig. 237; 1948: 239; Deevey 1950: 347; 1954: 270; Kalk 1958: 230.
Dynamena quadridentata: Billard 1925b: 222, fig. 42; Trebilcock 1928: 23; Leloup 1932: 160; 1934: 13; Blackburn 1938: 320; 1942: 113; Vervoort 1946a: 308; Day & Morgans 1956: 301; Buchanan 1957: 365, fig. 14; Pennycuik 1959: 193; Yamada 1959: 57; Ralph 1961a: 790, fig. 13e; Redier 1964: 137; Mammen 1965: 49, fig. 83; Ralph 1966: 159; Redier 1966: 87, pl. 1, figs 1, 3; 1967: 394; Vervoort 1968: 41, 103, fig. 19; Berrisford 1969: 394; Hirohito 1969: 14; Shepherd & Watson 1970: 140; Morris & Mogelberg 1973: 22, fig. 34a-b; Millard & Bouillon 1973: 70; 1974: 8; Sarma 1974: 156; Wedler 1975: 333 *et seq*.; Millard 1975: 266, fig. 87G–J; Mergner & Wedler 1977: 18, pl. 4, fig. 26; Sarma 1977: 746, 754; Millard 1978: 191 *et seq*.; Butler *et al*. 1983: 42; Calder 1983: 11, fig. 3; Flórez González 1983: 120, photo 28; Hirohito 1983: 40; McCain 1984: 99; Calder 1986b: 137, pl. 39; Bandel & Wedler 1987: 38; Mergner 1987: 187; Gibbons & Ryland 1989: 411–414, figs 29–30; Izquierdo *et al*., 1990: 35–36, fig. 4; Calder 1991: 96–98, fig. 51; Cairns *et al*. 1991: 26; Dawson 1992: 19; Calder 1993: 68 *et seq*.; Vervoort 1993a: 108–109; Bouillon *et al*. 1995: 66; Calder 1995: 543 *et seq*.; Hirohito 1995 (English text): 176–178, fig. 57a-e.
Dynamena (Pasya) quadridentata: Stechow 1925a: 223.
Dynamena quadridentata f. *typica*: Vannucci-Mendes 1946: 559, pl. 3, figs 27–28, 31; 1949: 241; 1950: 87; Vannucci 1951b: 107, 108, 110, 112, 115, 117.
Dynamena gibbosa Billard 1925a: 650, fig. 2G; 1925b: 119–120, fig. 45; van Soest, 1976: 82.
Pasythea dubia Hargitt 1927: 511, pl. 2, fig. 5.
Dynamena dubia: Yamada 1959: 58.
Dynamena thankasseriensis Mammen 1965: 48, fig. 82.

MATERIAL EXAMINED:

NZOI Stn I89: A few colonies several millimetres high on old hydroid (?) stem and on *Symplectoscyphus odontiferus* sp. nov. Dirty sample in poor condition. RMNH-Coel. slide 4766.

TYPE LOCALITY: *Sertularia quadridentata*: African coast (more likely Atlantic Ocean) near Ascension Island (Ellis & Solander 1786, *fide* Ralph 1961a; type probably lost). *Dynamena gibbosa*: Makassar Strait, 02°25′ S, 117°43′ E, 30–50 m (*Siboga* Stn 80, Billard 1925a, b; syntypes in ZMA, ZMA Coel. 4646 m (van Soest 1976)). *Pasythea dubia*: Hong Kong, on floating seaweed; type apparently in MCZ (Hargitt 1927). *Dynamena thankasseriensis*: Thankassery Beach, India, on *Sargassum* sp. (Mammen 1965, location of type unknown).

REMARKS: The only New Zealand material in the present collection is unfit for description. We refer to descriptions by Billard (1925a) and Ralph (1961a) of this fairly well known species.

RECORDS FROM NEW ZEALAND: This species is absent from Ralph's collections; her 1961a description is based on data from Bale (1884) and consequently refers to Australian material. There is only a single previous New Zealand record: Trebilcock (1928) records 'a few fragmentary specimens' from oyster shells taken at Stewart Island, but the record from this southern locality seems suspect. Vervoort (1993a) lists the species from New Caledonia: 22°30.4′ S, 167°14.1′ E, 57 m depth. The present record is from farther south in the region of Norfolk Island, 29°25.30′ S, 168°00.28′ E, 65 m depth.

DISTRIBUTION: *Dynemena quadridentata* is a species with a world-wide distribution in tropical, subtropical and temperate seas, occurring in sub-surface waters down to moderate depths. As shown by the long list of synonyms this is quite a variable species.

Gigantotheca gen. nov.

DIAGNOSIS: Big, loosely branched, fan-shaped colonies; principal branches on lower part of colony and there colony weakly polysiphonic, with isolated secondary tubules running up the branches; nodes absent or indistinct. Hydrothecae large, biseriate, alternate, tubiform, only a fraction of abcauline wall adnate, margin circular, rim non-everted, operculum unknown, base of hydrotheca open. Stem between insertion of hydrothecae geniculate. Gonothecae large, club- to slipper-shaped, with slit-like apical aperture; folds or ornamentation may surround gonothecal aperture. Insertion of gonothecae on front of colony by means of short pedicel attaching to branch or stem directly under hydrothecal base, leaving distinct scar when shed.

TYPE SPECIES: *Gigantotheca raukumarai* sp. nov.

REMARKS: A genus of large sertulariids with the colony structure of large species of *Sertularella* as for instance *Sertularella gayi gayi* (Lamouroux, 1821) but with much bigger, tubiform hydrothecae and much differing gonothecae.

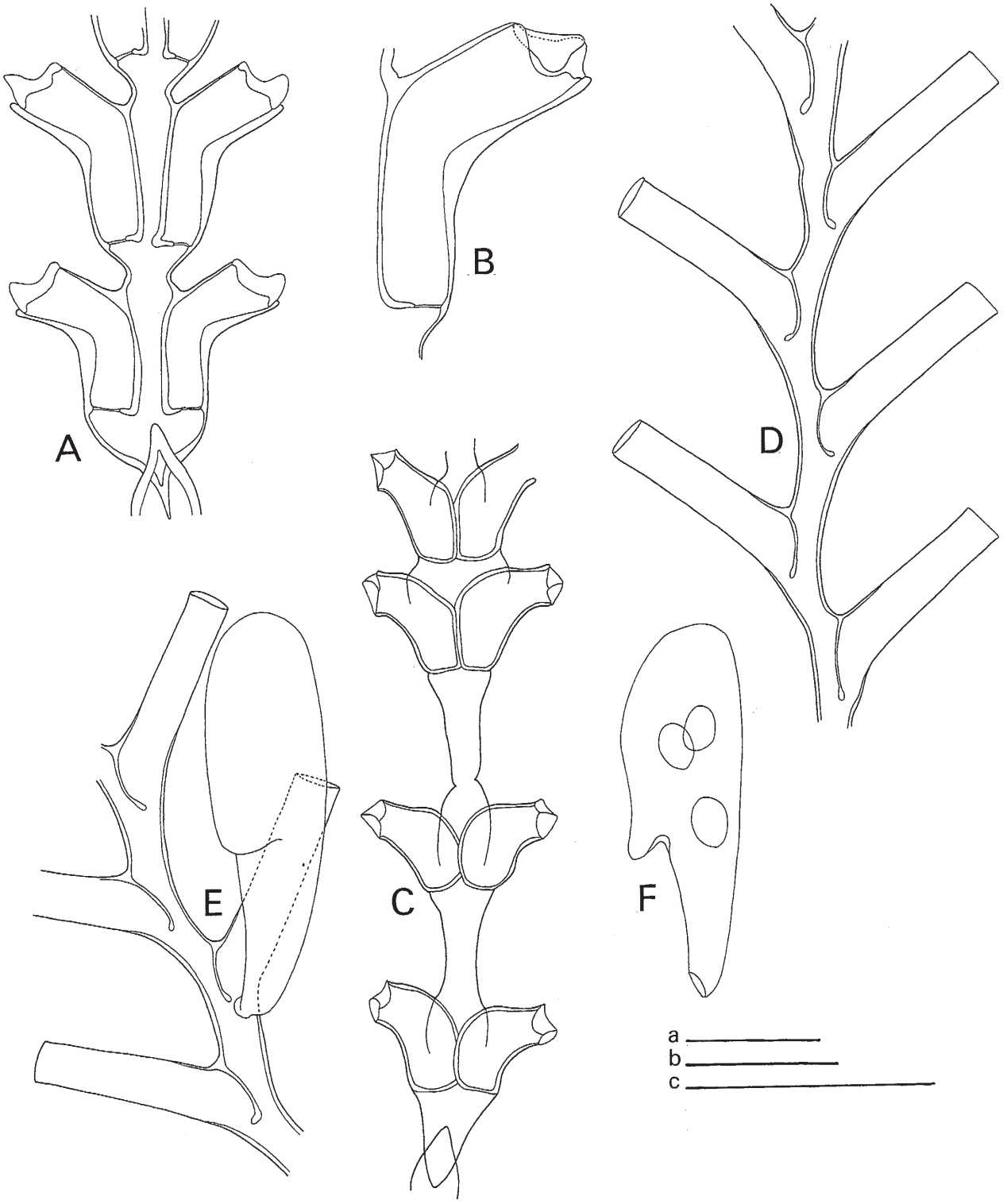

Fig. 26. A, B. ***Diphasia subcarinata*** (Busk, 1852). **A**, part of stem. **B**, hydrotheca (Loc. 482, slide 3911). **C.** ***Dynamena quadridentata*** (Ellis & Solander, 1786), part of stem (NZOI Stn I89, slide 4766). **D–F.** ***Gigantotheca maxima*** sp. nov. **D**, part of stem with hydrothecae. **E**, part of stem with hydrothecae and gonotheca, lateral view. **F**, female gonotheca, lateral view (BS 886, holotype, slide 2999). Scales: a, 1 mm (D-F); b, 1 mm (A); c, 0.5 mm (B, C). W.V.

In the two species studied so far (*Gigantotheca maxima* sp. nov. and *G. raukumarai* sp. nov.) no trace of a hydrothecal operculum has been observed; a deciduous operculum may have been present.

Gigantotheca maxima sp. nov. (Fig. 26D–F)

MATERIAL EXAMINED:

NMNZ: BS 886, large number of up to 85 mm high, branched colonies with gonothecae, with a dense cover of *Sertularella areyi* Nutting, 1904 and other epizootic hydroids (holotype, NMNZ Co.524). RMNH-Coel. no. 28555, 1 colony and 2 RMNH-Coel. slides 2999, part of type series). In addition a single forked colony, about 70 mm high, no gonothecae (paratype, NMNZ Co.548); **BS 887**, 3 colony fragments 40–70 mm long, 1 with a gonotheca (NMNZ Co.700) (not part of type series).

TYPE LOCALITY: 32°35.3′ S, 167°41.8′ E to 32°34.0′ S, 167°39.0′ E, Wanganella Bank, Norfolk Ridge, E slope, 437–422 m.

DESCRIPTION (of the holotype): Colonies erect, fan-shaped to indistinctly bushy, irregularly basally branched and polysiphonic, some secondary tubules running up axes and main branches for a short distance. Colonies up to 85 mm high attached to fixed substrate by small basal disk. Stem and branches composed of a regular succession of short internodes, separated by minor constrictions of perisarc and an occasional more or less distinct node, each internode with 1 large hydrotheca, geniculate to some extent between the hydrothecal bases. Hydrothecae all in 1 plane strictly alternate, pointing left or right, distance between hydrothecae considerable; a distance of half hydrothecal length between axil formed by stem and abcauline hydrothecal wall and base of hydrotheca. Hydrotheca cylindrical, with almost straight abcauline wall basally slightly concave running smoothly into wall of internode. Fused adcauline wall curved, comparatively thick, basally with droplet-shaped thickening, leaving a fairly narrow aperture in hydrothecal floor. Free adcauline wall about 2.5–3 times as long as fused part, parallel to abcauline hydrothecal wall. Aperture of hydrotheca circular, rim slightly thickened, not everted, perpendicular to hydrothecal length axis. Axil at base of free adcauline wall rounded.

Female gonothecae abundantly on frontal colonies. Gonotheca laege, inserting just below hydrotheca on front of colony, directed obliquely upwards, club- to slipper-shaped, narrowing towards its base, with rounded top and a slit-shaped aperture hidden under a projecting lip about halfway along gonotheca. Aperture turned towards axis of stem or branch. Each gonotheca with 2 or 3 globular eggs or developing planulae.

MEASUREMENTS of *Gigantotheca maxima* sp. nov. (in μm):

	NMNZ BS 886 slide 2999
Diameter of stem or branch (between hydrothecae)	480 – 550
Distance between hydrotheca (measured between axils of 2 successive hydrothecae)	1950 – 2035
Hydrothecae, length adnate adcauline wall	1065 – 1175
Length free part	2580 – 2675
Total depth	3450 – 3485
Diameter at rim	655 – 690
Female gonotheca, total length	4560 – 4940
Maximum diameter	1950 – 2035

REMARKS: This species shares with *Gigantotheca raukumarai* sp. nov. the shape and large size of the hydrothecae, as well as their arrangement along stem and branches. The gonotheca in *G. maxima* is frontally attached and has no ornamentation as in *G. raukumarai*, but the aperture is also a lateral slit.

RECORDS FROM NEW ZEALAND: Wanganella Bank, Norfolk Ridge, 32.5° S, 167.5° E, 422–487 m; gonothecae with eggs were observed in January.

DISTRIBUTION: Known only from a restricted area at Wanganella Bank, Norfolk Ridge.

ETYMOLOGY: The specific name *maxima* refer to the great size of hydro- and gonothecae.

Gigantotheca raukumarai sp. nov. (Figs 27A–C; 28A, B; 29A)

MATERIAL EXAMINED:

NZOI Stns: D160, 50 mm high top part of colony with gonothecae. Dead material, heavily encrusted. RMNH-Coel. slide 2841; **E731**, 1 large, forked colony 170 mm high, no gonothecae (paratype, P-1229 in NIWA collection). RMNH-Coel. slide 2248; **E850**, top part of a larger colony about 50 mm long; no gonothecae. Dead material; no tissue remnants in axes or hydrothecae. RMNH-Coel. slide 3474; **F868**, numerous colonies up to 150 mm high and many fragments (holotype, H-762 in NIWA collection). Some colonies with female gonothecae. RMNH-Coel. 29216 and 4 RMNH-Coel. slides 2206 are parts of type series. Axes and hydrothecae generally without tissue remnants, although in some colonies degenerated hydranths seem to be present. Gonothecae with yellow globular mass, probably representing an egg or developing embryo.

NMNZ: T16, large, 150 mm high colony, with polysiphonic stem, many fragments with female gonothecae.

NMNZ Co.388. Two RMNH-Coel. slides 2948. Hydrothecae and axes without living tissue; gonothecae with yellow global mass, probably an egg or developing embryo.

N.B. The material from NZOI Stns D160, E731, E850 as well as the NMNZ T16 material does not constitute a part of the type series.

TYPE LOCALITY: Southwest Pacific, NE slope off North Island, Raukumara Plain, 37°28.50′ S, 179°03.50′ E, 808–924 m.

DESCRIPTION (of the holotype): Colony erect, up to 150 mm high, snapped of at base; hydrorhiza therefore unknown. Stem polysiphonic basally, 2.5–3 mm thick, irregularly pinnately branched; branches roughly in 1 plane, springing from main stem just under hydrotheca; typically at least 3 hydrothecae between 2 sub-opposed branches. Stem and branches thin, slightly flexuous, hydrothecae alternate, spaced so that base of 1 level with axil of preceding hydrotheca on opposite side. Hydrotheca flask-shaped, basally but distinctly tumid; apically cylindrical or smoothly convex, pointing away from stem or branch at an angle of about 60°. Fused adcauline wall a smoothly curved plate with distinct basal thickening, typically shorter than free part but ratio variable (see table of measurements). Abcauline wall almost straight to smoothly concave; aperture circular, perpendicular to hydrothecal long axis; rim slightly but distinctly everted, slightly thickened. Some hydrothecae show remnants of a basal plate or diaphragm. Perisarc not particularly thick; thickest along fused adcauline hydrothecal wall. Many hydrothecae show signs of repair following sustained damage; some appear to have renovated apertures, and the contour of the apical part of some may be quite uneven; distinct circular scars not vislble; no operculum.

Gonothecae borne on stem and branches, inserting at the base of the hydrotheca and placed in same plane as hydrothecae. Female gonotheca large, swollen, pear-shaped, narrowing markedly towards its base. A large, slit-shaped opening faces upwards and has, on each side, a conspicuous, hyaline lobe, running lengthwise over top of gonotheca; there is also an occasionally short, blunt apical projection. A row of blunt, hollow projections runs across the ventral surface of the gonotheca; some of these are supported by a low ridge running obliquely across part of the gonothecal surface. Number of projections variable: those on longitudinal lobes may be entirely absent; those on transverse ridge may be reduced to 2. Gonothecae presumed to be female, containing a yellow, ovoid mass that may be either an ovum or a developing embryo.

REMARKS: The material of this new species, although agreeing in general colony structure and overall shape of the hydrothecae, shows some variability in detailed shape of the hydrothecae and female gonothecae. In the holotype (from NZOI Stn F868, slides 2206) the free portion of the hydrothecae points stiffly away from the stem under an angle of about 60°; the free part of the adcauline wall is typically straight and in some instances slightly convex basally. The female gonothecae have no projections at the 'lips' and only 2 spines on the 'body'. In the other female material, from NMNZ Stn T 16, slide 2948 the hydrothecae are shorter and typically with smoothly curved abcauline wall and free adcauline wall. The female gonothecae, in main structure identical with those of the holotype, have a distinct projection at each of the 'lips' and there are at least 6 projections on the body arranged in an oblique comb. The colony from NZOI Stn E731 (slide 2248) is intermediate in hydrothecal structure between the two discussed above: almost straight to smoothly curved free adcauline walls occur in the same colony. The male specimen from NZOI Stn D160 (slide 2841, fig. 29A) finally has the largest hydrothecae, though resembling those from NZOI Stn F868 in general structure. The hydrothecae in this (dead) material show signs off repeated repair after damage.

MEASUREMENTS of *Gigantotheca raukumarai* sp. nov. (in μm):

	NZOI Stn D160 slide 2841	NZOI Stn E731 slide 2248	NZOI Stn E850 slide 3474	NZOI Stn F868 slide 2206	NMNZ T 16 slide 2948
Diameter of stem or branch (measured at axil of hydrotheca)	395 – 480	605 – 810	415 – 450	395 – 430	515 – 605
Hydrotheca, length adnate adcauline wall	1210 –1290	1380 – 1555	860 – 990	950 – 1155	1345 – 1415
Length free part	1725 –1975	1480 – 1780	1845 – 2160	1635 – 1780	1345 – 1435
Total depth	2660 –2845	2415 – 2585	2465 – 2690	2240 – 2415	2240 – 2330
Diameter at rim	640 – 690	585 – 640	550 – 655	585 – 640	605 – 690
Female gonotheca, total length (excl. projections)				2240 – 2465	2330 – 2415
Height				1865 – 2015	1675 – 1690
Length of projections				260 – 430	455 – 465
Male gonotheca, total length	1725 – 1895				
Maximum diameter	760 – 860				

Fig. 27. ***Gigantotheca raukumarai*** sp. nov. **A**, part of stem with ramification (NZOI Stn F 868, holotype, slide 2206). **B**, part of stem with female gonotheca. **C**, female gonotheca, lateral view (NMNZ T16, slide 2948). Scale: a, 2 mm (A-C). W.V.

The holotype only shows signs of a much contracted hydranth at the base of the hydrotheca. There is no evidence for the presence of a caecum.

This species bears a superficial resemblance with *Sertularella magna* Nutting (1904 : 103–104, pl. 27, fig. 1), based on an about 8.5 cm high, monosiphonic colony from the North Pacific (52°06′ N, 171°45′ W, 518 m), but the shape of the hydrotheca seems to be quite different, being directed upwards distally. No measurements are given ("Hydrothecae enormous for this group, being many times as large as those of *S. poly-zonias*, ..."). The species has never since been collected. The type of Nutting's species, in the National Museum of Natural History (Smithsonian Institution), Washington, D.C., U.S.A.) is badly in need of re-description.

Records from New Zealand: The type locality of this species is at the Raukumara Plain, about 37.5° S, 179° E, 808–924 m; a second locality at the Raukumara Plain

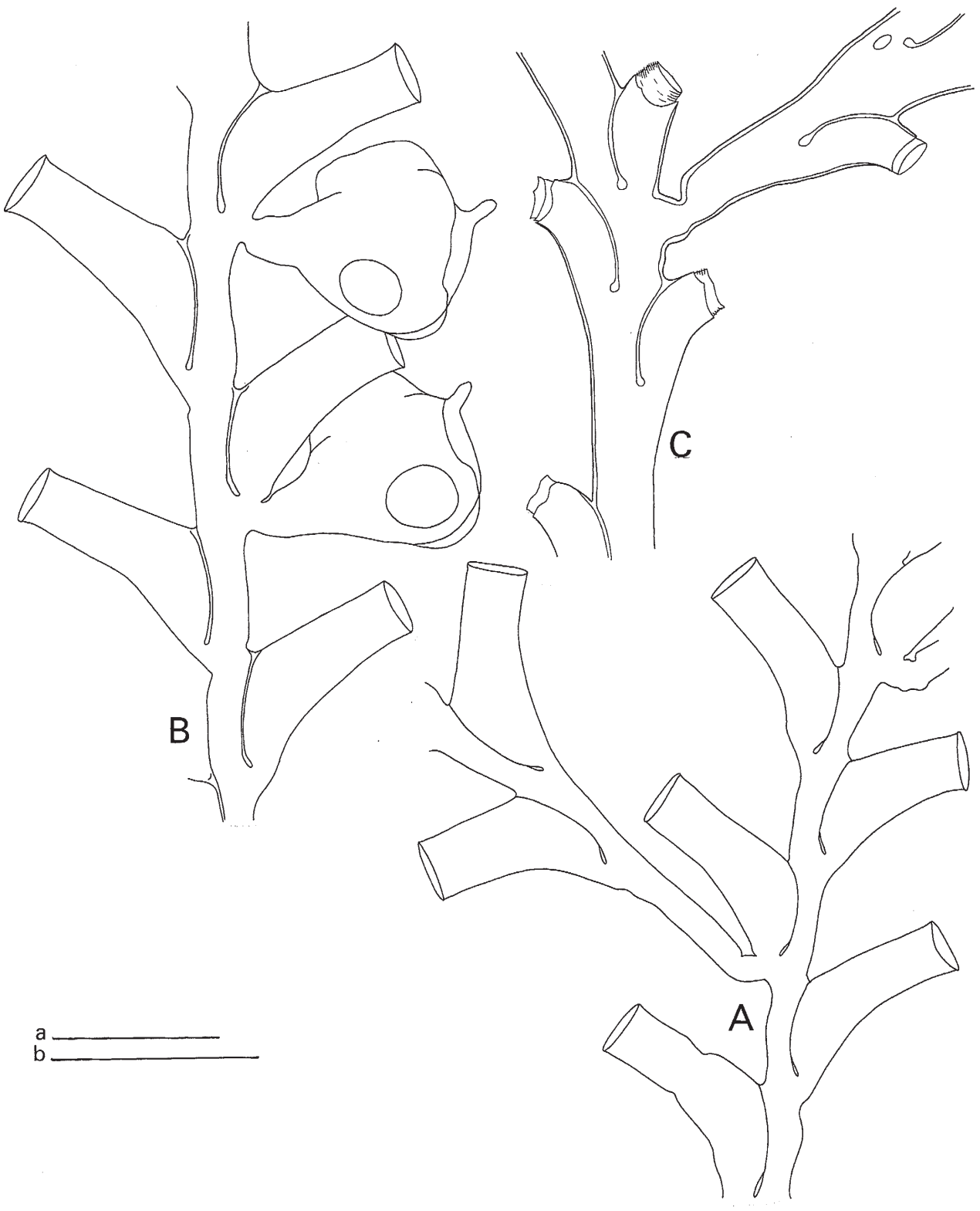

Fig. 28. A, B. ***Gigantotheca raukumarai*** sp. nov. **A**, part of stem with ramification. **B**, part of stem with female gonothecae (NZOI Stn F868, holotype, slide 2006). **C.** ***Gonaxia australis*** sp. nov. Part of stem with ramification (NZOI Stn S159, holotype, slide 2314). Scales: a, 1 mm (C); b, 2 mm (A, B). W.V.

is at 37.5° S, 177° E, 602–503 m. It has also been taken north of Three Kings Islands, about 34° S, 171° E, 509 m and in the Macquarie Gap between The Snares and Auck-land Island, 49.5° S, 166° E, 722 m. The remaining locality, NMNZ Stn T16, is doubtfully referred to Cook Strait with unknown depth.

DISTRIBUTION: This is decidedly a deep water species, so far only known from deeper waters around New Zealand. The southernmost locality, between The Snares and Auckland Island suggests that the species may also occur in deeper subantarctic waters farther off New Zealand.

ETYMOLOGY: The specific name, *raukumarai*, refers to the Raukumara Plain where holotype and paratype were found.

Gonaxia Vervoort, 1993a

TYPE SPECIES: *Gonaxia ampullacea* Vervoort, 1993a.

For a discussion of the genus and the species involved, see Vervoort (1993a: 113 *et seq)*.

Gonaxia australis sp. nov. (Figs 28C, 29B,–D)

MATERIAL EXAMINED:

NZOI Stn S159: Fragments of a colony about 70 mm high with several side branches 30–70 mm long, all bearing gonothecae (holotype H-763, in NIWA collection); 2 RMNH-Coel. slides 2314 belong to type series.

TYPE LOCALITY: Southwest Pacific SE of Banks Peninsula, 44°19.32′ S, 173°35.52′ E, 525 m.

DESCRIPTION (of holotype): Stem straight and erect, about 70 mm high, and snapped off, basally polysiphonic becoming monosiphonic in higher parts, with pinnately arranged hydrocladia (side branches), 30–70 mm long, placed in 1 plane; basal side branch with short secondary ramification; all hydrocladia monosiphonic. No division of stem into internodes; no perisarc constrictions indicating nodes. Stem with biserially arranged hydrothecae; all hydrothecae in 1 plane with hydrocladia and their hydrothecae.

Hydrocladia on conspicuous apophyses, between 2 consecutive apophyses. Threee hydrothecae: 1 axillary, 1 on same side opposite next apophysis and 1 on opposite side some distance under upper apophysis. Hydrocladium distinctly separated from apophysis by constriction of perisarc; hydrothecae alternate. Division into internodes only evident in younger parts of hydrocladia, distinct septa infrequent. Typically 3 hydrothecae in each internode though irregularities occur, some internodes having 2 or more than 3.

Hydrotheca a smoothly curved tubular, narrowing slightly to completely open base; adcauline wall a smooth curve basally ending in a conspicuous knob, about one-quarter of wall free from internode; abcauline wall slightly sigmoid, with minor basal convexity, slightly concave some distance under rim. Hydrothecal rim fragile, damaged remnants of a pair of obtuse lateral cusps some distance below aperture and a blunt abcauline cusp. Multiple renovations of hydrothecal rim, thin and almost perfectly hyaline, forming a cylindrical structure with frayed edges, occasionally indistinctly transversely striated. Hydrothecal operculum not observed, though remnants of opercular plates may be present amongst hyaline hydrothecal renovations. Hydranths present in some hydrothecae, but attached to inside by a circular sheath of tissue some distance above knob at end of adcauline wall; hydranths too badly preserved for description; no caecum observed.

Perisarc of colony yellow, fairly thick, thinning out at hydrothecal rim.

Gonothecae profuse, in a double row of large, banana-shaped bodies along front of hydrocladia attached below hydrothecae, leaving a large oval cicatrice when shed. Gonothecae narrowing fairly abruptly at apex, forming a short, conical funnel with a comparatively small circular aperture with smooth rim. Perisarc of gonotheca hyaline and transparent; all gonothecae empty.

REMARKS: Only one colony, the holotype, was available for study. This dredged specimen was thickly covered by fish slime and detritus. The brittle condition of the hydrothecal apertures did not facilitate inspection,

MEASUREMENTS of *Gonaxia australis* sp. nov. (in μm):

	NZOI Stn S159 slide 2314
Diameter of stem at polysiphonic base	775
Diameter of stem in monosiphonic parts	275 – 375
Axillary hydrotheca, length adnate adcauline wall	435 – 485
Length free adcauline wall	495 – 535
Maximum diameter	310 – 350
Diameter at rim	225 – 260
Diameter of hydrocladium at a node	230 – 310
Hydrocladial hydrotheca, length adnate adcauline wall	570 – 625
Length free adcauline wall*	165 – 210
Length of abcauline wall*	475 – 535
Maximum diameter	310 – 335
Diameter at rim	250 – 290
Gonotheca, total length	1560 – 1620
Maximum diameter	460 – 475
Diameter of terminal aperture	75 – 88

* = approximate, including renovations

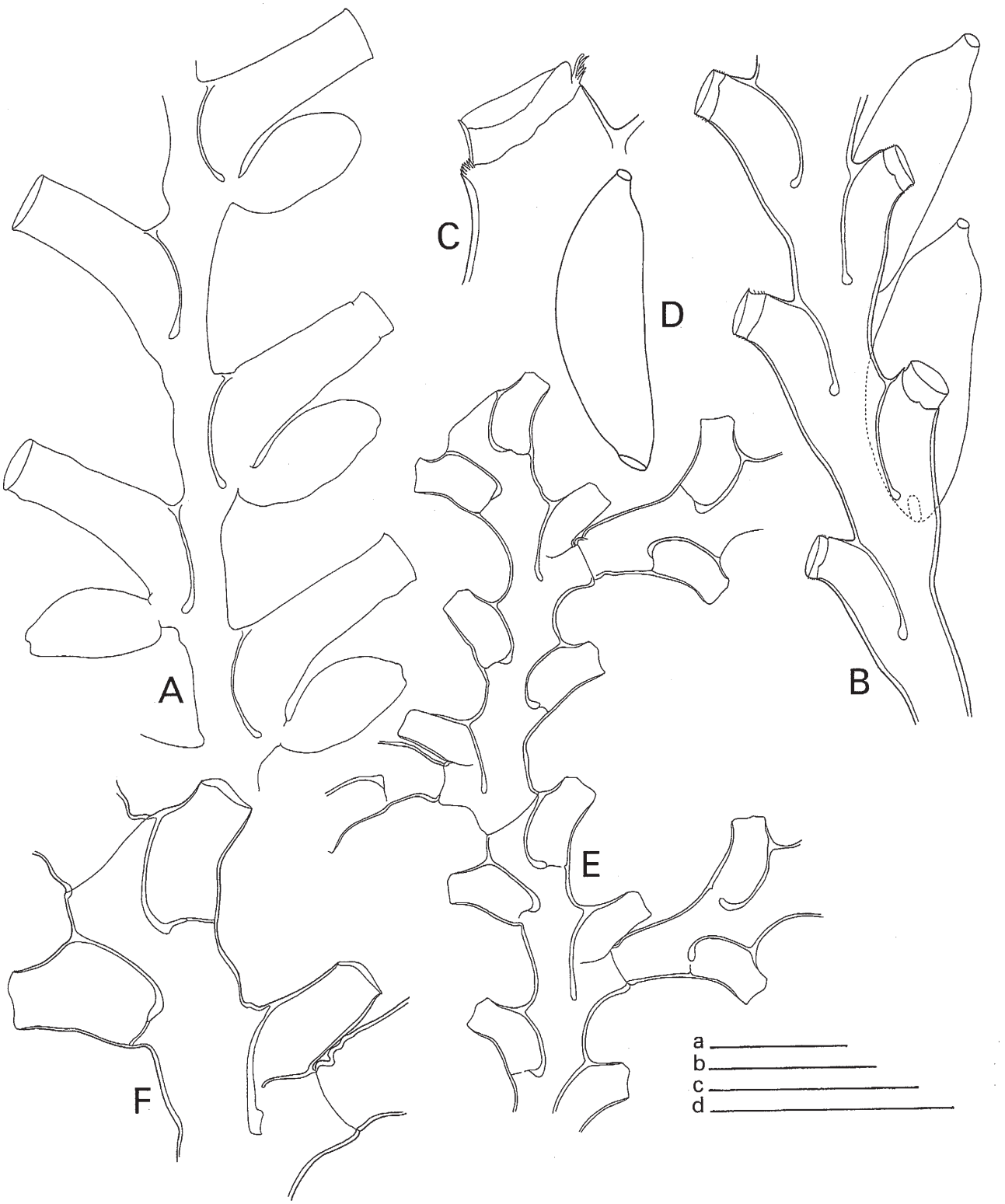

Fig. 29. A. ***Gigantotheca raukumarai*** sp. nov., part of stem with (?male) gonothecae (NZOI Stn D160, slide 2841). **B–D,** ***Gonaxia australis*** sp. nov. **B**, part of stem with gonothecae. **C**, proximal part of strongly renovated hydrotheca. **D**, gonotheca (NZOI Stn S159, holotype, slide 2314). **E, F.** ***Gonaxia grandis*** sp. nov. **E**, part of stem with hydrocladia. **F**, part of stem with insertion of hydrocladium and axillary hydrotheca (BS 886, slide 2994). Scales: a, 1 mm (E); b, 1 mm (B, D); c, 2 mm (A, F); d, 0.5 mm (C). W.V.

but some of the hydrothecae have the same arrangement of the marginal cusps as in *Gonaxia* Vervoort, 1993: one obtuse abcauline cusp and two obtuse lateral cusps close to the adcauline hydrothecal border. The gonothecae are quite characteristic and resemble those found in *G. pachyclados* Vervoort, 1993a, *G. sinuosa* Vervoort, 1993a and *G. similis* Vervoort, 1993a.

RECORDS FROM NEW ZEALAND: Southwest Pacific SE of Banks Peninsula, 44°19.32′ S, 173°35.52′ E, 525 m, NZOI Stn S159.

DISTRIBUTION: The species is known only from one locality south off Banks Peninsula. This record brings the genus, so far almost exclusively known from New Caledonian waters, the Norfolk Ridge, northern New Zealand waters, and the Tasman seamounts, much farther to the south in New Zealand waters.

ETYMOLOGY: The specific name *australis* is derived from the Latin adjective *australis* meaning southern, referring to the area where the specimen was found.

Gonaxia constricta (Totton, 1930)

Symplectoscyphus constrictus Totton 1930: 181, text-fig. 31, pl. 1, fig. 3; Ralph 1961a: 800–801, fig. 14f; Stepan'yants 1979: 69, 70. Dawson 1992: 20.
Gonaxia constricta: Vervoort 1993a: 140-143, figs 16d, 17a.

TYPE LOCALITY: Pacific Ocean off Three Kings Islands, 549 m.

REMARKS: A New Zealand species first described from the *Terra Nova* collection from north of the Three Kings Islands, collected 26.07.1911 (Totton 1930); it was re-described, after *Terra Nova* material, by Vervoort (1993a), but since the original record it has never been recorded. It is absent from the NZOI and NMNZ collections.

RECORDS FROM NEW ZEALAND: Off Three Kings Islands, 549 m (Totton 1930).

DISTRIBUTION: Known only from New Zealand waters off Three Kings Islands.

Gonaxia grandis sp. nov. (Fig. 29E, F)

MATERIAL EXAMINED:
NMNZ: BS 886, forked colony, 110 mm high (holotype) and 2 smaller colonies, 80 and 50 mm (paratypes); no gonothecae (NMNZ Co.515). RMNH-Coel. 28556, 2 slides 2994, are part of the type series.

TYPE LOCALITY: Wanganella Bank, Norfolk Ridge, E slope, 32°35.3′ S, 167°41.8′ E to 32°34.0′ S, 167°39.0′ E, 437–422 m.

DESCRIPTION: Colony snapped off at base, erect, stiff, with monosiphonic main stem up to 110 mm high. Branches (hydrocladia) pinnately arranged, roughly in 1 plane, springing from stem at base of axillary hydrothecae that differ in shape from remainder of stem and hydrocladial hydrothecae. Non-axillary hydrothecae of stem and hydrothecae of hydrocladia sub-opposite to alternate; stem with occasional oblique node. Hydrocladium springing from conspicuous apophysis at base of axillary hydrotheca; axillary hydrotheca elongate, narrowing gradually from base to apex, fused part of adcauline wall long and considerably thickened; base well developed, with small adcauline foramen for passage of coenosarc. Hydrocladia 15–25 mm long; between hydrocladium and that succeeding on opposite side there is an axillary hydrotheca and a sub-opposite pair. Hydrothecae large, rather deeply immersed into hydrocladium; immersed part distinctly swollen; free apical part tubiform, pointing away from axis at an angle of 80–90°. Abcauline wall obtuse to rather smoothly concave; fused part adcauline wall thick, curved, basally with thickened knob; foramen wide. Free adcauline wall straight to smoothly concave, shorter than adnate part. Hydrothecal rim with 3 rounded cusps: 1 abcauline and 2 lateral on adcauline side, obscure in many hydrothecae. No operculum.

MEASUREMENTS of *Gonaxia grandis* sp nov. (in μm):

	NMNZ BS 886 slide 2994
Stem, diameter at base	1135 – 1250
Stem hydrotheca, length abcauline wall	1540 – 1550
Length free adcauline wall	680 – 955
Length adnate adcauline wall	1540 – 1700
Total depth	2040 – 2225
Maximum diameter	1090 – 1135
Diameter at rim	700 – 750
Axillary hydrotheca, length adcauline wall	1340 – 1450
Length free adcauline wall	910 – 1135
Length adnate adcauline wall	1590 – 1725
Total depth	1930 – 2045
Maximum diameter	900 – 910
Diameter at rim	660 – 680
Hydrocladium, diameter at node	900 – 910
Hydrocladial hydrotheca, length abcauline wall	1630 – 1640
Length free adcauline wall	500 – 680
Length adnate adcauline wall	1815 – 1930
Total depth	2120 – 2155
Maximum diameter	1020 – 1090
Diameter at rim	725 – 770

Perisarc thick on main stem and hydrocladia, thinning out along walls of hydrothecae; few undamaged hydrothecae seen. Fully retracted hydranths present in many hydrothecae, these with a distinct abcauline caecum attached, by a ligament, to lateral wall of hydrotheca; about 10 tentacles.

The stem of one specimen has several tubiform structures resembling a polysiphonic main stem. Closer inspection reveals the presence of hollow, densely transversely striated tubes, either empty gonothecae or worm tubes. The detached apical portion of one of the tubes narrows considerably into a short neck; however no opercular plate is visible.

REMARKS: This new species resembles *Gonaxia pachyclados* Vervoort, 1993a, described from a locality off the south-eastern tip of New Caledonia at 140–160 m depth; it is, however, more than twice as large in dimensions of the hydrothecae. The hydrothecae, in the new species are more deeply immersed in the stem and hydrocladia, are more widely spaced and have a shorter free part in comparison to depth.

RECORDS FROM NEW ZEALAND: Wanganella Bank, Norfolk Ridge, E. slope, about 32.5° S, 167.5° E, 437–422 m.

DISTRIBUTION: Known only from Wanganella Bank, New Zealand.

ETYMOLOGY: The specific name *grandis* is derived from the Latin adjective *grandis* meaning great or big, referring to the size of the hydrothecae.

Gonaxia immersa sp. nov. (Fig. 30A–C)

MATERIAL EXAMINED:

NZOI Stn E312: Single 60 mm high colony; no gonothecae (holotype, H-764 in NIWA collection). RMNH-Coel. slide 2125, part of type series.

TYPE LOCALITY: Southweste Pacific, NNW of Three Kings Islands, 34°00.00′ S, 171°47.50′ E, 119 m.

DESCRIPTION: Pinnate and erect colony with about 60 mm high, monosiphonic stem, slightly geniculate in upper part. No division into internodes visible along stem, though presence of fissures in perisarc indicate damage followed by regeneration. Stem set with hydrothecae and hydrocladia, bilaterally placed in 1 plane, both hydro-thecae and hydrocladia alternate. Hydrocladia inserted on distinct apophyses with 1 slightly aberrant hydrotheca in upper axil; a pair of hydrothecae, 1 left, 1 right, between 2 succeeding and alternating apophyses. Hydrothecae of stem and hydrocladia identical in morphology, the axillary hydrotheca excepted; hydrothecae almost tubular and completely immersed in stem or hydrocladium. The apical portion is curved outwards; hydrothecal aperture protrudes slightly beyond stem or hydrocladium, and is parallel with stem or hydrothecal length axis or slightly tilted upwards. Hydrothecal rim with 3 cusps, 2 lateral and 1 abcauline; development of cusps much varied, in some hydrothecae rounded and low, in others acute and clearly visible. Operculum badly preserved in majority of hydrothecae, composed of 3 thin and transparent flaps attached in embayments between marginal cusps, but typically deciduous. Several hydrothecae are renovated or regenerated; results of these processes are thin and typically folded. Some hydrothecae show evidence of renovation of the opercular plates. Abcauline wall of hydrotheca straight or slightly convex, with semicircular thickening on both sides just under hydrothecal rim, creating the impression of a perisarc knob. Adcauline wall of hydrotheca broadly convex, curving outwards at base of hydrotheca with smoothly rounded knob. Hydrothecal base straight, with a narrow passage for the coenosarc. Axillary hydrothecae shorter than others, adcauline wall curved perpendicularly; hydrothecal aperture some distance from surface of stem. Hydrothecal base oblique, with distinct circular diaphragm; a big, elongate knob at curvature of adcauline wall, directed downwards. Some axillary hydrothecae have a circular hole or thin, circular area of perisarc at their base, either indicating places of attachment of shed gonothecae or places where gonothecae will develop.

Perisarc fairly thick, particularly on stem and apophyses; apex of hydrothecae thin and easily damaged.

MEASUREMENTS of *Gonaxia immersa* sp. nov. (in μm):

	NZOI Stn E312 slide 2125
Diameter of stem between apophyses	775 – 890
Distance between 2 succeeding apophyses	2060 – 2275
Apophyses, diameter at base	335 – 405
Hydrocladial/stem hydrotheca, length	
abcauline wall	520 – 590
Length adnate adcauline wall	815 – 850
Length free adcauline wall	35 – 90
Total depth	820 – 850
Maximum diameter	260 – 280
Diameter at rim	200 – 235
Axillary hydrotheca, length adcauline wall	370 – 445
Length adnate adcauline wall, including basal knob	815 – 1035
Length free adcauline wall	175 – 185
Maximum diameter	340 – 355
Diameter at rim	215 – 235

Exterior of colony is covered with small diatoms; hydrothecae contain remains of tissue; no intact hydranths were observed.

REMARKS: This species could not be identified with any of the known species of this remarkable genus. However, the structure of the apical part of the hydrotheca, the opercular apparatus and the morphology of the stem hydrothecae make it a typical representative of that genus. Almost fully immersed hydrothecae are also met with in *Gonaxia crassa* Vervoort, 1993a and *G. pachyclados* Vervoort, 1993a, from which it differs in size of the hydrothecae and construction of the colony.

RECORDS FROM NEW ZEALAND: Known only from the Southwest Pacific, NNW of Three Kings Islands, 34°00.00′ S, 171°47.50′ E, 119 m.

DISTRIBUTION: Known only from north of New Zealand.

ETYMOLOGY: The specific name *immersa* has been taken from the Latin verb *immergo, immersum*, meaning to immerse, to plunge, referring to the condition of the hydrothecae.

Gonaxia intercalata sp. nov. (Fig. 30D–F)

MATERIAL EXAMINED:

NMNZ: BS 899, forked, about 150 mm high, fragmented colony, hydrocladia about 20 mm long, no gonothecae. Holotype, NMNZ Co.1353. 2 RMNH-Coel. slides 2967B are part of type series.

TYPE LOCALITY: Middlesex Bank, NW of Three Kings Islands, 33°59.8′ S, 171°46.8′ E, 143–163 m.

DESCRIPTION (of holotype): Stem erect, robust, basally forked and polysiphonic, upper parts monosiphonic, divided into indistinct internodes separated by constrictions in perisarc. Colony irregularly planar with alternate hydrocladia springing from large apophyses on both sides of stem or branch. Usually 3 hydrothecae and 1 apophysis on each stem internode, of which 1 hydrotheca axillar and 2 above each other on opposite sides, but this arrangement frequently aborted, possibly as the result of regeneration after damage. Axillar hydrothecae differ from other stem and hydrocladial hydrothecae.

Hydrocladia 15–20 mm long, internodes indistinct, indicated by constrictions of perisarc. Hydrothecae biseriate, rather deeply immersed into internode, with exception of those in axil of apophyses, cylindrical, with flat base, smoothly curving outwards, slightly widened in middle region; about half to one-third of adcauline wall free; base of adcauline wall with a distinct knob; diaphragm wide, opposite side of abcauline wall with slight bulge in perisarc. Some hydrothecae with hyaline semicircular membrane suspended in diaphragm. Fused adcauline wall concave, smoothly curved; free part almost straight. Abcauline wall convex, forming a smooth curve with wall of internode. Hydrothecal rim with 3 indistinct, low, rounded cusps, 1 abcauline and 2 lateral, lateral cusps best developed; no perfect operculum observed though remnants of opercular plates adhere to some hydrothecal rims, attached to the embayments between the cusps. Axillar hydrothecae smaller and narrower than others; fused part of adcauline wall thickened and continued basally as a sclerotised rod with thickened, rounded end, attached to inside of wall of internode.

Perisarc moderately thick and fairly strong. Remains of hydranths indicate that the colony was taken alive, though the state of preservation is poor.

Gonothecae absent.

MEASUREMENTS of *Gonaxia intercalata* sp. nov. (in μm):

	NMNZ BS 899 slide 2967
Main stem, diameter at base	about 3000
Diameter of internode in monosiphonic part of stem	800 – 1020
Axillar hydrotheca, length adnate adcauline wall, including basal rod	1150 – 1300
Length free adcauline wall	540 – 605
Length abcauline wall	520 – 585
Total depth	890 – 1085
Maximum diameter	540 – 605
Diameter at rim	305 – 345
Hydrocladial hydrotheca, length adnate adcauline wall	1040 – 1195
Length free adcauline wall	260 – 475
Length abcauline wall	910 – 1170
Total depth	540 – 585
Maximum diameter	540 – 585
Diameter at rim	370 – 435

REMARKS: This species is in some respects intermediate between *Gonaxia pachyclados* Vervoort, 1993, and *Gonaxia immersa* sp. nov. It was found together with *Tasmanaria edentula* (Bale, 1924) with which it shares the shape and general structure of the colony; separation proved to be quite difficult. Detailed structure of the hydrothecae, however, show this species to be a distinct *Gonaxia* Vervoort, 1993a; this genus, restricted to New Caledonia, Norfolk Ridge, New Zealand, and Tasmanian waters, has its main centre of distribution and speciation in the Norfolk Ridge area. The type locality of the present new species is in that neighbourhood.

RECORDS FROM NEW ZEALAND: Middlesex Bank, NW of Three Kings Islands, 33°59.8′ S, 171°46.8′ E, 143–163 m.

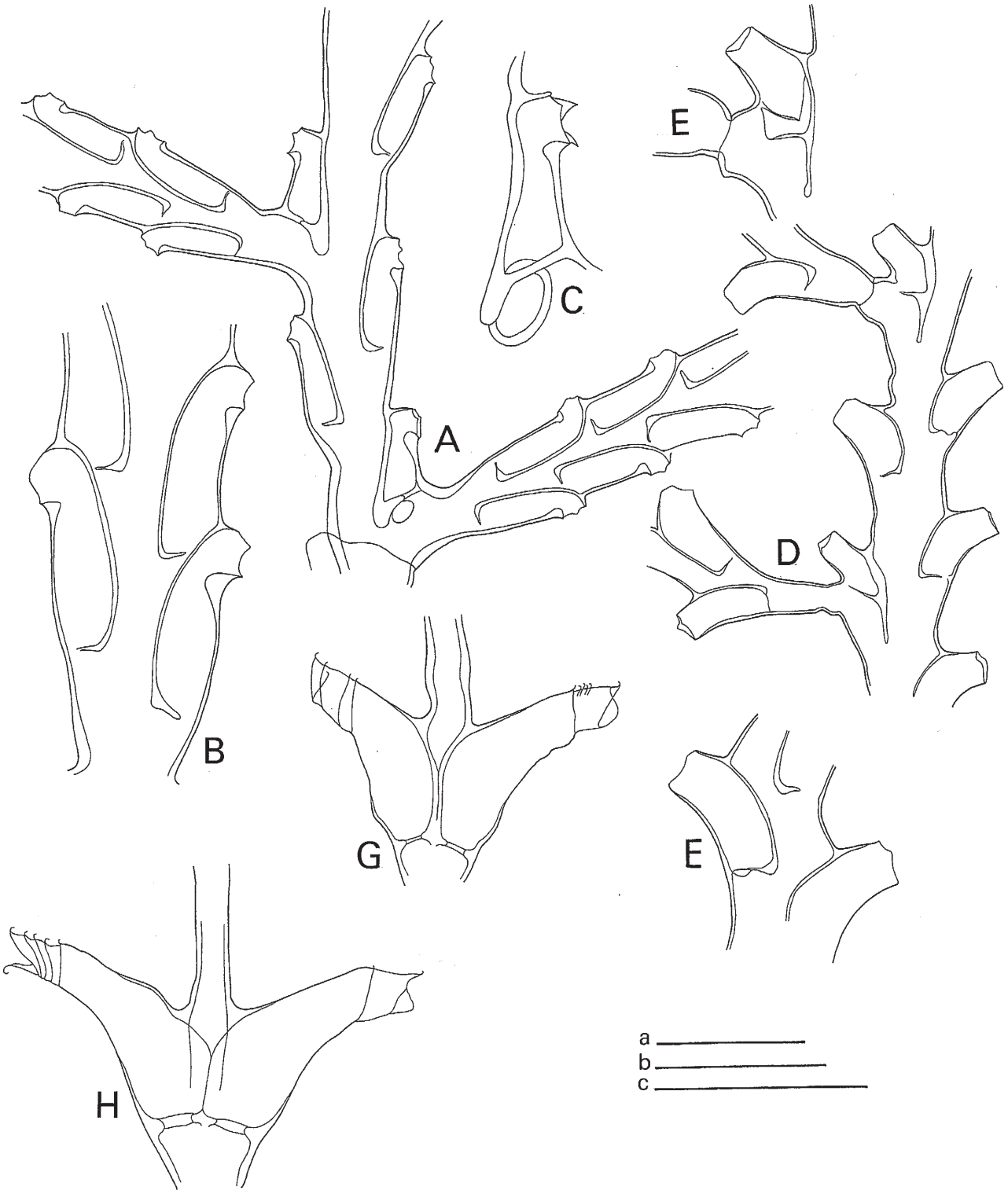

Fig. 30. A–C. ***Gonaxia immersa*** sp. nov. **A**, part of stem with two hydrocladia. **B**, part of hydrocladium. **C**, axillary hydrotheca with scar of shed gonotheca (NZOI Stn E312, holotype, slide 2125). **D–F.** ***Gonaxia intercalata*** sp. nov. **D**, part of stem with two hydrocladia. **E**, axillary hydrotheca. **F**, two hydrocladial hydrothecae (BS 899, holotype, slide 2967B). **G, H.** ***Salacia bicalycula*** (Coughtrey, 1876), pairs of hydrocladial hydrothecae (G, Loc. 559, slide 3943; H, Loc. 562, slide 3946). Scales: a, 1 mm (B, C, G, H); b, 1 mm (E, F); c, 2 mm (A, D). W.V.

DISTRIBUTION: Restricted to New Zealand waters NW of Three Kings Islands.

ETYMOLOGY: The species name *intercalata* has been derived from the Latin verb *intercalo, intercalare*, meaning to insert, to intercalate, referring to the arrangement of the hydrothecae.

Idiellana Cotton & Godfrey, 1942

TYPE SPECIES: *Idya pristis* Lamouroux, 1816.

Idiellana pristis (Lamouroux, 1816)

Idia pristis Lamouroux 1816: 199, pl. 5 fig. 5; von Lendenfeld 1885a: 419; Allman 1888: 85, pl. 39, figs 1–10; Farquhar 1896: 467–468; Bale 1924: 249 (*cum syn.*).
Sertularia pristis: Busk 1852: 389.
Idiella pristis: Stechow 1919: 106; Blackburn 1942: 116.
Idiellana pristis: Ralph 1961a: 766, fig. 5c-e; Cairns *et al*. 1991: 26; Tang 1991b: 257; Dawson 1992: 19; Vervoort 1993a: 188 (*cum syn.*); Bouillon *et al.* 1995: 67; Hirohito 1995 (English text): 178–180, fig. 58a-c; Watson 2000: 19, fig. 14A–E.

TYPE LOCALITY: Not specified (Australasian seas, Lamouroux 1816). Type probably lost.

RECORDS FROM NEW ZEALAND: There are no distinct New Zealand records besides the vague reference by von Lendenfeld (1885a: 419) "This species is found in many parts of New Zealand coasts ...". This reference has been copied by subsequent authors. This characteristic and easily recognised species does not occur in any of the New Zealand collections we have inspected.

DISTRIBUTION: Widely distributed over tropical and subtropical parts of Atlantic, Pacific, and Indian Oceans. It has been found in the lagoon at the southeastern extremity of New Caledonia, about 22.5° S, 166.5° E and in tropical Australia.

Salacia Lamouroux, 1816

TYPE SPECIES: *Salacia tetracythara* Lamouroux, 1816 [= *Thuiaria fenestrata* Bale, 1888 = *Calyptothuiaria opposita* von Campenhausen, 1896a].

The following species in *Salacia* have been considered.

Salacia articulata (Pallas, 1766)
Salacia bicalycula (Coughtrey, 1876a)
Salacia buski (Allman, 1876a);
Salacia desmoides (Torrey, 1902)[= *Sertularia desmoides* Torrey, 1902; *Dynamena dubia* Billard, 1922c; *Salacia cantabrica* García Corrales *et al.*, 1980); *Salacia curta* (Jäderholm, 1903)]
Salacia disjuncta Millard, 1964
Salacia farquhari (Bale, 1924)
Salacia hexodon (Busk, 1852) [= *Pasythea hexodon* Busk, 1852]
Salacia obliquanoda (Mulder & Trebilcock, 1914)
Salacia pyriformis (Fraser, 1936b)
Salacia sibogae Billard, 1924a
Salacia sinuosa (Bale, 1888) [= *Thuiaria sinuosa* Bale, 1888]
Salacia spiralis (Trebilcock, 1928)
S. tetracythara Lamouroux, 1816.
Doubtful species: *S. kurilae* (Nutting, 1904)

Salacia bicalycula (Coughtrey, 1876a) (Figs 30G, H, 31A–F, 33A)

Hydrallmania (?) bicalycula Coughtrey 1876a: 29–30, pl. 3, figs 8–9 (Jan.1876); Farquhar 1896: 465.
Hydrallmania bi-calycula: Coughtrey 1876b: 301.
Thuiaria bicalycula: Stechow 1921d: 259; Bale 1924: 243–244, fig. 9.
Salacia bicalycula: Stechow 1922: 150; Ralph 1961a: 770–771, figs 6, 7i; Dawson, 1992: 19.
Salacia (?) *bicalycula*: Stechow 1923d: 213, 214.
Desmoscyphus Buskii Allman 1876a: 265, pl. 14, figs 3–7 (25.Feb.1876); Farquhar 1896: 465.
Salacia buski: Stechow 1922: 150; 1923d: 213; Ralph 1961a: 771–773, fig. 7d-h; Dawson, 1992: 19.
Thuiaria buski: Bale 1924: 237; Trebilcock 1928: 19–20, pl. 7, figs 1–1c.
Thuiaria buski var. *tenuissima* Trebilcock, 1928: 20–21, pl. 7, fig. 2.

MATERIAL EXAMINED:
NZOI Stns: **A433** (dried out sample), *Salacia bycalicula* (Coughtrey, 1872) (J.E. Watson); **A738**, 1 colony 90 mm high, no gonothecae; **A742**, 1 colony 60 mm long; no gonothecea; **A841**, 1 colony 60 mm high, 6 gonothecae. Top part as RMNH-Coel. slide 2728; **A917**, regenerating colony 35 mm high, as RMNH-Coel. slide 2277; **B196**, about 15 colonies up to 80 mm high. No gonothecae; **B487**, colony about 40 mm high, all in RMNH-Coel. slide 2779. With developing colony of *Halecium delicatulum* Coughtrey, 1876b; **B561**, stem fragment 35 mm long, no hydrocladia; **B589**, 2 colonies 25 mm high, 1 of 55 mm height; no gonothecae; **B591**, 3 stems up to 80 mm high, with gonothecae; **B592**, 2 stems, basally fused, 90 mm high, no gonothecae; **B599**, single colony 140 mm high with a few gonothecae; **C844**, dried out sample, containing some fragments; **D20**, young colony about 15 mm high on stem of *Symplectoscyphus columnarius* (Briggs, 1914). All in RMNH-Coel. slide 2817; **D127**, 3 stems about 50 mm high, no gonothecae; **D132**, about 80 mm high stem from dried out sample. No gonothecae; **D876**, about 20 colonies and fragments, ranging from 20 to 120 mm; no gonothecae. RMNH-Coel. slide 2285; **D896**, single mutilated colony, 60 mm high, no gonothecae; **E96**, *Salacia bicalycula* (Coughtrey, 1876a) (J.E. Watson). [Slide 4188 JEW Colln]; **E108**, 2 stems, 50 and 80 mm high, smaller with a gonotheca. 1 colony basally with small stem of *Acryptolaria c. conferta* (Allman, 1877). RMNH-Coel. slide 2298; **E832**, 3 colonies about 80 mm high, 1 completely overgrown by *Sertularella integra* Allman, 1876a. No gonothecae. RMNH-Coel. slide 2177; **F77**, 3 colonies, 2 of 80 mm and unbranched, 1 of 120 mm and branched; **G685**, 3 colonies 40–50 mm high on old hydroid stem. No gonothecae; **G686**, 2 colonies, 50 and 129 mm high,

no gonothecae; **G687**, 1 stem about 80 mm high, no gonothecae; **G689**, 50 mm high colony, no gonothecae; **G695**, 3 stems, 100 mm high, no gonothecae; **G835**, 4 colonies, up to 40 mm high on sponge and empty worm tube. No gonothecae. RMNH-Coel. slide 2875. In addition 5 colonies, up to 80 mm high, on sponges. No gonothecae, with *Clytia hemisphaerica* (Linnaeus, 1767); **I340**, 2 fragments made up in RMNH-Coel. slide 2137.

NMNZ: BS 166, 3 developing colonies, unbranched, attached to stems of other hydroids. May belong here. **NMNZ Co. 619; BS 202**, 2 colonies, 80 mm high, no gonothecae. NMNZ Co.651; **BS 480**, 3 small colonies on *Symplectoscyphus subarticulatus* (Coughtrey, 1875); no gonothecae; with *Filellum antarcticum* (Hartlaub, 1904). Made up in RMNH-Coel. slide 3470. Also additional colonies and fragments; no gonothecae. NMNZ Co.414; **BS 621**, 4 colonies about 80 mm high, with gonothecae and epizootic *Clytia hemisphaerica* (Linnaeus, 1767). NMNZ Co.472. 3 RMNH-Coel. slides 2983; **BS 678**, 2 stems about 20 mm high on stem of *Lytocarpia vulgaris* sp. nov.; detached and put in RMNH-Coel. slide 3502; **BS 769**, single10 mm high stem on base of *Lytocarpia vulgaris* sp. nov. RMNH-Coel. slide 3511; **BS 838**, single stem, 70 mm high, no gonothecae. NMNZ Co.442; **R.V. *Munida* Stn 8**, 45°41.85′ S, 170°58.72′ E, 10 May.1990: Bunch of colonies, about 100 mm high, basally invested by a sponge; some gonotheca present. NMNZ Co. 543.

NMNZ Ralph Collection: Loc. 38, NMNZ Co.908, several fragments of a larger colony with some (empty) gonothecae. RMNH-Coel. slide 3603; **Loc. 77**, NMNZ Co.933, top part of a colony and some hydrocladia with gonothecae. 1 hydrocladium with gonothecae in RMNH-Coel. slide 3627. Partly dried out slide in RSC as *Thuiaria buski* O.S.M., no data; **Loc. 126**, NMNZ Co. 980, 2 top parts about 40 mm high and many smaller fragments, all with gonothecae. RMNH-Coel. slides 3663; **Loc. 404**, NMNZ Co.1194, fragments of large colony with many gonothecae. RMNH-Coel. slide 3873; **Loc. 415**, NMNZ Co.1201, 2 about 12 mm long hydrocladia; 1 in RMNH-Coel. slide 3884; **Loc. 451**, unstained slide in RSC as *Salacia buski*, no further data; **Loc. 526**, NMNZ Co.1258, fragments on worm tubes with unrecognisable, small species of *Halecium*. RMNH-Coel. slide 3934; **Loc. 531**, NMNZ Co.1260, small colonies on worm tube, together with *Clytia* cf. *elongata* Marktanner-Turneretscher, 1890. Part as RMNH-Coel. slide 3935; **Loc. 559**, NMNZ Co.1268, 10 mm long fragment, some smaller pieces attached to fixed object, and 10 mm long fragment with gonotheca. RMNH-Coel. slides 3943 and 3944; **Loc. 562**, NMNZ Co.1271, a few unbranched stems rising from stolon on worm tubes, longest about 7 mm; no gonothecae. RMNH-Coel. slide 3946. Also unrecognisable hydroids, probably *Halecium* sp.; **Loc. 565**, NMNZ Co.1273, com-pletely fragmented larger colony with many gonothecae; 1 or 2 developing planulae inside. RMNH-Coel. slide 3948. Poor slide in RSC as *Salacia bicalycula*, with data: Cook Strait, Stn 49; **Loc. 566**, NMNZ Co. 1274, completely fragmented colony with many gonothecae. RMNH-Coel. slides 3949 and 3950. With some fragments of *Obelia geniculata* (Linnaeus, 1758) and hydrotheca of *Modeeria rotunda* (Quoy & Gaimard, 1827) (RMNH-Coel. slide 3949); **Loc. 567**, NMNZ Co.1275, fragmented colonies with gonothecae. RMNH-Coel. slides 3952 and 3953; **Loc. 586**, NMNZ Co.1295, fragment of larger colony, some 15 mm high; no gonothecae. RMNH-Coel. slide 3972. Partly dried out slide in RSC as *Salacia buski*, no further data; **Loc. 592**, NMNZ Co.1302, fragments of colony with gonothecae. RMNH-Coel. slide 3980. 3 good slides in RSC as *Thuiaria bicalycula*, with data: Cook Strait. Labelled: large; **Loc. 598**, NMNZ Co.1307, stem fragments, with epizootic *Sertularella integra* Allman, 1876a. No gonothecae; **Loc. 603**, NMNZ Co.1312, fragments without gonothecae, RMNH-Coel slide 3992. Together with *Symplectoscyphus j. johnstoni* (Gray, 1843) and *S. subarticulatus* (Coughtrey, 1875); **Loc. 606**, NMNZ Co.1315, stem fragments and hydrocladia of several larger colonies; no gonothecae. RMNH-Coel. slide 3996. Also 2 small colonies of *Symplectoscyphus subarticulatus* (Coughtrey, 1875); **Loc. 607**, NMNZ Co.1316, stem fragments and hydrocladia of bigger colony or colonies, no gonothecae. No slide; **Loc. 609**, NMNZ Co.1318, fragments of 1 or several colonies and many detached hydrocladia, No gonothecae. RMNH-Coel. slide 3999. 3 good slides as *Thuiaria bicalycula*, with data: Cook Strait. Labelled: retractor muscle on hydranth; **Loc. 612**, NMNZ Co.1321, 80 mm high colony in 2 parts and loose hydrocladia; no gonothecae. RMNH-Coel. slide 4002 of top of colony; **Loc. 672**, good slide in RSC as *Thuiaria bicalycula*, with data: Cook Strait, Stn 101; **Loc. 681**, partly dried out slide in RSC as *Salacia bicalycula*, with data: Foveaux Strait.

PMBS: Aquarium Point, off End Beach, a little below extreme low spring tide, among *Macrocystis*. Branches come off almost at right angles. Identified by R. Kulka & P.M. Ralph, 1955; E. Otago, continental shelf. Identified by: P. Ralph) (as *Salacia buski*!) (Taken from card register).

Material Inspected: Otago continental shelf, prob. 73-110 m, R.V. *Taiaroa*, 29-30 June.1951, commercial otter trawl. 3 stems about 140 mm high on shell fragment. No gonothecae present.

Otago Museum, Dunedin, N.Z: **Iv. 766, A.52:55**: Single about 80 mm high, slightly fragmented stem with a number of, partly detached, hydrocladia. Some empty gonothecae present. Labelled: *Thuiaria buski*.

Additional Material: **Doubtful Sound**, 12 m, 11 April. 1994, leg. J.E. Watson. Several rather mutilated colonies up to 60 mm high and many fragments; with gonothecae (RMNH-Coel. 27857, slide 4037). Covered with hydrothecae of *Hebellopsis scandens* (Bale, 1888).

Also 3 slides in NHM: 26.8.6.17, from New Zealand, unstained glycerine jelly slide; 99.7.1.6278, from Busk collection, New Zealand, and 99.7.1.6370, New Zealand. All as *Desmoscyphus buskii* Allman, 1876a.

Type Locality: *Hydrallmania bicalycula*: Bluff Harbour, Foveaux Strait, 1.8–3.5 m (Coughtrey 1876a, b). *Desmoscyphus Buskii*: unspecified locality in New Zealand (Allman 1876a).

Description (based on available material): Stem erect, up to 100 mm high, moderately stiff; occasionally basally polysiphonic by fusion of several stems from colonies developing together, divided into internodes of varied length by oblique hinge-joints. Front of stem internodes with regularly spaced pairs of hydrothecae, adnate on front of colony, separated by width of internode on back. Hydrocladia spring from both sides of stem and are typically placed on long apophyses at the base of stem hydrothecae, pinnately arranged, both sides alternating.

Number of apophyses per internode varied, typically 2 or 3. Hydrocladia separated from apophysis by a sharp hinge-joint, hydrocladium divided into internodes of varied length by rather blunt hinge-joints; number of pairs of hydrotheca variable; Apertures of hydrocladial hydrothecae typically turned frontally and backwards, but variable because of basal hinge-joint. Spacing between pairs of hydrothecae on internodes of stem and hydrocladia variable, even in same colony. In some colonies pairs of hydrothecae closely packed; adcauline wall of hydrotheca touching base of succeeding pair; in others pairs separated by portion of wall of stem or internode that may exceed length of hydrotheca and may be slightly narrowed.

Hydrotheca basally cylindrical to slightly swollen, curving smoothly outwards without greatly diminishing in diameter; aperture roughly circular, almost parallel to stem or hydrocladial length axis. Adcauline wall usually a smooth, broad curve; adcauline walls of paired hydrothecae touching, length in contact greatly variable. Base of hydrotheca flat to slightly concave, with large diaphragm. Free portion of adcauline wall also variable in length, typically one-quarter to one-fifth length of adnate part, but occasionally nearly as long; distal end of adcauline wall in many hydrothecae turned or curved backwards. Abcauline wall basally straight, with fairly sharp curve just under aperture. Rim of aperture in young or undamaged hydrothecae almost circular, with indications of lateral lobes, development variable between hydrothecae. Distal part of hydrotheca brittle and damaged in majority of hydrothecae; damage repaired by regeneration from within hydrotheca, or by growth of a shorter (renovated) apical portion. Hydrotheca primarily closed by circular opercular flap with curled apex attached abcaudally, this present in many hydrothecae but occasionally withdrawn inside hydrotheca. Duplication and re-duplication of opercular plate frequent.

Perisarc of walls of stem and internodes fairly strong and thick, hydrothecal perisarc thin, particularly the apex, which is thin and brittle.

Gonothecae large, profuse along upper surface of hydrocladia, inserting with a very short pedicel just under a hydrotheca. Gonotheca large, elongate-ovoid, with a fairly large circular distal opening, initially closed by a membrane. Collar either extremely shallow or absent; no internal cusps or crenulations. Contents of gonothecae insufficiently preserved to identify sex.

REMARKS: An abundant material of *Salacia* answering Ralph's descriptions of *Salacia bicalycula* (Coughtrey, 1876a) and of *Salacia buskii* (Allman, 1876a) has convinced us that the criteria used by Ralph to discriminate between the two species are invalid, the two being in fact conspecific.

MEASUREMENTS of *Salacia bicalycula* (in μm):

	Ralph's Loc. 609 slide 3999	NZOI Stn A481 slide 2728
Diameter of stem (between pairs of hydrothecae	505 – 590	505 – 575
Length of apophysis	975 – 1690	1215 – 1690
Diameter	245 – 260	170 – 180
Stem hydrotheca, length fused adcauline wall	280 – 405	260 – 405
Length free adcauline wall	540 – 615	555 – 850
Length free part protruding from stem	170 – 205	260 – 370
Length abcauline wall	520 – 540	515 – 590
Total depth	850 – 875	815 – 850
Lateral diameter of rim	–	–
Distance between pairs of hydrothecae (top to base)	405 – 445	630 – 650
Hydrocaulus, diameter between pairs of hydrothecae	590 – 650	235 – 275
Hydrocladial hydrotheca, length fused adcauline wall	220 – 296	410 – 590
Length free adcauline wall	715 – 810	475 – 495
Length free part protruding from stem	185 – 220	255 – 265
Length abcauline wall	460 – 590	560 – 590
Total depth	850 – 890	775 – 780
Lateral diameter of rim	270 – 280	355 – 385
Female (?) gonotheca, length		3470 – 3690
Maximum diameter		1585 – 1735
Diameter of aperture		585 – 650

Ralph's principal argument to separate the two species was the development of the free axial or hydrocladial portion between pairs of hydrothecae: fairly long and narrowed in *S. bicalycula*, short and straight in *S. buskii*. A certain amount of variation is described and figured in *S. bicalycula*. The extensive material at our disposal shows that the variability is even wider, completely bridging the supposed gap between *S. bicalycula* and *S. buskii*. Specimens in which the distance between pairs of hydrothecae equals the depth of the hydrothecae are linked by intermediates to specimens in which the pairs of hydrothecae contact. The curvature of the hydrothecae, particularly the adcauline wall, is also quite varied. Specimens with moderately curved hydrothecae, having a short free portion of the adcauline hydrothecal wall which moreover is in contact with its neighbour over a considerable distance, are linked by intermediates to specimens with strongly curved hydrothecae that scarcely touch and are free for a considerable distance. We have consequently merged the two species, Coughtrey's name being the older and thus having priority.

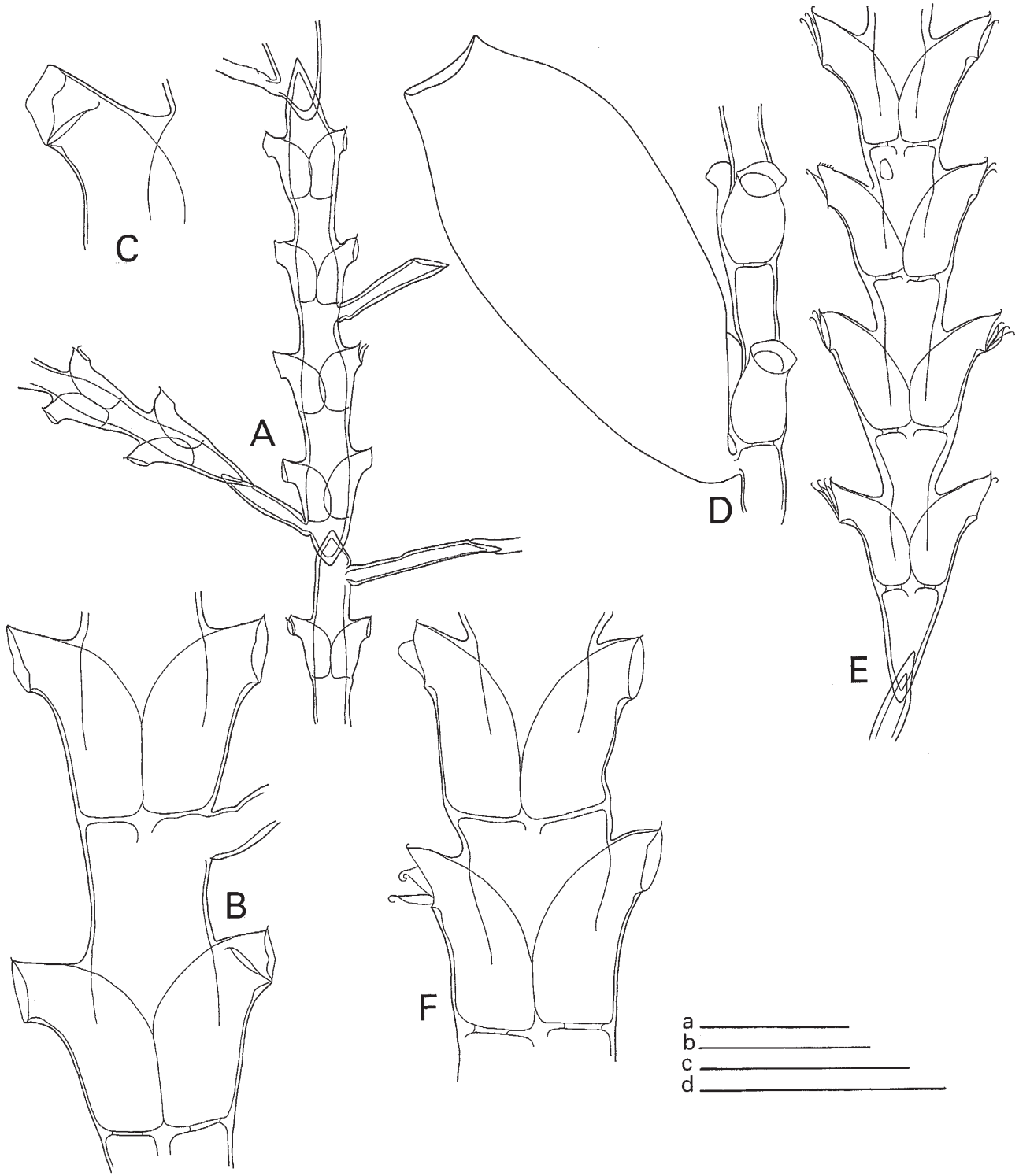

Fig. 31. A–F. ***Salacia bicalycula*** (Coughtrey, 1876). **A**, part of stem with insertion of hydrocladia. **B**, part of stem with two pairs of hydrothecae. **C**, distal part of stem hydrotheca. **D**, gonotheca, lateral view. **E**, proximal part of stem. **F**, two pairs of stem hydrothecae. (A–D, NZOI Stn A841, slide 2728; E, Loc. 566, slide 3949; F, Loc. 609, slide 3999). Scales: a, 1 mm (B, F); b, 1 mm (D, E); c, 2 mm (A); d, 0.5 mm (C). W.V.

RECORDS FROM NEW ZEALAND: Older records are from Bluff Harbour, South Island (Coughtrey 1876a, b; Trebilcock 1928); Wickliff Bay, Otago Peninsula (Coughtrey 1876a); north of Cape Maria van Diemen, 91 m, (Bale 1924); Island Bay (Trebilcock 1928). This is a characteristic New Zealand species, common in the deeper waters (29–260 m) around New Zealand; all records so far are within the area bordered by 34°–49.5° S, 164° E–176° W. Gonothecae present in April, May, June, August, and October.

The frequent records from Cook Strait and Foveaux Strait probably reflect the results of collecting efforts rather than areas of greater abundance.

DISTRIBUTION: Endemic New Zealand species; there are no records from outside the area specified above.

Salacia bicalycula spiralis (Trebilcock, 1928)
(Figs 32; 33B, C)

Thuiaria spiralis Trebilcock 1928: 21, pl. 7, figs 3–3e; Stranks 1993: 19.
Salacia spiralis: Ralph 1961a: 769, fig. 7j-l; Dawson 1992: 19.

MATERIAL EXAMINED:

NZOI Stns: A746, single colony fragment with isolated hydrothecae of *Filellum serratum* (Clarke, 1897). RMNH-Coel. slide 2714 only; **B581**, 2 colonies 80 mm high, no gonothecae. RMNH-Coel. slides 2789 and 2791, on first slide together with *Plumularia setacea* (Linnaeus, 1758); **E864**, many colonies up to 80 mm high with gonothecae and fragments. RMNH-Coel. slide 2190; **J953**, single colony about 150 mm high, with many gonothecae. RMNH-Coel. slide 2209 of top part; **J975**, 2 colonies 80 mm high, 1 with gonothecae.

NMNZ: BS 482, single colony 80 mm high, hydrocladia (side branches) all with gonothecae. NMNZ Co.862, RMNH-Coel. slide 3522; **BS 512**, single stem about 80 mm high with several branches showing weak spiralisation. In addition a 20 mm long stem fragment. No gonothecae. NMNZ Co.852; **BS 679**, 5 rather damaged colonies without gonothecae, but with growth of bryozoans. NMNZ Co.874, RMNH-Coel. slide 4423; **BS 834**, 2 detached stems about 25 mm high, made up in slide RMNH-Coel. 27694, slide 3394. 1 stem with distinct spiral structure; **BS 840**, 2 stems, 1 well developed with spiral structure, with gonothecae. NMNZ Co.770. Slide of hydrocladium with gonotheca as RMNH- Coel. 27715, slide 3415; **BS 904**, 6 colonies, up to 80 mm high, with gonothecae. NMNZ Co.430.

TYPE LOCALITY: *Salacia bicalycula spiralis*: Not specified by Trebilcock (1928): New Zealand. The presence of a possible syntype in MOV (no. MV F57898, 1 microslide) makes it possible to locate the type locality as Bluff, South Island, New Zealand, 05.May.1923.

DESCRIPTION (of material from NZOI Stn J953): Colony composed of monosiphonic stem and radiating, unbranched hydrocauli, length of stem about 150 mm, hydrocladia 15–20 mm long. Stem fairly rigid, basally straight, after first 30–40 mm coiled in loose anticlockwise spiral, with a diameter of 10–15 mm, divided into internodes by means of slightly oblique septa, each internode having 5 or 6 widely separated pairs of hydrothecae. Hydrocladia inserting on stout apophyses at base of pair of stem hydrothecae, pointing away from stem in both directions at about 70–80°; node separating base of hydrocladium from apophysis is a distinct hinge-joint. Hydrocladia with 1 or 2 slightly oblique nodes; 5 or 6 pairs of hydrothecae on hydrocladial internode. Pairs of hydrocladial hydrothecae separated but closer together than those on stem.

Hydrothecae on stem and hydrocladia identical, saccate, basal portion slightly swollen, narrowing apically, curving outwards. Hydrothecal pairs on front of stem or hydrocladium, about half of adcauline walls of hydrothecal pairs adnate, only short part adcauline wall free, slightly turned upwards. Hydrothecal aperture almost circular, more or less parallel to long axis of stem or hydrocladium, rim slightly thickened, with indication of weakly developed lateral cusps on each side. Abcauline wall of hydrotheca with internal upturned flap, apparently serving as attachment for hydranth; distal end of abcauline wall with minor

MEASUREMENTS of *Salacia bicalycula spiralis* (in μm):

	NZOI Stn J953 slide 2209
Diameter of stem (between pairs of hydrothecae)	540 – 670
Length of apophysis	1410 – 1625
Diameter	305 – 325
Stem hydrotheca, length fused adcauline wall	325 – 435
Length free adcauline wall	435 – 475
Length free adcauline wall protruding from stem	110 – 150
Length abcauline wall	475 – 520
Total depth	780 – 870
Lateral diameter of rim	280 – 305
Distance between pairs of stem hydrothecae (top to base)	870 – 955
Hydrocladia, diameter between pairs of hydrothecae	390 – 435
Hydrocladial hydrothecae, length fused part adcauline wall	435 – 540
Length free adcauline wall	390 – 435
Length free adcauline wall protruding from stem	175 – 215
Length abcauline wall	435 – 475
Total depth	840 – 855
Lateral diameter of rim	280 – 290
Female (?) gonotheca, length	3900 – 4000
Maximum diameter	1860 – 1875
Diameter at aperture	540 – 550

thickening, best visible in lateral aspect, barely visible in frontal view. Hydrothecal operculum a thin, abcauline circular flap.

Perisarc well developed on stem and hydrocladia; walls of hydrothecae thin, particularly distally, as a result many damaged hydrotheca and many with renovated margins. No hydranths have been found, although some hydrothecae contain remnants of tissue.

Gonothecae abundant, large, ovoid, with slightly wrinkled walls, narrowing basally into a short pedicel, inserting on hydrocladium at base of hydrothecal pair. Gonotheca with circular apical opening with thickened wall, with very short neck. Sex indeterminate, possibly female.

REMARKS: The specimens so far studied differ from Trebilcock's description and figures by the much stronger spiralisation of the (upper part of the) stem and unbranched hydrocladia. As far as the latter detail, Trebilcock referred to hydrocladia bearing secondaries and these are also quite distinct in his drawings (Trebilcock 1928, pl. 7, fig. 3); none of our specimens shows this peculiarity. A comparison of the description presented above with that of *Salacia bicalycula* (Coughtrey, 1876a) shows that the two species only differ in the spiral development of the upper part of the axis; we consequently consider it to be a subspecies of *S. bicalycula* rather than a separate species. Though Trebilcock's figure 3 shows a more or less spiral stem, the specific name *spiralis* may as well refer to the fact that the hydrocladia are spirally arranged around that stem, a fact borne out by the syntype slide in MOV; the remainder of Trebilcock's type is, unfortunately lost. The structure of hydrocladia and pairs of hydrothecae in the type slide bear out the descriptions presented above for *S. bicalycula* and *S. bicalycula spiralis*. Trebilcock's figure (1928, pl. 7, fig. 3) of the colony strongly resembles that of *Hydrallmania falcata* (L., 1758), with which Coughtrey must have been familiar when describing *Salacia bicalycula* as *Hydrallmania (?) bicalycula*.

RECORDS FROM NEW ZEALAND: Known from a restricted area off North Cape and near the Three Kings Islands; from Ranfurly Bank, off East Cape; from Kapiti Channel; from west of D'Urville Island, Cook Strait and probably also from Bluff, South Island, where it was probably washed ashore.

DISTRIBUTION: Known only from New Zealand.

Salacia desmoides (Torrey, 1902) (Fig. 33D–F)

Sertularia desmoidis Torrey 1902: 65–66, pl. 8, figs 70–72 (incorrect original spelling).
Sertularia desmoides: Fraser 1911: 72 (justified emendation); Billard 1924a: 66; Fraser 1938b: 9, 54; 1938c: 110; 1948: 247.
Salacia desmoides: Stechow 1922: 150; 1923d: 213; Millard 1975: 274, fig. 90A–C; 1978: 196 *et seq.*; Isasi Urdangarin 1985: 81–82, fig. 23; Boero & Fresi 1986: 146; Isasi & Saiz 1986: 70; Roca 1987: 211, 212; Altuna & García Carrascosa 1990: 54 *et seq.*, fig; Cairns *et al*. 1991: 26; Medel Soteras *et al.* 1991: 510–512, figs 1-3; Boero & Bouillon 1993a: 264; Altuna Prados 1995: 54, fig. 4A, B; Bouillon *et al.* 1995: 68; Medel & Vervoort 1998: 30–32.
Dynamena desmoides: Picard 1958: 193.
Salacia (?) *Desmoides*: Millard 1967: 179, fig. 4a-c.
Dynamena dubia Billard 1922c: 344, fig. 1.
Dymella dubia: Stechow 1923d: 167; Leloup 1940b: 16; Rees & White 1966: 277.
Salacia dubia: Billard, 1927: 340; 1931d: 676; Fey 1970: 398, 408; Castric & Michel 1982: 85, fig.; Hirohito 1983: 6, 41, fig. 16; Gili & García-Rubies 1985: 46, fig. 4D; Gili 1986: 116–117, fig. 4.21B; Aguirrezabalaga *et al*. 1987: 112–114, fig. 7; Altuna & García Carrascosa 1990: 54 *et seq.*, fig.; Izquierdo *et al*. 1990: 30–32, fig. 1; Castric-Fey & Chassé 1991: 523; Boero & Bouillon 1993a: 264; Hirohito 1995 (English text): 180-182, fig. 59a-d.
Salacia cantabrica García Corrales *et al*., 1980: 17, 20, pl. 7 fig. 2: Roca 1987: 212.

MATERIAL EXAMINED:

NZOI Stns: I89, several to 8 mm high colonies on *Symplectoscyphus odontiferus* sp. nov., no gonothecae. RMNH-Coel. slide 4767; **K801**, some about 10 mm high colonies on *Tasmanaria edentula* (Bale, 1924.); 1 gonotheca. All in RMNH-Coel. slide 2893.

NMNZ Ralph Collection: Loc. 401, NMNZ Co.1191, young colonies without gonothecae on *Salacia farquhari* (Bale, 1924). With *Clytia hemisphaerica* (Linnaeus, 1767) (RMNH-Coel. slide 3869).

TYPE LOCALITY: *Sertularia desmoides*: California, U.S.A., no distinct type locality specified: San Diego; San Clemente Island, San Pedro; rocky and sandy bottom, growing usually on seaweed (Torrey 1902). *Dynamena dubia*: La Pallice, near La Rochelle, Bay of Biscay coast of France (Billard 1922c; holotype, a microslide, in Billard's slide collection in MNHN, 544, labelled: "*Salacia dubia* Billard, fec. 28.x.22. type et *Dynamena pumila*. Dr Coulengeat leg. La Rochelle. 2.iii.16". *Salacia cantabrica*: Spanish Cantabrian Coast near Vega de Ribadesella, Asturias, 2–8 m; holotype in Dept. of Zoology, Colegio Univ. Integrado, Universidad Complutense de Madrid, Spain (García Corrales *et al.* 1980).

DESCRIPTION (of material from NZOI Stn K801): Erect, moderately branched stems about 10 mm high rising from stolons epizootic on other hydroids; stem basally of same diameter as stolon, divided into internodes by oblique hinge-joints; each internode with a pair of opposite hydrothecae, adnate to front, separated by width of internode at back. First internode springing directly from stolon, without apophysis, hydrothecal pair almost in middle of internode; remaining internodes with a pair of basal hydrothecae.

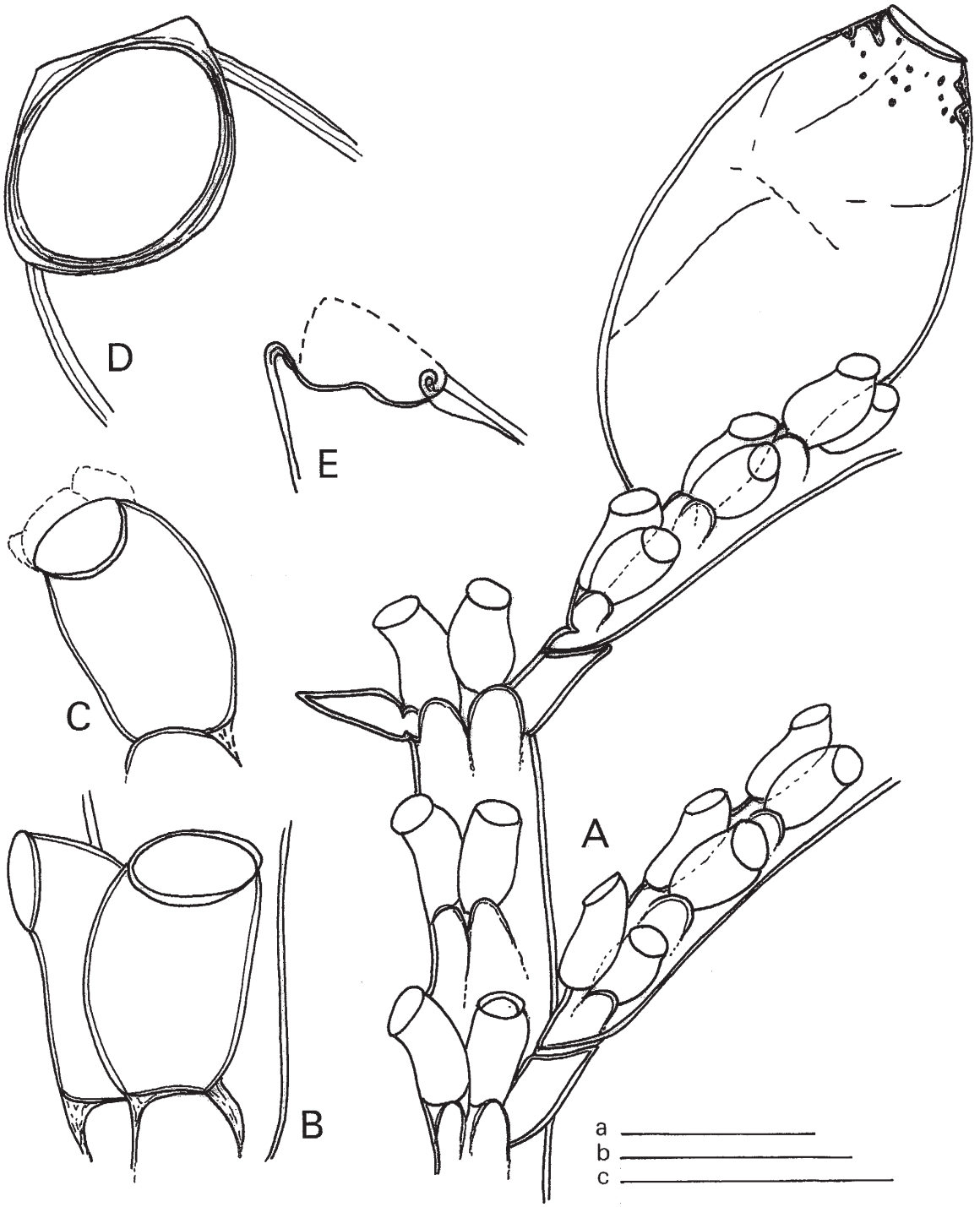

Fig. 32. A–E. ***Thuiaria spiralis*** Trebilcock, 1928 [= ***Salacia bicalycula spiralis*** (Trebilcock, 1928)] drawn after the syntype slide (MV F57898) in MOV. **A**, part of stem with hydrocladia and gonothecae, frontal view. **B**, pair of hydrocladial hydrothecae, fronto-lateral view. **C**, hydrotheca with remains of operculum. **D, E,** hydrothecal aperture with remains of operculum. Scales: a, 0.2 mm (D, E); b, 1 mm (A); c, 0.5 mm (B, C). J.E.W.

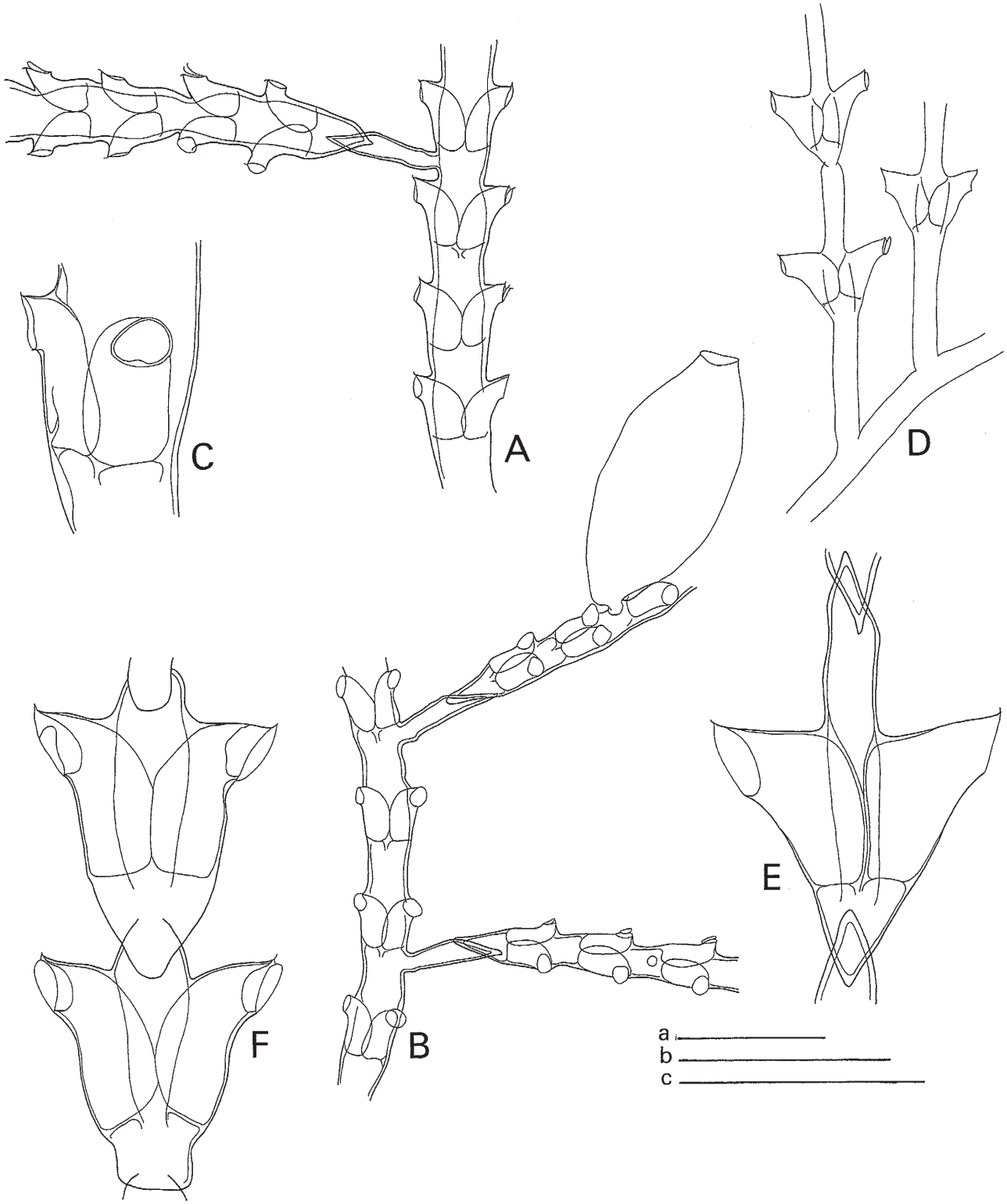

Fig. 33. A. ***Salacia bicalycula*** (Coughtrey, 1876), part of stem with hydrocladium (Loc. 609, slide 3999). **B, C.** ***Salacia bicalycula spiralis*** Trebilcock, 1928. **B**, part of stem with two hydrocladia. **C**, pair of stem hydrothecae, oblique lateral view (NZOI J953, slide 2209. **D–F.** ***Salacia desmoides*** (Torrey, 1902). **D**, part of colony with two stems arising from stolon. **E**, pair of (stem) hydrothecae (NZOI Stn K801, slide 2893). **F**, two pairs of (stem) hydrothecae (Loc. 401, slide 3869). Scales: a, 1 mm (C); b, 2 mm (A, B, D); c, 0.5 mm (E, F). W.V.

MEASUREMENTS of *Salacia desmoides* (in μm):

	NZOI Stn K801 slide 2893
Diameter of stolon	140 – 200
Diameter of stem at base	170 – 180
Length of first stem internode (stolon-first node)	2060 – 2385
Stem internode, length	1040 – 1300
Diameter	110 – 135
Stem hydrotheca, length fused adcauline wall	190 – 235
Length free adcauline wall (stem-apex)	235 – 310
Length abcauline wall	265 – 335
Diameter at rim	150 – 185
Distance between pairs (top-base)	800 – 850
Gonotheca, length	2060
Maximum diameter	800
Diameter of rim	500

Hydrothecae saccate, sharply curving outwards, occasionally free adcauline wall perpendicular to internodal long axis; typically, however, free adcauline wall pointing slightly upwards, upturned distally; abcauline wall with concavity some distance under rim. Hydrothecal aperture circular, rim smooth, not thickened; opercular flap visible in some hydrothecae, more or less circular, attached abcaudally. Base of hydrotheca flat, with central circular foramen. Side branches, when present, composed of a few internodes, springing from stem internode between hydrothecal bases and node.

Only one damaged gonotheca present, elongated ovoid, with widely spaced circular constrictions; apically flattened, with circular operculum. Pedicel short, attaching gonotheca to internode between hydrothecal bases and node.

REMARKS: The material from NZOI Stn K801 is scanty and quite dirty but could be identified because of the presence of a (damaged) gonotheca. Even in this small sample the variability in shape of the hydrothecae is considerable, confirmed by the widely differing measurements of the free part of the adcauline wall. Another sample found in Ralph's collection from a much more southerly locality (Loc. 401) was mistaken by Ralph for *Salacia farquhari* (Bale, 1924). In this material the internodes are much shorter and the hinge-joints are less acute. The colonies were collected in fresh state and have well preserved hydranths and opercula.

RECORDS FROM NEW ZEALAND: The NZOI records are from subtropical waters southeast of Norfolk Island, 29°25.30′ S, 168°00.20′ E, 65 m, and the Kermadec Ridge, 29°14.70′ S, 177°51.70′W, at 18 m.

However the NMNZ record concerns living material (developing on *Salacia farquhari* (Bale, 1924)) from Timaru Harbour on the east coast of the southern part of South Island, depth unknown but presumably in the littoral zone.

DISTRIBUTION: Tropical and subtropical parts of the Indo-Pacific and Atlantic. Known from the Eastern Pacific (California and neighbouring areas) and the southern Indian Ocean (Millard 1975; Medel & Vervoort 1998).

Salacia farquhari (Bale, 1924) (Fig. 34A–F)

Thuiaria farquhari Bale 1924: 244, fig. 10; Trebilcock 1928: 19, pl. 7, fig. 4.
Salacia farquhari: Ralph 1961a: 769–770, fig. 7a-c; Watson 1975: 165, figs 20–22; Dawson 1992: 19.

MATERIAL EXAMINED:

NZOI Stns: B221, small colony 15 mm high. Specimen with parasitic mite and its eggs inside hydrothecae. RMNH-Coel. slide 2750; **B225**, fragment 10 x 10 mm, young specimen with secondary ramifications (secondary hydrocladia) and heavily overgrown. Also fragments of large colony or colonies; no gonothecae. RMNH-Coel. slide 2760; **B229**, many delicately branched, about 40 mm high colonies on shells; no gonothecae; **B230**, numerous delicately branched colonies up to 60 mm high, on stones, shells, etc.; no gonothecae. Also fragments of stems. RMNH-Coel. slide 2762; **B247**, 1 colony about 40 mm high, no gonothecae. Lost; **B264**, several fragments from 1 or several larger colonies; no gonothecae.

NMNZ: BS 386, small colonies attached to stem and hydrocladia of *Crateritheca billardi* (Bale, 1915), 1 with gonotheca (3 RMNH-Coel. slides 3359b). N.B. This seems to be an exceptional record.

NMNZ Ralph Collection: Loc. 211, NMNZ Co.1058, many colonies, some branched, up to 8 mm high, detached from substratum; no gonothecae. RMNH-Coel. slide 3721. Partly dried out slide in RSC as *Salacia farquhari* Bale, no data; **Loc. 231**, NMNZ Co.1076, many colonies up to 15 mm high arising from a stolon detached from its substratum; no gonothecae. RMNH-Coel. slide 3741. With *Plumularia setacea* (Linnaeus, 1758) and *Sertularella robusta* Coughtrey, 1876b; **Loc. 240**, NMNZ Co. 1084, about 6 mm high stem attached to stolon; in RMNH-Coel. slide 3756. (N.B. Species mentioned in Ralph's register not found.) **Loc. 397**, NMNZ Co.1188, fragments of larger, much deteriorated colony (probably with fungal growth). RMNH-Coel. slide 3865. Partly dried out slide in RSC, as *Thuiaria bicalycula*, no data; labelled: excellent; **Loc. 401**, NMNZ Co.1191, tangled colonies and many frag-ments, the largest about 25 mm; no gonothecae. RMNH-Coel. slide 3868. With *Salacia desmoides* (Torrey, 1902) and *Clytia hemisphaerica* (Linnaeus, 1767). 4 slides in Ralph's slide collection as *Thuiaria bicalycula*, no data.

PMBS: Aquarium Point, PMBS, little below extreme low spring tide, among *Macrocystis* sp., End Beach, 16 April. 1953. Numerous partly fragmented colonies on sponges, with gonothecae. RMNH-Coel. 27267, slide 2684.

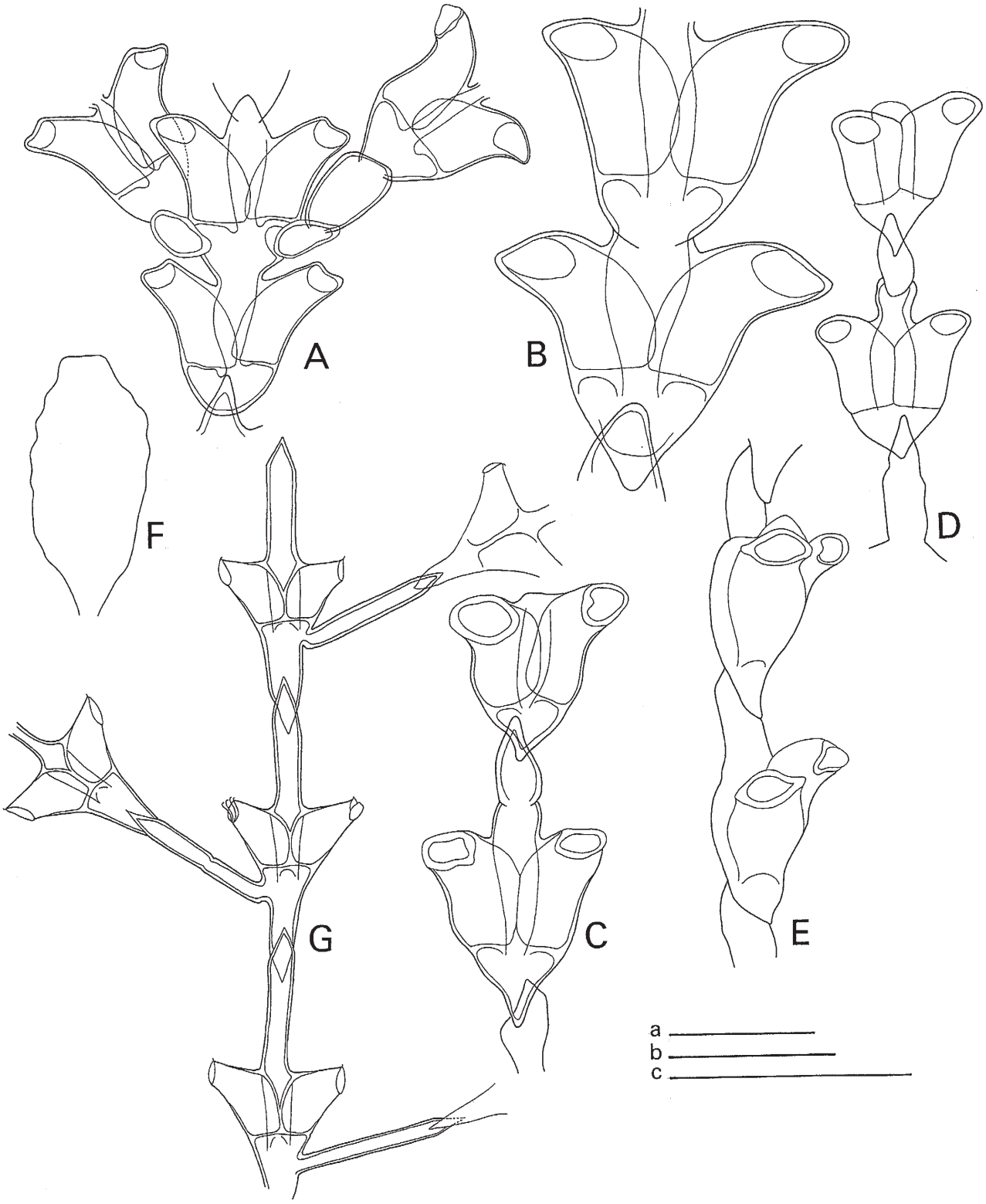

Fig. 34. A–F. ***Salacia farquhari*** (Bale, 1924). **A**, part of stem with two hydrocladia. **B**, two pairs of hydrocladial hydrothecae (Loc. 211, slide 3721). **C**, **D**, proximal parts of stem, frontal view. **E**, proximal part of stem, lateral view. **F**, gonotheca (BS 386, slide 3359b). **G.** ***Salacia macer*** sp. nov., part of stem with three hydrocladia (BS 886, holotype, slide 2995). Scales: a, 1 mm (A); b, 1 mm (F, G); c, 0.5 mm (B–E). W.V.

TYPE LOCALITY: Lyttelton Harbour, South Island; (holo)-type microslide in Canterbury Museum, Christchurch, no. 39; syntype (?) slide no. 40; both slides could not be traced during a recent visit by the junior author and are presumed lost. Syntypes also in NMV (Stranks 1993; MVF58219, 2 microslides) from Lyttelton, New Zealand.

DESCRIPTION (based on material from Loc. 211): Erect, up to 15 mm high colonies composed of monosiphonic axes arising from tubular stolon attached to other hydroids and algae. Stems short, with pinnately arranged, occasionally opposite branches; no secondary branches seen. Stem and branches divided into internodes bearing pairs of opposite hydrothecae, usually 2 pairs, occasionally 1 pair on internode; first stem internode with a sharp, acute hinge-joint, other internodes separated by rounded hinge-joints. Branches inserting by 1 or 2 short athecate internodes under hydrothecae of stem. Hydrothecal pairs on front of internodes, directed laterally and slightly frontally; touching on front and separated across internode on back. Hydrothecae more or less tubular, curved, proximal portion occasionally slightly swollen; adcauline wall convex, smoothly curved; abcauline wall concave, concavity deepest at about half length or slightly above. Aperture of hydrotheca widened laterally, with shallow lateral cusp on each side; rim thickened to a varied degree; no adcauline cusp visible. Operculum a rounded plate, attached to abcauline hydrothecal rim, deciduous in majority of hydrothecae. Hydrothecal floor thick and straight, with perisarc peg at end of adcauline wall.

MEASUREMENTS of *Salacia farquhari* (in μm):

	Ralph's Loc. 211 slide 3721
Stem internode with 2 pairs of hydrothecae, length	1150 – 1260
Diameter between pairs	150 – 160
Stem internode with 1 pair of hydrothecae, length	760 – 825
Diameter between pairs	105 – 120
Stem hydrotheca, length adnate adcauline wall	245 – 310
Length free adcauline wall	305 – 345
Length abcauline wall	385 – 435
Total depth	460 – 560
Diameter of rim (measured laterally)	185 – 205
Diameter at base of hydrothecal pair	370 – 400
Internodal hydrotheca, length adnate adcauline wall	260 – 310
Length free adcauline wall	330 – 340
Length abcauline wall	355 – 465
Total depth	480 – 545
Diameter of rim (measured laterally)	205 – 225
Diameter at base of hydrothecal pair	340 – 370

Basal part of internode rounded below hydrothecae. Perisarc notably strong throughout whole colony, especially along hydrothecal rim.

No gonothecae observed.

REMARKS: The present description is based on Ralph's material from the mouth of the Clarence River, near Kaikoura, east coast of South Island. Not all material mentioned by Ralph could be traced and some of her material such as that from Timaru, east coast of South Island, definitely does not belong here. Her description, therefore, may be based on composite material. The present material described is dead, remains of hydranths being present. It agrees with Ralph's drawings of this species (1961, fig. 7a-c) from Bale's original material. The gonotheca of this species is described by Ralph (1961: 770) and is figured by her and by Trebilcock (1928, pl. 7, fig. 4). The material inspected here is much larger than that seen by Ralph and permits us to conclude that in this species the length of the internodes and the distance between the pairs of hydrothecae is as variable as in *Salacia bicalycula* (Coughtrey, 1876a). It is, nevertheless, easily distinguished from this species by the smaller hydrothecae. Some of the colonies reach a height of 25 mm and in these the hydrocladia may bear short secondary ramifications. Many colonies are overgrown by small algae and by protozoans; it is also the only species of Leptolida in which a parasitic mite (Halocarida) has been observed. The mites adhere thead downwards, in the axil between internode and hydrotheca; eggs were seen inside the hydrothecae.

RECORDS FROM NEW ZEALAND: Mouth of the Clarence River, near Kaikoura; Lyttelton Harbour, Dunedin; Aquarium Point, Portobello; Menzies Bay; Foveaux Strait, all localities being on the east and south coasts of South Island. The material from Kaikoura are detached colonies from drifted material. An additional record by Ralph (Timaru, Canterbury Museum slide 41) is uncertain and from Trebilcock's material from Bluff, South Island, only the gonotheca has been figured. Amongst our material there is one indisputable record from northern New Zealand waters, viz., Middle Southeast Bay, Great King Island, at 42-46 m. The depth records extend from the littoral zone down to a depth of 46 m.

DISTRIBUTION: Unknown outside New Zealand. Known only from a few localities on the east and south coasts of South Island. It probably occurs more abundantly on algae and tunicates in the littoral zone but may easily be overlooked or confused with species of *Dynamena* and/or *Sertularia*.

Salacia macer sp. nov. (Figs 34G, 35A)

MATERIAL EXAMINED:

NMNZ: BS 886, fair number of about 40 mm high colonies on bryozoans; no gonothecae. Holotype, NMNZ Co. 517. Two RMNH-Coel. slides 2995 are part of type series. Single about 25 mm high colony; no gonothecae (paratype, NMNZ Co.552).

TYPE LOCALITY: Wanganella Bank, Norfolk Ridge, E slope, 32°35.3′–32°34.0′ S, 167°41.8′–167°39.0′ E, 437–422 m.

DESCRIPTION (of the holotype): Colonies composed of thin and flexible, monosiphonic axes about 40 mm high attached to bryozoans. Stem arising directly from thin stolon without apophysis, terminating in an oblique joint, remainder of stem composed of internodes with oblique joints, with a pair of opposite hydrothecae basally and a hydrocladium springing from internode at base of hydrothecae, directed alternately left and right. Hydrocladia 8–10 mm log, no distinction between basal internode of hydrocladium and apophysis; the apophysis terminating in an oblique joint. Remainder of hydrocladium composed of 3–5 slender internodes with oblique joints, a pair of hydrothecae basal on each internode. Pairs of identical hydrothecae on stem and hydrocladia partly adnate frontally and separated by internode at back. Hydrotheca urn-shaped, swollen basally, narrowing apically and then recurving laterally. Base of hydrotheca flat with circular foramen; abcauline wall straight to slightly concave; adcauline wall smoothly rounded basally; adnate part about one-third total length; free part straight, slightly upturned apically. Free abcauline walls of hydrothecal pair almost perpendicular to stem or hydrocladial axis. Operculum a circular abcauline flap, occasionally renovated.

Gonothecae absent.

MEASUREMENTS of *Salacia macer* sp. nov. (in μm):

	NMNZ BS 886 slide 2995
Stem internode, length	1950 – 2995
Diameter	160 – 280
Stem hydrotheca, diameter across pair	975 – 1065
Length adnate adcauline wall	215 – 305
Length free adcauline wall	370 – 410
Length abcauline wall	325 – 370
Maximum diameter	305 – 325
Diameter at rim	215 – 240
Hydrocladial internode, length	1510 – 1995
Diameter	110 – 130
Hydrocladial hydrotheca, diameter across pair	1125 – 1170
Length adnate adcauline wall	195 – 215
Length free adcauline wall	455 – 500
Length abcauline wall	370 – 410
Maximum diameter	260 – 280
Diameter at rim	240 – 260

REMARKS: This species comes nearest to *Salacia sibogae* Billard, 1924a (: 64, fig. 1B, C; 1925b: 206, text-fig. 49, pl. 8, fig. 30) but differs by arrangement and shape of the hydrothecae. Though in *S. sibogae* the hydrothecae are also arranged in pairs, these pairs are not frontal and the members of a pair do not touch. The hydrothecae of *S. sibogae* are slenderer, with a comparatively long free part. The internodes of the hydrocladia (and probably also of the stem) are separated by straight nodes in *S. macer* sp. nov.; the oblique hinge-joints between the internodes in that species are highly characteristic.

DISTRIBUTION: Known only from the type locality: 32°35.3′–32°34.0′ S, 167°41.8′–167°39.0′ E, Wanganella Bank, Norfolk Ridge, E slope, 437–422 m.

ETYMOLOGY: Specific name derived from the Latin adjective '*macer*', meaning lean, thin, indicating the slender habit of the colonies.

Sertularella Gray, 1848

TYPE SPECIES: *Sertularia polyzonias* Linnaeus, 1758.

For a survey of the species in this genus see Vervoort (1993a: 189–193). To that list should be added:

Sertularella acutidentata profunda Vervoort, 1993a
Sertularella anguina Vervoort, 1993a
Sertularella billardi Vervoort, 1993a
Sertularella bipectinata Vervoort, 1993a
Sertularella helenae Vervoort, 1993a
Sertularella leiocarpoides Vervoort, 1993a
Sertularella novaecaledoniae Vervoort, 1993a
Sertularella paucicostata Vervoort, 1993a
Sertularella pseudocostata Vervoort, 1993a

Sertularella acutidentata acutidentata Billard, 1919 (Fig. 35B–E)

Sertularella acutidentata Billard 1919: 20, figs IE, II; 1925b: 148–149, text-fig. 18, pl. 7, fig. 8; van Soest 1976: 82; Vervoort 1993a: 189; Hirohito 1995 (English text): 188–189, fig. 61a, b.
Sertularella acutidentata acutidentata: Vervoort 1993a: 193–196, figs 38c-e, 39b, tab. 27.
Sertularella philippensis Hargitt 1924: 496, pl. 6, fig. 22; Nutting 1927: 217.

MATERIAL EXAMINED:

NZOI Stn J680: Several small, about 35 mm high stems on *Lytocarpia chiltoni* (Bale, 1924), together with *Filellum serratum* (Clarke, 1879). RMNH-Coel. slides 2258, 2259 and 3546.

NMNZ: BS 886: Single colony with gonothecae on stem of *Lytocarpia rigida* sp. nov. NMNZ Co.522; 2 RMNH-Coel. slides 3646.

TYPE LOCALITY: *Sertularella a. acutidentata*: Sapeh Strait, between the islands Sumbawa and Komodo, Indonesia, 08°23.5′ S, 119°04.6′ E, 69 m (*Siboga* Stn 49a) (Billard 1919, 1925b; syntypes in ZMA, ZMA Coel. 3963, van Soest, 1976). *Sertularella philippensis*: several stations in the Philippine seas, no exact type locality indicated (Hargitt 1924; location of type unknown).

DESCRIPTION (of all material): Colonies epizootic on *Lytocarpia subdichotoma* (Ralph, 1961) and *Lytocarpia rigida* sp. nov., being attached to the stem of the host by means of a thin stolonal fibre. The specimen from BS 886 is weakly polysiphonic basally. Stem up to 25 mm long, composed of internodes separated by oblique nodes sometimes quite obscure in lower parts of stem. Stem internodes with 3 alkternate frontal hydrothecae, and pointing obliquely laterally, particularly on the youngest parts, in older parts in 1 plane. Side branches pinnate, pointing alternately left and right, springing from stem internodes directly under the upper hydrotheca, divided into internodes by oblique nodes; basal internode much longer than succeeding internodes. Upper portion of some internodes with wrinkled perisarc that may sometimes create the impression of rings.

Hydrothecae of stem and branches identical, fairly big and widening from base, swollen in distal third, free portion of hydrotheca of moderate length. Adcauline hydrothecal wall smoothly curved, basally with thickened, curved notch, length of free portion about one-fifth to one-half of adnate part. Distal internodal hydrotheca with basal side branch may be more strongly curved, with a longer free portion and with the basal part of the adcauline wall strongly thickened. Abcauline wall concave, usually with indentation some distance under rim. Hydrothecal base open. Hydrothecal rim with 4 rather acute cusps, 1 adcauline, 1 abcauline and 2 lateral. Development of cusps varied and subject to abrasion. Operculum composed of 4 hyaline flaps, deciduous in many hydrothecae, forming a low, pointed roof in well preserved hydrothecae.

Remnants of hydranths with large abcauline caecum visible in specimens from both stations.

Perisarc fairly thick but apparently rather weak on hydrotheca as many are creased. The hydrothecal rim stains more heavily than the rest of the hydrotheca, indicating thickened perisarc.

Female gonothecae, present in specimen from BS 886, are long, cylindrical, gradually widening from base onward, inserting at the base of stem or hydrocladial hydrothecae. Apex with a circular aperture , slightly depressed and surrounded by 3 obtuse cusps with notably thickened perisarc closed by an operculum. Gonophore with 2 developing eggs.

REMARKS: This material agrees with Billard's description. Some of the internodes have the 'ringed' condition commented upon by Billard; they also agree in the characteristic shape of gonotheca. In the New Caledonian material the hydrothecal cusps are better preserved and the operculum is more visible. The New Zealand specimens, all epizootic, may be considerably worn.

RECORDS FROM NEW ZEALAND: Recorded here from two stations in the Pacific north of New Zealand, depth 328–437 m; gonothecae were observed in January; Billard's type specimen, with gonothecae, was collected in April.

DISTRIBUTION: So far known only from Indonesian waters, Sapeh Strait and Madura Bay near the Island Flores (Billard 1925b) and from the Pacific southeast of New Caledonia (Vervoort 1993a).

MEASUREMENTS of *Sertularella acutidentata acutidentata* (in μm):

	Siboga Exp. (Billard 1925b)	New Caledonia (Vervoort, 1993a)	NZOI Stn J680 slide 3546	NMNZ BS 886 slide 3646
Stem, diameter at base	165 – 345	445	530	725
Hydrocladium, diameter at apophysis		190 – 205	185 – 220	275 – 295
Axillary hydrotheca, length abcauline wall		375 – 445	290 – 335	370 – 405
Length free adcauline wall		85 – 220	90 – 110	50 – 55
Length adnate adcauline wall		390 – 445	465 – 520	575 – 590
Total depth		540 – 555	530 – 545	590 – 595
Diameter at rim		230 – 260	205 – 230	260 – 275
Maximum diameter		245 – 265	205 – 250	275 – 295
Hydrocladial hydrotheca, length abcauline wall		505 – 615	405 – 480	about 480
Length free adcauline wall		185 – 335	80 – 140	35 – 75
Length adnate adcauline wall		440 – 605	460 – 510	520 – 630
Total depth		590 – 675	480 – 520	615 – 630
Diameter at rim		295 – 375	220 – 260	295 – 305
Maximal diameter		310 – 400	275 – 320	355 – 370
Gonotheca, length	2000 – 2400			4340 – 4450
Diameter	690 – 875			825 – 1040

Sertularella areyi Nutting, 1904 (Fig. 35F–I)

Sertularella areyi Nutting 1904: 83, pl. 17, fig. 6; Hirohito 1983: 44; Cairns *et al.* 1991: 26; Park 1992: 291; Vervoort 1993a: 189, 201–203, fig. 41c-g, tab. 30 (*cum syn.*); Hirohito 1995 (English text): 190, fig. 61c-e.
Sertularella annulaventricosa Mulder & Trebilcock 1915: 54, pl. 7, fig. 1, pl. 8, fig. 4; Stranks, 1993: 15.
Sertularella undulata Bale 1915: 284, pl. 46, fig. 1; Stranks 1993: 19.
Sertularella tricincta Billard 1939: 248–250, fig. 1; van Soest 1976: 84.
Sertularella capensis delicata Millard 1964: 38, fig. 12B–D.

Material Examined:

NZOI Stns: E136, dispersed small colonies epizootic on *Sertularia unguiculata* Busk, 1852; no gonothecae; **P34**, numerous colonies with gonothecae, up to 15 mm high, epizootic on *Synthecium protectum* Jäderholm, 1903. 2 RMNH-Coel. slides 2226.

NMNZ: BS 886, many colonies epizootic on *Gigantotheca maxima* sp. nov. and bryozoans. No gonothecae. NMNZ Co. 514; 2 RMNH-Coel. slides 2999.

Type Locality: *Sertularella areyi*: Off Havana, Cuba (Nutting 1904; type in NMNH,). *Sertularella annulaventricosa*: Queenscliff, Victoria, Australia (Mulder & Trebilcock 1915; syntype in MOV (MV F57995, two microslides (Stranks 1993)). *Sertularella undulata*: South Cape, Tasmania, 137 m (Bale 1915; holotype probably in MOV, MV F58331, one microslide (Stranks 1993)). *Sertularella tricincta*: *Siboga* Stn 257 Du-Roa Strait, Kai Islands, Indonesia, 52 m (Billard 1939; holotype in ZMA, ZMA Coel. 5203 (van Soest 1976)). *Sertularella capensis delicata*: Off the coast of Natal, 29°58′ S, 31°02′ E, holotype in SAM, SAMH 414 (Millard 1964).

Remarks: This species has recently been re-described from New Caledonia material (Vervoort 1993a); the present material, clearly belonging to this species, sheds some more light on its considerable variability. The species seems to occur chiefly on bigger hydroids, the thin stolon attaching itself loosely to the stem of the host. Stems rising from stolon may reach a height of about 15 mm; no branching occurs in the present material. The colonies from south of Norfolk Island most closely resemble the New Caledonian material; the hydrothecae have two distinct circular annulations with a thin, ragged frill. The hydrothecal rim is distinctly thickened and provided with four low, rounded cusps. The opercular plates are conspicuous and fold lengthwise when operculum closes. The gonothecae, occurring plentifully, have seven circular, flanged ribs; the flange being fairly broad on ribs three to five diminishing in width basally and apically. Aperture with three strong, blunt cusps with thick perisarc; no opercular plates; the apparently female gonothecae contain one or two eggs or developing planulae that are released through a central hole in the flattened apex.

In the Wanganella Bank specimens the internodes are greatly lengthened and there are five circular rings on the hydrothecae; all are very prominent and the flanges stand out like disks. The hydrothecae generally more cylindrical, with the apical part only slightly contracted. The hydrothecal rim is considerably thickened and the folded opercular plates quite prominent. The flanges on the hydrothecae are unambiguously circular and not spiral (as in many species of *Symplectoscyphus*). No gonothecae were found in the Wanganella Bank material.

Measurements of *Sertularella areyi* (in μm):

	New Caledonia (Vervoort 1993a)	NZOI Stn P34 slide 2226	NMNZ BS 886 slide 2999
Primary internode, length	295 – 1110	215 – 760	435 – 650
Diameter	110 – 115	130 – 175	110 – 150
Secondary and following internodes, length	775 – 850	715 – 1195	1400 – 2175
Diameter	125 – 160	150 – 175	130 – 195
Hydrotheca, length abcauline wall	520 – 575	735 – 800	825 – 865
Length free adcauline wall	295 – 370	500 – 540	650 – 750
Length adnatead cauline wall	295 – 355	435 – 520	325 – 340
Total depth	555 – 630	865 – 950	860 – 900
Diameter at rim	275 – 415	500 – 540	605 – 650
Maximum diameter	355 – 415	500 – 540	605 – 650
Male gonotheca, total length	1260 – 1410		
Maximum diameter	650 – 695		
Distance between apices of prongs	300 – 410		
Female gonotheca, total length		1800 – 1890	
Maximum diameter		930 – 1050	
Distance between apices of spines		370 – 435	

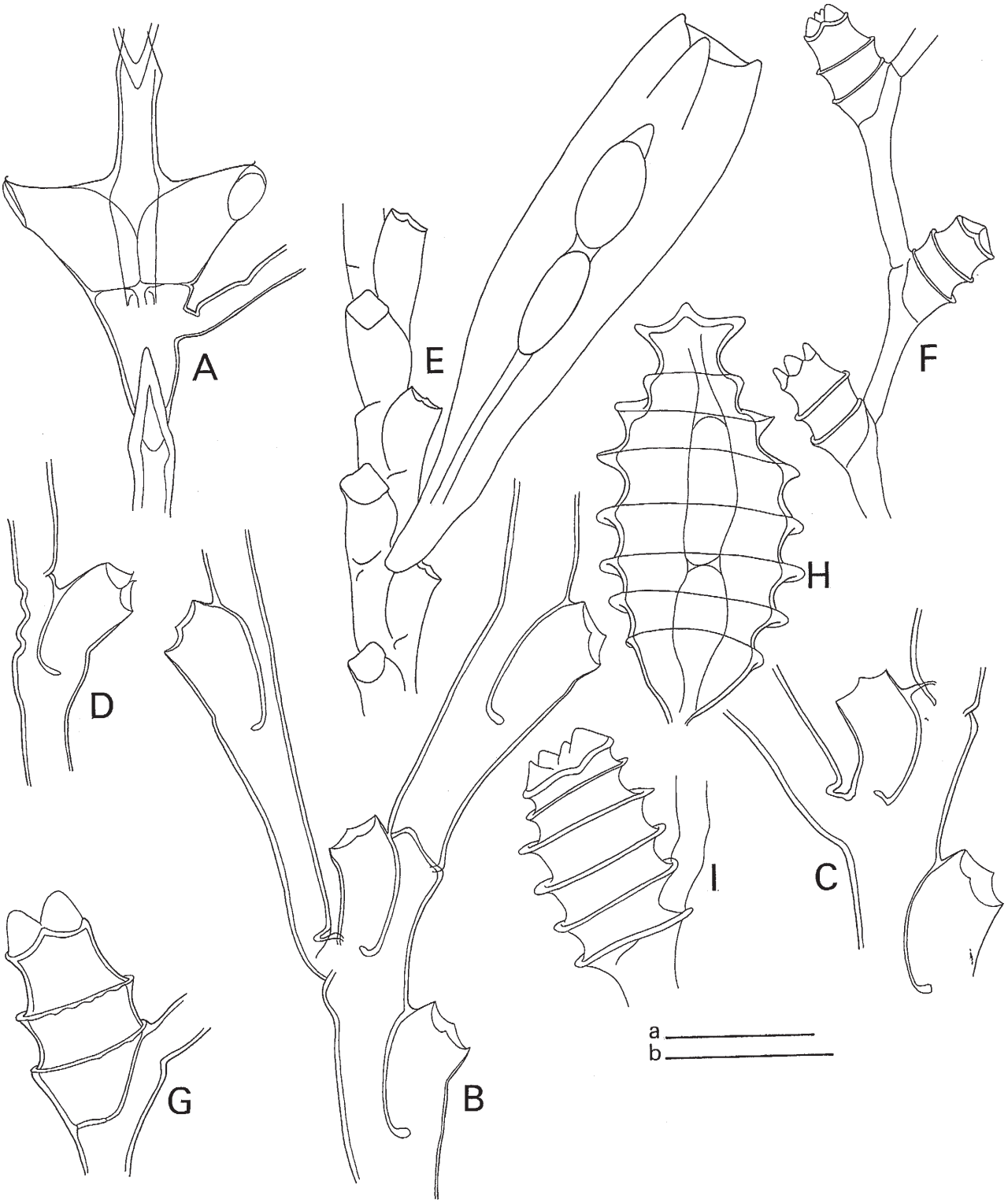

Fig. 35. A. ***Salacia macer*** sp. nov., pair of proximal stem hydrothecae (BS 886, holotype, slide 2995). **B-E.** ***Sertularella acutidentata acutidentata*** Billard, 1919. **B**, part of stem with hydrocladium. **C**, axillary stem hydrotheca. **D**, hydrocladial hydrotheca. **E**, female gonotheca (BS 886, slide 3646). **F–I.** ***Sertularella areyi*** Nutting, 1904. **F**, part of stem. **G**, stem hydrotheca. **H**, female gonotheca. **I**, stem hydrotheca. (F–H, NZOI Stn P34, slide 2226; I, BS 886, slide 2999). Scales: a, 1 mm (A-D, G-I); b, 1 mm (E, F). W.V.

Records from New Zealand: So far known from three localities in the New Zealand region, viz., south of Norfolk Island, about 29 S, 167 E, 370 m; Wanganella Bank 32.5° S, 167.5° E, 437–422 m, and Chatham Shelf, 44° S, 176° W, 60 m. Gonothecae were found in January.

Distribution: Tropical and subtropical parts of Atlantic, Indian, and Pacific Oceans: Caribbean, Brazilian waters, coast of Natal, east coast of Australia, Tasmania, Korea, Japanese waters, New Caledonia (Vervoort 1993a; Hirohito 1995).

Sertularella crassiuscula Bale, 1924 (Fig. 36A–F)

Sertularella solidula: Hartlaub 1901a: 71–72, pl. 4, figs 3, 13–14, 27; 1901b: 371–372 [not *Sertularella solidula* Bale, 1882].
Sertularella crassiuscula Bale 1924: 240–242, fig. 8; Stechow 1926: 105; Trebilcock 1928: 13; Kulka 1950: 80, fig. 5a, b; Ralph 1961a: 823–824, fig. 21h-n; 1961d: 236; Morton & Miller 1973: 152, fig. 54 no. 1; Gordon & Ballantine 1977: 100; Dawson 1992: 19; Vervoort 1993a: 189; Stranks 1993: 15.

Material Examined:

NMNZ: Petone Beach, Wellington, 24 Aug.1970: Numerous colonies 10–20 mm high, each stem unbranched and each with single empty gonotheca. NMNZ Co.467; 3 RMNH-Coel. slides 2980.

NMNZ Ralph Collection: Loc. 15, NMNZ Co.890, about 10 colonies up to 10 mm high on algae, with some shrivelled empty gonothecae. Dead specimens with growth of diatoms. RMNH-Coel. slide 3589. With *Plumularia setacea* (Linnaeus, 1758); **Loc. 18**, good slide in RSC as *Sertularella crassiuscula*, no data; **Loc. 102**, NMNZ Co.957, 4 colonies, highest about 4 mm; 1 empty gonotheca. RMNH-Coel. slide 3649; **Loc. 112**, NMNZ Co.967, 3 detached stems, 2, 4, and 7 mm long; no gonothecae. RMNH-Coel. slide 3655. Reasonable slide in RSC, as *Sertularella crassiuscula*, with data: Bay of Islands; **Loc. 117**, NMNZ Co. 972, several detached stems, some with empty gonothecae. RMNH-Coel. slide 3659. Good slide in RSC as *Sertularella crassiuscula*, no data; **Loc. 141**, NMNZ Co.993, 6 stems up to 15 mm high rising from fragments of stolon; 1 empty gonotheca observed. RMNH-Coel. slide 3670. Good slide in RSC as *Sertularella crassiuscula*, no data; **Loc. 151**, NMNZ Co.1011, about 10 stems up to 15 mm high arising from detached stolon. Hydrothecae with remnants of tissue; some gonothecae present, containing egg or developing planula. RMNH-Coel. slide 3675. Poor slide in RSC as *Sertularella crassiuscula*, no data. On label: long internode; **Loc. 327**, NMNZ Co.1160, many stems arising from a stolon creeping on algae, 8–10 mm high, with some empty gonothecae. No tissue left, dead material. RMNH-Coel. slide 3837; **Loc. 488**, NMNZ Co.1234, young colonies up to 5 mm high and primary hydrothecae arising directly from stolon on algae. No gonothecae; hydranths well preserved; operculum complete. RMNH-Coel. slide 3913; **Loc. 500**, NMNZ Co.1237, fair number of stems on algae and detached, unbranched stems up to 15 mm high, with gonothecae containing tissue. RMNH-Coel. slide 3916. Poor slide in RSC as *Sertularella crassiuscula*, no data. On slide: large hydrothecae, longish internodes; **Loc. 563**, NMNZ Co.1272, fair number of about 10 mm high stems rising from a stolon reptant on brown alga. Gonothecae present, as hydrothecae with remnants of tissue. RMNH-Coel. slide 3947. Partly dried out slide in RSC as *Sertularella grossiuscula*, no data. On label: long internodes; **Loc. 673**, good slide in RSC as *Sertularella crassiuscula*, no data; **Loc. 675**, good slide in RSC as *Sertularella crassiuscula*, no data; **Loc. 676**, poor slide in RSC as *Sertularella crassiuscula*, with data: Gt. Barrier, 11.50, Se4, Kulka; **Loc. 677**, poor slide in RSC as *Sertularella crassiuscula*, with data: St Heliers, Kulka, 3.6.1950, Se2, excellent.

Type Locality: New Zealand, no further specifications, holotype in Hincks's collection, NHM. Two probable syntypes in MOV mentioned by Stranks (1993): Akaroa, New Zealand (Chilton collection, MV F58223, one microslide) and North Island, New Zealand (from Hincks's collection in MOV, MV F58786).

Description: Erect stems 15–20 mm high, arising from stolon reptant on algae and lamellibranchs in littoral zone, usually unbranched, although 2 or 3 short side branches may occur. Internodes, with exception of first, short, typically curved and stems as a result geniculate. First internode distinctly ringed basally at junction with stolon. Specimens with almost straight, slightly longer internodes may occur; stem in such specimens almost straight. Internodes separated by distinct nodes, obliquely sloping in alternate directions. Typically free wall of internodes, node and free portion of adcauline hydrothecal wall form a smooth curve, less distinctly so in specimens with longer internodes. Abcauline wall of hydrotheca straight except for submarginal contraction of varied development, continuous with wall of internode; basal part of internode may have a partly developed ring. Hydrotheca distinctly swollen in basal half, narrowing apically, diverging from internode at an angle of about 60°; hydrotheca adnate for about half adcauline wall or less. Hydrothecal rim with 4 low, rounded cusps; internally 3 large, fairly deep plate-shaped teeth, 1 below abcauline marginal cusp, 1 in each of the embayments besides adcauline marginal cusps. Perisarc of internodes and hydrothecae firm and thick, hydrothecal rim thickened, degree of thickening variable, probably depending upon exposure to wave action. In colonies with particularly strong perisarc 2 additional teeth are visible inside thydrotheca, 1 below each of the lateral marginal cusps. Operculum only visible in young hydrothecae, composed of 4 triangular flaps attached in embayments between the marginal cusps, when closed forming a high, pointed, roof-shaped structure. Opercular plates shed from older hydrothecae; 1 or 2 renovations of the hydrothecal rim observed. Live material is scarce in the collection (Ralph's collection no. 488 from the intertidal at Russell); the hydranth is fairly big, has about 12 tentacles and a large abcauline caecum.

MEASUREMENTS of *Sertularella crassiuscula* (in μm):

	New Zealand (Ralph 1961a)	Ralph's Loc. 151 slide 3675
Stem internode, length	380 – 630	715 – 865
Diameter	310 – 375	195 – 215
Hydrotheca, length adnate adcauline wall	250 – 300	410 – 435
Length free adcauline wall	200 – 400	435 – 540
Diameter at rim	200 – 230	300 – 325
Length abcauline wall	400 – 450	540 – 550
Maximum diameter	300 – 400	435 – 475
Total depth		715 – 760
Gonotheca, total length	1800 – 2000	2500 – 2560
Greatest diameter	1000 – 1500	1365 – 1400
Diameter at end	350 – 470	450 – 460

Gonotheca large, elongate ovoid, 1 per stem, attached to 1 of basal internodes by means of short, smooth pedicel. Surface of gonotheca with 3 or 4 indistinct, ring-shaped depressions; apex of gonotheca slightly depressed with 3 or 4 low, rounded elevations surrounding a circular opening. Gonothecae female, containing a large, ovoid egg or developing planula.

REMARKS: Ralph (1961: 823) suspected a correlation between size of hydrotheca and length of internode with geographical range, the specimens from the northern limit of its range having smaller hydrothecae and smaller internodes; from the Cook Strait area southwards they would become taller with bigger hydrothecae. Specimens from Port Hutt on the Chatham Islands, however, proved to have small hydrothecae and short internodes. It seems more reasonable to suppose a correlation with wave action: specimens from exposed sites being dwarfed with small, strongly sclerotised hydrothecae and short, curved internodes.

The material from Ralph's collection no. 102 (Old Museum collection, locality unknown) is only hesitantly assigned to this species. It is very fragmentary, the hydrothecae have rather flared margins and sharp marginal cusps; the (single) gonotheca has two small terminal prongs.

RECORDS FROM NEW ZEALAND: Occurring on algae and lamellibranchs in the littoral and sublittoral zone. The many records listed by Ralph and (partly) represented in the present collection suggest that the species occurs all around New Zealand proper, including the Chatham Islands. Frequent on drifted algae. Live gonothecae observed in September.

DISTRIBUTION: Endemic to New Zealand; a wider distribution may be expected because of its occurrence on drifting algae.

Sertularella diaphana (Allman, 1885) (Fig. 36G, H)

Thuiaria distans Allman 1877: 27, pl. 17, figs 1–2 [=*Sertularella distans* (Allman, 1877), not *Sertularella distans* (Lamouroux, 1816)].
Thuiaria pinnata Allman 1877: 28, pl. 15, figs 1-2 [= *Sertularella pinnata* (Allman, 1877), not *Sertularella pinnata* Clark, 1877: 211, 226, pl. 12, figs 28-29)].
Thuiaria diaphana Allman 1885: 145–146, pl. 18, figs 1–3.
Thuiaria hyalina Allman 1888: 69–70, pl. 33, figs 2, 2a.
Sertularella distans: Hartlaub 1901a: 100.
Sertularella pinnigera Hartlaub 1901a: 113, footnote 1 [= *Thuiaria pinnata* Allman, 1877].
Sertularella lata Nutting 1904: 85–86, pl. 18 fig. 10 [= *Thuiaria hyalina* Allman, 1888; not *Sertularella lata* (Bale, 1882)].
Sertularella torreyi Nutting 1905: 934, 949, pl. 4, fig. 4, pl. 11, figs 2–3.
Sertularella speciosa Congdon 1907: 463, 476–479, figs 24–28.
Sertularella diaphana: Bale 1919: 337, pl. 16, fig. 5; Vervoort, 1993a: 214–216, figs 45d-e, 46d (*cum syn*.).
Sertularella delicata Billard 1919: 21, fig. IIIA; van Soest, 1976: 83.
Sertularella diaphana var. *delicata* Billard1925b: 161–162, text-fig. 24, pl. 7, fig. 14.
Sertularella sargassi Stechow 1920: 37; 1923d: 179 [= *Thuiaria distans* Allman, 1877].
Thuiaria quadrilateralis Hargitt 1924: 493–494, pl. 5, fig. 17.
Sertularella diaphana var. *orthogona* Billard 1925b: 161, fig. 23; van Soest 1976: 83.

MATERIAL EXAMINED:
NZOI Stn K801: Colony of 4 plumes connected by stolonal fibres, of which 2 about 60 mm, 2 of 35 mm; no gonothecae. RMNH-Coel. slide 2892.

TYPE LOCALITY: *Thuiaria distans*: Tortugas, shallow water (Allman 1877; type in MCZ). *Thuiaria pinnata*: Double-headed Shot Key, Tortugas, 5.5–7 m (Allman 1877; type in MCZ). *Thuiaria diaphana*: Moreton Bay, Queensland, Australia (Allman 1885; type probably in NHM). *Thuiaria hyalina*: *Challenger* Stn 126, south of Permanbuco, 10°46′ S, 36°02′ W, 1408 m (Allman 1888; type in NHM). *Sertularella torreyi*: *Albatross* Stn 3949, south coast of island Molokai, Hawaiian Islands, 128 m (Nutting 1905, syntype in NMNH, 22152). *Sertularella speciosa*: underground passage connecting Harrington Sound and Castle Harbour, Bermuda, 32°20′30″ N, 64°42′10″ W (Congdon 1907; location of type unknown). *Sertularella delicata*: *Siboga* Stn 78, Lumu-Lumu, Borneo Banc, Makassar Strait, 34 m, on *Lytocarpia brevirostris* (Busk, 1852) (Billard 1919, 1925; syntypes in ZMA, ZMA Coel. 3951, van Soest 1976). *Thuiaria quadrilateralis*: No accurate locality besides a station number given, Philippine Seas (Hargitt 1924; syntypes, two slides, in NMNH, 42650). *Sertularella diaphana* var. *orthogona*: *Siboga* Stn 105, near Sulu Islands, 06°08′ N, 121°19′ E, 275 m (Billard 1925; holotype in ZMA, ZMA Coel. 3950; van Soest 1976).

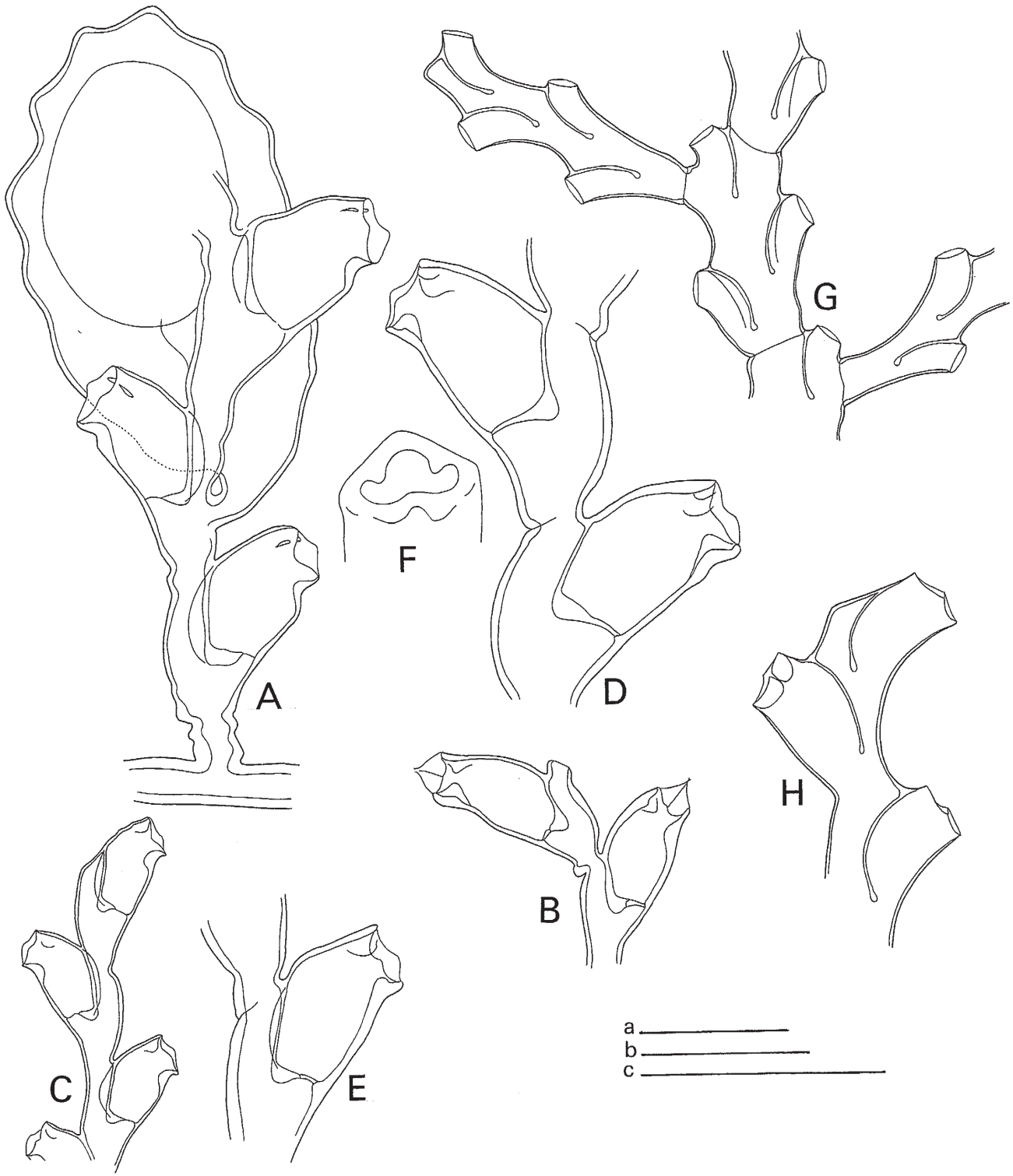

Fig. 36. A–F. ***Sertularella crassiuscula*** Bale, 1924. **A**, part of colony with female gonotheca (Loc. 151, slide 3675). **B**, part of stem with two stem hydrothecae (Loc. 488, slide 3913). **C**, part of stem. **D**, two stem hydrothecae from proximal part of stem. **E**, stem hydrotheca from distal part of stem. **F**, hydrothecal aperture, frontal view (NMNZ, Petone Beach, slide 2980). **G, H.** ***Sertularella diaphana*** (Allman, 1885). **G**, part of stem with two hydrocladia. **H**, hydrocladial hydrothecae (NZOI Stn K801, slide 2892). Scales: a, 1 mm (A, B, D, E, H); b, 1 mm (C, G); c, 0.5 mm (F). W.V.

DESCRIPTION: Colony comprising 4 flattened plumes, each composed of a monosiphonic stem with alternate, 8–20 mm long hydrocladia; stem and hydrocladia with biseriate, almost fully immersed, alternate hydrothecae. Axis divided into internodes separated by distinct, oblique nodes; each internode with 3 hydrothecae of which 1, the upper, axillary, 1 on opposite side, and 1 basally on side of small apophysis supporting the hydrocladium. Hydrocladia thin, almost geniculate, with an occasional node.

Hydrothecae of stem and hydrocladia similar, curved cylindrical, slightly widened in middle region, narrowing towards base, fully open basally as no diaphragm observed. Adcauline wall almost fully adnate, a fraction only being free; base of fused adcauline wall with rounded knob of perisarc. Rim of youngest hydrothecae with 4 low, sharp cusps, 2 lateral, 1 adcauline and 1 abcauline; these hydrothecae also with operculum composed of 4 triangular flaps attached in embayments between marginal cusps. In older hydrothecae apertural cusps and opercular flaps are absent leaving a circular and smooth rim; plane of aperture inclined downwards, at an angle of about 30° to stem or hydrocladial length axis.

Perisarc fairly thin and fragile; several hydrothecae collapsed. Remnants of hydranths mostly obscured by dirt adhering to the colony.

No gonothecae or attachment cicatrices observed.

REMARKS: Although this material is very dirty the arrangement and shape of the hydrothecae in younger parts of the colony leave no doubt about its identity.

MEASUREMENTS of *Sertularella diaphana* (in μm):

	New Caledonia (Vervoort 1993a)	NZOI Stn K801 slide 2892
Stem internode, length	1325 – 1625	2060 – 2495
Diameter	350 – 430	585 – 630
Axillary hydrotheca, length		
abcauline wall	190 – 275	250 – 260
Length free adcauline wall	30 – 75	60 – 65
Length adnate adcauline wall	385 – 445	670 – 735
Total depth	400 – 445	675 – 740
Diameter at apex	215 – 230	280 – 305
Maximum diameter	235 – 260	325 – 370
Hydrocladial hydrotheca, length abcauline wall	290 – 320	435 – 475
Length free adcauline wall	30 – 65	85 – 105
Length adnate adcauline wall	360 – 435	540 – 650
Total depth	370 – 445	715 – 735
Diameter at apex	205 – 260	305 – 370
Maximum diameter	265 – 280	345 – 390

The New Zealand material is consistently larger than the New Caledonian, this being smaller than that from the waters of the Malay Archipelago recorded by Billard (1925b).

RECORDS FROM NEW ZEALAND: Observed only at the Colville Ridge, 29°14.70′ S, 177°51.70′ W, 18 m.

DISTRIBUTION: World wide in tropical and subtropical seas. Recorded from New Caledonia and the northern part of the Norfolk Ridge (Vervoort 1993a).

Sertularella exigua Thompson, 1879

Sertularella exigua Thompson 1879: 101, pl. 16, fig. 3; Ralph 1961a: 831, fig. 24a; Dawson 1992: 20; Vervoort 1993a: 190.

TYPE LOCALITY: New Zealand, no exact locality (Thompson 1879; location of type unknown).

REMARKS: This species, which has never been rediscovered since the original description by Thompson, is discussed by Ralph (1961a) who pointed out that it is evidently closely related to *Sertularella simplex* (Hutton, 1873), from which species it is kept separate because no submarginal intrathecal cusps were described by Thompson.

Sertularella fuegonensis El Beshbeeshy, 1991

(Fig. 37A, B)

Sertularella picta: Vervoort 1972a: 114–116, fig. 35a, b (not figs 34, 35c = *Sertularella picta* (Meyen, 1834)).
Sertularella fuegonensis El Beshbeeshy 1991: 163–167, fig. 41a-d.

MATERIAL EXAMINED:
NZOI Stn A695: Fragmentary dried out colony in poor condition isolated from sample with algae and hydroids. RMNH-Coel. slide 2706.

TYPE LOCALITY: Atlantic off the southern part of South America, roughly between 41.5° and 52.5° S, 58.5°–68° W, 48–610 m; no distinct type locality being indicated. The syntype material, from nine stations of the 'Walter Herwig' expedition, is in the Zoological Museum of the University of Hamburg, Germany. Slide of Vervoort's material of *Sertularella picta* referred to by El Beshbeeshy (1991) is in NNM.

DESCRIPTION: Colony erect and flexuous, composed of monosiphonic main stem and irregularly placed, upwardly directed side branches. Stem and branches

MEASUREMENTS of *Sertularella fuegonensis* (in μm):

	Vema Stn 14–14 (Vervoort 1972a)	Southern Atlantic (El Beshbeeshy 1991)	NZOI Stn A695 slide 2706
Stem internode, length	475 – 540	452 – 556	820 – 1065
Diameter at node	175	145 – 185	130 – 165
Hydrotheca, length abcauline wall	420 – 485	417 – 493	510 – 575
Length free adcauline wall	390 – 425	382 – 429	395 – 425
Length adnate adcauline wall	230 – 245	226 – 243	280 – 330
Diameter at rim	190 – 215	185 – 220	195 – 230
Maximum diameter			295 – 330

made up of slender, generally short internodes, separated by oblique nodes, sloping in alternate directions; first internode of side branch much longer, springing from internode of main stem directly under hydrotheca. Hydrothecae at distal end of internodes, diverging at an angle of about 60°, biseriate and in same plane with stem, distinctly swollen in proximal half, narrowing towards rim; just below rim a marked constriction. Adnate adcauline wall shorter than free part; plane of hydrothecal aperture not quite perpendicular to hydrothecal length axis but slightly tilted adcaudally. Free part of both adcauline and abcauline walls undulated, most marked on adcauline side; no distinct ribs present. Hydrothecal rim with 4 rather blunt cusps, 1 adcauline, 1 abcauline and 2 lateral; cusp on abcauline side typically larger. Operculum incomplete in all hydrothecae inspected, but apparently composed of 4 triangular plates fitted into embayments between marginal cusps and when closed forming a low roof. No submarginal intrathecal cusps observed (see also under Remarks). Closely packed renovations of hydrothecal margin sometimes present. Rim of hydrotheca thickened, particularly in renovated hydrothecae.

No gonothecae present.

REMARKS: This material agrees best with El Beshbeeshy's description of *Sertularella fuegonensis*; this species is based on part of the material described by Vervoort (1972: 111–116) as *Sertularella picta* (Meyen, 1834) and on additional material from the southwest Atlantic. The slide of the *Vema* material to which El Beshbeeshy refers in his des-cription of *S. fuegonensis* present in the NNM collection, has been used for comparison and fits the description given above, with the exception of the length of the internodes; these may vary according to environmental conditions. The presence or absence of small intrathecal cusps in some of the older hydrothecae of the Vema 14–14 material could not be unambiguously demonstrated in the present material which was dead and covered with diatoms when collected. The presence of a Patagonian species in waters off New Zealand is not restricted to this species alone but has also been observed in others, as for instance *Acryptolaria patagonica* El Beshbeeshy, 1991.

RECORDS FROM NEW ZEALAND: Macquarie Ridge, south Tasman Sea, 54°36.40′ S, 158°57.00′ E, 91 m, southwest of South Island.

DISTRIBUTION: So far known only from several localities in the southern Atlantic off Patagonia, Argentina.

Sertularella gayi gayi (Lamouroux, 1821)

(Fig. 37C–J)

Sertularia gayi Lamouroux 1821: 12, pl. 6, figs 8–9.
Sertularella gayi: Bale 1915: 283; Hargitt 1924: 495, pl. 5, fig. 21; Vervoort 1966: 127, fig. 30; Hirohito 1969: 21, fig. 15; 1983: 44; Park 1990: 80; Dawson 1992: 20; Park 1992: 292.
Sertularella gayi f. *gayi*: Ralph 1961a: 833–834, fig. 24d-f.
?*Sertularella gayi*: Hirohito 1995, (English text): 192-194, fig. 63a, b.
Sertularella gayi gayi: Medel & Vervoort 1998: 40–45, figs 10–11 (*cum syn.*).

N.B. Indo-Pacific records mainly.

MATERIAL EXAMINED:

NZOI Stns: D145, about 30 mm high colony; no gonothecae; **D876**, 1 stem, about 60 mm high, with many hydrocladia. Hydrothecae with remnants of tissue; no gonothecae. 2 RMNH-Coel. slides 2288. With *Halecium delicatulum* Coughtrey, 1876b; **D889**, single colony, 70 mm high. Hydrothecae with remnants of tissue, no gonothecae. RMNH-Coel. slide 2293; **E140**, large colony or colonies, about 80 mm high or more, many fragments. No gonothecae; **M793**, large, bushy colony, profusely branched, about 180 mm high, thick polysiphonic stem. Colour brown. No gonothecae. Hydrothecae with tissue remnants and repeated renovations. 2 RMNH-Coel. slides 2899.

NMNZ: In crayfish pot off **Bench Islands**, 18 Nov.1955: Top part of colony, about 50 mm high. No gonothecae. NMNZ Co.491; 4.5 miles E. **Tory Channel**, 15 Aug.1963: 3 developing colonies on sponge, the largest with branches and 12 mm high. NMNZ Co.643; **Zone 2.25 F**, north Otago, J.G.O., Oct 1963:

Many developing colonies on worm tubes, 20–30 mm high; 1 large polysiphonic colony with thick main stem and covered with bryozoans. No gonothecae. NMNZ Co. 664; **BS 202**, 4 colonies up to 100 mm high and some fragments. No gonothecae. NMNZ Co.649; **BS 284**, branched colony, 60 mm high, no gonothecae; hydrothecae with tissue remnants. Densely covered with *Filellum* sp. NMNZ Co.456; 2 RMNH-Coel. slides 2974; **BS 480**, large colony, about 120 mm high and a much smaller colony. No gonothecae. NMNZ Co.412; **BS 486**, fragments of at least 4 colonies, up to 80 mm high, hydranths well preserved; no gonothecae. NMNZ Co.837; RMNH-Coel. slide 3515; **BS 488**, about 10 branched colonies up to 100 mm high on shells, as well as many fragments. No gonothecae. NMNZ Col.485; **BS 561**, 5 colonies on stylasterids and some fragments up to 70 mm high, no gonothecae. NMNZ Co.674; **BS 630**, large, branched colony, 90 x 60 mm, no gonothecae; many smaller colonies. NMNZ Co.423.

NMNZ Ralph Collection: Loc. 31, NMNZ Co.901, dead specimen with diatoms on in- and outside of hydrothecae. RMNH-Coel slide 3598; **Loc. 277**, NMNZ Co.1124, 2 fragments between algae. RMNH-Coel. slide 3803; **Loc. 406** NMNZ Co.1196, fragments of large colony, consisting of part of thick main stem and top part, as well as many fragments, hydrothecae with tissue remnants; no gonothecae. RMNH-Coel. slide 3878; **Loc. 489**, NMNZ Co.1235 (registered as 489. However, this is 699), fragments of large colony, stem fragments about 3 mm diameter, hydrothecae with remnants of tissue. Many gonothecae. RMNH-Coel. slide 3914. Completely covered with *Orthopyxis mollis* (Stechow, 1919), with abundant gonothecae. Slide with unreadable indications in RSC.; **Loc. 561**, NMNZ Co.1270, completely fragmented large colony, largest part 30 mm long and basally about 1.5 mm thick. Hydrothecae empty; no gonothecae. RMNH-Coel. slide 3945. Good slide in RSC as *Sertularella intricata*; no data; **Loc. 599**, NMNZ Co.1308, fragmented colony several centimetres high with well preserved hydranths; no gonothecae. RMNH-Coel. slide 3987 of top part; **Loc. 605**, NMNZ Co.1314, 5 stems 25–30 mm high, largest with beginning of polysiphony; well preserved hydranths, no gonothecae. RMNH-Coel. slide 3995; **Loc. 699**, 2 good slides in RSC as *Sertularella gayi*; no data.

PMBS: Northern waters, New Zealand. Identified by: P.M. Ralph. (Taken from card register).

Material Inspected: **Mu 67–79**, sample consists of number of thick, polysiphonic, much branched stems. Hydrothecae big, with hydranths. Many gonothecae. RMNH-Coel. 27268, slide 2685; **Mu 67–80, Hyd. 15**: Material consists of strongly polysiphonic basal part of stem about 35 mm high. 4 hydrocladia attached and some detached, 1 of hydrocladia 50 mm long. Long hydrocladium bears some developing gonothecae and a nearly mature gonotheca. RMNH-Coel. 27252, slide 2669. Second sample contains slightly polysiphonic stem fragment and a few hydrocladia, 1 with developing gonothecae.

Additonal Material: **Doubtful Sound**, 20 m, 04 April. 1994, leg. J.E. Watson. about 30 mm high stem with some hydrocladia, mixed with *Symplectoscyphus j. johnstoni* (Gray, 1843). Polyps well preserved. RMNH-Coel. 27853, slide 4033 (slide only).

Type Locality: Passage de la Déroute, near Pirou, Channel coast of the Cotentin Peninsula, France.

Description: Typically large, bushy colonies, to 200 mm high, with strong, forked, polysiphonic stem with biseriate hydrothecae; hydrocladia to 40 mm long in irregularly alternate position along stem, inserting under stem hydrothecae. Division of monosiphonic parts of stem and of hydrocladia varied; nodes may be present, oblique, sloping in alternate directions, or only indicated by constrictions in perisarc; distance between hydrothecae highly variable; hydrothecate parts occasionally slightly geniculate. Hydrocladiate hydrothecae biseriate; hydrothecae fairly deeply immersed in internode, adnate adcauline wall usually longer than free part, but sometimes shorter even on same colony. Pocket in axil between free adcauline wall and wall of internode present or absent. Fused adcauline wall basally curved and thickened; diaphragm distinct and fairly wide. Abcauline wall merging smoothly into wall of internode, proximal part may be slightly tumified; a minor concavity typically occurring on abcaudal side just under hydrothecal rim. Free adcauline wall may have a slight 'shoulder' and may be ribbed, the corrugations continuing some distance abcaudally along wall of hydrotheca. Plane of hydrothecal aperture at an angle of about 30° with internodal long axis; rim with 4 low, equally developed cusps: 1 adcauline, 1 abcauline and 1 lateral on each side; embayments between shallow. Opercular plates triangular, attached in embayments of hydrothecal rim, when closed forming low roof. Renovations of hydrothecal rim and opercular plates may occur, sometimes in considerable numbers. Development of perisarc variable, strong to very strong, particularly along internodes, diminishing gradually along hydrothecal walls.

Gonotheca elongate ovoid, narrowing proximally into a short, curved pedicel attaching gonotheca to internode opposite hydrothecal base. Places of attachment of shed gonothecae indicated by circular foramen, secondary tubes communicate with internodes at same spot. Gonotheca with 3–8 indistinct, transverse ribs, gradually diminishing proximally. Apex of gonotheca with 3 equally developed, rounded, conical cusps.

Remarks: This polymorphic, near-cosmopolitan species is best characterised by the shape of its rugged, bushy colony with thick, forked stem and roughly alternate hydrocladia. The general shape of the hydrotheca is of low diagnostic value; hydrothecae on almost every colony differs in detail from those on others, particularly in development of corrugations or ribs on the dorsal surface. Submarginal intrathecal cusps, as far as we are

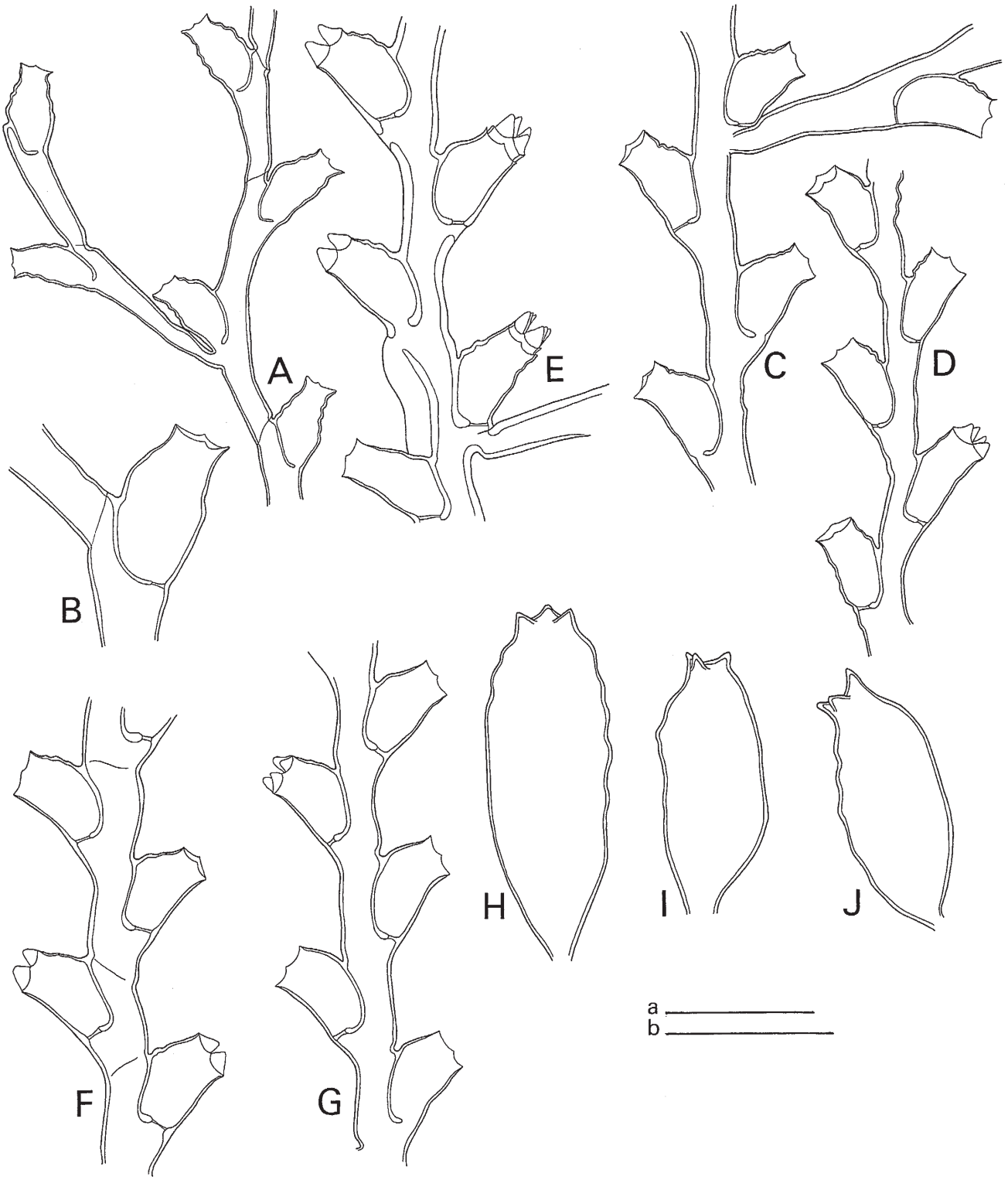

Fig. 37. A, B. ***Sertularella fuegonensis*** El Beshbeeshy, 1991. **A**, part of stem with branch. **B**, hydrotheca (NZOI Stn A695, slide 2706). **C–J.** ***Sertularella gayi gayi*** (Lamouroux, 1821). **C**, part of stem with branch (BS 284, slide 2974). **D–G**, parts of stem with hydrothecae. **H–J**, gonothecae (D, Loc. 406, slide 3878; E, G, PMBS, Mu 67-80, slide 2669; F, H–J, PMBS, Mu 67-79, slide 2685). Scales: a, 1 mm (B); b, 1 mm (A, C–I). W.V.

MEASUREMENTS of *Sertularella gayi gayi* (in μm):

	NW Atlantic (Ramil & Vervoort 1992a)	Mu 67–80 Hyd. 15 slide 2669	NMNZ BS 284 slide 2974
Hydrotheca, length abcauline wall	570 – 650	575 – 590	625 – 655
Length adnate adcauline wall	420 – 540	460 – 540	525 – 575
Length free adcauline wall	415 – 490	360 – 440	360 – 410
Total depth		670 – 740	740 – 770
Maximum diameter		425 – 475	375 – 475
Diameter at rim	270 – 320	310 – 360	295 – 310
Gonotheca, length, including cusps			
Maximum diameter			

	Ralph's loc. 406 slide 3878	Ralph's Loc. 561 slide 3945	Otago Peninsula slide 2685
Hydrotheca, length abcauline wall	625 – 640	575 – 640	605 – 640
Length adnate adcauline wall	510 – 525	490 – 575	510 – 555
Length free adcauline wall	330 – 360	410 – 425	280 – 385
Total depth	755 – 770	770 – 790	690 – 735
Maximum diameter	400 – 420	460 – 490	395 – 410
Diameter at rim	310 – 345	310 – 345	295 – 310
Gonotheca, length, including cusps	2050 – 2130*	2295 – 2460	
Maximum diameter	850 – 900*	950 – 986	

* = taken from slide 3914, Ralph's Loc. 489

aware, have never been seen in this species, in contradistinction to *Sertularella polyzonias* (Linnaeus, 1758) and *Sertularella geodiae* Totton, 1930, with which it could be confused. We do not consider the development and number of apertural cusps on the gonothecae to have any real taxonomic value. For further details on variability of this species we refer to Ramil and Vervoort (1992) and Medel and Vervoort (1998) where variability of a large Atlantic material of *S. gayi gayi* is discussed.

Gonothecae present in June.

RECORDS FROM NEW ZEALAND: Deeper waters of southern New Zealand, between 40° and 48.5° S, 167.5° E and 176° W, depth 58–366 m.

DISTRIBUTION: Widely distributed in the Atlantic Ocean, although apparently absent from Antarctic waters. Also recorded from the northern Pacific Ocean – Japanese and Korean waters (Hirohito 1969, 1983; Park 1990, 1992), doubtfully from the Philippines (Hargitt 1924) and equally doubtful from South African waters (Millard 1975). We have excluded Hirohito's (1995) records of this species as the figured specimens (fig. 63a, b) had submarginal intrathecal cusps while the free adcauline adcauline hydrothecal wall is much longer and much more strongly ribbed than occurs in specimens we have so far studied.

Sertularella geodiae Totton, 1930 (Fig. 38A–C)

Sertularella geodidae Totton 1930: 196–197, text-fig. 43, pl. 3, figs 7–8; Ralph 1961a: 831–833, fig. 24c, g; Dawson 1992: 20; Vervoort 1993a: 190, 216–218, figs 35c-d, 46e, 47a, tab. 35.

?*Sertularella geodiae*: Briggs 1938: 37; Naumov & Stepan'yants 1962: 86–87, fig. 10; Millard 1977a: 23–25, figs 6E–F; Stepan'yants 1979: 89–90, pl. 14, figs 4A, B; Branch & Williams 1993: 13.

[not *Sertularella geodiae*: Vervoort 1972: 120–123, fig. 37 (= *Sertularella hermanosensis* El Beshbeeshy, 1991)].

[not *Sertularella geodiae*: Blanco 1976: 39–42, pl. 3, figs 7–8 (= *Sertularella blanconae* El Beshbeeshy, 1991)].

MATERIAL EXAMINED:

NZOI Stns: J953, 1 colony 120 mm high; no gonothecae. RMNH-Coel. slide 2210; **J954**, single 120 mm high colony, forked, with thick, polysiphonic stem; no gonothecae.

TYPE LOCALITY: Seven miles east of North Cape, New Zealand, 128 m, *Terra Nova* Stn 96 (Totton 1930); holotype in NHM.

DESCRIPTION: Colony with thick, fascicled, up to 120 mm high, irregularly forked stem; hydrocladia up to 40 mm long, alternately arranged, resulting in irregularly pinnate colony. Hydrocladia originating from main stem directly under a hydrotheca; division of monosiphonic

MEASUREMENTS of *Sertularella geodiae* (in μm):

	New Zealand (Totton 1930)	New Caledonia (Vervoort 1993a)	NZOI Stn J953 slide 2210
Hydrocladial hydrotheca, length abcauline wall	600 – 700	650 – 715	740 – 785
Length free part adcauline wall	470 – 550	405 – 480	540 – 575
Length adnate part adcauline wall	680 – 760	515 – 540	705 – 770
Total depth		810 – 850	985 – 1030
Maximum diameter		445 – 470	555– 605
Diameter at rim	380 – 400	350 – 400	375– 425

parts of stem and hydrocladia into internodes indistinct, indicated by slight constrictions of perisarc and in stained slides by lightly coloured zone indicating weaker development of perisarc. Hydrocladium, especially in younger part, occasionally weakly geniculate.

Hydrothecae large, rather tumid; fused part of adcauline wall typically as long as or slightly longer free part, this part standing off almost perpendicularly from internode or stem, with well developed 'pocket' in axil between free adcauline wall and internode; free adcauline wall with slight 'shoulder' proximally. Fused adcauline wall basally with curved, rounded thickening; diaphragm wide. Hydrothecal aperture fairly wide, plane almost parallel to internodal long axis or at acute angle; rim with 4 low, sharp cusps, 2 lateral, 1 adcauline and 1 adcauline; embayments between shallow. Occasionally 3 small submarinal intrathecal cusps, 1 abcauline, 2 in embayments between adcauline cusp and laterals. Opercular plates hyaline, triangular, when closed forming a low roof; no renovations of hydrothecal rim or opercular plates observed. Perisarc thin for such a large species although there are few collapsed hydrothecae.

No gonothecae present.

REMARKS: We have restricted the synonymy of this species to records from northern New Zealand waters. Some of the material previously referred to this species, notably that from the southwest Atlantic, has been described as a new species by El Beshbeeshy (1991) while Antarctic records appear to be doubtful (cf. Naumov & Stepan'yants, 1962: 86–87).

Sertularella geodiae is similar to *Sertularella gayi gayi* (Lamouroux, 1821), in the shape of the irregularly forked, loosely pinnate colonies; the hydrothecae of the former, however, are much bigger and more tumid. Development of submarginal intrathecal cusps has so far never been observed in *S. g. gayi*, but it shares this character with *S. polyzonias* (Linnaeus, 1758) (cf. Medel & Vervoort 1998: 51, fig. 13), though its hydrothecae are generally bigger. Colony development in well grown *S. polyzonias* is much different from that of *S. geodiae*, the former having loosely branched, monosiphonic colonies without distinct main stem. *Sertularella polyzonias*, although like *S. gayi gayi* of near-cosmopolitan distribution, does not occur in the New Zealand collections. It is mentioned in Farquhar's list of New Zealand hydroids because at that time *Sertularella simplex* (Hutton, 1873) was considered a synonym (cf. Farquhar 1896: 465). *Sertularella polyzonias* is cited by Ralph (1961a: 834–835, figs 24h-i); the figures are from British material.

RECORDS FROM NEW ZEALAND: Known only from a few localities in the waters north off North Cape; *Terra Nova* Stn 90, off Three Kings Islands, 183 m; New Caledonian waters, 22°43.09′ S, 166°27.14′ E, 1665–1590 m, and two localities NW of North Cape, 34°39.60′ S, 172°13.10′ E, 270 m and 34°38.00′ S, 172°13.50′ E, 204 m.

DISTRIBUTION: Reliable records are known only from waters north of New Zealand and from New Caledonian waters.

Sertularella integra Allman, 1876a (Figs 38D–J, 39A)

Sertularella integra Allman 1876a: 262, pl. 13, figs 3–4; Bale 1924: 242; Ralph 1961a: 827–828, fig. 23a-d; Dawson 1992: 20; Stranks 1993: 16; Vervoort 1993a: 191.

Sertularella intricata Billard 1919: 20, fig. 1D; 1925b: 145, text-fig. 15, pl. 7, fig. 7; Redier 1966: 83; Ralph 1961a: 828–830, fig. 23e-g; van Soest 1976: 83; Dawson 1992: 20; Vervoort 1993a: 191.

?*Sertularella inconstans* Billard 1919: 19, fig. 1C; 1925b: 142–143, text-fig. 12, pl. 7, fig. 6; van Soest 1976: 83; Vervoort & Vasseur 1977: 48–49, fig. 18d-e.

[not *Sertularella inconstans* Vannucci Mendes, 1946: 569, pl. 4, fig. 38 = *Sertularella conica* Allman, 1877, *fide* Migotto, 1996].

Sertularella richardsoni Ralph 1961a: 825–827, fig. 22e-h; 1961d: 104; Hicks *et al*., 1991: 7; Dawson 1992: 20; Vervoort 1993a: 192.

MATERIAL EXAMINED:

NZOI Stns: A439, *Sertularella intricata* Billard, 1919 (J.E. Watson). [Slide 4206, JEW Colln]; **A444B** [samples that have been dried out, now in alcohol and in very poor condition,

marked: A 444x1, A 444x2, etc. Probably from 1 large sample]: *Sertularella intricata* Billard, 1919 (J.E. Watson); **A720**, up to 25 mm high, branched colonies with gonothecae from between bryozoans. Dirty material; hydro- and gonothecae empty. RMNH-Coel. slide 2720; **A732**, isolated colonies up to 40 mm high, between bryozoans. No gonothecae. Hydrothecae empty; dead material. RMNH-Coel. slide 2722; **A733**, several small colonies with gonothecae. Ribs on hydrotheca very moderately developed; no hydranths, dead material. RMNH-Coel. slide 2723; **B176**, fragment in RMNH-Coel. slide 2733. Dirty and overgrown material; may well belong here; **B221**, fragments only. Hydrothecae almost fully ribbed; no hydranths, dead material. RMNH-Coel. slide 2749; **B482**, 2 stems and a fragment, 30 mm high, no gonothecae; **B488**, 2 stems, 15 and 35 mm high, no gonothecae; **B571**, many about 30 mm high, partly branched stems, and partly rising from stolon creeping on shells of lamellibranchs. Some gonothecae present. Hydrothecae and gonothecae empty; dead material, lightly ribbed. RMNH-Coel. slide 2787; **C60**, several small colonies without gonothecae, about 8 mm high; **C118**, *Sertularella intricata* Billard, 1919 (J.E. Watson); **C125**, *Sertularella intricata* Billard, 1919 (J.E. Watson); **C595**, 3 stems, up to 15 mm high, taken from sponges. Additional specimens from another bottle, also from sponges, are branched and larger, up to 35 mm high. Rather dirty material with lightly ribbed, empty hydrothecae. RMNH-Coel. slide 2797; **D25**, young colonies on small stones, about 10 mm high; **D127**, gear DCMB, small colonies on *Symplectoscyphus subarticulatus* (Coughtrey, 1875); **D127**, gear TAM, small colonies on *Cryptolaria prima* Busk, 1857; **D133**, up to 30 mm long, detached, branched colonies. No gonothecae; **E108**, 5 stems 25 mm high on *Aglaophenia laxa* Allman, 1876a. RMNH-Coel. slide 2301. In addition numerous colonies from a dried out sample. Worn sample with almost smooth hydrothecae; **E109**, 1 branched, detached colony, 35 mm high; **E312**, isolated strands of hydrocauli, about 15–25 mm long; 1 gonotheca. Distal part of hydrotheca slightly upturned, ribs scarcely developed. RMNH-Coel. slides 2119, 2120 and 2122; E820, up to 40 mm high stems intimately associated with *Dictyocladium monilifer* (Hutton, 1873). Hydrothecae strongly ribbed over entire width. RMNH-Coel. slide 2171; **E832,** tangled colonies *on Salacia bicalycula* (Coughtrey, 1876a); may belong here. No gonothecae. Hydrothecae all empty and rather strongly deformed, being contracted in distal part. RMNH-Coel. slide 2176; **G686**, many stems up to 25 mm and occasionally branched, on *Symplectoscyphus subarticulatus* (Coughtrey, 1875) and bryozoans. No gonothecae; **G687**, many stems, up to 25 mm high, partly branched, on old hydroid stem and on *Symplectoscyphus subarticulatus* (Coughtrey, 1875); **I371**, about 20 mm high colonies epizootic on *Symplectoscyphus columnarius* (Briggs, 1914); no gonothecae; **J970**, *Sertularella integra* Allman, 1876a [Slide 4207 JEW Colln]; **Q85**, *Sertularella integra* Allman, 1876a (J.E. Watson). [Slide 4208 JEW Colln].

NMNZ: 4.5 miles E. **Tory Channel,** 15.Aug.1963, 3 stems, 20–25 mm high, unbranched, no gonothecae. NMNZ Co. 642; **BS 398**, a few about 10–15 mm high stems from a stolon creeping on *Dictyocladium thuja* sp. nov. No gonothecae. Hydrothecae with contracted hydranths. NMNZ Co.719; RMNH-Coel. 27667, slides 3367 and 3368; **BS 480**, many colonies on various hydroids, some stems branched. No gonothecae. NMNZ Co.413; **BS 519**, a few stems on empty lamellibranch, about 20 mm high, 1 of stems branched. Hydrothecae with contracted hydranths and *Hebellopsis scandens* (Bale, 1888). NMNZ Co.807; RMNH-Coel. slide 3485; **BS 621**, small, unbranched colonies, 10–20 mm high, on sponges and *Symplectoscyphus subarticulatus* (Coughtrey, 1875). NMNZ Co. 475; **BS 905**, 2 stems about 10 mm high, from old hydroid stem. No gonothecae. NMNZ Co.694; **R.V. *Munida*, Stn 8**, 45°41.85′ S, 170°58.72′ E, branched colonies about 60 mm high, on worm tube. No gonothecae. NMNZ Co.546.

NMNZ Ralph Collection: Loc. 40, NMNZ Co.909, a number of fragments of large, tangled colony without gonothecae. With *Halecium delicatulum* Coughtrey, 1876b (?), *Hebellopsis scandens* (Bale, 1888), and *Orthopyxis crenata* (Hartlaub, 1901). RMNH-Coel. slides 3604; **Loc. 62**, NMNZ Co.921, a few fragments heavily covered by debris and of fungal threads, suggesting tube had previously been dried out. RMNH-Coel. slide 3617. Partly dried out slide in RSC as *Sertularella integra* Allman, with data: Moeraki; **Loc. 72**, NMNZ Co.930, 2 fragments about 4 mm long, one made in RMNH-Coel. slide 3624. [On label: *Cryptolaria prima* (not found) and *Sertularia integra*]. Poor slide in RSC as *Sertularella integra* Allman, no data; **Loc. 205**, NMNZ Co.1054, many colonies of which some are branched; 2 gonothecae. With *Hebellopsis scandens* (Bale, 1888) and *Monotheca epibracteolosa* Watson, 1975. RMNH-Coel. slide 3716. Partly dried out slide in RSC as *Sertularella integra* Allman, no data; **Loc. 522**, NMNZ Co.1255, some small colonies, no gonothecae. With *Hebellopsis scandens* (Bale, 1888), *Dictyocladium monilifer* (Hutton, 1873), and *Symplectoscyphus j. johnstoni* (Gray, 1843). 2 RMNH-Coel. slides 3931 after some bleaching; **Loc. 579**, NMNZ Co. 1288, fragment of stolon with 6 stems, 10–25 mm high; some gonothecae. Contracted hydranths with about 12 tentacles and a big caecum. RMNH-Coel. slide 3966. Partly dried out slide in RSC as *Sertularella integra* Allman, with data: Cook Strait; **Loc. 580**, NMNZ Co. 1289, single 8 mm long branch or stem, quite dirty. No slide; 2 good slides in RSC as *Sertularella intricata* (*inconstans* crossed out), no data. Good slide as *Sertularella intricata*, with data: Cook Strait; **Loc. 581**, NMNZ Co.1290, about 40 mm long stolon with some stem fragments, with stolon and hydrothecae of *Hebellopsis scandens* (Bale, 1888). No gonothecae. RMNH-Coel. slide 3967; **Loc. 586**, partly dried out slide in RSC as *Sertularella integra* Allman, no data; **Loc. 587**, NMNZ Co.1297, large number of unbranched stems up to 25 mm high arising from stolonal tubes; no gonothecae. Some with *Filellum serratum* Clarke, 1879. RMNH-Coel. slide 3974; **Loc. 591**(?), NMNZ Co. 1301, single branch or stem; no gonothecae; no slide; **Loc. 597**, NMNZ Co.1306, several stems or branches, up to 20 mm high, some with a ramification. RMNH-Coel. slide 3984; **Loc. 598**, NMNZ Co.1307, large number of stems up to 30 mm high, many branched, partly developing on other hydroids [*Salacia bicalycula* (Coughtrey, 1876a)]. No gonothecae. RMNH-Coel. slide 3986; **Loc. 644**, NMNZ Co.1333, fair number of up to 15 mm high stems, some branched; no gonothecae. With hydrothecae of *Filellum serratum* (Clarke, 1879). RMNH-Coel. slide 4016. 2 good slides in RSC as *Sertularella intricata*; no data; **Loc. 665**, NMNZ Co.1336, about 10 stems up to 18 mm high, some with a few branches, invested by sponge; no gonothecae. RMNH-Coel. slide 4020. Reasonable slide in RSC as *Sertularella intricata*, no data; **Loc. 690**, poor slide in RSC as *Sertularella intricata*, with data: Whatipu; **Loc. 706**, perfect slide in RSC as *Sertularella richardsoni*, with data: Otago Canyon.

PMBS: Otago only. Identified by: P.M. Ralph. (Taken from card register).

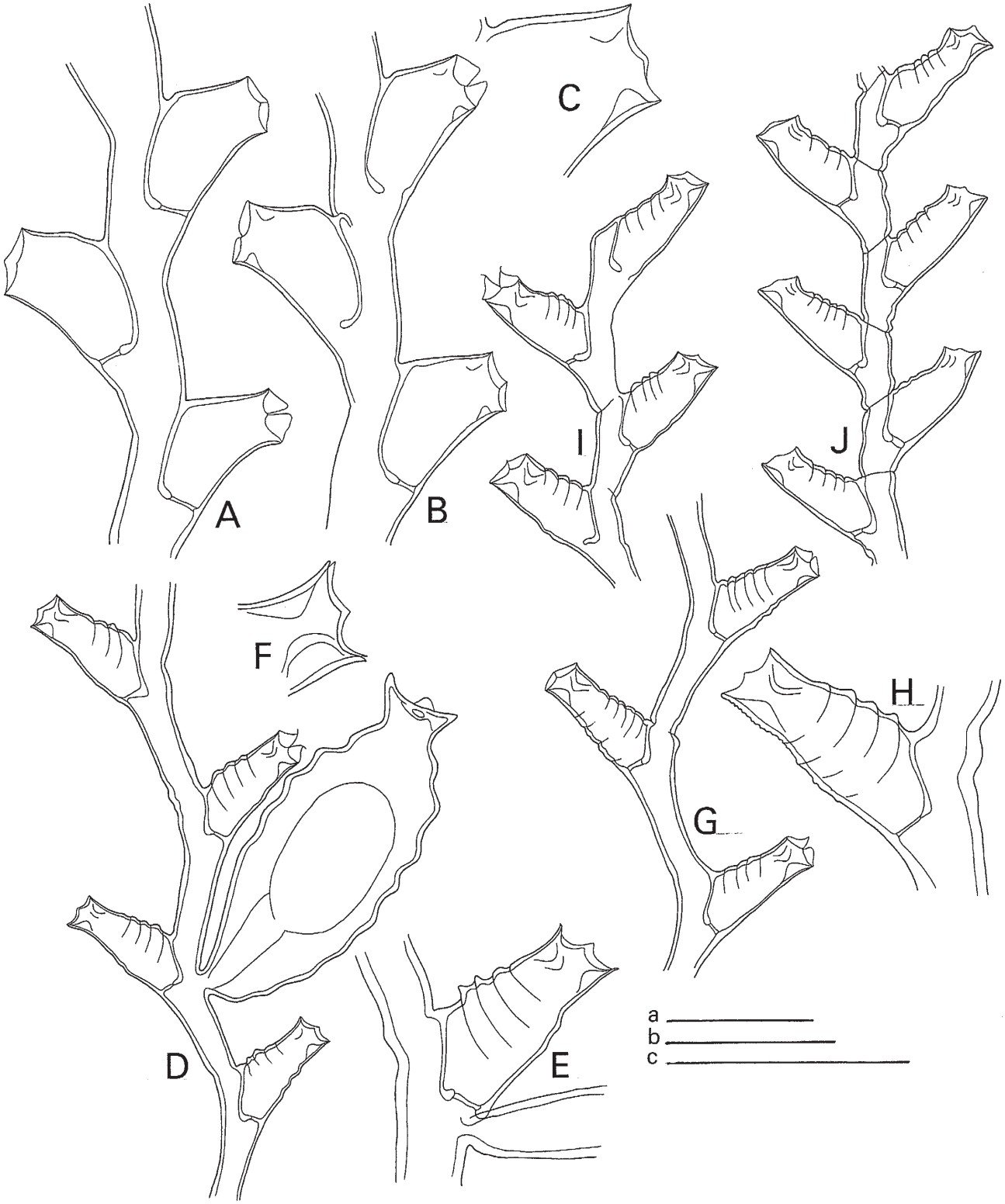

Fig. 38. A–C. ***Sertularella geodiae*** Totton, 1930. **A**, part of hydrocladium, hydrotheca without intrathecal cusps. **B**, part of hydrocladium, hydrothecae with intrathecal cusps. **C**, distal part of hydrotheca with intrathecal cusps (NZOI Stn J953, slide 2210). **D–J.** ***Sertularella integra*** Allman, 1876. **D**, part of stem with gonotheca. **E**, axillary hydrotheca. **F**, distal part of hydrocladial hydrotheca (PMBS, Mu 66-38, slide 2673). **G**, part of stem. **H**, stem hydrotheca (Loc. 598, slide 3986). **I**, part of stem (Loc. 665, slide 4020). **J**, part of stem (Loc. 644, slide 4016). Scales: a, 1 mm (C, E, H); b, 1 mm (A, B, D, G, I, J); c, 0.5 mm (F). W.V.

Material Inspected: **Mu 66–38, Hyd 32**: 25–30 mm high stems with branches on twig fragments, many detached fragments. RMNH- Coel. 27256, slide 2673.

Otago Museum, Dunedin, N.Z.: **Iv. 757. A.52:57**: Several small colonies about 10 mm high, with gonothecae, attached to *Symplectoscyphus subarticulatus* (Coughtrey, 1875). RMNH-Coel. 27245, slide 2662.

Type Locality: *Sertularella integra*: New Zealand, no accurate locality indication (Allman 1876a; holotype in NHM; syntype in MOV, 1 microslide, MV F59301; Stranks 1993). *Sertularella intricata*: *Siboga* Stn 95, Sulu Sea, 05°43.5′ N, 119°40′ E, 522 m (Billard 1919, 1925b; syntypes in ZMA, ZMA-Coel. 3945, van Soest 1976; two syntype slides in MNHN, Billard's slide collection nos 631 & 632). *Sertularella inconstans*: *Siboga* Stn 150, 0°06′ N, 129°07.2′ E, Djilolo Passage between Djilolo (Halmaheira) and Fou Island, 1089 m (Billard 1919, 1925; holotype in ZMA, ZMA Coel. 3946, van Soest, 1976). *Sertularella richardsoni*: N of Taiaroa Heads, Otago Peninsula, 29–36 m, holotype in NMNZ, Co 181; paratype Co 182). The holotype of *Sertularella richardsoni* Ralph, 1961, is a carmine coloured Canada-Balsam slide, labelled "Holotype. 5 miles N of Taiaroa Heads, Otago, New Zealand, 16–20 fathoms. *Sertularella richardsoni* Ralph 1961, TYPE, 702A, Taiaroa Heads, N.Z." (corresponds with record in Ralph's list of localities). The specimen is an about 25 mm long, monosiphonic branch with 2 side branches and 2 gonothecae, 1 with a marsupium. The cover glass is cracked. There is also a paratype slide (Co. 182) with almost identical labelling (Loc. 702B) with a slightly longer branch also bearing 2 gonothecae, both with marsupium.

Description: Colony composed of irregularly branched, intertwining, occasionally anastomosing, largely monosiphonic hydrocauli rising from a tubiform stolon reptant on other hydroids, algae or other fixed objects. Stem strongly to moderately geniculate, basally occasionally with a secondary tube, composed of internodes of varied length separated by oblique nodes sloping in opposite directions, that are either just visible as constrictions or as thin lines in perisarc; internodes bearing a large hydrotheca distally. Length of internodes typically diminishing distally; hydrothecae biserially arranged in 1 plane, diverging from stem at about 60º.

Hydrothecae fairly large, varying between conical, with largest diameter proximally, and asymmetrically saccate, bulging slightly in basal part of adcauline hydrothecal wall and more strongly so in basal portion of free abcauline wall. Free adcauline wall about twice as long as fused part or slightly longer. Hydrotheca typically slightly to distinctly narrowed below hydrothecal margin; part above constriction may be slightly curved adcaudally, resulting in plane of aperture becoming slightly tilted upwards. Hydrotheca below apical constriction typically with, 4 to 5 ribs, distinct on adcauline side and grandully disappearing abcaudally but some colonies with more strongly ribbed; 6–8 ribs, stronger on adcauline side. Hydrothecal rim with 4 well marked but not particularly sharp cusps; these moderately to distinctly flaring as a result of development of inframarginal constriction; 3 plate-shaped intrathecal teeth: 1 at abcauline side, 1 in each embayment between adcauline marginal cusp and laterals. Operculum 4-flapped, plates triangular when closed forming a low roof, occasionally with curled borders; 1 or 2 renovations of hydrothecal rim do occur.

Gonothecae large, elongate ovoid, almost smooth in basal half and gradually narrowing into a short pedicel inserting below a hydrotheca. Distal half of gonothecae with well marked, rounded ribs, fading basally. Distal part of gonotheca narrowing apically then widening to form a low platform with 4 strong, diverging conical teeth of varied height, surrounding a circular aperture. Few gonothecae contained tissue; 1 with a large oval egg or developing planula. Perisarc strong, along internodes, and hydrothecal walls. Gonothecae also strongly sclerotised, particularly apically and on conical teeth.

Remarks: This is a distinctive but highly variable species, which accounts for the fact that it has been described under at least three different names. It was recorded by Ralph from New Zealand waters as *Sertularella integra, Sertularella intricata,* and *Sertularella. richardsoni*, the latter being a supposedly new New Zealand species. Ralph inspected, re-described and figured Allman's type in NHM. The species name '*integra*' was coined by Allman (1876a) because of the smooth hydrothecal rim. Com-parison of Allman's figure (1876a, pl. 13, fig. 4) with that given by Ralph of Allman's type (1961a, fig. 23a, c) shows a a considerable difference in the shape of the hydrothecae. We have found the dimensions of the hydrothecae in our copious material to be greatly varied in the proportion of depth to width without great changes in general outline. Allman evidently figured a much worn and slender hydrotheca with a nearly smooth rim; in contrast Ralph figured short and plump hydrothecae with four quite low marginal cusps. Both shapes of hydrothecae occur in our material. Width and position of the hydrothecal aperture, as well as the development of the constriction under the hydrothecal rim are highly variable. Hydrothecae with the plane of the aperture almost perpendicular to the hydrothecal length axis occur along with hydrothecae with the aperture tilted upwards, while the differences in development of the sub-marginal constriction determines the degree to which the marginal cusps are 'flared'. Furthermore both number and development of the transverse hydrothecal ribs are as equally variable. The four to eight ribs are typically best developed

MEASUREMENTS of *Sertularella* (in μm):

	S.integra Allman, 1876a (cf. Ralph 1961a)	*S. intricata* Billard, 1919 (cf. Ralph 1961a)	*S. richardsoni* Ralph, 1961a (cf. Ralph 1961a)
Stem internode, length	450 – 800	500 – 800	1400
Diameter at node	30 – 400	250 – 400	150 – 250
Length first internode of branch			
Hydrotheca, length adnate adcauline wall	300 – 400	250 – 350	250 – 300
Length free adcauline wall	500 – 650	500 – 700	500 – 700
Length abcauline wall	700 – 900	700 – 1000	700 – 800
Total depth			
Maximum diameter	450 – 600		350 – 400
Diameter at rim	350 – 400		170 – 300
Gonotheca, length including apical cusps	2000 – 2250		2000 – 2500
Maximum diameter	1400		1100 – 1300
Diameter at terminal cone			250 – 300

	S. inconstans Billard, 1919 (cf. Vervoort & Vasseur, 1977)	*S. integra* Allman, 1876a Ralph's Loc. 598 slide 3986	*S. integra* Allman, 1876a Portobello slide 2673
Stem internode, length	525 – 620	990 – 1235	990 – 1405
Diameter at node		165 – 210	160 – 215
Length first internode of branch		1810*	
Hydrotheca, length adnate adcauline wall	285 – 310	295 – 330	345 – 395
Length free adcauline wall	445 – 450	625 – 640	605 – 625
Length abcauline wall	540 – 595	790 – 820	805 – 815
Total depth	660 – 670	850 – 875	860 – 875
Maximum diameter	270 – 285	380 – 395	345 – 395
Diameter at rim	190 – 215	260 – 265	230 – 265
Gonotheca, length including apical cusps			2475 – 3125
Maximum diameter			1140 – 1200
Diameter at terminal cone			360 – 380

* = Taken from slide 3984

adcaudally and tend to disappear gradually towards the abcauline wall, though some hydrothecae are almost fully ringed. The length and width of internodes of stem and branches are also varied, probably as a result of environmental factors such as water movement and water depth. In our large material we have been unable to isolate any well defined morphological 'types'; hence we consider it wise to unite the above listed material as one, variable species bearing the oldest available name: *Sertularella integra* Allman, 1876a.

The type of *Sertularella inconstans* Billard, 1919 was re-examined and re-described by Vervoort and Vasseur (1977). This species, in colony structure and morphology of the hydrothecae, resembles *S. integra* in many respects except size; it is much smaller (see table of measurements). For the time being we keep this species separate from *Sertularella integra* Allman, 1876a.

Gonothecae occur predominantly in October and November; a few in April.

RECORDS FROM NEW ZEALAND: First described from New Zealand by Allman (1876a, as *Sertularella integra*, from Busk's collection, no further data). Ralph (1961a) mentioned *S. integra* and *Sertularella intricata* Billard, 1919, from many New Zealand localities and described *Sertularella richardsoni* as a new species from the Otago area. The material of *Sertularella integra* Allman, 1876a, as defined here; it occurs in waters (29–256 m deep) all around New Zealand, the range extending from 34° to 54.5° S and 177° W–158.5° E. The species occurs on large algae with which it is transported and deposited on New Zealand beaches.

DISTRIBUTION: A very characteristic New Zealand species that also occurs in the seas of the eastern part of the Malay Archipelago.

Sertularella leiocarpa (Allman, 1888) (Fig. 39B–E)

Sertularia leiocarpa Allman 1888: 52–53, pl. 25, figs 1, 1a; Stranks 1993: 17.

Sertularella leiocarpa: Stechow 1925b: 477, fig. 35; Vervoort 1966: 128, figs 31–32; Millard 1968: 254, 269–270, fig. 4a-c; 1975: 292–294, fig. 95D–F; 1977b: 107; 1978: 197 *et seq*.; Gravier-Bonnet 1979: 44, fig. 8A; Millard 1980: 132; Gili *et al.* 1989: 103, 104, fig. 28; Vervoort 1993a: 191, 220–222, figs 47f, 48a-f, tab. 37.

MATERIAL EXAMINED:

NZOI Stn G185: About 60 mm high stem with some side branches; no gonothecae. RMNH-Coel. slide 2306.

TYPE LOCALITY: *Challenger* Stn 135c, southern Atlantic off Nightingale Island, Tristan da Cunha, 37°25′30″ S, 12°28′30″ W, 183–275 m (Allman 1888; holotype in NHM, 1888.11.13.40).

DESCRIPTION: Stem flexous, about 60 mm high, monosiphonic over entire length, with some side branches, springing from stem under a hydrotheca at irregular intervals. Stem and branches divided into internodes by means of thin, oblique nodes sloping in opposite directions; first internode of side branch long. Each internode with 1 distal hydrotheca; hydrothecae alternate, biseriate, widely spaced; stem or side branch between hydrothecae geniculate. Hydrothecae big; cylindrical, slightly curved in abcauline direction to straight, narrowing almost imperceptibly upward from base, rim slightly though distinctly everted. Abcauline wall of hydrotheca with slight concavity, running smoothly into wall of internode proximally; free adcauline wall one and a half times as long as adnate part, with slight convexity proximally, running into small axillary 'pocket'. Adnate adcauline wall slightly thickened basally, hook-shaped; diaphragm of moderate width, straight. Aperture in many hydrothecae with as many as 6 closely packed renovations. Rim with 4 rather sharp cusps, 1 abcauline, 1 adcauline, and 2 lateral; embayments between shallow; no submarginal intrathecal cusps. Operculum of triangular plates, firmly attached in embayments, forming a low roof; no opercular renovations seen.

Perisarc fairly firm, thick at nodes; thinner though firm along walls of internodes; gradually thinning out along hydrothecal walls; no collapsed hydrothecae observed. Hydranths fairly well preserved with a large caecum, attached by means of a thin filament to inside of hydrothecal abcauline wall at two-thirds its length from the base.

No gonothecae present.

MEASUREMENTS of *Sertularella leiocarpa* (in μm):

	New Caledonia (Vervoort 1993a)	NZOI Stn G185 slide 2306
Internode, length	910 – 1365	1230 – 1560
Diameter at node	90 – 135	215 – 260
Hydrotheca, length abcauline wall, including renovations	725 – 835	1065 – 1100
Length free adcauline wall	605 – 835	820 – 950
Length adnate adcauline wall	280 – 370	510 – 540
Total depth, including renovations	775 – 890	1180 – 1230
Maximum diameter	250 – 325	395 – 440
Diameter at apex	205 – 235	280 – 330
Gonotheca, length	1670 – 1715	
Maximum diameter	540 – 565	

REMARKS: This material, from a southern Pacific locality, corresponds better in size with the type material (total depth of hydrotheca 1085 –1105 mm, cf. Vervoort, 1993) than does the New Caledonian specimens with which our material is compared. However, the agreement in morphology of colony, internode and hydrotheca is such that there can be no reasonable doubt that all the material is conspecific, even though the New Zealand colony is sterile. The presence of fairly well preserved hydranths indicates that this material was collected alive.

RECORDS FROM NEW ZEALAND: Only found in the Southwest Pacific, near Chatham Islands, 44°08.00′ S, 179°24.00′ W, 410 m.

DISTRIBUTION: Southern Atlantic (Allman 1888); off Namibia (Gili *et al.*1989); off St Paul, southern Indian Ocean (Stechow 1925b); various localities in the Indian Ocean off southern Africa (Vervoort 1966; Millard 1975; Gravier-Bonnet 1979), and New Caledonian waters (Vervoort 1993a).

Sertularella quadridens quadridens (Bale, 1884)

Thuiaria quadridens Bale 1884: 119, pl. 7, figs 5-6; von Lendenfeld 1885b: 915, pl. 40, fig. 9; Hargitt 1924: 493, pl. 5, fig. 17.

Sertularella quadridens: Ritchie 1910b: 818, text-fig. 79, pl. 77, fig. 12a-b; Jäderholm 1916: 6, fig. 2; Stechow & Müller 1923: 471; Bale 1924: 242; Billard 1925b: 150–151, fig. 19a-b (*cum syn*.); Leloup 1937b: 5, 40, figs 27–28; Vervoort 1941: 214, fig. 5; 1946a: 314; Dawydoff 1952: 55; Pennycuik 1959: 195; Mammen 1965: 38, fig. 70; Rees & Thursfield 1965: 136; Ralph 1961d: 109; Dawson 1992: 20; Vervoort 1993a: 192; Bouillon *et al.* 1995: 70.

Sertularella quadridens f. *quadridens*: Ralph 1961a: 830, fig. 23h.

Thuiaria vincta Allman 1888: 68, pl. 32, figs 2, 2a.

TYPE LOCALITY: *Thuiaria quadrata*: Port Curtis, Queensland, Australia (Bale 1884); probable syntypes in MOV, MV F59061, microslide; also F58819, two microslides, and F58820, dry material (Stranks 1993), who also list as probable syntype material from Holbourne Island, 37 m, MV F58821, microslide.

REMARKS: Listed on the authority of von Lendenfeld (1885b) who mentioned this species from Timaru, New Zealand. This record has not been substantiated by the discovery of additional New Zealand material.

DISTRIBUTION: Subtropical and tropical eastern and northern Australia; seas of the eastern part of the Malay Archipelago; Philippine seas (Vervoort 1941); Gulf of Manaar, India (Mammen 1965); Indochina (Leloup 1937b).

Sertularella ramosa Thompson, 1879

Sertularella ramosa Thompson 1879: 102, pl. 16, figs 5, 5a; Ralph 1961a: 831, fig. 24b; Dawson 1992: 20; Vervoort 1993a: 192.

Sertularella ramosa(?): Bartlett, 1907: 42.

TYPE LOCALITY: New Zealand (Thompson 1879; no further details, location of type unknown).

REMARKS: This dubious species is only known from Thompson's description, in which it is compared with *Sertularella polyzonias* Linnaeus, 1758 and "*S. turgida*, Trask" [= *Symplectoscyphus turgidus* (Trask, 1857)]. According to Ralph (1961a) it also shows affinities with *Sertularella geodiae* Totton, 1930. Without proper redescription of the holotype *Sertularella ramosa* Thompson, 1879, remains a highly questionable species.

Sertularella robusta Coughtrey, 1876b (Figs 39F, 40A–F)

Sertularia simplex p.p. Coughtrey 1875: 283, figs 9–10; 1876a: 27, pl. 3, fig. 6a-c.

Sertularella robusta Coughtrey 1876b: 300; Stechow 1913b: 14; Bale 1924: 240; Jäderholm 1926: 4, fig. 3; Trebilcock 1928: 16, pl. 6, figs 3–3c; Totton 1930: 105; Blackburn 1937a: 367; 1937b: 171, fig. 1; 1938: 320; 1942: 115; Hodgson 1950: 33, fig. 58; Pennycuik 1959: 195, pl. 6, fig. 3; Leloup 1960: 234, fig. 7; Ralph 1961a: 824–825, fig. 22a-d; 1961c: 109; 1961d: 236; 1966: 159; Blanco 1968: 215, pl. 4, figs 4–7; Shepherd & Watson 1970: 140; Vervoort 1972a: 129, figs 40–41a; Watson 1973: 171, fig. 21; Leloup 1974: 33, fig. 27; Watson 1975: 166, figs 23–24; Blanco 1976: 42, pl. 4, figs 1–3; Vervoort & Vasseur 1977: 40–52, figs 18a-c, 19–22 (*cum syn.*); García Corrales *et al*. 1980: 43, fig. 14; Rho & Park 1980: 24–25, pl. 5 figs 4–7; Hirohito 1983: 46–47, fig. 19; Blanco 1984c: 264, figs 12–15; Park 1990: 82; El Beshbeeshy 1991: 182–188, fig. 46; Dawson 1992: 20; Park 1992: 292; Boero & Bouillon 1993a: 264; Vervoort 1993a: 192; Watson 1994a: 67; Bouillon *et al.* 1995: 71; Hirohito 1995 (English text): 200–201, fig. 65e, f.

Sertularella microgona von Lendenfeld, 1885a: 416, pl. 7, figs 1–3; Billard 1925b: 145, fig. 14; Vervoort & Vasseur 1977: 49–50.

Sertularella angulosa Bale 1894: 102–103, pl. 4, fig. 6; Stechow, 1923a: 10; 1925b: 143, fig. 13; 1926: 102; Plante 1965: 259, 307; Millard & Bouillon 1973: 70; Vervoort & Vasseur 1977: 50–52; Stranks 1993: 14.

Sertularella tenella: Jäderholm 1905: 31, pl. 12, fig. 8 [not *Sertularella tenella* (Alder, 1856)].

Sertularella robusta var. *quasiplana* Trebilcock 1928: 18, pl. 6, figs 4, 4a.

Sertularella polyzonias var. *robusta*: Stepan'yants 1979: 86, 88, pl. 16, fig. 2.

MATERIAL EXAMINED:

NZOI Stns: E263, 20 mm high fragment from between bryozoans. RMNH-Coel. slide 2105 only; **J17**, small colonies, up to 8 mm high, no gonothecae. 2 RMNH-Coel. slides 2889; **J970**, *Sertularella robusta* Coughtrey, 1876b (J.E. Watson).

NMNZ: BS 561, many unbranched colonies, 5 mm high, developing on bryozoans. Gonothecae present. With *Filellum serpens* (Hassall, 1848). NMNZ Co.671; 3 RMNH-Coel. slides 3032; **BS 882**, reptant and partly detached colony on algae composed of stems of about 5–7 internodes and many isolated hydrothecae attached to the stolon. No gonothecae. Hydrothecae fairly slender, narrowed apically, with 5 or 6 distinct rings, about two-thirds of adcauline thecal wall free. NMNZ Co.777; RMNH-Coel. slide 3327.

NMNZ Ralph Collection: Loc. 69, NMNZ Co.929, several up to 8 mm high colonies, as well as primary hydrothecae on stolon on algae. RMNH-Coel. slide 3623. Reasonable slide in RSC as *Sertularella simplex intermedia*, no data; **Loc. 181**, NMNZ Co.1036:, 2 about 3 mm high fragments, in RMNH-Coel. slide 3703; also unrecognisable fragments. Dried out slide in RSC as *Sertularella simplex intermedia* + *Amphisbetia minima*. No further data; **Loc. 197**, poor slide as *Plumularia setacea, Sertularella robusta* + smaller *Sertularia*, no data; **Loc. 231**, NMNZ Co.1076, 2 stems, of which larger 8 mm high; no gonothecae. All in RMNH-Coel. slide 3743. With *Salacia bicalycula* (Coughtrey, 1876a) and *Plumularia setacea* (Linnaeus, 1758); **Loc. 248**, 2 fair slides in RSC as *Sertularella simplex* var. *intermedia*, no data; **Loc. 268**, NMNZ Co.1116, many up to 10 mm high stems arising from stolon on *Sargassum* sp., partly detached, with gonothecae. RMNH-Coel. slide 3796; **Loc. 271**, NMNZ Co. 1118, detached, up to 8 mm high colonies without gonothecae. Material very brittle. RMNH-Coel. slide 3797. Dried out slide in RSC as *Sertularella robusta*, no data; **Loc. 293**, NMNZ Co. 1138, many colonies 8–10 mm high, with gonothecae, on algae. RMNH-Coel. slide 3820; **Loc. 405**, good slide in RSC as *Sertularella subarticulata* & *Sertularella robusta*, with data: Foveaux Strait, oyster beds; **Loc. 444**, poor slide in RSC as *Sertularella robusta*, with data: Hawke Bay; **Loc. 480**, NMNZ Co.1229, about 4 mm high stems and primary hydrothecae, no gonothecae, all on green algae. RMNH-Coel. slide 3908. With *Orthopyxis crenata* (Hartlaub, 1901) and *Obelia* sp.; **Loc. 481**, NMNZ Co.1230, on basal part of stem of *Aglaophenia laxa* Allman, 1876a; no gonothecae, about 8 mm high. RMNH-Coel. slide 3910. Also unidentifiable *Clytia/Orthopyxis* sp.; **Loc. 516**, NMNZ Co.1250, fair number of colonies up to 15 mm high from stolon on algae. Many gonothecae, mainly in lower part of stem and on stolon.

RMNH-Coel. slide 3926. Poor slide in RSC as *Sertularella robusta*, no data. on label: long internodes; **Loc. 683**, poor slide in RSC as *Sertularella robusta*, with data: Easter 1950, Kulka, Se3; **Loc. 684**, poor slide in RSC as *Sertularella robusta*, with data: Easter 1950, Kulka, Se6, on *D. moniliferum*.

Ralph's Chatham Islands Expedition Collection: Stn 14: Several stems and a number of fragments, heavily overgrown with bryozoans; some gonothecae. NMNZ Co.1343; **Stn 25**, 29.Jan.1954: Detached colonies up to 12 mm high; no gonothecae. Also quite young colony composed of 4 hydrothecae springing separately from stolon on *Symplectoscyphus* cf. *johnstoni* (Gray, 1853); 1 with beginning of formation of stem. RMNH-Coel. slide 4418. According to label: "*Glycimerus* sp. with *Clytia johnstoni*", latter not found. NMNZ Co.1348.

Otago Museum, Dunedin, N.Z.: **Iv. 757, A.52:57**, many hydrothecae observed rising from stolon covering fragment of algae; no gonothecae. Hydrothecae perfectly symmetrical, with ribbed surface; rim with 4 low cusps. Agrees with the aberrant hydrotheca of *Sertularella simplex* (Hutton, 1873) described and figured by Ralph (1961: 321–322, fig. 21a). RMNH-Coel. 27246, slide 2663.

TYPE LOCALITY: *Sertularella robusta*: Foveaux Strait oyster beds (Coughtrey 1876b; location of type unknown). *Sertularella microgona*: Port Phillip, Victoria, Australia, on stones in the Laminarian zone (von Lendenfeld 1885a; syntype, a microslide, in MOV, MV F59275, Stranks 1993). Type locality of *Sertularella angulosa* unknown; a probably syntype in MOV (MV F58749, microslide; Stranks 1993). *Sertularella robusta* var. *quasiplana*: Island Bay, Wellington, New Zealand (Trebilcock 1928; probable syntype, a microslide, in MOV. MV F60244, Stranks 1993).

DESCRIPTION: Erect colonies developing from tubular stolon without internal septa, reptant on algae and solid objects; height up to 25 mm; stem straight to strongly geniculate. Side branches develop frequently, springing from axis immediately below hydrotheca; first internode of branch may be quite long; anastomoses not present. Stem and branches divided into internodes of varied length by means of oblique nodes, alternately sloping in opposite directions; internodes basally with a ring or a few undulations. Hydrothecae with 5–7 transverse rings, but development varied: in some colonies hydrothecae completely ringed and rings standing out as sharp ribs; in others rings only visible at the free adcauline border, fading out towards abcauline hydrothecal wall; occasionally weakly developed ribs are difficult to observe and free adcauline border appearing almost smooth. Hydrothecae at distal end of internode, free adcauline wall usually longer than fused part, sometimes almost twice as long. Hydrotheca distinctly tumid, narrowing some distance below rim; marginal cusps consequently slightly flaring; 4 distinct though blunt marginal cusps; operculum of 4 plates forming a low roof when closed. Plane of hydrothecal aperture usually perpendicular to hydrothecal long axis but occasionally tilted upwards; 3 large, plate-shaped submarginal intrathecal cusps, 1 behind abcauline marginal cusp, 2 under embayments between adcauline marginal and lateral cusps. Adnate adcauline wall nearly straight, with sharp curve at hydrothecal base ending in a rounded knob of perisarc. Diaphragm distinct, circular.

Perisarc of colony fairly strong and thick, hydrothecal rim thickened.

Gonothecae on stolon and stem, inserted immediately below hydrothecae. Gonotheca elongate ovoid, with 4 or 5 strong ribs, rounded and prominent on distal half, fading out basally where gonotheca narrows into short, curved pedicel. Apical part of gonotheca conical to cylindrical, with 3 acute cusps surrounding a central opening.

REMARKS: The species agrees in many respects with *Sertularella simplex* (Hutton, 1873) but is even more

MEASUREMENTS of *Sertularella robusta* (in μm):

	S. robusta Coughtrey, 1876b (Ralph 1961a)	Ralph's Loc. 481 slide 3910	Ralph's Loc. 516 slide 3926
Stolon, diameter			185 – 195
Stem internode, length	350 – 700	560 – 1010	675 – 755
Diameter	200 – 300	100 – 135	100 – 115
Hydrotheca, length adnate adcauline wall	250	225 – 255	195 – 270
Length free part	300 – 400	280 – 325	390 – 450
Length abcauline wall	400 – 500	450 – 460	525 – 535
Total depth		465 – 495	535 – 590
Diameter at rim		165 – 180	225 – 235
Maximum diameter	250 – 350	245 – 255	280 – 305
Gonotheca, total length	1410 – 1700	1730 – 1975*	
Greatest diameter	900 – 1000	825 – 990*	
Diameter at end	200	245*	

* taken from Ralph's Loc. 293, slide 3820

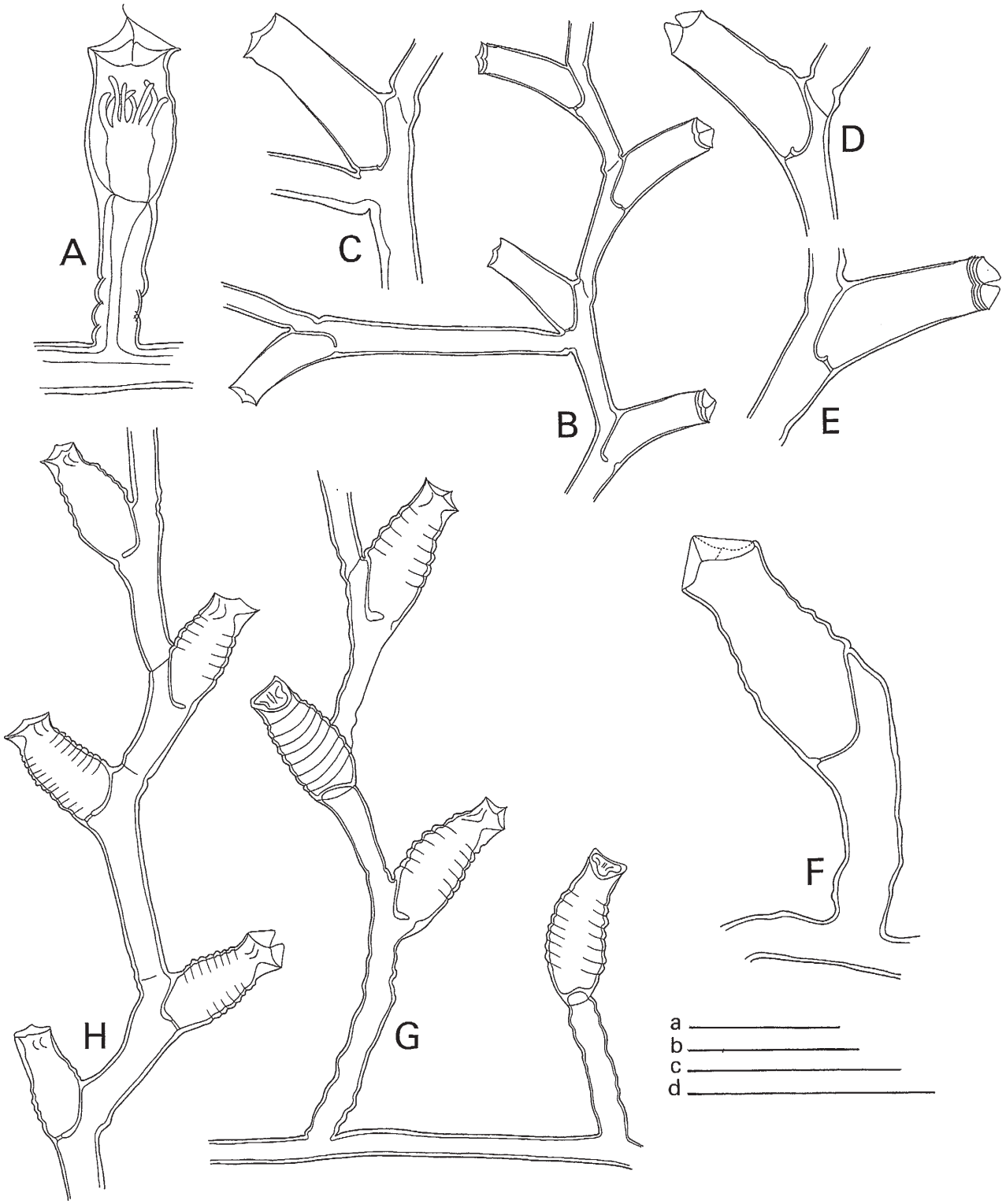

Fig. 39. A. ***Sertularella integra*** Allman, 1876, young colony with primary hydrotheca (BS 561, slide 3032). **B–E.** ***Sertularella leiocarpa*** (Allman, 1888). **B**, part of stem with hydrocladium. **C,** axillary hydrotheca. **D, E**, hydrothecae (NZOI Stn G185, slide 2306). **F.** ***Sertularella robusta*** Coughtrey, 1876, young colony with primary hydrotheca (NMNZ, Chatham Islands Exped., Stn 25, slide 4418). **G, H.** ***Sertularella*** cf. ***robusta*** Coughtrey, 1876. **G**, two stem arising from stolon, one with primary hydrotheca (BS 482, slide 3518). **H**, strongly geniculate stem (BS 769, slide 3505). Scales: a, 1 mm (G, H); b, 1 mm (C, D. E); c, 2 mm (B); d, 0.5 mm (A, F). W.V.

variable than that species in length of the internodes, shape of the hydrotheca and development of ribs. In *S. robusta* side branches develop more frequently here and primary hydrothecae appear to be quite common. The hydrothecae are characteristically rather tumid and the ribs transverse and prominent. There are unmistakable specimens of *S. robusta* with the hydrothecae rather more cylindrical than swollen and specimens in which the hydrothecae show vestial ribs on the adcauline side, disappearing completely towards the abcauline side, which is completely smooth. In others the distal part of the hydrothecae is strongly contracted and occasionally slightly curved downwards; these may result from regeneration after damage.

It is beyond doubt that this widely distributed, variable species has been described under other names. *Sertularella microgona* von Lendenfeld, 1885, and *Sertularella angulosa* Bale, 1894, are undoubted synonyms and are thus referred to in the synonymy given above (see also Vervoort & Vasseur 1977). *Sertularella keiensis* Billard, 1925b, may also well belong here.

Records from New Zealand: Intertidal waters all around New Zealand from 32.5°S to at least 47° S, 167.5°– 174.5° E, downwards to a depth of about 274 m. The species occurs frequently on algae and is transported in currents and washed ashore on beaches of New Zealand and Chatham Islands.

Distribution: Summarised by Vervoort (1972) and Hirohito (1995) and includes Indonesian waters, east coast of Australia, and Atlantic waters of southern South America. Hirohito (1995) recorded the species from Japanese waters; Vervoort and Vasseur (1977) from Moorea Atoll, French Polynesia.

Sertularella cf. ***robusta*** Coughtrey, 1876b (Fig. 39G, H)

Material Examined:

NZOI Stn B93: Small, 2–3 mm high stems from a stolon on algae; no gonothecae. Condition bad.

NMNZ: BS 482, single unbranched colony 20 mm high; no gonothecae. RMNH-Coel. slide 3525; **BS 679**, small colonies on *Crateritheca bidens* sp. nov. and *Symplectoscyphus columnarius* (Briggs, 1914). NMNZ Co.845; in 1 of RMNH-Coel. slides 3517B and in 3518; **BS 769**, several up to 8 mm high, strongly geniculate stems on various hydroids; no gonothecae observed. 4 RMNH-Coel. slides 3505. Condition excellent. Hydrothecal aperture with 3 or 5 internal cusps. In addition small, up to 5 mm high colonies on stem of another hydroid (RMNH-Coel. slide 3530).

Remarks: This material differs from that described above under *Sertularella robusta* Coughtrey, 1876b by smaller overall size, the strongly ribbed, slender hydrothecae and the generally geniculate condition of the stem. It may very well represent young colonies of this widely distributed species. The material originates from the Kapiti Channel and from northern New Zealand waters.

Sertularella simplex (Hutton, 1873) (Figs 40G, H; 41A–C)

Sertularia simplex Hutton 1873: 257; Stranks 1993: 18.
Sertularia simplex p.p. Coughtrey 1875: 283, pl. 20, figs 8–11; 1876b: 300.
Sertularella simplex: Coughtrey 1876a: 27; Bartlett 1907: 42; Bale 1924: 240, fig. 7; Stechow 1926: 105; Trebilcock 1928: 15, pl. 6, figs 1–1d, 2–2e; Kulka 1950: 80; Ralph 1961a: 821–823, fig. 21a-g; 1966: 159; Mâne-Garzón & Milstein 1973: 22; Morton & Miller 1973: 152, fig. 54, no. 9; Watson 1973: 171, fig. 22; Gordon & Ballantine 1977: 100; Watson 1979: 234; Staples & Watson 1987: 218; Dawson 1992: 20; Vervoort 1993a: 192; Watson 1994a: 67; Bouillon *et al.* 1995: 71.
[not *Sertularella simplex*: García Corrales *et al.* 1980: 45, fig. 15; Boero & Bouillon 1993a: 264 = *Sertularella robusta* Coughtrey, 1876b].
Sertularella ?simplex: Irving 1995: 324, appendix 2.
Sertularella fusiformis var. *nana* Hartlaub 1901b: 372, pl. 21, fig. 18.
Sertularia polyzonias: Hilgendorf 1898: 210, pl. 20, figs 2, 2a.

Material Examined:

NZOI Stn J970: *Sertularella simplex* (Hutton, 1873) (J.E. Watson). [Slide 4205 JEW Colln].

Measurements of *Sertularella* cf. *robusta* (in μm):

NMNZ	BS 482 slide 3525	BS 679 slide 3518	BS 769 slide 3530
Stolon, diameter	195 – 230	115 – 130	115 – 130
Internode of stem, length	900 – 1720	655 – 1065	655 – 820
Diameter	195 – 230	100 – 130	115 – 130
Hydrotheca, length adnate adcauline wall	310 – 330	245 – 260	215 – 245
Length free part	525 – 590	410 – 425	425 – 490
Length abcauline wall	740 – 770	510 – 525	475 – 495
Total depth	800 – 835	575 – 590	555 – 575
Diameter at rim	280 – 310	145 – 165	145 – 180
Maximum diameter	345 – 410	215 – 245	230 – 260

NMNZ Ralph Collection: Loc. 24, NMNZ Co. 894, a few colonies 2–3 mm high from stolon on algae. No gono-thecae. RMNH-Coel. slide 3591. Unstained slide in RSC as *Sertularella simplex*, no data. On label: smooth; **Loc. 131**, NMNZ Co.985, colony composed of 2 hydrothecae on fragment of alga; with *Phialella quadrata* (Forbes, 1848). No slides. Unstained slide in RSC as *Sertularella simplex*, no data; **Loc. 212**, NMNZ Co.1059, many colonies, partly detached, partly on decayed substratum, up to 8 mm high; no gonothecae. RMNH-Coel. slide 3722; **Loc. 224**, dried out slide in RSC as *Sertularella simplex* + *Halecium lenticulare*, no data. On label: somewhat gibbous, granuled; **Loc. 248**, NMNZ Co.1092, sample consists of large number of small, partly fragmented colonies of which longest about 8 mm, with gonothecae. 2 RMNH-Coel. slides 3767. Reasonable slide in RSC as *Sertularella simplex*, no data. On label: waved; **Loc. 251**, NMNZ Co.1095, numerous colonies detached from substratum, up to 10 mm high, with many gono-thecae. RMNH-Coel. slide 3770; **Loc. 263**, NMNZ Co. 1111, sample consists of partly decomposed algae to which are attached several about 7 mm high stems; no gonothecae. RMNH-Coel. slide no. 3788. With *Amphisbetia minima* (Thompson, 1879) and *Plumularia setaceoides* Bale, 1882; **Loc. 280**, NMNZ Co.1127, about 10 mm high stem, without gonothecae. RMNH-Coel. slide 3807; **Loc. 284**, NMNZ Co.1131, small, about 8 mm high colonies arising from a stolon reptant on sponge fragment; no gonothecae. RMNH-Coel slide 3811; **Loc. 305**, NMNZ Co.1147, fragmentary colony about 2 mm high, 6 hydrothecae, as well as several smaller fragments and an initial colony consisting of 1 hydrotheca, arising from stolon on calcareous algae (*Corallium* sp.). No slide. Dead material, no tissue remnants; **Loc. 337**, NMNZ Co.1164, sample consists of a fragment of algae with some colonies attached. Mostly sessile hydrothecae and some gonothecae. Sample in poor condition, probably once dried. No slide. With *Amphisbetia bispinosa* (Gray, 1843), with 1 gonotheca, also in poor condition; **Loc. 343**, NMNZ Co.1168, some fragments of *Sargassum* sp. with a fair number of about 10 mm high colonies, some with gono-thecae. RMNH-Coel. slide 3844. With *Halecium delicatulum* Coughtrey, 1876b. Poor, partly dried out slide in RSC as *Halecium delicatulum* (male) and *Sertularella*. No data; **Loc. 395**, NMNZ Co.1186, single stem; no slide. Amongst colonies of *Symplectoscyphus irregularis* (Trebilcock, 1928); **Loc. 399**, NMNZ Co.1189, fragments of stem about 8 mm high, with some gono-thecae. Specimens heavily overgrown. RMNH-Coel. slide 3866, after bleaching; **Loc. 423**, unstained slides in RSC as *Sertularella simplex*, no data. On label: 'waved', no spirit sp. left; **Loc. 517**, NMNZ Co.1251, detached colonies and gono-thecae, up to 7 mm high, all unbranched. RMNH-Coel. slide 3927. Poor slide in RSC as *Sertularella simplex*, no data; **Loc. 685**, good slide in RSC as *Sertularella simplex*, with data: St Heliers Bay, R. Kulka, 3.1.1950.

PMBS: *Sertularella ? simplex*. Identified by R. Kulka. (Taken from card register, probably the specimens under Ralph's Loc. 263).

TYPE LOCALITY: *Sertularia simplex*: Lyall Bay, Wellington, New Zealand (Hutton 1873; possible syntype, a microslide, in MOV, MV F59288, Stranks 1993). *Sertularella polyzonias* var. *nana*: Sumner, Christchurch, New Zealand (Hartlaub 1901b, location of type unknown).

DESCRIPTION: Small hydroid with erect, monosiphonic stems 10–15 mm high, rising from stolon frequently reptant on algae but also on fixed objects like lamellibranchs. One or 2 branches may occur, springing from stem immediately under hydrotheca. Stem and branches, if present, divided into internodes with 1 distal hydrotheca each; nodes usually distinct, oblique, sloping in alternate directions; first internode with a few rings; remaining internodes may have a few indistinct rings or undulations basally. Anastomoses between stems and branches have been observed but do not occur in present material. Stem straight, slightly to strongly geniculate.

Hydrothecae saccate, usually distinctly tumid, adnate to internode for about half adcauline hydrothecal wall to slightly less, greatest diameter in middle of hydrotheca, contracted just below hydrothecal rim. Typically abcauline wall of hydrotheca slightly convex, continuing smoothly into wall of internode below hydrotheca. Hydrothecal rim with 4 distinct, rounded cusps, 1 adcauline, 1 abcauline and 2 lateral, distinctly flaring as a result of hydrothecal contraction below rim; plane of aperture perpendicular to hydrothecal length axis or slightly tilted upwards. Three big intrathecal, plate-shaped teeth, 1 abcauline and 2 in embayments between abcauline marginal cusp and lateral cusps; 2 smaller additional intrathecal teeth may be present under lateral cusps in heavily sclerotised colonies. Operculum composed of 4 triangular flaps attached in embayments between marginal cusps, when closed forming a low roof. Single renovations of the hydrothecal rim occasionally present.

Gonothecae present on stem, inserting directly below a hydrotheca, or stolon; shape elongate ovoid, narrowing basally into a very short pedicel. There are 4 or 5 ring-shaped depressions giving the surface a ribbed appearance. The apical portion is more or less cylindrical and provided with 3 or 4 rounded cusps of varied development, surrounding a central aperture.

MEASUREMENTS of *Sertularella simplex* (in μm):

	New Zealand (Ralph 1961a)	Ralph's Loc. 517 slide 3927
Stem internodes, length	450 – 1000	390 – 565
Diameter at node	175 – 250	85 – 105
Hydrotheca, length adnate adcauline wall	200 – 300	185 – 210
Length free part	200 – 300	305 – 320
Diameter at rim		155 – 180
Length abcauline wall	400 – 520	390 – 450
Maximum diameter	200 – 250	205 – 210
Total depth		480 – 505
Gonotheca, total length	1500	1135 – 1210
Maximum diameter	550 – 800	495 – 590
Diameter at end	150	135 – 180

Some of the gonothecae are well preserved and contain a single large egg or developing planula.

REMARKS: We find this species shows a considerable range of variability. Strongly sclerotised specimens occurring on algae in the tidal zone may be difficult to separate from the co-occurring *Sertularella crassiuscula* Bale, 1924; the hydrothecae in the present species are typically slenderer and distinctly contracted under the hydrothecal rim. The internodes are longer with the proximal part ringed or undulated; they do not have the convex shape continuing in the node and free adcauline hydrothecal wall, characteristic of *S. crassiuscula*. The gonothecae, are smaller, more distinctly ringed and have three or four cusps. Large specimens of *S. simplex* may resemble specimens of *Sertularella robusta* Coughtrey with poorly developed hydrothecal ribs, the more so since slender colonies of the latter may also be geniculate. In *S. robusta*, as in *S. simplex*, the hydrothecal rim may be slightly tilted upwards. Typically, however, the ribs on the exterior of the hydrothecae of *S. robusta* are well developed and afford a reliable diagnostic character.

RECORDS FROM NEW ZEALAND: Lyall Bay; Timaru; Dunedin (Hilgendorf 1898). We have checked material from off North Island, about 35° S, 174.5° E, 86 m; off Coromandel Peninsula; Opotiki, Bay of Plenty; Little Barrier Island; Woodpecker Bay; Kaikoura; Avon-Heathcote Estuary; Little Papanui, Christchurch; Dunedin; Otago Peninsula, and Stewart Island. Additional records are algae and solid objects in the intertidal zone all around New Zealand and goes to depths of 86 m. Ripe gonothecae were observed in August.

DISTRIBUTION: Almost known exclusively from New Zealand but also recorded from southeast Australia (Watson 1973, 1979, 1994a).

Sertularella sinensis Jäderholm, 1896 (Fig. 41D–H)

Sertularella sp. Inaba 1892: 432, figs 11–12.

Sertularella sinensis Jäderholm 1896: 11, pl. 2, figs 2–3; Hartlaub 1901a: 20, 47, 51, 53, 56, 69, 70, 72, 125, pl. 4, fig. 12; Jäderholm 1903: 280; Stechow 1913b: 13, 129, figs 99–100; Jäderholm 1919: 17; Stechow 1923b: 13; Hiro [= Utinomi] 1939: 175, fig. 8; Rees & Thursfield 1965: 138; Yamada 1959: 65; Naumov 1960: 342–343, fig. 232; Hirohito 1969: 23; Rho & Chang 1974: 144, pl. 5, figs 1–2; Belousov 1975a: 206; 1975b: 655, fig. 1, no. 46; Rho 1977: 266, pl. 82, fig. 78; Hirohito 1983: 47; Yamada & Kubota 1987: 40; Park 1990: 82; 1992: 292; Vervoort 1993a: 192, 235–236, figs 53c-f, 54a, tab. 43; Wallin 1994: 50; Hirohito 1995 (English text): 203, fig. 67a-d; Park 1995: 15.

MATERIAL EXAMINED:

NZOI Stn K825: Single colony, 80 x 70 mm, fan-shaped, stem polysiphonic, many male gonothecae. Specimen with high number of rings on hydrotheca. 3 RMNH-Coel. slides 2270.

NMNZ: BS 437, 45 mm high colony with single side branch. No gonothecae. Covered with *Modeeria rotunda* (Quoy & Gaimard, 1827). NMNZ Co.460; RMNH-Coel. slide 2977.

TYPE LOCALITY: South China Sea, about 90 km south of Hsia-Men (Amoy), about 65 m depth (Jäderholm 1896; holotype in Zoological Museum, Uppsala University, Sweden, 396a-q. Wallin 1994).

DESCRIPTION (of NZOI Stn K825 specimen): Colony irregularly fan shaped, about 80 mm high and 70 mm wide, with polysiphonic stem and many polysiphonic side branches, bearing hydrocladia 15–20 mm long, springing from stem or branch directly below a hydrotheca and irregularly pinnately arranged, number of hydrothecae between 2 successive hydrocladia 3–7; hydrocladia occasionally with secondary branches. Stem, side branches, and hydrocladia divided into short inter-nodes separated by indistinct, oblique nodes, sloping in opposite directions. Internodes obscured in polysiphonic parts of colony, only visible in monosiphonic parts, sometimes marked only by constriction of perisarc.

Hydrothecae placed at distal end of internode, biseriate, alternately directed left and right, in same plane as hydrocladium, diverging from internode at angles of 90–60°. Hydrotheca saccate, distinctly swollen in basal part, narrowing towards rim and with considerable constriction just under rim as result of which marginal cusps are flared. Free adcauline wall slightly longer than or as long as adnate part, slightly convex. Adnate adcauline wall hook-shaped, slightly thickened basally; diaphragm moderately wide, wall of internode on opposite side with small thickening. Abcauline wall of hydrotheca slightly convex but sometimes straight. Surface of hydrotheca with 16–20 concentric, sharp ribs, completely encircling hydrotheca but for basal 3 or 4 which are visible only on abcauline side. Hydrothecal rim with 4 flaring, blunt marginal cusps separated by shallow embayments, into which are fitted 4 triangular opercular plates, forming a low roof when closed; 1 or 2 renovations of hydrothecal aperture and operculum frequent. 3 submarginal intrathecal cusps some distance under rim: 1 abcauline and 2 lateral below embayments between lateral marginal cusps and adcauline cusp.

Male gonothecae occur in profusion, attached to stem, side branches or internodes just below a hydrotheca; some of the tendrils also bear gonothecae.

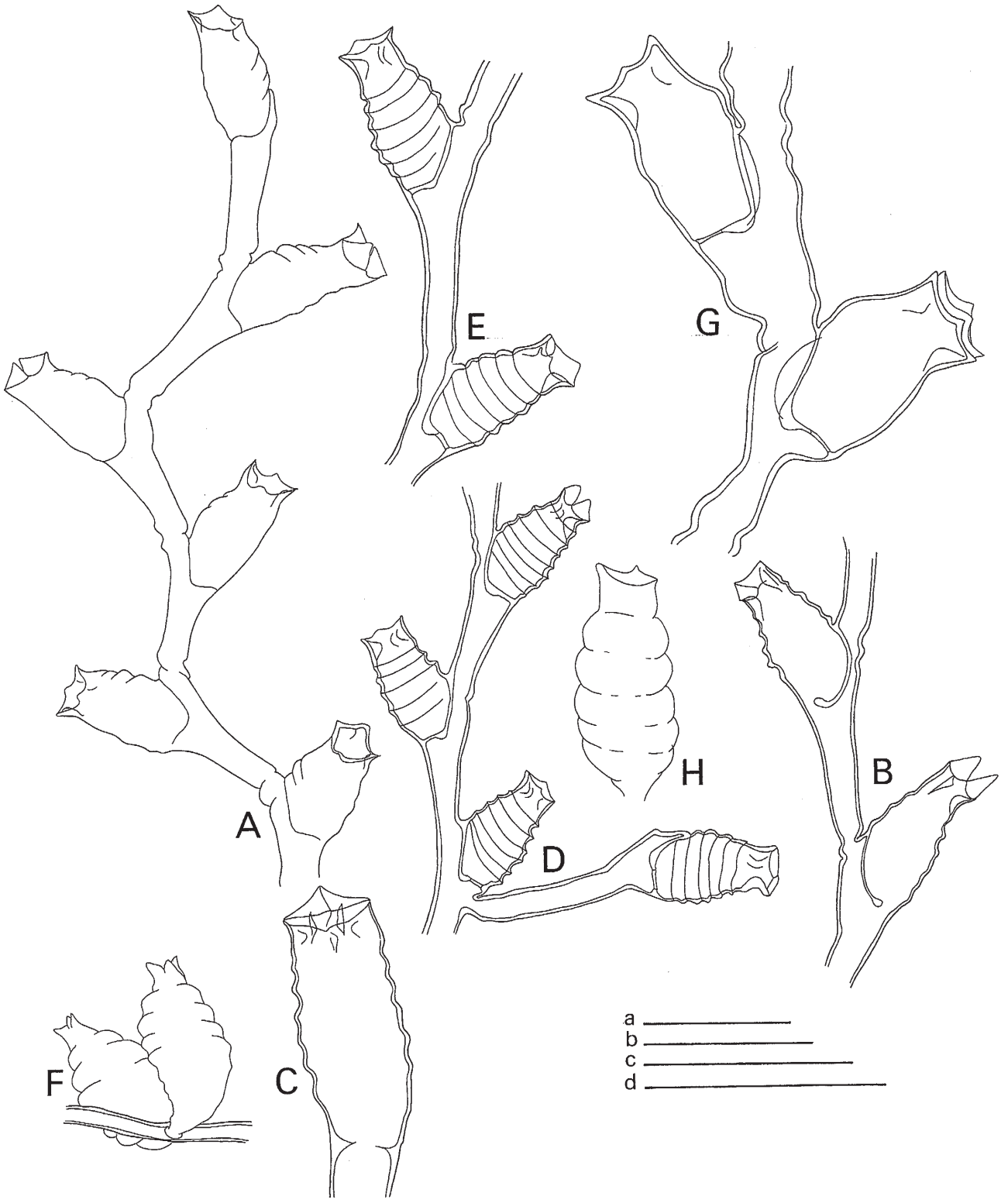

Fig. 40. A–F. ***Sertularella robusta*** Coughtrey, 1876. **A**, strongly geniculate stem (BS 561, slide 3032). **B**, strongly ribbed stem hydrothecae, lateral view. **C**, primary hydrotheca, oblique view from above, showing arrangement of the five intrathecal cusps (BS 882, slide 3427). **D**, part of stem with hydrocladium and strongly ribbed hydrothecae (Loc. 481, slide 3910). **E**, stem fragment (Loc. 516, slide 3926). **F**, gonothecae (Loc. 293, slide 3820). **G, H.** ***Sertularella simplex*** (Hutton, 1873). **G**, stem fragment with two hydrothecae, proximal hydrotheca renovated (Loc. 263, slide 3788). **H**, gonotheca (Loc. 248, slide 3767). Scales: a, 1 mm (A, B, D, E); b, 1 mm (H); c, 2 mm (F); d, 0.5 mm (C, G). W.V.

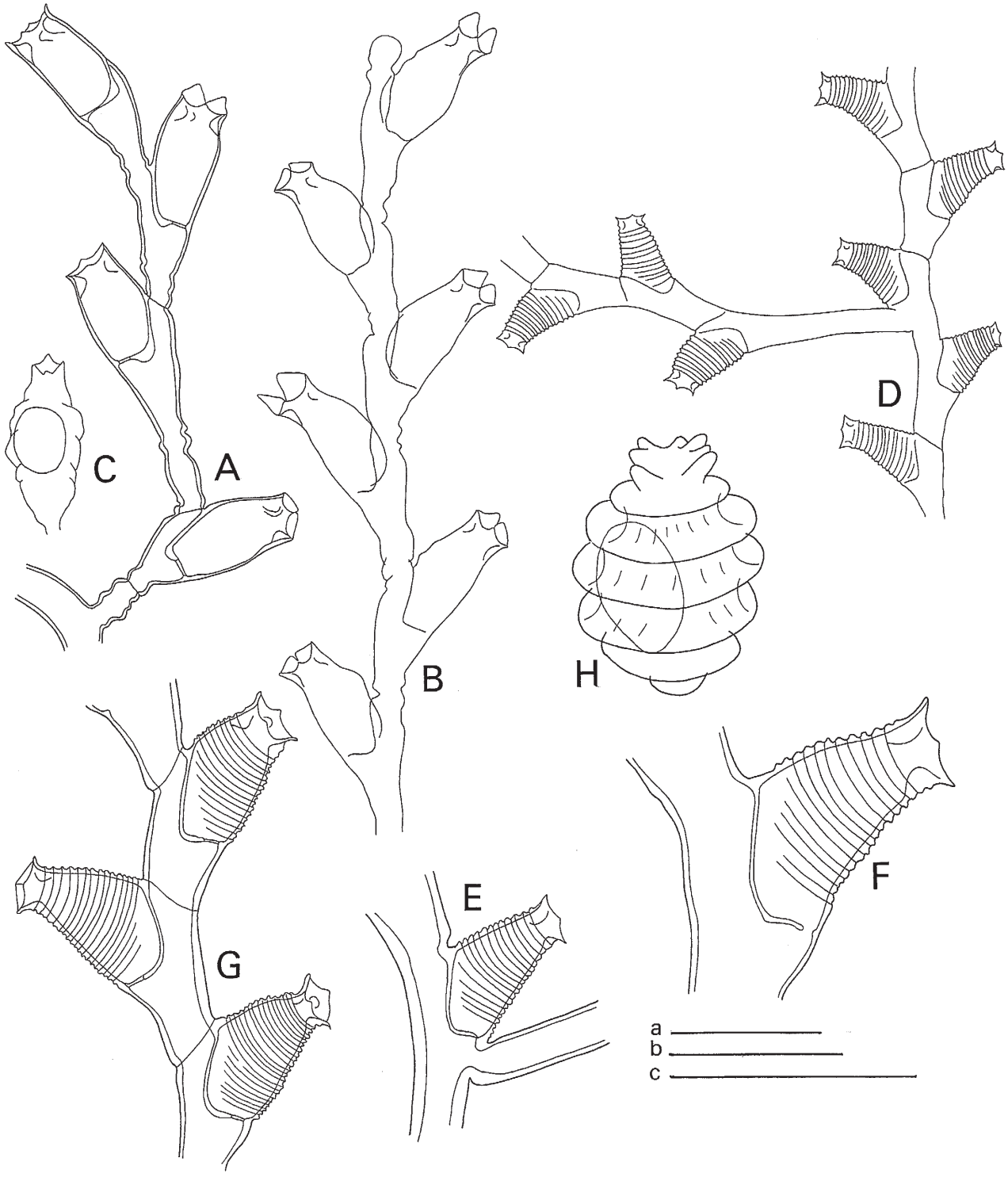

Fig. 41. A–C. ***Sertularella simplex*** (Hutton, 1873). **A**, stem with four hydrothecae (Loc. 24, slide 3591). **B**, part of stem (Loc. 263, slide 3788). **C**, gonotheca (Loc. 517, slide 3927). **D–H.** ***Sertularella sinensis*** (Jäderholm, 1896). **D**, part of stem with hydrocladium. **E**, axillary hydrotheca. **F**, hydrocladial hydrotheca (BS 437, slide 2977). **G**, part of stem. **H**, male gonotheca (NZOI Stn K825, slide 2270). Scales: a, 1 mm (A, B, E, G); b, 1 mm (C, D, H); c, 0.5 mm (F).

MEASUREMENTS of *Sertularella sinensis* (in μm):

	New Caledonia (Vervoort 1993a)	NZOI Stn K825 slide 2270	NMNZ BS 437 slide 2977
Stem, diameter at base	1100 – 1200	735	
Hydrocladium, diameter at base	160 – 190	165 – 260	
Stem hydrotheca, length abcauline wall	340 – 360	460 – 490	
Length free adcauline wall	280 – 295	410 – 460	
Length adnate adcauline wall	290 – 295	345 – 375	
Total depth	450 – 465	625 – 685	
Diameter at rim	170 – 175	165 – 195	
Maximum diameter	260 – 275	345 – 360	
Hydrocladial hydrotheca, length abcauline wall	295 – 390*	425 – 460*	420 – 430
Length free adcauline wall	200 – 340*	345 – 390*	395 – 425
Length adnate adcauline wall	245 – 310	345 – 375	280 – 360
Total depth	400 – 480*	625 – 655*	540 – 575
Diameter at rim	150 – 205	145 – 165	195 – 215
Maximum diameter	245 – 275	310 – 330	280 – 295
Distance between two successive hydrothecae measured from axil to base of hydrotheca	260 – 295	230 – 260	
Male gonotheca, total length		1720 – 1935	
Maximum diameter		1230 – 1280	
Distance between marginal cusps		590 – 740	

* = including renovations

Gonotheca large, barrel-shaped, with 6 or 7 deep circular constrictions, separating 5 or 6 circular, sharp carinae with slightly irregular, jagged perimeter. Apex of gonotheca produced into short inverted cone with a flattened, wide, squarish plateau, the 4 angles being produced into thick, blunt cusps; between each pair of cusps is another less developed, blunt cusp; this results the aperture being surrounded by 8 cusps. Basally the gonotheca narrows into an extremely short pedicel. All gonothecae contain a large, oval mass of developing spermatocytes.

REMARKS: In the specimen from NZOI Stn K825 secondary tubules originating from the basal stolonal fibres run all the way along the stem and side branches; they become free at the top and develop normal hydrocladia; occasionally also bearing gonothecae. In the same specimen several hydrothecae show signs of repair after sustaining considerable damage to the distal end. This may be the result of predation by nudibranchs or pycnogonids. In the material from BS 437 the hydrothecae are less constricted apically. The number of ribs on the hydrothecae (about 18) is higher than in material previously described from New Caledonia (10–12) and 10 in Japanese colonies recorded by Hirohito (1995). The gonothecae in our material have fewer ribs than those figured by Hirohito (1995, fig. 67d).

RECORDS FROM NEW ZEALAND: Found at two localities of the Kermadec Ridge northeast of New Zealand, between 145 and 154 m depth; gonothecae occurred in July.

DISTRIBUTION: Known from the Sea of Okhotsk, from Japanese waters, the Bonin Islands, Korean waters, South China Sea, Taiwan Strait and New Caledonian waters (Vervoort 1993a).

Sertularella stolonifera sp. nov. (Fig. 42A–C)

MATERIAL EXAMINED:

NMNZ: BS 480, creeping stolon and hydrothecae found amongst *Symplectoscyphus j. johnstoni* (Gray, 1843), attached to unrecognisable hydroid stems (holotype). NMNZ Co.421; RMNH-Coel. slide 2959, part of type series.

TYPE LOCALITY: 5–6 miles south of Wellington Harbour, 41°26.5′ S, 174°46.5′ E, 106–99 m.

DESCRIPTION (of the holotype): Individual colonies arising from a reptant stolon with wrinkled perisarc, probably developing on other hydroids; the colonies have 1–5 hydrothecae connected by an axis with wrinkled to indistinctly ringed perisarc; no division into internodes visible; apophysis on stolon of considerable length.

MEASUREMENTS of *Sertularella stolonifera* sp. nov. (in μm):

	NMNZ BS 480 slide 2959
Stolon, diameter	130 – 150
Length of base of first hydrotheca	440 – 450
Diameter at base of first hydrotheca	195 – 225
Hydrotheca, length abcauline wall	430 – 450
Length adnate adcauline wall	250 – 290
Length free adcauline wall	280 – 315
Total depth	430 – 515
Diameter at rim	235 – 300
Maximum diameter	310 – 335

Hydrothecae drum-shaped, with thick, irregularly wrinkled or indistinctly ringed perisarc, with exception of ultimate hydrotheca, adnate to stem for slightly less than half of adcauline wall; adnate part basally curved, forming a short plate to which base of hydranth is attached. Diaphragm distinctly visible, fairly wide, met on opposite, abcauline side by a slight thickening of perisarc. Hydrotheca with ring-shaped constriction some distance under rim. Hydrothecal aperture perpendicular to hydrothecal length axis, with 4 fairly low marginal cusps; operculum composed of 4 triangular plates attached in embayments between marginal cusps, when closed margins folded upwards. In older hydrothecae the rim and opercular plates show evidence of frequent renovation. Hydranths with about 12 short, contracted tentacles visible; a large caecum attached either to inside wall of hydrotheca. Some colonies show regeneration of a complete hydrotheca after loss of the terminal one.

No gonothecae present.

REMARKS: The structure of the hydrotheca and presence of a large caecum place this species in the genus *Sertularella* Gray, 1848. The strong development of the perisarc makes observation of the interior of the hydrotheca difficult. This species approaches *Sertularella areyi* Nutting, 1904 in colony structure and in the folded condition of the opercular plates in adult hydrothecae.

RECORDS FROM NEW ZEALAND: A single sample of this curious species was obtained from Cook Strait, 41°26.5′ S, 174°46.5′ E, 5–6 miles south of Wellington Harbour, 106–99 m.

DISTRIBUTION: Known only from New Zealand waters.

ETYMOLOGY: Species name *stolonifera*, from 'stolonifer' or 'stoloniferous', mainly used in descriptive botany to indicate the possibility to produce stolons or offshoots, is here used to indicate the mode of colony-growth of this new species.

Sertularella vervoorti El Beshbeeshy, 1991
(Fig. 42D, E)

Sertularella cylindritheca: Vervoort 1972: 126, fig. 39a; Stepan'yants 1979: 90, pl. 14, fig. 5A–B [not *Sertularella cylindritheca* (Allman, 1888)].
Sertularella cylindritheca p.p. Cornelius 1979: 306.
Sertularella vervoorti El Beshbeeshy 1991: 192–196, fig. 48, tab. 48; Vervoort 1993: 192.

MATERIAL EXAMINED:
NZOI Stn D7, colony fragment, about 30 mm high, apparently dried out; with *Tulpa diverticulata* Totton, 1930. RMNH-Coel. slide 4760.

TYPE LOCALITY: No distinct holotype or type locality indi-cated by El Beshbeeshy (1991); his material (syntypes) originating from four localities in the eastern South Atlantic off Patagonia, roughly 41.5°–51° S, 57°–59.5° W, 80–960 m; this material in the Zoological Museum of the University of Hamburg, Germany.

DESCRIPTION: Colonies to 20 mm high, pseudo-dichotomously branched stem, weakly polysiphonic at base, attached to unrecognisable hydroid, divided into long, slender internodes bearing distally an almost free hydrotheca and a small apophysis supporting following internode or 2 apophyses supporting diverging internodes; the process of bifurcation may be repeated several times. Hydrothecae almost completely free, only a minor part of adcauline wall being attached to internode. Hydrothecae large, barrel-shaped, greatest diameter in basal half; distal half gradually changing from cylindrical to squarish, with indications of 3 or 4 very low, rounded weak transverse ribs visible as undulations of the hydrothecal walls. Hydrothecal rim slightly thickened, renovated once or twice, with 4 very low, rounded marginal cusps and an operculum of 4 plates, present in nearly all hydrothecae. Opercular plates forming very low roof when closed. Perisarc airly strong along stem and internodes, thinning out considerably along hydrothecal walls.

No gonothecae present.

REMARKS: The present material differs from previous descriptions by fewer hydrothecal renovations; it is, nevertheless, well characterised by its colony structure and the large hydrothecae.

RECORDS FROM NEW ZEALAND: Known only from the Macquarie Island region, 55°11.40′ S, 158°43.00′ E, 241 m.

DISTRIBUTION: Southwest Atlantic off Patagonia (Vervoort 1972a; Stepan'yants 1979), as *Sertularella cylindritheca* (El Beshbeeshy, 1991) and Tasman Seamounts (Watson &

MEASUREMENTS of *Sertularella vervoorti* (in μm):

	Off Patagonia (El Beshbeeshy 1991)	Tasman Seamounts (Watson & Vervoort 2001)	NZOI Stn D7 slide 4760
Internode, length	2425 – 5145	2925 – 3500	1395 – 1890
Width at node	232 – 348	330 – 350	215 – 345
Hydrotheca, length free adcauline wall*	1554 – 1855	2375 – 2625	1560 – 1640
Length adcauline wall**	1345 – 1624	2050 – 2475	1150 – 1230
Diameter at rim	626 – 857	800 – 1000	525 – 575
Maximum diameter			740 – 770
Width at floor	510 – 614	650 – 800	410 – 495

* = including renovations
** = measurements based on a few complete hydrothecae

Vervoort 2001). The species, consequently, is not an endemic of Patagonian waters (El Beshbeeshy 1991: 196) but of wide distribution in the southern oceans.

Sertularella sp. 1 (Fig. 42F–H)

MATERIAL EXAMINED:

NZOI Stns: A917, small colonies, up to 8 mm high, on worm tube, no gonothecae. RMNH-Coel. slide 2278; **E719**, small colonies, 10–15 mm high, on stem of *Lytocarpia subdichotoma* (Ralph, 1961). All in RMNH-Coel. slide 2245; **G697**, profusely branched colony about 30 mm high developing on old hydroid stem, no gonothecae. 4 RMNH-Coel. slides 2869). With *Symplectoscyphus j. johnstoni* (Gray, 1843), also present on slide.

DESCRIPTION: Colonies composed of flaccid stems rising from a stolon reptant on worm tube or hydroid stems, height 10–25 mm; stems monosiphonic, sparingly branched, branches originating from internode directly below hydrothecae, of same structure as stem. Stem and branches divided into fairly long internodes by oblique nodes, slanting in opposite directions, visible only as thin lines.

MEASUREMENTS of *Sertularella* sp. 1 (in μm):

NZOI	Stn A917 slide 2278	Stn E719 slide 245
Stem internode, length	605 – 1150	1085 – 1365
Diameter at node	95 – 130	110 – 130
Hydrotheca, length adnate part adcauline wall	345 – 370	370 – 435
Length free part	325 – 345	390 – 410
Length abcauline wall	455 – 475	520 – 565
Total depth	520 – 585	640 – 735
Diameter at rim	175 – 240	260 – 280
Maximum diameter	280 – 325	345 – 410

Hydrothecae rather big, drum-shaped, about half or slightly less of adcauline wall adnate to internode. Surface of hydrotheca with 2 or 3 corrugations, starting at free adcauline wall and running downwards, occasionally also visible along abcauline wall of hydrotheca. Hydrothecal rim perpendicular to hydrothecal length axis, with 4 rather sharp cusps. Hydrotheca closed by means of operculum of 4 triangular plates attached in embayments of rim, when closed forming a low roof. Three to 5 renovations of hydrothecal rim common. No tissue remains.

Perisarc on internodes fairly thick, thinning out along hydrothecal border and becoming fragile, many hydrothecae collapsed or damaged.

No gonothecae observed.

REMARKS: The species resembles material described from Indonesian waters by Billard (1925b: 140–141, text-fig. 10, pl. 7, fig. 4) as *Sertularella gayi* var. *parva*. However, it shows no signs of polysiphony as did Billard's *Siboga* material. It also differs in the frequent occurrence of renovated hydrothecae, of which Billard's material showed no trace. It seems best not to allocate a specific name to this material, pending the discovery of fertile specimens. The three samples recorded here differ slightly in size, the material from NZOI Stn E719 having slightly larger hydrothecae and longer internodes; the hydrothecal cusps are less prominent. A mixture of several species of *Symplectoscyphus* and *Sertularella* were found at NZOI Stn I371. They became dried-out and in poor condition. Consequently the material is unfit for specific identification.

RECORDS FROM NEW ZEALAND: Three records, one from south of the Otago Peninsula, 528 m, one at the Chatham Rise, 203 m, and the third from deep water south-east of East Cape, 915–750 m.

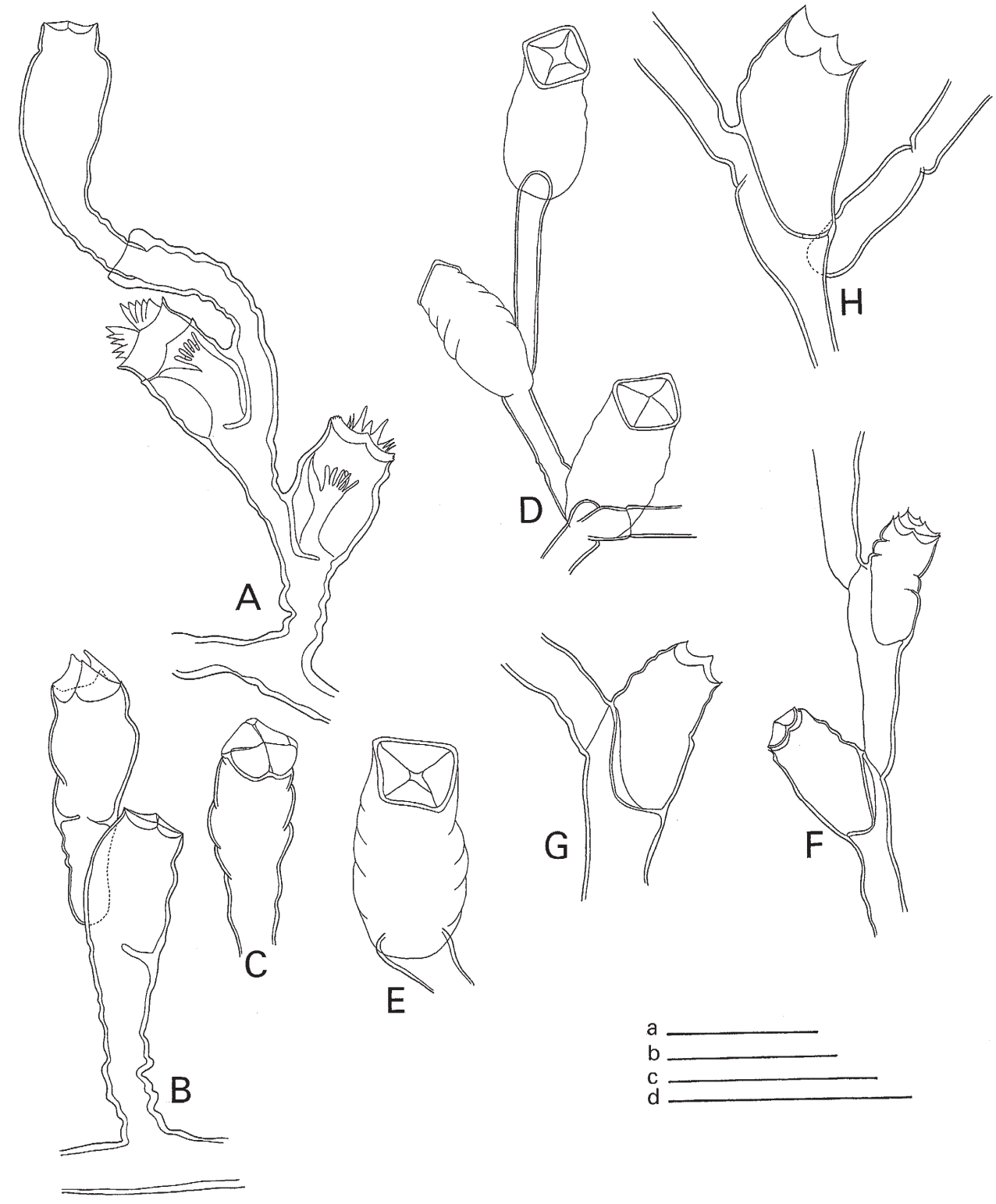

Fig. 42. A–C. ***Sertularella stolonifera*** sp. nov. **A**, **B**, colonies arising from stolon, lateral view. **C**, hydrotheca, oblique view from above (BS 480, holotype, slide 2959). **D, E.** ***Sertularella vervoorti*** El Beshbeeshy, 1991. **D**, part of colony. **E**, hydrotheca, oblique view from above (NZOI Stn D7, slide 4760). **F–H.** ***Sertularella*** sp. 1. **F**, part of stem. **G**, stem hydrotheca (NZOI Stn A917, slide 2278). **H**, axillary hydrotheca (NZOI Stn E719, slide 2245). Scales: a, 1 mm (A-C, F); b, 1 mm (E); c, 2 mm (D); d, 0.5 mm (G, H). W.V.

Sertularia Linnaeus, 1758

TYPE SPECIES: *Sertularia cupressina* Linnaeus, 1758.

Sertularia distans (Lamouroux, 1816) (Fig. 43A–C)

Dynamena distans Lamouroux 1816: 180, pl. 5, figs 1a, 1B; Cornelius 1979: 296–299, fig. 26; 1995b: 108–111, fig. 27 (*cum syn.*); Medel & Vervoort 1998: 63-66, figs 6c, 20a-b.
[Not *Sertularia distans* Lamouroux 1816: 191 = *Sertularella* sp.].
Sertularia lamourousii Deshayes & Milne Edwards 1836: 153 (replacement name for *Dynamena distans* Lamouroux, 1816)
Sertularia gracilis Hassall 1848: 2233.
Sertularia (Dynamena) distans: Busk 1852: 394.
Dynamena mediterranea Marktanner-Turneretscher, 1890: 242, pl. 5, figs 5, 5a.
Sertularia poutalesi Nutting 1904: 59, pl. 5, fig. 5.
Sertularia stookeyi Nutting 1904: 59–60, pl. 5, figs 6–7.
Sertularia distans: Billard 1906: 331; Medel & Vervoort 1998: 63-66, figs 6c, 20a-b (*cum syn.*).
Sertularia heterodonta Ritchie 1909: 79–81, fig. 4a-d.
Ssertularia lamourouxi: Bedot 1910: 371.
Sertularia distans var. *gracilis*: Billard 1912: 465.
Tridentata heterodonta: Stechow 1922: 149.
Tridentata lamourouxi: Stechow 1922: 149.
Dynamena distans: Stechow 1923b: 12.
Tridentata gracilis: Stechow 1927: 312.
Sertularia distans var. *gracilis* f. *peculiaris* Leloup 1935: 47–49, figs 28–29.
Tridentata distans: Hirohito 1969: 23, fig. 16; Calder 1991: 105–107, fig. 55 (*cum syn.*).

MATERIAL EXAMINED:

NZOI Stn I73, small colony detached from bryozoan. RMNH-Coel. slide 2129.

TYPE LOCALITIES: *Dynamena distans*: on "*Fucus natans* et quelques autres productions marines de l'Océan Atlantique" (Lamouroux 1816). *Sertularia gracilis*: Brighton, Sussex, England, U.K. [cf. Cornelius 1979: 296; syntypes in NHM, 1848.7.14.6 (on *Chondrus crispus* Stackh.) and 1899.7.1.5867, microslide]. *Sertularia pourtalesi*: Tennessee Reef, 38 m (Allman 1877, as *Sertularia distans*; type probably in MCZ). *Dynamena mediterranea:* Mediterranean (Marktanner-Turneretscher, 1890; location of holotype unknown). *Sertularia stookeyi*: Great Bahama Bank, on floating seaweed (Nutting 1904, syntype in NMNH, 19710 and 19711). *Sertularia heterodonta*: Abrolhos Bank, Brazil, 18°24′ S, 37°58′ W, on seaweed, 66 m (Ritchie 1909). *Sertularia distans* var. *gracilis* f. *peculiaris*: Caribbean waters, no distinct type locality indicated (Leloup 1935, material of this form in ISRN and NNM).

DESCRIPTION: Colony fragment about 6 mm high, erect, monosiphonic, unbranched; axis divided into internodes by means of oblique septa, constrictions of perisarc above each pair of hydrothecae. Base of colony an athecate internode arising from small apophysis on fragment of stolon, terminating in an oblique hinge-joint. The next 3 internodes also separated by hinge-joints, typically with 2 pairs of opposed hydrothecae, touching on front of colony, separated across internode at rear. Hydrothecae curved, more or less cylindrical, widest in middle and then curving outwards, adnate to internode for more than half adcauline length; free adcauline wall almost straight line in distal pairs; basal plate straight. Hydrothecal rim produced into 2 blunt, fairly long lateral cusps, of which frontal smaller than posterior; adcauline wall of hydrotheca without median adcauline cusp when viewed from above. Hydrothecal aperture closed by 2 opercular plates, attached in embayments between lateral cusps, upper plate tent-shaped, smaller than flat abcauline plate. Rim of hydrotheca slightly thickened. 1 hydrotheca with a more or less distinct, small intrathecal cusp and rim of 1 of hydrothecae is renovated. When viewed from oblique position basal plate of hydrotheca shows an oval foramen; hydrothecal floor with 2 small perisarcal knobs of varied development; 1 adcauline pointing to interior of internode, 1 abcauline projecting in interior of hydrotheca. Perisarc fairly thick on internodes, rapidly thinning out along hydrothecal border; some hydrothecae are collapsed and one has evidently regenerated after damage. Hydranths moderately well preserved, with small abcauline caecum attached to wall by filament of tissue a short distance below hydrothecal rim.

No gonothecae present.

MEASUREMENTS of *Sertularia distans* (in μm):

	Bermuda (Calder 1991)	NZOI Stn I73 slide 2129
Length of internode	289 – 429	1065 – 1150
Diameter at constriction		45 – 55
Hydrotheca, length abcauline wall	182 – 228	180 – 205
Length adnate adcauline wall	0 – 158	170 – 180
Length free adcauline wall	121 – 298	115 – 145
Width at rim	58 – 89	75 – 80
Maximum diameter		100 – 115
Width at base	56 – 112	55 – 70

REMARKS: The material of this species in the present collection is limited and sterile; it fits the description of this species by Calder (1991).

RECORDS FROM NEW ZEALAND: So far recorded only from a single locality north of New Zealand in the vicinity of Norfolk Island, 29°00.20′ S, 168°00.80′ E, 51 m.

DISTRIBUTION: Circumglobal in temperate, subtropical, and tropical waters, covering eastern and western Atlantic, eastern and western Pacific and Indian Ocean (Calder 1991).

Sertularia marginata (Kirchenpauer, 1864)
(Fig. 43D–G)

Dynamena marginata Kirchenpauer 1864: 13, fig. 8.
Sertularia marginata: Bale 1913: 125, pl. 12, fig. 9; Mulder & Trebilcock 1914b: 43; 1915: 54, pl. 8, fig. 5; Jäderholm 1920: 5; Jarvis 1922: 340; Totton 1930: 204, fig. 48b; Billard 1931a: 391, fig. 1, no. 1; Leloup 1935: 49; Blackburn 1938: 319; Leloup 1939a: 421, fig. 4; Blackburn 1942: 114; Vannucci Mendes 1946: 567, pl. 3, fig. 31a, pl. 4, figs 36–37; Vannucci 1951b: 106, 109, 110, 111, 113, 116, 117; Buchanan 1957: 367; Millard 1957: 224, fig. 13; Picard 1958: 193; Ralph 1961a: 785–788, fig. 12d-g; Millard 1964: 49; Mammen 1965: 5, fig. 77; van Gemerden-Hoogeveen 1965: 39, figs 13–17; Millard 1966b: 492; Rees & White 1966: 278; Vervoort 1966: 130, figs. 33-34; 1968: 106; Berrisford 1969: 394; Day *et al.* 1970: 15; Patriti 1970: 40, fig. 52; Morris & Mogelberg 1973: 24; Millard & Bouillon 1974: 8, 33, fig. 6E; Millard 1975: 311, fig. 99A–D; Gordon & Ballantine 1977: 100; Calder & Hester 1978: 91; Millard 1978: 198 *et seq.*; Marinopoulos 1979: 120; García Corrales *et al*. 1980: 52, fig. 18; Calder 1983: 15–16, figs 6–7; Flóres González 1983: 120, photograph 31; Masunari 1983: 84; Staples & Watson 1987: 218; Altuna & García Carrascosa 1990: 54 *et seq*., fig; Izquierdo *et al*. 1990: 43–44, fig. 9; Medel Soteras *et al.* 1991: 514–516, fig. 5; Dawson 1992: 19; de Oliveira Pires *et al*. 1992: 7; Vervoort 1993b: 556–557; Watson 1994a: 67; Boero & Bouillon 1993a: 264; Medel & Vervoort 1998: 66–70, figs 20c–22 (*cum syn.*).
Sertularia marginata var. *typica*: Vannucci Mendes 1949: 248; Vannucci 1951a: 84; 1954: 115.
Tridentata marginata: Calder 1991: 107–109, figs 56–57; 1993: 68 *et seq.*; 1995: 543 *et seq*.
Dynamena amplectens Allman 1885: 141, pl. 16, figs 3–4.
Desmoscyphus inflatus Versluys 1899: 42, figs 11–13.

MATERIAL EXAMINED:

NZOI Stns: E108, several plumes on short basal part, about 20 mm high, no gonothecae; **I69**, 5 colonies up to 40 mm high some with gonothecae, on base of *Solanderia secunda* (Inaba, 1892). RMNH-Coel. slide 2253; **P84**, small unbranched stems on stem of *Gymnangium ascidioides* (Bale, 1882) and some fragments. No gonothecae. RMNH-Coel. slide 2903.

NMNZ Ralph Collection: Loc. 27, NMNZ Co.897, a few branched colonies up to 15 mm high on algae. No gonothecae. RMNH-Coel. slide 3594. 3 tolerable slides in RSC as *Sertularia marginata* Kirchenpauer, no data; **Loc. 490**, NMNZ Co.1236, fair number of stems, unbranched, about 6 mm high, without gonothecae, arising from stolon on algae. Very brittle. RMNH-Coel. slide 3915. 3 good slides in RSC as *Sertularia marginata*, no data; **Loc. 634**, good slide in RSC as *Sertularia marginata* Kirchenpauer, with data: St. Heliers.

TYPE LOCALITY: *Dynamena marginata*: Pacific Ocean, on the algae *Sargassum* sp. (Kirchenpauer 1864, location of type unknown).

Dynamena amplectens: "Atlantic, attached to floating gulf-weed" (Allman 1885, type probably in NHM). *Desmoscyphus inflatus*: Island Branco, Cape Verde Archipelago (Versluys 1899, location of type unknown).

DESCRIPTION (of material from NZOI Stn I69): Pinnate, monosiphonic stems up to 30 mm high rising from apophysis on creeping stolon, separated from remainder of stem by hinge-joint; stem divided into internodes by incomplete, oblique septa; internodes with a pair of opposite hydrothecae, or with sub-opposite pair and a third hydrotheca in which case one of the paired hydrothecae is in the axil of an apophysis supporting a hydrocladium. Stem apophyses alternately directed left or right; third hydrotheca on apophysis-bearing internode on same side as apophysis. Proximal node of hydrocladia a hinge-joint, first hydrocladial internode long, ahydrothecate; remaining 7 or 8 internodes short, separated by indistinct, slightly oblique nodes and each with a pair of opposite hydrothecae in middle of internode.

Cauline and internodal hydrothecae saccate, with swollen base, better developed on adcauline side, adnate to internode for more than half adcauline hydrothecal length, but length of free adcauline portion variable along stem. Hydrocladial hydrothecae on front of internode; adcauline walls touching, separated at rear. Adcauline hydrothecal wall pointing rather sharply away from internode, free adcauline walls perpendicular to internodal length axis. Abcauline wall smooth, continuous with basal part of internode, internally with perisarc knob at about half, forming the base of an internal ridge or incomplete septum running in adcauline direction, gradually fading out. Hydrothecal aperture slightly thickened, thickening visible in lateral view as small internal cusps on adcauline and abcauline sides, but continuing as a ridge of varied development along hydrothecal rim. There are 2 well developed lateral marginal cusps; occasionally, depending on angle of view, a minor adcauline cusp visible. Operculum a roof-shaped, large adcauline plate, folded and occasionally split in middle, and a smaller abcauline plate. Occasional renovations of hydrothecal rim, maximum being 3. Cauline hydrothecae sometimes deformed, in these the internal abcauline perisarc knob is quite obvious. Contracted hydranth with a distinct abcauline caecum.

Gonothecae large, ovoid, basally strongly contracted into a short pedicel attaching gonotheca just below third hydrotheca of apophysis-bearing stem internode; apex of gonothecae truncate, with circular operculum and with indications of 2 blunt, opposite spines. There are 7 or 8 circular ribs, between which gonotheca is strongly contracted; apical part of gonotheca with 2 or 3 additional ribs with narrow hyaline frill, invisible in lower ribs. Gonothecae empty.

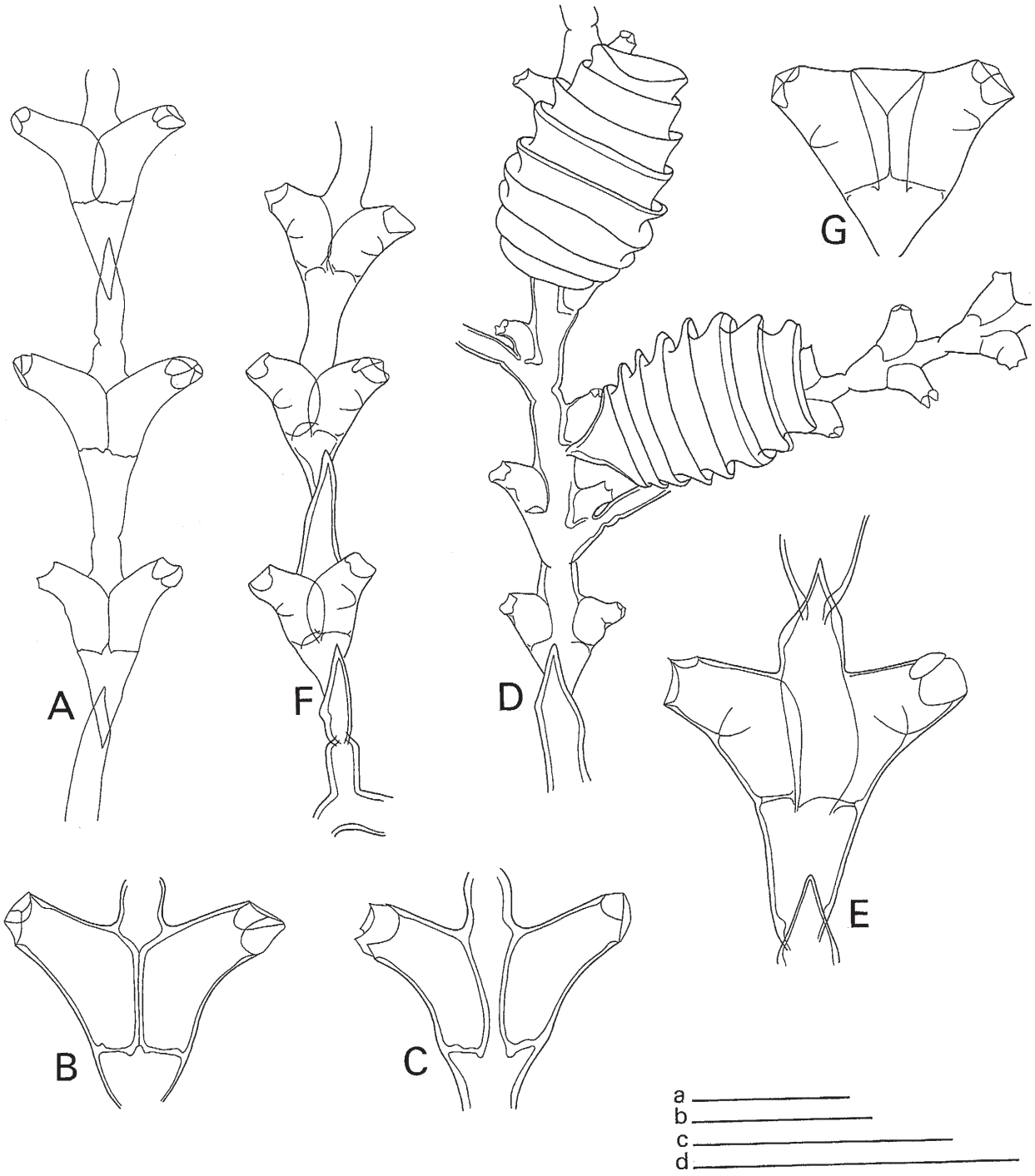

Fig. 43. A–C. ***Sertularia distans*** (Lamouroux, 1816). **A**, proximal part of stem. **B**, pair of stem hydrothecae, frontal view. **C**, pair of stem hydrothecae, view from back (NZOI Stn I73, slide 2129). **D–G.** ***Sertularia marginata*** (Kirchenpauer, 1864). **D**, part of colony with gonothecae. **E**, pair of hydrocladial hydrothecae (NZOI Stn I69, slide 2253). **F**, proximal part of stem of young colony. **G**, top pair of hydrothecae, frontal view (NZOI Stn P84, slide 2903). Scales: a, 1 mm (F); b, 1 mm (D); c, 0.5 mm (A, E, G); d, 0.4 mm (B, C). W.V.

MEASUREMENTS of *Sertularia marginata* (in μm):

	NZOI Stn I69 slide 2253	NZOI Stn P84 slide 2903	Ralph's Loc. 27 slide 3594	Ralph's Loc. 490 slide 3915
Stolonal apophysis	295 – 310	135		
Length	2580	650 – 760		
First stem internode, length	1300	705		
Diameter at superior node	255 – 260	110 – 115		
Apophyses bearing stem internode, length	1325 – 1450	500	1070 – 1075	
Diameter at superior node	200 – 215	148	175 – 235	
Stem hydrotheca, length fused part adcauline wall*	335 – 370	280 – 295	320 – 355	
Length free part	230 – 245	150 – 170	160 – 190	
Total depth	460 – 475	355 – 370	385 – 450	
Diameter at rim	160 – 170	135 – 140	150 – 175	
Distance between margins of pair of stem hydrothecae	950	605 – 675		
Hydrocladial internode, length	735 – 845		760 – 800	605 – 650
Diameter at node	105 – 110		110 – 150	95 – 110
Hydrocladial hydrotheca, length fused part adcauline wall	295 – 320		240 – 250	290 – 300
Length free part	215 – 160		275 – 285	145 – 185
Total depth	420 – 435		390 – 400	385 – 390
Diameter at rim	140 – 155		140 – 150	130 – 135
Gonotheca, total length	1950 – 2015			
Maximum diameter	935 – 1260			

* = axillary hydrothecae excluded

REMARKS: The colonies from NZOI Stn I69 have been assigned to this species because they agree best with the descriptions of *Sertularia marginata* Kirchenpauer, 1864. They differ in the rim of the hydrotheca which is only slightly thickened (best visible in lateral view as minor knobs at the end of adcauline and abcauline hydrothecal walls), and the gonothecae have no distinct apical cusps or spines. In this material the internal ridges in the hydrotheca, running obliquely upwards from the thickening halfway along the abcauline wall, are difficult to see, although visible when seen under high magnification in a stained slide.

The colonies from NZOI Stn P84 are unbranched, with long stem internodes. The seven pairs of hydrothecae are distinctly frontally directed, have distinct internal ridges and a notably thickened hydrothecal rim.

RECORDS FROM NEW ZEALAND: New Zealand records of this widely distributed species are few: off North Cape, *Terra Nova* Stn 134, on algae, 20–36 m, (Totton 1930); Poor Knights, about 36° S, 175° E, on *Solanderia* sp., 23 m (present record); Russell, Bay of Islands and Long Beach, in both cases on algae and intertidal (Ralph 1961a and present record); St Heliers, Auckland, no depth record (Ralph 1961a); Tasman Sea, near Lord Howe Island, on *Gymnangium ascidioides* (Bale, 1882), 59 m (present record), and Pacific off South Island, about 43.5° S, 177° W, on hydroid stems, 95 m (present record). It was noted as abundant in Doubful Sound in 1994 (J.E.W.) but was not collected.

DISTRIBUTION: Circumglobal in tropical and subtropical seas: western and eastern Atlantic, Indian Ocean, western and eastern Pacific (Medel & Vervoort 1998).

Sertularia tenuis Bale, 1884 (Fig. 44A–C)

Sertularia divergens Busk 1852: 392; Bale 1884: 81, pl. 5, fig. 3, pl. 19, fig. 16; Trebilcock 1928: 23. [not *Sertularia divergens* Lamouroux, 1816].
Sertularia tenuis Bale 1884: 82, pl. 5, figs 4, 5, pl. 19, fig. 16; 1913: 129; Mulder & Trebilcock 1914: 42; Jarvis 1922: 340; Billard 1925c: 201; Bale 1926: 16; Blackburn 1942: 114; Ralph 1961a: 785, fig. 11a-g; Ralph 1961d: 236; Staples & Watson 1987: 218; Dawson 1992: 19; Stranks 1993: 19.
Tridentata tenuis: Stechow 1922: 150; 1923d: 205.

MATERIAL EXAMINED:
NZOI Stns: B225, gear GLO, many colonies up to 12 mm on algae; no gonothecae. RMNH-Coel. slide 2759; **D127**, gear TAM, fragment without gonothecae. RMNH-Coel slide 2829.

TYPE LOCALITY: *Sertularia divergens*: Swan Island, Banks Strait, Tasmania, on algae (Busk 1852; syntype, a microslide, in MOV, MV F57955, Stranks 1993). *Sertularia tenuis*: Williamstown, Port Phillip Bay, Victoria,

Australia (Bale 1884; possible syntypes in MOV: MV F58811 (2 microslides); MV F60227 (dry material), (Stranks 1993).

DESCRIPTION: Pinnate plumes about 15 mm high arising from reptant stolon on algae, composed of monosiphonic stem and alternately arranged hydrocladia of 5 or 6 mm length, springing from the stem at an angle of about 45°. Stem basally with athecate internode, articulating by means of oblique hinge-joint. Stem divided into short internodes with oblique nodes, occasionally reduced to constrictions in perisarc. Cauline internodes with basal apophysis, an axillary hydrotheca and a pair of sub-opposite hydrothecae; apophyses alternate, either directly supporting a hydrocladium or by an intermediate internode; in both cases joint with hydrocladium is an oblique hinge-joint. Hydrocladia divided into short internodes separated by oblique nodes; each internode with a pair of hydro-thecae, touching on front, separated on back of inter-node. Cauline and hydrocladial hydrothecae identical, those of axial internodes widely separated, saccate, basal part swollen, with laterally directed, narrowing apical portion. Abcauline hydrothecal wall concave; adcauline wall adnate for about half length or slightly less, free part straight or slightly convex. Hydrothecal rim produced into 2 big, rounded lateral cusps; no evidence of an adcauline marginal cusp. Operculum large, tent-shaped adcauline plate and a smaller abcauline plate. Adcauline plate frequently recurved and abcauline plate tilted downwards, leaving a gaping aperture. Hydranth contracted with a small abcauline caecum attached by ligament to upper part of internal abcauline wall of hydrotheca.

No gonothecae.

REMARKS: This species resembles *Sertularia tumida* (Allman, 1877), particularly colonies in which the hydrothecae are not thickened and only moderately swollen. The colony structure is identical, although colonies of *S. tumida* are bigger. All our specimens of *S. tenuis* are fairly densely covered with filamentous algae, which does not seem to deleteriously affect the hydranths.

RECORDS FROM NEW ZEALAND: Foveaux Strait, 46°50.00′ S, 168°18.00′ E, 31 m and Southwest Pacific, Macquarie Gap, 46°42.00′ S, 168°17.30′ E, 29 m. Additional material is mentioned by Trebilcock (1928) from oyster shells of the Stewart Island region. Ralph (1961) also mentioned the species from the Chatham Islands (Stns 14 and 37), but the material from Stn 37 that we have been able to inspect, belongs to *Sertularia tumida* Allman, 1877.

MEASUREMENTS of *Sertularia tenuis* (in μm):

	NZOI Stn B225 slide 2759
Stolonal apophysis, length	1120 – 1130
Diameter	80 – 85
Apophysis bearing hydrocladium, length	85 – 140
Diameter at node	65 – 80
Intermediate internode of hydrocladium, length	165 – 195
Diameter	65 – 80
Stem hydrotheca, length fused part adcauline wall	205 – 220
Length free part	140 – 150
Length abcauline wall	225 – 235
Total depth	310 – 330
Diameter at rim	60 – 70
Hydrocladial internode, length	390 – 420
Diameter at node	65 – 85
Hydrocladial hydrotheca, length fused part adcauline wall	185 – 195
Length free adcauline wall	170 – 195
Length abcauline wall	225 – 235
Total depth	295 – 320
Diameter at rim	70 – 85

DISTRIBUTION: Although Ralph reported distribution of this species as "essentially cosmopolitan", it appears to be restricted to waters off the east coast of Australia and to southern New Zealand waters.

Sertularia tumida Allman, 1877 (Figs 44D–F; 45A–D)

Sertularia tumida Allman 1877: 23–24, pl. 16, figs 3–4.
Tridentata westindica Stechow 1920: 38–39, fig. 5.
Tridentata tumida: Stechow 1922: 150; Calder 1991: 109–110. figs 58–59.
Sertularia borneensis Billard 1925a: 649, fig. 1D; 1925b: 171–173, fig. 31.
[not *Sertularia borneensis* f. *parvula* Vannucci 1949: 249, pl. 3, figs 47–48 = ?*Dynamena turbinata* Lamouroux, 1816].
Sertularia westindica: Fraser 1944a: 291, pl. 62, fig. 279.
Dynamena tumida: Leloup 1960: 228.
Sertularia west-indica: Mammen 1965: 40, fig. 71 (incorrect spelling).
Sertularia turbinata: Vervoort & Vasseur 1977: 60–64, figs 26–27; García Corrales *et al*. 1980: 57, fig. 19.
[not *Dynamena turbinata* Lamouroux, 1816].

MATERIAL EXAMINED:

NZOI Stns: B595, 3 small colonies, up to about 15 mm high, no gonothecae. RMNH-Coel. slide 2793; **I74**, many unbranched stems about 6 mm high from stolons creeping on bryozoans, quite characteristic; no gonothecae. RMNH-Coel. slide 2130; **Q174**, small stem, 10 mm high, with 3 branches, on bryozoans. RMNH-Coel. slide 2915.

NMNZ: BS 679, small colonies up to 20 mm high on stones and various hydroids; no gonothecae. NMNZ Co.876. Additional sample taken from *Crateritheca zelandica* (Gray, 1843). RMNH-Coel. 29215, 2 RMNH-Coel. slides 4762; **BS 769**, 2 colonies up to 15 mm high on base of *Hydrodendron cacini-formis* (Ritchie, 1907). Only as RMNH-Coel. slide 3512; **BS 838**, up to 15 mm high, pinnate and unbranched colonies on various hydroids and bryozoans. NMNZ Co.441. In addition a few colonies on bryozoans, up to 250 mm high; no gonothecae. NMNZ Co.766; RMNH-Coel. 27710, slide 3410; **BS 840**, 10-15 mm high colonies on various hydroids. No gonothecae. NMNZ Co.399.

NMNZ Ralph Collection: Loc. 588, NMNZ Co.1298, 3 colonies up to 20 mm high and some fragments. No gonothecae. A colony in RMNH-Coel. slide 3975.

Ralph Chatham Islands Expedition Collection: Stn 37, several about 8 mm high stems together with *Halopteris campanula* (Busk, 1852) on sponge; no gonothecae. NMNZ Co. 1351; RMNH-Coel. slide 4420.

TYPE LOCALITY: *Sertularia tumida*: Tortugas, shallow water (Allman 1877, location of type unknown). *Tridentata westindica*: Martinique, Lesser Antilles (Stechow 1920; location of type probably in ZSBS). *Sertularia borneensis*: *Siboga* Stn 80, Borneo Banc, 02°25′ S, 117°43′ E, 34 m, on *Macrorhynchia phoenicea* (Busk, 1852) (Billard 1925a, b; syntypes in ZMA, ZMA Coel 3923, van Soest 1976).

DESCRIPTION: Colony plumose, composed of mono-siphonic stem springing from reptant stolon; hydro-cladia alternately arranged in 1 plane, up to 10 mm long. Stem divided into internodes by oblique nodes, first internode athecate and without hydrocladia, springing from apophysis on stolon, followed by 1 or more inter-nodes without thecae or hydrocladia, separated by oblique nodes; last node separated from first hydro-cladiate internode by an oblique hinge-joint. Internodes of stem separated by oblique nodes, in upper part of stem nodes geniculate, with 3 hydrothecae and a basal apophysis supporting a hydrocladium; apophyses alternately directed left or right. Cauline internodes with 3 hydrothecae: a basal axillar hydrotheca followed by a sub-opposite pair; hydrothecae of pair not in contact across internode. Apophysis on cauline internode long, fused with first internode of hydrocladium, ending in oblique hinge-joint. Hydrocladia composed of short internodes separated by oblique nodes, each with a pair of hydrothecae. Hydrocladial hydrothecal touching in front, widely separate at back. Hydrothecae saccate, swollen basally, curving outward, but degree of curvature variable throughout colonies. Abcauline wall of hydrotheca concave; one-third to half of adcauline wall adnate, whole of adcauline wall smoothly rounded. Hydrothecal rim slightly but distinctly thickened, with 2 prominent, rounded cusps, that on back of hydrotheca being better developed. Rim at adcauline side slightly upturned, without forming distinct cusp.

MEASUREMENTS of *Sertularia tumida* (in μm):

	NZOI Stn B595 slide 2793
Stolonal apophysis, diameter	150
Length	650
Apophysis bearing stem internode, length	870
Diameter at superior node	135 – 170
Stem hydrotheca, length fused adcauline wall*	220 – 250
Length free adcauline wall	105 – 185
Total depth	345 – 355
Diameter at rim	105 – 115
Hydrocladial internode, length	525 – 585
Diameter at node	65 – 90
Hydrocladial hydrotheca, length fused adcauline wall	140 – 185
Length free adcauline wall	185 – 260
Total depth	320 – 355
Diameter at rim	90 – 105

* = measured on front of colony

Operculum well preserved in most colonies,composed of tent-shaped adcauline valve and a semicircular abcauline valve. Perisarc of stem and internodes fairly thick and strong; no collapsed hydro-thecae. Hydranths with distinct, fairly spacious abcau-line caecum, attached by ligament to inside abcauline wall close under rim.

No gonothecae.

REMARKS: This material differs from *Sertularia marginata* Kirchenpauer, 1864, by the following particulars:

1. The hydrothecae of the pairs on the stem are dis-placed, being sub-opposite.
2. All hydrothecae are strongly curved outwards, this, combined with the strongly swollen basal portion, gives the hydrothecae a characteristic appearance.
3. Lateral marginal cusps asymmetrically developed, that on front being much smaller than that on the back.
4. Perisarc strongly developed, particularly on the internodes and along the hydrothecal rim; this last feature influences the shape of the hydrothecal aper-ture, particularly in the stem hydrothecae.

We have followed Calder (1991) in the synonymy of this species.

RECORDS FROM NEW ZEALAND: Several localities in northern New Zealand waters; from Cook Strait; from near the Chatham Islands; and from the Southwest Pacific, 46°40.00′ S, 169°22.60′ E, 73 m, substrate unknown.

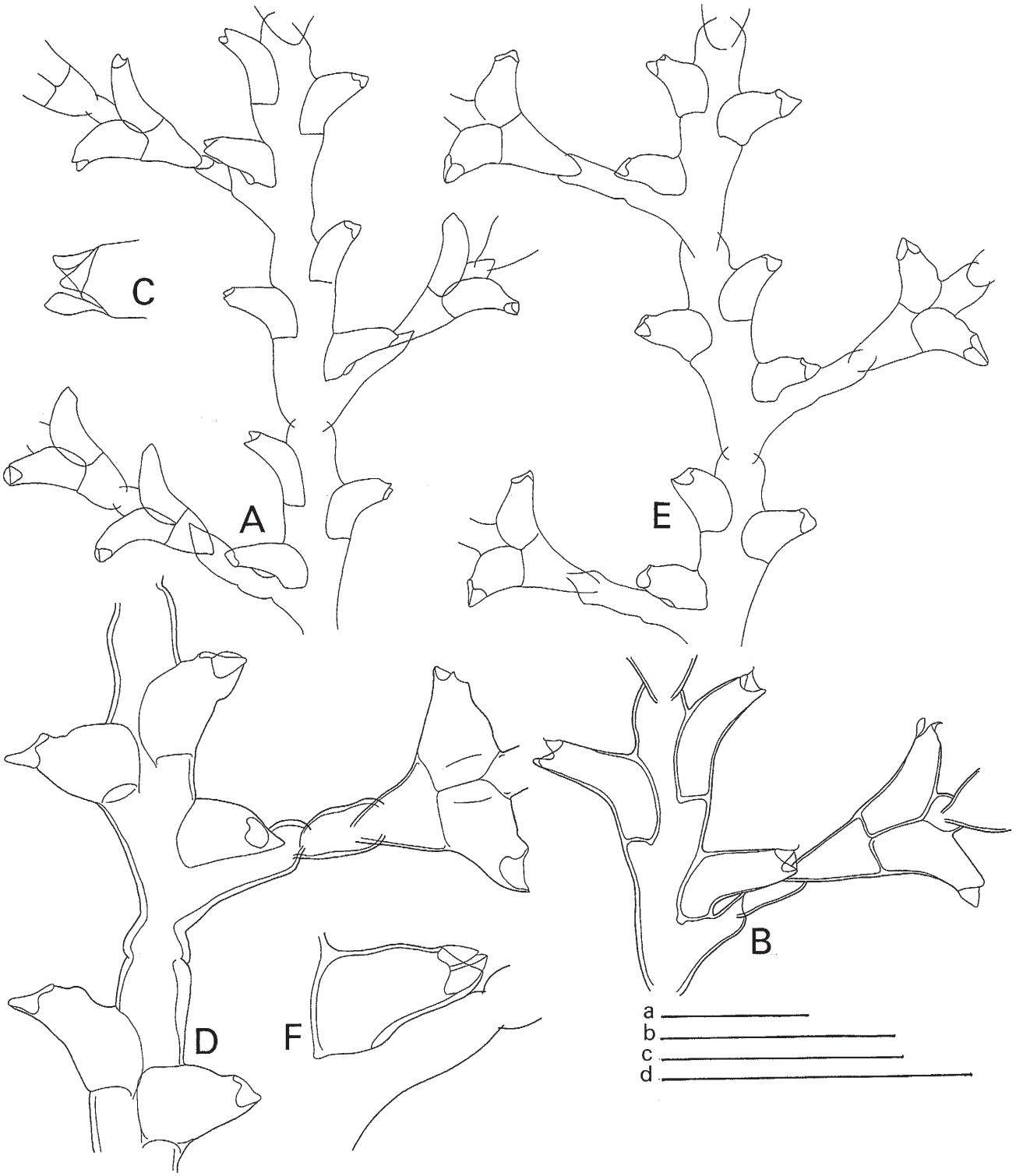

Fig. 44. A–C. S*ertularia tenuis* Bale, 1884. **A**, part of colony. **B**, part of stem with hydrocladium and axillary hydrotheca. **C**, hydrothecal aperture and operculum, lateral view (NZOI Stn B255, slide 2759). **D–F. *Sertularia tumida*** Allman, 1877. **D**, Part of colony (NZOI Stn B595, slide 2793). **E**, part of colony. **F**, axillary hydrotheca (BS 679, slide 4762). Scales: a, 1 mm (A, E); b, 0.2 mm (C); c, 0.5 mm (B, D); d, 0.4 mm (F). W.V.

The species is rather rare in the collections and seems to be mainly restricted to hard substrata in the deeper littoral zone.

DISTRIBUTION: Circumglobal in western and eastern Atlantic, Indian Oceans and western Pacific (Calder 1991).

Sertularia unguiculata Busk, 1852 (Fig. 45E–H)

Sertularia unguiculata Busk 1852: 387, 394; Farquhar 1896: 463; Bartlett 1907: 42; Bale 1914: 16; Mulder & Trebilcock 1914b: 43; Bale 1915: 273; Jäderholm 1917: 16; Bale 1924: 248; Trebilcock 1928: 23; Totton 1930: 203, fig. 48a (*cum syn.*); Blackburn 1937: 170; 1942: 113; Hodgson 1950: 26, figs 45–46; Ralph 1961a: 788–790, fig. 13a-d; 1961d: 236; 1966: 159; Morton & Miller 1973: 152, fig. 54, no. 7; Watson 1973: 178; Gordon & Ballantine 1977: 100; Staples & Watson 1987: 218; Dawson 1992: 19; Stranks 1993: 19; Watson 1994a: 67; Bouillon *et al.* 1995: 73.
Amphisbetia unguiculata: Stechow, 1923d: 200.

MATERIAL EXAMINED:

NZOI Stns: B223,gear DD/GOL, 1 fragment, 8 mm. RMNH-Coel. slide 2741; **B248**, gear DIS, 2 fragments about 8 mm long. RMNH-Coel. slide 2769; **C765**, 1 colony about 6 mm high, 4 hydrocladia, no gonothecae. In addition 3 stems 10–15 mm high. RMNH-Coel. slide 2097; **D127**, gear TAM, 4 stems up to 40 mm high, no gonothecae. RMNH-Coel. slide 2827; **D873**, about 20 colonies, up to 70 mm high, some with gonothecae. RMNH-Coel. slide 2281; **E136**, large bunch of colonies, about 50 mm high, and fragments. Many gonothecae; **J17**, stem fragment, about 20 mm long, no gonothecae.

NMNZ Ralph Collection: Loc. 124, good slide in RSC as *Sertularia unguiculata* Busk; no data; **Loc. 127**, NMNZ Co. 981, about 15 mm long colony fragment with gonothecae and some smaller fragments. RMNH-Coel. slide 3664; **Loc. 229A**, NMNZ Co.1074, 8 plumes up to 20 mm high, no gonothecae, 1 in RMNH-Coel. slide 3737. With *Aglaophenia plumosa* Bale, 1882. Partly dried out slide in RSC as *Sertularia unguiculata* Busk, with data: P.V.A.; **Loc. 244**, NMNZ Co.1088, several about 12 mm high stems and some fragments; no gonothecae, RMNH-Coel. slide 3763. With *Symplectoscyphus j. johnstoni* (Gray, 1843) and *Clytia mollis* (Stechow, 1919); **Loc. 308**, NMNZ Co.1149, fragmentary plumes up to 35 mm high, some branched. No gonothecae. Material dirty and very fragile. RMNH-Coel. slide 3829 (after bleaching). Poor slide in RSC as *Sertularia unguiculata* Busk, no data; **Loc. 310**, NMNZ Co. 1150, completely fragmented plume. RMNH-Coel. slide 3830. Dead specimen, no tissue remnants. Good slide in RSC as *Sertularia unguiculata*, no data; **Loc. 410**, NMNZ Co.1198, 5 pinnate colonies, 20–25 mm high, no gonothecae. RMNH-Coel. slide 3880. Partly dried out slide in RSC as *Sertularia unguiculata*, data none; **Loc. 614**, NMNZ Co.1323, 7 stems of varying height, highest 37 mm and with gonothecae; some fragments. RMNH-Coel. slide 4004; **Loc. 615**, NMNZ Co. 1324, small fragment. RMNH-Coel. slide 4007. With *Halopteris campanula* (Busk, 1852) and *Plumularia setacea* (Linnaeus, 1758).

TYPE LOCALITY: Swan Island, Banks Strait, Tasmania (Busk 1852); possible syntype in MOV (MV F59330, 1 microslide) (Stranks 1993).

DESCRIPTION: Monosiphonic stems up to 50 mm high, rising from a stolon creeping on algae and fixed objects; stem composed of successive internodes, first internode with oblique hinge-joint and articulating with strong apophysis on stolon; 1 or 2 intermediate athecate internodes may be present. Stem internodes separated by nodes that only in higher parts of stem are complete, in lower parts represented by constrictions in perisarc. Internodes in basal parts of stem with 2 apophyses, each with an axillar hydrotheca and a sub-opposite pair above; higher parts of stem have 1 apophysis and 3 hydrothecae per internode; internodes of higher parts frequently geniculate; all apophyses laterally directed and alternating, separated from hydrocladia by oblique hinge-joints, with 1 or occasionally several intermediate athecate internodes. Hydrocladia up to 10 mm long; internodes with 1–5 pairs of opposite hydrothecae; more pairs of hydrothecae in basal parts of colony and hydrocladia, internodes separated by means of oblique nodes.

Hydrothecae urceolate, apical portion narrowed, curved obliquely outwards and forwards in both cauline and hydrocladial internodes, fairly deeply immersed into internode; adnate adcauline wall at least twice as long as free part. Axial hydrothecae widely separated, not touching; axillary hydrotheca fairly strongly curved, partly adnate to hydrocladial apophysis. Hydrocladial hydrothecae touching on front of colony or partly adnate, separated widely on back. Hydrothecal rim typically thickened, with 2 rounded lateral cusps of unequal development, that on back being much bigger; no indication of adcauline cusp. Operculum of 2 strongly attached flaps of nearly identical shape and development, adcauline flap folded in middle and slightly roof-shaped. Hydranth with 10–12 tentacles, a big adcauline ligula set with nematocysts and a distinct abcauline caecum attached to inside of abcauline hydrothecal wall. Perisarc strong, thinning out along free part of hydrotheca.

Gonothecae borne on internodes of stem, inserting under apophyses, large, smooth, barrel-shaped, apically with large circular opening surrounded by low collar and closed by circular flap.

REMARKS: This species is fairly variable in development of the perisarc and number of hydrothecae per internode. Both stem and hydrocladia may terminate in tendrils. The variability was noticed and described by Bale (1884: 77–78), it is also borne out by the present material, though we have not found the variety with three rows of hydrothecae mentioned by Bale.

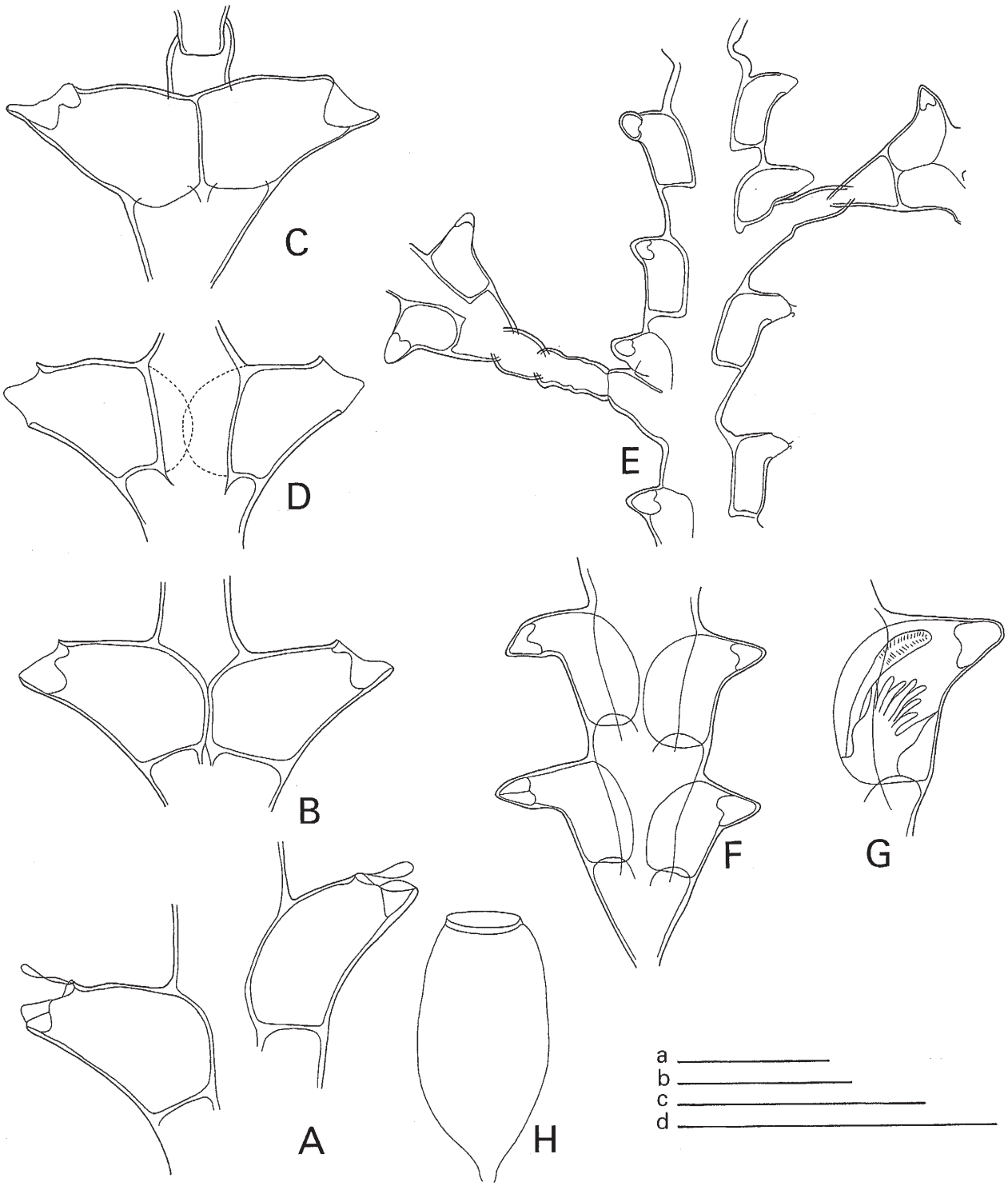

Fig. 45. A–D. ***Sertularia tumida*** Allman, 1877. **A**, pair of stem hydrothecae, frontal view. **B**, first pair of hydrocladial hydrothecae, frontal view. **C**, pair of distal hydrocladial hydrothecae, frontal view. **D**, pair of proximal hydrocladial hydrothecae, view from back (BS 679, slide 4762). **E–H.** ***Sertularia unguiculata*** Busk, 1852. **E**, part of stem with two hydrocladia. **F**, proximal part of hydrocladium, frontal view. **G**, hydrotheca with polyp, caecum and ligula. **H**, gonotheca (Loc. 614, slide 4004). Scales: a, 1 mm (E); b, 1 mm (H); c, 0.5 mm (F); d, 0.4 mm (A–D, G). W.V.

MEASUREMENTS of *Sertularia unguiculata* (in μm):

	Ralph's Loc. 614, slide 4004
Stolonal apophysis, length	1300
Diameter	420
Apophysae bearing hydrocladium, length	420 – 450
Diameter at node	100 – 110
Stem hydrotheca, length fused adcauline wall	250 – 255
Length free adcauline wall	110 – 130
Length abcauline wall	170 – 205
Total depth	280 – 295
Diameter at rim	65 – 80
Axillary hydrotheca, length fused adcauline wall	195 – 225
Length free adcauline wall	100 – 130
Length abcauline wall	225 – 235
Total depth	255 – 270
Diameter at rim	65 – 80
Hydrocladial internode, length	410 – 1230
Diameter at node	65 – 130
Hydrocladial hydrotheca, length fused fused adcauline wall	205 – 225
Length free adcauline wall	100 – 110
Length abcauline wall	145 – 170
Total depth	205 – 280
Diameter at rim	80 – 85
Gonotheca, length	1800
Maximum diameter	885
Diameter of aperture	460

RECORDS FROM NEW ZEALAND: Recorded from sub-littoral waters all around New Zealand between 34.5°–46.5° S, 168.5° E–176° W, 17–60 m depth. Frequently washed ashore on algae, ascidians and other hard substrate. Gonothecae present in collections from January, February, August, and October, some empty gonothecae on drifted material.

DISTRIBUTION: Well distributed in sub-littoral and moderately deep waters around Australia, Tasmania and New Zealand.

Staurotheca Allman, 1888

TYPE SPECIES: *Staurotheca dichotoma* Allman, 1888.

REMARKS: This genus has recently been re-defined by Peña Cantero *et al.* (1997). It is mainly restricted to the Antarctic and subantarctic; the occurrence of a species from the north of New Zealand is surprising and is doubtful due to the poor condition of the specimen.

?*Staurotheca megalotheca* sp. nov. (Fig. 46A–D)

MATERIAL EXAMINED:

NZOI Stn F924, single colony with gonothecae, about 100 mm high (holotype, H-765 in NIWA collection). 3 RMNH-Coel. slides 2202, part of type series.

TYPE LOCALITY: Southwest Pacific, northeast slope off North Cape, 34°07.50′ S, 172°47.00′ E, 315 m.

DESCRIPTION (of holotype): Erect colony about 100 mm high, composed of an irregularly branched, polysiphonic main stem; there are 3 primary and 3 secondary branches, one primary branch basally bearing few secondary tubules; remaining 2 branches and secondary branches monosiphonic, with an irregular division into internodes, nodes occasionally absent; one (to several pairs) of opposite hydrothecae or one (or several whorls) of 3 hydrothecae, usually in decussate arrangement but sometimes with a few pairs in same plane.

Hydrothecae large, tubiform, curved, adnate with internode for about half length, rather deeply sunken into internode; free portion curving outward. Abcauline wall of hydrotheca smoothly curved, free adcauline wall convex, angle with internodal axis about 60°. Hydrothecal floor uneven, with knobs of perisarc on both sides of diaphragm, those on adcauline side the larger; floor straight, not mushroom-shaped. Hydrothecal aperture circular, plane almost parallel to internodal long axis, slightly tilted upwards.

Gonothecae large, club-shaped, narrowing basally into a short, thick pedicel attaching gonotheca to internode directly under hydrothecal base and tightly pressed against base; all gonothecae on front of colony and roughly in a line; basal part of gonothecae with a flattened oval, distal part pointing away from internode; top rounded, with a small circular aperture at end of a short neck.

MEASUREMENTS of *Staurotheca megalotheca* sp. nov. (in μm):

	NZOI Stn F924 slide 2202
Internode, length	3970 – 4080
Diameter at node	815 – 1250
Hydrotheca, length adnate adcauline wall	2610 – 2840
Length free adcauline wall	2270 – 2385
Total depth	3975 – 4200
Diameter at rim	750 – 1020
Gonotheca, total length	5335 – 5790
Length of pedicel	225 – 795
Maximum diameter	1930 – 2270

Perisarc thin throughout colony, resulting in many collapsed hydrothecae. Perisarc of gonothecae firm though not particularly thick. No tissue left. Gonothecae empty.

REMARKS: This material agrees with the diagnosis of *Staurotheca* Allman, 1888, recently given by Peña Cantero *et al.* (1997) but for the following details:

1. Size of hydrotheca and length of free part is larger than previously observed in other species referred to this genus.
2. The hydrothecal base, although uneven by development of knobs of perisarc, is definitely not upwardly concave ('mushroom-shaped') as in the majority of species of *Staurotheca*.
3. The gonotheca differs from others so far reported in *Staurotheca* species with non-ornamented gonothecae, that type of gonothecae having radial symmetry and being urn-shaped to ovoid. The place of insertion of the gonotheca is identical: on the internode immediately under a hydrotheca with arrangement more or less in one line.

Peña Cantero and Vervoort (1997) indicate that in such species that could be studied the cnidome is composed of two size classes of macrobasic mastigophores. This character could not be checked because of the absence of tissue from the NZOI specimen.

RECORDS FROM NEW ZEALAND: Observed at a single locality off the northeast slope of North Island, 34°07.50′ S, 172°47.00′ E, 315 m. The gonothecae on the colony found in October, were empty.

DISTRIBUTION: Restricted to New Zealand waters.

ETYMOLOGY: The species name *megalotheca*, of Greek derivation, combines μεγα (mega), meaning large, with θηχη (Latin thecae), meaning sheaths, and refers to the great size of the hydrothecae.

Stereotheca Stechow, 1919

TYPE SPECIES: *Sertularia elongata* Lamouroux, 1816. The genus is monotypic.

Stereotheca elongata (Lamouroux, 1816) (Fig. 46E, F)

Sertularia elongata Lamouroux 1816: 189, pl. 5, fig. 3–3c; Busk 1852: 388; Thompson 1879: 107, pl. 18, fig. 2–2c; Bale 1884: 75, pl. 6, figs 7–8, pl. 19, fig. 7; Allman 1885: 140, pl. 15, figs 1–6; Bale 1888, 770; Marktanner-Turneretscher 1890: 230; Farquhar 1896: 461; Hilgendorf 1898: 208, pl. 19, fig. 3–3b; Billard 1907c: 217, fig. 2; 1909: 323; 1910: 22, fig. 9; Ritchie 1911: 845; Bale 1914a: 8–10; 1915: 277; Mulder & Trebilcock 1914a: 8, pl. 1 figs 7–10.

Levinsenia elongata: Bale 1915: 261.

Stereotheca elongata: Stechow 1923d: 203; Bale 1924: 252; Stechow 1925a: 231; Trebilcock 1928: 23; Blackburn 1937a: 368; 1938: 320; Cotton & Godfrey 1941: 4 and fig. on cover; Blackburn 1942: 112; Kulka 1950: 81; Ralph 1961a: 762–764, fig. 4e-k; 1961d: 109; Rees & Thursfield 1965: 144; Ralph 1966: 159; Millard 1968: 254, 272–273; Shepherd & Watson 1970: 140; Millard 1975: 313, fig. 101D, E; Watson 1975: 166; Millard 1978: 198; Cornelius 1979: 308; Staples & Watson 1987: 218; Dawson 1992: 20; Watson 1992: 220; 1994a: 67; Bouillon *et al.* 1995: 73; Cornelius 1995b: 112.

Sertularia scandens Lamouroux 1816: 189.

Sertularia millefolium Lamarck 1816: 116.

Sertularia lycopodium Lamarck 1816: 117.

Dynamene abietinoides Gray 1843: 294.

Sertularia abietinoides: Hutton, 1873: 257; Coughtrey 1875: 285; 1876a: 28; 1876b: 300.

MATERIAL EXAMINED:

NZOI Stns: B215, 1 colony about 25 mm high. RMNH-Coel. slide 2753; **B480**, fragment, 17 mm long. RMNH-Coel. slide 2774; **B613**, 4 stems, 25–30 mm high, springing from network of stolonal fibres; **B616**, 4 stems, about 50 mm high, on bryozoans; no gonothecae; **B617**, single plume, 25 mm long, no gonothecae; **B619**, about 10 plumes, about 30 mm long. No gonothecae; **C180**, *Stereotheca elongata* (Lamouroux, 1816) (J.E. Watson); **C344**, *Stereotheca elongata* (Lamouroux, 1816) (J.E. Watson); **G692**, 1 fragment, 8 mm long. All in RMNH-Coel. slide 2872; **G694**, 4 colonies, 30 mm long with some gonothecae. RMNH-Coel. slide 2865 of 1 colony; **M778**, *Stereotheca elongata* (Lamouroux, 1816) (J.E. Watson).

NMNZ: BS 457, 50 mm long plume with gonothecae (NMNZ Co. 530); **BS 838**, numerous colonies up to 100 mm high, on rock fragment; no gonothecae. NMNZ Co.439.

NMNZ Ralph Collection: Loc. 1, NMNZ Co.881, several about 50 mm high branches without gonothecae. Dead specimen with growth of diatoms inside hydrothecae [as *Salacia bicalycula*]. RMNH-Coel. slide 3581; **Loc. 3**, NMNZ Co. 882, several branches about 30 mm long, no gonothecae. Dead specimen with sand grains inside hydrothecae. RMNH-Coel. slide 3582; **Loc. 103**, NMNZ Co.958, 2 top parts of branches, about 5 and 7 mm long, no gonothecae. Smaller made up in RMNH-Coel. slide 3650; **Loc. 113**, good slide in RSC as *Stereotheca elongata*, no data; **Loc. 132**, NMNZ Co.986, 4 top parts or small colonies about 25 mm long; no gonothecae. 1 made up in RMNH-Coel. slide 3666. Unstained slide in RSC as *Stereotheca elongata*, no data; **Loc. 135**, NMNZ Co.988, fragment of 10 mm length, no gonothecae and heavily overgrown. No slides. Reasonable slide in RSC as *Stereotheca elongata* & *Sert. johnstoni* ??, no data; **Loc. 144**, NMNZ Co. 995, fragments of a larger colony, some as long as 50 mm; many gonothecae. RMNH-Coel. slide 3671. Good slide in RSC as *Stereotheca elongata*, no data; **Loc. 160**, partly dried out slide as *Stereotheca elongata*, no data; **Loc. 169**, NMNZ Co.1027, part of a plume and loose hydrocladia; no gonothecae. RMNH-Coel. slide 3695; **Loc. 218**, NMNZ Co.1064, 1 complete colony with stolon and several fragments; no gonothecae. 1 fragment in RMNH-Coel. slide 3727. Partly dried out slide in RSC as *Stereotheca elongata*, no data; **Loc. 290**, NMNZ Co.1135, single plume about 15 mm high, with gonothecae, basal part taken for RMNH-Coel. slide 3816; **Loc. 295**, NMNZ Co.1140, about

10 plumes, highest about 45 mm; 1 plume in RMNH-Coel. slide 3822; **Loc. 300**, NMNZ Co.1143, 2 stems about 25 mm high, 1 in RMNH-Coel. slide 3827; **Loc. 301**, NMNZ Co.1144, 6 colonies between 25 and 40 mm high, partly with calcareous algae; no gonothecae. No slide; **Loc. 314**, NMNZ Co.1153, single plume about 15 mm high, basal part in RMNH-Coel. slide 3832. No tissue, dead material!; **Loc. 426**, dried out slide in RSC as *Stereotheca elongata*, no data; **Loc. 438**, NMNZ Co. 1218, 1 plume 40 mm long, very dirty, dead specimen; no slide; **Loc. 619**, NMNZ Co.1327, numerous colonies up to 50 mm long, composed of unbranched stem with about 5 mm long hydrocladia; no gonothecae. RMNH-Coel. slide 4010.

PMBS: *Stereotheca elongata* (Lamouroux, 1816). Identified by: P. Ralph. (Taken from card register).

MATERIAL INSPECTED:

Mu 66–38, Hyd 196, sample consists of a couple of branched, feather-shaped colonies, the longest about 80 mm high. No gonothecae; **Mu 67–10, Hyd 19a**, bunch of about 70 mm high, partly branched colonies on a fragment of alga. No gonothecae observed.

Otago Museum, Dunedin, N.Z.: **Iv. 768, A.52:56**, 4 colonies, 20–40 mm high, composed of stem and strictly pinnately arranged hydrocladia about 5 mm long. No gonothecae observed. Hydrothecae as described by Ralph (1961a: 762, fig. 4e-k).

TYPE LOCALITY: *Sertularia elongata*: "Mers de l'Australasie" (Lamouroux 1816; according to van Praet (1979): "Australie", syntype in Lamouroux collection in MNHN no number given).
Sertularia scandens: "Mers de l'Australasie" (Lamouroux 1816; type lost).
Sertularia millefolium: "Mers Australes ou de la Nouvelle-Hollande" (Lamarck 1816, syntypes in MNHN, H.L. 745).
Sertularia lycopodium: "Mers de la Nouvelle-Hollande" (Lamarck 1816, syntypes in MNHN, H.L. 739; see for additional information on dry syntypes of *S. millefolium* and *S. lycopodium*: van Praet, 1979: 900–901).
Dynamene abietinoides: New Zealand, no further data (Gray 1843, location of type unknown).

DESCRIPTION: Flexuous colonies up to 100 mm high, main stem unbranched (present material), monosiphonic, with strictly pinnate hydrocladia 3–8 mm long, basal part free from hydrocladia. Stem divided into internodes; nodes straight in ahydrocladiate basal part; internodes short, at first without, but gradually acquiring hydrothecae, that on first internodes occur in pairs. After 15–20 mm nodes gradually become oblique, separating axial internodes by proximal apophysis, an axillary hydrotheca and a pair of sub-opposite hydrothecae on distal part. Apophyses alternately directed left and right, supporting hydrocladia divided into regular internodes with slightly oblique nodes and a sub-opposite pair of hydrothecae. Nodes scarcely visible in older parts of stems and basal parts of hydrocladia; cauline and hydrocladial internodes may also occasionally have 2 pairs of sub-opposite hydrothecae.

Hydrothecae almost cylindrical; adcauline wall adnate for half or more of its length; free part may be quite short; apical portion of hydrotheca curving outward to varied degree. Aperture tilted upwards, degree of tilt varied. Rim with 3 pairs of long lateral cusps with rounded tip; adcauline and abcauline part of rim sclerotised and occasionally fairly strongly curved outward creating impression of median cusps.

MEASURMENTS of *Stereotheca elongata* (in μm):

	Ralph's Loc. 1 slide 3581	NZOI Stn B480 slide 2774	New Zealand (Ralph 1961a)
Length of cauline internode	910 – 1195	825 – 975	700 – 800
Diameter at node	245 – 280	355 – 370	200 – 300
Length of hydrocladial internode	555 – 665	445 – 480	500 – 700
Diameter at node	135 – 150	160 – 185	100 – 200
Depth of hydrotheca (including cusps)	405 – 480	480 – 665	350 – 430**
Maximum diameter	205 – 220	220 – 235	
Diameter at rim	170 – 200	185 – 220	100 – 150
Gonotheca, length (including cusps)*	3365 – 3470		1500 – 2000
Maximum diameter	1130 – 1150		
Diameter of aperture	630 – 635		400
Height of collar	110 – 115		

* = measurements taken from slide 3816
** apical cusps not included

Considerable sclerotisation of all material, particularly cauline and hydrocladial internodes; thickening diminishing along hydrothecal walls.

Gonothecae large, fusiform, with large terminal aperture surrounded by conspicuous collar and 2 large, opposite, blunt spines; inside of collar with fine knobs or cusps. Insertion of gonothecae on stem internode just below basalmost hydrotheca of sub-opposite pair.

REMARKS: All material inspected was dead; the colonies from Ralph's Loc. 218 (RMNH-coel. slide 3727) contain tissue remnants. Two gonothecae were present in the dead material from Ralph's collection, Loc. 290 (RMNH-Coel. slide 3816). The material in the present collection gives no information as to the localities of living material, but Ralph (1961: 764) indicated that the species is best known from Cook Strait and from the east coast of the South Island.

This is a well known and well characterised species; there is, nevertheless, a considerable amount of variability in the shape of the hydrothecae and the development of the marginal cusps. The axial hydrothecae, in particular, may be rather deformed.

RECORDS FROM NEW ZEALAND: First recorded from Auckland, New Zealand, by Marktanner-Turneretscher (1890); same locality also mentioned by Jäderholm (1917). Also recorded from Lyall Beach, Wellington; Kuri Beach and Taieri Beach, Otago Peninsula, on fronds of sea weeds, by Hilgendorf (1898). The species commonly occurs amongst drifted material on North and South Island beaches and suitable localities between 35°–47°S, 166.5°–179°E (midlands on Great Barrier Island, Te Awaiti, Wanganui, Wellington, Makara Beach, Island Bay in Cook Strait, Palliser Bay, Kaikoura coast; Christchurch, Lyttelton Harbour; Otago; Dunedin, Bluff, Foveaux Strait). All material we have inspected was dead and contained no soft tissue, with the exception of some colonies from Kaikoura (Ralph's Loc. 218). According to Ralph (1961a: 762) extensive beds of this species occur in the area of Cook Strait and Dunedin.

DISTRIBUTION: Various localities in Australian waters (Bale 1884, 1888, 1915; Ritchie 1911; Watson 1975; Stapels & Watson 1987); Tasmania (Hodgson 1950), and Algoa Bay, South Africa (Millard 1975). For comments on the supposed occurrence of this species in European waters (Ritchie 1907c) we refer to Cornelius's remarks (1979: 308). In southeast Australia it is common on sea grasses and algae in shallow ocean waters. The tough stems are commonly cast up on local beaches. In the 1880s it was extensively used to make decorative montages of seashells and seaweed. This could very well explain the occurrence of a fragment floating in European waters.

Symplectoscyphus Marktanner-Turneretscher, 1890

TYPE SPECIES: *Symplectoscyphus australis* Marktanner-Turneretscher, 1890 [= *Symplectoscyphus j. johnstoni* (Gray, 1843)].

For a review of the species in this genus see Vervoort (1993a: 239–242).

The following species have since been added.

Symplectoscyphus bathypacificus Vervoort, 1993a;
Symplectoscyphus commensalis Vervoort, 1993a;
Symplectoscyphus effusus Vervoort, 1993a;
Symplectoscyphus johnstoni tropicus Vervoort, 1993a;
Symplectoscyphus pseudocolumnaris Vervoort, 1993a; and
Symplectoscyphus ralphae Vervoort, 1993a.
Symplectoscyphus watsonae Vervoort, 1993a has been removed to *Dictyocladium* Allman, 1888.
Symplectoscyphus sinuosus Fraser, 1948, has been placed in the genus *Fraseroscyphus* Boero & Bouillon 1993b.

Symplectoscyphus amoenus sp. nov. (Fig. 46G–I)

MATERIAL EXAMINED:

NZOI Stn E312, single 50 mm high colony composed of stem and side branches (hydrocladia). Several gonothecae present (holotype H-766 in NIWA collection). RMNH-Coel. slide 2126, part of type series.

TYPE LOCALITY: Southwest Pacific, NNW of Three Kings Islands, 34°00.00′ S, 171°47.50′ E, 119 m.

DESCRIPTION (of holotype): Colony erect, composed of stem about 50 mm high, polysiphonic at base, with laterally disposed, alternating side branches (hydrocladia), arranged in one plane. Axis divided into internodes separated by weak constrictions of perisarc, no distinct nodes visible. Side branches spring from below hydrotheca. Three hydrothecae between successive side branches, of which basal hydrotheca axillary, remaining 2 alternate.

Hydrothecae of stem and branch identical, adcauline wall adnate for about one-third its length, slightly curved downwards, diverging from internode at an angle of about 60°. Adnate adcauline wall curved, strongly curved to form basal plate of hydrotheca, diaphragm distinct, marked by minor thickening of perisarc at inside of abcauline wall. Free adcauline wall of hydrotheca convex, particularly in basal third; abcauline wall nearly straight to slightly concave; hydrothecal rim distinctly everted, with 3 fairly sharply pointed cusps, 1 adcauline, 2 lateral. Axillary hydrothecae less curved, almost cylindrical. Hydrothecal aperture frequently renovated, renovations may be very short or of considerable size.

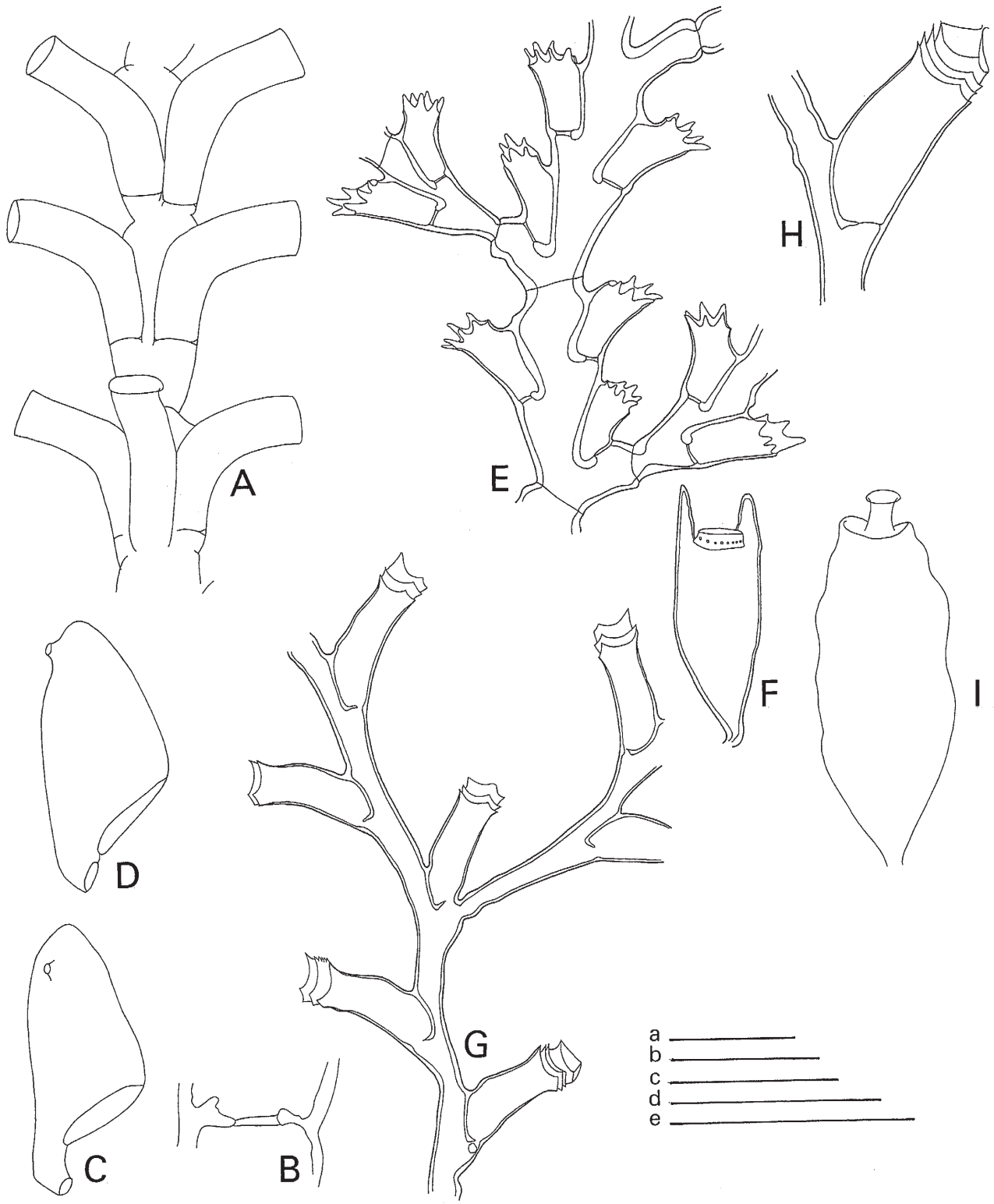

Fig. 46. A–D. ***Staurotheca megalotheca*** sp. nov. **A**, part of stem. **B**, proximal part of hydrotheca showing hydrothecal diaphragm. **C, D,** gonothecae (NZOI Stn F924, holotype, slide 2202). **E, F.** ***Stereotheca elongata*** (Lamouroux, 1816). **E**, part of colony. **F**, gonotheca (Loc. 1, slide 3581). **G–I.** ***Symplectoscyphus amoenus*** sp. nov. **G**, part of colony. **H**, hydrocladial hydrotheca. **I**, gonotheca (NZOI Stn E312, holotype, slide 2136). Scales: a, 2.5 mm (A, C, D); b, 1 mm (B); c, 1 mm (E, G, I); d, 2 mm (F); e, 0.5 mm (H). W.V.

MEASUREMENTS of *Symplectoscyphus amoenus* sp. nov. (in μm):

	NZOI Stn E312 slide 2126
Stem internode, length	575 – 850
Diameter	145 – 165
Hydrocladial internodes, length	655 – 740
Diameter	115 – 145
Stem or hydrocladial hydrotheca, length adnate adcauline wall	280 – 360
Length free adcauline wall	575 – 735
Length abcauline wall	625 – 755
Total depth	755 – 920
Diameter at rim	230 – 260
Maximum diameter	275 – 310
Axillary hydrotheca, length adnate adcauline wall	280 – 360
Length free adcauline wall*	720 – 755
Length abcauline wall*	785 – 820
Diameter at rim	215 – 230
Maximum diameter	275 – 295
Gonotheca, total length	2375 – 2450
Maximum diameter	900 – 910
Length of funnel	245 – 275
Diameter at rim	145 – 165

* = renovations included

Operculum 3-flapped, when closed forming a low roof, present in a few hydrothecae.

Perisarc thick, in the preserved material horn-brown, thinning out gradually along walls of hydrothecae. Many hydrothecae have remnants of opercular plates adhering to the rim. Though not well preserved, hydranths are present.

Gonothecae big, elongate ovoid, narrowing basally into a short pedicel attaching gonothecae to stem or hydrocladial internode just under base of hydrotheca. Gonothecal wall gradually becoming undulated near apex, where last undulation forms a rounded platform with central slender funnel with flaring, circular rim. Each gonotheca contains an ovoid body, probably a developing planula.

REMARKS: The hydrothecal rim may be strongly deformed by repeated renovations. The perisarc of some hydrothecae is ribbed; at the base of the first hydrocladial internode it may be more or less ringed.

RECORDS FROM NEW ZEALAND: Only known from NNW of Three Kings Islands, 34°00.00′ S, 171°47.50′ E, 119 m, collected in April with gonothecae containing remnants of tissue.

DISTRIBUTION: Known only from north of New Zealand.

ETYMOLOGY: The species name *amoenus* comes from the Latin *amoenus*, meaning charming or ravishing, chosen to express the beauty of this species.

Symplectoscyphus candelabrum sp. nov.
(Fig. 47A–D)

MATERIAL EXAMINED:

NZOI Stns: E312, colonies to 25 mm high, developing epizootically on stems of *Sertularella integra* Allman, 1876a; no gonothecae (holotype, H-767 in NIWA collections; 3 RMNH-Coel. slides 2120, with *Sertularella integra* Allman, 1876a, are part of the type series; **I89**, 15 mm long fragment with 1 side-branch (RMNH-Coel. slide 4765).

TYPE LOCALITY: NZOI Stn E312, 34°00.00′ S, 171°47.50′ E, NNW of Three Kings Islands, 119 m.

DESCRIPTION (of holotype): Colony to 40 mm high, entirely monosiphonic, flexuous, with stem arising from tubiform stolon epizootic on *Sertularella integra* Allman, 1876a; at base of stem a few indistinct rings or wrinkles in perisarc. Branches develop at irregular intervals and may have secondary ramifications. Fewer than 3 or 4 side branches per stem, long, flexuous, springing from distinct stem apophysis with axillary hydrotheca; 3 or more hydrothecae between 2 succeeding branches. Division of stem and branches into internodes indistinct, nodes perisarc constrictions, best visible on side branches.

Hydrothecae biserate, alternate, with exception of axillary hydrothecae strongly diverging from internode, free adcauline wall almost perpendicular to internode, with strong curvature apically; aperture distinctly tilted upwards to almost horizontal, about half adcauline wall free from internode; fused part rounded basally, diaphragm large and clearly visible. Abcauline wall with minor flexure at half its length, internally thickened at that point. Axillary hydrothecae less strongly diverged frrom internode; angle between free adcauline wall and internode aboout 60°. Rim of hydrotheca with 3 rounded but well formed cusps of which 1 adcauline and 2 lateral; embayments between cusps shallow. Rim thickened from repeated renovations, particularly on abcauline side. Opercular plates distinct, particularly on axillary hydrothecae; adcauline plate recurved; lateral plates apically rounded.

Perisarc thick, yellowish, not thinning out along hydrothecal walls, slightly thickened under marginal cusps without actually forming submarginal intrathecal cusps. No tissue remains in hydrothecae.

Gonothecae absent.

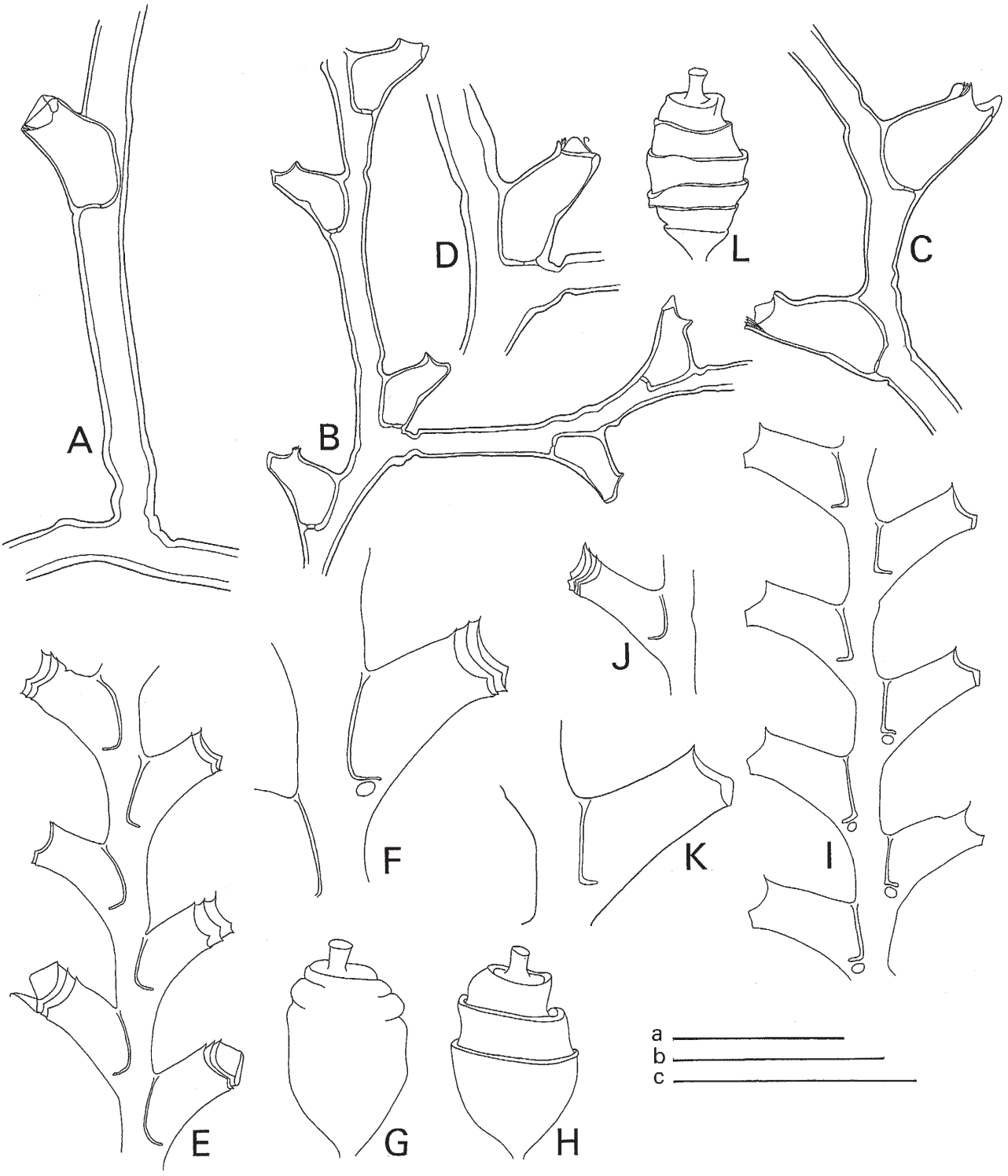

Fig. 47. A-D. ***Symplectoscyphus candelabrum*** sp. nov. **A**, Proximal part of stem. **B**, part of stem with hydrocladium. **C**, hydrocladial hydrothecae. **D**, Axillary hydrotheca (NZOI Stn E312, holotype, slide 2120). **E-L.** ***Symplectoscyphus columnarius*** (Briggs, 1914). **E**, part of hydrocladium. **F**, Hydrocladial hydrotheca. **G, H,** gonothecae (NZOI Stn B482, slide 2778). **I,** part of hydrocladium. **J, K,** hydrothecae. **L**, gonotheca (NZOI Stn C596, slide 2798). Scales: a, 1 mm (B, F, K); b, 2 mm (E, G–J, L); c, 0.5 mm (A, C, D). W.V.

MEASUREMENTS of *Symplectoscyphus candelabrum* sp. nov. (in μm):

	NZOI Stn E312 slide 2120
Stolon, diameter	90 – 135
Stem, diameter at base	115 – 140
Diameter at node	80 – 115
Internode, diameter at node	67 – 84
Axillary hydrotheca, length abcauline wall*	280 – 290
Length adnate adcauline wall	180 – 195
Length free adcauline wall*	180 – 185
Total depth	330 – 350
Maximum diameter	150 – 160
Diameter at rim	110 – 115
Hydrocladial hydrotheca, length adcauline wall*	270 – 290
Length adnate adcauline wall	170 – 195
Length free adcauline wall	170 – 200
Total depth	330 – 345
Maximum diameter	155 – 180
Diameter at rim	125 – 130

* including renovations

REMARKS: In spite of the absence of gonothecae we have described this species as a new taxon because the curious shape of the hydrothecae makes recognition possible even in sterile material. The many hydrothecal renovations are largely restricted to the inside of the rim and do not greatly lengthen the hydrotheca.

RECORDS FROM NEW ZEALAND: Found at one locality NNW of Three Kings Islands, 34°00.00′ S, 171°47.50′ E, at 119 m depth and one southeast of Norfolk Island, 29°25.30′ S, 168°00.20′ E, 65 m.

DISTRIBUTION: Known only from northern New Zealand waters.

ETYMOLOGY: The specific name *candelabrum* (Latin noun meaning candlestick) refers to the curiously upturned hydrothecal aperture that gives the colony the appearance of a candelabrum.

Symplectoscyphus columnarius (Briggs, 1914) (Fig. 47E–L)

Sertularella columnaria Briggs 1914: 286, 294, fig. 1; Bale 1924: 239; Stepan'yants 1979: 72, pl. 13, fig. 2.

Symplectoscyphus columnarius; Stechow 1922: 148; 1923a: 10; 1923d: 171; Totton 1930: 180-181, text-fig. 30, pl. 1, fig. 10; Briggs 1938: 29; Ralph 1961a: 802–803, fig. 15d-h; 1961c: 108; Leloup 1974: 35, fig. 29; Dawson 1992: 20; Vervoort 1993a: 239, 247, tab. 47.

MATERIAL EXAMINED:

NZOI Stns: A444B [samples that have been dried out, now in alcohol and in very poor condition, marked: A 444 x 1, A444 x 2, etc. Probably from 1 large sample]: *Symplectoscyphus columnarius* (Briggs, 1914) (J.E. Watson); **A713**, isolated fragment and a small colony about 60 mm high, no gonothecae. All in 3 RMNH-Coel. slides 2718; **B175**, fragments of a larger colony, no gonothecae. RMNH-Coel. slide 2729; **B482**, colony 100 mm high, no gonothecae. In addition several fragments, 1 with gonothecae. RMNH-Coel. slide 2778; **B488**, fragment 35 mm long; no gonothecae. In addition fragments of hydrocladia. Heavily overgrown by *Modeeria rotunda* (Quoy & Gaimard, 1827). All in 2 RMNH-Coel. slides 2781; **B556**, stem about 50 mm high and 2 young stems, about 10 mm, no gonothecae. RMNH-Coel. slide 2782; **B571**, single fragment, about 25 mm high, between other hydroids. RMNH-Coel. slide 2786; **B591**, single, unbranched stem without gonothecae, length 65 mm; **B592**, fragment of stem with hydrothecae, length 35 mm; no gonothecae; **C118**, *Symplectoscyphus columnarius* (Briggs, 1914). (J.E. Watson); **C125**, *Symplectoscyphus columnarius* (Briggs, 1914). (J.E. Watson). [Slide 4187 JEW Colln]; **C596**, 5 stems up to 30 mm high from thick stolon reptant on shell; 2 with gonothecae. RMNH-Coel. slide 2798; **C601**, beautifully branched, 80 mm high colony and some fragments, all with many gonothecae; **C617**, 2 colonies, 1 branched, no gonothecae; **D20**, 2 colonies, 40 and 60 mm high; no gonothecae. RMNH-Coel. slide 2815; **D133**, 3 colonies, 1 on stone, 2 detached, the longest 150 mm bears many gonothecae; **D138**, 2 colonies, unbranched, about 50 mm high; no gonothecae; **D139**, 5 colonies up to 60 mm high, partly attached to small stones. Gonothecae present; **D144**, single, 40 mm high stem, attached to bryozoans; **D148**, stem fragments 10–25 mm high, detached from shell of brachiopod. Gonothecae present. Additional colonies, 60 mm high, with gonothecae, attached to small stone; **D154**, 6 colonies, detached from substratum, 20–30 mm high, no gonothecae; **D155**, fragmentary colony, 20 mm high, basal part invested by bryozoans. No gonothecae; **D198**, single stem about 45 mm high, no gonothecae; **D876**, detached fragments, about 60 mm long, no gonothecae. RMNH-Coel. slide 2287; **D877**, 2 stems, 50 and 70 mm high, on stone. No gonothecae; **E400**, several up to 40 mm high stems, some branched, no gonothecae, from dried out sample; **E820**, about 5 stems up to 40 mm high, some branched. Many renovations of hydrothecae. No gonothecae; **E832**, 1 stem about 20 mm high, with 4 hydrothecae of *Tulpa diverticulata* Totton, 1930. All in RMNH-Coel. slide 2178; **F921**, single colony about 40 mm high, no gonothecae. All in RMNH-Coel. slide 2197; **I340**, single 70 mm high stem with some hydrocladia; **I371**, 2 colonies about 70 mm high and some fragments, no gonothecae. Heavily overgrown, partly by *Sertularella integra* Allman, 1876a; **K855**, 2 colonies, 1 with single branch, 25 mm high, and second about 350 mm with several branches (hydrocladia). No gonothecae. Smaller colony as RMNH-Coel. slide 2273; **Q85**, *Symplectoscyphus columnarius* Briggs, 1914 (J.E. Watson); **Q135**, *Symplectoscyphus columnarius* (Briggs, 1914) (J.E. Watson); **S13**, *Symplectoscyphus columnarius* (Briggs, 1914) (J.E. Watson); **S192**, 3 stems 60 mm high, unbranched, on worm tube. 1 stem in 2 parts as RMNH-Coel. slide 2316). (Depth or locality record cannot possibly be correct!); **S397**, 145 mm high colony without gonothecae; with *Modeeria rotunda* (Quoy & Gaimard, 1827). (Slides 4226 and 4406 JEW Colln; RMNH-Coel. slide 4769).

NMNZ: 4.5 miles east **Tory Channel**, 15.Aug.1963, 3 stems up to 25 mm high, no gonothecae. NMNZ Co. 641; **BS 180**, 4 small colonies, 20–40 mm high, no gonothecae. NMNZ Co. 634; **BS 396**, single fragment, 15 mm long, partly invested by sponge, from which it has been detached. NMNZ Co. 597. All in RMNH-Coel. slide 3019; **BS 399**, 1 stem, 50 mm high, with 2 side branches on same side. No gonothecae. NMNZ Co. 632; **BS 482**, rather mutilated colonies and fragments, partly on shells; no gonothecae (NMNZ Co. 859); **BS 668**, about 15 erect colonies, partly attached to a small pebble. Largest colony about 170 mm long and with gonothecae. Only 1 colony with (single) branch. NMNZ Co. 725. Small stem as RMNH-Coel. 27650, slide 3350; **BS 678**, 5 colonies between 30 and 70 mm length, entirely covered with small colonies of bryozoans. NMNZ Co. 825; **BS 679**, numerous colonies up to 60 mm high, no gonothecae. NMNZ Co. 844. Additional colonies with epizootic bryozoans, some colonies of *Sertularella* cf. *robusta* Coughtrey, 1876b and *Eudendrium* sp. NMNZ Co. 845, RMNH-Coel. slides 3518 and 4763; **BS 834**, 5 branched colonies up to 40 mm high, some densely covered with *Filellum* sp. NMNZ Co. 752. 2 slides, 1 with *Filellum* sp., as RMNH-Coel. 27691, slides 3391; **BS 835**, fragment, 25 mm high, completely covered by bryozoans. NMNZ Co. 587; **BS 838**, single pinnate colony 120 mm high, top part broken. No gonothecae. NMNZ Co. 440. Also single plume-shaped colony composed of stem and pinnately arranged hydrocladia up to 25 mm long. Larger part of colony heavily overgrown by bryozoans and unidentifiable athecate hydroids (NMNZ Co. 763). RMNH-Coel. 27707, slide 3407; **BS 904**, 40 mm high pinnate colony. No gonothecae. NMNZ Co. 435; **BS 905**, 2 pinnate colonies about 70 mm high. No gonothecae. NMNZ Co. 691.

NMNZ Ralph Collection: Loc. 558, NMNZ Co. 1267, 2 fragments 15 and 35 mm long. Basal part of longer fragment in RMNH-Coel. slide 3942. No gonothecae. Poor slide in RSC as *Sertularella columnaria*, no data; **Loc. 621**, NMNZ Co. 1329, about 80 mm high top part of branched colony and some fragments. Stem monosiphonic. No gonothecae. Completely dead material covered with bryozoans. RMNH-Coel. slides 4012. Poor slide in RSC as *Sertularella columnaria*, no data.

TYPE LOCALITY: Seven miles east of Cape Pillar, Tasmania, 183 m (Briggs 1914; holotype in AMS).

DESCRIPTION: Big, erect colonies with strong, polysiphonic stem, some groups of stems spring together from matting of fairly thick stolonal tubes on firm substratum, usually rocks. Branching of stem irregular and more or less in 1 plane, branches are hydrocladia that have become polysiphonic by apposition of secondary tubules. Division of stem and branches (hydrocladia) into internodes only visible in young parts of colonies; nodes indicated by slight constrictions of perisarc. Hydrothecae alternately arranged in 1 plane, 1 per internode. Distance between hydrothecae varied and probably influenced by external conditions. In some colonies distal ends of stem and branches with slender, fairly long internodes that may become geniculate.

Hydrothecae rather cylindrical, slightly swollen or widened basally. Adnate adcauline wall almost straight, making right angle with bottom plate; free adcauline wall almost straight, making angle of about 60° with length axis of internode, about 1.5 times as long as adnate part, near rim slightly upturned. Abcauline wall of hydrotheca slightly to distinctly concave; plane of hydrothecal aperture perpendicular to hydrothecal length axis, rim slightly everted. Renovations of apical part of hydrotheca frequent and well spaced; occasionally a complete, renovated hydrotheca within remnants of old one. Hydrothecal rim with 3 cusps, 1 adcauline and 2 lateral; embayments shallow. Operculum 3-flapped, remnants present in many hydrothecae. Complete opercular apparatus forming a low triangular roof when closed.

Many colonies with remnants of or with contracted hydranths; polyp big, with 22–24 tentacles in a whorl around a conical hypostome. Abcauline caecum spacious, attached by ligament to inside of abcauline hydrothecal wall at about half its length.

Gonothecae occur in profusion on some colonies, forming a series along stem or branch. Gonotheca ovoid, narrowing basally into a short pedicel; gonotheca with several depressions or ribs, in spiral arrangement and of varied development in various colonies. In majority of colonies only apical part of gonotheca has a spirally curved depression, it gradually fades out on basal half of gonotheca. There is an apical platform with a centrally placed funnel widening distally into a circular aperture. In other colonies the depressions are more clearly marked with fairly sharp, distinct ribs, running also on basal part of gonotheca. Such ribs never have the character of carinae or flanges. The different morphology of the gonothecae may be sex-related but this could not be ascertained due to bad preservation of the contents.

Development of perisarc considerable on the internodes, of light horn-brown colour.

REMARKS: This sturdy species with its large hydrothecae and slightly everted hydrothecal rim is normally easily recognisable; young colonies have longer internodes that may distinctly geniculate. The renovations of the hydrothecal rim are fairly widely spaced; renovations of whole hydrotheca from extensively damaged original hydrothecae are common, demonstrating the unusual regenerative capacity of this species.

RECORDS FROM NEW ZEALAND: A characteristic species of the deeper water around New Zealand, and in Cook Strait, the area of distribution extending from 50.5° S to 30.5° S, 166° E to 175.5° W; the depth range is from 95 down to at least 668 m. The depth record from NZOI Stn S192 (0 m) is suspicious.

MEASUREMENTS of *Symplectoscyphus columnarius* (in μm):

	NZOI Stn C596 slide 2798	NMNZ BS 482 slide 2778
Diameter of stem at base		1500 – 2000
Distance between axils of successive hydrothecae on same side	1720 – 1970	1640 – 1800
Hydrothecae, length adnate adcauline wall	540 – 575	820 – 900
Length free adcauline wall	985 – 1035	640 – 675
Length abcauline wall	1035 – 1065	950 – 985
Total depth	1230 – 1280	1230 – 1260
Diameter at rim	440 – 475	460 – 490
Maximum diameter	510 – 525	605 – 625
Gonotheca, total length	2295 – 2380	1920 – 2130
Maximum diameter	1150 – 1230	1310 – 1345
Diameter of platform at apex	570 – 580	475 – 605
Length of funnel	245 – 295	260 – 310
Diameter at rim	160 – 195	215 – 260

DISTRIBUTION: Known only from Tasmanian and New Zealand waters.

Symplectoscyphus confusus Totton, 1930
(Fig. 48A–D)

Symplectoscyphus confusus Totton 1930: 184, text-fig. 35, pl. 1, figs 4, 6; Ralph 1961a: 816–817, fig. 19g; Dawson 1992: 20; Vervoort 1993a: 239.
Sertularella confusus: Stepan'yants, 1979: 76, pl. 17, fig. 8.

MATERIAL EXAMINED:
NZOI Stns: A695, sample consists largely of algae and has once been dried out. Several fragments about 20 mm high tangled with *Sertularella fuegonensis* El Beshbeehsy, 1991; no gonothecae. RMNH-Coel. slide 2710; **I705**, bunch of anastomosing colonies, about 30 x 40 mm; some gonothecae. 3 RMNH-Coel. slides 2885; **X486**, 60 mm long colonies on coral fragments. Many gonothecae. 4 RMNH-Coel. slides 2941.

TYPE LOCALITY: Off Three Kings Islands, *Terra Nova* Stn 91, 549 m (Totton 1930, holotype in NHM, no. 29.10.10.6).

DESCRIPTION: Colony composed of many up to 60 mm high, flexuous, monosiphonic stems rising from communal mass of stolons attached to coral fragments. From the stems arise side branches (hydrocladia) up to 40 mm long at an angle of 60–90°; only very occasionally are there secondary branches; branches of same structure as main stem. Stem and branches divided into very long, slender internodes, separated by weak perisarc constrictions; no real septa present. Internodes with 1 or 2 hydrothecae; hydrothecae alternately arranged in 1 plane, widening basally, more or less triangular in lateral view. Adnate adcauline wall straight, nearly twice as long as free part, with rectangular curve basally to form basal plate, in which is a wide diaphragm; free adcauline wall straight or weakly convex. Abcauline hydrothecal wall straight or with slight concavity in upper half. Hydrothecal aperture perpendicular to hydrothecal length axis, rim with 3 rounded cusps, 1 adcauline, 2 lateral; renovations present in some hydrothecae and if present close together, creating impression of a thickened, striated hydrothecal rim. Operculum incomplete in all hydrothecae inspected, although remnants of opercular plates occasionally present; operculum evidently composed of 3 triangular plates fitting into shallow embayments between marginal cusps to form a low roof when closed. Fragments of polyps are occasionally present but are too badly preserved to be of diagnostic value.

Gonothecae occur in profusion along stem and branches, attached to internode immediately under hydrotheca, when shed leaving a circular scar. Gonotheca elongated ovoid, narrowing basally into a short pedicel. Surface of gonotheca with a spirally coiled ridge, starting at a small platform at top of gonotheca and descending in 8 or 9 coils, last 1 or 2 coils being less raised. Edge of ridge irregular, distinctly visible as a thickened ring on exterior of gonotheca but not forming a flange. Apical platform with central, fairly short tube, flaring gradually towards a circular rim.

All gonothecae are empty.

REMARKS: The gonothecae, that occur in profusion, are not pressed against the internode, but are circular in cross section even in the lower segment. They contain a globular mass of tissue but the condition of preservation was unsatisfactory, consequently their sex could not be determined.

This species belongs to a group of symplectoscyphid hydroids that are very hard to identify. Ralph's (1961a) description and figure are based on Totton's data. The species was thought by Totton (1930: 185) to be closely related to *Symplectoscyphus filiformis* (Allman, 1888), the identification of this New Zealand material as *S. confusus* is primarily based on the elongated ovoid shape of the gonothecae, the ribs of which have about 9 coils and no frill. The terminal tube is centrally placed and fairly wide, and usually gradually widens towards the apex without being actually everted. However, there is distinct variability in the shape of the tube in the many gonothecae and in some the funnel is almost cylindrical as figured by Totton (1930, fig. 35).

MEASUREMENTS of *Symplectoscyphus confusus* (in μm):

	Off Three Kings Islands (Ralph 1961a)	NZOI Stn X486 slide 2941
Stem, length of internode		1180 – 2870
Diameter at node		165 – 215
Branch, length of first internode		1230 – 1475
Length of following internodes		900 – 1725
Diameter at node		
Hydrotheca, length adnate adcauline wall		295 – 345
Length free adcauline wall	230	215 – 260
Length abcauline wall	250	360 – 375
Total depth		475 – 495
Diameter at rim	190	180 – 195
Maximum diameter	190	230 – 260
Gonotheca, total length, including funnel	1250 – 1340	1360 – 1475
Maximum diameter	590	675 – 785
Length of funnel		130 – 165
Diameter of funnel at rim		145 – 165

RECORDS FROM NEW ZEALAND: Known only from off Three Kings Islands, 549 m depth (type locality); Chatham Rise, 42°46.67′ S, 179°54.83′ W, 910–921 m depth; Bounty Platform, 47°30.00′ S, 178°45.00′ E, 39 m, and Macquarie Ridge, south Tasman Sea, 54°36.40′ S, 158°7.00′ E, 91 m.

DISTRIBUTION: Known only from the New Zealand localities given above.

Symplectoscyphus epizooticus Totton, 1930
(Fig. 48E–G)

Symplectoscyphus epizooticus Totton 1930: 185-186, text-fig. 36a-b, pl. 1, figs 5–6; Ralph 1961a: 815–816, fig. 18d-e; Vervoort 1993a: 239; Dawson 1992: 20; Watson & Vervoort 2001: 169–171, fig. 10a–d.
Sertularella epizooticus?: Naumov & Stepan'yants 1962: 81.
Sertularella epizooticus: Stepan'yants 1979: 79, pl. 13, fig. 5.

MATERIAL EXAMINED:
NZOI Stns: E841, many tangled stems, 15–20 mm high, with gonothecae. 3 RMNH-Coel. slides 2180; **E849**, fragment made up in slide no. 3483; no gonothecae.

TYPE LOCALITY: *Terra Nova* Stn 91, off Three Kings Islands, 549 m, attached to *Symplectoscyphus confusus* Totton, 1930 (Totton 1930, holotype in NHM, 29.10.10.7, microslide).

DESCRIPTION: Small, up to 20 mm high, profusely branched, entirely monosiphonic colonies, springing from a tubular stolon attached to fixed objects. Branching pseudo-dichotomous: hydrocladia spring from apophyses under a hydrotheca, both hydrocladium and original stem directed in opposite directions at an angle of about 120°; hydrocladia re-branch in same fashion; various orders of branching present. Internodes on stems and branches long and slender, separated by sometimes obscure constrictions of perisarc. Hydrotheca at distal end of internode, alternate, with slight tendency towards frontal exposition; stem or branch between hydrothecae weakly geniculate.

Hydrotheca cylindrical, distinctly swollen in mid-region; adcauline wall adnate for about half length; free part straight or very weakly convex, diverging from internode at about 60°. Abcauline wall straight, basally a smooth continuation of wall of internode; some hydrothecae with minor curve of abcauline wall at about half its length ('re-entrant angle'). Hydrothecal rim with 3 marginal cusps, 1 adcauline, 2 lateral, prominent but rounded at extreme tip, separated by moderately deep embayments; rim perpendicular to hydrothecal length axis, thickened, no submarginal intrathecal cusps. Nearly all hydrotheca with short, hyaline renovations. Opercular plates triangular, deciduous; hydranth poorly preserved.

Gonothecae occur in profusion, elongated ovoid, basally with short pedicel attaching gonotheca to internode just under hydrothecal bottom. Gonotheca with a deep spiral groove of about 12 twists, with thickened free edge, gradually forming a hyaline lamella on the lower 7 or 8 turns. Back of gonotheca with depression on lower half where spiral twists are interrupted where gonotheca rests against internode; on upper part of this region the spiral twists are displaced in an upward direction. Apex of gonotheca with fairly long, distally widening tube, centrally placed on a small plateau bordered by a ridge.

Perisarc of colonies fairly thick though hyaline, thinning out along hydrothecal walls to thickened rim. Shed gonothecae leave a large, more or less circular scar below hydrotheca, covered by a thin layer of hyaline perisarc.

REMARKS: The material described by Watson and Vervoort (2001) from Tasmanian seamounts although slightly smaller, has identical gonothecae with the same number of ribs (11 or 12) with similar distinct flange. *Symplectoscyphus epizooticus* comes very close to *Symplectoscyphus commensalis* Vervoort, 1992, from the northern extremity of the Norfolk Ridge; in the latter there are differences between male and female gonothecae.

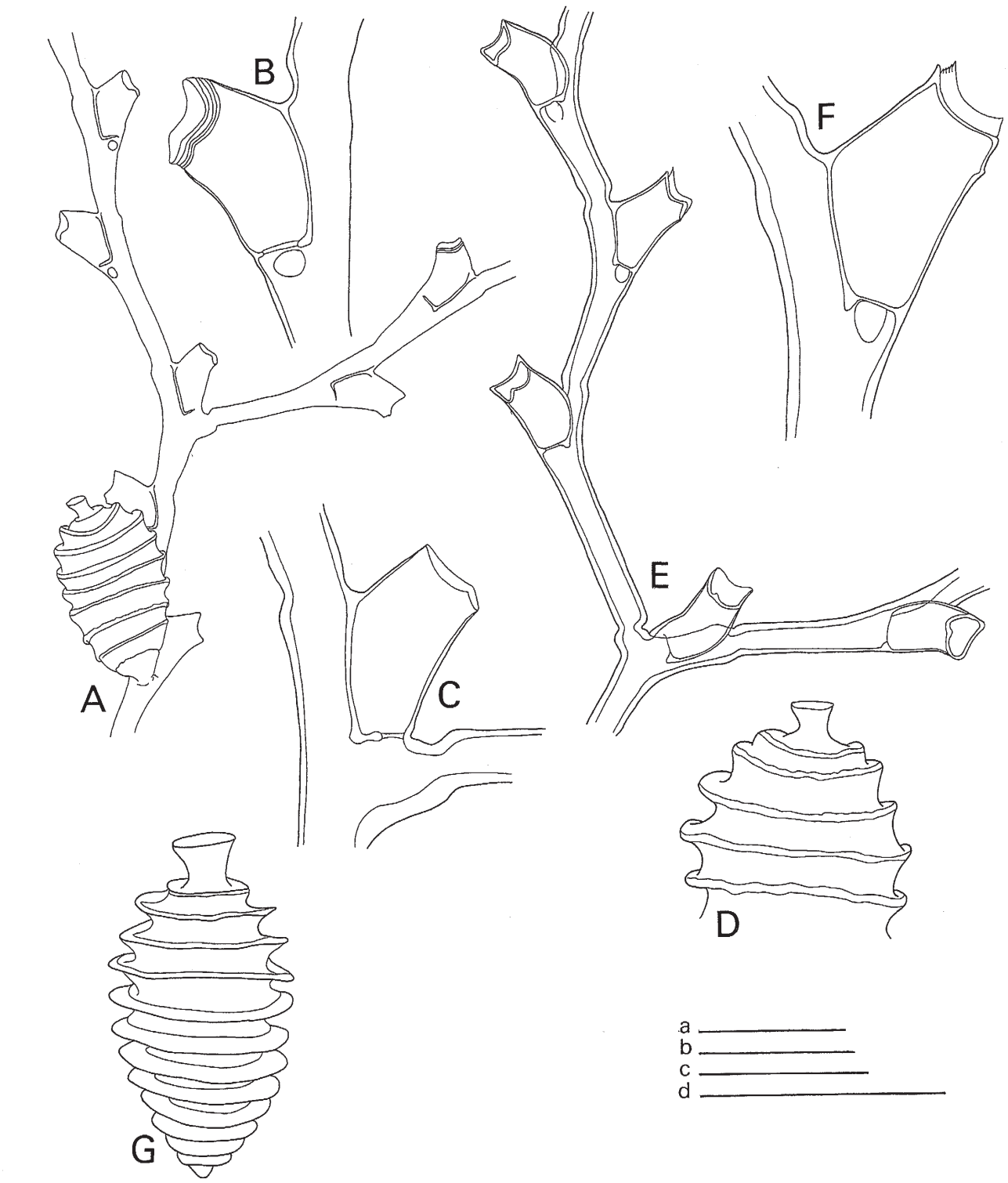

Fig. 48. A–D. ***Symplectoscyphus confusus*** Totton, 1930. **A**, part of colony with gonotheca. **B,** repeatedly renovated hydrocladial hydrotheca. **C**, axillary hydrotheca. **D**, distal part of gonotheca (NZOI Stn X486, slide 2941). **E–G.** ***Symplectoscyphus epizooticus*** Totton, 1930. **E**, part of stem with hydrocladium. **F**, hydrocladial hydrotheca. **G**, gonotheca (NZOI Stn E841, slide 2180). Scales: a, 1 mm (D, E, G); b, 0.2 mm (F); c, 1 mm (A); d, 0.5 mm (B, C). W.V.

MEASUREMENTS of *Symplectoscyphus epizooticus* (in μm):

	NZOI Stn E841 slide 2180	New Zealand (Ralph 1961a)
Internode, length	665 – 1150	700
Diameter at node	85 – 135	120
Hydrotheca, length adnate adcauline wall	200 – 235	200
Length free adcauline wall	210 – 240	230
Length abcauline wall	225 – 255	200
Total depth	225 – 255	
Maximum diameter	190 – 220	150
Diameter at rim	150 – 170	130
Gonotheca, overall length, including funnel	1280 – 1315	
Maximum diameter, including frill	690 – 700	
Length of funnel	170 – 225	
Diameter at rim	56 – 62	
Number of spiral twists	10 – 11	
Width of frill	34 – 39	

It is difficult to recognise the species from Totton's short description, the more so since the gonothecae which he described and figured were probably immature, although a central aperture on a short tube is mentioned (but not figured). Ralph's additional description (1961a: 815–816) and the measurements given therein are probably based on re-inspection of the type series in NHM. The species is primarily characterised by the long and thin internodes. Long internodes also seem to be a character of *Symplectoscyphus tuba* Totton, 1930, although these, according again the Ralph's measurements, are almost twice as wide. Delicate and profusely branched symplectoscyphids with long, thin internodes occur in material from the Tasman seamounts and from the Three Kings Islands region. This material bears mature gonothecae that differ considerably from Totton's account of a presumable juvenile gonotheca.

RECORDS FROM NEW ZEALAND: So far known only from the Three Kings Islands region at depths varying between 183 and 262 m.

DISTRIBUTION: Known only from waters north of New Zealand and from the Tasmanian seamounts.

Symplectoscyphus fuscus (Trebilcock, 1928)
(Fig. 49A–G)

Sertularella fusca Trebilcock 1928: 13, pl. 1, figs 2-2b.
Symplectoscyphus fuscus: Ralph 1961a: 800, fig. 14c-e; Dawson 1992: 20; Vervoort 1993a: 239.

MATERIAL EXAMINED:

NMNZ: Crayfish pots, **Tatapouri, Gisborne**, Dec.1965: Numerous, up to 25 mm high colonies with many gonothecae on algae. Intimately associated with *Aglaophenia laxa* Allman, 1876a. NMNZ Co. 657, 2 RMNH-Coel. slides 3028; **Opoutama Beach, Mahia**, 06.Sept.1970: Many stems up to 25 mm long on algae, no gonothecae. With *Aglaophenia laxa* Allman, 1876a. NMNZ Co. 562; 2 RMNH-Coel. slides 3011.

NMNZ Ralph Collection: Loc. 703, 1 bad and 1 good slide as *Sertularella fusca*, with data: Little Papanui, D.

PMBS: *Symplectoscyphus fuscus* (Trebilcock, 1924). Identified by: P. Ralph.

MATERIAL INSPECTED: **Mu 66–38, Hyd 29**: Numerous up to 10 mm high pinnate colonies on worm tube or bryozoan. Many mature and spend gonothecae. RMNH-Coel. 27455, slide 2672. Id., second sample.

TYPE LOCALITY: St Clair, Dunedin, in rock pools below the swimming pool, probably on algae (Trebilcock 1928; possible syntype in MOV, MV F57895, microslide).

DESCRIPTION: Flexuous colonies with a curved, monosiphonic main stem springing from a thin network of tubiform stolons attached to thalli or to holdfasts of algae, height up to 25 mm. Stem placed on distinct stolonal apophysis, divided into short internodes; first internode basally with a few distinct rings. Stem internodes with fairly small base, widening distally and supporting 1 hydrotheca; nodes oblique. Stem hydrothecae alternate, pointing obliquely upwards and forwards, arranged in 2 planes meeting at an angle of 90° or less. Hydrocladia arising from stem internodes from near base of each stem hydrotheca, directed outwards and obliquely upwards, divided into internodes, each bearing a hydrotheca, arranged in same manner as stem hydrothecae.

Hydrothecae of stem and hydrocladia identical, more or less cylindrical with slight swelling adcaudally; adcauline hydrothecal wall adnate with internode for about half its length, abcauline wall straight to slightly concave. Fused part adcauline wall strongly convex, basally conspicuously swollen. Basal plate strong, with circular hydropore. Hydrothecal aperture variable throughout and between colonies, with 3 rounded cusps: 1 abcauline, and 2 lateral, abcauline cusp typically enlarged.

Development of perisarc much varied, normally rather strong, extending to hydrothecal walls and rims, which may be considerably thickened. Some hydrothecae show remnants of the opercula. Operculum when complete, 3-flapped, forming a low roof. In nearly all full grown hydrothecae the opercular plates are shed.

Gonothecae occurring in profusion on some colonies, attached to stem internodes just below hydrothecae and lying in space between hydrocladia. Two types of gonothecae present. First type ovoid, with about 8 rings not sharply demarcated and without ridge or flange. Top of gonotheca with 3 obtuse cusps on a small column; no aperture seen. Second type shorter and more rounded, with a spiral ridge descending from top to bottom in 7 to 8 coils; edge of ridge sharp and irregular; no flange present.

REMARKS: The structure of the colony, with gonothecae disposed between successive hydrocladia, is not unlike that of the open corbula met with in certain genera of Aglaopheniidae. There is much variation between colonies from various localities in development of the perisarc, which considerably influences the ultimate shape of the hydrotheca. Strong development of the perisarc of the hydrothecal rim and the abcauline cusp may obscure the presence of lateral cusps. Hydranths are present in the Taiaroa Heads material; they have a distinct, large abcauline caecum.

RECORDS FROM NEW ZEALAND: Tatapouri near Gisborne; Opoutama, Mahia Beach, Hawke Bay; Dunedin area (St Clair, Taiaroa Heads, and Little Papanui). Littoral zone down to at least 40 m, usually on algae, but also on solid objects like worm tubes and bryozoans. Empty gonothecae were found in December.

DISTRIBUTION: Known only from the eastern coasts of New Zealand.

Symplectoscyphus howensis sp. nov.

(Fig. 49H–K)

MATERIAL EXAMINED:

NZOI Stn P82: Small stems to 30 mm high and many fragments, on algae between *Aglaophenia sinuosa* Bale, 1888; several gonothecae. Holotype (H-768, in NIWA collection) a 30 mm high colony with gonotheca; fragments and RMNH-Coel. slide 2901 are part of type series.

TYPE LOCALITY: Tasman Sea near Lord Howe Island, 31°49.80′ S, 159°19.70′ E, 78 m.

DESCRIPTION (of holotype): Up to 30 mm high, monosiphonic stems with irregular branches and some unbranched stems attached to fragments of tubiform stolon. Stems basally smooth; no division into internode. Hydrothecae alternate, in 1 plane; tip of adcauline cusps approximately on same level as hydrothecal floor of next hydrotheca (on opposite side). Tips of stems and branches weakly geniculate.

MEASUREMENTS of *Symplectoscyphus fuscus* (in μm):

	Opoutama slide 3011	Taiaroa slide 2672	Tatapouri slide 3028
Axial internode, length	590 – 820		
Diameter at node	180 – 215		
Diameter just under insertion of hydrocladium	295 – 360		
Axial hydrotheca, length adnate adcauline wall	180 – 215		
Length free adcauline wall	345 – 375		
Length abcauline wall	425 – 490		
Maximum diameter	245 – 295		
Diameter at rim	230 – 280		
Hydrocladial hydrotheca, length adnate adcauline wall	195 – 230		
Length free adcauline wall	310 – 330		
Length abcauline wall	460 – 540		
Maximum diameter	245 – 280		
Diameter at rim	215 – 230		
Gonotheca, first type, total length		1640 – 1700	
Maximum diameter		785 – 800	
Diameter at apex		245 – 250	
Gonotheca, second type, total length			1310 – 1425
Maximum diameter			705 – 755
Diameter at apex			325 – 330

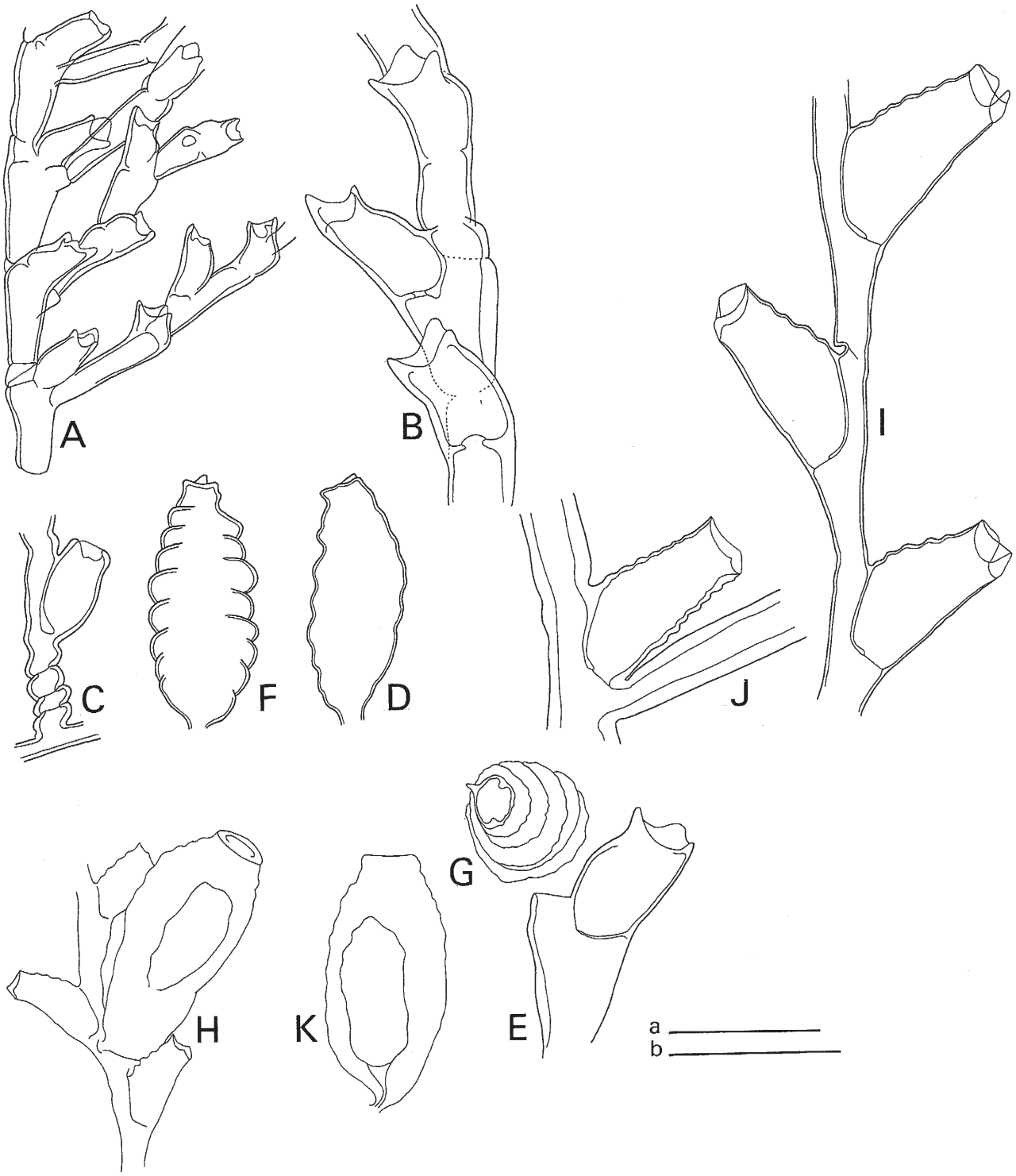

Fig. 49. A–G. ***Symplectoscyphus fuscus*** (Trebilcock, 1928). **A**, part of colony. **B**, part of hydrocladium (NMNZ, Opoutama Beach, Mahia, slide 3011). **C**, proximal part of stem of young colony. **D**, gonotheca (PMBS, Mu 66-38, slide 2672). **E**, hydrocladial hydrotheca. **F**, gonotheca, lateral view. **G**, spend gonotheca, view from above (NMNZ, Tatapouri, slide 3028). **H-K.** ***Symplectoscyphus howensis*** sp. nov. **H**, part of stem with gonotheca. **I**, hydrocladial hydrothecae. **J**, axillary hydrotheca. **K**, gonotheca (NZOI Stn P82, holotype, slide 2901). W.V.

Hydrothecae basally fairly wide, narrowing gradually apically, slightly tumid. Free adcauline wall about 1.5 times as long as adnate part, straight or basally slightly convex, with 5 or 6 transverse undulations fading distally towards abcauline hydrothecal wall. Abcauline wall almost straight; occasionally with quite indistinct undulations. Adnate hydrothecal wall curved, basally slightly thickened; diaphragm on abcauline side, wide. Hydrothecae diverging from stems and branches at an angle of about 60°; aperture perpendicular to hydrothecal axis; rim with 3 acute cusps, 1 adcauline, 2 lateral; embayments shallow. Many hydrothecae with more or less complete operculum composed of 3 triangular flaps when closed forming a low triangular roof. No submarginal intrathecal cusps; rim of hydrotheca not thickened; 1 or 2 renovations occasionally present.

Perisarc on basal part of stem fairly strong and thick, yellowish, rapidly thinning out along remainder of stem and branches, and along walls of hydrothecae; top parts of colony and stems consequently quite flexuous.

Gonothecae big, ovoid, broadest in middle, narrowing basally into a short pedicel, apically into a circular platform with rounded depression; gonotheca attached to internode just under hydrothecal base. Walls of gonotheca uneven, apically with 4 or 5 indistinct rings; 2 gonothecae contain a large, yellowish ovoid mass, either a developing egg or planula.

REMARKS: A distinctive species that could not be identified with any described species of *Symplectoscyphus*. Gonothecae were found in May.

RECORDS FROM NEW ZEALAND: So far found at a single locality in the Tasman Sea near Lord Howe Island, 31°49.80′ S, 159°19.70′ E, 78 m.

DISTRIBUTION: Lord Howe Island region in the Tasman Sea.

ETYMOLOGY: Species name *howensis* refers to Lord Howe Island, the type locality for the species.

MEASUREMENTS of *Symplectoscyphus howensis* sp. nov. (in μm):

	NZOI Stn P82 slide 2901
Stem, diameter at base	218
Distance between axils of 2 stem hydrothecae	785 – 1015
Distance between axils of 2 hydrothecae of hydrocladium	655 – 900
Axillary hydrotheca, length adnate adcauline wall	335 – 350
Length free adcauline wall	445 – 505
Length abcauline wall	590 – 645
Total depth	645 – 700
Maximum diameter	295 – 335
Diameter at rim	230 – 240
Non-axillary hydrotheca, length adnate adcauline wall	280 – 335
Length free adcauline wall	450 – 505
Length abcauline wall	560 – 590
Total depth	590 – 615
Maximum diameter	295 – 305
Diameter at rim	195 – 225
Gonotheca, total length	1885 – 1920
Maximum diameter	850 – 900
Diameter of platform at top	410 – 425

Symplectoscyphus indivisus (Bale, 1882)
(Fig. 50A–D)

Sertularella indivisa Bale 1882: 24, pl. 12, fig. 7; 1884: 105, pl. 3, fig. 5, pl. 19, fig. 27;
Sertularella indivisa; Bartlett 1907: 42; Stechow 1913a: 144; 1913b: 12, 134, figs 106–107; Bale 1915: 285; Jäderholm 1917: 8, pl. 1, fig. 6; Briggs 1918: 34, 36; Blackburn 1937: 368; Cotton & Godfrey 1941: 4, fig.; Blackburn 1942: 115; Vervoort 1946a: 310; Hodgson 1950: 31, figs 55–56.
Symplectoscyphus indivisus; Stechow 1922: 148; 1923b: 12; 1923d: 172; Millard 1961: 207; Ralph 1961a: 803–804, fig. 15i-k; 1961d: 236; Shepherd & Watson 1970: 140; Watson 1973: 175; Millard 1975: 320; Tang & Huang 1986: 318; Dawson 1992: 20; Vervoort 1993a: 240; Watson 1994a: 67.
Sertularella Muelleri Kirchenpauer 1884: 49-50, pl. 16, figs 7–7b; von Lendenfeld 1885a: 478; Farquhar 1896: 464.
Sertularella solidula Bale 1882: 24-25, pl. 12, fig. 8; 1884: 106–107, pl. 3, fig. 6, pl. 19, fig. 28; Whitelegge 1889b: 41; Bartlett 1907: 42; Mulder & Trebilcock 1915: 55, pl. 8, fig. 3; Stranks 1993: 18; Vervoort 1993a: 192.
Symplectoscyphus solidulus; Stechow 1922: 148.
Sertularella variabilis Bale 1888: 764-765, pl. 15, figs 5–9; Stranks 1993: 19.
Symplectoscyphus variabilis; Stechow, 1922: 148.

MATERIAL EXAMINED:

NMNZ: Denham Bay Beach, 9.May.1908: 3–10 mm high stems detached from substratum, 1 branched. Gonothecae present. NMNZ Co. 627. 2 RMNH-Coel. slides 3024; **Denham Bay Beach**, 14.Oct.1908: Several 2–8 mm high stems, arising from stolon detached from substratum. 3 detached gonothecae with marsupium. NMNZ Co. 628.

PMBS: I. Large, heavy walled theca with 2 or 3 rugae (= waves of side) + 3 prominent internal vertical teeth inside cup.; II. **Little Papanui**, on shells of *Mytilus canaliculus* [= *Perna canaliculus* (Gmelin, 1791)]. (Taken from card register).

TYPE LOCALITY: *Sertularella indivisa*: Port Phillip Bay, Victoria, Australia (Bale 1882; probable syntypes in MOV, MV F59068; MV F58888; MV F58889). *Sertularella solidula*: Port Phillip Bay, Victoria, Australia (Bale 1882, probable syntypes in MOV, MV F58890; MV F59234). *Sertularella variabilis*: Bondi Bay, New South Wales, Australia (Bale 1888, probable syntypes in MOV, MV F58765; MV F58766; MV F58767). All (probable) syntypes are microslides from the Bale collection (Stranks 1993). *Sertularella muelleri*: Chatham Islands (Kirchenpauer 1884); type probably in MUH.

DESCRIPTION: A small, unbranched symplectoscyphid, stem up to 15 mm high rising from a tubiform stolon attached to algae or fixed objects, stem invariably monosiphonic, composed of internodes separated by oblique nodes, showings signs of torsion basally and apically; basal portion of axis with a few more or less distinct rings, frequently geniculate, with thick perisarc;

Hydrothecae inserted at distal part of internode, adnate for about half length of adcauline wall, tumescent, narrowing apically, walls with 3 or 4 annulations starting at adcauline side and running downwards, gradually fading out, in many hydrothecae annulations mere undulations of hydrothecal wall, more distinct on adcauline than on abcauline side. Hydrothecae biserially arranged in 1 plane, diverging from internode at an angle of about 45°; wall of internode and abcauline hydrothecal wall smoothly contiguous. Hydrothecal rim thickened, with 3 marginal cusps of varied develop-ment but typically of equal size; 3 small submarginal intrathecal cusps in embayments between marginal cusps. Fused part adcauline wall with sharp curve near hydrothecal bottom and with rounded thickening; diaphragm circular, small. Operculum 3-flapped, complete in some hydrothecae only, when complete and closed forming a low roof.

Gonotheca inflated, elongated ovoid, narrowing basally into short pedicel, attaching to internode just below hydrotheca. Walls of gonothecae with 5–7 indistinct, low ribs, better developed on distal half. Apex of gonotheca narrowing rather sharply, provided with 3 thick, rounded prominences surrounding a small, circular aperture.

Perisarc of internodes and hydrothecae thick; that of gonothecae thin, with exception of apical cusps that are notably strong.

REMARKS: We have only seen material from the Kermadec Islands, rather far from New Zealand coastal waters proper; the Portobello material has not been rediscovered and is not mentioned by Ralph (1961a). The Kermadec material was evidently dead and is covered by diatoms.

MEASUREMENTS of *Symplectoscyphus indivisus* (in μm):

	Kermadec Islands slide 3024	Tasmania (Ralph 1961a)
Internode, length	450 – 590	
Diameter at node	85 – 100	
Hydrotheca, length adnate adcauline wall	190 – 200	250
Length free adcauline wall	250 – 260	
Length abcauline wall	360 – 370	350
Total depth	390 – 420	
Maximum diameter	270 – 285	
Diameter at rim	185 – 195	180 – 200
Gonotheca, total length, including apical cusps	1065 – 1230	1250
Maximum diameter	705 – 885	750

Sertularella muelleri Kirchenpauer, 1884, has been treated here as a synonym of *Symplectoscyphus indivisus* Bale, 1882, following Ralph (1961a) in this respect, though Kirchenpauer's description and figures are not really diagnostic and refer to a species with pinnately arranged side branches, not normally observed in *S. indivisus*.

RECORDS FROM NEW ZEALAND: Known only from Sunday Islands, Kermadec, the record probably refers to drifted material; the Portobello record could not be checked. Ralph's (1961a) record from the Chatham Islands is based on Kirchenpauer's description of *Sertularella muelleri* of which the synonymy with *S. indivisus* is considered doubtful.

DISTRIBUTION: Ralph (1961a: 804) refers to an essentially cosmopolitan distribution which we believe to be incorrect as the species so far has only been recorded with certainty from the coasts of southeast Australia (where it is a common species), Tasmania, and from the Kermadec Islands.

Symplectoscyphus irregularis (Trebilcock, 1928) (Fig.50E–G)

Sertularella irregularis Trebilcock 1928: 13, pl. 5, figs 1-1b; Stranks 1993: 17.
Symplectoscyphus irregularis; Ralph 1961a: 818-820, fig. 19d-f; Dawson 1992: 20; Vervoort 1993a: 240.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 227, NMNZ Co. 1072, Many about 2–4 mm high stems, some with gonothecae, rising from stolon investing large bryozoan.

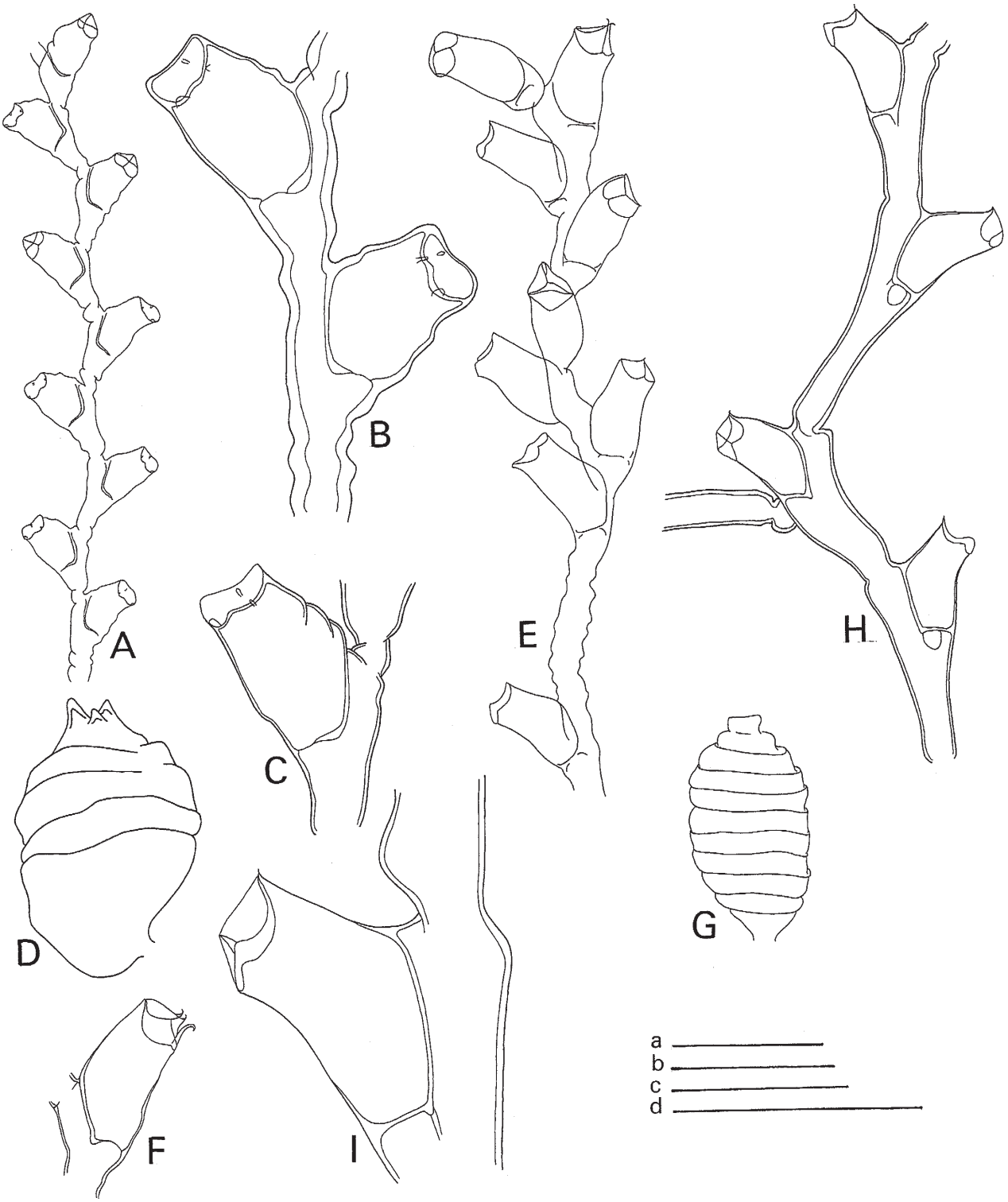

Fig. 50. A–D. ***Symplectoscyphus indivisus*** (Bale, 1882). **A**, stem. **B**, part of stem with stem hydrothecae. **C**, stem hydrotheca with distinctly marked grooves. **D**, gonotheca (NMNZ, Denham Bay Beach, slide 3024). **E–G.** ***Symplectoscyphus irregularis*** (Trebilcock, 1928). **E**, stem. **F**, stem hydrotheca. **G**, gonotheca (Loc. 394, slide 3861). **H, I.** ***Symplectoscyphus johnstoni johnstoni*** (Gray, 1843). **H**, part of stem with hydrocladium. **I**, stem hydrotheca (NZOI Stn A696, slide 2712). Scales: a, 1 mm (D, G, H); b, 0.2 mm (F, I); c, 1 mm (A); d, 0.5 mm (B, C, E). W.V.

RMNH-Coel. slide 3735. Poor slide in RSC as *Sertularella crassiuscula*, no data; **Loc. 391**, NMNZ Co. 1182, fragment with *Amphisbetia bispinosa* (Gray, 1843) and *Amphisbetia trispinosa* (Coughtrey, 1875). RMNH-Coel. slide 3857; **Loc. 394**, NMNZ Co. 1185, tangled colonies with gonothecae, about 10 mm high. With *Turritopsis nutricula* (McCrady, 1857) and *Plumularia setacea* (Linnaeus, 1758). RMNH-Coel. slide 3861; **Loc. 395**, NMNZ Co. 1186, several dense, heavily tangled and anastomosing colonies about 12 mm high, with gonothecae. Living material with polyps. Also stem of *Sertularella simplex* (Hutton, 1873). RMNH-Coel. slide 3863; **Loc. 595**, good slide in RSC as *Symplectoscyphus irregularis*, no data.

TYPE LOCALITY: Intertidal of St Clair, Dunedin. Stranks (1993) mentions possible syntypes from the type locality: MV F57894 and MV F57940 in the MOV collection; both are microslides.

DESCRIPTION: Tiny symplectoscyphid, stem several millimetres high, composed of short internodes with thin perisarc, separated by oblique septa; stem typically unbranched or with a few side branches, rising from tubular, anastomosing stolon on algae or fixed objects; basal internode with a number of indistinct annulation; these also occur occasionally between other stem internodes. Hydrothecae elongated, basally slightly tumescent, gradually narrowing apically; margin slightly everted; abcauline wall with distinct cavity some distance under rim. Adcauline wall of hydrotheca adnate for about one-third of its length or less, free portion smoothly curved; bottom of hydrotheca straight; diaphragm small. Hydrothecal rim with 3 fairly acute marginal cusps, 1 adcauline and 2 lateral; opercular plates big, attached in rounded embayments of hydrothecal rim, forming a fairly high, pointed roof; margins of plates recurved. Arrangement of hydro-thecae along stem irregular, forming an indistinct and often quite irregular spiral, bringing every third or fourth hydrotheca on same side. However, arrangement may be more irregular in some stems. Walls of hydrotheca smooth or slightly undulated. Renovations rare, usually single in some hydrothecae only. Hydranths contracted; the abcauline caecum, described by Ralph as poorly developed, has not been observed. 18–20 tentacles.

Gonothecae occur along stems in present material, inserting on internode below a hydrotheca, shape elongated ovoid, with a spiral grove of 9 or 10 turns from apex to base; frills or carinae absent. A fairly wide, slightly expanding tube occurs on an apical platform, terminal aperture circular.

REMARKS: This material was also described by Ralph (1961a); no ramifications of the hydrocaulus have been observed. Ralph gives the height of the hydrocaulus as being up to 0.50 mm, obviously a mistake.

MEASUREMENTS of *Symplectoscyphus irregularis* (in μm):

	Ralph's Loc. 394, slide 3861	New Zealand (Ralph 1961a)
Internode, length	170 – 225	150
Diameter at node	55 – 70	
Hydrotheca, length adnate adcauline wall	105 – 125	90
Length free adcauline wall	175 – 190	200
Length abcauline wall	210 – 225	210
Total depth	275 – 280	
Maximum diameter	125 – 140	130
Diameter at rim	105 – 130	100
Gonotheca, total length, including funnel	920 – 985	900 – 1000
Maximum diameter	540 – 590	600
Length of funnel	65 – 98	70
Diameter at apex	180 – 195	130

RECORDS FROM NEW ZEALAND: A rare species, so far known only from the type locality (St Clair, Dunedin), Taylor's Mistake, Christchurch, and from Woodpecker Bay; the material from Christchurch and Woodpecker Bay was evidently collected in living condition.

DISTRIBUTION: Known exclusively from South Island, New Zealand.

Symplectoscyphus johnstoni johnstoni (Gray, 1843)
(Figs 50H, I; 51A–E)

Sertularia johnstoni Gray 1843: 294; Hutton 1873: 256.
Sertularella johnstoni: Coughtrey 1876b: 299; Hilgendorf 1898: 207–208, pl. 19, figs 2, 2a; Bartlett 1907: 42; Jäderholm 1917: 10; Bale 1924: 239; Naumov & Stepan'yants 1962: 82, fig. 6; Stepan'yants 1979: 78, pl. 17, fig. 6; Stechow 1922: 148; 1923a: 108; 1923d: 172; Ralph 1961c: 104; 1961d: 236; Millard 1975: 320; Bouillon *et al.* 1995: 73.
Symplectoscyphus johnstoni forma *johnstoni*: Ralph 1961a: 808, figs 17a-n, 18a-c.
Symplectoscyphus johnstoni johnstoni: Dawson, 1992: 20; Vervoort 1993a: 240.
Sertularia sub-pinnata Hutton 1873: 256.
Sertularia delicatula Hutton 1873: 256–257.
Sertularella purpurea Kirchenpauer 1884: 49, pl. 16, figs 3, 3a, 3b.
Sertularella capillaris Allman 1885: 133, pl. 8, figs 1–3.
Symplectoscyphus australis Marktanner-Turneretscher 1890: 235, pl. 4, figs 9, 9a; Stechow 1922: 148; 1923d: 171.
Symplectoscyphus spiritualis Totton 1930: 184, fig. 34; Ralph 1961a: 816, fig. 18h-k; Dawson 1992: 20; Vervoort 1993a: 241.
Sertularella subdichotoma: Vervoort 1946: 314, fig. 5 (not *Symplectoscyphus subdichotomus* (Kirchenpauer, 1884)).

MATERIAL EXAMINED:

NZOI Stns: A431, *Symplectoscyphus j. johnstoni* (Gray, 1843) (J.E. Watson). [Slide 4185 JEW Colln]; **A433**, *Symplectoscyphus j. johnstoni* (Gray, 1843) (J.E. Watson); **A444B**, *Symplectoscyphus j. johnstoni* (Gray, 1843) (J.E. Watson); **A696**, several bottles filled with shells and unrecognisable hydroid remains. Isolated from this sample 2 about 8 mm long fragments, all in RMNH-Coel. slide 2712; **A705**, several tangled colonies, 10 x 10 mm, no gonothecae. 2 RMNH-Coel. slides 2716. Sample dried out and later on restored; **A738**, bunch of colonies about 50 x 50 mm; no gonothecae. 2 RMNH-Coel. slides 2726; **A750**, several small colonies up to 15 mm high; no gonothecae; **B176**, 2 small colonies, 15 and 25 mm high, and a fragment. No gonothecae; **B196**, several small colonies up to 10x15 mm; no gonothecae. RMNH-Coel. slide 2736; **B197**, several colonies up to 15 mm high, no gonothecae. RMNH-Coel. slide 2738; **B220**, gear DD/GLO, 1 fragment of about 20 mm no gonothecae. All in RMNH-Coel. slide 2744; **B224**, gear GLO, up to 25 mm high colonies on small stone. No gonothecae; **B224**, gear DIS, small colonies with gonothecae, up to 15 mm high on shell fragments and bryozoans; **B230**, large clumps of colonies, up to 30 x 30 x 30 mm. No gonothecae; **B237**, gear DD, single fragment, 20 mm high; **B237**, gear DIS, numerous colonies with gonothecae, forming bulk of sample; **B238**, gear GLO, bunch of tangled colonies 30 x 30 mm, no gonothecae; **B238**, gear DIS, bunch of tangled colonies 30 x 50 mm, no gonothecae; **B246**, fragments of large colony only. No gonothecae; **B247**, many colonies with gonothecae in dense clumps of tangled stems and branches; **B251**, 2 fragments, 10 mm high, no gonothecae; **B252**, 3 fragments, 10 mm high. No gonothecae; **B482**, several bunches of tangled colonies, 20 x 20 mm, no gonothecae; **B581**, small colony, 10 x 10 mm, no gonothecae; **B595**, fragment about 15 mm high, no gonothecae. RMNH-Coel. slide 2792; **B605**, some isolated fragments, up to 15 mm high, no gonothecae; **C125**, *Symplectoscyphus j. johnstoni* (Gray, 1843) (J.E. Watson); **C381A**, single fragment, 15 mm high; **C617**, many bushy colonies, no gonothecae; **C652**, 30 mm long branch with gonothecae. All in RMNH-Coel. slide 2807; **C672**, *Symplectoscyphus j. johnstoni* (Gray, 1843) (J.E. Watson); **C763**, several up to 10 mm high colonies on stems of *Crateritheca novaezelandiae*; **D49**, 8 mm high colony on small stone. All in RMNH-Coel. slide 2821. Internodes with 1-sided perisarc thickenings; **D76**, 4 colonies, 8–10 mm high, on old hydroid stem. No gonothecae; **D127**, some colonies, with large colonies of *Symplectoscyphus procerus* (Trebilcock, 1928). RMNH-Coel. slide 2831. Gonothecae with centrally placed funnel; **D131**, gear TAM, 5 fragments, 15–30 mm long, no gonothecae; **D131**, gear DCMB, dried out sample containing 1 fragment, 30 mm long; **D132**, a few fragments, about 10 mm high, from dried out sample; **D133**, fragment, 25 mm long. No gonothecae; **D148**, fragments, 30 mm high, no gonothecae; **D156**, several tufts, about 40 x 40 mm, no gonothecae. Partly growing on and overgrown by bryozoans; **D196**, colonies mixed with bryozoans, no gonothecae; **D874**, bunch of tangled colonies, with many fusions, about 40 mm high, some gonothecae. Two RMNH-Coel. slides 2291. Gonothecae with excentrally placed funnel; female gonothecae with developing planulae. With *Filellum serratum* (Clarke, 1879); **E312**, many tangled colonies, colour brownish, with gonothecae. 2 RMNH-Coel. slides 2117. Internodes with 1-sided thickening of perisarc. With hydrothecae of *Filellum serpens* (Hassall, 1848); **E402**, small tufts about 15 mm high, no gonothecae; **F922**, large bunches of densely tangled colonies, no gonothecae. 2 RMNH-Coel. slides 2198; **G672**, numerous colonies forming bulk of very large sample. Gonothecae abundant; **G686**, bunch of colonies 30 x 40 mm mixed with bryozoans. No gonothecae; **G691**, tuft of colonies, about 50 x 50 mm, attached to empty worm tubes. Some gonothecae present; **G694**, large mass of tangled colonies attached to stones. No gonothecae. Dirty sample; **G697**, about 50 mm high stems on old hydroid stems without gonothecae and mixed with *Sertularella* sp. Part of RMNH-Coel. slides 2869; **G708**, 2 small colonies, about 25 mm high, attached to worm tubes. No gonothecae; **I84**, fair colony, about 40 x 40 mm, no gonothecae; **I342**, bunch of colonies, 40 x 40 mm, no gonothecae; **J15**, several small colonies with gonothecae, about 30 x 30 mm; **J17**, bunch of colonies, about 40 x 30 mm, without gonothecae. Size of hydrothecae varied, although generally small. 2 RMNH-Coel. slides 2890; **Q35**, many colonies up to 15 mm high on bryozoans. No gonothecae; **Q85**, *Symplectoscyphus j. johnstoni* (Gray, 1843) (J.E. Watson); **S184**, bunch of colonies, about 50 x 50 mm, forming fine lace work. No gonothecae; **S237**, 2 fragments, larger 15 x 15 mm, no gonothecae; **T46**, *Symplectoscyphus j. johnstoni* (Gray, 1843) (J.E. Watson).

NMNZ: Cray fish pot off **Bench Islands**, Foveaux Strait, 18.Nov.1955, forming bulk of sample. Large bunch of tangled colonies, 50 x 50 mm, no gonothecae. NMNZ Co. 490; **Zone 2.25 F, Nth. Otago**, J.G.O., Oct.1963, several colonies with polyps in expanded condition, about 110 x 50 mm and densely interwoven. No gonothecae. NMNZ Co. 663; **Wangaruru Harbour**, 10.Jan.1970, small bunch of colonies, 10 x 15 mm with some gonothecae. NMNZ Co. 458; **BS 202**, bunch of colonies, 20 x 40 mm. No gonothecae. NMNZ Co. 653. 2 RMNH-Coel. slides 3027; **BS 379**, bunch of colonies, 20 x 40 mm, without gonothecae. NMNZ Co. 559; **BS 389**, several small colonies from base of *Crateritheca novaezelandiae* (Thompson, 1879). NMNZ Co. 504; **BS 394**, small bunch of colonies, about 20 x 10 mm; no gonothecae. NMNZ Co. 667; **BS 398**, large colony, about 50 x 80 mm, composed of intertwining and anastomosing stems; many gonothecae. NMNZ Co. 509. Large tuft, 30 x 30 x 40 mm, detached from base of *Crateritheca novaezelandiae* (Thompson, 1879); no gonothecae. NMNZ Co. 601. 2 clumps of anastomosed colonies with gonothecae, about 40 mm high and 15 x 15 mm in circumference. NMNZ Co. 722. Fragment with gonothecae as RMNH-Coel. 27670, RMNH-Coel. slide 3370; **BS 480**, large bunch of colonies about 40 x 40 mm, many gonothecae. NMNZ Co. 415; **BS 519**, small, intergrown colonies on various hydroids, up to 15 mm high; no gonothecae. NMNZ Co. 808, RMNH-Coel. slide 3486. Internodes with 1-sided perisarc thickening; **BS 561**, bunch of tangled colonies about 60 x 50 mm; no gonothecae. NMNZ Co. 673; **BS 678**, 2 minute colonies detached from stolon on stem of *Lytocarpia vulgaris* sp. nov., 8 and 12 mm high, in RMNH-Coel. slide 3503; **BS 679**, small, intergrown colony on bryozoans; no gonothecae. NMNZ Co. 877; **BS 834**, small fragment of larger colony, about 40 mm long; no gonothecae. NMNZ Co. 749. Small bunch of stems, tangled, about 20 x 20 mm, no gonothecae observed, attached to stems of *Tubularia*(?) sp. NMNZ Co. 754. Some loose stems as RMNH-Coel. 27693, 3 RMNH-Coel. slides 3393; **BS 835**, single colony attached to small bryozoan colony, no gonothecae NMNZ Co. 586; **BS 837**, large tufts of colonies, densely mixed with bryozoans, up to 50 mm high; many gonothecae present. NMNZ Co. 683; **BS 838**, 2 bunches of tangled colonies with gonothecae, up to 40 mm high, spread about 10 mm. NMNZ Co. 762.

RMNH-Coel. 27706, 2 RMNH-Coel. slides 3406. Also colonies up to 15 mm high growing from stolon creeping on stems of *Pycnotheca mirabilis* (Allman, 1883), latter only recognisable because of presence of large gonothecae. NMNZ Co. no. 764. RMNH-Coel. 27708, slides 3408; **BS 862**, large clump of densely interwoven and anastomosing colonies, 70 x 70 x 70 mm. No gonothecae observed. NMNZ Co. 685; **BS 899**, bunch of colonies without gonothecae, associated with *Dictyocladium monilifer* (Hutton, 1873) and bryozoans. NMNZ Co. 450; **BS 904**, large tuft, 50 x 50 mm, no gonothecae. NMNZ Co. 434; **BS 913**, 2 bunches of colonies about 50 mm high, composed of interwoven, tangled, leaf-like fronds with many gonothecae. Material is dead and slightly overgrown. NMNZ Co. 796. 3 RMNH-Coel. slides 3344. N.B. Gonothecae are as those figured by Ralph for *S. johnstoni subtropicus* with symmetrically placed apical tube, whilst on other gonothecae that tube is distinctly eccentrically. There are no submarginal intrathecal cusps or warts; **BS 918**, sample consists of numerous colonies, densely interwoven with bryozoans, forming almost solid clump. NMNZ Co. 588. 2 RMNH-Coel slides 3016; **R.V. *Munida*, Stn 8**, small bunch of colonies about 40 x 40 mm, many gonothecae. NMNZ Co. no. 545.

NMNZ Ralph Collection: **Loc. 39**, NMNZ Co. 928, fragmented colony without gonothecae. RMNH-Coel. slide 3622; **Loc. 51**, NNMZ Colln 911, tangled and broken fragments of a larger colony; 1 (detached) gonotheca. RMNH-Coel. slide 3609; **Loc. 91**, NMNZ Co. 947, 2 colony fragments 4 and 15 mm long, with many empty gonothecae. RMNH-Coel. slide 3637; **Loc. 107**, NMNZ Co. 962, 2 fragments of colonies, 8 and 10 mm long; no gonothecae. Smaller made up in RMNH-Coel. slide 3653; **Loc. 115**, NMNZ Co. 970, tangled bundle of colony fragments, some with gonothecae. RMNH-Coel. slide 3657. 1 gonotheca in slide has distinct hyaline frills on gonotheca of *S. j. johnstoni* type. Good slide in RSC as *Sertularella delicatula* ?, no data. On label: no teeth?; **Loc. 135**, NMNZ Co. 988, about 15 mm high fragment, with *Stereotheca elongata* (Lamouroux, 1816) and unrecognisable hydroid fragment. Heavily overgrown; no slides. Reasonable slide in RSC as *Stereotheca elongata* & *Sert. johnstoni* ??, no data; **Loc. 150**, NMNZ Co. 1010, several fragments up to 8 mm high, no gonothecae, sample with much detritus. 1 fragment with hydrotheca of *Modeeria rotunda* (Quoy & Gaimard, 1827). RMNH-Coel. slide 3674. Unstained slide in RSC as *Stegopoma fastigiatum* (Alder) with *Sertularella* and *Hebella*, no data; **Loc. 192**, NMNZ Co. 1045, 2 tiny fragments, along with some fragments of bryozoans; no gonothecae. 1 fragment in RMNH-Coel. slide 3711; **Loc. 219**, NMNZ Co. 1065, fragments of a larger colony without gonothecae, height about 15 mm. 3 fragments in RMNH-Coel. slide 3728. Good slide in RSC as *Sertularella johnstoni*, no data; **Loc. 222A**, NMNZ Co. 1069 (this number not in our copy of register, probably this locality), strongly fragmented colonies without gonothecae, 10–15 mm high. RMNH-Coel. slide 3732; **Loc. 234**, NMNZ Co. 1079, numerous colonies 15–20 mm high, strongly ana-stomosed, with some gonothecae; fragment on RMNH-Coel. slide 3749. Mixed with some 25 mm high colonies of *Plumularia setacea* (Linnaeus, 1758); **Loc. 244**, NMNZ Co. 1088, many fragments of larger colony, with gonothecae, covered with *Clytia mollis* (Stechow, 1919). With *Sertularia unguiculata* Busk, 1852. On sea squirt (*Corella* sp.); **Loc. 265**, NMNZ Co. 1113, tangled stems, RMNH-Coel. slides 3791. Also *Plumularia setacea* (Linnaeus, 1758). RMNH-Coel. slide 3792. Good slide in RSC as *Sertularella johnstoni*, no data; **Loc. 267**, NMNZ Co. 1115, tangled stems and fragments up to 20 mm high, with some gonothecae. Colonies heavily overgrown by small bryozoans. 2 RMNH-Coel. slides 3795. *Opercularella humilis* (Bale, 1924) visible in 1 slide. Material taken alive; many partly expanded polyps. Poor slide in RSC as *Sertularella johnstoni* ??, no data; **Loc. 290**, NMNZ Co. 1135, bunch of tangled colonies with many gonothecae; some stems isolated and in 2 RMNH-Coel. slides 3815. With *Stereotheca elongata* (Lamouroux, 1816); **Loc. 450**, NMNZ Co. 1220, strongly fragmented and brittle colonies without gonothecae, the largest parts about 20 mm high. Densely covered with *Filellum serratum* (Clarke, 1879). RMNH-Coel. slide 3896. Poor slide in RSC as *Sertularella johnstoni delicatula*, no data. On label: 3 teeth; **Loc. 506**, partly dried out slide in RSC as *Sertularella j. delicatula*, no data; **Loc. 522**, NMNZ Co. 1255, small colonies *of Symplectoscyphus j. johnstoni* (Gray, 1843), *Sertularella integra* Allman, 1876a, and *Dictyocladium monilifer* (Hutton, 1873) with *Hebellopsis scandens* (Bale, 1888). RMNH-Coel. Slides 3931 after some bleaching; **Loc. 574**, NMNZ Co. 1283, numerous colonies with many gonothecae, strongly tangled. RMNH-Coel. slide 3961; **Loc. 575**, NMNZ Co. 1284, small number of colonies or colony fragments, with gonothecae. RMNH-Coel. slide 3962. Partly dried out slide in RSC as *Sertularella johnstoni* ?, no data; **Loc. 578A**, NMNZ Co. 1286, fragments of a larger colony, with some gonothecae. RMNH-Coel. slide 3964; **Loc. 578B**, NMNZ Co. 1287, fragments of a larger colony, without gonothecae. RMNH-Coel. slide 3965; **Loc. 579**, poor slide as *Symplectoscyphus johnstoni delicatula*, no data. On label: no teeth; **Loc. 590**, NMNZ Co. 1300, strongly tangled colonies of a delicate specimen with gonothecae. RMNH-Coel. slide 3977. Partly dried out slide in RSC as *Sertularella johnstoni del.*, no data; **Loc. 595**, NMNZ Co. 1304, dense bunch of delicate colonies without gonothecae; with *Orthopyxis mollis* (Stechow, 1919) and *Plumularia setacea* (Linnaeus, 1758). Good slide in RSC as *Symplectoscyphus irregularis*, no data; **Loc. 596**, NMNZ Co. 1305, dense bunch of delicate colonies without gonothecae. No slide; **Loc. 597**, NMNZ Co. 1306, tangled colonies with a few gonothecae. RMNH-Coel. slide 3985; **Loc. 598**, NMNZ Co. 1307, tangled colonies without gonothecae, mixed with *S. integra* Allman, 1876a. No slide. Good slide in RSC as *Sertularella johnstoni*, no data; **Loc. 600**, NMNZ Co. 1309, tangled colonies about 15 mm high, and many fragments; no gonothecae. RMNH-Coel. slide 3988. Good slide in RSC as *Sertularella johnstoni*, no data; **Loc. 601**, NMNZ Co. 1310, large bunch of strongly tangled colonies and fragments; gonothecae present. RMNH-Coel. slide 3989. Good slide in RSC as *Sertularella simplex*, no data. On label: 'waved'; **Loc. 602**, NMNZ Co. 1311, several tangled colonies about 15 mm high, no gonothecae. RMNH-Coel. slide 3990; **Loc. 603**, NMNZ Co. 1312, large bunch of tangled colonies; no gonothecae observed (RMNH-Coel. slide 3991). With *Salacia bicalycula* (Coughtrey, 1876a) and *Symplectoscyphus subarticulatus* (Coughtrey, 1875). Good slide in RSC as *Sertularella johnstoni*, no data; **Loc. 604**, NMNZ Co. 1313, bunch of several colonies 25 mm high; no gonothecae. Covered with *Filellum serratum* (Clarke, 1879). RMNH-Coel. slide 3994. Good slide in RSC as *Sertularella johnstoni*, no data; **Loc. 616**, NMNZ Co. 1325, several about 20 mm high stems with branching in 1 plane; no gonothecae. 1 colony as RMNH-Coel. slide 4008; **Loc. 695**, good slide in RSC as *Sertularella johnstoni*, with data: Dunedin, 1950, Kulka, S.A. 7.

Ralph's Chatham Island Expedition Collection: Stn 25, detached colonies up to 12 mm high without gonothecae. According to label "on *Glycimerus* spec., *Sertularella robusta* Coughtrey with *Clytia johnstoni*", latter not found. A very young colony of *Sertularella robusta* Coughtrey, 1876b, attached to fragment of *Symplectoscyphus j. johnstoni*. NMNZ Co. 1348; RMNH-Coel. slide 4418. May belong here.

PMBS: I. *Symplectoscyphus johnstoni* – cup in axil of branch. II. Cape Maria van Diemen. Identified by P.M. Ralph. Taken from card register. Written in pencil: **Mu 67–81** (with trunk); **Mu 67–79** (without trunk). These remarks refer to the 2 colonies on the card. One of these, the upper, is really *Symplectoscyphus j. johnstoni*, with the characteristic, loose mode of branching and many anastomoses. The lower colony, with has a distinctly ramified stem, appears to be *Hydrodendron tottoni* Rees & Vervoort, 1987.

Otago Museum, Dunedin, N.Z.**: Iv. 770**, dense tuft or tufts composed of anastomosing, more or less dichotomously ramified stems with many gonothecae. Hydrothecae as described and figured by Ralph (1961: 810–811, figs 17a-n, 18a-c). Gonothecae of figured type, fairly elongated ovoid, with spiral ridge that becomes carinated and frilled in upper third of gonothecae; apical funnel more or less in centre of top, slightly expanding. Gonothecae occurring on front of ramifications. RMNH-Coel. 27238, RMNHCoel. slide 2655; **Iv. 765**, sample consists of a lamellibranchiate shell with a network of tubes attached to surface and a detached basal part of colony about 7 mm high. Hydrothecae in poor condition; no gonothecae. May well belong to this species.

Additonal Material: **Doubtful Sound**, 20 m, 04.April. 1994, leg. J.E. Watson. Large number of tangled colonies with many gonothecae. From a dried out sample, later on restored. Mixed with some fragments of *Sertularella g. gayi* (Lamouroux, 1821). RMNH-Coel. 27854, slide 4034.

Type Locality: *Sertularia johnstoni*: New Zealand (no further locality record; Gray 1843), location of type unknown. *Sertularia subpinnata*: Lyall Bay (Hutton 1873, probable syntypes, two microslides in MOV, MV F59290, Straks, 1993). *Sertularia delicatula*: Lyall Bay (Hutton 1873, type lost); *Sertularella purpurea*: Chatham Islands (Kirchenpauer 1884, location of type unknown); *Sertularella capillaris*: New Zealand, no further locality record (Allman 1885; type probably in NHM); *Symplectoscyphus australis*: Australia, no further locality records (Marktanner-Turneretscher 1890; type probably in NHMW); *Symplectoscyphus spiritualis*: *Terra Nova* Stn 134, Spirits Bay, off North Cape, New Zealand, 20-36.5 m, (Totton 1930; holotype in NHM, 29.10.10.11).

Description: Colonies of varied form, usually composed of more or less erect or flexuous, pseudo-dichotomously or pinnately branched stems, with several orders of branching, frequently anastomosing, forming irregular masses reaching several centimetres height and diameter, of pale horny yellow to purplish brown colour. Young colonies more regular in structure, often pinnately branched with stem geniculations between ramifications. In such regularly structured colonies stem divided into internodes each with a single distal hydrotheca; hydrothecae alternate and in 1 plane, branches (primary hydrocladia) springing from apophyses under axillar hydrotheca, usually 3 hydrothecae between 2 succeessive opposite apophyses. Hydrocladia divided into internodes each with 1 hydrotheca; hydrothecae alternately directed left or right. Both cauline and hydrocladial internodes of varied length, typically about twice as long as hydrotheca. Hydrocladial nodes visible as distinct, slightly oblique constrictions of perisarc. Nodes partly or almost entirely obscured on stem and hydrocladia in many colonies or only present in basal parts of hydrocladia. Such colonies occur on large algae and other fixed objects. Structure of colonies may become obscured by development of additional (secondary, tertiary, etc.) hydrocladia, irregular ramifications of stem and strong tendencies towards anastomosing. Anastomoses result from tendril formation at end of stems or hydrocladia, followed by fusion with neighbouring hydrothecae or by development of a new colony.

Hydrotheca tubular to slightly saccate, greatest diameter in middle, adcauline wall adnate for about half length or less, but variable. Free adcauline wall straight to slightly convex; angle between internode and free part about 60°. Abcauline wall slightly to distinctly concave, frequently with a distinct curve ('re-entrant angle') at about half its length. Hydrothecal rim with 3 cusps, 1 adcauline, 2 lateral, more or less rounded adcauline cusps may be slightly to distinctly upturned. No submarginal intrathecal cusps, hydrothecall rim may occasionally be slightly thickened. Embayments between marginal cusps rounded, of moderate depth. Operculum composed of 3 triangular flaps attached in embayments, when closed forming a roof of moderate height. Renovations of hydrothecal rim frequent in some colonies and with considerable lengthening of the hydrotheca; in other colonies absent or restricted to a few renovations only. Adnate adcauline hydrothecal wall straight, with small knob at its base and there sharply curved to form hydrothecal bottom; diaphragm small. Abcauline caecum small but distinct, attached inside hydrotheca along a line running from base of fused of part adcauline wall to a point about halfway inside abcauline wall. In hydrothecae with partly decayed hydranths this line of attachment is still distinctly visible. 18–20 tentacles. Perisarc of colony usually moderately developed, thickest on internode, thinning out along hydrothecal walls.

Gonothecae elongated ovoid, with greatest diameter in upper third, gradually narrowing basally into a short pedicel, attaching gonotheca to internode immediately below hydrothecal bottom.

Top of gonotheca rather flattened, a spiral groove starting there running downwards in 12–14 twists; free margin of furrow with a ridge of thickened perisarc, without flange or frill, diminishing in development proximally. Spiral fold forms a small, asymmetrically placed platform at top of hydrotheca, bearing a central short funnel with circular, everted rim. Back of gonothecae strongly adpressed against internode with interruption of spiral fold resulting in a longitudinal depression without rings or grooves. Diameter of terminal tube dependent upon sex of gonotheca,widest in female gonothecae. Size of gonotheca dependent upon development of the gonophore; young gonothecae truncate, apical portion flat without the characteristic plateau with funnel; mature gonothecae with upper third distinctly swollen and apical part with terminal plateau and funnel shifted frontally. Gonothecae occur in profusion at time of spawning and when shed leave a large circular to quadrangular scar ('foramen') under hydrothecal base soon overgrown by a thin sheath of perisarc.

REMARKS: This is one of the more common hydroids of New Zealand sub-littoral waters, occurring under varied conditions of water depth, temperature, wave action, incidence of light, etc. Colony development may vary between small, straggling colonies of several millimetres in height developing attached to algae or other fixed objects, to a bunch of tightly interwoven stems and branches in which it is impossible to distinguish between main stem or branches, resulting from development of many anastomoses. Gonothecae vary in number of spiral twists and thickening of perisarc along its edge; twists vary between 14 and 22 in our material. Slender, almost symmetrical gonothecae occur alongside gonothecae with a frontally swollen distal part with a strongly asymmetrical terminal plateau.

Different ecological conditions under which the colonies develop is reflected in an almost unlimited variability in mode of branching, length of internodes and exact shape of hydrothecae and gonothecae. We have therefore slightly widened the concept of the nominotypical subspecies *Symplectoscyphus johnstoni johnstoni* (Gray, 1843) so as to include Totton's *Symplectoscyphus spiritualis*. When comparing Totton's and Ralph's description of *S. spiritualis* with the present concept of *S. j. johnstoni* as it appears from our very large material, shape of colony and morphology of hydrothecae and gonotheca offer no clear cut characteristics upon which to retain Totton's species, the more so since no indisputable material of *S. j. johnstoni* seems to have been present in the *Terra Nova* collection studied by Totton. Our conclusion is strengthened by inspection of Ralph's (sterile) material of "*Symplectoscyphus spiritualis*" which fits completely within the variation of our large New Zealand material of *S. j. johnstoni*. The following notes refer to features observed in particular colonies:

NZOI Stns: D49, colonies with long internodes, fine and profusely branched, mostly in one plane. Nodes marked by constrictions with internal perisarc thickening. D127, gonothecae with centrally placed plateau with funnel. D874, gonothecae with swollen distal portion and asymmetrically placed funnel.

Ralph's material from Loc. 115: Distal part of some gonothecae with distinct hyaline frill along perisarc ridge; other gonothecae on same colony of typical shape.

RECORDS FROM NEW ZEALAND: Originally recorded from New Zealand without exact locality (Gray 1843). Also

MEASUREMENTS of *Symplectoscyphus j. johnstoni* (in μm):

NZOI	Stn A696 slide 2712	Stn A705 slide 2716	Stn D49 slide 2831
Length of internode	475 – 615	250 – 310	280 – 505
Diameter at node	100 – 125	100 – 125	73 – 95
Hydrotheca, length adnate adcauline wall	260 – 270	210 – 225	140 – 155
Length free adcauline wall	195 – 215	130 – 170	200 – 215
Length abcauline wall	270 – 310	195 – 250	230 – 240
Total depth	365 – 395	280 – 290	300 – 310
Maximum diameter	175 – 190	165 – 180	135 – 155
Diameter at rim	150 – 160	110 – 135	115 – 135
Gonotheca, overall length*	900 – 985		
Maximum diameter*	330 – 380		
Length of apical funnel	28 – 34		
Diameter of funnel at rim	84 – 100		

* = Measurements of colonies from NZOI Stn D874

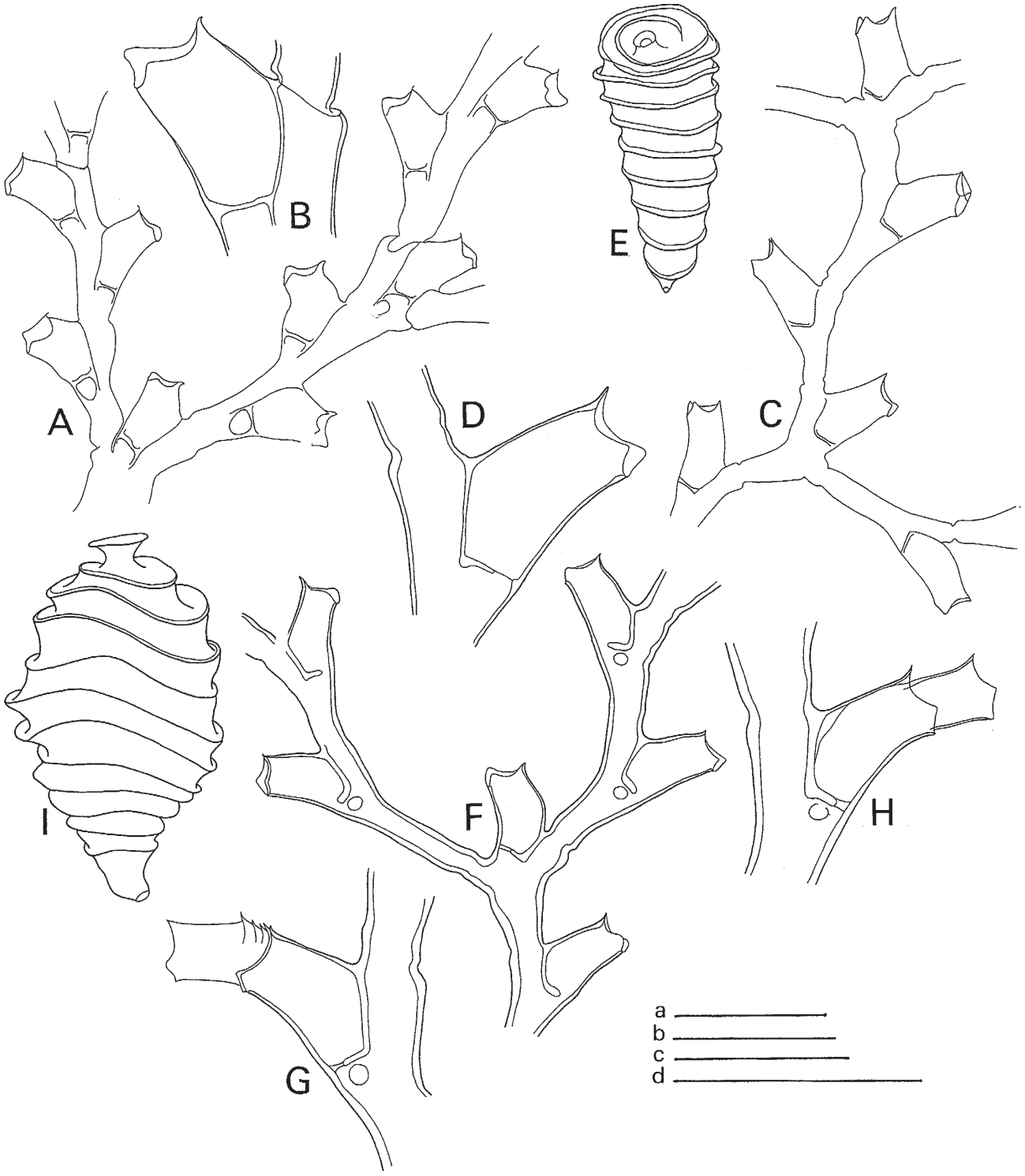

Fig. 51. A–E. ***Symplectoscyphus johnstoni johnstoni*** (Gray, 1843). **A**, part of stem with hydrocladium. **B**, hydrocladial hydrotheca (NZOI Stn A705, slide 2716). **C**, part of colony. **D**, hydrocladial hydrotheca (NZOI Syn D99, slide 2821). **E**, female gonotheca (NZOI Stn D874, slide 2291). **F–I.** ***Symplectoscyphus johnstoni tropicus*** Vervoort, 1993. F, part of colony. **G, H**, renovated hydrocladial hydrothecae. **I**, female gonotheca (NZOI D896, slide 2296). Scales: a, 1 mm (A, C, F); b, 0.2 mm (B, D); c, 1 mm (E, I); d, 0.5 mm (G, H). W.V.

recorded from Chatham Islands; Lyall Bay, Wellington; east and south coasts of South Island, in rock pools and on sea weeds (Hilgendorf 1898). The picture emerging from present records is that of a species widely distributed between 29°–54.5° S, 159°E–175.5° W, depths between 15 and 580 m. Cast ashore on all New Zealand beaches. Gonothecae probably occur all the year round, having been recorded from August and November to May.

DISTRIBUTION: A characteristic species of New Zealand sub-littoral waters, probably also known from Victoria, Australia, though not definitely recorded in recent times.

Symplectoscyphus johnstoni subtropicus Ralph, 1961

Symplectoscyphus johnstoni: Totton 1930: 181, fig. 32a-c.
Symplectoscyphus johnstoni forma *subtropicus* Ralph 1961a: 811, fig. 18l-n.
Symplectoscyphus johnstoni subtropicus: Hicks *et al.* 1991: 7; Dawson 1992: 20; Vervoort 1993a: 240, 255–257, fig. 60f-i, tab. 51 (= tab. 50 on p. 257).

MATERIAL EXAMINED:

NZOI Stn C169: *Symplectoscyphus* cf. *johnstoni subtropicus* Ralph, 1961 (J.E. Watson).

NMNZ Ralph Collection: **Loc. 693**, syntype microslide of this subspecies in NMNZ, Co. 204, bearing the following labelling: "*Symplectoscyphus johnstoni subtropicus* Ralph, 1961, Syntype, Co. 204. Cape Maria van Diemen, R. Kulka, 18.2.1952. P.M.R. 693, "*Sertularella johnstoni subtropicus*" Ralph, 1961, SYNTYPE". This is a carmine (?) stained Canada Balsam slide of about 25 mm long colony fragments bearing a single, quite indistinct gonotheca (and 3 colonies of bryozoans).

TYPE LOCALITY: Cape Maria van Diemen (Ralph 1961a, syntype in NMNZ).

REMARKS: For a description of this subspecies we refer to Ralph (1961a: 811, fig. 18l-n) and Vervoort (1993a: 255–257, fig. 60f-i).

RECORDS FROM NEW ZEALAND: Originally described from Cape Maria van Diemen (Ralph 1961a); an additional (doubtful) record comes from the Tasman Sea, off Mount Egmont, 39°40.00′ S, 172°25.00′ E, 234 m.

DISTRIBUTION: Known only from the waters north of New Zealand and from the Pacific north of New Caledonia (Vervoort 1993a).

Symplectoscyphus johnstoni tropicus Vervoort, 1993a (Fig. 51F–I)

Symplectoscyphus johnstoni tropicus Vervoort 1993a: 259–263, figs 61a-f, 62 a-d.

MATERIAL EXAMINED:

NZOI Stn D896: Some small colonies, about 20 mm high, 3 gonothecae. Part in RMNH-Coel. slide 2296.

TYPE LOCALITY: New Caledonian waters, MUSORSTOM 4 Stn CP153, 19°04.20′ S, 163°21.20′ E, 235 m; holo- and paratypes in MNHN, Hy-1117; paratypes in NHM (1989.11.24.286) and NNM (RMNH-Coel. 25940, slide 1019 and RMNH-Coel. 25941, slide 541).

DESCRIPTION: Colony about 35 mm high, irregularly and loosely branched, base of stem with a few secondary tubules, some branches with tendrils forming anastomoses with neighbouring branches. Side branches arising from big apophyses; division into internodes of stem and branches indistinct, nodes slightly oblique constrictions of perisarc; first internode of branch rather long.

Hydrothecal adcauline wall adnate for about half length or slightly less; fused part straight in axillary hydrothecae, curved in other hydrothecae; bottom of hydrotheca with diaphragm bordering abcauline wall. Free part adcauline wall straight, angle with internode in non-axillary hydrothecae about 60°, adcauline marginal cusp at apex distinctly upturned, sharp. Abcauline hydrothecal wall slightly concave; lateral marginal cusps blunt. Axillary hydrothecae a curved cylinder with smoothly rounded adcauline and concave abcauline wall. Majority of hydrothecae with 2 or 3 short marginal renovations, some with many, resulting in a considerably lengthened, hyaline distal portion. Circular scars of shed gonothecae numerous, in internode direct under hydrothecal bottom plate.

Gonotheca elongated ovoid, in lateral aspect with weak sigmoid curve. Gonothecae with spiral groove descending from top to bottom in 11 or 12 twists; free edge of groove thickened with a narrow hyaline margin, fading out basally. Apex of gonotheca a small platform with a short central funnel with strongly everted rim. Only 3 gonothecae observed, of which 1 contained 2 ovoid bodies, either eggs or developing planulae. Basal two-thirds of back of gonothecae pressed against internode, pattern of ridges interrupted by flattening.

REMARKS: This subspecies is more robust with stiffer colonies than the nominotypical subspecies. Nodes are marked only by constrictions, as is frequently the case in *Symplectoscyphus j. johnstoni*. The hydrotheca of the present subspecies is characterised by the upturned adcauline marginal cusp and the frequent renovations, which occasionally result in a considerably lengthened, hyaline distal part. In the present specimens the female gonotheca has a visibly everted apical funnel, the depression on the back of the gonotheca is moderate and the exterior grooves extend farther downwards than in *Symplectoscyphus j. johnstoni*.

MEASUREMENTS of *Symplectoscyphus johnstoni tropicus* (in μm):

	New Caledonian waters (Vervoort 1993a)	NZOI Stn D896 slide 2296
Stem internode, length	665 – 700	885 – 1115
Diameter at node	110 – 115	125 – 135
Hydrocladial internode, length	405 – 505	735 – 900
Diameter at node	80 – 95	115 – 145
Non-axillary hydrotheca, length		
abcauline wall*	260 – 355	250 – 390
Length free adcauline wall*	215 – 390	190 – 390
Length adnate adcauline wall	185 – 220	205 – 230
Total depth*	315 – 390	310 – 465
Maximum diameter	150 – 160	180 – 190
Diameter at rim	110 – 140	160 – 170
Female gonotheca, length	1035 – 1110	1330
Maximum diameter	400 – 545	820
Length of funnel	70 – 75	130
Diameter of funnel at rim	160 – 170	245
Male gonotheca, length	1160	
Maximum diameter	380	
Length of funnel	70	
Diameter at rim	150	

* including renovations

RECORDS FROM NEW ZEALAND: A single locality in the Southwest Pacific near the Chatham Islands, 44°20.00′ S, 175°50.00′ W, 106 m; the specimen, collected in March, had ripe gonothecae.

DISTRIBUTION: Previously known only from New Caledonian waters, 150–680 m. The present record extends the geographical distribution considerably southwards.

Symplectoscyphus macrogonus (Trebilcock, 1928) (Fig. 52A–D)

Sertularella macrogona Trebilcock 1928: 11, pl. 1, fig. 4–4d.
Symplectoscyphus macrogonus: Ralph 1961a: 798–800, fig. 14a-b; 1961c: 109; Dawson 1992: 20; Vervoort 1993a: 240.
?*Symplectoscyphus macrogonus*: Millard 1957: 219; 1964: 51; Grindley & Kensley 1966: 6; Day *et al.* 1970: 15; Millard 1975: 316, fig. 102D–G; 1978: 199 *et seq.*; Gili *et al.* 1989: 105, fig. 29B.
Sertularella macrocarpa: Stranks, 1993: 17.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 213, NMNZ Co. 1060, many colonies up to 8 mm high with many gonothecae, partly detached, partly attached to strongly decayed substratum (algae?). With *Amphisbetia minima* (Thompson, 1879). RMNH-Coel. slide 3723. Poor slide in RSC as *Sertularella macrogona* & *Amphisbetia minima*, no data; **Loc. 221**, NMNZ Co. 1067, several bunches of about 15 stems attached to flattened hydrorhizal mass, detached from substratum; some gonothecae present. 2 RMNH-Coel. slides 3730; **Loc. 223**, NMNZ Co. 1070, many stems 5–8 mm high rising from stolon investing top part of large bryozoans; gonothecae present. RMNH-Coel. slide 3733. Poor slide in RSC as *Sertularella macrogona*, no data; **Loc. 424**, NMNZ Co. 1209, numerous about 8 mm high stems, mostly unbranched; no gonothecae. RMNH-Coel. slide 3891. Poor slide in RSC as *Sertularella macrogona*, no data; **Loc. 704**, 2 fair slides in RSC as *Symplectoscyphus macrogonus*, no data.

PMBS: I. *Sertularella macrogona* (on additional card) — side view, appears to have single row of hydrothecae; II. Little Papanui, on *Mytilus canaliculus* [= *Perna canaliculus* (Gmelin, 1791)]. Operculum with 3–4 valves, hydrothecae sessile, not zigzagged. No nematophores. Lowest part of hydrocaulus closely annulated. (Taken from card register).

TYPE LOCALITY: St Clair, Dunedin (Trebilcock 1928; syntypes in MOV, MV F57892, two microslides, listed by Stranks (1993: 17) as *Sertularella macrocarpa* Trebilcock, 1928).

DESCRIPTION: Flexuous, about 10 mm high, monosiphonic stems rising from an anastomosing net of tubiform stolons on algae or molluscs; stolonal tubes without internal perisarc pegs. Stems divided into short internodes by means of distinct, straight to moderately oblique nodes. First internode separated from stolon by a few more or less distinct rings, occasionally short, athecate internodes may be present between thecate stem internodes. Internodes each with 1 more or less tubiform hydrotheca diverging from internode at 45°–60°; adcauline hydrothecal wall moderately to strongly convex, abcauline wall almost straight to fairly strongly concave in which case hydrotheca curves smoothly outwards. Hydrothecae biserially arranged in 1 plane to frontally arranged in 2 planes making an angle of about 30°. Adcauline hydrothecal wall adnate for about one-third to slightly more. Hydrothecal rim 3-cusped: 1 adcauline and 2 lateral, but cusps typically of different development. In colonies with hydrothecae arranged biserially in 1 plane marginal cusps not thickened, almost equally developed. In material with frontally arranged hydrothecae development of perisarc considerable, with lateral cusps much more developed than adcauline cusp and with considerably thickened hydrothecal rim. In such hydrothecae one of lateral cusps usually better developed resulting in asymmetry of hydrotheca. Moreover, development of thickened hydrothecal rim may create an erroneous impression of internal cusps being present. Hydrothecal operculum composed of 3 flaps closing to form a low roof, complete in a few hydrothecae only.

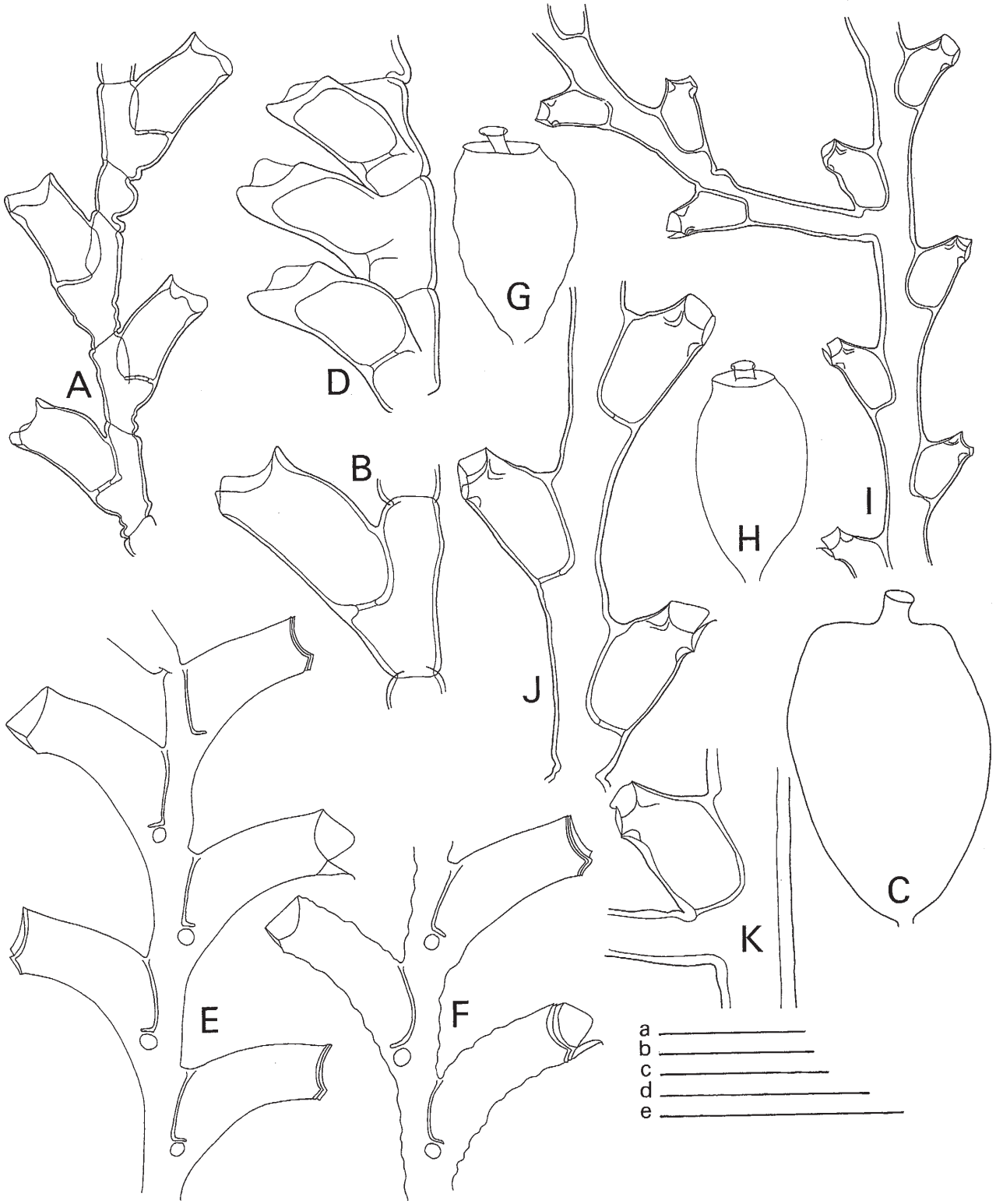

Fig. 52. A–D. ***Symplectoscyphus macrogonus*** (Trebilcock, 1928). **A**, part of stem with normally developed hydrothecae. **B**, stem hydrotheca. **C**, gonotheca (Loc. 213, slide 3723). **D**, part of stem with strongly sclerotized hydrothecae (Loc. 424, slide 3891). **E–H.** ***Symplectoscyphus macroscyphus*** sp. nov. **E**, hydrocladial hydrothecae from proximal part of stem. **F**, hydrocladial hydrothecae from distal part of stem. **G, H**, hydrothecae (BS 886, holotype, slide 2997). **I–K.** ***Symplectoscyphus odontiferus*** sp. nov. **I**, part of colony. **J**, hydrocladial hydrothecae. **K**, axillary hydrotheca (NZOI Stn I89, holotype, slide 2133). Scales: a, 1 mm (C, J, K); b, 0.2 mm (B); c, 1 mm (I); d, 2 mm (E–H); e, 0.5 mm (A, D). W.V.

Renovations of hydrothecae may occur, 2 or 3 widely spaced renovations being present. Hydrothecal bottom well developed, straight, thickened, with large circular hydropore. Perisarc thick, particularly along walls of internode. Many hydrothecae with well developed, slender hydranth with vaulted hypostome surrounded by 16 tentacles; no caecum observed in any hydrotheca.

Gonothecae large for such a small species, ovoid with flattened top, narrowing basally into a short pedicel, attaching gonotheca to internode immediately below hydrotheca. A short tube with a circular aperture in middle of flattened top. All gonothecae empty.

REMARKS: The above description has been taken from the New Zealand material exclusively and differs in several respects from Ralph's description, that has been combined from the New Zealand material and Millard's (1975) South African material. The principal differences are the complete absence of internal hydrothecal cusps in the New Zealand material and the complete absence of a hydrothecal caecum. In reference to the hydrothecal caecum Ralph stated (1961a: 798): "the points of attachment of the hydranth caecum marked by a faint circular band of tiny chitinous processes; in lateral view the processes appear as a low diagonal line from the back of the base, across the hydrotheca to the abcauline wall". In spite of the close inspection of all of the present material (including material seen by Ralph) no chitinous processes nor a caecum could be found. Ralph's description may be inspired by Millard's figure (1975, fig. 102G), though no such processes or presence of a caecum are mentioned by Millard. Moreover, Ralph's figure of a hydrotheca with expanded polyp (1961a, fig. 14b) shows no trace of a caecum. The South African material is also characterised by well developed submarginal intrathecal cusps, absent from the New Zealand material. We have therefore separated the New Zealand material from the South African records.

In Stranks's 'Catalogue of recent Cnidaria type specimens in the Museum of Victoria' (1993) the specific names of *Sertularia macrocarpa* Bale, 1884, and *Sertularella macrogona* Trebilcock, 1928, have been transposed. The syntypes of Bale's species are listed under '*macrogona, Sertularia* Bale, 1884, etc.', and those of Trebilcock's species under '*macrocarpa, Sertularella* Trebilcock, 1928, etc.'.

RECORDS FROM NEW ZEALAND: Originally described from the Dunedin area (St Clair); additionally recorded from Kaikoura (drifted material), Taylor's Mistake, near Christchurch (on bryozoans) and Little Papanui, near Dunedin (on algae). These records are all based on the material in Ralph's collection and give no extension beyond the area given by Ralph (1961a): the east coast of South Island, New Zealand. The specimens found on drifted material at Kaikoura have many empty gonothecae.

MEASUREMENTS of *Symplectoscyphus macrogonus* (in μm):

Ralph's	Loc. 223 slide 3733	Loc. 424 slide 3891
Stem internode, length	225 – 250	280 – 295
Diameter at node	65 – 75	95 – 110
Hydrotheca, length adnate adcauline wall	115 – 135	115 – 140
Length free adcauline wall	175 – 210	185 – 210
Length abcauline wall	235 – 290	335 – 345
Total depth	270 – 310	365 – 375
Maximum diameter	130 – 140	170 – 180
Diameter at rim	115 – 130	150 – 165
Gonotheca, total length, including funnel*	1230 – 1280	
Maximum diameter*	490 – 655	
Length of terminal tube	115 – 145	
Diameter of tube at aperture	65 – 80	

* Taken from slide 3723, material from Kaikoura, drift.

DISTRIBUTION: Principally known from a restricted area along the east coast of South Island; the South African records need confirmation.

Symplectoscyphus macroscyphus sp. nov.
(Fig. 52E–H)

MATERIAL EXAMINED:
NMNZ: BS 886, 5 colonies, up to 70 mm high, spread about 45 mm, partly with gonothecae (holotype, NMNZ Co. 519). 2 RMNH-Coel. slides 2997 belong to type series.

TYPE LOCALITY: Wanganella Bank, Norfolk Ridge, east slope, 32°35.3' S, 167°41.8' E to 32°34.0' S, 167°39.0' E, 437–422 m, 29.Jan.1981.

DESCRIPTION: Colony erect, with 70 mm high, polysiphonic stem, basally with some thick stolonal fibres attaching colony to rock. Branching irregular, mostly in 1 plane; branches being hydrocladia becoming polysiphonic by apposition of stolonal tubes and having secondary branches. Division into internodes only apparent in youngest parts of colony and mostly visible as weak constrictions of perisarc. Internodes, if visible, with a single hydrotheca; hydrocladial hydrotheca alternate, biserate. Hydrothecae large, a curved tubiform structure of more or less uniform diameter throughout, smoothly curving outward, abcauline wall concave, forming contiguous, smooth curve with wall of internode; adnate adcauline wall slightly more than half length of free adcauline wall; adnate part almost straight; free part smoothly convex.

Plane of hydrothecal aperture parallel to internode; rim with 3 fairly acute cusps, 1 adcauline and 2 lateral, separated by broad, shallow embayments. Distal part of hydrotheca with up to 8 closely placed renovations. Remnants of operculum present in many hydrothecae but complete in only a few and then forming a fairly high triangular roof. Bottom of hydrotheca with wide opening. Internode with circular scar just under hydrothecal bottom plate, indicating former insertion of gonotheca. Remnants of hydranth present in some hydrothecae; hydranth rather small for such a big species, with a small abcauline caecum attached by ligament to inside of abcauline hydrothecal wall at about two-thirds its length from rim.

Gonothecae occur in profusion on some of colonies, forming a longitudinal series on front of stem or branch. Gonotheca an elongated ovoid body, with slightly undulated walls, undulations become more pronounced near top, where last undulation forms a platform with centrally placed funnel. Length of funnel slightly varied, but invariably flaring apically towards a circular opening. Basally gonotheca gradually narrows into a short pedicel, attaching gonotheca to internode just below bottom plate of hydrotheca. All gonothecae are empty.

REMARKS: This species is remarkable because of the size of its hydrothecae. It resembles *Symplectoscyphus columnarius* (Briggs, 1914) but is nearly twice as big. Also, the hydrothecae here are smoothly curved, while the gonothecae are bigger and are almost smooth. The internodes and hydrothecae at the top of some colonies have a ribbed structure; this, however, is restricted to a few internodes and hydrothecae only.

MEASUREMENTS of *Symplectoscyphus macroscyphus* sp. nov. (in μm):

	NMNZ BS 886 slides 2997
Diameter of stem at base	1300 – 1500
Distance between axils of successive hydrothecae on same side	2295 – 2540
Hydrotheca, length adnate adcauline wall	655 – 825
Length free adcauline wall	1310 – 1640
Length abcauline wall	1475 – 1560
Total depth	1800 – 1885
Diameter at rim	590 – 640
Maximum diameter	655 – 720
Gonotheca, total length	2375 – 2460
Maximum diameter	1150 – 1195
Diameter of platform at apex	625 – 655
Length of funnel	215 – 330
Diameter at rim	195 – 230

RECORDS FROM NEW ZEALAND: East slope of Wanganella Bank, 32°35.3′ S, 167°41.8′ E, to 32°34.0′ S, 167°39.0′ E, 437–422 m.

DISTRIBUTION: Known only from New Zealand.

ETYMOLOGY: The specific name has been taken from the Greek *macros* = big, and the Greek *scyphos* = cup, referring to the size of the hydrothecae.

Symplectoscyphus odontiferus sp. nov. (Fig. 52I–K)

MATERIAL EXAMINED:

NZOI Stn I89: Colonies to 30 mm and fragments, heavily overgrown; no gonothecae (holotype, H-769 in NIWA collections). RMNH-Coel. slide 2133 is part of type series.

TYPE LOCALITY: Southwest Pacific, southeast of Norfolk Island, 29°25.30′ S, 168°00.20′ E, 65 m.

DESCRIPTION: Colony monosiphonic or basally weakly polysiphonic, stem stiff; division in internodes indistinct, marked by some irregularly occurring constrictions of perisarc. Side branches (hydrocladia) monosiphonic, alternate, in same plane as stem, perpendicular to stem; internodes indistinct, first internode most prominent, long. 3 or more hydrothecae between 2 successive branches , 1 axillary.

Hydrothecae alternate, biseriate along stem and branches, separated by distance equal to length of adnate adcauline wall or slightly less. Hydrotheca saccate, basally rounded, greatest diameter in upper third; two-thirds or slightly less of adcauline wall adnate, curving gently into basal plate; diaphragm wide. Free adcauline wall weakly concave to almost straight, occasionally with indication of a rib or elevation near junction with internode. Abcauline wall straight, with slight concavity just under rim. Hydrothecal rim perpendicular to length axis, with 3 fairly acute marginal cusps, 1 adcauline, 2 lateral, separated by rounded embayments. No renovations; operculum strong, composed of 3 hyaline triangular plates, present in majority of hydrothecae, when closed forming fairly high roof. 3 big, rounded submarginal intrathecal cusps present below deepest point of embayments.

Perisarc of stem and side branches firm, thinning out gradually along walls of hydrothecae, though less so along abcauline border; colour yellowish.

No gonothecae.

REMARKS: This is one of the few species of *Symplectoscyphus* with submarginal intrathecal cusps. The hydrothecae are quite small, although larger than in *S. j. johnstoni* (Gray, 1843) and related species.

The colony is quite stiff and some stems and hydrocladia produce tendrils which contact neighbouring hydrothecae and hydrocladia from other parts of the same colony. The specimens are overgrown by other hydroids.

MEASUREMENTS of *Symplectoscyphus odontiferus* sp. nov. (in μm):

	NZOI Stn I89 slide 2133
Stem, diameter at base	330 – 335
Side branches, diameter at base of first internode	200 – 230
Axillary hydrotheca, length adnate adcauline wall	420 – 430
Length free adcauline wall	285 – 295
Length adcauline wall	405 – 430
Total depth	515 – 545
Maximum diameter	310 – 335
Diameter at rim	195 – 205
Hydrocladial hydrotheca, length adnate adcauline wall	375 – 405
Length free adcauline wall	225 – 240
Length abcauline wall	410 – 420
Total depth	505 – 515
Maximum diameter	270 – 290
Diameter at rim	170 – 19

RECORDS FROM NEW ZEALAND: Known only from the type locality in waters southeast of Norfolk Island.

DISTRIBUTION: Only observed in subtropical waters southeast of Norfolk Island.

ETYMOLOGY: From the Greek *odontos* (teeth) and *ferein* (bearing).

Symplectoscyphus paulensis Stechow, 1923
(Fig. 53A, B)

Symplectoscyphus paulensis Stechow 1923a; 8–10; 1923d: 172; 1925b: 467–468, fig. 28; Millard 1967: 183–184, fig. 4G, H; Vervoort 1972: 180–183, figs 60b, 61; Millard 1975: 317–319, fig. 102A–C; 1977b: 107; 1978: 199 *et seq.*; Hirohito 1983: 51–53, fig. 24; Vervoort 1993a: 241, 263–264, figs 63a-d, 65a, tab. 52; Bouillon *et al.* 1995: 74.
Sertularella paulensis, Stepan'yants, 1979: 71, pl. 17 fig. 2.

MATERIAL EXAMINED:
NZOI Stn G697: Colony about 35 mm high, all in RMNH-Coel. slide 2870.

TYPE LOCALITY: *Valdivia* Stn 165, southern Atlantic off St Paul, 38°40′ S, 77°39′ E, 680 m (Stechow 1923a, 1925b) lectotype and syntypes in ZSBS.

DESCRIPTION: Stem monosiphonic over entire length, division into internodes indistinct, constrictions of perisarc occasionally visible above axillary hydrothecae; upper part of stem indistinctly geniculate. 6 side branches (hydrocladia) present, separated by 3 hydrothecae of which 1 axillar; distinct apophysis at base of axillary hydrotheca; demarcation of hydrocladium from apophysis distinct, marked by strong constriction and wrinkling of perisarc.

Hydrocladial hydrothecae alternate, in 1 plane, big, weakly curved cylindrical, slightly to distinctly narrower basally. Axillary hydrothecae same size as others but more strongly narrowed at base. Adcauline wall of hydrotheca almost completely free, only one-quarter or less adnate; free adcauline wall smoothly curved; basal plate thin, almost straight, diaphragm on abcauline side, distinct. Abcauline wall concave, connecting smoothly with internode, a minor swelling at level of diaphragm. Hydrothecal rim with 3 large, pointed cusps, separated by deep, semicircular embayments. Opercular plates hyaline, complete in a few hydrothecae, forming a low triangular roof. Renovations of hydrothecal rim frequent, close. Axillary hydrothecae differ from others only by slightly straighter, abcauline wall.

Three gonothecae present, 1 in reasonable condition. General shape an inverted pear, broadest part in upper third, with 5 or 6 thin, transverse ribs, separated by shallow grooves. Whether ribs are circular or spiral could not be ascertained. Apex of gonothecae with short, narrow cylinder, rim not everted. Base of gonotheca gradually narrowing into short pedicel inserted at base of stem or hydrocladial hydrothecae; a distinct circular foramen indicating location of shed gonothecae. 1 gonotheca with 2 ovoid, yellow bodies, either eggs or developing planulae.

Perisarc thin, particularly along walls of hydrothecae, many of which have collapsed.

REMARKS: Although larger in all dimensions this material closely resembles *Symplectoscyphus paulensis* Stechow, 1923 from the Atlantic and from South African waters. The shape of hydrothecae and gonothecae is quite characteristic for this species. In spite of the robust appearance of this species, the perisarc is quite fragile; unfortunately the only undamaged gonotheca in our material has been slightly compressed in a microslide.

RECORDS FROM NEW ZEALAND: The present record from Canterbury Bight seems to represent the first New Zealand and Pacific record of this characteristic species.

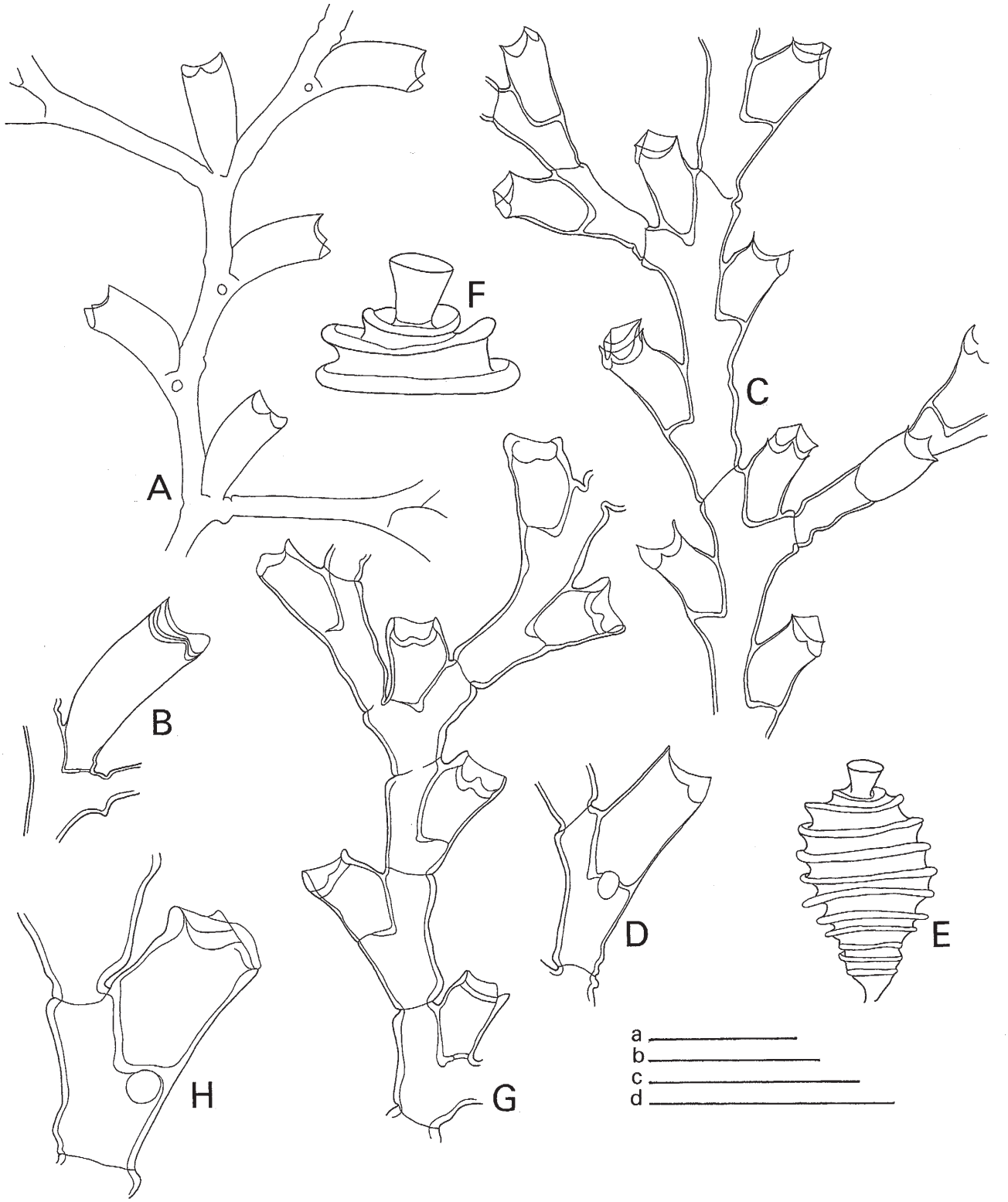

Fig. 53. A, B. ***Symplectoscyphus paulensis*** Stechow, 1923. **A**, part of colony. **B**, axillary hydrotheca (NZOI Stn G697, slide 2370). **C–F.** ***Symplectoscyphus procerus*** (Trebilcock, 1928). **C**, part of colony (Loc. 405, slide 3877). **D**, hydrocladial hydrotheca (Loc. 404, slide 3874). **E**, gonothecae. **F**, distal part of gonotheca (NZOI Stn B221, slide 2748). **G, H.** ***Symplectoscyphus pseudodivaricatus*** Ralph, 1961. **G**, part of stem with ramification. **H**, hydrocladial hydrotheca (Loc. 427, slide 3893). Scales: a, 1 mm (C, F, G); b, 1 mm (B, E); c, 2 mm (A); d, 0.5 mm (D, H). W.V.

MEASUREMENTS of *Symplectoscyphus paulensis* (in μm):

	St Paul, lectotype (Vervoort 1993a)	S. African waters (Vervoort 1993)	NZOI Stn G697 slide 2870
Stem internode, length	1625 – 1845	865 – 1085	
Diameter at node	280 – 370	175 – 215	245 – 260
Hydrocladial internode, length	1410 – 1840	1200 – 1300	
Diameter at node	195 – 240	130 – 195	195 – 215
Hydrotheca, length abcauline wall*	670 – 870	760 – 825	1065 – 1130
Length free adcauline wall*	865 – 935	910 – 935	1015 – 1145
Length adnate adcauline wall	540 – 585	370 – 390	345 – 395
Total depth*	1105 – 1260	1100 – 1130	1310 – 1345
Maximum diameter	445 – 500	410 – 435	460 – 510
Diameter at rim	410 – 435	390 – 415	425 – 440
Gonotheca, maximum diameter		1065	1195
Total length (including funnel)		1520	1720
Length of funnel			164
Diameter of funnel at rim			130

*including renovations

DISTRIBUTION: Originally described from the southern Atlantic off St Paul (Stechow 1923), from the South Atlantic (Vervoort 1972), and from South African waters (Millard 1967; Vervoort 1993).

Symplectoscyphus procerus (Trebilcock, 1928)
(Fig. 53C–F)

Sertularella procera Trebilcock 1928: 11, pl. 1 figs 5–5d.
Symplectoscyphus procerus: Ralph 1961a: 805–807, fig. 16g-h; Dawson 1992: 20; Stranks 1993: 18; Vervoort 1993a: 241.

MATERIAL EXAMINED:

NZOI Stns: B219, gear GLO, fragment about 25 mm high with male gonothecae; with epizootic *Orthopyxis mollis* (Stechow, 1919) and its gonothecae. RMNH-Coel. slide 2755; **B221**, dried out sample. Fragments only, with female gonothecae. With epizootic *Orthopyxis mollis* (Stechow, 1919). RMNH-Coel. slides 2748 and 2751; **B222**, gear DD/GLO, 1 fragment 10 mm long, no gonothecae. All in RMNH slide 2747; **B223**, gear GLO, 20 mm high stem with gonothecae, with *Orthopyxis mollis* (Stechow, 1919) on *Obelia* sp. RMNH-Coel. slide 2757; **D127**, gear TAM, large tufts with many female gonothecae forming bulk of sample; with *Symplectoscyphus j. johnstoni* (Gray, 1843). RMNH-Coel. slide 2831.

NMNZ Ralph Collection: Loc. 101, NMNZ Co. 956,small fragment 15 mm high, with 2 damaged gonothecae. Fragment in RMNH-Coel. slide 3648; **Loc. 404**, NMNZ Co. 1194, single 18 mm high colony with female gonothecae; made up in RMNH-Coel. slide 3874; **Loc. 405**, NMNZ Co. 1195, single about 18 mm high branch with distinct main stem and pinnately arranged hydrocladia, also with female gonothecae. RMNH-Coel slide 3877.

TYPE LOCALITY: Bluff, Foveaux Strait, South Island, New Zealand (Trebilcock 1928, syntype in MOV (MV F57893, microslide, Stranks 1993).

DESCRIPTION: Erect, flexuous colonies composed of tangled, up to 25 mm high stems, polysiphonic at their base, with pinnately arranged, up to 12 mm long side branches, springing from apophyses on stem; no secondary branches observed. Both stem and branches divided into internodes by distinct oblique nodes; wall of internodes above and below nodes bearing evidence of torsion or with indistinct rings; perisarc of stem and branches usually undulated. Stem internodes with an alternate distal apophysis with axillary hydrotheca and 2 hydrotheca in alternate position on remaining proximal part of internode. Internodes of branches with a single hydrotheca but occasionally several hydrothecae on 1 internode; hydrothecae facing slightly frontally.

Hydrothecae tubiform, slightly tumescent in mid-region, diverging from internode at about 45°; adnate for half adcauline wall or less. Adcauline wall distinctly convex. Abcauline wall a slightly concave continuation of internode. Hydrothecal rim with 3 sharply acute triangular cusps, 1 adcauline, 2 lateral; cusps separated by deep embayments, slightly outwardly turned. Hydrothecal rim not thickened, no intrathecal cusps. Operculum composed of 3 triangular flaps firmly attached to marginal embayments, when closed forming fairly high, triangular roof; 1 or 2 renovations of margin and operculum common. Bottom of hydrotheca straight; diaphragm small, almost invisible; basal part of adnate adcauline wall thickened into a rounded knob.

Gonothecae occurring profusely on some colonies; male and female gonothecae slightly different. Female gonotheca elongated ovoid; greatest diameter in upper third, narrowing gradually towards base. Gonotheca deeply furrowed, with a spiral fold with thickened edge running downwards in 11 or 12 turns from a small apical platform; fold without flange. Apical platform bearing a flaring funnel with circular rim. Male gonotheca elongated, of uniform diameter over greater part of length, also with apical platform and spiral fold of 11 or 12 twists. The funnel is slightly slenderer and less flaring than that of female gonotheca.

Perisarc firm, particularly along walls of internodes, thinning out but still firm along hydrothecae. Abcauline caecum quite small, attached to middle of inside abcauline hydrothecal wall by a thin filament.

REMARKS: This rare species is recognised by the frontally facing hydrothecae and the prominent marginal hydrothecal cusps, separated by deep, rounded embayments. The bulk of the material has contracted hydranths and seems to have been collected alive. Gonothecae were found in January and May.

MEASUREMENTS of *Symplectoscyphus procerus* (in μm):

	Ralph's Loc. 405 slide 3877
Stem internode, length	1115 – 1150
Diameter at node	155 – 190
Internode of side branch, length	390 – 405
Diameter at node	95 – 115
Stem hydrotheca, length adnate adcauline wall	225 – 250
Length free adcauline wall	150 – 170
Length abcauline wall	225 – 245
Total depth	345 – 365
Maximum diameter	170 – 180
Diameter at rim	140 – 150
Hydrocladial hydrotheca, length adnate adcauline wall	165 – 210
Length free adcauline wall	185 – 240
Length abcauline wall	300 – 325
Total depth	350 – 390
Maximum diameter	170 – 185
Diameter at rim	145 – 170
Female gonotheca, length, including funnel	1390 – 1410
Maximum diameter	780 – 800
Length of funnel	165 – 175
Diameter at rim	145 – 150
Male gonotheca, length, including funnel*	1640 – 1720
Maximum diameter	725 – 735
Length of funnel	195 – 200
Diameter at rim	130 – 135

* taken from slide 2755

RECORDS FROM NEW ZEALAND: All localities so far known are from the Foveaux Strait area and mostly from the oyster beds. This is probably an endemic species of the Foveaux Strait oyster beds. A fragment in Ralph's collection, Loc. 101 and identified as *Symplectoscyphus johnstoni* seems to belong here; there is no exact locality record.

DISTRIBUTION: Known only from South Island, New Zealand.

Symplectoscyphus pseudodivaricatus Ralph, 1961a (Fig. 53G, H)

Sertularella johnstoni: Bale 1884: 109, pl. 3, fig. 7, pl. 19, fig. 21. [not *Sertularella johnstoni* (Gray, 1843) = *Symplectoscyphus johnstoni* (Gray, 1843)].

Sertularella divaricata: Bale 1914b: 20, pl. 2, fig. 7 [not *Sertularella divaricata* (Busk, 1852)].

Symplectoscyphus pseudodivaricatus Ralph 1961a: 807–808, fig. 16i-n; 1961c: 109; Leloup 1974: 38, fig. 32; Dawson 1992: 20; Vervoort 1993a: 241.

Symplectoscyphus cf. *pseudodivaricatus*: Vervoort 1993a: 266–270, fig. 65c-d, tab. 55.

?*Sertularella pseudodivaricata*: Naumov & Stepan'yants 1972: fig. 3c.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 399, NMNZ Co. 1189, fragments of parts of stem about 8 mm high, with some gonothecae. Specimens rather heavily overgrown. 1 of RMNH-Coel. slides 3866, after bleaching. With *Sertularella simplex* (Hutton, 1873); **Loc. 427**, NMNZ Co. 1212, 3 fragments, 2, 5, and 8 mm length; no gonothecae. RMNH-Coel. slide 3893. 3 perfect slides in RSC as *Sertularella divaricata*, Bale's description; no data. Good slide in RSC as *Sertularella divaricata* Bale's description. No data.

TYPE LOCALITY: Queenscliff, Victoria, Australia (Bale 1884, as *Sertularella johnstoni*). Location of type, Bale's 1884 specimens of '*Sertularella johnstoni*', unknown, but probably MOV.

DESCRIPTION: Erect, monosiphonic stems of varied height, in present material up to 10 mm but according to Ralph (1961a) as high as 75 mm, arising from stolon on algae and fixed objects such as lamellibranchs. Stem with pinnately or irregularly arranged side-branches (hydrocladia), that according to Ralph may bear secondary ramifications. Stems divided into short internodes that carry 1–3 hydrothecae and occasionally an apophysis supporting a side branch; apophyses alternately arranged. In colonies with pinnate side-branches 3 hydrothecae occur between 2 successive apophyses, the upper 1 being axillary. Internodes of branches usually longer than those of main stem, bearing a single hydrotheca. Nodes of stem and branches clearly visible, complete, slightly to strongly oblique.

Hydrothecae fairly small, swollen in mid-region, adnate adcauline wall much longer than free part, straight, basally terminating in rounded knob; free adcauline wall straight to moderately convex; diaphragm small, on abcauline side of bottom plate. Abcauline wall of hydrotheca forming continuation of wall of internode, occasionally slightly sinuous; Hydrothecal rim with 3 rounded cusps, 1 adcauline, 2 lateral; adcauline cusp recurved. Wall of hydrotheca with very thick perisarc, increasing distally along rim, forming a distinctly visible thickened zone around the rim, in lateral view creating impression of submarginal intrathecal cusps. Operculum complete in a few hydrothecae; flaps hyaline and small, forming a quite low roof.

Perisarc thick and strong on internodes and hydrothecae. Contracted hydranths present, 12–14 tentacles. Abcauline caecum small, attached by thin filament to middle of internal abcauline hydrothecal wall, in some hydrothecae place of attachment marked by thickening of perisarc.

Gonotheca absent from present material but described by Ralph: "gonothecae pyriform; when viewed from the side, the lower half or less of the inner surface is seen to be flattened and the back fits neatly against stem or branch; the front of the gonotheca is rounded in a convex curve, and both the front and the sides have 7–9 widely and evenly spaced prominent transverse ridges; the distal ridges form complete rings because the back stands away from the stem in this region of the gonotheca; distal end a little flattened, but without the pronounced forward slope characteristic of *S. j. johnstoni*; aperture terminal on a tubuliform neck with slightly flared margin; neck may be slightly eccentrically placed on the summit of the gonotheca; length of gonotheca 1.0–1.5 mm and 0.50–0.80 mm in greatest width; length of terminal neck approximately 0.05 mm, width of neck at flared margin approximately 0.08 mm."

Remarks: We have accepted Ralph's synonymy of this species and followed her description. The present notes are from Ralph's specimens from Little Papanui, Otago Peninsula. In the material we have studied there is no evidence of frontal arrangement of hydrothecae; all are alternately arranged and in one plane. The material from Antarctic waters referred by Naumov and Stepan'yants (1972) to *Sertularella pseudodivaricata* is so different from Ralph's original material that we have excluded it from the synonymy of that species. The New Zealand material also differs considerably from colonies from the New Caledonia area previously doubtfully referred to *Symplectoscyphus pseudodivaricatus* by Vervoort (1993a).

Measurements of *Symplectoscyphus pseudodivaricatus* (in μm):

	Ralph's Loc. 427 slide 3893
Stem internode, length	365 – 810
Diameter at node	125 – 170
Hydrocladial internode, length	560 – 575
Diameter at node	100 – 110
Hydrotheca, length fused adcauline wall	225 – 235
Length free adcauline wall	140 – 225
Length abcauline wall	280 – 335
Maximum diameter	195 – 210
Diameter at rim	185 – 195

Symplectoscyphus divaricatus (Busk, 1852) (= *Sertularia divaricata* Busk (1852: 388)), though discussed and figured by Ralph (1961a: 813, fig. 20a, b) is not a New Zealand species. It was described by Busk from Bass Strait (82 m), on dead shells, and from Patagonia and the Straits of Magellan ("in the latter locality, however, the habit is much more robust", Busk, 1852: 389). Totton (1930) claimed the discovery of the holotype, but gives no details; Ralph's redescription, apparently, is based on Patagonian material from a microslide in NHM, 1899.7.6624). Additional syntype and possible syntype material is in MOV (Stranks, 1993, MV F59325, microslide labelled schizotype, from BMNH 99.7.1.6205, and MV F59326, microslide); provenance of this material is from Bass Strait, on dead shells.

Records from New Zealand: So far known only from Little Papanui, Otago Peninsula.

Distribution: Known only from southeast Australia, Queenscliff, Victoria, Australia (Bale 1884; cf. Ralph 1961: 807) and from the Otago Peninsula, South Island, New Zealand.

Symplectoscyphus pygmaeus (Bale, 1882)

Sertularella pygmaea Bale 1882: 25, pl. 12, fig. 9; 1884: 108, pl. 3, fig. 8, pl. 19, fig. 19; Farquhar 1896: 464; Bartlett 1907: 421; Bale 1924: 230; Trebilcock 1928: 10; Blackburn 1938: 320; 1942: 115; Hodgson 1950: 36, figs 63–64; Stranks, 1993: 18.
Symplectoscyphus pygmaeus: Stechow 1923d: 172; Ralph 1961a: 805, fig. 16d-f; 1961c: 109; Leloup 1974: 40–41, figs 32B–C, 37; Watson 1975: 166; Dawson 1992: 20; Bouillon *et al.* 1995: 74.
Symplectoscyphus pygmaeus?: Watson 1973: 176.

Type Locality: Queenscliff, Victoria, Australia (Bale 1844; probable syntype in MOV, MV F58892, microslide, Stranks (1993), who also lists another probable syntype from Griffith Point, Victoria, MV F58893).

REMARKS: Described and discussed by Ralph (1961), but not represented in the present collection. Ralph's description is based on Bale (1884), Hodgson (1950), and a specimen from MOV.

RECORDS FROM NEW ZEALAND: New Zealand (Bale 1924); Bluff, South Island (Trebilcock 1928).

DISTRIBUTION: Australian waters of Victoria, New South Wales, and Tasmania (Bale 1882, 1884; Bartlett 1907, Blackburn 1938, 1942; Hodgson 1950, Watson 1975), probably also Pearson Island, Great Australian Bight (Watson 1973). Also recorded from localities in New Zealand, of which only Bluff (Trebilcock 1928) specified. Leloup (1974) recorded the species from Chilean coastal waters, but his material was sterile, which makes identification doubtful.

Symplectoscyphus rentoni (Bartlett, 1907)
(Fig. 54A, B)

Sertularella rentoni Bartlett 1907: 43, pl. 1; Trebilcock 1928: 10, pl. 1, fig. 3; Stranks 1993: 18.
Symplectoscyphus rentoni: Stechow 1922: 148; 1923d: 172; Ralph 1961a: 804–805, fig. 16a-c; 1961c: 109; Dawson 1992: 20; Vervoort 1993a: 241.

MATERIAL EXAMINED:
NMNZ Ralph Collection: Loc. 186, NMNZ Co. 1041, 8 colonies 2–3 mm high from stolon reptant on thick thallus of algae; no gonothecae observed. RMNH-Coel. slide 3707. A poor and a good slide in RSC as *Symplectoscyphus rentoni* (Bale), *Sertularella* sp.?, no data; **Loc. 295**, NMNZ Co. 1140, many small colonies, some branched, on bryozoans, height 6 mm maximally; no gonothecae. RMNH-Coel. slide 3823.

TYPE LOCALITY: Queenscliff, Victoria, Australia [Bartlett 1907; syntype in MOV, MV F57883, microslide (Stranks 1993)].

DESCRIPTION (based on fragment with 4 hydrothecae): Erect stems several millimetres high arising from stolon on alga; stolonal tube circular in cross section, without internal pegs, stems with some irregular basal rings separated by slightly oblique nodes; rest of stem made up of short internodes, separated by oblique, twisted nodes, slanting in opposite directions, each internode with a hydrotheca on distal part; hydrothecae alternate, in 1 plane. Hydrotheca tubular, half of adcauline hydrothecal wall or more free from internode; fused part thick and straight, basally strongly curved and with thickened knob. Diaphragm rather wide, joining thickening of perisarc on opposite abcauline wall. Free adcauline wall smoothly convex; abcauline wall with minor concavity. Hydrothecal rim with 3 well developed, rounded cusps separated by rounded embayments; rim thickened, in lateral view creating impression of sub-marginal intrathecal cusps. Some hydrothecae with a single renovation; hydrothecal operculum complete in 1 hydrotheca only, composed of 3 triangular, hyaline flaps closing to form a very low roof. No hydranths present; according to Ralph there is a caecum of which she stated: "line of points of attachment of the hydranth caecum, when viewed laterally, forms as low diagonal that extends from the back of the ledge supporting the hydranth to the abcauline wall". We are unable to verify that statement; no hyaline points being visible in our material.

Perisarc well developed, thick on internode and basal part of hydrotheca, thinning out slightly along hydrothecal wall then increasing in thickness around rim forming well marked, thickened ring.

According to Bartlett (1907) the gonotheca is large, rotund, with a depressed area around top, from which arises a short tubular neck with entire margin. Size 1.25 x 1.25 mm (excluding terminal tube of 0.25 mm length).

MEASUREMENTS of *Symplectoscyphus rentoni* (in μm):

	Ralph's Loc. 186 slide 3707
Stolon, diameter	75 – 115
Stem internode, length	265 – 335
Diameter at node	67 – 100
Hydrotheca, length adnate adcauline wall	135 – 150
Length free adcauline wall	140 – 170
Length abcauline wall	185 – 200
Total depth	255 – 275
Maximum diameter	115 – 135
Diameter at rim	105 – 110

REMARKS: As no colonies occur in the present collections the description and figures are based on Ralph's material. Ralph's drawings (1961a, fig. 16a-b) fail to show the considerable development of the perisarc.

RECORDS FROM NEW ZEALAND: Recorded by Trebilcock (1928) from intertidal rock pools at St Clair, Dunedin, Otago Peninsula and by Ralph (1961a) from the sublittoral zone of Island Bay, Wellington, where it was found on algae. There are no additional New Zealand records of this species.

DISTRIBUTION: Known only from southeast Australia (Queenscliff, Victoria) and from two New Zealand localities. The species is quite rare but may have escaped attention because of its small size.

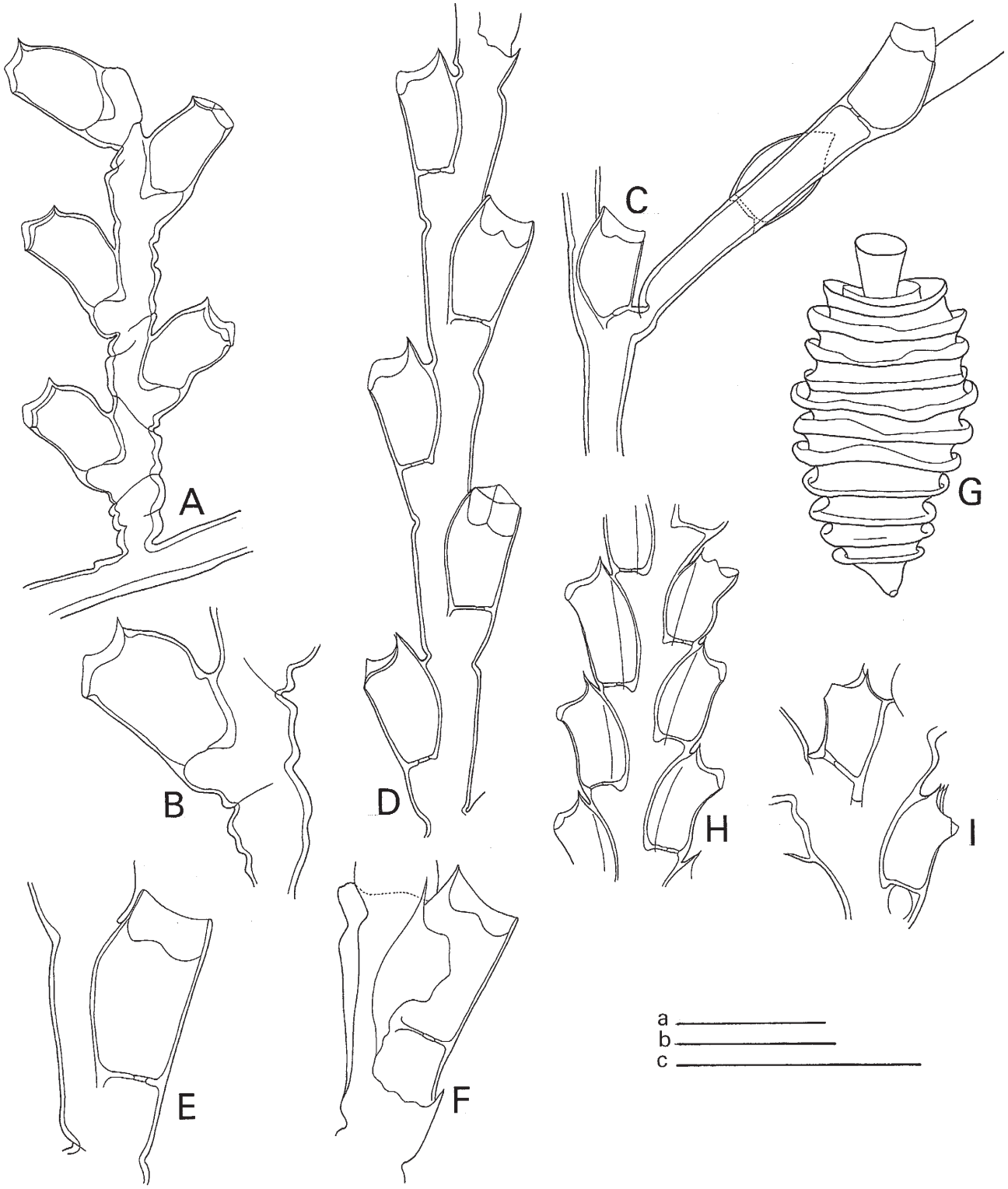

Fig. 54. A, B. ***Symplectoscyphus rentoni*** (Bartlett, 1907). **A**, small stem. **B**, stem hydrotheca (Loc. 186, slide 3707). **C–G.** ***Symplectoscyphus spiraliformis*** sp. nov. **C**, part of stem with hydrocladium and axillary hydrotheca. **D**, part of hydrocladium. **E**, hydrocladial hydrotheca. **F**, renovated hydrotheca developing in damaged primary hydrotheca. **G**, gonotheca (BS 390, holotype, slide 3005). **H, I.** ***Symplectoscyphus subarticulatus*** (Coughtrey, 1875). **H**, part of hydrocladium. **I**, axillary hydrotheca (Loc. 217, slide 3726). Scales: a, 1 mm (C, D, G–I); b, 0.2 mm (B); c, 0.5 mm (A, E, F). W.V.

Symplectoscyphus spiraliformis sp. nov.

(Fig. 54C–G)

MATERIAL EXAMINED:

NMNZ: BS 390, about 150 mm high colony with many gonothecae (NMNZ Co. 536, holotype); 3 RMNH-Coel. slides 3005 are part of type series.

TYPE LOCALITY: Three Kings Islands, 34°01′ S, 172°07′ E, 604 m.

DESCRIPTION: Colony about 150 mm high, composed of a monosiphonic stem and 10–15 mm long, spirally arranged hydrocladia. Stem comprising a succession of 200–250 μm long internodes, forming a loose, anti-clockwise helicoidal spiral, stem snapped off at base. Stem internodes separated by indistinct nodes, typically indicated by weak constrictions of perisarc, each internode with 2 hydrothecae and an apophysis supporting the hydrocladium. Apophysis distal on internode, with axillary hydrotheca; second hydrotheca in mid-region of internode, opposite axillary hydrotheca. Hydrocladia separated from apophyses by distinct nodes, with 18–20 internodes, nodes slightly oblique, indicated by constrictions of perisarc, each internode with 1 hydrotheca. Hydrocladial hydrothecae alternate, pointing left and right and slightly upwards, thus not exactly in 1 plane. Hydrocladia following spiral curvature of stem, imparting a brush-like shape to the colony.

Hydrocladial hydrothecae a slightly curved cylinder, narrowing basally, greatest diameter in middle. Adcauline wall smoothly convex, about one-quarter free from internode. Abcauline wall straight or with minor concavity below rim. Aperture of hydrotheca slightly tilted downwards; rim with 3 cusps, of which adcauline cusp sharp, 2 lateral cusps rounded; embayments between cusps fairly deep, rounded. Operculum composed of 3 triangular plates, forming a fairly high roof, complete in some hydrothecae only. Bottom of hydrotheca straight, with distinct diaphragm.

Perisarc fairly thin, hyaline and colourless, with exception of basal part of colony, where it is slightly thicker and yellowish. Colony lax, collapsing out of fluid. Axillary hydrotheca same as hydrocladial hydrothecae but with thicker perisarc, yellowish in lower parts of colony.

Hydranths too badly preserved for description.

Gonothecae occur in profusion on upper face of hydrocladia, inserting on internode immediately below base of hydrotheca, when shed leaving a large, circular scar. Gonotheca elongated ovoid, widest in middle, narrowing towards base into a short conical pedicel. Surface of gonothecae with a deep spiral groove of about 12 turns from apex to base ; ribs with fairly broad hyaline frill, upturned on distal ribs. Apical rib forming a circular platform with conical tube in centre, tube widening from base onwards; rim circular. Hydrocladia may bear about 10 gonothecae; gonothecae contain 2 or 3 large oval masses, either eggs or developing embryos.

MEASUREMENTS of *Symplectoscyphus spiraliformis* sp. nov. (in μm):

	NMNZ BS 390 slide 3005
Stem internode, length	2500 – 2875
Diameter at node	175 – 225
Hydrocladial internode, length	470 – 616
Diameter at node	155 – 180
Axillary hydrotheca, total depth	395 – 470
Greatest diameter	220 – 230
Hydrocladial hydrotheca, length adnate adcauline wall	345 – 360
Length free adcauline wall	110 – 135
Length abcauline wall	315 – 325
Total depth	390 – 410
Maximum diameter	225 – 240
Diameter at rim	200 – 220
Gonotheca, total length, including funnel	1300 – 1560
Maximum diameter	705 – 740
Funnel, length	225 – 290
Funnel, diameter at base	125 – 135
Funnel, diameter at rim	155 – 220

REMARKS: This species resembles *Symplectoscyphus spiralis* (Hickson & Gravely, 1907) in colony structure. However, the hydrocladia in *S. spiraliformis* sp. nov. do not branch, the hydrocladial hydrothecae are different in shape and are more deeply submerged in the internode, the hydrothecal rim is different and there are no submarginal intrathecal cusps. The holotype consists of only one colony of which the basal part is missing; the basal structure however suggests that only a few stem internodes are missing. Some of the stem internodes are quite short and have only an axillary hydrotheca, others have two additional hydrothecae.

RECORDS FROM NEW ZEALAND: Known only from the type locality near the Three Kings Islands, 34°01′ S, 172°07′ E, 604 m.

DISTRIBUTION: Known exclusively from New Zealand.

ETYMOLOGY: The species name *spiraliformis* is a Latinisation of the English expression 'formed as a spiral' and refers to the structure of the stem.

Symplectoscyphus subarticulatus (Coughtrey, 1875) (Figs 54H, I; 55A–E)

Thuiaria articulata Hutton 1873: 258 [not *Thuiaria articulata* (Pallas, 1766)].
Thuiaria sub-articulata Coughtrey 1875: 287–288, pl. 20, figs 32–34; 1876a: 301; 1876b: 30–31; Thompson 1879: 110; Whitelegge 1889a: 193; Farquhar 1896: 465; Hilgendorf 1898: 210–211, pl. 20, figs 6, 6a; Hutton 1904: 320.
Sertularella subarticulata: Ritchie 1911: 839; Bale 1914: 242; Briggs 1918: 34, 36 (*cum syn.*); Trebilcock 1928: 12, pl. 7, figs 7–7b.
Thuiella subarticulata: Stechow, 1919: 106.
Symplectoscyphus subarticulatus: Ralph 1961a: 801–802, figs 14g-h, 15a-c; Blanco 1968: 213, pl. 4, figs 1–3; Leloup 1974: 41, fig. 38; Gordon & Ballantine 1977: 100; Millard 1977a: 35–37, fig. 10A–D; Gravier-Bonnet 1979: 52; Branch & Williams 1993: 13, fig.; Vervoort 1993a: 241; Bouillon *et al.* 1995: 74.
Thuiaria bidens Allman 1876a: 269–270, pl. 18, figs 1-2.
Sertularia fertilis von Lendenfeld, 1885a: 406, pl. 7, figs 4–5.

MATERIAL EXAMINED:

NZOI Stns: A439, *Symplectoscyphus subarticulatus* (Coughtrey,1875) (J.E. Watson). [slide 4184 JEW Colln]; **A444B**, *Symplectoscyphus subarticulatus* (Coughtrey, 1875) (J.E. Watson). [slide 4182 JEW Colln]; **B176**, fragments of a large colony with gonothecae; **B197**, large colony 110 x 100 mm with gonothecae; **B219**, gear DIS, 2 fragments about 7 mm; **B220**, gear DD/GLO, fragment with gonothecae, 15 mm. RMNH-Coel. slide 2745; **B220**, gear DD, completely fragmented colony; **B220**, gear DIS, fragmented colony and gonothecae; **B221**, dried out sample. Fragments only; **B222**, gear DD, fragment 15 x 20 mm and gonothecae; **B223**, gear DD/GOL, 1 fragment, 10 mm. RMNH-Coel. slide 2740; **B223**, gear GLO, single small colony 10 x 15 mm, no gonothecae; **B237**, gear GLO, fragmented colony with gonothecae; **B237,** gear DD, 2 branches about 25 mm, with gonothecae; **B238**, 3 branches, 25 mm long, with *Hebellopsis scandens* (Bale, 1888). RMNH-Coel. slide 2767; **B248**, 2 fragments about 8 mm long; **B264**, 1 large colony, about 80 x 60 mm and many fragments; gonothecae abundant; **B264A**, 2 branches about 15 mm long, with gonothecae; **B265**, 1 fragment 8 mm long; **B482**, several colonies, 80 x 80 mm, and fragments, many gonothecae. Partly covered by *Orthopyxis affabilis* sp. nov. and its gonothecae, 3 RMNH-Coel. slides 2777; **B487**, several large colonies on stones, partly fragmented. No gonothecae; **B581**, 2 colonies, 80 x 80 mm; no gonothecae; **B583**, single colony about 40x 70 mm; no gonothecae; **B691**, mutilated colony, without gonothecae; **C118**, *Symplectoscyphus subarticulatus* (Coughtrey, 1875) (J.E. Watson); **C844**, dried out sample, containing fragments only; **C921**, *Symplectoscyphus subarticulatus* (Coughtrey, 1875). RMNH-Coel. slide 2310 (J.E. Watson). [slide 4183 JEW Colln]; **C929**, material dried out, condition poor, *Symplectoscyphus subarticulatus* (Coughtrey, 1875) (J.E. Watson); **D127**, gear DCMB, 3 colonies on shells, up to 30 mm high, no gonothecae; **D127**, gear TAM, many colonies, up to 50 x 50 mm with gonothecae and *Sertularella integra* Allman, 1876a; **D132**, several large colonies, 50 x 55 mm, base invested by bryozoans; **D273** (bottle no. 2, sample totally dried out), *Symplectoscyphus subarticulatus* (Coughtrey, 1875) (J.E. Watson); **D874**, large, fan-shaped colony, about 80 x 80 mm, many fusions between hydrocladia. Gonothecae present. RMNH-Coel. slide 2283; **D883**, 80 mm high complex colony, basally invested by a sponge. No gonothecae. Many fusions; **E108**, small colony, about 20 x 40 mm, no gonothecae. In addition numerous colonies, some as high as 120 mm, from a dried out sample; **E820**, numerous colonies, up to 100 mm high, many springing from thick, polysiphonic stems. Many gonothecae. RMNH-Coel. slide 2169; **F82**, 1 colony, 50 x 40 mm, no gonothecae; **F94**, slender colony, 70 mm high, hydrocladia 35 mm long. No gonothecae; **G656**, single colony, 35 x 30 mm, no gonothecae, covered by bryozoans; **G674**, single colony about 80 mm high, spread 25 mm; no gonothecae. Covered by bryozoans; **G685**, 2 colonies, 40 x 110 mm and 50 x 50 mm. No gonothecae; **G686**, many colonies and fragments, up to about 80 x 50 mm, no gonothecae. In association with *Sertularella integra* Allman, 1876a; **G687**, mutilated colony about 70 mm high, bearing some stems of *Sertularella integra* Allman, 1876a; **G708**, many colonies and fragments, up to 60 mm high, with gonothecae; **J17**, several small colonies with gonothecae on some of branches; up to 35 mm high; **Q85**, *Symplectoscyphus subarticulatus* (Coughtrey, 1875) (J.E. Wat-son); **Q116**, dried out sample, about 50 mm high, branched stem with gonothecae. [slide 4209, JEW Colln]. RMNH-Coel. 4409, slide 4771; **Q119**, *Symplectoscyphus subarticulatus* (Coughtrey, 1875) (J.E. Watson).

NMNZ: Cray fish pot off **Bench Islands**, 18.Nov.1955, about 5 colony fragments up to 20 mm high, no gonothecae. NMNZ Co. 492; 4.5 miles E. **Tory Channel**, Cook Strait, 15.Aug.1963: Some small colonies, 20–30 mm high, and some fragments. No gonothecae. NMNZ Co. no. 639; **Zone 2.25 F**, Northern Otago, Oct.1963, No. 1080, fair number of fan-shaped colonies up to 80 x 80 mm high, no gonothecae. NMNZ Co. 662; **BS 166**, about 10 developing colonies up to 20 mm high and a better developed fragment. No gonothecae. NMNZ Co. 617; **BS 202**, many colonies up to about 80 mm high and fragments. No gonothecae. NMNZ Co. 650; **BS 398**, 3 stems in poor condition, highest about 40 mm. No gonothecae. NMNZ Co. 511. Also 2 large colonies, 80 x 60 mm and a fragmentary colony. No gonothecae. NMNZ Co. 603; **BS 480**, several colonies and fragments, highest about 70 mm. Many gonothecae. Densely covered by *Filellum serpens* (Hassall, 1848). NMNZ Co. 416; **BS 482**, numerous colonies and fragments, the largest with a spread of 80 mm and 75 mm high; many gonothecae. NMNZ Co. 858; **BS 509**, small, unbranched, 22 mm high colony; no gonothecae. NMNZ Co. no. 821; **BS 512**, numerous fragments of several much branched colonies, richtly bearing gonothecae. NMNZ Co. 850; **BS 522**, large bunch of branched colonies about 130 mm high, no gonothecae. NMNZ Co. 386; **BS 561**, 1 colony, 30 x 40 mm, no gonothecae. NMNZ Co. 676; **BS 621**, about 10 small colonies, up to 20 mm high, in association with *Hebellopsis scandens* (Bale, 1888) and *Sertularella integra* Allman, 1876a. NMNZ Co. 476; **BS 840**, several fragmented colonies, broken from separate basal portion attached to stone. Length of plumes about 60 mm; no gonothecae. NMNZ Co. 769. RMNH-Coel. 27714, slide 3414; **R.V. *Munida*, Stn 8,** 10.May.1990, some mutilated plumes covered by *Filellum serpens* (Hassall, 1848). NMNZ Co. 544.

NMNZ Ralph Collection: Loc. 36, NMNZ Co. 906, fragments of larger colony; no gonothecae. Live specimen with hydranths. RMNH-Coel. slide 3601; **Loc. 50**, NMNZ Co. 910, fragments of a larger colony, about 25 mm long, with gonothecae. RMNH-Coel. slide 3608; **Loc. 59**, NMNZ Co. 918, fragments of larger colony or colonies, with gonothecae.

RMNH-Coel. slide 3615. Good slide in RSC as *Sertularella subarticulata* (fascicled at base), no data; **Loc. 73**, NMNZ Co. 931, fragments of larger colony with gonothecae. RMNH-Coel. slide 3625; **Loc. 80**, NMNZ Co. 936, fragments of a colony without gonothecae. RMNH-Coel. slide 3629. With *Symplectoscyphus* sp. (RMNH-Coel. slide 3630). Partly dried out slide in RSC as *S. subarticulatus*, with data North Reef, 183 m, D.H. Graham; **Loc. 207**, NMNZ Co. 1056, several fragments of larger colony and some gonothecae. RMNH-Coel. slide 3719. Partly dried out slide in RSC as *Sertularella subarticulata*, with data: Oyster beds, Foveaux Strait; **Loc. 216**, NMNZ Co. 1055, fragments of a larger colony with many gonothecae. 2 fragments made up in RMNH-Coel. slide 3718; **Loc. 217**, NMNZ Co. 1063, fragments of a larger colony without gonothecae. RMNH-Coel. slide 3726 of fragment; **Loc. 220**, NMNZ Co. 1066, 2 stems about 15 mm high and some fragments, 1 with stolon. RMNH-Coel. slide 3729; **Loc. 278**, NMNZ Co. 1125, 2 fragments about 8 mm high. RMNH-Coel. slide 3804; **Loc. 403**, NMNZ Co. 1193, 2 branched colonies about 40 mm high, with thick main stem and many gonothecae, as well as some fragments. RMNH-Coel. slide 3872; **Loc. 405**, good slide in RSC as *Sertularella subarticulata* and *Sertularella robusta*, with data: Foveaux Strait, Oyster beds; **Loc. 603**, NMNZ Co. 1312, fragments of *Symplectoscyphus subarticulatus* (Coughtrey, 1875) and *Salacia bicalycula* (Coughtrey, 1876a) amidst large bunch of tangled colonies of *Symplectoscyphus j. johnstoni* (Gray, 1843). RMNH-Coel. slide 3993; **Loc. 606**, NMNZ Co. 1315, 2 small colonies of which RMNH-Coel. slides 3997. With *Salacia bicalycula* (Coughtrey, 1876a). Poor slide in RSC as *Thuiaria ? Sert. unguiculata* removed!, with data: Long Beach, Russell; **Loc. 608**, NMNZ Co. 1317, Several about 15 mm high stems and many detached hydrocladia. No gonothecae. RMNH-Coel. slide 3998. Good slide in RSC as *Sertularella subarticulata*, data not to be read; **Loc. 689**, partly dried out slide in RSC as *Sertularella subarticulata*, with data: S. 80° E of Taiaroa Heads.

PMBS: Continental shelf, **E. Otago**, Continental shelf. Identified by P.M. Ralph. (Taken from card index).

Material Inspected: **E. Otago** continental shelf, probably 73-110 m, 29–30.June.1951, commercial otter trawl. Several well developed stems, basally contiguous, about 80 mm high, of shape characteristic of this species. No gonothecae. RMNH-Coel. 27259, slide 2676; **Mu 67–63, Hyd. 14**, single large colony fragment composed of 40 mm long stem with several pinnate branches.

Otago Museum, Dunedin, N.Z.: **Iv. 757, A.52:57**, many colonies up to 30 mm high, mostly unbranched, with gonothecae. On it are attached some colonies of *Sertularella integra* Allman, 1876a, also with (characteristic) gonothecae. RMNH-Coel. slide 2662; **Iv. 763, A.52:49**, colonies growing up to a height of about 150 mm, partly on axes of older colonies. Some of colonies completely covered with *Filellum serpens* (Hassall, 1848). No gonothecae. RMNH-Coel. 27239, slide 2656. In addition several small, 15–20 mm high stems of *Symplectoscyphus j. johnstoni* (Gray, 1843), mixed with *S. subarticulatus* and *Synthecium elegans* Allman, 1873. RMNH-Coel. 27240, slide 2657; **Iv. 770**, large, fan-shaped colony composed of repeatedly branched main stem; ramifications bearing alternate, pinnately arranged hydrocladia, all in 1 plane. Gonothecae abundant, on the ramifications at base of hydrocladia, with frilled carina spirally curved around gonothecal wall, best visible on top half of gonotheca. Apical funnel short, slightly expanding. RMNH-Coel. 27237, slide 2654.

Type Locality: *Thuiaria subarticulata*: Oamaru, east coast South Island, New Zealand [Coughtrey 1875; possible syntypes from Timaru in MOV, MV F59294, two microslides (Stranks 1993); these are probably paratypes rather than syntypes]. *Thuiaria bidens*: New Zealand, Busk Collection, no further data (Allman 1876a, type probably in NHM). *Sertularia fertilis*: Timaru, east coast South Island (von Lendenfeld 1885a, location of type unknown).

Description: Young colony composed of monosiphonic stem with pinnately arranged side branches (hydrocladia) up to 20 mm long, attached to fixed objects (shells, stones, rock) by means of a flattened basal plate composed of thick, anastomosing stolons. Structure of colony becomes more complicated by polysiphony of main stem, forking of main stem and development of secondary and tertiary hydrocladia; all these developments still mainly in 1 plane, resulting in a more or less fan-shaped up to 100 mm high colony with a main stem of about 5 mm diameter at its base. Structure of colony best seen in upper, monosiphonic parts of colony. Here axis divided into short internodes with oblique nodes slanting in opposite directions, each internode with large apophysis in distal third and 3 hydrothecae, 1 in axil of apophysis, 1 almost opposite and 1 under apophysis; apophyses alternately pointing left and right and supporting hydrocladia. Development of stem internodes varied, occasionally absent and indicated by perisarc constrictions.

Hydrocladia flattened, with 2 rows of closely approximated hydrothecae; nodes usually almost invisible, when visible usually an oblique constriction in perisarc. Node separating hydrocladium from stem apophysis distinct.

Hydrothecae tubiform, curved smoothly or rather suddenly in apical portion, bottom plate straight, with diaphragm at abcauline side. Axillary hydrotheca of stem internodes shorter than remaining 2 hydrothecae on internode, one-quarter to one-third of adcauline wall free from internode, upturned at apex. Stem hydrothecae with one-third or less of adcauline wall free from internode, apex upturned to varied degree. Adcauline wall of all stem hydrothecae continued basally in a strand of perisarc fused to inside of internode. Hydrocladial hydrothecae deeply immersed in internode, free adcauline wall one-fifth of length or less; free upturned apex is always present. Base of adnate adcauline wall with small but distinct knob of perisarc. Hydrothecae on same side of internode close and almost touching to separated by distance about twice length of free adcauline wall.

Abcauline wall slightly to distinctly concave, basally continuing smoothly into wall of internode. Rim of hydrotheca with 3 marginal cusps, 1 adcauline, recurved, acute cusp and 2 blunt lateral cusps in adcauline position; embayments between cusps semicircular, moderately deep. Opercular plates triangular, hyaline, when closed forming a low roof. 1–3 renovations, if present, only visible at the adcauline cusp. Internodal stem hydrothecae of some colonies show distinct tendency to face frontally.

Gonothecae ovoid, narrowing basally into short pedicel, attaching to stem internode or basal portion of hydrocladium just below hydrotheca. Gonotheca with 7 or 8 deep circular constrictions, producing circular ribs with thickened free margin; no flange or frill observed. Apical rib forms a platform with central funnel, widening towards rim. Length of funnel almost constant, but diameter varied, widest in what is probably the female gonotheca, narrower in male. Gonothecae occur in profusion on front of colony, strongly adpressed to stem internode or hydrocladium; back of gonotheca with depression interrupting circular depressions and ribs. When shed gonothecae leave a large irregularly circular shape below hydrothecal bottom, overgrown by a sheath of thin perisarc.

Development of perisarc varied, thin and horny-yellow in young colonies and material from deep water, dark brown and thick in others.

REMARKS: Though many colonies have been inspected only very few were fresh enough to study details of the operculum. Complete opercula were observed only in axillary hydrothecae, though many (fresh) hydrothecae had plates adhering to the hydrothecal rim. No sufficiently well preserved hydranths were found to permit a count of the number of tentacles; many partly decayed hydranths have a diagonal strip of tissue running inside the hydrotheca from the adcauline base or slightly higher to a point about halfway up the inside of the abcauline wall, the tissue probably having served as attachment for the hydranth and abcauline caecum. The development of ribs on the gonothecae is quite variable. The number of ribs may as few as 5, gradually fading away proximally on the gonotheca. In some colonies the grooves in the body of the gonothecae are quite deep and the keel along the ribs is strongly reinforced, in others the wall is undulated rather than ribbed.

RECORDS FROM NEW ZEALAND: Previous records from New Zealand are those by Allman (1876a, no further data); Lyall Bay (Hutton 1873); Oamaru (Coughtrey 1875); Timaru (von Lendenfeld 1885a; Stranks 1993); Taieri Beach (Hilgendorf 1898); and Bluff and Stewart Island (Trebilcock 1928).

MEASUREMENTS of *Symplectoscyphus subarticulatus* (in µm) (measurement of hydrothecae including renovations):

Ralph's	Loc. 317 slide 3726	Loc. 220 slide 3629
Stem internode, length	1150 – 1230	1315 – 1395
Diameter at node	175 – 220	210 – 225
Axillary hydrotheca, length adnate adcauline wall	235 – 245	365 – 420
Length free adcauline wall	170 – 180	170 – 185
Length abcauline wall	220 – 230	210 – 225
Total depth	360 – 370	450 – 485
Maximum diameter	205 – 220	195 – 205
Diameter at rim	155 – 170	155 – 175
Non-axillary stem hydrotheca, length adnate adcauline wall	350 – 390	420 – 505
Length free adcauline wall	72 – 140	105 – 145
Length abcauline wall	225 – 255	265 – 310
Total depth	425 – 450	450 – 475
Maximum diameter	195 – 225	230 – 240
Diameter at rim	170 – 175	170 – 175
Hydrocladial hydrotheca, length adnate adcauline wall	390 – 400	410 – 420
Length free adcauline wall	45 – 60	67 – 78
Length abcauline wall	275 – 285	280 – 300
Total depth	450 – 460	440 – 450
Maximum diameter	190 – 195	185 – 200
Diameter at rim	165 – 180	160 – 180
Female gonotheca, total length, including funnel*	1315 – 1475	
Maximum diameter	835 – 870	
Length of funnel	168 – 195	
Diameter at rim	140 – 162	
Male gonotheca, total length, including funnel**	1150 – 1230	
Maximum diameter	900 – 985	
Length of funnel	195 – 225	
Smallest diameter of funnel	61 – 67	
Diameter at rim	134 – 150	

* slide 3917, Ralph's Loc. 207
** slide 3625, Ralph's Loc. 73

This is a very characteristic New Zealand species, principally, though not exclusively of South Island coastal waters between 41°–50.5° S, 177° W–166° E, particularly of the east coast, regularly cast ashore and occasionally transported over considerable distances. Additional specimens originate from between the Three Kings Islands and North Cape (BS 398), from Ranfurly Bank, off East Cape (BS 840, specimens with contracted polyps) and from the Kapiti Channel (BS 482). Depth distribution between 6 and 340 m; gonothecae observed in March, May, June, October, and November; von Lendenfeld mentioned gonothecae from material collected in April.

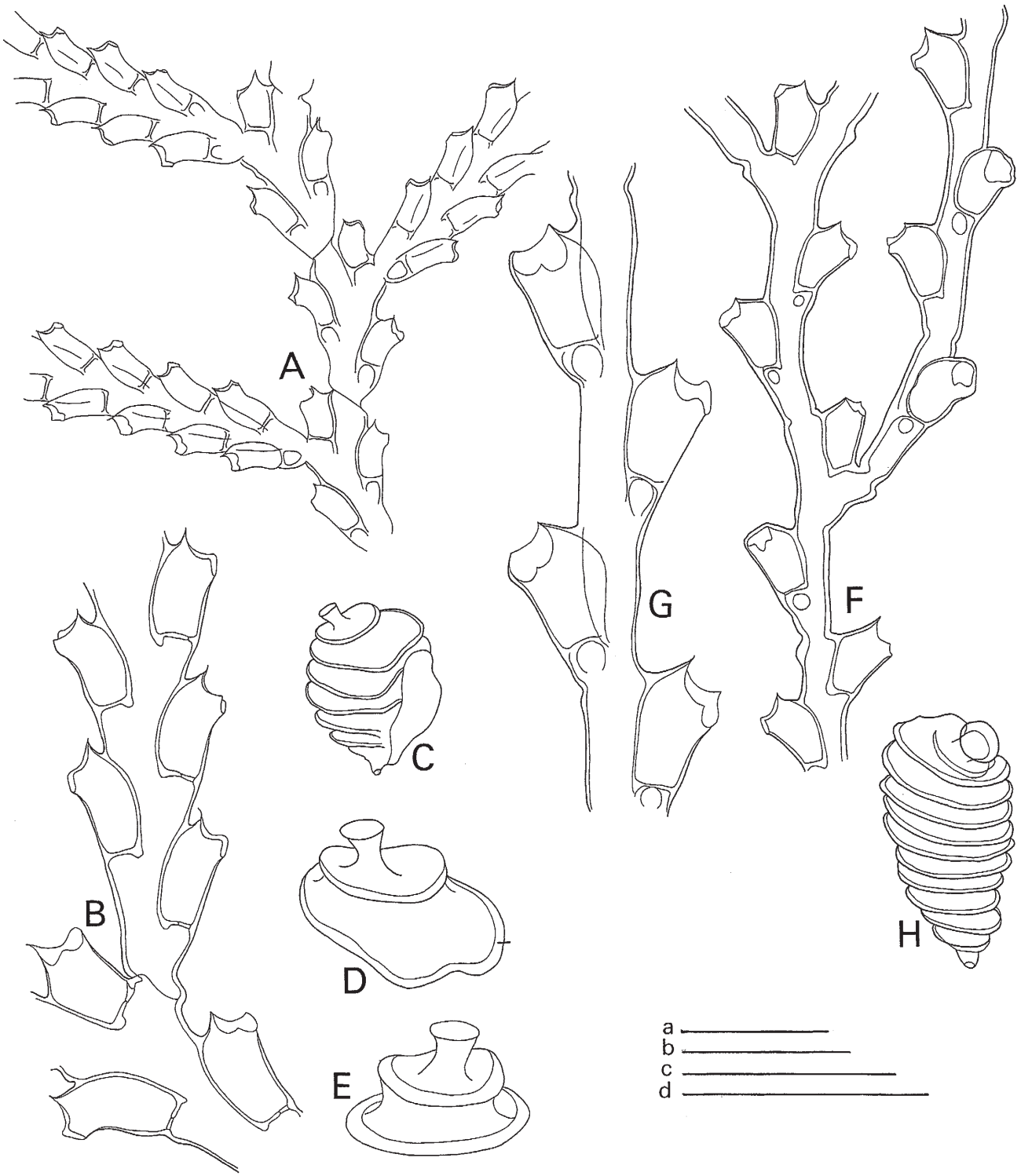

Fig. 55. A–E. ***Symplectoscyphus subarticulatus*** (Coughtrey, 1875). **A**, part of stem with hydrocladia (Loc. 217, slide 3726). **B**, insertion of hydrocladium on stem and axillary hydrotheca (Loc. 220, slide 3629). **C**, gonotheca. **D**, distal part gonotheca (Loc. 73, slide 3625). **E**, distal part gonotheca (Loc. 207, slide 3719). **F–H.** ***Symplectoscyphus subdichotomus*** (Kirchenpauer, 1884). **F**, part of colony (NZOI Stn D882, slide 2292). **G**, hydrocladium (Loc. 296, slide 3824). **H**, gonotheca (NZOI Stn P39, slide 2230). Scales: a, 1 mm (B, D–F); b, 1 mm (A, H); c, 2 mm (C); d, 0.5 mm (G). W.V.

Many gonothecae in our material are empty; gonothecae with well preserved contents occurred in March. Drifted colonies may be strongly abraded; the distal part of hydrocladial hydrothecae being lost. The sturdy colonies serve as substratum for many epizootic hydroids, particularly species of *Filellum*, *Hebella*, *Hebellopsis*, *Campanularia*, *Halecium*, etc.

DISTRIBUTION: Though principally a New Zealand species, additional material has been recorded from Lord Howe Island (Briggs 1918), from Port Jackson, N.S.W., Australia (Whitelegge 1889), east coast of Isla Chilvé, Chile (Leloup 1974), mouth of the Rio Negro, Argentina (Blanco 1968) and the Kerguelen area (Millard 1977a).

Symplectoscyphus subdichotomus (Kirchenpauer, 1884) (Figs 55F–H; 56A–F)

Sertularella subdichotoma Kirchenpauer 1884: 46, pl. 16, figs 1–1b; Jäderholm 1920: 6; 1926: 6; Totton 1930: 188; Leloup 1960: 234, fig. 8; Blanco 1963: 178; Stepan'yants 1979: 77, pl. 17, fig. 7.

Symplectoscyphus subdichotomus: Stechow 1922: 149; 1923d: 173; Ralph 1961a: 813–815, fig. 20a-b; 1966: 159; Edwards 1973: 587; Watson 1973: 175; Leloup 1974: 42, fig. 40; Gravier-Bonnet 1979: 52; Staples & Watson 1987: 218; Branch & Williams 1993: 13, fig. 1; Vervoort 1993a: 241; Watson 1994a: 67; Bouillon *et al.* 1995: 74; Zamponi *et al.* 1998: 12.

?*Symplectoscyphus subdichotomus*: Blanco 1967a: 273, pl. 3, figs 6–10, pl. 4, figs 1–2; 1967d: pl. 4, figs 5–16; 1969: 49–53, figs 1–15; 1976: 49, pl. 16, figs 1–2; Milstein 1976: 83, figs 7, 10, 12, 31; Blanco 1982: figs 13, 15; Hirohito 1983: 53–55, fig. 25; Blanco 1984a: 34–36, pl. 29, figs 64–66; El Beshbeeshy 1991: 232–237, fig. 59; Hirohito 1995 (English text): 222–224, fig. 75a-e.

Sertularella divaricata var. *subdichotoma*: Jäderholm 1917: 9.

Not *Sertularella subdichotoma*: Vervoort 1946: 314–317, fig. 5 [= *Symplectoscyphus j. johnstoni* (Gray, 1843)].

Not *Symplectoscyphus subdichotomus*: Vervoort 1972a: 140–147, figs 44b-d, 45; Millard 1977: 37, fig. 11D–F [partly *Symplectoscyphus filiformis* (Allman, 1888)]

MATERIAL EXAMINED:

NZOI Stns: D882, 1 colony, 55 mm high, composed of several stems, forming lace-like structure with many fusions. No gonothecae. RMNH-Coel. slide 2292; **E389**, fragment 15 mm long, no gonothecae. RMNH-Coel. slide 2112; **I341**, colony 20 mm high, no gonothecae; **P21**, small bunch of colonies about 30 mm high, no gonothecae. 2 RMNH-Coel. slides 2224; **P39**, bunch of colonies about 30 x 30 mm, partly on shell fragments. Many gonothecae. RMNH-Coel. slide 2230.

NMNZ: Between **Cape Reinga** and **Three Kings Islands**, 28.Oct.1962 (previously preserved in formalin and as a result extremely brittle), fragments of large tuft. NMNZ Co. 714; sample as RMNH Coel. 27679, 2 RMNH-Coel. slides 3379; **BS 769**, bunch of tangled and intergrown colonies about 60 mm high; no gonothecae. NMNZ Co. 833. 2 RMNH-Coel. slides 3509; **BS 899**, small colony without gonothecae. NMNZ Co. 451. 2 RMNH-Coel. slides 2970. Also quite small fragment about 5 mm high, made up in slide. RMNH-Coel. 27688, slide 3388.

NMNZ Ralph Collection: Loc. 296, NMNZ Co. 1141, tangled colonies, without polyps but with many gonothecae, forming 2 masses of about 20 mm diameter. 2 RMNH-Coel. slides 3824.

Otago Museum, Dunedin, N.Z: **Iv. 763. A.52:49**, several small, 15–20 mm high stems mixed with *S. subarticulatus* (Coughtrey, 1875) and *Synthecium elegans* Allman, 1872. RMNH-Coel. 27241, 2 slides 2658. With *Hebellopsis scandens* (Bale, 1884) and *Orthopyxis mollis* (Stechow, 1919).

TYPE LOCALITY: Kirchenpauer referred to material from Bass Strait, Australia and from the Strait of Magellan. His original material has been re-inspected by Totton (1930: 188), who identified the material figured by Kirchenpauer as the Australian material, which was subsequently indicated as the type series, the holotype being a specimen bearing the MUH registration number C 4311.

DESCRIPTION: Species that in general appearance comes very close to *Symplectoscyphus j. johnstoni* (Gray, 1843); having the same kind of colony, varying between small, straggling colonies on fixed objects and bigger, more or less reticulate colonies of strongly interwoven, repeatedly branched but always monosiphonic stems. Principal difference between both species in morphology of hydrothecae and gonothecae.

Hydrothecae alternate, situated at end of imperfectly separated internodes; nodes completely absent or indicated by slight constrictions of perisarc. Hydrothecae largely in 1 plane, with a tendency towards frontal exposition. Body of hydrothecae deeply immersed in internode, length of free adcauline wall about half or less than that of adnate part, making an angle of about 80° with internode. Hydrotheca more or less cylindrical, outwardly curved apically; adnate adcauline wall straight to weakly convex, with small knob of perisarc at base; hydrothecal bottom straight, a small diaphragm on abcauline side. Free adcauline wall straight, curved upwards at apex. Hydrothecal rim with 3 prominent marginal cusps, 1 adcauline, 2 lateral; adcauline cusp distinctly everted. Embayments between marginal cusps deep. No submarginal intrathecal cusps, but hydrothecal rim may be considerably thickened, particularly in cauline hydrothecae. Operculum composed of 3 triangular plates when closed forming a very low roof. Attachment of hydranth and development of abcauline caecum as in *S. j. johnstoni*. Development of perisarc varied, typically moderately thick on the internodes, thinning out along hydrothecal walls, particularly on free adcauline wall.

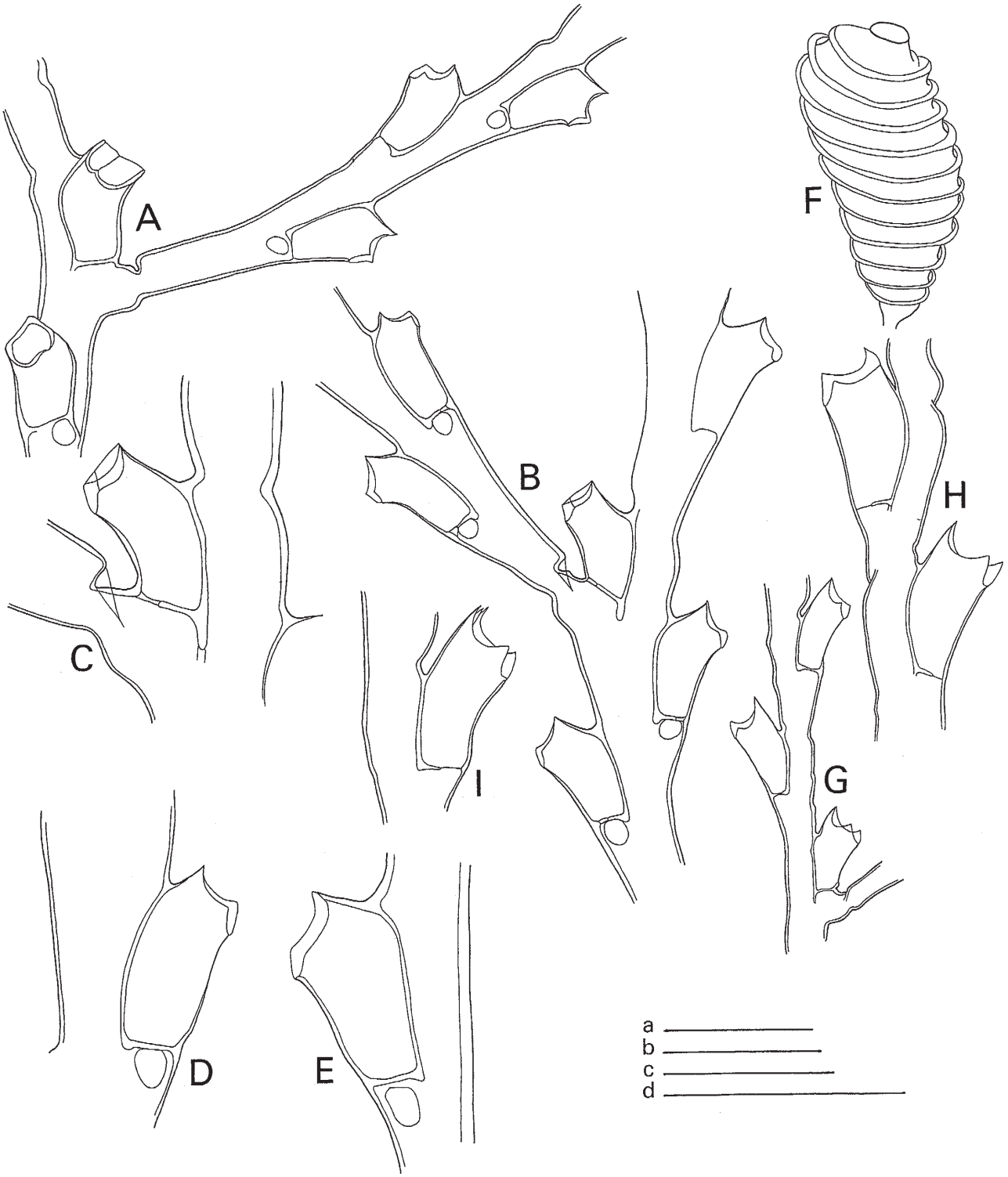

Fig. 56. A–F. ***Symplectoscyphus subdichotomus*** (Kirchenpauer, 1884). **A**, part of stem with hydrocladium (NZOI Stn P39, slide 2230). **B**, part of stem with hydrocladium. **C**, axillary hydrotheca. **D**, hydrocladial hydrotheca (Otago Museum, Iv. 763, A52:49, slide 2658). **E**, hydrocladial hydrotheca (NZOI Stn D882, slide 2292). **F**, gonotheca (Loc. 296, slide 3824). **G–I.** ***Symplectoscyphus*** **sp**. 1. **G**, part of stem. **H**, part of hydrocladium. **I**, hydrocladial hydrotheca (NZOI Stn A696, slide 2713). Scales: a, 1 mm (A, B, F, H, I); b, 0.2 mm (E); c, 1 mm (G); d, 0.5 mm (C, D). W.V.

Gonothecae, compared to those of *Symplectoscyphus j. johnstoni*, more swollen and ovoid, less strongly pressed against internode and depression at back scarcely developed. Apical part of gonotheca with large terminal plateau with a wide, short central or slightly displaced funnel. Spiral fold around gonotheca with 10–13 twists, and carina as in *Symplectoscyphus j. johnstoni*; no flange or frill observed.

REMARKS: Although this species is not listed by Ralph (1961a) as a New Zealand species, we have found amongst some of her material of *Symplectoscyphus j. johnstoni* (Gray, 1843) specimens answering to our concept of this species. Her material from Loc. 296, Makara Beach, seems to belong here although the gonothecae have a cylindrical tube. A gonotheca with that type of terminal tube has been described by Totton (1930) from New Zealand waters as *Symplectoscyphus confusus*; the type locality being *Terra Nova* Stn 91, off Three Kings Islands, depth 549 m. The hydro-thecae of the Makara Beach specimen do not conform with Totton's description but answer to those of *S. subdichotomus*, with which the Makara Beach material has been identified.

RECORDS FROM NEW ZEALAND: Recognised from several isolated localities around New Zealand (depth 23–183 m): off Norfolk Island; Three Kings region; off North Cape; off East Cape, Otago Peninsula, and Chatham Islands.

DISTRIBUTION: It seems unlikely that Kirchenpauer's material from Australia and Magelhan Strait is conspecific; records of *Symplectoscyphus subdichotomus* from South American waters should be taken with much reserve. It also seems questionable whether the species really occurs in South African waters (cf. Millard 1975: 320) no reliable material being available. Records based on well identified material come from the seas bordering southeast Australia, including Bass Strait, and from New Zealand waters.

Symplectoscyphus tuba Totton, 1930

Symplectoscyphus tuba Totton 1930: 186, fig. 37a-b; Ralph 1961a: 816, fig. 18f-g; Vervoort 1993a: 241, 272–274, figs 67-d, tab. 56.
?*Symplectoscyphus tuba*: Leloup 1974: 42, fig. 41; Bouillon *et al.* 1995: 74.
Sertularella tuba: Stepan'yants 1979: 76, pl. 17, fig. 4.

TYPE LOCALITY: *Terra Nova* Stn 90, off Three Kings Islands, 83 m; type in NHM.

REMARKS: Species described from New Zealand waters by Totton (1930); Ralph's (1961a) re-description is apparently based on her inspection of the type as no additional material has become available. Leloup's (1974, quoted by Bouillon *et al.* 1995) record of this species from Golfo de Ancud, Chilean coastal waters, is here considered doubtful as his material was sterile; we believe that it is impossible to distinguish this species from its congeners (*S. confusus, S. epizooticus* and *S. j. johnstoni*) in absence of gonothecae.

RECORDS FROM NEW ZEALAND: Off Three Kings Islands, 183 m (Totton 1930). This species is not represented in our material.

DISTRIBUTION: Known only from the type locality.

MEASUREMENTS of *Symplectoscyphus subdichotomus* (Kirchenpauer, 1884) (in μm):

	NZOI Stn P39 slide 2230	NZOI Stn D882 slide 2292	Ralph's Loc. 296 slide 3824
Length of internode	390 – 615	280 – 450	390 – 410
Diameter at node	155 – 195	115 – 150	125 – 140
Hydrotheca, length adnate adcauline wall	285 – 335	225 – 295	260 – 270
Length free adcauline wall	150 – 170	70 – 100	85 – 100
Length abcauline wall	245 – 255	180 – 200	210 – 225
Total depth	405 – 415	255 – 325	300 – 325
Maximum diameter	205 – 215	135 – 145	180 – 190
Diameter at rim	180 – 185	100 – 115	140 – 155
Gonotheca, overall length	1475 – 1560		1300 – 1395
Maximum diameter	850 – 885		605 – 655
Length of funnel	95 – 140		85 – 95
Diameter of funnel at apex	300 – 345		140 – 155

Symplectoscyphus vanhoeffeni Totton, 1930

Symplectoscyphus vanhöffeni Totton 1930: 187, fig. 38a-d; Briggs 1938: 31; Ralph 1961a: 817–818, fig. 19a-c; Leloup 1974: 47, fig. 39; Blanco 1984a: 36–37, pl. 30, figs 67–68; 1984b: 40; Branch & Williams 1993: 13, fig; Vervoort 1993a: 241; Bouillon *et al.* 1995: 74.
Sertularella vanhoeffeni: Naumov & Stepan'yants 1972: 34, 40, fig. 4; Stepan'yants 1972: 70; 1979: 77, pl. 17, fig. 5.

MATERIAL EXAMINED:
NMNZ Ralph Collection: Loc. 701, 2 good slides in RSC as *Symplectoscyphus (?) vanhoeffeni*, no data.

TYPE LOCALITY: Vanhoeffen's specimens of *Sertularella subdichotoma* originated from 'Gauss Station' of the German South Polar Expedition 1901–1903, at 65°21' S, 86°06' E, depth about 385 m; these specimens may still be present in MNB. Totton's *Terra Nova* material comes from three localities in the Ross Sea, Antarctica. His material from *Terra Nova* Stn 220, off Cape Adare, 82–91 m), bearing immature and spent gonothecae, is here chosen as the lectotype.

REMARKS: Re-described by Ralph (1961a) from Antarctic and New Zealand material; the New Zealand colonies, six stems up to 25 mm high, had one male gonotheca. No additional material of this species was available to us.

RECORDS FROM NEW ZEALAND: Otago, Canyon A, 146–183 m) (Ralph 1961a).

DISTRIBUTION: Southern Ocean and Ross Seas, Antarctica (Vanhoeffen 1910; Totton 1930); New Zealand (Ralph 1961a).

Symplectoscyphus sp. 1. (Fig. 56G–I)

MATERIAL EXAMINED:
NZOI Stn A696: Several bottles filled with shells and unrecognisable hydroid remains. Isolated from this sample: *Symplectoscyphus* sp. 1. Two fragments about 15 mm long, in NNM-Coel. slide 2713.

DESCRIPTION: Material consists of 2 monosiphonic stem fragments 20 and 30 mm high, the longest with 3 ramifications. Division into internodes indistinct, no real nodes present but indicated by oblique constrictions of perisarc. Hydrocladia (side branches) placed on conspicuous apophyses; axillary hydrotheca not greatly different from other hydrothecae.

Hydrothecae arranged alternately in 1 plane, evenly spaced, tip of abcauline cusp of hydrotheca level with bottom hydrotheca above on opposite side. Hydrotheca curving outwards, narrow basally, adcauline wall adnate for half to two-thirds of its length, free parts lightly curved; abcauline wall concave. Hydrothecal rim with 3 conspicuous cusps, of which adcauline cusp is considerably the larger; embayments between cusps deep. Hydrothecal rim thickened; aperture renovated once or twice, remnants of opercular plates frequently present. Bottom of hydrotheca straight, with large adcauline diaphragm.

Perisarc thin, particularly along walls of hydrothecae, several hydrothecae are fully collapsed. Only remnants of hydranths present. Gonothecae absent.

MEASUREMENTS of *Symplectoscyphus* sp. 1 (in μm):

	NZOI Stn A696 slide 2713
Stem internode, length	820 – 900
Diameter at node	195 – 235
Hydrocladial internode, length	625 – 740
Diameter at node	180 – 195
Axillary hydrotheca, length adnate adcauline wall	390 – 405
Length free adcauline wall	155 – 255
Length abcauline wall	380 – 390
Total depth	515 – 530
Maximum diameter	240 – 270
Diameter at rim	255 – 290
Non-axillary hydrotheca, length adnate adcauline wall	365 – 390
Length free adcauline wall	265 – 335
Length abcauline wall	410 – 460
Total depth	550 – 570
Maximum diameter	250 – 300
Diameter at rim	240 – 315

REMARKS: Condition of the material and absence of gonothecae prohibit the description of this material as a new species. In some respects it resembles the Antarctic *Symplectoscyphus curvatus* (Jäderholm, 1925) though in this comparatively well known species the hydrothecae are slightly larger, more strongly curved with a much smaller proportion of the adcauline hydrothecal wall adnate to the internode.

RECORDS FROM NEW ZEALAND: Macquarie Ridge, south Tasman Sea, 54°37.70' S, 158°57.00' E, 433 m.

Symplectoscyphus sp.

MATERIAL EXAMINED:
NZOI Stns: C118, *Symplectoscyphus* sp. (J.E. Watson); **D72**, about 60 mm long fragment, either a stem or a hydrocladium. Hydrothecae empty, strongly renovated; no gonothecae. In 2 parts in RMNH-Coel. slide 2822. Unfit for further description;

F188, *Symplectoscyphus* spec. (J.E. Watson) [slide 4222, JEW Colln]; **Q85**, *Symplectoscyphus* sp. [slide 4186, JEW Colln].

REMARKS: Material is unfit for proper identification.

Tasmanaria Watson & Vervoort, 2001

TYPE SPECIES: *Sertularella edentula* Bale, 1924.

Tasmanaria edentula (Bale, 1924) (Fig. 57A–E)

Sertularella edentula Bale 1924: 237, fig. 16; Totton 1930: 200, text-fig. 46, pl. 3, fig. 6; Ralph, 1961a: 834-835, fig. 25.
Sertularella edentula: Dawson 1992: 19; Stranks 1993: 15; Vervoort 1993a: 190.
?Papilionella edentula: Antsulevich & Vervoort 1993: 439.
Tasmanaria edentula: Watson & Vervoort 2001: 171.
Not *Sertularella edentula*: Vervoort 1972: 127, fig. 39b-d [= *Sertularella vervoorti* El Beshbeeshy, 1991].
Not *Thuiaria edentula*: Stepan'yants 1979: 92, pl. 17, figs 9a-v [= *Sertularella vervoorti* El Beshbeeshy, 1991].

MATERIAL EXAMINED:

NZOI Stns: B93, single stem with 3 hydrocladia; no gonothecae; **E312**, large, mutilated colonies, with thick stems; no gonothecae. Hydrothecae with remains of tissue. RMNH-Coel. slide 2124; **E841**, 1 hydrocladium, 40 mm high; dirty and dead material. RMNH-Coel. slide 2181; **J970**, *Tasmanaria edentula* Bale, 1924. [Slide 4211 JEW Colln]; **P442**, large, branched colony about 80 x 80 mm; no gonothecae. Hydrothecae with fully retracted hydranths. RMNH-Coel. slide 2234.

NMNZ: BS 392, 3 colonies, two plume-shaped and pinnate; the third forked with pinnate branches. Height up to 120 mm. No gonothecae. NMNZ Co. 577; **BS 394**, colony fragment with 2 pinnate branches, 80 mm long; no gonothecae. NMNZ Co. 591. Also 2 well developed colonies 80 and 110 mm high and some fragments, both with gonothecae. NMNZ Co. 665; **BS 886**, 150 mm high, pinnate colony. No gonothecae. NMNZ Co. 521; **BS 899**, many large, branched colonies, up to 200 m high, hydrocladium as long as 40 mm; no gonothecae. NMNZ Co. 447; 3 RMNH-Coel. slides 2967. Also many pinnate colonies and many fragments; the highest colonies about 220 mm long and bearing gonothecae along stem. NMNZ Co. 785. Some colonies separate as RMNH-Coel. 27682, slide 3382. Mixed with *Gonaxia intercalata* sp. nov. and difficult to separate; **BS 905**, numerous colonies and fragments up to 80 mm high; several colonies bear gonothecae. NMNZ Co. 686; **BS 907**, mutilated colony 80 mm high, only some hydrocladia left. NMNZ Co. 813; **BS 911**, 3 forked colonies, largest about 150 mm high, with pinnate hydrocladia 15–20 mm long. Many gonothecae present, exclusively placed on both sides of axis at base of hydrocladia. NMNZ Co. 794. 1 colony as RMNH-Coel. 27647, 4 slides 3338; **BS 912**, single forked colony 120 mm high; no gonothecae. NMNZ Co. 583; **BS 913**, 2 large bunches, each composed of several forked stems, about 150 mm high, with many gonothecae; hydrothecae with tissue rests. NMNZ Co. 1352; RMNH-Coel. slide 3342.

NMNZ Ralph Collection: Loc. 415, NMNZ Co. 1201, 2 stem fragments, 15 mm high and 7 separate hydrocladia. Hydrothecae with rests of tissue. 2 RMNH-Coel. slides 3883. Reasonable slide in RSC as *Sertularella edentula*; no data.

TYPE LOCALITY: Ten miles NW of Cape Maria van Diemen, 91 m (Bale 1924); five syntype slides in MOV, MV F58218 (Stranks 1993).

DESCRIPTION: Robust, planar colonies with a basally thick and polysiphonic, often irregularly forked main stem, becoming monosiphonic in upper third; there with alternately arranged, to 50 mm long hydrocladia. Colony attached to firm substratum (corals, bryozoans) by thick stolonal fibres forming a dense mat around base of stem. Monosiphonic parts of stems divided into internodes by oblique nodes; each internode with 3 hydrothecae, 1 axillar on upper part of internode, 1 on same side basally and 1 opposite in almost intermediate position. Monosiphonic part of stems slightly compressed; hydrothecae inserted on narrow side.

Hydrocladia inserted on distinct apophysis below axillar hydrotheca; fairly indistinct, oblique septa dividing hydrocladia into internodes of varied length. Hydrocladia also slightly compressed in same plane as stem; hydrothecae inserted on narrow side, subopposite to alternate.

Hydrothecae of stem and hydrocladium identical in morphology; axillar hydrothecae differing slightly. Cauline hydrothecae almost cylindrical, slightly narrowing apically and smoothly curving outward. Floor of hydrotheca straight, perpendicular to cauline or hydrocladial axis, almost perpendicular to adnate adcauline wall; with small knob of perisarc. Diaphragm fairly wide, circular, with conical, hyaline flap of perisarc, projecting downwards. Hydrotheca completely immersed in stem or internode; adcauline wall smoothly convex, almost fully adnate, only some hydrothecae, notably those at base of a node, with a small part of adcauline wall free. Abcauline wall concave some distance under rim, a small elevation of perisarc at hydrothecal bottom. Hydrothecal aperture circular, rim smooth; plane of aperture at 20–30° with length axis, inclined downwards. Some hydrothecae show remnants of hyaline opercular material, usually attached inside hydrothecal rim; no complete operculum. It seems, therefore, that the hyaline sheath covering developing hydrothecae is pierced by the hydranth when it erupts at maturity.

Gonothecae occur plentifully in our material as large, more or less bean-shaped bodies attached to the stem below cauline hydrothecae leaving a large, oval scar when shed. The mature, presumably female gonotheca has its greatest diameter in the upper third and narrows proximally into a short pedicel without node attached to the stem. Apex of gonotheca smoothly and broadly rounded, with oval aperture

just below top; wall beneath aperture straight. Dorsal side of gonotheca with 2 curved, longitudinal carinae running downwards and gradually diminishing in width to disappear completely in basal part of gonotheca.

MEASUREMENTS of *Tasmanaria edentula* (in μm):

	New Zealand (Ralph 1961a)	NZOI Stn P442 slide 2234
Stem, diameter at base*		about 5000
Length stem internode at monosiphonic part		2975 – 3665
Diameter at node in monosiphonic part		930 – 1260
Stem hydrotheca, length adnate adcauline wall, including prolongation		1195 – 1410
Length free adcauline wall		100 – 260
Length abcauline wall		390 – 500
Maximum diameter		540 – 650
Diameter at rim		370 – 410
Hydrocladial internode, length	3000 – 8000	7270 – 7810
Diameter at node	750	435 – 540
Hydrocladial hydrotheca, length length adnate adcauline wall		1080 – 1300
Length free adcauline wall		0 – 110
Length abcauline wall	500 – 700	825 – 910
Maximum diameter		500 – 585
Diameter at rim	370 - 500	370 – 410
Female(?) gonotheca, total length	4000 – 4300	4990 – 5200**
Maximum diameter	2000	1475 – 1510**
Diameter at base		280 – 325**

* = specimen from BS 899, slide 2967
** = specimen from BS 911, slides 3338

REMARKS: It appears that the arrangement of the hydrothecae is alternate rather than sub-opposite; the distance between individual hydrothecae on same side is different in the various colonies. The gonothecae in our material are supposed to be female; the best preserved contain a longitudinal strand of tissue with an oval body, presumably a developing egg. None of the gonothecae has a pedicel from the body separated by a node; the gonotheca with a distinct, separate pedicel observed and figured by Ralph (1961a: 835, fig. 25f) must be an abnormality.

State of preservation too bad for final conclusions on the sex of the fertile material. Although this condition did not permit tentacle counts, a fairly spacious abcauline caecum could be observed.

The species is usually attached to large, strongly calcified bryozoans which cover the basal part of the stem.

RECORDS FROM NEW ZEALAND: Restricted to a fairly limited area north of New Zealand, 32.5°–35° S, 167.5°–174.5° E, depth 55–262 m.

DISTRIBUTION: Known exclusively from waters north of New Zealand.

Tasmanaria pacifica sp. nov. (Fig. 57F–H)

MATERIAL EXAMINED:

NZOI Stn T22: 140 mm high, branched colony without gonothecae, with many hydrothecae of *Filellum serratum* (Clarke, 1879). Holotype, H-770 in NIWA collection. [Slides no. 4227, 4228 in JEW Colln, also sample as RMNH-Coel. 29126; four slides 4770.]

TYPE LOCALITY: Southwest Pacific, 48°00.10′ S, 180°00.00′, 268 m.

DESCRIPTION: Robust, irregular colonies with a thick, repeatedly branched stem, basally several millimetres thick; stem and branches polysiphonic over greater part of their length, monosiphonic in top parts and there moderately geniculate. Branches originating from hydrocladia that continue to elongate and become covered by secondary tubules. Division of stem, branches, and hydrocladia into internodes obscure, hydrocladia with occasional perisarc constriction above axillary hydrotheca. Structure of colony can best by described from monosiphonic parts; hydrocladia alternate, springing from large apophysis below axillary hydrotheca. 1 hydrotheca opposite apophysis and 1 on opposite side under apophysis.

Hydrotheca tubiform, smoothly curved outwards, only slightly narrowing basally. In material inspected nearly all hydrothecae considerably renovated. Adcauline wall adnate for about half length; adnate part smoothly curved, basally considerably swollen. In not renovated hydrothecae this swelling has a laterally directed projection; the diaphragm is suspended between this projection and a perisarc peg on inside of abcauline wall. Abcauline wall of hydrotheca slightly or strongly concave. Base of abcauline wall with a swelling of varied development. Hydrothecal rim circular and frequently renovated. These renovations occasionally concern complete hydrothecae after comprehensive damage.

Perisarc strong and thick, yellowish brown in thin parts, dark brown, almost opaque in remaining parts of colony.

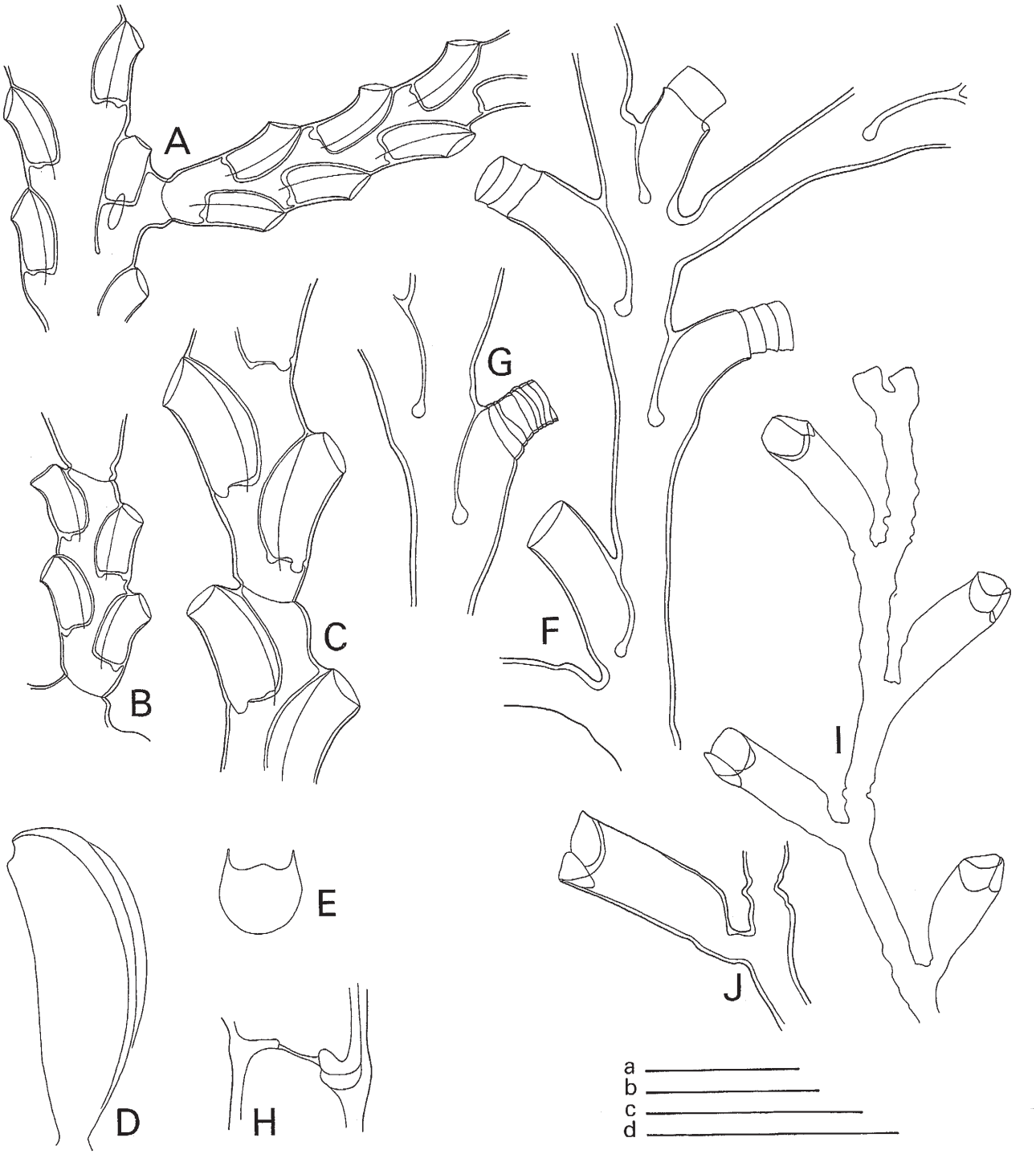

Fig. 57. A–E. ***Tasmanaria edentula*** (Bale, 1924). **A**, part of stem with hydrocladium. **B**, part of hydrocladium (Loc. 415, slide 3883). **C**, part of hydrocladium with hydrothecae (NZOI Stn E312, slide 2124). **D**, gonotheca, lateral view. **E**, gonotheca, optical cross section (BS 911, slide 3338). **F–H.** ***Tasmanaria pacifica*** sp. nov. **F**, part of stem with hydrocladia. **G**, much renovated hydrotheca. **H**, hydrothecal diaphragm (NZOI Stn T22, holotype, slide 4770). **I, J.** ***Parascyphus simplex*** (Lamouroux, 1816). **I**, part of stem. **J**, hydrotheca (BS 679, slide 3517B). Scales: a, 1 mm (I); b, 1 mm (C, F, G); c, 2 mm (A, B, D, E); d, 0.5 mm (H, J). W.V.

Only 3 gonothecae, all damaged. Gonotheca large, inserted on a short, smooth pedicel below a hydrotheca on branch; gonotheca directed upwards, elongated conical, somewhat flattened, in frontal aspect widening from pedicel to about middle, narrowing a little below margin, in side view, almost same width throughout; apex on adcauline side produced into a neck flanked by 2 short blunt apical cusps separated by a shallow emargination; abcauline side produced into 2 very long, tapering hollow spines of similar length, diverging from one another at an acute angle; pair of spines separated from oral cusps by a deep almost U-shaped embayment; length of spines variable between gonothecae. Orifice of gonotheca between blunt cusps but all 3 too damaged for precise description. Perisarc of gonotheca moderately thick but much thinner than that of hydrothecae.

MEASUREMENTS of *Tasmanaria pacifica* sp. nov. (in μm):

	NZOI Stn T22 slide 4770
Stem, diameter at base	2200
Diameter of internode of monosiphonic parts measured under axillary hydrotheca	410 – 540
Hydrotheca, length adnate adcauline wall	655 – 690
Length free adcauline wall*	625 – 740
Length abcauline wall*	935 – 1300
Maximum diameter	395 – 460
Diameter at rim	315 – 360
Gonotheca, length from base to apex of cusps	1840 – 2140
Maximum width of body in frontal view	920 – 1000
Width of body in side view	580
Height of apical cusps from emargination to tip	180 – 360
Length of spines	640 – 1120
Width of spines across base	200 – 260

* including renovations

All dimensions in present material are very variable.

REMARKS: Provisionally classified as a species of *Tasmanaria* because of the structure of the hydrothecae (circular rim, bottom open, curved cylinder) and the two prongs on the gonothecae. All three gonothecae damaged in various places, so that description is composite of three specimens. Clearly the gonothecal orifice is between the marginal cusps but all are so damaged that no trace remains. Likewise only one gonotheca has the two long spines intact; on the other two spines that are either damaged or missing, it is possible that the apical cusps, if seen from another angle, may possibly be broadly lobate with several vertical pleats in the perisarc; unfortunately the material is too damaged to be certain.

RECORDS FROM NEW ZEALAND: One locality in the South-west Pacific, 48°00.10′ S, 180°00.00′, 268 m. The hydrothecae are empty; condition of the gonothecae unknown.

DISTRIBUTION: Known only from southern New Zealand waters.

ETYMOLOGY: The specific name refers to the area, Pacific Ocean, in which the material was taken.

Family **THYROSCYPHIDAE** Stechow, 1920
Parascyphus Ritchie, 1911

TYPE SPECIES: *Laomedea simplex* Lamouroux, 1816.

Parascyphus simplex (Lamouroux, 1816) (Fig. 57I, J)

Laomedea simplex Lamouroux 1816: 206.
Campanularia tridentata Bale 1894: 98, pl. 3, fig. 3; Bartlett 1907: 42; Mulder & Trebilcock 1914a: 11; Stranks 1993: 5.
Sertularella tridentata: Hartlaub 1901a: 46, fig. 21.
Thyroscyphus tridentatus: Hartlaub, 1901b: 369, pl. 21, fig. 14, pl. 22, fig. 23; Ritchie 1909a: 74–75, fig. 1a, b.
Thyroscyphus simplex: Billard 1909b: 1065; 1909c: 312; Briggs 1914: 286, 288; Bale 1915: 245; 1924: 236; Trebilcock 1928: 8; Blackburn 1937a: 364; Hodgson 1950: 10, fig. 22.
Parascyphus simplex: Ritchie 1911: 160–163, fig. 1; Stechow 1925a: 224; Splettstösser 1929: 100, 126, figs 92–94; Totton 1930: 179, fig. 29a-b; Blackburn 1938: 321; 1942: 112; Broch 1948: 4, 9; Ralph 1961a: 755, fig. 1b; Rees & Thursfield 1965: 117; Millard 1966b: 491; 1968: 254, 268, fig. 4D; Berrisford 1969: 394; Watson 1973: 169; Millard 1975: 270, fig. 89A–B; 1978: 196; Cornelius 1979: 306; Stepan'yants 1979: 60, pl. 10, fig. 4; Millard 1980: 132; Dawson 1992: 19; Blanco 1994a: 153; 1994b: 198; Watson 1994a: 67; Bouillon *et al.* 1995: 67; Cornelius 1995: 112; Watson 1996: 78.

MATERIAL EXAMINED:

NZOI Stns: A911, 5 colonies 30 mm high on shell fragment; no gonothecae. RMNH-Coel. slide 2276; **C344**, *Parascyphus simplex* (Lamouroux, 1816) (J.E. Watson); **G835**, bunch of colonies on sponge, 10–20 mm high, no gonothecae observed. 2 RMNH-Coel. slides 2876; **I75**, fragments found between *Synthecium subventricosum* Bale, 1914; no gonothecae. RMNH-Coel. slide 2095; **I87**, fragmentary specimens; **M763**, colonies, 10–15 mm high, on *Synthecium elegans* Allman, 1872; no gonothecae. RMNH-Coel. slide 2897.

NMNZ: BS 410, many colonies up to 12 mm high, no gonothecae observed. NMNZ Co. 638. 7 RMNH-Coel. slides 3025; **BS 769**, small stems, up to 8 mm high, on *Crateritheca zelandica*a (Gray, 1843); no gonothecae. NMNZ Co. 843, 2 RMNH-Coel. slides 3517B; **BS 834**, a few colonies reptant on stems of *Tubularia* (?) sp., NMNZ Co. 748). No slide; very poor material, only some hydrothecae left; **BS 886**, small colony on stem of *Lytocarpia rigida* sp. nov.; no gonothecae. In RMNH-Coel. slide 3642.

Otago Museum, Dunedin, N.Z: **Iv. 763. A.52:49**, tangled and branched colonies 10–20 mm high; dead specimens, hydrothecae in poor condition; no gonothecae observed. RMNH-Coel. 27242, slide 2659.

TYPE LOCALITY: *Laomedea simplex*: Australia; no further specification (Lamouroux, 1816). *Campanularia tridentata*: Port Philip Bay, Victoria, Australia (Bale 1894), probable syntype in MOV, MV F58748, microslide, (Stranks 1993).

DESCRIPTION: Monosiphonic stems to 20 mm high, occasionally with 1 or 2 branches, arising from a tubular stolon creeping on other hydroids, bryozoans, etc.; base of stem with a few irregular ring-shaped wrinkles. Stem and branch internodes marked by constrictions or torsion of perisarc; no true nodes observed. Internodes with big distal lateral apophysis supporting hydrotheca; apophyses and hydrothecae alternate and biserial, with distinct frontal exposition. Hydrotheca on short, wrinkled pedicel; true diaphragm absent, though a ridge of perisarc occurs on abcauline side; passage between hydrotheca and pedicel wide.

Hydrotheca more or less tubular, with straight or slightly wrinkled adcauline wall; abcauline wall basally convex. Hydrotheca completely free from internode, directed away at an angle of about 60°. Hydrothecal rim with 3 conspicuous cusps separated by deep, rounded embayments. Opercular apparatus composed of 3 large hyaline flaps, strongly attached to hydrothecal rim and persistent in nearly all hydrothecae, closure of opercular flaps occasionally quite irregular; hydrothecal rim not thickened. Renovations have not been observed.

Perisarc firm but fairly thin on stems and branches, thinning out along hydrothecal walls, with a small thickening at end of adcauline wall serving attachment for long adcauline caecum. Hydranths present in majority of hydrothecae, usually contracted, with 16–18 tentacles, arranged around a slightly elevated hypostome.

Gonothecae absent.

REMARKS: The material accords with descriptions by Splettstösser (1929); Totton (1930) and Ralph (1961a). Gonothecae have been described by Bale (1915), and Stechow (1925).

MEASUREMENTS of *Parascyphus simplex* (in μm):

	NMNZ BS 679 slide 3517B
Stem internode, length	505 – 615
Diameter at node	95 – 105
Hydrotheca, length abcauline wall	455 – 470
Length adcauline wall	475 – 490
Total depth	505 – 530
Maximum diameter	150 – 185
Diameter at rim	168 – 180

The material from NZOI Stn A911 is remarkable by the development of the hydrothecal pedicels, occasionally surpassing the hydrotheca in length, resulting from repeated renovations of the original pedicel after loss of the hydrotheca.

RECORDS FROM NEW ZEALAND: Previously recorded from French Pass, near Cook Strait (Hartlaub 1901b); Island Bay, Wellington (Trebilcock 1928) and off North Cape (*Terra Nova* Stn 134, Totton 1930). Though described and figured by Ralph (1961a) no new records were added and no material occurs in her collection. Present records are scattered and are from the Pacific southeast of Norfolk Island, about 29° S, 168° E; Wanganella Bank, 32.5° S, 167.5° E; Whangaroa Harbour; Ranfurly Bank, off East Cape, 38° S, 179° E; Lord Howe Rise, Tas-man Sea, about 41° S, 174° E; Milford Sound, South Island, and North Reef, Otago Peninsula, depths varying between 21 and 437 m. This small and mainly epizootic species probably has a much wider distribution in New Zealand waters.

DISTRIBUTION: Australia (Lamouroux 1816); coast of Western Australia (Watson 1996); Great Australian Bight (Bale 1915; Watson 1973); Oyster Bay, Albany, SW Australia (Stechow 1925a); Port Philip Bay, Victoria (Bale 1894; Mulder & Trebilcock 1914); Bass Strait (Blackburn 1934a, 1938, 1942; Watson 1994a); Tasmania (Briggs 1914; Hodgson 1950); Gough Island, South Atlantic (Ritchie 1909); Vema Seamount, South Atlantic (Millard 1966b; Berrisford 1969); off Natal coast and deeper water off east coast of South Africa (Millard 1968, 1975, 1980). A doubtful record by Broch (1948) would bring the species as far south as Elephant Island, South Shetlands.

The record from the North Atlantic (Clyde Sea area, Scotland, Ritchie 1911) has been discarded by Cornelius (1975, 1995) and we concur. The record by Bouillon *et al.* 1995) from 'Oyster Harbour (Irlande)' probably refers to Stechow's (1925a) Australian record from the Albany region.

Symmetroscyphus Calder, 1986

TYPE SPECIES: *Thyroscyphus intermedius* Congdon, 1907.

Symmetroscyphus australis sp. nov. (Fig. 58A–C)

MATERIAL EXAMINED:

NZOI Stns: D6, small colonies, developing from a stolon, creeping on *Acryptolaria patagonica* El Beshbeeshy, 1991. No gonothecae. Holotype, H-771 in NIWA collection. RMNH-Coel. slide 2814; **D9**, fragment of stolonal colony, 10 mm long, apparently from dried out sample (paratype, P-1230).

TYPE LOCALITY: South Tasman Sea, near Macquarie Islands, 55°29.00′ S, 158°31.50′ E, 415 m.

DESCRIPTION (of holotype): Sample consists of 3 fragments of stolon with a total of 15 hydrothecae, none in perfect condition. Stolon a hollow tube of uniform diameter, smooth on outside, without internal perisarc pegs, detached from colony of *Acryptolaria patagonica* El Beshbeeshy, 1991. Hydrothecae arise singly along stolon on a short rather indistinct pedicel. Perisarc of stolon firm though not particularly thick, narrowing in hydrothecal pedicel. Hydrothecal pedicel short, smooth; hydrotheca vase-shaped, almost cylindrical, gradually narrowing towards base or slightly swollen, symmetrical or nearly so, wall of hydrotheca distally smooth, in basal half with minor undulations, though not ribbed. Rim of hydrothecal aperture slightly widened, distinctly though not heavily thickened; rim with 4 low pointed cusps, separated by quite shallow embayments. Operculum 4-flapped, flaps roughly triangular; none of hydrothecae with perfectly fitting, closed valves. Interior of hydrotheca with basal ring-shaped thickening of perisarc demarcating hydrotheca from pedicel. Only tissue rests were found inside hydrotheca; no nematocysts were observed. Some hydrothecae show remains of a diaphragm suspended in a ring at bottom of hydrotheca; diaphragm with central hydropore with slightly upturned edges.

No gonothecae.

MEASUREMENTS of *Symmetroscyphus australis* sp. nov. (in μm):

	NZOI Stn D6 slide 2814
Stolon, diameter	240 – 345
Pedicel, length	215 – 370
Diameter just under perisarc ring	260 – 305
Hydrotheca, total length	1550 – 1560
Maximum diameter	760 – 800
Diameter at rim	605 – 650

REMARKS: The present material seems largely to fit Calder's (1986) definition of the genus *Symmetroscyphus* and its type species *Symmetroscyphus intermedius* (Congdon, 1907) (= *Thyroscyphus intermedius* Congdon, 1907), though differing from the latter by its larger size, lower marginal cusps, and a less distinctly undulated hydrothecal wall. Unfortunately there are no gonothecae (those of *Symmetroscyphus intermedius* also being unknown) and the almost complete absence of tissue makes it impossible to check a very important character, viz., the presence of large nematocysts in the ectoderm. One of the hydrothecae in the present material reveals an important character, the presence of a central hydropore in the bottom of the hydrotheca. As only the morphology of hydranth and nematothecae can give accurate generic allocation, reference of the present species to the genus *Symmetroscyphus* is provisional.

DISTRIBUTION: The type locality is near Macquarie Island in the south Tasman Sea, far outside New Zealand waters proper. A second locality is in the immediate vicinity. Depth at those localities varies between 113 and 415 m.

ETYMOLOGY: Species name *australis* from Latin adjective *australis*, meaning southern, emphasising the southern record for this species.

Thyroscyphus Allman, 1877

TYPE SPECIES: *Thyroscyphus ramosus* Allman, 1877.

Thyroscyphus fruticosus (Esper, 1793)

Spongia fruticosa Esper 1793: 188.

Lytoscyphus fruticosus: Stechow 1922: 147; 1923d: 150; Stechow & Müller 1923: 465, pl. 27, fig. 6; Stechow 1925a: 215, fig. G.

Hincksella fruticosa: Stechow 1922: 147.

Thyroscyphus fruticosus: Splettstösser 1929: 7–30, 122, figs 1–27, map 1; Leloup 1932: 158; Billard 1933: 11, pl. 1, fig. 1; Dollfus 1933: 127; Vervoort 1941: 202–204; 1946a: 306; Millard 1958: 199; Ralph 1961a: 754-755, fig. 1a; Macnae & Kalk 1962: 114; Schmidt 1972b: 1; Redier 1963: 21, fig. 4; Mammen 1965: 31, fig. 64; Vervoort 1967: 35, figs 8–9; Gravier 1970a: 116; Fishelson 1971: 122; Schmidt 1972a: 35, 41, 42, 43, 45, pl. 2A; Millard & Bouillon 1973: 76; Schmidt 1973a: 284; Hirohito 1974: 24, fig. 10; Millard & Bouillon 1974: 8; Millard 1975: 323–325, fig. 104; Mergner & Wedler 1977: 18, pl. 2, fig. 14; Millard 1978: 199 *et seq*; Cornelius 1982: 121; McCain 1984: 99; Mergner 1987: 187; Gibbons & Ryland 1989: 425–427, fig. 40; Boero & Bouillon 1993a: 264; Vervoort 1993a: 557; Bouillon *et al.* 1995: 75.

Sertularia fruticosa: Cornelius 1982: 121.

Campanularia thyroscyphiformis Marktanner-Turneretscher 1890: 206, pl. 3, fig. 4.

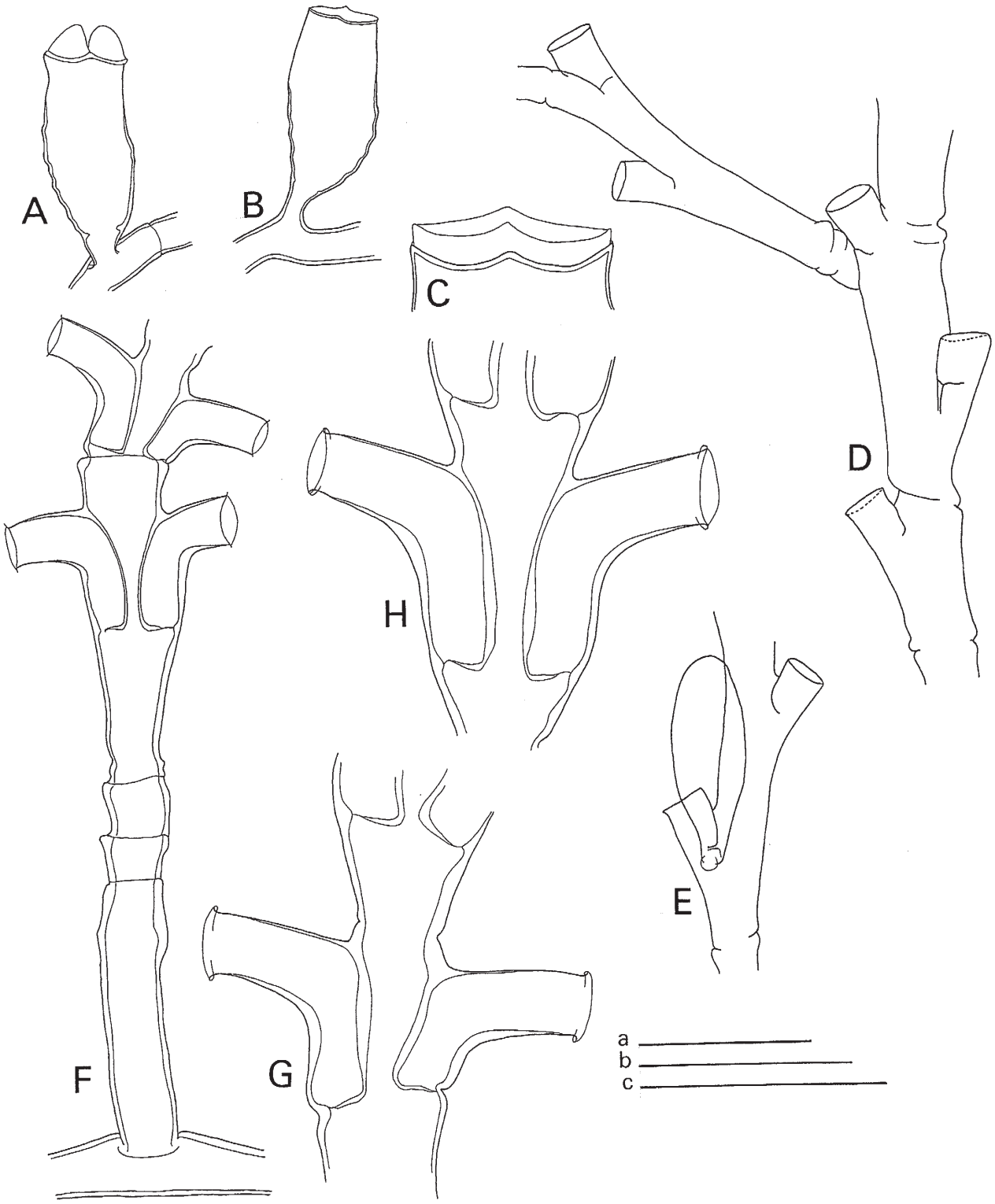

Fig. 58. A-C. ***Symmetroscyphus australis*** sp. nov. **A, B**, hydrothecae inserting on stolon. **C**, renovated hydrothecal rim. (NZOI Stn D6, holotype, slide 2814). **D, E.** ***Hicksella sibogae*** Billard, 1918. **D**, monosiphonic part of stem with hydrocladium. **E**, part of hydrocladium with gonotheca (NZOI Stn P84, slide 2905). **F–H.** ***Synthecium brucei*** sp. nov. **F**, proximal part of stem. **G**, proximal pair of hydrothecae. **H**, distal pair of hydrothecae (BS 882, holotype, slide 3330). Scales: a, 1 mm (A, B, G, H); b, 2 mm (F); c, 0.5 mm (C–E). W.V.

TYPE LOCALITY: Unknown; no type specimen known.

RECORDS FROM NEW ZEALAND: Described and figured from 'New Zealand', without specification of the exact locality, by Thompson (1879). No material of this widely distributed circumtropical species occurs in the collections we have studied.

Family **SYNTHECIIDAE**
Marktanner-Turneretscher, 1890
Hincksella Billard, 1918

TYPE SPECIES: *Hincksella sibogae* Billard, 1918, by subsequent designation (Totton 1930: 151) [= *Cyclonia* Stechow, 1921f; type species by monotypy: *Cyclonia gracilis* Stechow, 1921f = *Syntheciella* Stechow, 1922, type species by monotypy: *Synthecium alternans* Allman, 1888].

REMARKS: In this genus the gonothecae develop from the internode at the base of the hydrotheca, from the stolon, or from both locations. The genus *Cyclonia* Stechow, 1921f, principally based on characters concerning the location of the gonothecae (stolonal in *Cyclonia*, springing from the internodes in *Hincksella*) has here been synonymised with *Hincksella* Billard, 1918, the more so since the two remaining characters considered diagnostic by Stechow have no real value. The spherical shape of the gonothecae in *Cyclonia* only concerns the female gonothecae and as far as these are known in *Hincksella* they are invariably spherical. The finer appearance ("zarterer Habitus") of *Cyclonia gracilis* is also found in *Hincksella pusilla* Ritchie, 1910a.

The following species have been considered and are commented upon.

* = present name and/or generic designation

Hincksella alternans (Allman, 1888) [= *Synthecium alternans* Allman, 1888; *Synthecium (Syntheciella) alternans* (Allman, 1888)]. Gonothecae described and figured by Allman, 1888.

Hincksella corrugata Millard, 1958, gonothecae unknown.

Hincksella cylindrica (Bale, 1888) [= *Sertularella cylindrica* Bale, 1888]. Gonothecae with pronounced sexual dimorphism.

Hincksella echinocarpa (Allman, 1888) [= *Sertularia echinocarpa* Allman, 1888]. Gonothecae described by Allman, 1888.

Hincksella fallax (Hartlaub, 1904) [= *Sertularella fallax* Hartlaub, 1904]. Gonothecae unknown. Unlikely to be a species of *Hincksella*, most probably *Staurotheca*.

Hincksella formosa (Fewkes, 1881) [= *Sertularella formosa* Fewkes, 1881 = *Sertularia integritheca* Allman, 1888 (*fide* Nutting 1904: 104)]. Species of somewhat uncertain generic position with shape and arrangement of hydrothecae that would place it in *Hincksella* Billard, 1918, but with gonothecae with a four-flapped operculum as in *Sertularella* Gray, 1843.

Hincksella fruticosa (Esper, 1793) [= **Thyroscyphus fruticosus* (Esper, 1793)]

Hincksella gracilis (Stechow, 1921f). Species has never been figured, may well be conspecific with *Hincksella pusilla* (Ritchie, 1910a).

Hincksella gracilis (Fraser, 1937) [= *Synthecium gracile* Fraser, 1937]. Doubtful species, shortly described and badly figured, may well be conspecific with *Hincksella pusilla* (Ritchie, 1910a).

Hincksella indiana Millard, 1967, gonothecae unknown.

Hincksella projecta (Fraser, 1938b) [= *Synthecium projectum* Fraser, 1938b]. Gonosome unknown. Briefly described and badly figured species; near *Hincksella indiana* Millard, 1967.

Hincksella pusilla (Ritchie, 1910a) [= *Sertularella cylindrica* var. *pusilla* Ritchie, 1910a; *Cyclonia pusilla* (Ritchie, 1910a)]. Gonothecae with pronounced sexual dimorphism. Often considered a dwarf form of *Hincksella cylindrica* (Bale, 1888), here treated as a separate species.

Hincksella rigida (Fraser, 1938b) [= *Synthecium rigidum* Fraser, 1938b]. Gonosome unknown.

Hincksella sibogae Billard, 1918. Young and mature gonothecae described by Billard (1925b).

Hincksella stolonifera (Hartlaub, 1904). Probably a species of *Staurotheca* (see Peña Cantero *et al.* 1997: 368–370, fig. 10E–G).

Hincksella sibogae Billard, 1918 (Fig. 58D, E)

Hincksella sibogae Billard 1918: 23, fig. 2; 1925b: 122, text-fig. 1, pl. 7, fig. 1; Briggs & Gardner 1931: 190; Pennycuik 1959: 156, 189; van Soest 1976: 85.

MATERIAL EXAMINED:

NZOI Stn P84, mutilated colony, about 150 mm high, stem strongly polysiphonic, much forked. Only some branches complete and those with gonothecae. 3 RMNH-Coel. slides 2905.

TYPE LOCALITY: *Siboga* Stn 46a, Sapeh Strait, east of Sumbawa Island, 08°23.5′ S, 119°04.6′ E, 69 m (Billard 1925b; syntypes in ZMA, ZMA Coel. 4495, van Soest 1976).

REMARKS: The present material generally fits Billard's (1925b) description and the additional notes presented by Briggs and Gardiner (1931). The Tasman Sea material presents the following features:

1. The colony reaches a considerable size, being 150 mm high, with a strongly polysiphonic, much forked stem.
2. On main stem and branches the hydrocladia are arranged in sub-opposite pairs, roughly in one plane. The stem is divided into internodes with four hydrothecae; the sub-opposite pair of hydrocladia springing from the bases of the upper two hydrothecae. Irregularities occur in the upper (younger) parts of the colony, where internodes

with three, two, or one hydrotheca are present and the sub-opposite arrangement of the hydrocladia is lost.

3. The perisarc is quite soft; hydrothecae and gonothecae are easily compressed and deformed when making a microslide preparation. Nodes between internodes of axis and hydrocladia are only weakly indicated and usually accompanied by some rings or wrinkles of perisarc. The hydrothecal bottom, in contra-distinction to the impression gained from Billard's figures (1925b, fig. IA, B) is not sharply defined. The hydranth, as also appears from Billard's fig. IC, has a circular attachment halfway the hydrotheca; no desmocytes being visible.
4. The present material richly bears gonothecae; their sex could not be ascertained. They are elongated sac-shaped with a rounded top and slightly larger (and probably also more mature) than those figured and measured by Billard. They insert at the base of the hydrocladial hydrothecae, leaving a large, circular fenestra when shed.

MEASUREMENTS of *Hincksella sibogae* (in μm):

	Siboga Stn 49a (Billard 1925b)	NZOI Stn P84 slides 2905
Diameter of stem	175 – 190	400 – 425
Distance between hydrocladia*	1400 – 1680	
Distance between pairs of sub-opposite hydrocladia		3000 – 3050
Length of proximal part hydrocladium**	805 – 1140	1050 – 1085
Diameter of hydrocladium at base***	140 – 300	300 – 325
Distance between hydrothecae****	210 – 350	975 – 1085
Length of hydrothecae	210 – 245	225 – 260
Diameter of hydrothecae at rim	260 – 280	375 – 390
Gonotheca, length	1330 – 1530	1700 – 1775
Maximum diameter	595	540 – 550

* measured between two successive hydrocladia
** measured between axil and base of first hydrotheca
*** minimum diameter between two successive hydrothecae
**** from axil between adcauline hydrothecal wall and internode to bottom next hydrotheca

Some of our measurements greatly exceed those given by Billard (1925). Billard indicates in a footnote that the complete colonies were found later and the measurements he presents may have been taken from fragmentary material.

RECORDS FROM NEW ZEALAND: The present record (near Lord Howe Island, Tasman Sea) is outside New Zealand coastal waters.

DISTRIBUTION: First described from Indonesian waters: Sapeh Strait, E of Sumbawa Island, 08°23.5′ S, 119°04.6′ E, 69 m (*Siboga* Stn 49a, type locality) and Flores Sea N of Tanah Djampeah Islands, 3–400 m depth (*Siboga* Stn 65a, Billard 1925b). An additional record comes from Linden Bank, Great Barrier Reef, 51 m, Stn II, Great Barrier Reef Exped. (Briggs & Gardner 1931). The present record extends the distribution of this rare species to the Tasman Sea near Lord Howe Island, 59 m (NZOI Stn P84).

Synthecium Allman, 1872

TYPE SPECIES: *Synthecium elegans* Allman, 1872 by monotypy.

The following species have been considered and commented upon.

* = present name and/or generic designation

Synthecium alternans Allman, 1888 [= *Syntheciella alternans* (Allman, 1888); **Hincksella alternans* (Allman, 1888)]

Synthecium campylocarpum Allman, l888. Gonothecae described and figured by Allman (1888) and Ralph (1958).

Synthecium carinatum Totton, 1930. Gonothecae described and figured by Totton (1930).

Synthecium chilense Hartlaub, 1905 [= **Synthecium protectum* Jäderholm, 1903; *Synthecium robustum* Nutting, 1904]

Synthecium crassum (Fraser, 1940a) [= ?*Diphasia crassa* Fraser, 1940a]. Poorly known species, by appearance of hydrothecae and their paired arrangement probably *Synthecium*; however, Fraser described a delicate, one-flapped, adcauline operculum.

Synthecium cylindricum Bale, 1888 [= **Hincksella cylindrica* (Bale, 1888)]

Synthecium cylindricum var. *pusilla* (Ritchie, 1910a) [= **Hincksella pusilla* (Ritchie, 1910a)]

Synthecium dentigerum Jarvis, 1922. Gonothecae described and figured by Vervoort and Vasseur (1977).

Synthecium elegans Allman, 1872. Gonothecae figured by Allman (1872); figured and described by Allman (1876a), Ralph (1958), and Hirohito (1995).

Synthecium elegans var. *subventricosum* Bale, 1914 [= **Synthecium subventricosum* Bale, 1914]

Synthecium evansi (Ellis & Solander, 1786). Gonosome briefly described by Gili (1986).

Synthecium flabellum Hargitt, 1924. Poorly described species, figured with developing gonothecae; may be identical with *Synthecium samauense* Billard, 1925a.

Synthecium formosum (Fewkes, 1881) [= *Sertularella formosa* Fewkes, 1881; may well be a species of *Hincksella* Billard, 1918]

Synthecium gracile Fraser, 1937 [= **Hincksella gracilis* (Fraser,

1937)]; *Synthecium gracilis* Coughtrey, 1875 [= **Amphisbetia minima* (Thompson, 1879), possible syntype mentioned by Stranks 1993: 19; MOV, MV F59293].

Synthecium hians Millard, 1957. Gonosome unknown.

Synthecium longithecum Totton, 1930. Gonotheca unknown. Totton (1930) described gonotheca from 'very similar species'. Here considered conspecific with **Synthecium megathecum* Billard, 1924.

Synthecium maldivense Borradaile, 1905 [= **Dynamena crisioides gigantea* Billard, 1925a, *fide* Billard, 1925b]

Synthecium(?) *marginatum* (Allman, 1877) [= **Sertularia marginata* Allman, 1877}. Poorly known species, may well belong to another genus, gonosome unknown.

Synthecium megathecum Billard, 1925a [= *Sertularella tubitheca sensu* Pictet, 1893: 51, pl. 2 figs 44–45; *Sertularia tubitheca sensu* von Campenhausen, 1896b: 309]. Gonosome figured and described by Billard (1925b).

Synthecium megathecum var. *parvulum* Billard, 1925b. Gonosome unknown.

Synthecium (?) *nanum* Fraser, 1943. Questionable species, briefly described, gonosome unknown.

Synthecium orthogonium (Busk, 1852). Species usually considered to fall into the synonymy of *Synthecium patulum* (Busk, 1852). Holotype, a microslide preparation, in NHM, 99.7.1.6367. Type locality, as given by Bale (1884: 89) is Prince of Wales Channel, Torres Strait, epizootic on *S. pristis* [= *Idiellana pristis* (Lamouroux, 1816)].

Synthecium patulum (Busk, 1852). Species of which no (holo)type is known, can only be reconstructed from Busk's figure. Type locality, as given by Bale (1884: 88) is Bass Strait, 82 m. Further localities given by Bale are Williamstown and Queenscliff.

Synthecium patulum elongatum Billard, 1925b. Gonosome unknown.

Synthecium projectum Fraser, 1938b [= **Hincksella projecta* (Fraser, 1938b)].

Synthecium protectum Jäderholm, 1903. Gonothecae described and figured by Jäderholm, 1903.

Synthecium ramosum Allman, 1885. Holotype in NHM, 86.2.19.12–13, figured by Totton (1930), here considered conspecific with **Synthecium elegans* Allman, 1872, following Billard (1910).

Synthecium rectum Nutting, 1904. Gonothecae unknown.

Synthecium rigidum Fraser, 1938b [= **Hincksella rigida* (Fraser, 1938b)]

Synthecium robustum Nutting, 1904. Gonothecae described and figured by Nutting (from dried specimen!), Ritchie (1906) and Vervoort (1972) [= **Synthecium projectum* Jäderholm, 1903].

Synthecium robustum Totton, 1930 [= **Synthecium tottoni* Ralph, 1958]

Synthecium samauense Billard, 1925a. Gonothecae described and figured by Billard (1925a, b) and Vervoort and Vasseur (1977).

Synthecium sertularioides (Lamouroux, 1816: 178) [= *Dynamena sertularioides* Lamouroux, 1816]. Species of uncertain standing, usually synonymised with *Dynamena tubiformis* Lamouroux, 1816, also an uncertain species. Provenance: Australasia (Lamouroux, 1816).

Synthecium singulare Billard, 1925b [= **Synthecium dentigerum* Jarvis, 1922]

Synthecium stoloniferum (Hartlaub, 1904) [= *Sertularia stolonifera* Hartlaub, 1904; probably a species of *Staurotheca*, see Peña Cantero *et al.* 1997: 368–370, fig. 10E–G].

Synthecium subventricosum Bale, 1914 [= *Synthecium elegans subventricosum* Bale, 1914]. Gonothecae described by Ralph (1958).

Synthecium symmetricum Fraser, 1938b. Rather uncertain species, structure and gonosome shortly described and inadequately figured.

Synthecium tottoni Ralph, 1958 [= *Synthecium robustum* Totton, 1930, not *Synthecium robustum* Nutting, 1904]. Measurements of gonothecae given but these are not described.

Synthecium tubiformis (Lamouroux, 1821) [= *Dynamena tubiformis* Lamouroux, 1821]. Species of uncertain standing, usually synonymised with *Dynamena sertularioides* Lamouroux, 1816, also an uncertain species. Provenance: Australasia (Lamouroux, 1821).

Synthecium tubiger Borradaile, 1905. Gonothecae unknown.

Synthecium tubithecum (Allman, 1877). Gonothecae described but not figured by Nutting (1904).

Synthecium tubulosum (Heller, 1868) [= **Synthecium evansi* (Ellis & Solander, 1786].

Synthecium sp. Gravier-Bonnet, 1979: 43, fig. 4E–F.

Synthecium brucei sp. nov. (Fig. 58F–H)

MATERIAL EXAMINED:

NMNZ: BS 882, tuft of 6 stems attached to a thick, creeping stolon, partly detached from colony of bryozoans; no gonothecae. Holotype (4 stems) in NMNZ (NMNZ Co. 780), 1 paratype as RMNH-Coel. 27643, 1 slide 3330.

TYPE LOCALITY: Wanganella Bank, Norfolk Ridge, summit, 32°31.8′ S, 167°29.5′ E, 113–118 m.

DESCRIPTION (of type series): Stems stiff and unbranched, arising from stolon attached to a firm substrate (i.e., bryozoan), pointing straight upwards; hydrothecae arranged in strictly opposite pairs; members of a pair pointing in opposite directions. Nodes only occasionally present, transverse; internodes of varied length. Part of stem below first pair of hydrothecae of varied length, occasionally quite short, about as long as distance between consecutive pairs of hydrothecae, in some colonies much longer and showing signs of renovation (fig. 58F). Length of colonies varied, up to 70 mm high, as many as 20 pairs of hydrothecae present. Stem narrowing slightly above each pair of hydrothecae but in a few cases only this narrowing is much more developed (fig. 58G) and a weak node is present. Perisarc of stem of considerable thickness, in preserved specimens of yellowish-brown colour.

Hydrothecae large, with exception of first pair strictly opposite, in full lateral position; consequently there is no difference between frontal or rear view of colony. Hydrotheca tubular, usually rather sharply

curved outwards at about half their length; free part slightly curved to almost straight. Rim circular and slightly but distinctly everted; plane of aperture in majority of hydrothecae parallel to long axis of stem, perpendicular to long axis of free part hydrotheca. Abcauline wall of hydrotheca concave, rounded; perisarc with considerable thickening in curved portion. Fused adcauline wall also thickened; hydrothecal floor thickened at axial side; diaphragm located just behind perisarc thickening of abcauline wall, small. Free adcauline wall about as long as fused adcauline wall.

All hydrothecae contain remnants of a hydranth but too badly preserved to count number of tentacles.

No gonothecae observed.

MEASUREMENTS of *Synthecium brucei* sp. nov. (in μm):

	NMNZ BS 882 slide 3330
Stolon, diameter	540 – 545
Stem, diameter at base	695 – 715
Distance between pairs of hydrothecae	605 – 935
Hydrothecae, length adnate adcauline wall	1540 – 1585
Length free adcauline wall	760 – 1365
Overall length	2060 – 2235
Diameter at rim	455 – 605
Distance between pairs*	455 – 650
Minimum distance between hydrothecae of a pair**	110 – 130

* measured from axil between free adcauline wall and wall of internode to base of next hydrotheca on same side

** measured in frontal or rear view as minimal distance between fused adcauline walls

REMARKS: This new species is characterised by the considerable size of the hydrothecae and the stiff, unbranched stems, reaching a height of 70 mm. Beautiful and elegant species with a striking habit.

RECORDS FROM NEW ZEALAND: Known only from Wanganella Bank, Norfolk Ridge, summit, 32°31.8′ S, 167°29.5′ E, 113–118 m.

DISTRIBUTION: Known only from New Zealand region.

ETYMOLOGY: Named for New Zealand malacologist, Bruce Marshall, National Museum of New Zealand, Wellington, N.Z.

Synthecium campylocarpum Allman, 1888

Synthecium campylocarpum Allman 1888: 78–79, pl. 37, figs 1, 1a-c; Marktanner-Turneretscher 1890: 248; von Campenhausen 1896b: 310, pl. 15, fig. 6; Farquhar 1896: 466; Billard 1910: 25, fig. 10; Stechow 1913a: 144; 1913b: 12, 127, figs 96–97; Jäderholm 1916: 6; 1919: 14, pl. 3, fig. 6; Stechow 1923b: 11; Totton 1930: 169; Ralph 1958: 347, fig. 15a-g; Yamada 1959: 52; Hirohito 1969: 18; Stranks 1993: 19; Watson 1996: 78; 2000: 40–41, figs 30A–G, 31A–F.

Synthecium orthogonia: Bale 1888: 767–768, pl. 17, figs 1–5 [not *Synthecium orthogonium* (Busk, 1852)].

MATERIAL EXAMINED:

NZOI Stn J970: *Synthecium* cf. *campylocarpum* Allman, 1888. (J.E. Watson).

TYPE LOCALITY: *Challenger* Stn 163B, off Port Jackson, New South Wales, 33°51.25′ S, 151°22.25′ E, 55–64 m [Allman 1888; syntypes in NHM (99.7.1.6367) and MOV (Stranks, 1993, MV F59323 and MV F58214, two microslides)].

REMARKS: Synonymised by Billard (1925b) with *Sertularia patula* Busk, 1852, a species with unknown holotype, only known from a figure by Bale, re-drawn by Totton (1930), and with *Sertularia orthogonia* Busk, 1852. The species was recorded from Auckland by Marktanner-Turneretscher (1890); it has been redescribed and figured by Ralph (1958) from material collected off Myora, Queensland, Australia, at 13 m depth. There have been widely varying concepts of the species. Bale's (1888) opinion that *S. orthogonium* (Busk, 1852) and *S. campylocarpum* Allman, 1888 are conspecific was followed by many later authors (e.g., Jäderholm 1903; Thornely 1904; Nutting 1905; Jäderholm 1916; Stechow & Müller 1923). However, examination of type and other material by Watson (2000) clearly demonstrated that *S. orthogonium* and *S. campylocarpum* are distinct species. No reliable New Zealand material of this species is available to us: the material from NZOI Stn J970 is sterile and in poor condition. This species has small hydrothecae (about 500–680 μm overall length and a width at the rim of 170–250 μm), it is, however, particularly characterised by the elongate, pod-shaped gonothecae with 7–10 slightly flared transverse ridges, length 1250 μm, greatest diameter 560 μm (characters and measurements taken from Ralph (1958). This description seems to refer to the female gonothecae. The male gonotheca, not described by Ralph, is longer, pod-shaped, and smooth.

The synonymy of this species has become increasingly obscure because of frequent erroneous synonymisation; the exact pattern of distribution is still quite obscure. It is probably restricted to (sub)tropical waters

of the eastern part of Indonesia (Ternate, von Campenhausen 1896a, b), to the north of Australia (Watson 2000) and New Zealand (Auckland, Marktanner-Turneretscher 1890). Records from Polynesia (Tahiti) are unreliable and are based on Jäderholm's (1903) record of fragmentary specimens of *Synthecium orthogonium*; his records of that species from Japan are referred to *Synthecium elegans* Allman, 1872, by Hirohito (1995).

Synthecium carinatum Totton, 1930

Synthecium carinatum Totton 1930: 171, fig. 24a-d; Ralph 1958: 346–347, fig. 15a-b.

Material Examined:

NMNZ Ralph Collection: Loc. 187: 2 stained Canada Balsam slide in RSC as *Synthecium carinatum*, no data.

Type Locality: *Terra Nova* Stn 144, off Cape Maria van Diemen, North Island, 64–73 m, growing on a bryozoan; holotype in NHM, 2910.10.10.

Remarks and Distribution: This species was described by Totton (1930) from material collected in New Zealand waters by the *Terra Nova* Expedition: Stn 134, Spirits Bay, near North Cape, 20–37 m, growing on a sponge, and Stn 144, off Cape Maria van Diemen, North Island, 64-73 m, growing on a bryozoan (type locality). This is a species with small hydrothecae (diameter at rim 110 µm) with an internal cusp on the adcauline side. The (male) gonothecae are ribbed and flattened in a plane perpendicular to the plane of branching. A further locality is given by Ralph (1958: 436): Doubtless Bay, 3 nautical miles offshore, on submarine cable, Cable Ship *Matai*, 14 Aug 1951 (Ralph's collection Loc. 187).

No material occurs in the present collections; this is a rare New Zealand species. The slides in RSC have not been studied in detail.

Synthecium elegans Allman, 1872 (Fig. 59A–D)

Synthecium elegans Allman 1872: 229, fig.; Coughtrey 1875: 285; Allman, 1876a: 266; Hilgendorf 1898: 211–212, pl. 20, figs 3, 3a; 1911: 541; Jäderholm 1917: 14, pl. 2, fig. 3; Bale 1924: 251; Billard 1925b: 129, fig. 5; Totton 1930: 168, fig. 22a-b; Blackburn 1942: 111; Kulka 1950: 81, fig. 12a, b; Millard 1957: 203, fig. 9d; 1958: 182; 1964: 25; Day *et al.* 1970: 15; Morton & Miller 1973: 152; Millard 1975: 236, fig. 77A–B; Mergner & Wedler 1977: 16, pl. 3, fig. 18a-b; Grange *et al.* 1981: 223; Hirohito 1983: 6, 36, fig. 14; Mergner 1987: 187; Staples & Watson 1987: 218; Bouillon *et al.* 1995: 76; Hirohito 1995 (English text): 153–154, text-fig. 48c-g, pl. 10, fig. C.
Sertularia elegans: Coughtrey, 1876a: 29; 1876b: 301.
Parathecium elegans: Stechow 1923d: 151.
Synthecium elegans elegans: Ralph 1958: 349–352, fig. 17a-e.

Material Examined:

NZOI Stns: A751, 1 colony about 40 mm high and some fragments, no gonothecae. Dead colonies and very dirty. RMNH-Coel. slide 2717; **B197**, about 10 colonies 15–50 mm high, partly on bryozoans. Much abraded and dirty specimens, no hydranths present. Hydrothecae of big size, probably female specimen. RMNH-Coel. slide 2737; **B247**, 1 colony 15 mm high, on shell fragment, with some hydrothecae of *Hebellopsis scandens* (Bale, 1888) and some young colonies. Characteristic material with fairly short hydrothecae that widen suddenly when curving outward. Large size, probably female. RMNH-Coel. slide 2768; **C86**, colonies up to 15 mm long and fragments, detached from stones. No gonothecae. Poor material; may belong here; **C601**, many colonies up to 60 mm high, mainly on bryozoans; no gonothecae. Specimen with wide hydrothecae, probably female. RMNH-Coel. slide 2806; **D1**, 2 stems, 25 mm high, no gonothecae; **D139**, colony 15 mm high and a fragment, no gonothecae; **D873**, 4 colonies, 12–25 mm high, no gonothecae. Hydrothecae in this material quite characteristic. RMNH-Coel. slide 2282; **E312**, many colonies up to 50 mm high on dead branches and bryozoans, mixed with some colonies of *Synthecium subventricosum* Bale, 1914. No gonothecae. 2 RMNH-Coel. slides 4356; **F922**, 2 colonies on stem fragment of unrecognisable hydroid, no gonothecae. Probably female specimen with wide hydrothecae and well preserved hydranths. RMNH-Coel. slide 2200; **G707**, several colonies, up to 45 mm on bryozoans. Completely dead, dirty specimens; no hydranths, no gonothecae. RMNH-Coel. slide 2874; **G835**, several colonies on sponges, 10–40 mm high, no gonothecae. Only some of hydrothecae with a polyp. RMNH-Coel. slide 2877; **M763**, some about 40 mm high stems. Dead material, completely overgrown by *Hebellopsis scandens* (Bale, 1888). RMNH-Coel. slide 2896; **Q104**, several colonies up to 35 mm high, many gonothecae present. Dirty material, completely covered by *Hebellopsis scandens* (Bale, 1888) and its gonothecae. RMNH-Coel. slide 2910; **Q174**, small fragment, 8 mm long, on bryozoan. RMNH-Coel. slide 2914.

NMNZ: Cuvier Island, 16.Nov.1908, W.R.R. Oliver: 4 colonies, up to 105 mm length, gonothecae abundant. NMNZ Co. 611; **North of Kapiti,** F. Abernethy, 23.May.1956: 2 stems 20 mm high and some fragments; no gonothecae. NMNZ Co. 612; **BS 163**, single colony, 20 mm high, no gonothecae. NMNZ Co. 625; **BS 169**, single stem, 25 mm high, with some fully developed gonothecae. NMNZ Co. 613; **BS 202**, about 15 colonies up to 35 mm high, no gonothecae. NMNZ Co. 652; **BS 389**, 2 developing colonies on *Halecium* sp., height about 10 mm. NMNZ Co. 506; **BS 396**, 2 colonies, 35 mm high, no gonothecae. NMNZ Co. 704; **BS 482**, several small colonies on various hydroids, e.g., stem of *Salacia bicalycula spiralis* (Trebilcock, 1928); no gonothecae. Fresh specimen with well preserved polyps. NMNZ Co. 864, RMNH-Coel. slide 3524; **BS 894**, 2 stems detached from substratum, composed of stem and some branches, 15 and 35 mm high; no gonothecae. NMNZ Co. 784; **BS 904**, 3 colonies, 10–40 mm high, no gonothecae. Well preserved sample; hydrothecae with hydranths and of big size, probably female. NMNZ Co. 432; 3 RMNH-Coel. slides 2962.

NMNZ Ralph Collection: Loc. 149, stained Canada Balsam slide in RSC as *Synthecium elegans* var. *elegans*, no data; **Loc. 188**, NMNZ Co. 1043, fragments in tube with that number and listed as *Halopteris campanula*. No gonothecae; hydrothecae can only imperfectly be observed because of dense cover of *Hebellopsis scandens* (Bale, 1888), but most likely this species. RMNH-Coel. slide 3710; **Loc. 453**, NMNZ Co. 1221, 4 stems 10–40 mm high, all with gonothecae, with *Hebellopsis scandens* (Bale, 1888). RMNH-Coel. slide 3897. Stained Canada Balsam slide in RSC as *Synthecium elegans*, gonangia, no data; **Loc. 454**, stained Canada Balsam slide in RSC as *Synthecium elegans* var. *elegans*, male, no data; **Loc. 475**, NMNZ Co. 1224, many colonies (much pressed together in tube), about 35 mm high, all with gonothecae and densely covered with *Hebellopsis scandens* (Bale, 1888), also with some gonothecae. RMNH-Coel. slide 3901; **Loc. 476**, NMNZ Co. 1225, many colonies with gonothecae on sea weed, completely covered with *Hebellopsis scandens* (Bale, 1888) and its gonothecae. RMNH-Coel. slide 3901; **Loc. 479**, NMNZ Co. 1228, about 15 mm high stems, tangled with colonies of *Synthecium subventricosum* Bale, 1914, with *Hebellopsis scandens* (Bale, 1888), both without gonothecae. RMNH-Coel. slide 3904; **Loc. 486**, partly empty Canada Balsam slide in RSC as *Synthecium elegans*, with data: dredged, Tamaki, 30/5/1950(?); **Loc. 530**, NMNZ Co. 1259, 3 young colonies about 5 mm high, composed of erect stems with maximally 5 pairs of hydrothecae, arising from stolon. No gonothecae. No slide; **Loc. 532**, NMNZ Co. 1261, 3 fragments about 6 mm high, no gonothecae. RMNH-Coel. slide 3936; **Loc. 544**, NMNZ Co. 1262, 3 complete colonies without gonothecae, 20–30 mm high. Fresh sample with polyps; up to about 5 renovations. RMNH slide 3937; **Loc. 545**, NMNZ Co. 1263, 2 about 10 mm long hydrocladia with *Hebellopsis scandens* (Bale, 1888), empty gonotheca of the latter on 1 fragment. Fresh sample with polyps of both species. RMNH-Coel. slide 3938; **Loc. 572/573**, NMNZ Co. 1282, 2 stems 25 and 30 mm high, with *Hebellopsis scandens* (Bale, 1888); no gonothecae. RMNH-Coel. slide 3960. Partly dried out slide in RSC as *Synthecium elegans* var., no data; **Loc. 584**, NMNZ Co. 1293, 2 colonies with gonothecae, about 25 mm high. RMNH-Coel. slide 3970. Partly dried out slide in RSC as *Synthecium elegans* var., no data; **Loc. 664**, NMNZ Co. 1335, about 10 stems up to 22 mm high and some fragments. No gonothecae. RMNH-Coel. slide 4018. Unstained Canada Balsam slide in RSC, no data, as *Synthecium elegans* var. *elegans* Allman.

Otago Museum, Dunedin, N.Z.: **Iv. 763. A.52:49**, pinnate stems up to 40 mm long attached to base of *Symplectoscyphus subarticulatus* (Coughtrey, 1875). Mixed with *Symplectoscyphus j. johnstoni* (Gray, 1843). Gonothecae present. Dead specimen completely covered by *Hebellopsis scandens* (Bale, 1888) and *Orthopyxis mollis* (Stechow, 1919). RMNH-Coel. 27240, slide 2657.

TYPE LOCALITY: New Zealand (Allman, 1872), type specimen not known to exist; a lectotype, designed by Totton (1930) from dried material in the Busk Collection, is in NHM, 99.7.1.6746.

REMARKS: The plentiful material here referred to *Synthecium elegans* is in complete agreement with Ralph's description; the only point of difference being the fact that no anastomoses have been observed. The hydrothecal rim, in the bulk of the material, is not circular but depressed on both sides; its plane generally makes an acute angle with the long axis of stem or branch. Renovations are restricted to one or two, with the exception of the material from Ralph's Loc. 544 (*Alert* Stn 54-6, Canyon E, off Otago Peninsula, 194–179 m, E.J. Batham, 16.Jan.1954) which has repeatedly renovated hydrothecae. Gonothecae are plentiful in our material; the ovoid bodies are laterally compressed with 6 or 7 heavily sclerotised ridges, meeting in a zigzag pattern on front and back of the gonotheca. The aperture is at the end of a conical terminal structure. Gonothecae were found in February, July, September, and November. Colonies may be overgrown by *Hebellopsis scandens* (Bale, 1888) or support hydrothecae of *Filellum* sp.

MEASUREMENTS of *Synthecium elegans* (in μm):

	Ralph's Loc. 453 slide 3897	New Zealand (Ralph 1958)
Stem, diameter at base	800	
Diameter at part bearing side branches	605 – 825	
Distance between pairs of side branches	3645 – 4775	3000 – 5000
Distance between pairs of hydrothecae*	975 – 1040	
Minimum distance between hydrothecae on stem	175 – 325	
Hydrothecae, length adnate adcauline wall	715 – 760	750 – 860
Length free adcauline wall	240 – 650	
Overall length	995 – 1085	
Diameter at rim	260 – 300	250 – 310
Distance between pairs*	455 – 475	
Minimum distance between hydrothecae of a pair**	108 – 130	
Gonothecae, overall length	1170 – 1260	
Width in frontal view	890 – 935	

* measured from axil between free adcauline wall and wall of internode to base of next hydrotheca on same side

** measured in frontal or rear view as minimum distance between fused adcauline walls

RECORDS FROM NEW ZEALAND: First reported from Stewart Island (Coughtrey 1875, 1876a, b) and subsequently from the upper harbour, Dunedin, on shells (Hilgendorf 1898). This is a common and well distributed species in New Zealand waters, occurring between 34° and 48.5° S, 167°–179° E, depth 0–216 m.

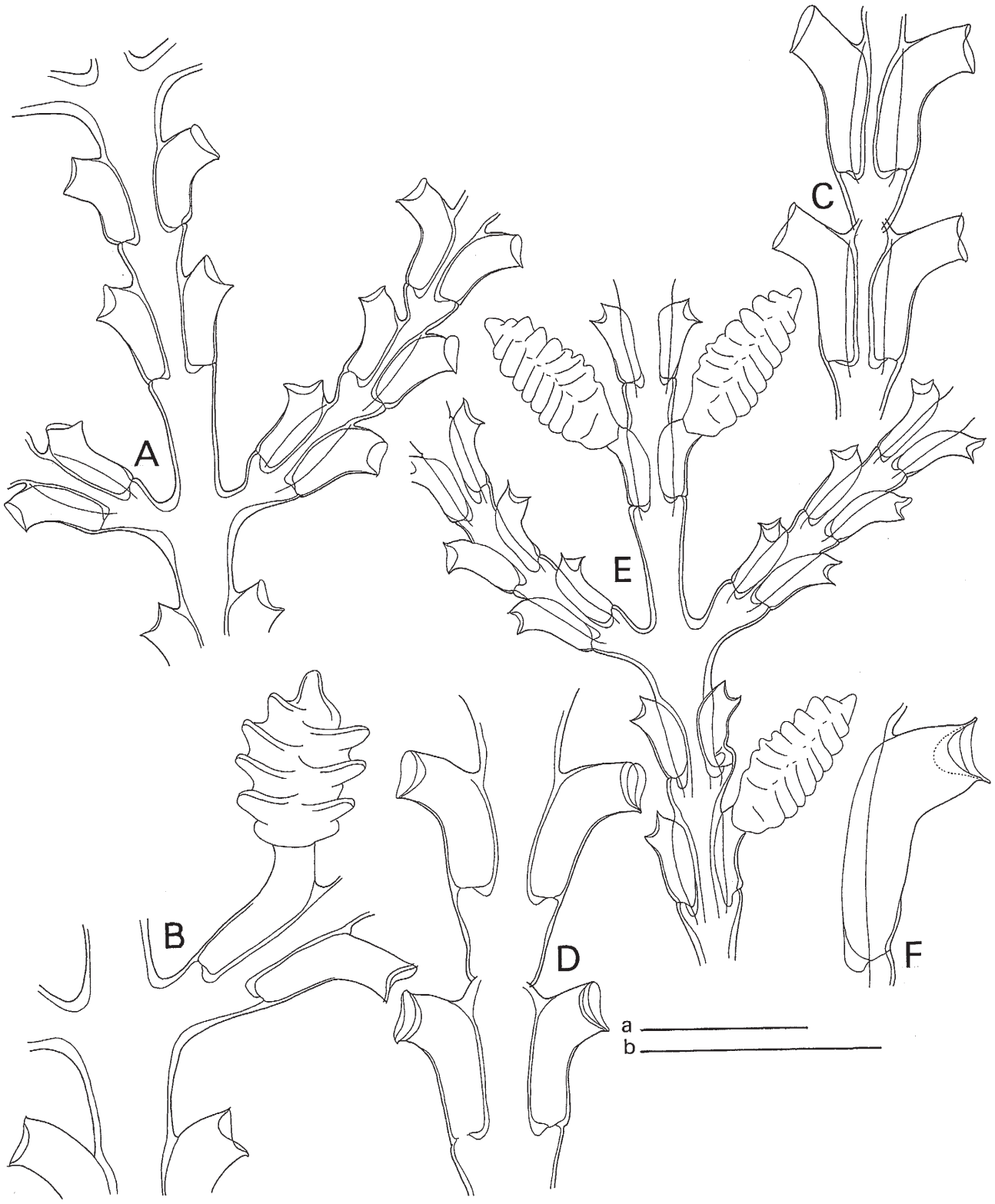

Fig. 59. A-D. ***Synthecium elegans*** Allman, 1872. **A**, part of colony (NZOI Stn D873, slide 2282). **B**, part of stem with hydrocladium bearing gonotheca. **C**, two pairs of hydrocladial hydrothecae (Loc. 453, slide 3897). **D**, two pairs of stem hydrothecae (Loc. 544, slide 3937). **E, F.** ***Synthecium gordoni*** sp. nov. **E**, part of stem with hydrocladia and gonothecae. **F**, renovated hydrotheca (NMNZ, between Cape Reinga and Three Kings Islands, holotype, slide 3375). Scales: a, 1 mm (A-E); b, 0.5 mm (F). W.V.

DISTRIBUTION: The geographical distribution extends over large areas of the tropical and subtropical Indo-Pacific, including Indonesian waters (Billard 1925b), and Sagami Bay, Japan (Hirohito 1995). It may also occur along the Indian Ocean coasts of southern Africa and in Australian waters, though occasional confusion with *Synthecium subventricosum* Bale, 1914, probably has occurred.

Synthecium gordoni sp. nov. (Fig. 59E, F)

MATERIAL EXAMINED:

NZOI Stn E283, several colonies 10–15 mm high on *Hydrodendron caciniformis* (Ritchie, 1907) (paratype in NIWA collection). RMNH-Coel. slide 2114, part of type series.

NMNZ: Between **Cape Reinga** and **Three Kings Islands**, 90–101 m. Several large tufts of much tangled, fine colonies (holotype, NMNZ Co. 713; part as paratype, RMNH-Coel. 27675, 4 slides 3375).

TYPE LOCALITY: Between Cape Reinga and Three Kings Islands, 490–101 m.

DESCRIPTION: Colonies form an irregular, bushy mass of flexuous stems, some as high as 70 mm, rising from tangled stolonal fibres detached from a solid substratum. Individual stems all monosiphonic, no nodes are visible but the flexuous stems are partitioned by pairs of side-branches (hydrocladia) initially in 1 plane, but occasionally re-branching or forming stolons supporting additional, small stems. Anastomoses between tendrils formed by individual stems not seen but may have occurred in the tangled mass of axes. 2 pairs of (opposite) hydrothecae occur between 2 successive pairs of side branches each supported by a short apophysis without node; distance between the pairs of branches about 2.5 mm, basal part of segment fairly long, longer than height of hydrothecae; distance between pairs of hydrothecae on stem about half height of hydrothecae. Basal parts of stems occasionally with single pair of hydrothecae between pairs of side branches; constrictions of perisarc, sometimes present, may indicate separation into internode. Side branches (hydrocladia) without nodes, pairs of hydrothecae closely packed, separated by a short stretch of perisarc about as long as diameter of hydrothecal rim.

Hydrothecae arranged in strictly opposite pairs; those of first pair on a side branch may be slightly displaced. Hydrothecae of stems and branches (hydrocladia) identical, tubular, distal third fairly suddenly curving outwards, deeply embedded into stem or branch, basally with rounded, adcauline, perisarc thickening; diaphragm (hydropore) in front of thickening, often slightly oblique. Rim of hydrotheca not circular as in remaining species of this genus, but deepened laterally and thus with upper and lower lip. Emarginations frequently asymmetrical; hydrothecal rim slightly everted and frequently renovated. Rests of hydranths only are present.

Perisarc thick, yellowish in preserved specimens, thinning out considerably on hydrothecae, that are collapsible, particularly in the distal region.

Gonothecae abundant, springing from both stem and hydrocladial hydrothecae, of the type normally met with in *Synthecium*, i.e., elongated ovoid with thick perisarc, slightly compressed in a plane perpendicular to that of ramification. On each side 8–10 oblique depressions that separate obliquely upwardly directed, strongly sclerotised ribs that meet on upper and lower surface of the gonotheca and form a zig-zag pattern. Distally each gonotheca has a short, conical funnel with terminal aperture. The (female) gonothecae in this material contain two large eggs; male gonothecae not observed.

MEASUREMENTS of *Synthecium gordoni* sp. nov. (in μm):

	NMNZ Cape Reinga slides 3375
Stolon, diameter	360 – 445
Stem, diameter at base	340 – 385
Distance between pairs of hydrothecae*	480 – 665
Hydrotheca, length adnate adcauline wall	650 – 700
Length free adcauline wall	220 – 295
Overall length	755 – 850
Diameter at rim	155 – 175
Distance between pairs*	
Minimum distance between hydrothecae of a pair **	145 – 155
Gonotheca, overall length	1475 – 1625
Maximum diameter	650 – 760

* measured from axil between free adcauline wall and wall of internode to base of next hydrotheca on same side

** measured in frontal or rear view as minimum distance between fused parts of adcauline walls

REMARKS: Distinct species of *Synthecium*, characterised by the aberrant hydrothecal aperture, that has an upper and a lower lip. The plentiful gonothecae are distinctly *Synthecium*-type.

Records from New Zealand: Known only from the waters north of New Zealand, between Cape Reinga and Three Kings Islands,90–110 m, and the Southwest Pacific, off Three Kings Islands, 34°25.00′ S, 172°35.00′ E, 79 m. Gonothecae occurred in October.

Distribution: So far known exclusively from northern New Zealand waters.

Etymology: The name has been chosen in honour of Dr Dennis Gordon, of the National Institute for Water and Atmospheric Research (NIWA,) Wellington, New Zealand, to acknowledge the great help he has given both authors.

Synthecium megathecum Billard, 1925a

(Fig. 60A, B)

Synthecium megathecum Billard 1925a: 648; 1925b: 130–132, text-fig. 6, pl. 7, fig. 2; Leloup 1937b: 5, 33, fig. 21; Vervoort 1946a: 306; Dawydoff 1952: 55; Pennycuik 1959: 189, pl. 6, fig. 1; van Soest 1976: 85; Gravier-Bonnet 1979: 36, fig. 7; Rees & Vervoort 1987: 98–100, figs 18a, 19a; Bouillon *et al.* 1995: 77.

Synthecium longithecum Totton 1930: 174, fig. 26; Ralph 1958: 352, fig. 18a; Gravier-Bonnet 1979: 41.

Material Examined:

NZOI Stns: B556, 1 colony, 35 mm high, no gonothecae. Dead material without hydranths. RMNH-Coel. slide 2783; **E751**, colony 20 mm high on base of *Cryptolaria pectinata* (Allman, 1888); **E759**, small, 25 mm long stem in poor condition, on stem of unrecognisable hydroid; no gonothecae. May belong here; **I91**, several specimens about 40 mm high with young gonothecae, attached to bryozoans. RMNH-Coel. slide 4355; **J953**, 2 colonies 20 and 15 mm high, on stem of *Sertularella geodiae* Totton, 1930, no gonothecae. 1 stem with a colony of *Plumularia setacea* (Linnaeus, 1757). RMNH-Coel. slide 2211; **J958**, a few colonies up to 40 mm high on stem of *Nemertesia elongata* Totton, 1930. Dead material with empty hydrothecae. RMNH-Coel. slide 2261.

NMNZ: BS 437, 35 mm high colony, detached, no gonothecae. Dead material, no polyps. NMNZ Co. 459; RMNH-Coel. slide 2976; **BS 488**, 2 colonies, 35 mm high and a fragment on shells; no gonothecae. NMNZ Co. 486; **BS 519**, a single 22 mm high colony; no gonothecae. Fresh specimen with well preserved polyps. RMNH-Coel. slide 3488; **BS 724**, 4 stems rising from flattened mass of hydrorhizal fibres, probably detached from firm object, 35–55 mm high, with strictly opposite branches; no gonothecae. Fresh material, hydranths present. NMNZ Co. 737; 2 RMNH-Coel. slides 3333; **BS 882**, a single stem about 12 mm high with 4 pairs of hydrothecae, no branches, no gonothecae. Fragmentary material. RMNH-Coel. slide 3321; **BS 886**, about 20 colonies up to 40 mm high on various hydroids, sponges, etc. Rather dirty material with female gonothecae. NMNZ Co. 518, 2 RMNH-Coel. slides 2996. In addition 4 stems about 8–20 mm high partly on stem of *Lytocarpia* (?) *rigida* sp. nov., 1 colony with *Filellum serratum* (Clarke, 1879). Hydranths deteriorated. RMNH-Coel. slide 3643; **BS 899**, single colony on *Sertularella edentula* Bale, 1924. Abraded, dirty material, hydranths deteriorated. NMNZ Co. 452; RMNH-Coel. slide 2971.

NMNZ Ralph Collection: Loc. 60, NMNZ Co. 919, fragments of a larger colony, heavily overgrown by algae and diatoms; no gonothecae. Hydranths deteriorated. RMNH-Coel. slide 3616; **Loc. 572/573**, NMNZ Co. 1281, numerous colonies up to 35 mm high and many fragments; fine female gonothecae present. Hydranths in some of hydrothecae well preserved. 3 RMNH-Coel. slides 3959. Partly dried out slide in RSC as *Synthecium elegans* var., no data; **Loc. 593**, NMNZ Co. 1303, 7 colonies up to 25 mm high, and many fragments. Nodes are occasionally present in stem; female gonothecae present. No hydranths. With *Hebellopsis scandens* (Bale, 1888). RMNH-Coel. slide 3981.

Type Locality: *Synthecium megathecum*: *Siboga* Stn 144, 01°04.5′ S, 127°52.6′ E, strait between the southern tip of Halmahera and Damar Island, syntypes in ZMA, ZMA Coel. 3842 (van Soest 1976). *Synthecium longithecum*: *Terra Nova* Stn 91, off Three Kings Islands, 549 m, holotype in NHM.

Description: Pinnate colonies with erect, 30–50 mm high, monosiphonic stem, with indistinct division into long and slender internodes; nodes, if present, between the 2 pairs of hydrothecae between side branches (hydrocladia). Hydrocladia in opposite pairs, placed on distinct apophyses; between each pair of apophyses 1 or 2 pairs of strictly opposite hydrothecae. No proper ramifications of stem observed, nor are there any anastomoses. Hydrocladia 10–15 mm long, with pairs of hydrothecae and an occasional node; hydrothecae of first pair sub-opposite. Hydrothecae tubular, about half of adcauline wall adnate to internode; free part of hydrotheca gracefully curved outwards; gentle curve particularly noticeable on abcauline wall. Length of free part varied, usually of about same length as adnate part, but longer and shorter portions occur within same colony. Hydrothecal rim circular, slightly everted, parallel to internodal length axis; in some hydrothecal rim with minor lateral deepening, as also observed in *Synthecium elegans*. Hydrothecae of a pair well separated on adcauline side. Some of hydrothecae with well preserved hydranths without adcauline caecum; 10–12 tentacles.

Female gonothecae resembling those of *Synthecium elegans* in size and shape; in the present material the ribs are pronounced but not so strongly sclerotised as in the latter.

Remarks: A comparison of the descriptions and measurements of *Synthecium megathecum* Billard, 1925a (in Billard 1925b: 130–132, fig. 6, pl. 7 fig. 2) and *Synthecium longithecum* Totton, 1930 (: 174, fig. 26) has convinced us that the two are conspecific; no concise

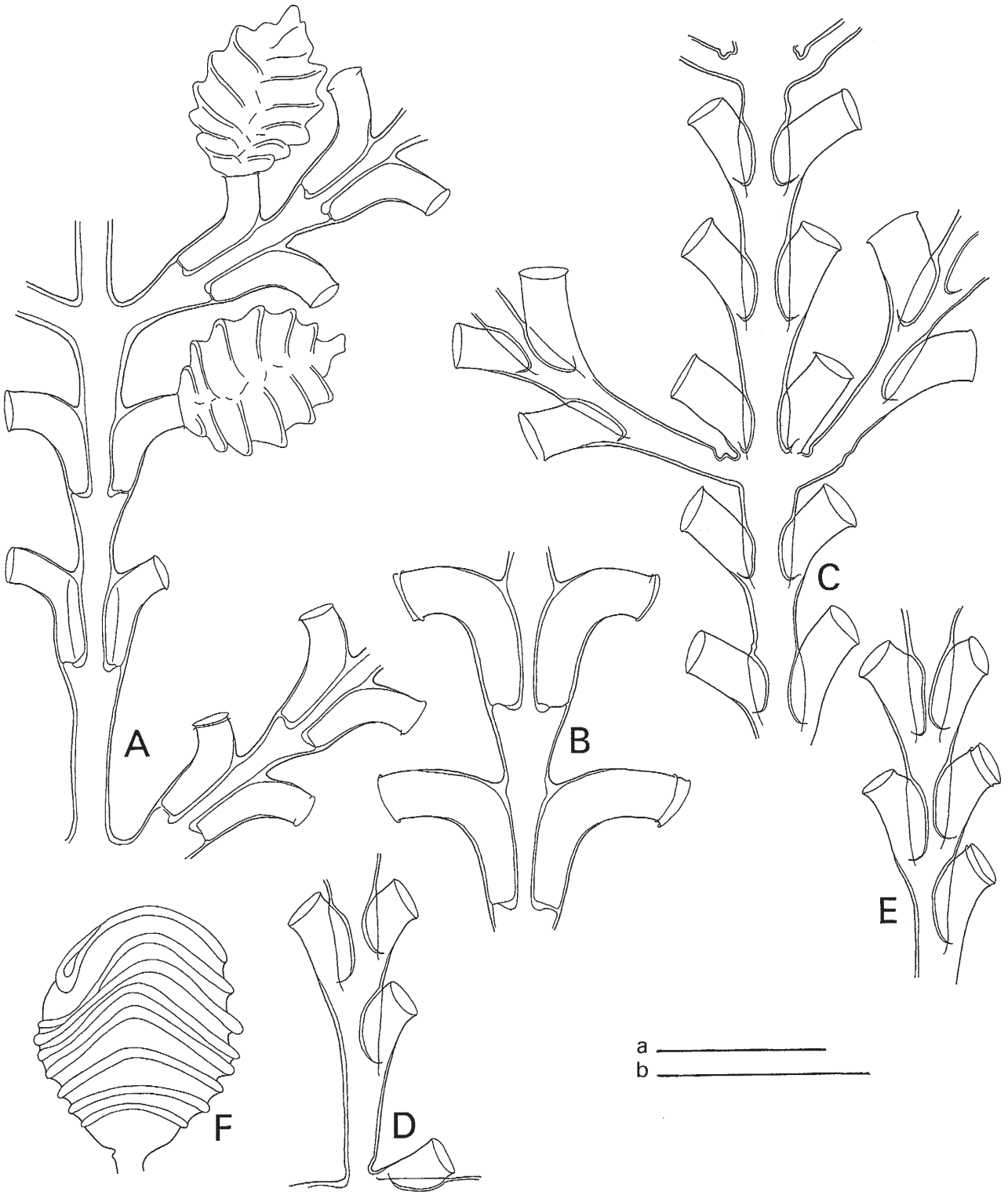

Fig. 60. A, B. ***Synthecium megathecum*** Billard, 1925. **A**, part of stem with hydrocladium and gonothecae (Loc. 572/573, slide 3959). **B**, two pairs of hydrocladial hydrothecae (Loc. 593, slide 2132). **C–F.** ***Synthecium protectum*** Jäderholm, 1903. **C**, part of stem with hydrocladia (NZOI Stn P34, slide 2225). **D**, insertion of hydrocladium and axillary hydrotheca (NZOI Stn I85, slide 2132). **E**, part of hydrocladium. **F**, gonotheca (BS 904, slide 4285). Scales: a, 1 mm (A, B); b, 2 mm (C–F). W.V.

Measurements of *Synthecium megathecum* (in μm):

Ralph's	Loc. 572/573 slide 3959	Loc. 593 slide 3981
Stolon, diameter	390 – 435	
Stem, diameter at base	410 – 585	
Distance between pairs of hydrothecae	390 – 650	
Hydrothecae of stem, length adnate adcauline wall	540 – 695	
Length free adcauline wall	360 – 460	
Overall length	870 – 975	
Diameter at rim	240 – 305	
Distance between pairs*	325 – 435	
Minimum distance between hydrothecae of a pair**	110 – 130	
Hydrothecae of hydrocladia, length adnate adcauline wall	670 – 715	735 – 780
Length free adcauline wall	545 – 605	435 – 865
Overall length	1040 – 1085	1170 – 1250
Diameter at rim	260 – 325	305 – 325
Distance between pairs*	280 – 360	
Minimum distance between hydrothecae of a pair**	110 – 130	
Gonotheca, overall length	1300 – 1365	1475 – 1490
Maximum diameter	975 – 1040	930 – 950

* measured from axil between free adcauline wall and wall of internode to base of next hydrotheca on same side

** measured in frontal or rear view as minimum distance between fused parts of adcauline walls

differences can be taken from those accounts. We have consequently applied the oldest available name to this species. *Synthecium megathecum*, however, is very close to, if not identical with *Synthecium elegans* Allman, 1872. In the former the majority of hydrothecae has a free part as long as or in length slightly exceeding the adnate part; in the latter the free part is usually shorter. Both species have hydrothecae of intermediate size and in both species the hydrothecal rim may have lateral embayments, though this is of more common occurrence in *S. elegans*. The difference in shape of the female gonothecae is slight and can largely be explained by difference in age.

Ralph's figure of this species (1958, fig. 18a) has an incorrect scale. The figure has been taken from Totton (1930, fig. 26) and is reproduced at the same magnification, the scale given by Ralph doubles its size. The measurements given in Ralph's text are correct.

The gonotheca described by Totton (1930: 174, as *Synthecium longithecum*), from a specimen from Murray Island, Torres Straits, is probably a male gonotheca as it is smooth and cylindrical, 1250 μm long with a diameter of 600 μm.

Records from New Zealand: Recorded from a large number of localities in the New Zealand region. In that area it ranges from 29.5° to 44° S, 167.5° E to 177° W, the depth records varying between 62 and 437 m depth. Gonothecae were found in January, April, and July.

Distribution: This species is widely distributed in the Indo-West Pacific, being recorded from the Zanzibar area, East Africa (Rees & Vervoort 1987), Madagascar (Gravier-Bonnet 1979), Caûda, Bay of Nha Trang, Viet-Nam (Leloup 1937b, Dawydoff 1952), the Java Sea and many localities in the the eastern part of Indonesia (Vervoort 1946a; Billard 1925b), and from Wilson Island and Heron Island, Queensland, Australia (Pennycuik 1969).

Synthecium protectum Jäderholm, 1903

(Fig.60C–F)

Synthecium protectum Jäderholm, 1903: 262, 290–291, pl. 13, figs 5–6; 1904b: 4.

Synthecium robustum Nutting, 1904: 136, pl. 41, figs 4–6; Hartlaub 1905: 673–674, fig. H[5]; Ritchie 1907a: 521, 522, 536, 537, pl. 1, fig. 6; 1909a: 67; Fraser 1943: 91; 1944a: 236, pl. 49, fig. 221; Rees & Thursfield 1965: 115; Vervoort 1968: 101; 1972: 193, figs 65, 66, 68a; Leloup 1974: 24, fig. 19; Blanco 1976: 51, pl. 6, figs 3–5, pl. 7, figs 1–3; Blanco & Lunaschi de Redolotti 1978: 73–75, figs 1–5; Stepan'yants 1979: 101, pl. 16, fig. 5A–V; Cairns *et al*. 1991: 25; El Beshbeeshy 1991: 121–126, fig. 28; Blanco 1994a: 160; 1994b: 195; Bouillon *et al.* 1995: 77; Genzano 1996b: 6; Zamponi *et al.* 1998: 12.

Synthecium chilense Hartlaub 1904: 671–673, figs E[5], F[5], G[5]; Ritchie 1907a: 538.

Material Examined:

NZOI Stns: I85, specimen about 60 mm high; no gonothecae. RMNH-Coel. slide 2132; **P34**, large, forked colony composed of 5 thick stems, 120 mm high, basally polysiphonic, and 1 separate colony 60 mm high. No gonothecae. Completely covered by *Sertularella aryei* Nutting, 1904 and its gonothecae. RMNH-Coel. slide 2225; **P946**, 5 stems 120 mm high, no hydrocladia, 1 gonotheca.

NMNZ: BS 899, stems of about 80 mm length, basally with large gonothecae. Hydrocladia largely shed; **BS 904**, 5 colonies about 80 mm high with basal part attached to bryozoans. Many large gonothecae at base of stems. NMNZ Co. 433; 2 RMNH-Coel. slides 4285.

Type Locality: *Synthecium protectum*: recorded by Jäderholm (1903) from two South American localities: Cape Valentyn, Patagonia, 274 m (figured specimen) and Bahía Inutil, Tierra del Fuego, the first is here chosen as the type locality, type in ZRS. *Synthecium robustum*: *Albatross* Stn 2776, 52°41′ S, 69°55′30″ W, 38 m, (Nutting 1904, type in NMNH, 19714). *Synthecium chilense*: Calbuco, Chile (Hartlaub 1904, location of type unknown).

MEASUREMENTS of *Synthecium protectum* (in μm):

	NZOI Stn P34 slide 2225	NMNZ BS 904 slides 4285
Stem, diameter at base		about 1000
Diameter at part bearing side branches	435 – 590	475 – 695
Distance between pairs of side branches	4340 – 4775	3900 – 6295
Distance between pairs of hydrothecae*	870 – 975	450 – 760
Minimum distance between hydrothecae on stem**	175 – 325	110 – 195
Hydrothecae, length adnate adcauline wall	735 – 870	760 – 910
Length free adcauline wall	435 – 605	175 – 305
Overall length	975 – 1085	865 – 935
Diameter at rim	435 – 540	370 – 500
Distance between pairs*	760 – 890	435 – 865
Minimum distance between hydrothecae of a pair**	110 – 150	110 – 175
Gonotheca, overall length		2820
Maximum diameter		2385

* = measured from axil between free adcauline wall and wall of internode to base of next hydrotheca on same side

** = measured in frontal or rear view as minimum distance between fused parts of adcauline walls

REMARKS: Detailed descriptions of this species are given by Jäderholm (1903), Vervoort (1972, as *S. robustum*) and El Beshbeeshy (1991, as *Synthecium robustum*), it is not necessary, therefore to describe the New Zealand material in detail. El Beshbeeshy points to the fact that in full grown colonies, length between 50 and 80 mm, the hydrothecae on the basal part of the stem have almost completely disappeared; such stems are thick, about 1 mm in diameter but still monosiphonic; polysiphony can be brought about by fusion of stems of individual colonies. Development of nodes in the stems is quite irregular; they are in our material confined to older parts of the stems and also occur in some of the older side branches (hydrocladia), where one or two basal internodes demarcated by transverse nodes, may be present. Differences in the length of the free portion of the hydrothecae are quite noticeable: that part is quite short in the material from NMNZ BS 904 (fig. 60E), intermediate in that from NZOI Stn I85 (fig. 60D) and quite long in NZOI Stn P34 (fig. 60C). The proximal part of the adcauline wall of the hydrotheca is sunken into the internode, the perisarc of the internodal wall folding over the basal portion of each hydrotheca. That perisarc is quite strong and thick on stem and branches, but thins out rapidly along the hydrothecal walls, the hydrothecae being easily collapsible. Remnants of hydranths are present in all the material; those in BS 904 being preserved to the extent that the presence of an abcauline caecum could be observed.

Gonothecae from the colonies from BS 904 have been studied in more detail. They occur on the lowest part of the stem, springing from (damaged) hydrothecae by means of a short pedicel and are male. The gonothecae are slightly depressed in a plane perpendicular to that of branching and are broadly oval when seen from their broad side. There are 8 or 9 strong, rounded ribs, circular in the basal part of the gonotheca, but strongly undulated on the upper half, the last rib forming a broad 'mouth', the depression inside holds in its centre the gonothecal aperture placed on a minor elevation. In appearance these gonothecae resemble those described earlier (Vervoort, 1972: 196–197, fig. 68a) but those from PS 904 are probably more mature.

The synonymy of *Synthecium robustum* Nutting, 1904 and *Synthecium chilense* Hartlaub, 1905, has been discussed by Vervoort (1972: 197–198); attention is drawn to the fact that Nutting's material of this species was dried: his figure of the gonotheca (pl. 41, fig. 4) being largely based on reconstruction. El Beshbeeshy (1991: 126) included Jäderholm's *Synthecium protectum* in the synonymy of *Synthecium robustum*, but without applying the oldest available name (*Synthecium protectum* Jäderholm, 1903) to the species. We concur with the fact that the three species are conspecific.

RECORDS FROM NEW ZEALAND: The present colonies originate from the Norfolk Island region and from the area to the north of Three Kings Islands (Middlesex and King Banks); they are from moderately deep water (128–370 m). A doubtful colony comes from the South Fiji Ridge, 660 m depth. Gonothecae were found in January, February, and June.

DISTRIBUTION: *Synthecium protectum* has its chief distribution in waters bordering the southern part of South America, the region including the type localities of *S. protectum*, *S. robustum* and *S. chilense* (Vervoort 1972; El Beshbeeshy 1991). Additional records are from the Caribbean region (Fraser 1943, 1944a); those records may need confirmation as no additional material from that area has been recorded.

Synthecium subventricosum Bale, 1914

(Fig. 61A–H)

Synthecium subventricosum Bale 1914a: 5, pl. 1, figs 3–5; Stranks 1993: 19–20.

Synthecium elegans var. *subventricosum*: Ralph 1958: 347–349, fig. 16a-h; Watson 1973: 167, figs 15–16.

Synthecium elegans p.p. Blackburn 1942: 111.

MATERIAL EXAMINED:

NZOI Stns: A431, fragments from a dried out sample (J.E. Watson); **A444B**, fragments from large, dried sample (J.E. Watson); **A721**, several fragmented colonies found between bryozoans, no gonothecae. Dead specimens in poor condition. 2 RMNH-Coel. slides 2721; **A733**, 2 colonies, about 25 and 50 mm long, no gonothecae. RMNH-Coel. slide 2725; **A734**, 1 colony 15 mm high, no gonothecae; **A746**, single small colony about 15 mm high; **A749**, 2 small colonies, 18 and 12 mm high, no gonothecae. RMNH-Coel. slide 2715; **B233**, some tangled colonies growing on shell fragments, 20 mm high, no gonothecae; **B660**, doubtful specimen that may belong here; **C617**, 3 colonies up to 20 mm high, strongly intertwined, with a few female gonothecae; dirty sample. RMNH-Coel. slide 2803; **C763**, 3 small, 8 mm high stems, no gonothecae; **D876**, small colonies about 12 mm high on bryozoans, no gonothecae. RMNH-Coel. slide 2286; **E108**, gear DCMB, several colonies on bryozoans, 25 mm high, no gonothecae; **E312**, several small, 5–15 mm high fragments found between other hydroids in this large sample. Hydrothecae with fairly distinct proximal swelling, although variable in development. Some hydrothecal apertures slightly asymmetrical. Partly grown with *Lafoea dumosa* (Fleming, 1820). RMNH-Coel. slides 2127 and 5357; **I72**, isolated, small colonies 10–15 mm high, with *Hebellopsis scandens* (Bale, 1888), with gonotheca. Male specimen, contains several sac-shaped, empty gonothecae, very thin walled. RMNH-Coel. slide 2128; **I75**, large sample of this species with *Hebellopsis scandens* (Bale, 1888) and *Orthopyxis affabilis* sp. nov.; no gonothecae. RMNH-Coel. slide 2095; **P7**, 2 colonies 20 and 35 mm high on stem of *Lytocarpia* sp. Colonies with distinct, erect, well developed though thin main stem. Larger colony with female gonothecae, RMNH-Coel. slide 2221; **Q174**, numerous colonies up to 30 mm long on base of *Aglaophenia laxa* Allman, 1876. Gonothecae present. Hydrothecae in this sample with several renovations and as a result slightly longer than usually observed. Dirty sample. 2 RMNH-Coel. slides 2912.

NMNZ: Off **Green Island**, Otago, 30.Jan.1955, 2 small colonies or fragments, 5–8 mm high. No gonothecae. NMNZ Co. 623; **BS 512**, 2 isolated colonies about 15 mm high, no gonothecae. NMNZ Co. 854; **BS 834**, several about 8 mm high colonies on bryozoans, with *Monotheca togata* Watson, 1973. NMNZ Co. 753, RMNH-Coel. 27692, slide 3392; **BS 886**, 2 small colonies on stem of *Lytocarpia* (?) *rigida* sp. nov., with *Filellum serratum* (Clarke, 1879). NMNZ Co. 522, 2 RMNH-Coel. slides 3640 and 2 slides 4280; **BS 899**, single 20 mm high stem on old hydroid stem. RMNH-Coel. 27687, slide 3387.

NMNZ Ralph Collection: Loc. 153, NMNZ Co. 1012, fragments of a larger colony. RMNH-Coel. slide 3676. Tube also contains fragments of *Symplectoscyphus j. johnstoni* (Gray, 1843) and *Salacia bicalycula* (Coughtrey, 1876) (not given separate NMNZ Co. numbers); **Loc. 419**, NMNZ Co. 1204, 1 colony about 35 mm high with many gonothecae, and a few fragments, also with gonothecae. Set with *Filellum serpens* (Hassall, 1848). RMNH-Coel. slide 3887. Partly dried out slide in RSC as *Synthecium elegans* var. *subventricosum* Busk, no data. Stained Canada Balsam slide as *Synthecium elegans* Busk var. *subventricosum*, no data. 2 partly dried out slides as *Synthecium elegans* Busk, no data; **Loc. 479**, NMNZ Co. 1228, sample consists of tangled colonies of this species with *Hebellopsis scandens* (Bale, 1888)] and *Synthecium elegans* Allman, 1872; both without gonothecae. RMNH-Coel. slide 3905; **Loc. 520**, NMNZ Co. 1253, tangled colonies about 15 mm high, no gonothecae. RMNH slide 3929.

TYPE LOCALITY: Great Australian Bight, 73-183 m (Bale, 1914a; syntypes in MOV (6 slides, MV F58653 and F58654, Stranks, 1993).

MEASUREMENTS of *Synthecium subventricosum* (in μm):

	Ralph Loc. 520 slide 3929	NZOI Stn I72 slide 2128	NZOI Stn P7 slide 2221
Stolon, diameter	305 – 345		475 – 500
Stem, diameter at base	195 – 280		455 – 500
Diameter at part bearing side branches	175 – 260		435 – 500
Distance between pairs of side branches	2710 – 2820		2820 – 2925
Distance between pairs of hydrothecae*	435 – 500		single pair
Minimum distance between hydrothecae on stem	50 – 60		0 – 175
Hydrotheca, length adnate adcauline wall	370 – 390		435 – 505
Length free adcauline wall	175 – 280		195 – 260
Overall length	585 – 630		650 – 695
Diameter at rim	175 – 195		210 – 250
Distance between pairs	345 – 410		605 – 715
Minimum distance between hydrothecae of a pair**	65 – 110		35 – 65
Female gonotheca, overall length			1300 – 1400
Maximum diameter			985 – 1100
Male gonotheca, overall length		1520 – 1950	
Maximum diameter		650 – 760	

* measured from axil between free adcauline wall and wall of internode to base of next hydrotheca on same side

** measured in frontal or rear view as minimum distance between fused parts of adcauline walls

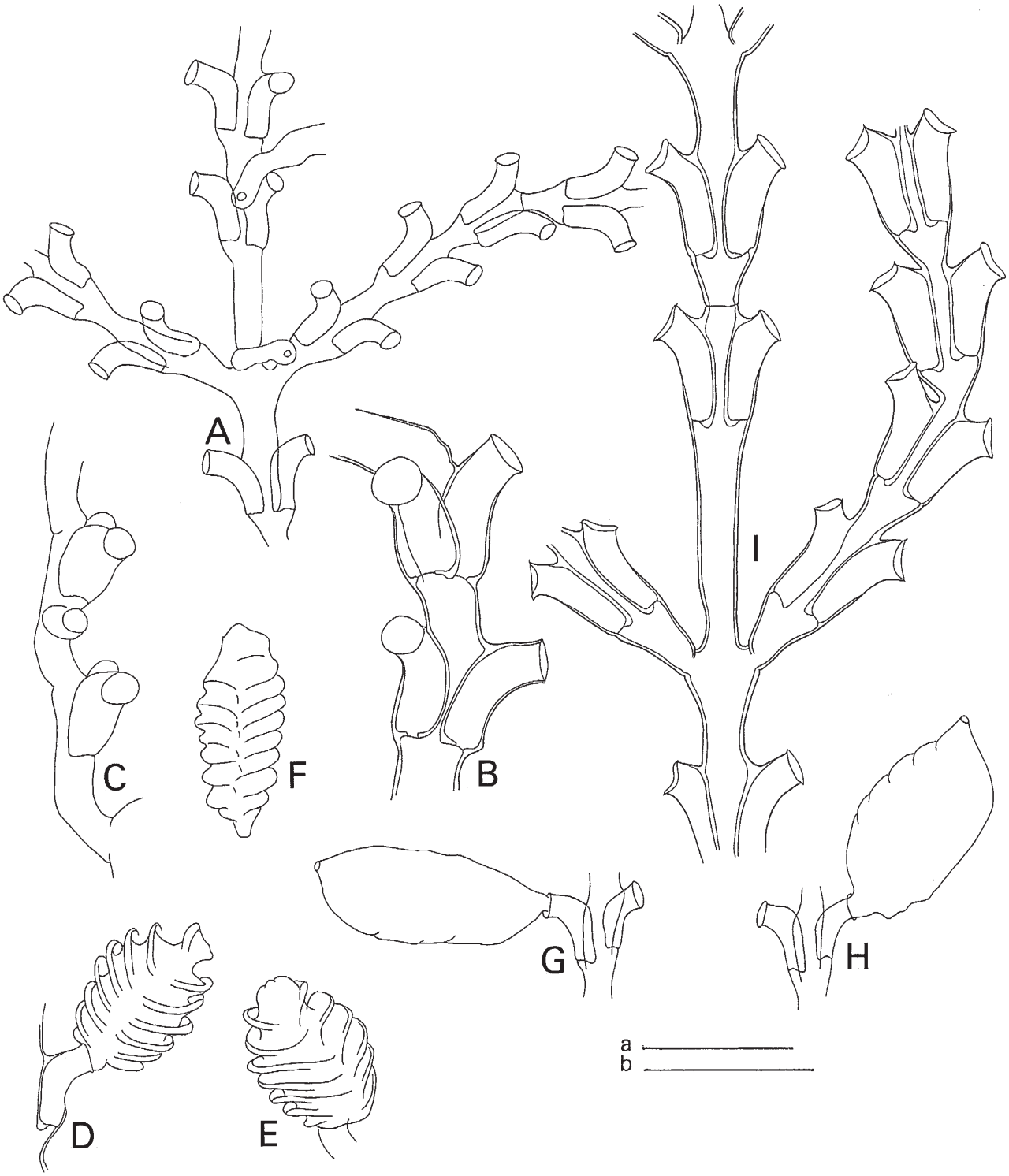

Fig. 61. A–H. ***Synthecium subventriculosum*** Bale, 1914. **A**, part of stem with hydrocladia. **B**, hydrothecae developing on stolonal tendril, oblique frontal view (Loc. 520, slide 3929). **C**, hydrothecae developing on stolonal tendril, lateral view. **D, E**, female gonothecae, frontal view. **F**, female gonotheca, seen from back (NZOI Stn 7, slide 2221). **G, H**, mature male gonothecae, lateral view (NZOI Stn I72, slide 2128). **I**. ***Synthecium tottoni*** Ralph, 1958, part of stem with hydrocladia (Additional material, Bauza Island, slide 4035). Scales: a, 1 mm (B); b, 1 mm (A, C–I). W.V.

REMARKS: The material brought to this species agrees with Ralph's account of *Synthecium elegans* forma *subventricosa*, though occasionally slightly superior in size of the hydrothecae. Development of a true stem is rare in this species, usually the colonies are straggly with a strong tendency towards the formation of stolonal tendrils that develop short, secondary stems. Such stolonal tubes may develop at the end of the hydrocladia but may also issue from an internode directly under a pair of hydrothecae. The hydrothecae developing on those stolonal tubes are frontally placed and usually slightly bigger than those normally developing on the hydrocladia while the internodes are curved. The hydrothecae in this species are tubular, retaining the same diameter along their whole length; the curvature of the free apical part is gentle; length of the free part usually less than that of the fused basal part. The hydrothecal aperture may have one or two renovations and its plane is parallel to the hydrocladial axis or long axis of stem; the rim is perfectly circular. The perisarc of the hydrotheca forms a small, rounded thickening abcaudally; the hydropore (diaphragm) is on the adcauline side of the hydrothecal bottom.

Both female and male gonothecae have been observed, occurring on separate colonies; the size of the female colony is slightly superior to that of the male. The female gonothecae are ovoid, distinctly compressed in a plane perpendicular to that of the plane of ramification and have thick, strong perisarc; they contain a single large egg or planula. There are 7 or 8, rarely up to 10, more or less circular ribs, meeting in a zigzag line on frontal and dorsal side of the gonotheca; the broad ribs have a distinct upward curved flange. The gonothecae spring with a short, almost invisible pedicel from hydrothecae of stem and hydrocladia; their aperture is at the top on a small prominence. Male gonothecae were only observed on the colonies from NZOI Stn I72; they are bigger than the female ones. Their general outline is elongated ovoid to sac-shaped with undulating or weakly ribbed walls; the perisarc (in the empty gonotheca) is quite thin.

Our reasons for considering this a species separate from *Synthecium elegans* Allman, 1872 (and not a forma as proposed by Ralph, 1958) are the consistently smaller size of this species, that only quite occasionally forms erect stems; the strong tendency to form tendrils and anastomoses, and the perfectly circular shape of the hydrothecal rim. The female gonothecae have ribs with a quite distinct flange; this character, however, may depend upon the age of the gonotheca.

DISTRIBUTION: This species is widely distributed around New Zealand, the area covering the seas between 29° S and 49.5° S, 167.5° E and 175.5° W, depth records lie between 37 and 302 m.

Synthecium tottoni Ralph, 1958 (Fig.61I)

Synthecium robustum Totton 1930, 173–174, fig. 25a-d (not *Synthecium robustum* Nutting, 1904).
Synthecium tottoni Ralph 1958: 352–353, fig. 25d.

ADDITIONAL MATERIAL:

Bauza Island, Doubtful Sound, 20 m, 04.April.1994 (J.E. Watson). 4 colonies and some fragments, varying in height between 20 and 45 mm. Some gonothecae present. Specimen covered with *Orthopyxis mollis* (Stechow, 1919). RMNH-Coel. 27855, slide 4035.

TYPE LOCALITY: *Terra Nova* Stn 134, Spirits Bay, off North Cape, New Zealand, 20–36.5 m. Holotype in NHM, 29.10.10.5.

DESCRIPTION (of Bauza Island specimens): Colonies with erect stem between 20 and 45 mm high, monosiphonic, springing from some thin stolonal filaments, indistinctly divided into internodes. Pairs of side branches (hydrocladia) spring from the stem, directed obliquely upwards and laterally, all in 1 plane with main stem; apophyses weakly developed, separated by 1 or 2 (the usual condition) pairs of hydrothecae; part of stem between insertion of hydrocladia and first pair of hydrothecae elongated. Oblique node between pairs of hydrothecae occasionally present

Hydrothecae of stem and hydrocladia set in opposite pairs, similar, tubiform, basal three-quarters partly immersed into internode; distal quarter directed laterally and obliquely upwards; angle between free part adcauline wall and internode about 45°. Hydrotheca not widening apically; plane of aperture set at an angle of about 40° with internodal axis, occasionally laterally deepened; hydrothecal rim slightly though distinctly everted. Hydrothecal floor with rounded adcauline perisarc thickening; hydropore (diaphragm) at the abcauline side, fairly narrow. Hydrocladia occasionally with oblique node between pairs of hydrothecae.

Perisarc firm on stem and hydrocladia, rapidly thinning out along the hydrothecal walls. Hydranths in this material are deteriorated.

Two (female) gonothecae occur on one of the fragments; they are, however, in bad state and unsuitable for drawing. Each gonotheca a flattened, oval structure, flattened in a plane perpendicular to that of branching. There are about 10 more or less circular ribs with a broad, internally curved flange.

REMARKS: This is the only specimen in the collection answering Totton's description of *Synthecium robustum* [= *Synthecium tottoni* Ralph, 1958] because the length of the free part of the adcauline hydrothecal wall is

MEASUREMENTS of *Synthecium tottoni* (in μm):

	Doubtful Sound slide 4035	*Terra Nova* Stn 134 (Totton 1930)
Stem, diameter at base	390	
Stem hydrothecae, length		
adnate adcauline wall	715 – 780	
Length free adcauline wall	110 – 195	
Overall length	845 – 890	
Diameter at rim	260 – 280	
Distance between pairs of hydrothecae*	345 – 410	
Minimum distance between hydrothecae of a pair**	85 – 110	
Hydrocladial hydrotheca, length		
adnate adcauline wall	735 – 880	820 – 920
Length free adcauline wall	130 – 280	250 – 300
Overall length	890 – 935	
Diameter at rim	280 – 305	250 – 260
Distance between pairs of hydrothecae*	370 – 410	
Minimum distance between hydrothecae of a pair	65 – 110	
Gonotheca, overall length***	1250 – 1260	1450 – 2000
Diameter in lateral view	370 – 520	700 – 800

* measured from axil between free adcauline wall and wall of internode to base of next hydrotheca on same side

** measured in frontal or rear view as minimum distance between fused parts of adcauline walls

*** deformed by pressure of cover glass

short compared to the length of the adnate part of that wall. The gonothecae of the Doubtful Sound specimen answer Totton's description (1930: 174) — "Gonothecae ovoid, compressed at right angles to plane of branching, with from eleven to twelve thickened folds, upturned at the free edge, and apical aperture". Unfortunately the gonothecae are not optimally preserved.

The hydrothecal rim, in our specimen, is more distinctly everted than seems to have been the case in Totton's specimens.

This species only differs from *Synthecium elegans* Allman, 1872, by the generally reduced length of the free portion of the hydrothecae. Otherwise characteristic representatives of the latter may have (some) hydrothecae considered diagnostic for *S. tottoni*, as may occur also for hydrothecae diagnostic for *S. megathecum* Billard, 1925a. The possibility that *S. elegans*, plentifully represented in our collections, shows an even greater amount of variability then demonstrated here, with *Synthecium megathecum* and *S. tottoni* representing extreme forms at both ends of the range, cannot altogether be neglected.

RECORDS FROM NEW ZEALAND: This is the second record of this rare species from a locality much farther south than the type locality (Bauza Island, Doubtful Sound, South Island, 20 m depth). Gonothecae were observed in April. Colonies on two slides from J.E. Watson's collection with the following labels:

'New Zealand, Tricky Cove, Doubtful Sound, 20 m, on rock, 02.04.1994' (slide 4260) and

'New Zealand, Tricky Cove, Doubtful Sound, 12 m, yellow, 01.04.1994' (slide 4292)

cannot be separated from that described above as *Synthecium tottoni* and that is based on a much smaller sample with only a few gonothecae. In this additional material the shape of the hydrothecae varies between that here described for *S. tottoni* and *S. elegans*. The gonothecae, that are in better position in the additional slides, seem to differ from those of *S. elegans* as described here by the larger number of ribs and their compressed structure.

Superfamily PLUMULARIOIDEA Hincks, 1868

Family **AGLAOPHENIIDAE** L. Agassiz, 1862
Aglaophenia Lamouroux, 1816
[= *Corbulifera* Naumov, 1960]

TYPE SPECIES: *Sertularia pluma* Linnaeus, 1758 (subsequent designation by Apstein 1915: 126).

The following species of this genus have been considered: * indicates the present allocation.

Aglaophenia acacia Allman, 1883. Corbula described by Svoboda (1979).

Aglaophenia acacia elegans Milstein, 1976. Corbula described by Millstein (1976).

Aglaophenia acanthocarpa Allman, 1876a [= *Aglaophenia divaricata* var. *acanthocarpa* Allman, 1876a]. Corbula described by Ralph (1961b).

Aglaophenia acanthostoma Trebilcock, 1928 [lapsus for *Aglaophenia acanthocarpa* Allman, 1876]

Aglaophenia acutidentata Allman, 1885 [= *?Aglaophenia pluma* (Linnaeus, 1758)]

Aglaophenia adriatica Babic, 1911 [= **Aglaophenia octodonta* (Heller, 1868)]

Aglaophenia allmani Nutting, 1900 [= *Aglaophenia ramosa* Allman, 1877, not *Aglaophenia ramosa* (Busk, 1852)]. Corbula unknown?

Aglaophenia alopecurus Kirchenpauer, 1872 [= ?*Aglaophenia divaricata* (Busk, 1852)] (doubtful species, see Millard (1975: 415)).

Aglaophenia amathioides Lamouroux, 1816 [= **Hydrallmania falcata* (Linnaeus, 1758)]

Aglaophenia amoyensis Hargitt, 1927. Corbula described by Hargitt (1927).

Aglaophenia antarctica Jäderholm, 1903. Corbula unknown.

Aglaophenia aperta Nutting, 1900. Corbula described by Nutting (1900).

Aglaophenia apocarpa Allman, 1877 [= **Aglaophenia lophocarpa* Allman, 1877; *Aglaophenia elegans* Nutting, 1900]. Corbula described by Svoboda (1979).

Aglaophenia arborea Verrill, 1879 [= **Aglaophenia struthionides* (Murray, 1860)]. Corbula described by Nutting (1900).

Aglaophenia armata Bale, 1914c [= **Lytocarpia armata* (Bale, 1914c)]. Shape of hydrotheca near *Aglaophenia acanthocarpa* Allman, 1876a.

Aglaophenia ascidioides Bale, 1882 [= **Gymnangium ascidioides* (Bale, 1882)]

Aglaophenia attenuata Allman, 1883. Doubtful species resembling both *Lytocarpia brevirostris* (Busk, 1852) and *Aglaophenia tubulifera* (Hincks, 1861), see Millard (1975: 415); no type available.

Aglaophenia avicularis Kirchenpauer, 1872 [= **Halicornopsis elegans* (Lamarck, 1816)]

Aglaophenia bakeri Bale, 1919. Corbula described by Bale (1919).

Aglaophenia balei Marktanner-Turneretscher, 1890 [= **Gymnangium balei* (Marktanner-Turneterscher, 1890)]

Aglaophenia banskii Gray, 1843 [= *Monoserius banksii* (Gray, 1843); *?Monoserius pennarius* (Linnaeus, 1758)]

Aglaophenia bellis Thornely, 1900 [= **Aglaophenia cupressina* Lamouroux, 1816]

Aglaophenia bicornuta Nutting, 1900. Corbula unknown.

Aglaophenia bifida Stechow, 1923 [= **Aglaophenia parvula* Bale, 1882]

Aglaophenia billardi Bale, 1914a. Corbula described by Bale (1914).

Aglaophenia bilobidentata Stechow, 1907. Corbula unknown.

Aglaophenia brachiata (Lamarck, 1816) [= **Lytocarpia brachiata* (Lamarck, 1816)]

Aglaophenia brevicaulus Kirchenpauer, 1872. Corbula unknown.

Aglaophenia brevirostris Busk, 1852 [= **Lytocarpia brevirostris* (Busk, 1852)]

Aglaophenia bullata (Fleming, 1826). According to Bedot (1921a) an unidentifiable species.

Aglaophenia calamus Allman, 1883 [= **Aglaophenia pluma* (Linnaeus, 1758)]

Aglaophenia calycifera Bale, 1914c [= **Lytocarpia calycifera* Bale, 1914c]

Aglaophenia carinata Bale, 1894 [= **Lytocarpia brachiata* (Lamarck, 1816), *Lytocarpia carinata* (Bale, 1894)]

Aglaophenia carinifera Bale, 1914c. Gonosome unknown.

Aglaophenia chalarocarpa Allman, 1886 [= **Aglaophenia pluma* (Linnaeus, 1758)]

Aglaophenia coarctata Allman, 1883. Gonosome unknown.

Aglaophenia compressa Bonnevie, 1899 [= **Cladocarpus bonneviae* (Jäderholm, 1909)]

Aglaophenia conferta Kirchenpauer, 1872 [= ?*Aglaophenia parvula* Bale, 1882]

Aglaophenia constricta Allman, 1877 [= **Gymnangium constrictum* (Allman, 1877)]

Aglaophenia contorta Nutting, 1900 [= *Lytocarpia contorta* (Nutting, 1900), **Lytocarpia tridentata* (Versluys, 1899)]

Aglaophenia crispata Kirchenpauer, 1872 [= **Lytocarpia crispata* (Kirchenpauer, 1862)]

Aglaophenia cristifrons Nutting, 1900 [= **Lytocarpia cristifrons* (Nutting, 1900)]

Aglaophenia crucialis Lamouroux, 1816 [= *Aglaophenia macrocarpa* Bale, 1888]. Corbula described by Bale (1888), as *A. macrocarpa.*

Aglaophenia ctenata (Totton, 1930) [= *Lytocarpia ctenata* Totton, 1930]. Corbula described by Totton (1930).

Aglaophenia cubiformis Rioja y Martín, 1906 [probably lapsus for *Aglaophenia tubiformis* Marktanner-Turneretscher, 1890]

Aglaophenia cupressina Lamouroux, 1816 [= *Plumularia bipinnata* Lamarck, 1816; *Aglaophenia bellis* Thornely, 1900; *Aglaophenia macgillivrayi* (Busk, 1852); *Corbulifera macgillivrayi* (Busk, 1852)]; *Aglaophenia curvidens* Fraser, 1937.] Corbula described by Billard (1913) and Bale (1915).

Aglaophenia cylindrata Versluys, 1899 [= *Aglaophenia rhynchocarpa* Allman, 1877]. Corbula described by Jäderholm (1903), as *A. cylindrata*.

Aglaophenia dannevigi Bale, 1914a. Corbula described but not figured by Bale (1914a).

Aglaophenia decumbens Bale, 1914a. Gonosome unknown.

Aglaophenia delicatula (Busk, 1852) [= **Lytocarpia delicatula* (Busk, 1852)]

Aglaophenia dentata Billard, 1913. See Watson (1992), probably lapsus for *Aglaophenia postdentata* Billard, 1913.

Aglaophenia dichotoma Kirchenpauer, 1872. Composite species including, among others, *Aglaophenia pluma* (Linnaeus, 1758).

Aglaophenia dichotoma var. *magna* Billard, 1931d. Questionable variety.

Aglaophenia diegensis Torrey, 1902. Has been considered a synonym of *Aglaophenia pluma*; however, *A. diegensis* is a Pacific species. Corbula described by Fraser (1937).

Aglaophenia disjuncta Pictet, 1893 [= **Macrorhynchia phoenicea* (Busk, 1852)].

Aglaophenia dispar Fraser, 1948. Corbula described and figured by Fraser (1948).

Aglaophenia divaricata (Busk, 1852) [= *Lytocarpia divaricata* (Busk, 1852]. Corbula described by Bale (1915).

Aglaophenia divaricata var. *briggsi* Bale, 1926 [= *Lytocarpia divaricata* var. *briggsi* (Bale, 1926)] . Corbula described by Hodgson (1950).

Aglaophenia divaricata var. *cystifera* Bale, 1915 [= *Lytocarpia divaricata* var. *cystifera* (Bale, 1915)]

Aglaophenia divaricata var. *mccoyi* Bale, 1882 [= *Lytocarpia divaricata* var. *mccoyi* (Bale, 1882)]

Aglaophenia diversidentata Fraser, 1948. Corbula described and figured by Fraser (1948).

Aglaophenia dolichocarpa Allman, 1886. Corbula described and figured by Allman; not recorded since Allman's description.

Aglaophenia dromaius Allman, 1873a. Corbula described and figured by Allman (1873a).

Aglaophenia dubia Nutting, 1900 [= *Aglaophenia gracilis* Allman, 1877]. Species with unknown gonosome.

Aglaophenia elegans Lamouroux, 1816. Unidentifiable species according to Bedot (1921a).

Aglaophenia elegans Nutting, 1900 [= **Aglaophenia lophocarpa* Allman, 1877]

Aglaophenia elongata Meneghini, 1845 [= ?*Aglaophenia flowersi* Nutting, 1900]. Corbula described by Svoboda (1979), and Svoboda and Cornelius (1991).

Aglaophenia elongata var. *flexilis* Billard, 1913. Corbula unknown.

Aglaophenia elongata var. *sibogae* Billard, 1913. Corbula unknown.

Aglaophenia elongata Allman, 1873 [= **Aglaophenia longa* Stechow, 1923d]

Aglaophenia epizoica Fraser, 1948. Corbula described and figured by Fraser (1948).

Aglaophenia filamentosa (Lamarck, 1816) [= **Macrorhynchia filamentosa* (Lamarck, 1816)]

Aglaophenia filicina (Pallas, 1766) . According to Bedot (1921a) an unidentifiable species.

Aglaophenia filicula Allman, 1883 [= **Aglaophenia tubulifera* (Hincks, 1861)]. Corbula described and figured by Allman (1883).

Aglaophenia filicula Hilgendorf, 1898. According to Bale (1924) an unidentifiable species.

Aglaophenia fimbriata (Lamarck, 1816) [= *Plumularia fimbriata* Lamarck, 1816]. According to Bedot (1921a) an unidentifiable species).

Aglaophenia flexuosa Lamouroux, 1816 [= **Lytocarpia flexuosa* (Lamouroux, 1816)]

Aglaophenia flowersi Nutting, 1900 [= ?*Aglaophenia elongata* Meneghini, 1845]

Aglaophenia fluxa Fraser, 1948. Corbula described and figured by Fraser (1948).

Aglaophenia folini Gourret, 1906 [= **Cladocarpus sigma* (Allman, 1877)]

Aglaophenia formosa (Busk, 1852) [= **Lytocarpia formosa* (Busk, 1852)]

Aglaophenia formosa Bonnevie, 1898 [= **Cladocarpus dubius* Broch, 1910]

Aglaophenia frutescens Lamouroux, 1816 [= **Schizotricha frutescens* (Ellis & Solander, 1786)]

Aglaophenia fusca Kirchenpauer, 1872 [= **Macrorhynchia filamentosa* (Lamarck, 1816)]

Aglaophenia (?) galatheae Kramp, 1956 Corbula unknown.

Aglaophenia glutinosa Lamouroux, 1816. According to Bedot (1921a) an unidentifiable species.

Aglaophenia gracilis Lamouroux, 1816. According to Bedot (1921a) an unidentifiable species.

Aglaophenia gracilis Allman, 1877 [= **Aglaophenia dubia* Nutting, 1900]. Corbula unknown.

Aglaophenia gracillima Fewkes, 1881. Corbula described and figured by Fraser (1944).

Aglaophenia gracillima Borradaile, 1905 [= **Aglaophenia tenuinoda* Stechow, 1919]. Species with unknown gonosome; also considered a variety or forma of *Aglaophenia pluma* (Linnaeus, 1758) which, considering its occurrence in a tropical lagoon, seems unlikely.

Aglaophenia graeffii Kirchenpauer, 1876 [= **Macrorhynchia graeffei* (Kirchenpauer, 1876)]

Aglaophenia harpago von Schenck, 1965. Corbula figured and described by Svoboda (1979).

Aglaophenia helleri Marktanner-Turneretscher, 1890 [= **Aglaophenia octodonta* (Heller, 1868)]

Aglaophenia heterocarpa Bale, 1882 [= **Lytocarpia brevirostris* (Busk, 1852)]

Aglaophenia heterodonta Jäderholm, 1903 [= **Aglaophenia parvula* Bale, 1882]. Corbula described by Jäderholm (1903), as *A. heterodonta*.

Aglaophenia hians (Busk, 1852) [= **Gymnangium hians* (Busk, 1852)]

Aglaophenia holubi Leloup, 1934. This species, according to Millard (1975), is beyond recognition; the corbula, described and figured by Leloup, is too much eroded to be of any use. The holotype is still in ISRN.

Aglaophenia howensis Briggs, 1918. Corbula described though not figured by Briggs (1918)

Aglaophenia huttoni (Coughtrey, 1875). According to Bedot (1921a) an unidentifiable species, but according to Ralph (1961: 52) *Halicornopsis elegans* (Lamarck, 1816).

Aglaophenia huttoni Kirchenpauer, 1876 [= *Aglaophenia zelandica* Stechow, 1921d; **Gymnangium longirostre* (Kirchenpauer, 1872)]. According to Bedot (1921a) an unidentifiable species, but according to Ralph (1961b: 54) *Gymnangium longirostre* (Kirchenpauer, 1872).

Aglaophenia huxleyi (Busk, 1852) [= **Lytocarpia huxleyi* (Busk, 1852)]

?*Aglaophenia hypnoides* (Pallas, 1766). According to Bedot (1921a) an unidentifiable species.

Aglaophenia ijimai Stechow, 1907 [= **Aglaophenia suensoni* Jäderholm, 1896]

Aglaophenia ilicistoma Bale, 1882 [= **Gymnangium ilicistomum* (Bale, 1882)]

Aglaophenia incisa Coughtrey, 1875 [= **Lytocarpia incisa* (Coughtrey, 1875)]

Aglaophenia inconspicua Torrey, 1902. Corbula described by Torrey (1902) and Fraser (1937).

Aglaophenia inconstans Fraser, 1941. Corbula unknown.

Aglaophenia indica Stechow, 1921f [= *Halicornaria plumosa* (Armstrong, 1879]. Doubtful species with unknown gonosome.

Aglaophenia insignis Fewkes, 1881. Corbula described and figured by Nutting (1900).

Aglaophenia insolens Fraser, 1943. Gonosome unknown.

Aglaophenia integra G.O. Sars, 1874 [= **Cladocarpus integer* (G.O. Sars, 1874]

Aglaophenia integriseptata Fraser, 1948. Corbula described and figured by Fraser (1948).

Aglaophenia kirchenpaueri (Heller, 1868) [= *Aglaophenia septata* Broch, 1912]. Corbula described and figured by Svoboda (1979), Svoboda & Cornelius (1991) and Cornelius (1995).

Aglaophenia latecarinata Allman, 1877 [= *Aglaophenia minuta* Fewkes, 1881; ?*Aglaophenia pelagica* Lamouroux, 1816]. Corbula figured by Hirohito (1995).

Aglaophenia latecarinata var. *madagascariensis* Billard, 1907. Corbula unknown; *Aglaophenia lateseptata* Fraser, 1948. Corbula described and figured by Fraser (1948).

Aglaophenia latirostris Nutting, 1900. Corbula described and figured by Nutting (1900) and Fraser (1938).

Aglaophenia laxa Allman, 1876a. Corbula described and partly figured by Ralph (1961b).

Aglaophenia laxa var. I Stechow, 1909

Aglaophenia laxa var. II Stechow, 1909

Aglaophenia lendenfeldi Bale, 1887 [= *Aglaophenia kirchenpaueri* von Lendenfeld, 1885a]

Aglaophenia lignosa Kirchenpauer, 1872 [= **Cladocarpus lignosus* (Kirchenpauer, 1872)]

Aglaophenia ligutala Kirchenpauer, 1872 [= **Macrorhynchia filamentosa* (Lamarck, 1816)]

Aglaophenia longa Stechow, 1923d [= *Aglaophenia elongata* Allman, 1873]

Aglaophenia longicarpa Fraser, 1938. Corbula described and figured by Fraser (1938b).

Aglaophenia longicornis (Busk, 1852) [= **Gymnangium longicorne* (Busk, 1852), *Gymnangium intermedium* (Billard, 1913)]

Aglaophenia longiramosa Fraser, 1945 [= **Macrorhynchia allmani* (Nutting, 1900)]

Aglaophenia lophocarpa Allman, 1883 [= *Aglaophenia apocarpa* Allman, 1883, *Aglaophenia elegans* Nutting, 1900]. Corbula described by Allman (1883), Svoboda (1979), and Svoboda & Cornelius (1991)

Aglaophenia macgillivrayi (Busk, 1852) [= **Aglaophenia cupressina* Lamouroux, 1816]

Aglaophenia macrocarpa Bale, 1888 [= **Aglaophenia crucialis* Lamouroux, 1816]

Aglaophenia maldivensis Borradaile, 1905 [= **Lytocarpia brevirostris* (Busk, 1852)]

Aglaophenia mammillata Nutting, 1900 [= ?*Aglaophenia latecarinata* Allman, 1877]

Aglaophenia marginata Ritchie, 1907b [= **Aglaophenia pluma* (Linnaeus, 1758)]

Aglaophenia mccoyi Bale, 1882 [= **Aglaophenia divaricata* var. *mccoyi* Bale, 1882]

Aglaophenia megalocarpa Bale, 1914a [= **Lytocarpia megalocarpa* (Bale, 1914a)]

Aglaophenia meganema Fraser, 1937. Corbula unknown.

Aglaophenia (?) mercatoris Leloup, 1937a. Corbula unknown; could be a species of *Macrorhynchia*.

Aglaophenia microdonta Pieper, 1884 [= **Aglaophenia elongata* (Meneghini, 1845)]

Aglaophenia minima Nutting, 1900. Corbula described and figured by Nutting (1900)

Aglaophenia minuta Fewkes, 1881 [= **Aglaophenia latecarinata* Allman, 1877]

Aglaophenia moebii Schulze, 1875 [= **Cladocarpus integer* (G.O. Sars, 1874)]

Aglaophenia mulderi Bartlett, 1907. Gonosome unknown.

Aglaophenia multiplicato-pinnata Kirchenpauer, 1876 [= **Macrorhynchia hornelli* (Thornely, 1904)]

Aglaophenia myriophyllum Savigny & Audouin, 1809 [= ?*Aglaophenia tubulifera* (Hincks, 1861)]

Aglaophenia myriophyllum (Linnaeus, 1758) [= **Lytocarpia myriophyllum* (Linnaeus, 1758)]

Aglaophenia nanella Stechow, 1919 [= ?*Aglaophenia harpago* von Schenck, 1965]

Aglaophenia octocarpa Nutting, 1900. Corbula unknown.

Aglaophenia octodonta (Heller, 1868) [= *Aglaophenia adriatica* Babic, 1911; *Aglaophenia helleri* Marktanner-Turneretscher, 1890]

Aglaophenia octodonta var. *adriatica* Babic, 1911 [= **Aglaophenia octodonta* (Heller, 1868)]

Aglaophenia parasitica Warren, 1908 [= **Lytocarpia formosa* (Busk, 1851)]

Aglaophenia parva Pieper, 1880 [= **Aglaophenia pluma* (Linnaeus, 1758)]

Aglaophenia parvula Bale, 1882 [= ?*Aglaophenia conferta* Kirchenpauer, 1872; *Aglaophenia heterodonta* Jäderholm, 1903; *Aglaophenia bifida* Stechow, 1923c]. Corbula unknown.

Aglaophenia patagonica d'Orbigny, 1839 [= ?*Aglaophenia acacia* Allman, 1877; ?*Aglaophenia crucialis* Lamouroux, 1816]

Aglaophenia patula Kirchenpauer, 1872 [= **Macrorhynchia filamentosa* (Lamarck, 1816)]

Aglaophenia pelagica Lamouroux, 1816. Doubtful species; may be identical with *Aglaophenia latecarinata* Allman, 1877.

Aglaophenia pennaria (Linnaeus, 1758 [=**Monoserius pennarius* (Linnaeus, 1758)]

Aglaophenia pennatula (Ellis & Solander, 1786) [= **?Gymnangium montagui* (Billard, 1912)]

Aglaophenia perforata Allman, 1885 [= **Macrorhynchia philippina* (Kirchenpauer, 1872)]

Aglaophenia perpusilla Allman, 1877 [= **Aglaophenia latecarinata* Allman, 1877]

Aglaophenia pharetra (Broch, 1918) [= **Cladocarpus pharetrus* (Broch, 1918)]

Aglaophenia phyllocarpa Bale, 1888. Corbula described, but not figured, by Bale (1888).

Aglaophenia phyteuma Kirchenpauer, 1876 [= **Lytocarpia phyteuma* (Kirchenpauer, 1876)]

Aglaophenia picardi Svoboda, 1979. Corbula described by Svoboda (1979) and Svoboda & Cornelius (1991).

Aglaophenia pinguis Fraser, 1938c. Corbula described and figured by Fraser (1938c).

Aglaophenia pinnatula in Waddington ex D. Morris, Nat. Hist. Bournemouth: 217. Probably lapsus for *Aglaophenia pennatula* (Ellis & Solander, 1786).

Aglaophenia pluma (Linnaeus, 1758) [= *Aglaophenia acutidentata* Allman, 1885, *Aglaophenia plumosa* Pennington, 1885, *Aglaophenia calamus* Allman, 1883; *Aglaophenia chalarocarpa* Allman, 1885; *Aglaophenia dichotoma* Kirchenpauer, 1872 p.p.]. Corbula described by Svoboda (1979), Svoboda & Cornelius (1991) and Cornelius (1995)

Aglaophenia pluma var. *gracillima* Borradaile, 1905 *sensu* Broch (1933), partly *A. harpago* von Schenck, 1965, partly *A. tubiformis* Marktanner-Turneretscher, 1890 (see Svoboda, 1979: 98; see also remarks under *Aglaophenia gracillima* Borrodaile, 1905)

Aglaophenia pluma var. *helleri* Marktanner-Turneretscher, 1890 [= **Aglaophenia octodonta* (Heller, 1868)]

Aglaophenia pluma var. *heteroclita* Bedot, 1919

Aglaophenia pluma var. *sibogae* Billard, 1913

Aglaophenia pluma var. *teissieri* Svoboda, 1979 (nomen nudum) [= **Aglaophenia picardi* Svoboda, 1979]

Aglaophenia pluma var. *tenuinoda* Stechow, 1919 [= *Aglaophenia gracillima* Borradaile, 1905, **Aglaophenia tenuinoda* Stechow, 1919]

Aglaophenia plumatella (McCrady, 1859) (probably only nomen nudum)

Aglaophenia plumifera Kirchenpauer, 1872 [= **Lytocarpia flexuosa plumifera* (Kirchenpauer, 1872)]

Aglaophenia plumosa Bale, 1882. Corbula described, but not figured, by Bale (1884) and Ralph (1961)

Aglaophenia plumosa Pennington, 1885 [= *Aglaophenia reflexa* Stechow, 1919; **Aglaophenia pluma* (Linnaeus, 1758)]

Aglaophenia postdentata Billard, 1913. Corbula described and figured by Millard and Bouillon (1973).

Aglaophenia praecisa Fraser, 1938c. Corbula unknown.

Aglaophenia prolifera Bale, 1882 [= **Gymnangium proliferum* (Bale, 1882)]

Aglaophenia prominens Fraser, 1938c. Corbula described and figured by Fraser (1938c).

Aglaophenia propinqua Fraser, 1938. Corbula unknown.

Aglaophenia (?) pusilla Kirchenpauer, 1872. Corbula unknown.

Aglaophenia ramosa (Busk, 1852) [= **Aglaophenia divaricata* (Busk, 1852)]

Aglaophenia ramosa Allman, 1877 [= **Aglaophenia allmani* Nutting, 1900]

Aglaophenia ramulosa Kirchenpauer, 1872. Gonosome unknown, nor certain whether or not a corbula.
Aglaophenia raridentata Fraser, 1944a [= *Aglaophenia elegans* Nutting, 1900; **Aglaophenia lophocarpa* Allman, 1877]
Aglaophenia rathbuni Nutting, 1900. Corbula described and figured by Nutting (1900).
Aglaophenia reflexa Stechow, 1919 [= *Aglaophenia plumosa* Pennington, 1885; **Aglaophenia pluma* (Linnaeus, 1758)]
Aglaophenia rhynchocarpa Allman, 1877 [= *Aglaophenia cylindrata* Versluys, 1899]. Corbula described and figured by Allman (1877) and Nutting (1900).
Aglaophenia rigida Allman, 1877 [= **Aglaophenia acacia* Allman, 1877]
Aglaophenia robusta Fewkes, 1881. Corbula unknown.
Aglaophenia roretzii Marktanner-Turneretscher, 1890 [= **Gymnangium roretzii* (Marktanner-Turneretscher, 1890)]
Aglaophenia rostrata Kirchenpauer, 1872 [= **Macrorhynchia phoenicea* (Busk, 1852)]
Aglaophenia rubens Kirchenpauer, 1872. Corbula unknown.
Aglaophenia savignyana Kirchenpauer, 1872 [= *Monoserius pennarius* (Linnaeus, 1758)]
Aglaophenia scabra (Lamarck, 1816) [= **Plumularia scabra* Lamarck, 1816]
Aglaophenia schneideri Borradaile, 1905. Corbula unknown, could very well be a species of *Lytocarpia*.
Aglaophenia secunda Kirchenpauer, 1872 [= **Monoserius pennarius* (Linnaeus, 1758)]
Aglaophenia septata Ritchie, 1907a. Corbula described by Ritchie (1910a) and Vervoort (1966).
Aglaophenia septifera Broch, 1912 [= **Aglaophenia kirchenpaueri* Marktanner-Turneretscher, 1890]
Aglaophenia simplex (d'Orbigny, 1839). Unidentifiable species.
Aglaophenia sinuosa Bale, 1888. Corbula described but not figured by Bale (1888, 1919).
Aglaophenia speciosa Pallas, 1766. Unidentifiable species.
Aglaophenia spicata Lamouroux, 1816 [= **Monoserius pennarius* (Linnaeus, 1758)]
Aglaophenia squarrosa Kirchenpauer, 1872. Doubtful species.
Aglaophenia struthionodes (Murray, 1860) [= *Aglaophenia arborea* Verrill, 1873]. Corbula described by Nutting (1900).
Aglaophenia suensoni Jäderholm, 1896 [= *Aglaophenia ijimai* Stechow, 1907]. Corbula figured and described by Stechow (1909) and figured by Hirohito (1995).
Aglaophenia suensoni var. *ijimai* Stechow, 1907 [= **Aglaophenia suensoni* Jäderholm, 1896]
Aglaophenia sulcata (Lamarck, 1872) [= **Plumularia sulcata* Lamarck, 1816]
Aglaophenia superba Bale, 1884 [= **Gymnangium superbum* (Bale, 1884)]
Aglaophenia symmetrica Fraser, 1938c. Corbula described and figured by Fraser (1938c).
Aglaophenia tasmanica Bale, 1914a. Corbula described, but not figured, by Bale (1914a).
Aglaophenia (?) tenerrima Kirchenpauer, 1876. Doubtful species, corbula unknown.
Aglaophenia tenuinoda Stechow, 1919 [= *Aglaophenia gracillima* Borradaile, 1905]
Aglaophenia tenuissima Bale, 1914c [= **Lytocarpia tenuissima* (Bale, 1914c)]
Aglaophenia thompsoni Bale, 1882 [= **Gymnangium longirostre* (Kirchenpauer, 1872)]
Aglaophenia thornelyi Bedot, 1921a [= **Macrorhynchia plumosa* (Thornely, 1904)]
Aglaophenia tongensis Kirchenpauer, 1876 (nomen nudum) [= **Lytocarpia brevirostris* (Busk, 1852)]
Aglaophenia transitionis Fraser, 1941. Corbula unknown.
Aglaophenia tricuspis McCrady, 1859. Unidentifiable species.
Aglaophenia tridentata Versluys, 1899 [= *Aglaophenia contorta* Nutting, 1900)]; *Aglaophenia trifida* L. Agassiz, 1862 [= **Aglaophenia acacia* Allman, 1877]
Aglaophenia triplex Fraser, 1948. Corbula unknown.
Aglaophenia triramosa Nutting, 1927. Corbula described and figured by Nutting (1927).
Aglaophenia tubiformis Marktanner-Turneretscher, 1890. Corbula described by Svoboda (1979), Svoboda & Cornelius (1991) and Cornelius (1995).
Aglaophenia tubulifera (Hincks, 1861). Corbula described by Svoboda (1979), Svoboda & Cornelius (1991) and Cornelius (1995).
Aglaophenia uncinata (Lamarck, 1816) [= **Aglaophenia pluma* (Linnaeus, 1758)]
Aglaophenia urceolifera (Lamarck, 1816) [= **Gymnangium urceoliferum* (Lamarck, 1816)]
Aglaophenia urens Kirchenpauer, 1872 [= **Macrorhynchia philippina* (Kirchenpauer, 1872)]
Aglaophenia venusta Fraser, 1948. Corbula described by Fraser (1948).
Aglaophenia vitiana Kirchenpauer, 1872 [= **Lytocarpia brevirostris* (Busk, 1852)]
Aglaophenia whiteleggei Bale, 1888 [= *Lytocarpus nuttingi* Hargitt, 1927]. Corbula figured by Hirohito (1995).
Aglaophenia zelandica (Stechow, 1921d) [= *Aglaophenia huttoni* Kirchenpauer, 1876; **Gymnangium longirostre* (Kirchenpauer, 1872)]. According to Bedot (1921a) an unidentifiable species);.
Aglaophenia sp. Hirohito, 1983; *Aglaophenia* sp. Altuna Prados, 1994.

Nine New Zealand species of *Aglaophenia* are described herein, of which 4 are new. *Aglaophenia filicula*, described and figured by Hilgendorf (1898: 215–216, pl. 21, figs 2, 2a–b) from the Dunedin area is an unrecognisable species; Hilgendorf's material appears to be lost. It is not identical, however, with *Aglaophenia filicula* Allman, 1883 [= *Aglaophenia tubulifera* (Hincks, 1861)], a species from the northeast Atlantic.

Aglaophenia acanthocarpa Allman, 1876a
(Fig. 62A, B)

Aglaophenia acanthocarpa Allman 1876a: 274, pl. 21, figs 1–4; Farquhar 1896: 467; Bale 1924: 258, fig. 14; 1926: 23; Kulka 1950: 81, fig. 16a, b; Ralph 1961b: 67-69, figs 9h-j, 10g; 1961c: 109; Dawson 1992: 18; Stranks 1993: 7.
?*Aglaophenia divaricata* var. *acanthocarpa*: Bale 1915: 313; Jäderholm 1917: 18, pl. 2, fig. 8.
Aglaophenia laxa: Hilgendorf 1911: 541 (not *Aglaophenia laxa* Allman, 1876a).
?*Aglaophenia acanthostoma* Trebilcock 1928: 25 (incorrect subsequent spelling).

MATERIAL EXAMINED:

NZOI Stns: C671, *Aglaophenia acanthocarpa* Allman, 1876 [Slide 4166 JEW Colln]; **C765**, 1 plume about 10 mm high, 2 corbulae. In addition sample with many branched stems with corbulae. RMNH-Coel. slide 2096; **J674**, numerous plumes, 10–15 mm high, from a stolon creeping on algae. Some plumes branched. Many corbulae. RMNH-Coel. 27737, slide 2256; **J970**, *Aglaophenia acanthocarpa* Allman, 1876 [Slide 4411 JEW Colln].

NMNZ: BS 399, several mutilated stems, up to 100 mm high, no corbulae. NMNZ Co. 630.

NMNZ Ralph Collection: Loc. 118, NMNZ Co. 1002, plumes about 15 mm high rising from a short stem, arranged more or less spirally. They have the characteristic reddish-brown colour; hydrocladia closely approximated, curved inward, over the corbulae; plume itself also slightly curved. Distinctly *A. acanthocarpa*. 2 RMNH-Coel. slides 3456; **Loc. 304**, NMNZ Co. 1146, a few damaged plumes about 15 mm high without corbulae (RMNH-Coel. slide 3828), to which are attached a few colonies of *Monotheca* sp. and bryozoans. Poor slide in RSC as *Plumularia spinulosa, Aglaophenia acanthocarpa* (?), no data; **Loc. 402**, NMNZ Co. 1192, 2 branched plumes about 25 mm high, 1 with corbula, and several unbranched, partly damaged plumes. RMNH-Coel. slide 3871; **Loc. 735**, poor slide in RSC as *Aglaophenia acanthocarpa*, with data: Whatipu, Easter 1950; **Loc. 736**, fair slide in RSC as *Aglaophenia acanthocarpa*, with data: May 1950.

TYPE LOCALITY: New Zealand; the species was originally described by Allman (1876a) from New Zealand material sent over by Busk; there is no distinct locality record. According to Stranks (1993) a holotype microslide and two paratype microslides are in MOV, FV F59304 and F59305, respectively; the locality record on those slides is "New Zealand".

REMARKS: *Aglaophenia acanthocarpa* has been kept separate from the variable *Aglaophenia laxa* Allman, 1876a, by characters of the colony and the hydrothecae; it shares many characters including an almost identical corbula. The colony in *A. acanthocarpa* is decidedly bushy, branches being formed in all directions but generally also directed upwards. The hydrocladia are short, have fewer internodes than those of *A. laxa* and are directed obliquely forward, with the tips curved inwards. The hydrocladial internodes are short and strongly sclerotised, especially at the back, and have two rings or incomplete septa. The basal part of the hydrotheca is swollen to a varied degree, but its adcauline wall does not protrude into the internode and is separated by a distinct, thick wall with a large, square hydropore. The internal, adcauline septum is thin and projects straight into the hydrothecal cavity. The hydrothecal aperture is only slightly tilted downwards and its rim is thickened, particularly noticeable in frontal view. There is a distinct, curved and pointed median cusp with a prominent median carina, of which the shape varies between a rounded and an obtusely pointed lamina. There are three pairs of marginal cusps of which the second pair is best developed, triangular and folded outwards. The first pair of cusps is moderately developed; the embayment between first pair of lateral cusps and the median cusp on each side is partly occupied by an everted, rounded, hyaline lamella; the third pair of cusps is small and may be completely hidden behind the lateral nematothecae. The median nematotheca is a conspicuous structure, occupying nearly all of the frontal hydrothecal wall; a minor, curved portion is visible above the insertion of the nematotheca. Free part of median nematotheca greatly varying in length on hydrothecae of the same colony, being of moderate length in some and greatly elongated, proboscis-like in others; the abcauline wall of the nematotheca may be almost smooth or show a strong curvature; it is internally thickened. Apical orifice circular, perpendicular to internodal long axis; a large, oval foramen present at the base of the abcauline wall. Hydrothecal cavity and nematotheca communicate through a distinct foramen in the frontal hydrothecal wall. Lateral nematothecae slightly curved, tube-shaped, pointing upwards, with a large, oval hole opening into the internodal cavity; aperture circular with smooth rim. Along the length of the internodes the lateral nematothecae greatly increase in length, being short and scarcely surpassing the nodes in the basal internodes and reaching the level of the first internodal septum in the apical internodes.

The corbulae fit the accurate description given by Ralph; the first internode of the 'ribs' (gonohydrocladium of Ralph) has a triplet of nematothecae in a position suggesting a hydrothecate internode of which the hydrotheca is completely reduced, thus giving this species (and *A. laxa*) a position intermediate between *Aglaophenia* and *Lytocarpia*.

RECORDS FROM NEW ZEALAND: Described by Allman (1876a) from New Zealand without distinct locality record; subsequently recorded by Hilgendorf (1911) as *Aglaophenia laxa*, from the Kermadecs, by Kulka (1950) from the Auckland area, and by Ralph (1961b) from various New Zealand localities. The localities listed by Ralph (1961b) suggest that the species is distributed over shallow waters all around New Zealand, covering both sides of North and South Island; the material from Lyall Bay and Palliser Bay, Cook Strait, listed by Ralph and of which material survives in Ralph's collection in NMNZ has been re-identified by us as belonging to *Aglaophenia laxa* Allman, 1876a. The present records confirm that picture as the species is recorded from the Kermadec area (NZOI Stn J674); between Cape Maria van Diemen and the Three Kings Islands (NZOI Stn C765), Pacific off the northern part of North Island (NZOI Stn J970 and NMNZ BS 399), and Palliser Bay, Cook Strait

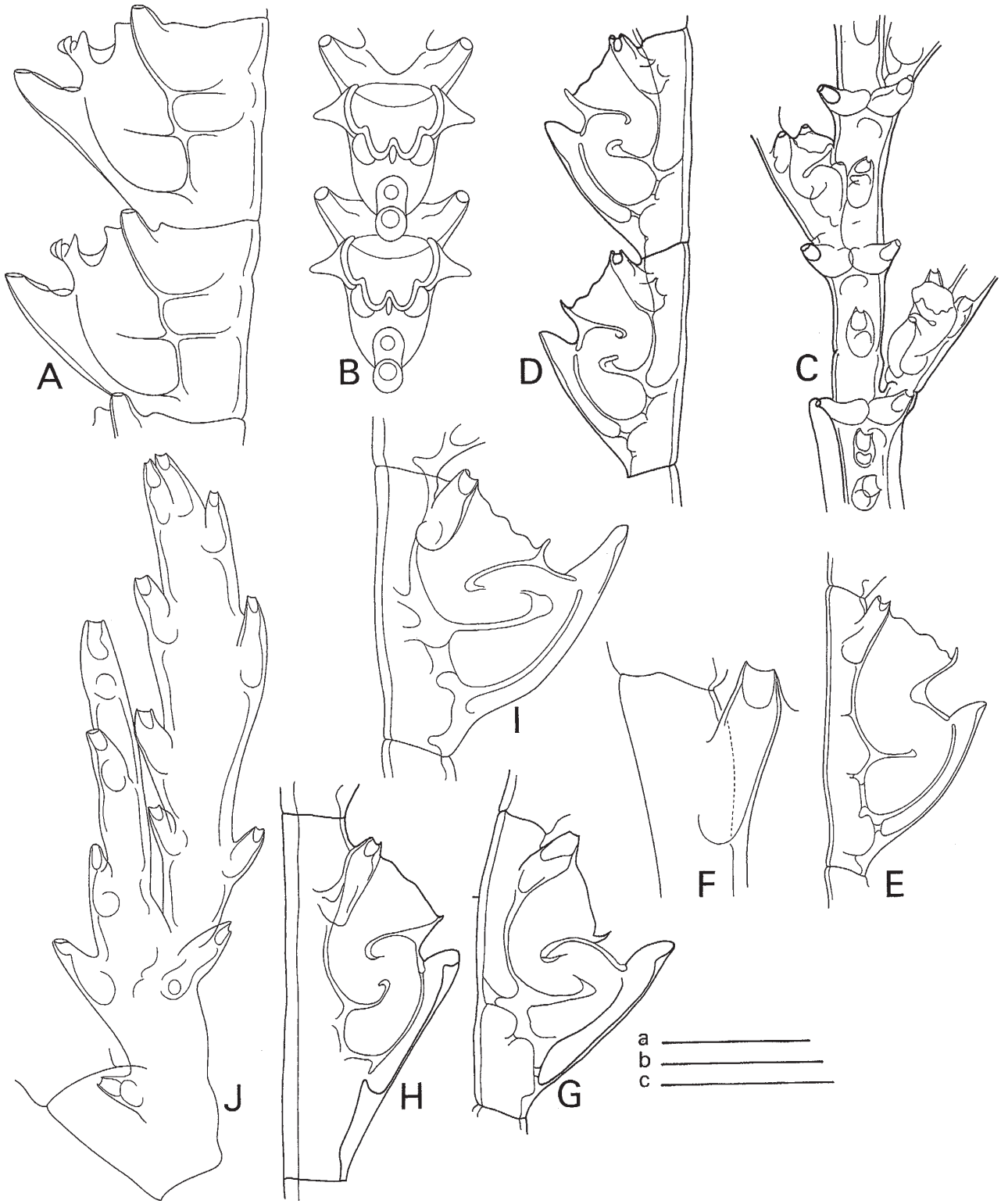

Fig. 62. A, B. ***Aglaophenia acanthocarpa*** Allman, 1876. **A**, pair of hydrocladial hydrothecae, lateral view. **B**, the same, frontal view (NZOI Stn C765, slide 2096). **C–J.** ***Aglaophenia ctenata*** (Totton, 1930). **C**, part of stem showing insertion of hydrocladia. **D**, pair of hydrocladial hydrothecae, lateral view (NZOI Stn E327, slide 2110). **E**, hydrocladial hydrotheca, lateral view. **F**, lateral nematotheca (BS 668, slide 3351). **G**, hydrocladial hydrotheca, lateral view (NZOI Stn E731, slide 2247). **H**, the same (NZOI Stn E713, slide 2243). **I**, the same. **J**, gonohydrocladium (NZOI Stn I368, slide 2153). Scales: a, 1 mm (D–E, G–J); b, 0.2 mm (A, B, F); c, 1 mm (C). W.V.

(Ralph's collection Loc. 118). The depth records vary between 3 and 86 m. Corbulae were present in February and September.

DISTRIBUTION: In the concept presented above an exclusively New Zealand species of which the distribution extend north as far as the Kermadec Islands.

Aglaophenia ctenata (Totton, 1930) (Fig.62C–J)

Thecocarpus ctenatus Totton, 1930: 237 fig. 69a.
Aglaophenia ctenata: Ralph 1961b: 64–65, fig. 9a, b; Dawson 1992: 18.

MATERIAL EXAMINED:

NZOI Stns: C166, *Aglaophenia* cf. *ctenata* (Totton, 1930). [Slide 4169 JEW Colln]; **C168**, *Aglaophenia* cf. *ctenata* (Totton, 1930) (J.E. Watson); **C169**, *Aglaophenia* cf. *ctenata* (Totton, 1930) (J.E. Watson); **C171**, *Aglaophenia* cf. *ctenata* (Totton, 1930) (J.E. Watson); **C623**, *Aglaophenia ctenata* (Totton, 1930) (J.E. Watson); **C627**, *Aglaophenia ctenata* (Totton, 1930) (J.E. Watson); **C632**, *Aglaophenia ctenata* (Totton, 1930). Detached hydrocladia only. [Slide 4236 JEW Colln]; **E72**, single plume-shaped colony, 65 mm high, no corbulae; **E79**, 2 colonies, one 100 mm high with basal tuft and a corbula; the other a young colony only 50 mm high, no basal tuft; **E323**, several (about 10) damaged stems, 100 mm high with a few corbulae; **E327**, single colony 35 mm high, no corbulae. RMNH-Coel. slide 2110; **E713**, single colony 120 mm high, basal tuft of fibres, no corbulae. RMNH-Coel. slide 2243; **E719**, 2 colonies,40 and 50 mm high, the latter forked and with several corbulae; **E731** (dried out sample), 2 complete colonies as simple, unbranched plumes, with many corbulae, height about 70 mm. Aberrant in shape of hydrothecae, that are strongly curved. RMNH-Coel. slide 2247; **E743**, 3 complete and several mutilated colonies, maximal height about 40 mm, no corbulae. Shape of hydrothecae agrees with figure given by Ralph (1961b, fig. 9b); **E747**, 3 colonies 100, 120 and 150 mm high, the middle with many corbulae. Colonies of the simple, unbranched, plume-shaped type, with fairly thick stem basally; **E748**, 8 colonies, some damaged, some with corbulae. Length of hydrocladia 10–30 mm. All colonies with basal tuft. Hydrothecae inspected and found to be those of the type figured by Ralph (1961); **E749**, 4 colonies about 40 mm high with basal tuft of fibres and unbranched, plume-shaped. Hydrothecae of the normal type. No corbulae; **E756**, single 80 mm high colony, no corbulae. Hydrothecae of the strongly curved type mentioned earlier; **E757**, single colony 60 mm high, hydrothecae of the strongly curved type; no corbulae; **E907**, *Aglaophenia ctenata* (Totton, 1930) (Slide 4167 JEW Colln]; **F10**, *Aglaophenia ctenata* (Totton, 1930) (Slide 4168 JEW Colln]; **F871** (dried out sample), 2 colonies, 35 and 60 mm high, simple plume-shaped, without corbulae; **F872**, 3 complete colonies, about 35 mm high. No corbulae; **F873**, 2 colonies, 1 incomplete, 30–50 mm high. No corbulae; **F895**, 1 young colony, 40 mm high, no corbulae; **F900**, 2 colonies, 70–35 mm high, no corbulae; **F925**, 8 partly broken colonies up to 130 mm length and a few corbulae; **F926**, single colony 130 mm high and 1 corbula; **G173**, single 40 mm high, young colony composed of unbranched stem and basal tuft, hydrocladia pinnately arranged, 10–15 mm long. No corbulae; **G188**, single 70 mm high colony with big basal tuft anchored in back volcanic sand; 2 corbulae; **G403**, 2 colonies, 40 and 60 mm high, no corbulae; **G663**, single, plume-shaped colony, 60 mm high, with basal tuft of fibres; no corbulae; **G886**, 2 colonies 80 and 200 mm high, both with corbulae. RMNH-Coel. slide 2881; **G938**, single colony, 150 mm high, 2 corbulae; **G941**, single complete colony about 45 mm high, plume shaped, no corbulae, and 3 stems that may also belong here. Hydrothecae filled with dirt, of an elongated type, with fairly short intrathecal septa. RMNH-Coel. slide 2250; **I368**, 2 colonies about 100 mm high with some coppiniae. 2 RMNH-Coel. slides 2153; **J657**, single plume-shaped, 80 mm high colony with 2 corbulae; **J701**, single 50 mm high, plume-shaped colony without corbulae, attached in sand by means of thick bunch of stolonal fibres; **P441**, single colony, unbranched plume, 80 mm high, no corbulae. RMNH-Coel. slide 2231; **S192**, 5 colonies about 60 mm high, with basal tuft and a plume composed of pinnately arranged, long hydrocladia. No corbulae; **V364**, small colony about 40 m high. RMNH-Coel. slide 2931; **V367**, single colony about 45 mm high, no corbulae; **V369**, 1 colony, 60 mm high, no corbulae; **V373**, 45 mm high colony without corbulae, but with 4 Cirripedia (Ascothoracidae) attached; **W252**, 1 colony about 80 mm high, spread almost 40 mm. No corbulae.

NMNZ: BS 210, single, 50 mm high plume, no corbulae. NMNZ Co. 572; **BS 559**, 14 stems up to 120 mm high, all unbranched, some with corbulae. NMNZ Co. 482; 2 RMNH-Coel. slides 2989; **BS 668**, about 15 colonies in height varying between 155 and 55 mm, nearly all with basal bundle of rooting fibres (hydrorhiza). No corbulae present. NMNZ Co. 726; RMNH-Coel. 27651, slide 3351; **BS 854**, 1 stem, 90 mm high, bearing pinnate hydrocladia and 2 corbulae. NMNZ Co. 680; **BS 894**, 4 colonies between 60 and 80 mm high, the highest with 3 corbulae. Colonies strictly feather-shaped, stem unbranched, basally with dense rooting mass attaching colony in sand. Corbula open, with slender ribs with nematothecae on both sides. NMNZ Co. 781, 2 RMNH-Coel. slides 3347; **BS 899**, single 130 mm high colony in 2 pieces, with 3 corbulae and basal tuft. NMNZ Co. 790; **BS 907**, single stem about 80 mm high with 2 corbulae. NMNZ Co. 815; 2 RMNH-Coel. slides 3494; 37°40.2′ S, 178°53.6′ E, between Motuhora and White Island, 1 colony, 50 mm high, no corbulae. NMNZ Co. 660.

NMNZ Ralph Collection: Loc. 145, NMNZ Co. 996, part of a colony 12 mm high with 12 hydrocladia up to 10 mm long; detached basal part with hydrorhiza. No corbula. RMNH-Coel. slide 3672. Poor slide in RSC as *Aglaophenia ctenata*, no data; **Loc. 569**, NMNZ Co. 1277, fragments of a large or several large colonies with many corbulae. Hydrocladia about 15 mm long. 2 RMNH-Coel. slides 3955. Poor slide in RSC as *Aglaophenia ctenata*, no data; **Loc. 570**, NMNZ Co. 1278, 1279 (second sample), about 45 mm high colony in 2 fragments, 1 with a small corbula. RMNH-Coel. slide 3956; **Loc. 577**, poor slide in RSC as *Thecocarpus ctenatus*, no data; **Loc. 731** (bears also number 577), poor slide in RSC as *Thecocarpus ctenatus*, no data.

PMBS: Papanui Canyon, on sandy mud. Colour yellowish. Identified by P.M. Ralph. (Taken from card register).

MATERIAL INSPECTED: **Mu 67–61** (specimen on card: yellowish): Sample consist of 2 complete colonies with large basal tuft and some smaller colonies or fragments. Specimen on card shows many corbulae; those not seen in bottled specimens. Second sample of strongly fragmented specimen.

TYPE LOCALITY: Described by Totton (1930) from a complete, sterile specimen from an unknown locality and a fertile fragment from *Terra Nova* Stn 91, off Three Kings Island, 549 m; the latter locality is here considered the type locality. Type in NHM.

REMARKS: Of this rare endemic species we have a very abundant material permitting us to comment on the two descriptions available: those by Totton (1930) and Ralph (1961b).

The shape of the colony is always pinnate, some as high as 100 mm, with a thick polysiphonic stem and up to 25 mm long alternate but tightly packed hydrocladia. In young colonies the hydrocladia are well separated and the stem may be partly monosiphonic with division into internodes, each having one terminal apophysis with a pair of opposite nematotheca at their base and one or two nematothecae on the proximal part of the internode. No mamelon has been observed; the nematothecae have deeply scooped apertures. Polysiphony of the stem results from apposition of secondary tubes at the back of the primary axis.

The hydrocladia may have as many as 45 internodes; distinct nodes only occur in young colonies or younger parts of the old colonies. The septa or rings inside the internode are variously developed, but usually three are present: one at the bottom of the internode and two flanking the hydropore, of which the upper is oblique and usually best developed. In strongly sclerotised colonies an additional, incomplete septum may develop behind the curved upper adcauline hydrothecal wall and a second behind the base of the lateral nematothecae.

The hydrothecae in this species have a most characteristic shape and yet show so much variation that almost every colony has its own particular shape. The hydrothecal cavity is sigmoid because of the development of an abcauline septum at the base of the median cusp and a more basal abcauline septum a small distance above the hydropore. This causes the hydranth to curve considerably when extending through the hydrothecal aperture. The length of the internode and consequently the shape of the sigmoid, S-shaped curvature of the hydrothecal lumen vary greatly; in some colonies, as for instance that from NZOI Stn I368, the curvature is extreme; in others, mostly in young colonies, for instance that from BS 668, the hydrothecal cavity is elongated and the abcauline septum is reduced to an insignificant, sclerotised ridge. Although little variability occurs in the lateral nematothecae, there is considerable difference in length of the median nematotheca of which the gutter-shaped, fully open aperture may considerably surpass the median cusp.

The corbula of this species has only briefly been described by Totton, whose description was copied by Ralph (1961) as her specimens were sterile. Many of the present colonies have male or female corbulae, present on different colonies. The corbulae have a long pedicel and are fully open; the costae are stiff and directed upwards giving the impression of a small comb. This must have occasioned Totton the coin the specific name "ctenata', comb-like, for this curious species. The long pedicel is composed of five or six normal, thecate internodes; the gonocladium or rachis is composed of 30–40 internodes that are almost completely fused. Each internode has a distinct apophysis with a pair of nematothecae, one external, one internal. The apophyses support stiff gonohydrocladia of which there are 15–20 sub-opposite pairs, pointing obliquely upwards and laterally or strictly upwards. There are three nematothecae on the base of the gonohydrocladium: two lateral, of which one is at the base of the costa, and a third placed slightly higher; there are two or three nematothecae on the distal part of the gonohydrocladium. The costa has four or five pairs of nematothecae, in some corbulae strictly opposite on an elongated oval costa or considerably displaced on a much narrower costa. The gonothecae insert on the inside of the gonocladial apophyses; the female gonothecae are globular and reach the middle of the costae, and contain a single egg. The male gonotheca is elongate ovoid and reaches almost to the end of the costae.

All complete colonies have a thick, globular mass of thin hydrorhizal stolons at their base suggesting that the colonies live on a soft bottom.

The structure of the corbula in this species approaches *Aglaophenia digitulus* sp. nov. described below.

COLOUR: Young colonies yellowish; mature colonies reddish-brown.

RECORDS FROM NEW ZEALAND: Recorded by Totton (1930) from an unknown locality and from off Three Kings Islands at 549 m depth; Ralph (1961b) described material from the Chatham Rise, 300 m depth. The present locality records indicate that the species is well distributed in deeper water (119–1050 m) all around New Zealand, extending as far north as 34° S and as far south as 49.5° S, between 167° E and 179.5° W, occurring in the Tasman Sea as well as in the southern Pacific (including the Chatham Rise and the Chatham Islands area), extending from the southern part of the Kermadec area to well south of Stewart Island. It does

not seem to occur outside the New Zealand area. The single record from shallow water (NZOI Stn S192) is doubtful as all other records are below 119 m depth. Fertile corbulae present January–March, May, September, and November.

DISTRIBUTION: Known only from New Zealand waters.

Aglaophenia difficilis sp. nov. (Fig. 63A–D)

MATERIAL EXAMINED:

NZOI Stns: I351, 1 colony broken off from hydrorhiza; a few hydrocladia on distal end of stem (paratype P-1231 in NIWA collection), 1 corbula (dissected). RMNH-Coel. slide 2146; **I352**, 2 colonies of which largest colony 300 mm high, 170 mm of lower stem ahydrocladiate, 4 corbulae, of which 3 on slide (holotype H-773 in NIWA collection); second colony 250 mm high. 2 RMNH-Coel. slides 2148. 3 more RMNH-Coel. slides 3478 of a dissected corbula, a young corbula, and pieces of branches; all parts of type series.

NMNZ: 23 miles NE of **Poor Knights Islands**, single rather abraded colony, composed of a long stem practically devoid of branches and hydrocladia. Only some branches with hydrocladia left. Total length 370 mm, with large basal tuft of fibres. NMNZ Co. 400; 2 RMNH-Coel. slides 2954. This material does not form part of the type series.

TYPE LOCALITY: 36°39.00′ S, 174°04.20′ E, Tasman Sea off the northern part of North Island, 0 m (?).

DESCRIPTION (of holotype): Stems wiry, hydrorhiza a small plug of hair-like stolons, lower stem polysiphonic, consisting of several parallel tubes, the number becoming fewer distally, ultimate branches monosiphonic. Branch internodes long and thin, nodes transverse, a row of up to 10 nematothecae between the nodes and 2 nematothecae side by side on the apophysis of the stem; no nematothecae between the hydrocladial apophysis and distal node.

Hydrocladia long, lax, with up to 20 hydrothecae, given off on a short apophysis from the distal part of the internode. Internodes long, lower wall slightly concave, nodes transverse, moderately distinct and 1 short, indistinct septum passing down from the hydrotheca.

Hydrothecae large, slipper-shaped, base slightly convex into the internode, abcauline wall smoothly convex to margin, a short intrathecal septum directed backwards from the base below the median nematotheca. Margin with 1 sharply pointed anterior tooth followed by 6 pairs of shallow crenulations all of equal size.

Hydrotheca with 2 short median nematothecae, 1 (proximal) situated on internode, the other (distal) on hydrotheca; both nematothecae of same shape, but proximal shorter, tubular, completely adnate, orifice occupying entire distal end, adcauline of proximal passing into a strong wedge or hook-shaped septum directed forward into the internode.

Lateral nematothecae small, bun-shaped, set well down in the internode, orifice large, facing forward, occupying the entire distal end.

Corbulae large, closed, up to 15 mm long (including pedicel); pedicel with up to 4 hydrothecae, distal 2 with 3 median nematothecae, similar in shape to the laterals. Corbula broad, distally attenuated into a spear-like point, axial nodes distinct, 2 nematothecae at the base of each rib. Body of corbula with 16 paired leaflets bordered with 5–7 nematothecae on each side similar to the laterals; distal end of corbula with several pairs of reduced leaflets bearing a few or no nematothecae.

MEASUREMENTS of *Aglaophenia difficilis* sp. nov. (in μm):

	NZOI Stn I352 slides 2148, 3478
Stem (branch) internode, length	1804 – 2296
Width	163 – 182
Hydrocladium, length of internode	820 – 951
Width at node	117 – 130
Hydrotheca, length, posterior to margin	553 – 579
Width at margin	286 – 325
Superior median nematotheca, length	215 – 260
Width at orifice	39 – 46
Inferior median nematotheca, length	156 – 169
Lateral nematotheca, length	124 – 130
Maximum width	65 – 72
Corbula, width of axis	325 – 350
Length of leaflet	950 – 1100
Width of leaflet	350 – 400

COLOUR: Stems light brown, hydrocladia greenish-white.

REMARKS: The stems of the colonies are tall and wiry, the hydrocladiate branches being given off apically. Although short, the intrathecal septum is very variable in thickness, ranging from a forward pointing wedge to a slender partition. Marginal dentition of the hydrotheca is also very variable, some cusps having a blunt apex while on other hydrothecae the margin is reduced to a wavy line.

The corbulae contain only a few small gonothecae, some with tissue but too degenerate to permit determination of sex. Because of the thickness of the corbulae, whole mounts were optically too dense to glean much information about the axial structures. Nevertheless, we are reasonably confident that the species should be assigned to *Aglaophenia*.

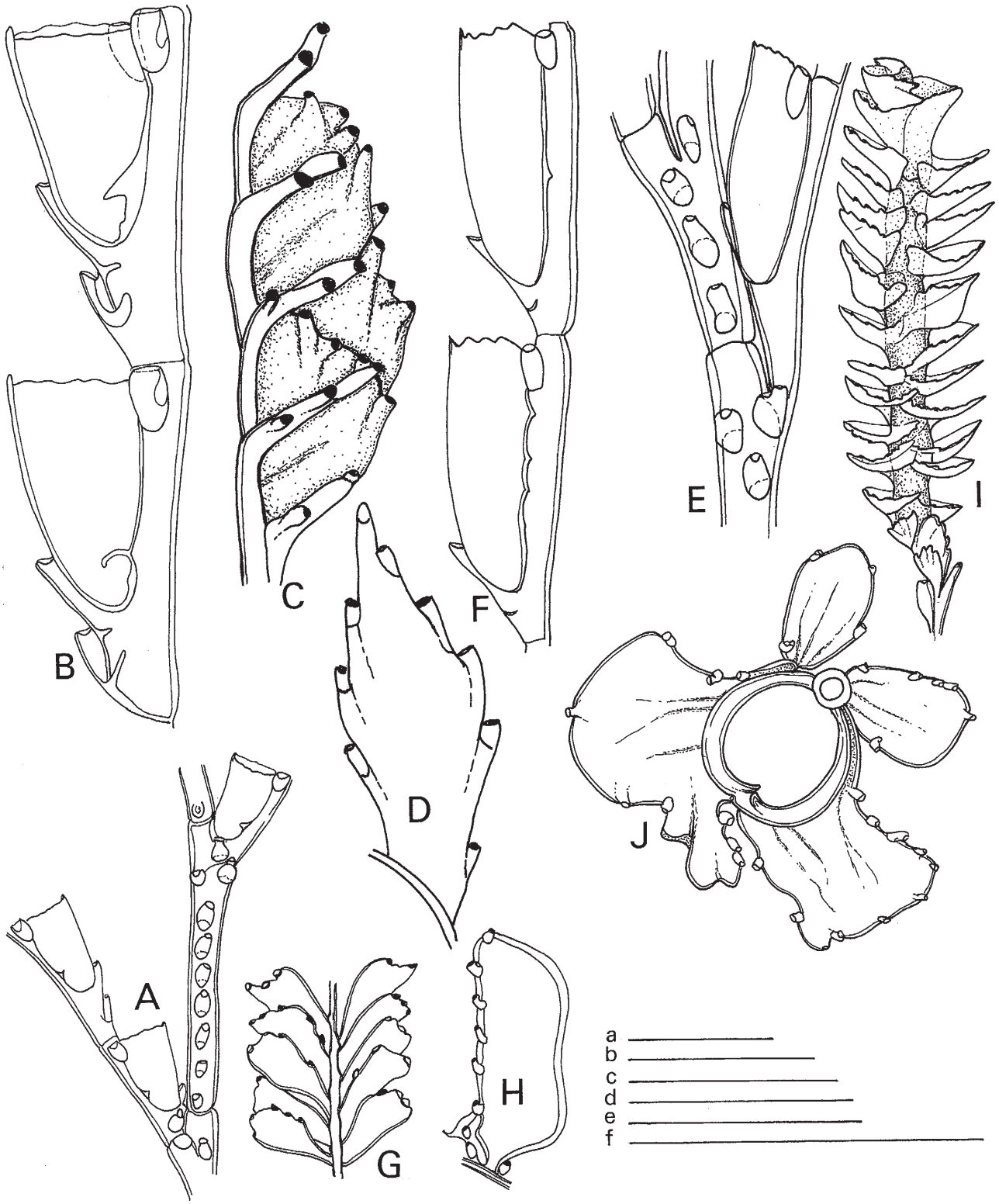

Fig. 63. A–D. ***Aglaophenia difficilis*** sp. nov. A, monosiphonic part of stem with hydrocladia. **B**, pair of hydrocladial hydrothecae, lateral view (NZOI Stn I351, holotype, slide 2146). **C**, corbula, lateral view. **D**, gonohydrocladium (NZOI Stn I351, holotype, slide 3478). **E–J.** ***Aglaophenia hystrix*** sp. nov. **E**, monosiphonic part of stem with hydrocladia. **F**, pair of hydrocladial hydrothecae, lateral view. **G**, part of corbula, seen from back. **H**, gonohydrocladium. **I**, corbula, lateral view. **J**, cross section through middle of corbula (NZOI Stn I35, holotype, slides 2151). Scales: a, 1 mm (A); b, 1 mm (E); c, 0.5 mm (B, D), 1 mm (F), 2 mm (H, J); d, 1 mm (C); e, 0.5 mm (G); f, 10 mm (I). J.E.W.

The very long branch internodes, the hydrotheca with two median nematothecae and the long, spear-shaped corbula are distinctive. The species, in the structure of hydrocladia, is more or less intermediate between *Lytocarpia spiralis* (Totton, 1930) and *L. subdichotoma* (Ralph, 1961), though the colony structure is identical. The hydrothecae are longer than those of *L. subdichotoma*, but not as elongated as those of *S. spiralis*. The most striking difference is in the presence of two median nematothecae, one partly fused with the abcauline hydrothecal wall, the second placed more inferior; it is smaller and free from the hydrotheca.

Records from New Zealand: North Cape area and Tasman Sea off the northern part of North Island, also deep water off Poor Knights Islands; bathymetric distribution from surface (?) to 500 m depth.

Distribution: Known only from New Zealand.

Etymology: The specific name comes from the Latin adjective *difficilis*, meaning difficult and indicating the difficulties in classifying this species.

Aglaophenia digitulus sp. nov. (Fig. 64A–E)

Material Examined:

NMNZ: BS 571, 2 big colonies, about 250 mm high, several smaller colonies and fragments. Many corbulae present (holotype, NMNZ Co. 498). A side branch, as RMNH-Coel. 27766 and 4 RMNH-Coel. slides 2992 are part of type series. In addition a 70 mm long branch with 2 coppiniae (paratype, NMNZ Co. 535). 2 slides, RMNH-Coel. 27767, slides 3004 (part of type series).

Type Locality: 29°18.8′ S, 177°54.2′ W, southeast of D'Arcy Point, Raoul Island, Kermadec Islands, 274–21 m.

Description (of complete holotype specimen): Erect, branched colony with a slender, polysiphonic main stem, height 270 mm, diameter of stem at base about 2 mm. A thick, round bundle of stolonal fibres with many sand grains indicates that the colony was originally attached in sediment. Main stem branched about 150 mm above base. There are 4 side branches, sub-opposite and in 1 plane; side branches moderately branched, all in same plane. Hydrocladia occur along side branches and stem above first ramification, fewer hydrocladia on stem below first branching. Axis of stem and side branches composed of primary tube, bearing nematothecae and apophyses, and a number of secondary tubes running parallel to primary tube; only extreme apex of branches monosiphonic and their division into internodes indistinct, marked by shallow perisarc constrictions. On the main tube apophyses and nematothecae frontal; nematothecae principally in 1 frontal row, but displaced by the apophyses, that are alternately directed left and right. Two nematothecae between 2 successive apophyses (of which 1 points right, the other left); in addition there is 1 complete nematotheca at the base of each apophysis as well as a mamelon on the apophysis. Stem nematothecae large, tumbler-shaped, with circular aperture with strongly everted margin. All nematothecae communicate with interior of main tube by means of a large, rounded basal foramen, creating the impression of a thin septum. Mamelon distinctly elevated, circular. Perisarc of main tube and nematothecae thick.

Hydrocladia inserting on the apophyses, 15–20 mm long, rather widely spaced, 2 hydrocladia on same side being 2 or 3 mm apart; each hydrocladium with 18–25 hydrothecae, divided into slender internodes with minor apical curvature; nodes slightly oblique and distinct. No septa or rings occur in the internodes.

Hydrothecae large and deep, in frontal view elongated and slender; adcauline wall almost straight but basally produced into short, knob-shaped projection into hydrothecal cavity, in some hydrothecae with a short, thin ledge. Abcauline wall of hydrotheca distinctly constricted just above apex of median nematotheca; remainder of abcauline hydrothecal wall slightly bulging to almost straight. Abcauline hydrothecal margin produced into blunt median cusp, slightly furrowed longitudinally; this may give the erroneous impression of a thickened median cusp being present. Hydrothecal rim perpendicular to internodal axis, which 5 pairs of lateral cusps in addition to the furrowed median cusp; 4 frontal pairs as big as median cusp, the fifth pair is quite small. All cusps are blunt and separated by rounded embayments.

Median nematotheca short and squat, covering about one-quarter of the abcauline hydrothecal wall, aperture large, oval, often with slightly crenulated rim; basis of nematotheca with curved internal septum. Paired lateral nematothecae vase-shaped, not reaching hydrothecal rim; aperture with almost straight external margin, internal margin deeply scooped out, rounded. In lateral view a thin, incomplete, internal septum present; basis of lateral nematothecae with circular foramen for communication with interior of internode.

Corbulae abundant, taking place of a hydrocladium; pedicel long, composed of 8–10 normal hydrocladial internodes with normal hydro- and nematothecae.

Corbula itself 3–5 mm long, composed of a curved rachis and closely adpressed, flattened ribs or costae

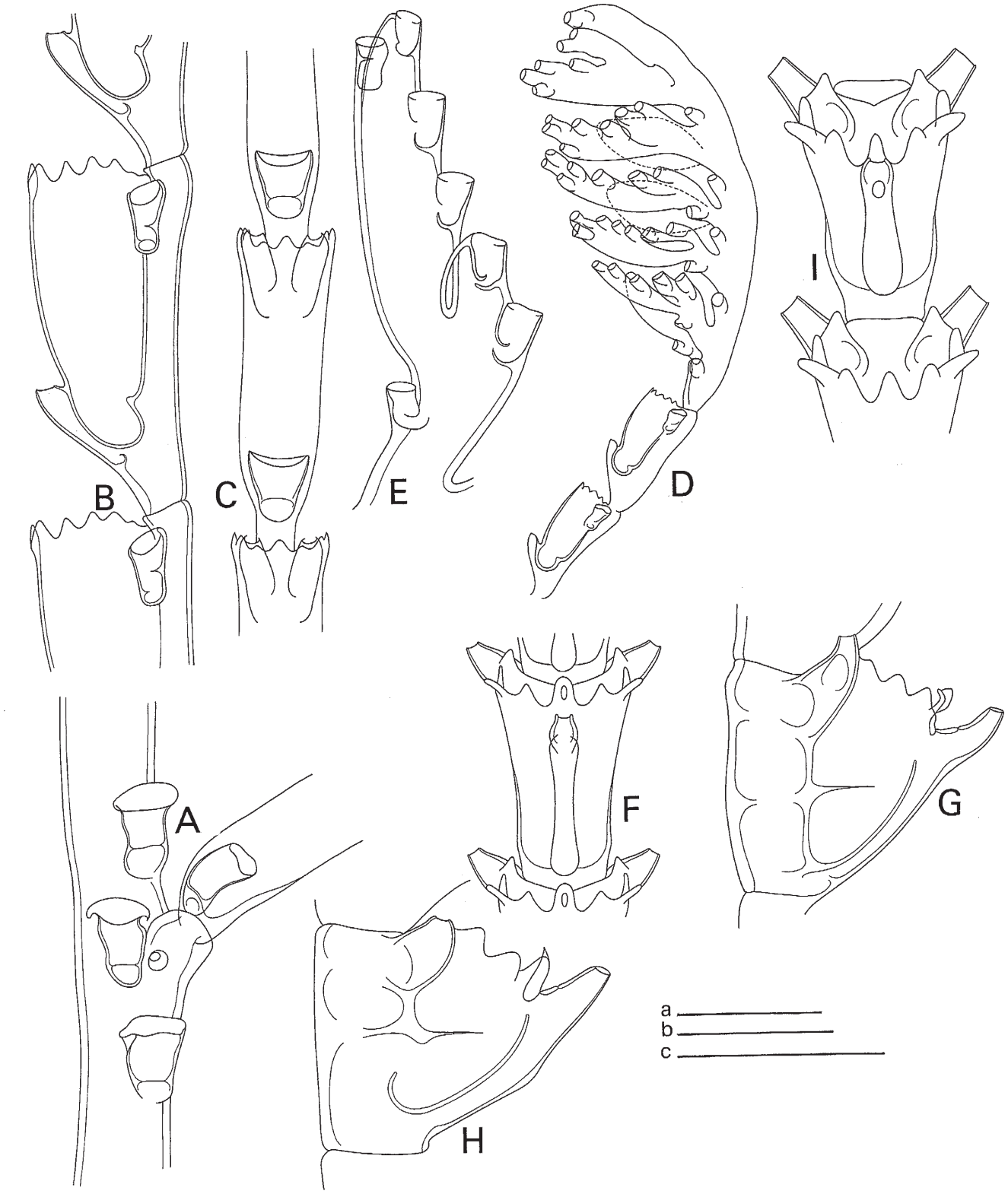

Fig. 64. A-E. ***Aglaophenia digitulus*** sp. nov. **A**, part of stem with insertion of hydrocladium, showing the arrangement of nematothecae, frontal view. **B**, hydrocladial hydrotheca, lateral view. **C**, the same, frontal view. **D**, corbula, lateral view. **E**, gonohydrocladium (BS 571, holotype, slide 2991). **F–I.** ***Aglaophenia laxa*** Allman, 1876. **F**, hydrothecal hydrotheca, frontal view. **G**, the same, lateral view (NZOI Stn E146, slide 2305). **H**, hydrocladial hydrotheca, lateral view. **I**, the same, frontal view (NZOI Stn P100, slide 3452). Scales: a, 1 mm (A–C, E–G); b, 0.2 mm (H, I); c, 2 mm (D). W.V.

enclosing a number of large, elongated-oval gonothecae. Rachis composed of a number of fused nodes with thick perisarc; fusions marked by slight irregularities of the curved, free border. There are 5–8 pairs of flattened ribs or costae, alternately on left or right side; each with a nematotheca at the base. Each rib or costa is a flattened structure composed of 2 parts: a rounded frontal lobe with 2 nematothecae and an elon-gated oval main part with 2 or 3 nematothecae along the frontal edge, 1 at apex, 1 just below apex on dorsal side, and a nematotheca at branching of frontal lobe. The rachis also ends in a nematotheca. All nematothecae large, cup-shaped with circular rim and basally communicating with the coenosarc of the costa by means of a foramen bordered by curved perisarc lips. Some of the corbulae have large, elongated oval gonothecae inserting in the internal border of the nematotheca at the costal base.

All hydrothecae have a small, completely retracted hydranth inside indicating that the specimens were alive when collected.

MEASUREMENTS of *Aglaophenia digitulus* sp. nov. (in μm):

	NMNZ BS 571 slides 2992, 3004
Axial tube, diameter	225 – 250
Stem nematotheca, length	210 – 250
Diameter at rim	155 – 190
Hydrocladial internode, length	985 – 1080
Diameter at node	100 – 135
Hydrotheca, total depth	900 – 1035
Diameter at rim	365 – 375
Median nematotheca, total length, measured from apex to septum	310 – 335
Diameter at margin, measured in frontal view	170 – 195
Lateral nematotheca, depth	235 – 250
Diameter at rim	70 – 110
Corbula, maximum length of costa	1640 – 1900
Nematotheca of costa, depth	115 – 195
Diameter at rim	100 – 115
Gonotheca, total length	985 – 1065
Maximum diameter	410 – 575

REMARKS: This species resembles *Lytocarpia spiralis* in the shape of the hydrotheca, but the colony structure and corbulae are quite different. The hydrothecae have a sharply dentate rim and are generally larger than those of *L. spiralis*. The colony differs in structure as the side-branches are situated in (sub)opposite pairs along the stem. The corbula approaches that of *L. spiralis* in the length of the pedicel.

The total absence of hydrothecae or their remnants in the corbula makes it necessary to classify this species in *Aglaophenia* though the hydrothecae have distinct affinities with some of the species of *Lytocarpia*.

RECORDS FROM NEW ZEALAND: Not in New Zealand coastal waters, the colonies originating from the Kermadec area.

DISTRIBUTION: Known only from the type locality, south-east of D'Arcy Point, Raoul Island, Kermadec Islands, depth 274–21 m.

ETYMOLOGY: The specific name, *digitulus*, has been taken from the Latin word 'digitulus', meaning little finger, referring to the broad gonohydrocladia, curving like fingers over the gonothecae.

Aglaophenia hystrix sp. nov. (Fig. 63E–J)

MATERIAL EXAMINED:

NZOI Stns: I35, colony about 250 mm high, snapped off from base, forking and produced into 2 plumes, 1 with a beautiful corbula. Basal part of stem shows distinct helicoid sympodial structure (paratype, P-1232 in NIWA collection). RMNH-Coel. slide 3544; **I366**, 1 large colony about 300 mm high (holotype, H-774 in NIWA collection) and several fragments, 1 as RMNH-Coel. 27747 (probably parts of holotype). Many corbulae. 4 RMNH-Coel. slides 2151; 1 slide of hydrocladia, 3 slides of corbulae (1 slide a dissected corbula), all part of type series.

NMNZ: BS 210, about 10 mutilated, young colonies, about 40–50 mm high, no corbulae (paratypes, NMNZ Co. 571). 2 RMNH-Coel. slides 3014, part of type series.

TYPE LOCALITY: 34°42.30′ S, 174°17.60′ E, Southwest Pacific, off North Island, 705 m.

DESCRIPTION (of holotype): 1 colony 30 cm high and upper parts of a stem probably from the same colony. If so, the original colony must have been at least 450 mm high.

Stem 4 mm wide at the base, hydrorhiza a large bundle of fine, anastomosing stolons. Stem polysiphonic, woody at the base but becoming wiry distally as fascicular tubes become fewer. Lower stem ahydrocladiate and without nematothecae, showing only scars where branches have been shed. Upper stem sympodially branched and hydrocladiate, ultimate branches monosiphonic, long and slender.

Monosiphonic branch internodes long, nodes indistinct, marked by a slight constriction in the perisarc, with a row of 3 nematothecae the same shape and size as the laterals, the most distal situated at the base of the hydrocladial apophysis.

Hydrocladia up to 40 mm long, given off from a short apophysis on the proximal end of the branch inter-node. Hydrocladial internode long and straight, nodes distinct, transverse to slightly oblique. Internode with-out septa or with up to 3 short, rudimentary septa directed downward from the base of the hydrotheca but not extending upwards into the hydrotheca.

Hydrothecae large, posterior elliptical, adcau-line wall straight, abcauline wall expanding a little to the margin. Margin perpendicular to the internode with 1 sharply pointed anterior tooth and 4 pairs of cusps, all of the same shape and size, apices rounded, the embayments being an inverted image of the cusps.

Median nematotheca tubular, short, narrow, expanding a little distally, completely adnate to the hydrotheca, orifice sinuous, occupying the entire distal end of the nematotheca. Posterior of nematotheca marked by a distinct rounded septum; a small circular foramen at the base of the septum connecting with the internode. Lateral nematothecae small, rectangular, laying parallel to the internode but not projecting past the hydrotheca, distal end completely open with a scoop-shaped orifice.

Corbula replacing a hydrocladium, closed, arched, up to 20 mm long, including pedicel. Pedicel with 1 or 2 internodes without hydrothecae but each with a row of 3 nematothecae. Corbula with a blunt distal end and up to 18 sets of leaflets, proximal and distal pairs reduced in size. Corbula with 2 axial tubes, 1 (primary tube) consisting of 2 broad interlocking semi-circular flanges, much larger in diameter than the other (secondary) tube, the secondary tube on the periphery and set between the flanges of the primary tube. Neither tube divided into nodes, perisarc of both very thick. 2 sets of leaflets given off the front of the primary tube, leaflets large, saucer-shaped, standing out stiffly from the stem, concave side facing distally, the paired leaflets joined in a zig-zag pattern down the mid line of the anterior surface of the corbula. Anterior edge of leaflets thick and bordered with up to 8 unevenly distributed nematothecae, perisarc of posterior edge thinner and with few or no nematothecae. Posterior side of corbula with opposite pairs of smaller leaflets given off from the auxiliary tube. Leaflets free, not joined, almost as broad as long, edge with up to 8 scattered nematothecae. Auxiliary tube with 2 nematothecae at the base of the small leaflet, and 1 on the tube below the apophysis.

Gonothecae small, enclosed inside the primary tube, pedicel attached to the secondary tube; gonophores female.

COLOUR: Lower stem and branches dark to light brown; hydrocladia golden.

MEASUREMENTS of *Aglaophenia hystrix* sp. nov. (in μm):

	NZOI Stn I366 slides 2151
Stem (branch) internode, length	1476 – 1722
Width	247 – 267
Hydrocladia, length of internode	1443 – 1558
Width of internode	143 – 182
Hydrotheca, length, posterior to margin	1279 – 1328
Width at margin	377 – 426
Median nematotheca, length, septum to orifice	468 – 520
Width of orifice	42 – 59
Lateral nematotheca, length	163 – 215
Maximum width	85 – 117
Corbula, maximum diameter of primary axial tube	1148
Maximum diameter of auxiliary tube	328
Maximum length of anterior leaflet	1640
Maximum width of anterior leaflet	1722
Maximum length of posterior leaflet	1312
Maximum width of posterior leaflet	853

REMARKS: The species is notable for the large size and overall golden colour of the colony, and the long hydrocladia given off at the distal end. In keeping with the size of the colony, the hydrothecae and corbula are also equally large. A sterile colony would have a superficial resemblance to *Lytocarpia spiralis* (Totton, 1930) or *Lytocarpia tenuissima* (Bale, 1914). It may be distinguished from the former by its sympodial, rather than spiral branching and from the latter by the hydrothecal margin being perpendicular, not oblique to the internode.

The corbula is a very complex structure; as careful search revealed no evidence of hydrothecae, we assign the species to *Aglaophenia*. In transverse section, the corbula appears as a large annulus (primary tube) into which is set the smaller (auxiliary) tube, the former supporting the larger leaflets and the latter, the smaller, in a petal-like arrangement.

The points of attachment of both large and small leaflets to their respective axial tubes is so convoluted as to be extremely difficult to describe. The adaptation for protection of the gonothecae is unusual, the gonothecae arising from the auxiliary tube, and enclosed inside the thick, almost impregnable, cylindrical primary axis.

RECORDS FROM NEW ZEALAND: Known from deep water off the Poor Knights Island region (596–705 m depth) and from northeast of Mayor Island, depth about 730 m.

DISTRIBUTION: Known exclusively from New Zealand waters.

ETYMOLOGY: *Hystrix* refers to the prickly appearance of the strange corbula of this species and has been taken from the Latin substantive '*hystrix*', porcupine.

Aglaophenia laxa Allman, 1876a (Figs 64F–I; 65A, B)

Aglaophenia laxa Allman 1876a: 275, pl. 21, figs 5–7; Hilgendorf 1911: 541, figs 1–3; Bedot 1921a: 340; Stechow 1923a: 17; Bale 1924: 260, fig. 15; Trebilcock 1928: 25, pl. 5, figs 5–5b; Totton 1930: 233, figs 67, 68; Ralph 1961b: 69, fig. 10a-c; 1961c: 109; Doak 1971: pl. 17; Gordon & Ballantine 1977: 100; Dawson 1992: 18; Stranks 1993: 11; Bouillon *et al.* 1995: 33.

[Not *Aglaophenia laxa*: Stechow 1909: 93, pl. 6, figs. 10, 11 [= *Aglaophenia whiteleggei* Bale, 1888)].

[Not *Thecocarpus laxus*: Billard, 1913 [= *Lytocarpia acuta* Stechow, 1923a)].

MATERIAL EXAMINED:

NZOI Stns: B215, 1 colony about 30 mm high. RMNH-Coel. slide 2754; **B272**, 3 fragments of a larger colony about 20–30 mm high. No corbulae. RMNH-Coel. slide 2772; **B581**, branched plume 25 mm high; no corbulae. May belong here; **D132**, about 100 mm high, branched colony from dried out sample. No corbulae. Condition poor. Identification doubtful; **D133** (dried out sample), several mutilated colonies about 150 mm high, no corbulae. In addition 4 stems, about 50 mm high, attached to stone. No corbulae; **D138** (dried out sample), colony fragment about 60 mm high; no corbulae; **D139**, colony fragment 50 mm high from dried out sample; no corbulae; **D144**, parts of a larger, fragmented colony. No corbulae; **D175**, part of mutilated colony. No corbulae; **E108**, 2 irregularly branched colonies, about 35 mm high, no corbulae. RMNH-Coel. slide 2300; **E146**, large colony about 150 mm high, composed of branched stems, bearing 10-20 mm long plumes. No corbulae observed. RMNH-Coel. slide 2305; **E341**, *Aglaophenia laxa* Allman, 1876. [Slide 4231, JEW Colln]; **F78**, 2 colonies, 80-90 mm high and rather profusely branched. No corbulae observed. RMNH-Coel. slides 3451; **G695**, 1 colony, about 80 x 100 mm; no corbulae; **G708**, 2 colonies, 1 branched about 100 mm high, and a smaller, unbranched colony. No corbulae; **I341**, several about 80 mm high colonies with corbulae. RMNH-Coel. slide 2142; **K851**, several plumes about 10 mm high on an irregularly branched stem of 70 mm length. May belong here. RMNH-Coel. slide 2272; **P84**, 3 complete colonies, profusely branched, up to 150 mm high, many corbulae; **P100**, numerous colonies with corbulae, up to 100 mm high. Part as RMNH-Coel. 27732, slides 3452 and 3462; **P103**, single branched colony 80 mm high; no corbulae; **P114**, small colony with several corbulae, height about 80 mm; **P444**, many colonies up to 80 mm high, with many corbulae. RMNH-Coel. slide 2235; **Q174**, about 25 colonies developing on a sponge. Sparingly branched. No corbulae; **S237**, 2 fragments, about 30 mm high, 1 branched, the other with 1 corbula.

NMNZ: Opononi, Hokianga Harbour, many plumes 20–30 mm high rising from a stolon creeping on algae. Corbulae abundant, occasionally 2 per colony. NMNZ Co. 668; from crayfish pots, **Tatapouri, Gisborne**, numerous stems rising from a stolon creeping on algae. Many corbulae, occasionally 2 per stem. Associated with *Symplectoscyphus fuscus* (Trebilcock, 1928). NMNZ Co. 658, RMNH-Coel. slide 3029; **Opoutama Beach, Mahia**, A.N. Baker, many plumes about 10–20 mm high on algae, many corbulae. Mixed with *Symplectoscyphus fuscus* (Trebilcock, 1928). NMNZ Co. 561; 2 RMNH-Coel. slides 3010; **Poor Knights Islands**, bottom of Northern Arch, 3 colonies about 70 x 60 mm attached to bryozoans, many corbulae. NMNZ Co. 495; **BS 390**, mutilated colony, 150 mm high, no corbulae. NMNZ Co. 540; **BS 398**, 5 colonies of varied development, the largest is 150 x 100 mm. No corbulae. NMNZ Co. 600, 2 RMNH-Coel. slides 3020; **BS 480**, single colony, 80 mm high, no corbulae. Spread about 50 mm. NMNZ Co. 410; **BS 678**, tangled colony consisting mainly of branched basal stem parts with some hydrocladia attached. NMNZ Co. 734, RMNH-Coel. slide 3323; **BS 679**, about 10 branched colonies up to 80 mm high with many corbulae, partly with bryozoans. With hydrothecae and gonothecae of *Anthohebella parasitica* (Ciamician, 1880). NMNZ Co. 840, RMNH-Coel. 27777, slides 3576; **BS 838**, 3 abraded colonies, about 100 mm high, no corbulae NMNZ Co. 444. Also single mutilated colony about 80 mm high, with single corbula. Condition poor. NMNZ Co. 765, RMNH-Coel 27709, slide 3409; **BS 840**, 3 large colonies about 150–200 mm high, no corbulae, some fragments. Basal part covered with colonies of *Lytocarpia incisa* (Coughtrey, 1875). NMNZ Co. 391; **BS 916**, mutilated colony fragment, 70 mm long, 1 corbula present. NMNZ Co. 699.

NMNZ Ralph Collection: Loc. 133, NMNZ Co. 1005, branched plumes, light brownish colour; hydrocladia widely spaced, curved outwards. 2 RMNH-Coel. slides 3459. Fair slide in RSC as *Aglaophenia laxa*, no data; **Loc. 156**, NMNZ Co. 1007, tube contains no specimen. Poor slide in RSC as *Aglaophenia laxa*, no data; **Loc. 190**, NMNZ Co. 1003, 3 separate plumes and 1 forked, about 20 mm high. Colour brownish-violet, hydrocladia not fully spread out, rather far apart, curved inward. Identified by Ralph as *A. acanthocarpa* but thought to be rather *A. laxa* (RMNH-Coel. slides 3457); **Loc. 269**, NMNZ Co. 1006, isolated and some branched plumes, colour violet-brown; hydrocladia spread, in single plane, widely spaced. RMNH-Coel. slides 3460; **Loc. 313**, NMNZ Co. 1008, no hydrocladia left but judging from the shape of colony is almost certainly *A. laxa*. Poor slide in RSC as *Aglaophenia laxa*, no data; **Loc. 481**, NMNZ Co. 1230, single branched plume 25 mm high, basally slightly polysiphonic; no corbula. RMNH-Coel. slide 3909. On basis small colony of *Sertularella robusta* Coughtrey, 1876, no gonothecae, about 8 mm high. Also *Clytia hemisphaerica* (Linnaeus, 1767); **Loc. 483**; NMNZ Co. 1232, 1 plume 20 mm high with 2 side branches and some smaller, unbranched plumes. No corbulae. RMNH-Coel. slide 3909; **Loc. 491**; NMNZ Co. 1004, separate plumes from a bigger colony, mixed with other hydroids. Hydrocladia spread outward, fairly widely separated. Identified by Ralph as *A. acanthocarpa*, but thought to represent rather *A. laxa*. 2 RMNH-Coel. slides 3458; **Loc. 582**, NMNZ Co. 1291, much mutilated colony that must have been about 80 mm high; no corbulae, many detached hydrocladia. RMNH-Coel. slide 3968.

PMBS: MATERIAL INSPECTED: **Mu 66–24,** colour dark, height 300 mm. Identified by P.M. Ralph. Sample consists of a num-

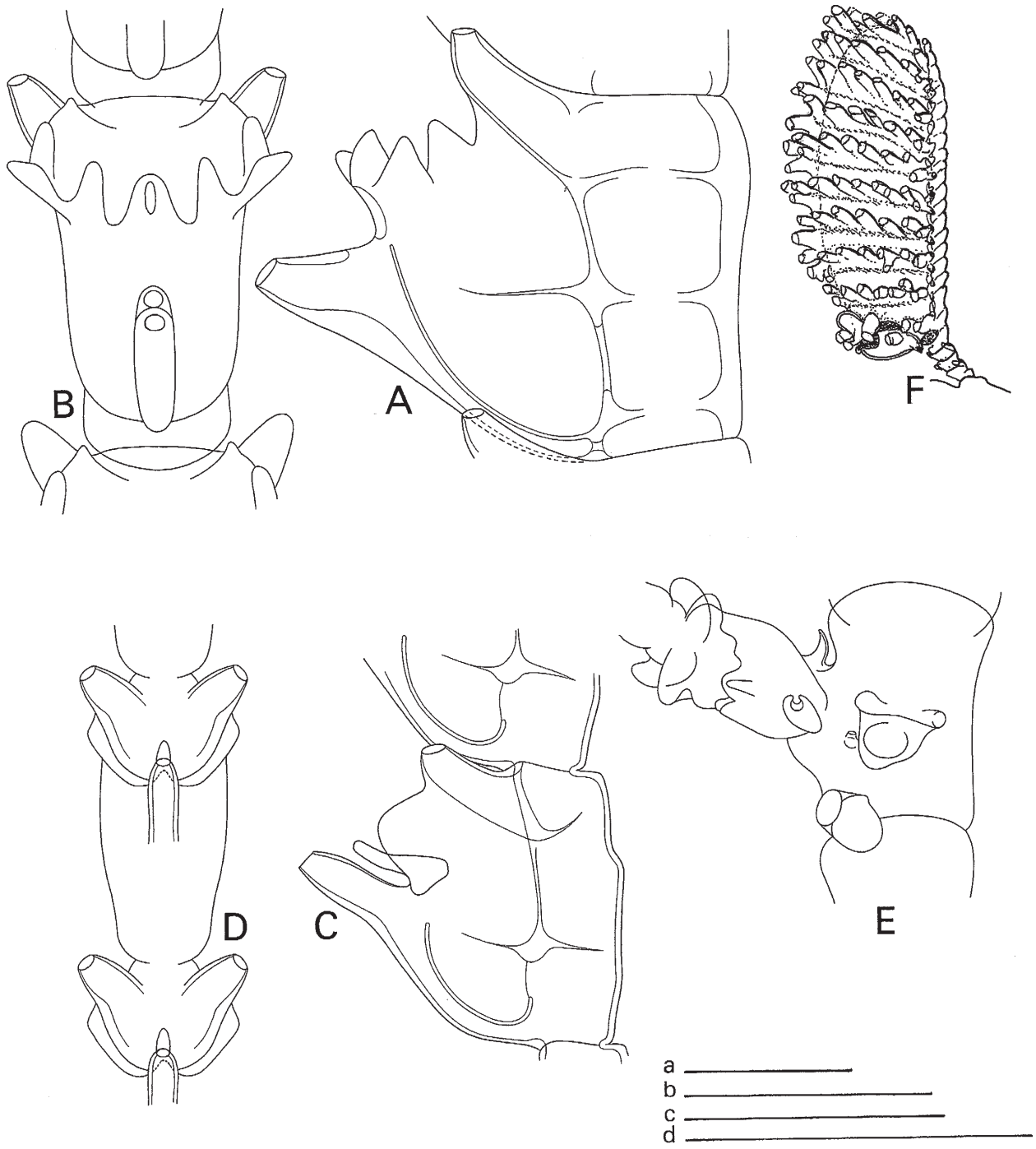

Fig. 65. A, B. ***Aglaophenia laxa*** Allman, 1876. **A**, hydrocladial hydrotheca, lateral view. **B**, the same, frontal view (NZOI Stn B215, slide 2754). W.V. **C, D.** ***Aglaophenia plumosa*** Bale, 1882. **C**, hydrocladial hydrotheca, lateral view. **D**, the same, frontal view (PMBS, Aquarium Point, Portobello, slide 2687). W.V. **E, F**. ***Aglaophenia sinuosa*** Bale, 1888. **E**, insertion of hydrocladium on axis, showing arrangement of nematothecae, frontal view (NZOI Stn P82, slide 3472). W.V. **F**, corbula, lateral view (New South Wales coast, J.E.W. slide 4392). J.E.W. Scales: a, 0.2 mm (C, D); b, 0.2 mm (A, B); c, 0.5 mm (E); d, 78 mm (F).

ber of large fragments, showing branching in 1 plane but quite loose. Some of branches opposite, other at irregular intervals, but always strictly in single plane. Does not agree at all with Ralph's account of "a small species with erect stem up to 8.0 mm in length", etc. RMNH-Coel. 27257, slide 2674.

The dried material (on the card) is characterised by the fairly long and highly diverging median nematotheca. This also appears from Ralph's drawing (1961b, fig. 9h).

TYPE LOCALITY: New Zealand (no further data), Busk's collection, "growing over the surface of a litoral fucus" [Allman, 1876a; holotype most likely in NHM though Stranks (1993) mentions a probable holotype in MOV, MV F59306, microslide; in addition three paratype microslides are mentioned, MV F59307].

REMARKS: All material examined is from shallow to moderately deep water. Most of the colonies examined are large with the irregular, multiplanar branching and brown to black colour also typical of *Aglaophenia divaricata* (Busk, 1852) from southern Australia.

There has been considerable discussion in the past to define the limitation of *A. acanthocarpa* versus *A. laxa* and to separate those from the *A. divaricata* species group (Bale 1924, 1926; Ralph 1961b). These authors distinguished *A. acanthocarpa* from *A. divaricata* by the shallower immersion of its hydrothecae in the internode, the presence of a distinct hydropore connecting the base of the hydrotheca with the internode, the absence of a tapering median nematotheca and the more delicate hydrotheca of *A. acanthocarpa*. Nevertheless, Bale (1926) admitted that *A. divaricata* var. *briggsi* from the east coast of Australia is very closely related to *A. acanthocarpa.*

Aglaophenia divaricata and its varieties are very common coastal hydroids in southeastern Australia (J.E.W. pers. obs.), showing exactly the same peculiar branching habit and coloration as seen in *A. laxa* from New Zealand. The *A. divaricata–A. acanthocarpa* group (including *A. laxa*) is in need of a detailed review; however for the present it seems best to keep the species separate. All our New Zealand material of uncertain status has been listed as *A. laxa* awaiting review.

The relegation of material to *Aglaophenia laxa* rather than to *A. acanthocarpa* (with exception of the material of uncertain status indicated as such in the list of localities) is based on differences in shape of the colony and differences in development of the hydrothecal rim. The typical colony of *A. laxa* is multi-pinnate with the hydrocladia fairly widely spaced and in one plane. The hydrothecal rim is not thickened and the second pair of marginal cusps is only slightly directed outwards; in frontal view of the hydrotheca they stand out like the ears of a horse while the plane of the hydrothecal aperture is only slightly tilted downwards. The frontal view of a typical *A. laxa* is thus quite different from that of a typical *A. acanthocarpa*. However, there is as much variability in the first named species as there is in the second. The shape of the carina on the median marginal cusps and the length and shape of the median nematotheca show the same amount of variability in both species and afford no characters for specific separation. The material considered to represent *A. laxa* usually is darkly coloured but the condition of preservation does not permit definite conclusions about presence or absence of zooxanthellae with the exception of that from NZOI Stn P100. Here the presence of zooxanthellae could be proved beyond doubt. Moreover this material differs by the absence of a septum in the basal part of the hydrotheca, separating hydrothecal cavity from internode, approaching in this way the condition usually ascribed to *Aglaophenia divaricata* (Busk, 1852).

The corbula of *Aglaophenia laxa* was described by Ralph (1961) and does not differ substantially from that of *Aglaophenia acanthocarpa*. Corbulae present in January, February, May, June, November, and December.

RECORDS FROM NEW ZEALAND: In shallow and moderately deep water (21–668 m) all around New Zealand, ranging from 30.5° S to 50.5° S and 159° E to 177° W, being represented both on the Tasman Sea as well as on the Pacific coasts. The species, in the concept presented here, is restricted to New Zealand coastal waters, including the southern area of the Kermadec ridge, the Tasman Sea east of Lord Howe Island, Stewart Island and the Macquarie Island area.

DISTRIBUTION: A characteristic New Zealand species also found in the Tasman Sea and at the Kermadec Ridge.

Aglaophenia plumosa Bale, 1882 (Fig. 65C, D)

Aglaophenia plumosa Bale 1882: 37; 1884: 153, pl. 14, fig. 5, pl. 17, fig. 12; Bartlett 1907: 43; Bedot 1921a: 341; Bale 1924: 257; Stechow 1925a: 260; Blackburn 1938: 318; Cotton & Godfrey 1941: 4, fig; Blackburn 1942: 110; Hodgson 1950: 56, fig. 87; Ralph 1961b: 65–67, fig. 9f-g; Redier 1967: 401; Shepherd & Watson 1970: 140; Morton & Miller 1973: 154; Watson 1973: 194; 1975: 172; Grange *et al*. 1981: 224; McInnes 1982: 163; Staples & Watson 1987: 218; Harris 1990: 243, fig. 11; Dawson 1992: 18; Watson 1992a: 220; Stranks 1993: 12; Watson 1994a: 67; 1996: 79.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 55, poor slide in RSC as *Aglaophenia plumosa*, no data; **Loc. 180**, NMNZ Co. 878, numerous colonies about 10 mm high from a stolon creeping on algae, mixed with *Plumularia setaceoides* Bale, 1882. No corbulae. RMNH-Coel. slides 3577; **Loc. 229**, poor slide in RSC, no data; **Loc. 229A**, NMNZ Co. 1074, 2 plumes 10 and 15 mm high, no corbulae. Also detached hydrocladia.

RMNH-Coel. slide 3738; **Loc. 240**, in RSC slide with 2 labels, a: *Tulpa diverticulata* & *Aglaophenia plumosa*, on b: Diag. necessary *Synthecium* sp., *Hebella*, *E. mollis;* **Loc. 409**, NMNZ Co. 879, bunch of about 25 colonies of which longest about 45 mm, either basally branched or settled onto stem of older colony. No corbulae. RMNH-Coel. slides 3578; **Loc. 527**, poor slide in RSC, no data; **Loc. 528**, NMNZ Co. 880, bunch of about 10 colonies, the highest about 15 mm, from creeping stolon detached from holdfast; no corbulae. RMNH-Coel. slides 3579; **Loc. 732**, poor slide as *Aglaophenia plumosa*, no data (bears also number 527); **Loc. 733**, poor slide in RSC as *Aglaophenia plumosa*, no data.

PMBS: *Aglaophenia ?plumosa*. **Aquarium Point**, on rocks north of Bridge and by lateral-reef, scattered on sides of rocks. Colour brownish. More robust than *Plumularia*, stiff, feather-like. Identified by P.M. Ralph. (Taken from card index).

Material Inspected: **Aquarium Point**, low tide, rocks just north of Bridge, 4.April.1953, colour light brown (on card). Bunch of plumes attached to sponge. A hydroid characterised by the plume-shaped stems, 20–30 mm high and about 10 mm wide. No corbulae seem to occur in this material. RMNH-Coel. 27270, slide 2687.

Type Locality: Aldinga, South Australia (Bale 1882); a number of probable syntypes in MOV are listed by Stranks (1993): 5 microslides, MV F59042-5, and dry material, MV F59046.

Remarks: This species is well characterised and easily recognised by the everted lobes on the lateral hydrothecal rim and the conspicuous, thick marginal cusp. All material we inspected was sterile.

Distribution: Originally described from South Australia and common in shallow waters along the coasts of eastern and southern Australia (cf. Watson 1996). The New Zealand material seen by us does not add to the localities already given by Ralph: Gladstone Pier, Lyttleton Harbour; Menzies Bay, Banks Peninsula; the reef at Portobello Marine Biological Station, and Ringaringa, Stewart Island (see Station List for details). Its total absence in NZOI collections and in the deeper water samples in NMNZ proves the predominantly littoral occurrence of this species.

Aglaophenia sinuosa Bale, 1888 (Figs 65E, F; 66A–E)

Aglaophenia sinuosa Bale 1888: 790–791, pl. 21, figs 1–2; Jäderholm 1917: 19, pl. 2, fig. 9; Stranks 1993: 13; Watson 1994: 67.

Material Examined:

NZOI Stns: P82, many plumes, up to 100 mm long on bivalves on an old black coral stem. Corbulae present. RMNH-Coel 27770; 2 slides 2900; 4 additional slides 3472, partly bleached; **P84**, 1 plume, 150 mm high, many corbulae; **P114**, many plumes with numerous corbulae on shells and bryozoans, up to 100 mm high.

Type Locality: Queensland coast, Australia (about 20° S, no depth recorded, Bale (1888); probable syntypes in MOV, MV F58777, two microslides, Stranks, 1993).

Description (material from NZOI Stn P114): Colony composed of monosiphonic stem up to 100 mm long, divided into distinct internodes by transverse nodes, occasionally forked, attached to solid substratum by means of a few thick stolonal fibres. Each stem internode with an apophysis at about half its length, apophyses alternately directed left and right and rather widely spaced; hydrocladia inserting on apophyses of internodes directed laterally, making an angle of about 80° with long axis of internodes. Each stem apophysis with 3 nematothecae and 1 (frontal) mamelon. 1, large and gaping nematotheca occurs on the front of the internode at the base of the apophysis; the mamelon is almost covered by its large basal part. A second, frontal gutter-shaped nematotheca occurs near the border with the previous internode. A third, strongly curved nematotheca occurs on the back near the insertion of the hydrocladium; it is just visible in frontal view at the upper axil of the apophysis.

Hydrocladia up to 8 mm long, divided into distinct internodes by transverse nodes, up to 20 internodes present. Each internode with 1 hydrotheca and 3 nematothecae: 2 laterals and 1 median nematotheca; all hydrothecae frontally directed. In our specimens there are no internal septa in the internodes.

Hydrotheca fairly big, covering almost entire internode, closely packed, more or less saccate, interior with distinct S-curve as the result of presence of 2 internal septae projecting into interior of hydrotheca, 1 abcauline just above rim of median nematotheca; the second, adcauline, slightly above the hydrothecal bottom; both septa curved upwards at their tip. Hydrothecal aperture slightly sloping downwards, set at an angle of about 80° with the internodal axis; rim with unequal cusps. There is a rounded median, adcauline cusp and 4 pairs of rounded lateral cusps, gradually increasing in size backwards, the fourth being fairly thick and strongly curved outwards. Front of hydrotheca with longitudinal carina running from base of abcauline septum upwards, gradually widening, its apex in lateral aspect slightly surpassing the median adcauline cusp. There is no median adcauline cusp.

Median nematotheca gutter-shaped, with broadly rounded, occasionally slightly crenulated rim, covering about half the hydrothecal frontal wall. Laterals short and stubby, just projecting above hydrothecal rim, with a sudden backward curvature, margin deeply scooped internally.

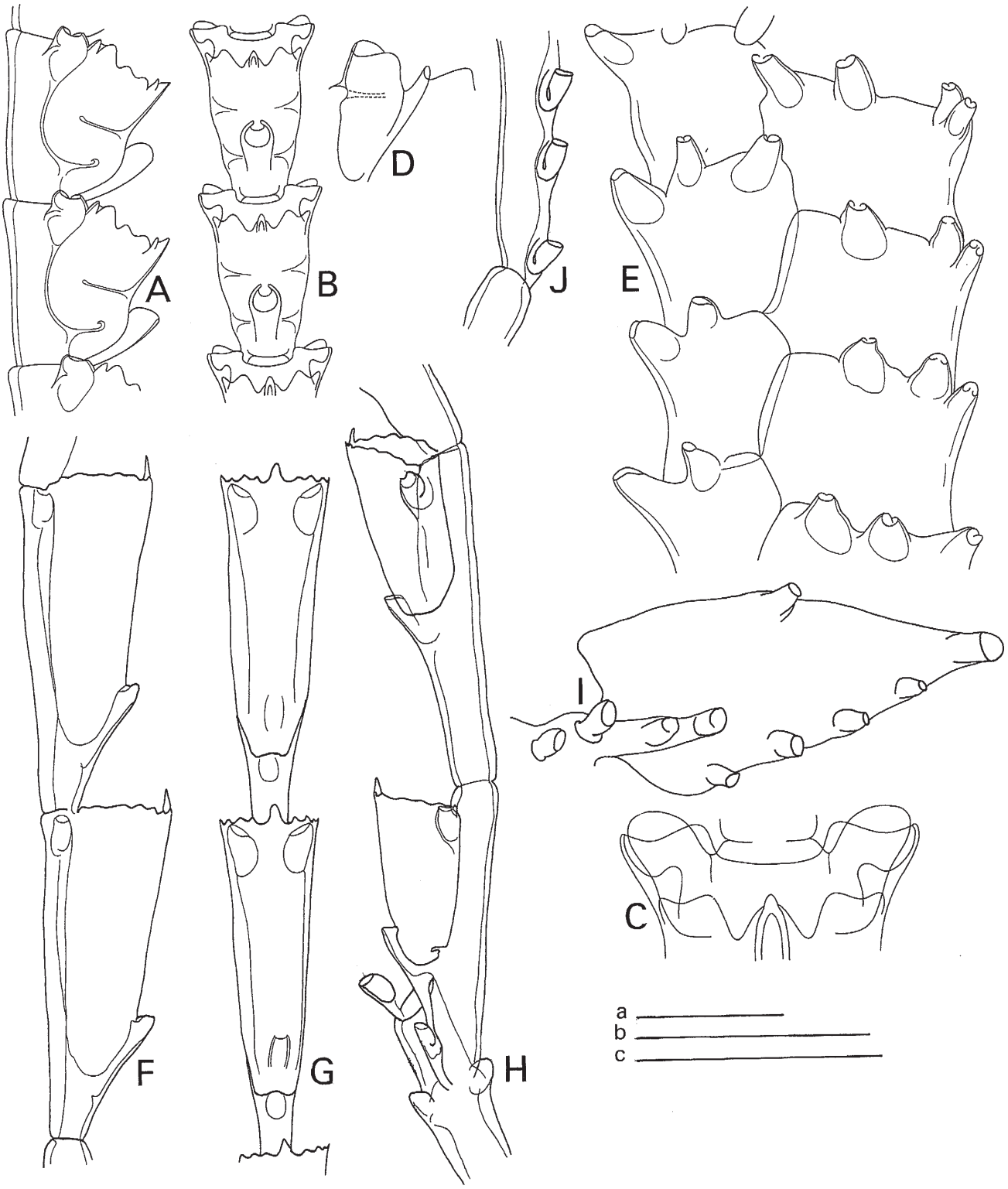

Fig. 66. A–E. ***Aglaophenia sinuosa*** Bale, 1888. **A**, hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, rim of hydrotheca, oblique view from above. **D**, lateral nematotheca of hydrocladial hydrotheca, lateral view. **E**, imbricate gonohydrocladia of corbula, seen from above (NZOI Stn P82, slide 3472). **F–J.** ***Aglaophenia subspiralis*** sp. nov. **F**, hydrocladial hydrothecae, lateral view. **G**, the same, frontal view. **H**, pedicel of corbula, lateral view. **I**, gonohydrocladium, lateral view. **J**, proximal part of 'spur' of gonohydrocladium, lateral view. Scales: a, 1 mm (F–J); b, 0.2 mm (C, D); c, 0.5 mm (A, B, E). W.V.

Our observations on the 3 corbulae found in the various specimens differ from Bale's (1888) description but the difference may be due to sexual dimorphism. The corbulae, that take the place of a hydrocladium, are compact and heavily sclerotised, of elongate oblong shape, about 0.6 mm thick and 2.5 mm long, placed on a pedicel composed of a single internode with normally developed hydrotheca. The jointing of the rhachis is quite obscure, the nodes being scarcely indicated. There are 8–11 pairs of heavily sclerotised, strongly curved gonohydrocladia, curving and folding over the (female) gonothecae but not completely fusing, as the edges of the imbricate leaflets are clearly marked; they fully enclose the interior of the corbula. The basal-most gonohydrocladium is free; the 2 distal-most are incomplete. Each gonohydrocladium divided into 2 parts: a strongly curved leaflet and a short 'spur'. Hydrothecae were not observed; the 'spur' has 3 nematothecae, of which 2, an opposite pair, occur at the top, a third curved nematotheca occur on the 'body' of the spur. A row of gutter-shaped nematothecae occurs along the free edge of the leaflet; 2 strongly curved nematothecae occur at the junction of leaflet and spur. The strongly sclerotised condition of the corbula makes accurate observation difficult.

MEASUREMENTS of *Aglaophenia sinuosa* (in μm):

	NZOI Stns P82 & P114 slides 2900 & 3472
Stem, diameter at base	500 – 600
Internode of stem, length	475 – 560
Diameter	250 – 310
Median stem nematotheca, length	135 – 170
Diameter	140 – 168
Hydrocladial internode, length	310 – 350
Diameter	110 – 125
Hydrotheca, depth	290 – 320
Width at rim	220 – 265
Median nematotheca, length (base-apex)	195 – 215
Width at rim	65 – 80
Lateral nematotheca, length	115 – 130
Maximum diameter	65 – 72
Diameter at rim	16 – 28
Corbula, length gonotheca	335 – 390
Diameter gonotheca	200 – 250

REMARKS: The agreement with Bale's description is complete but for the structure of the corbula; as indicated above this may be due to sexual dimorphism. Type material of this species in the Museum of Victoria, Melbourne, was studied by one of us (J.E.W.). The material consists of two microslide preparations, Canada Balsam mounted, labelled (Bale's handwriting) *Aglaophenia sinuosa*, Bale, Port Denison. One slide bears Bale's personal catalogue number 300. The slides (F58777) are possible syntypes (Stranks1993). They consist of two parts of a stem with hydrocladia. One slide contains a single corbula and the other four corbulae. Other material held in the second author's collection includes: three microslides and preserved material (J.E.W. No. 1868, reef 3 km north of Wollongong NSW, 22 m, Mar.1978; J.E.W. No. 2062, reef 3 km north of Wollongong NSW, 25 m, Mar.1983; J.E.W. No. 4392, Bass Point NSW (south of Wollongong), reef, 18 m, 31.Oct.1995). "The material is fertile with corbulae enclosing well developed planulae and agrees exactly with hydrothecae figured by Bale, the pointed anterior tooth (viewed from above) distinguishing it from *L. howensis* which has a much broader tooth. The drawings of corbulae from my preserved material (J.E.W. 1459 *L. howensis* and J.E.W. 4392 microslide) clearly show that although similar, the corbulae are distinct. Similarities are in the two proximal hydrothecae before the first leaflet and complete fusion of the leaflets after the first (non-fused) leaflet. The first leaflet of *A. sinuosa* seems to be a little inflated. Corbula of *L. howensis* is the longer (4.4 mm cf. 2.9 mm) although both are the same maximum width (1.3 mm). Basic morphology is the same, being com-posed of fused leaflets with nematothecae on upper edges. The *A. sinuosa* nematothecae are a little larger and more conical than those of *L. howensis* and are more crowded. The nodes of the rachis of *A. howensis* are almost vertical whereas those of *A. sinuosa* are distinctly oblique. Viewed from above, the leaflets of *L. howensis* meet with only slight displacement in the middle, whereas those of *A. sinuosa* are more offset although not alternate. One or two corbulae of both species have an extra free leaflet attached to the side of the corbula; however this seems aberrant and not a sexual difference.

One of the interesting features about both species is the regular reversal of segments all the way up the stem. This reversal also includes the way the corbulae face. This character and the unusually stiff and wiry stems are an easy means of recognising both species in the water. The very short, crowded internodes on the ahydrocladiate lower stems and the unusually strong, opposed oblique nodes are present in both species. These nodes often fade distally up the stem.

The species are very difficult to distinguish if infertile and if hydrothecae are seen only in lateral view.

DISTRIBUTION: Originally described from the Queensland coast; additional material comes from the southeast coast of Australia. The present records are from the Tasman Sea in the vicinity of Lord Howe Island, between 59 and 85 m depth, outside New Zealand

coastal waters. Also observed at Norfolk Island at 10 m depth (J.E.W. pers. obs.).

Aglaophenia subspiralis sp. nov. (Fig. 66F–J)

MATERIAL EXAMINED:

NZOI Stn D119, 3 colonies 100–120 mm high, 1 with 3 corbulae (holotype, H-775 in NIWA collection); 1 specimen as RMNH-Coel. 27768, slide 2279, part of type series.

TYPE LOCALITY: Chatham Gap, Southwest Pacific, 43°45.00′ S, 178°40.00′ E.

DESCRIPTION (after specimen on slide 2279): Colony fine and flexuous, with thin, monosiphonic, sparingly branched stem, divided into internodes of varied length, separated by straight nodes. Stem and branches with a frontal row of large nematothecae and apophyses either supporting the hydrocladia, the branches or the corbulae. Nodes only distinct in higher parts of stem and branches. The number of nematothecae on the various internodes differs considerably; the minimum being 6, found on the youngest internodes. Nematothecae on stem and branches cup-shaped, large, with circular to oval aperture; rim smooth. Apophyses rounded, with 2 nematothecae: 1 frontal apophysis and a second almost on the rear. In addition there is a distinct, raised, frontal mamelon. Such a mamelon could not be found on the 2 apophyses that support corbulae.

Hydrocladia 15–20 mm long, composed of 10–20 slender internodes each supporting an elongate hydrotheca and 3 nematothecae: an unpaired median inferior and a pair of lateral nematothecae; nodes distinct and transverse. No septa or rings occur in the internode.

Hydrotheca long and slender; adcauline wall straight, a small knob with a thin ledge projecting into the hydrothecal interior occurs in some hydrothecae but is obscured by remains of the hydranth in others. Abcauline wall of hydrotheca straight and slightly oblique; diameter of hydrotheca slightly increasing apically. Hydrothecal margin perpendicular to internodal axis; rim undulated or produced into a number of rounded triangular cusps, and a much more prominent median cusp; this median cusp not thickened but slightly furrowed frontally.

Median nematotheca covering basal quarter of hydrothecal abcauline wall; adcauline wall with imperfect internal adcauline septum, aperture gutter-shaped, fully open. Lateral nematothecae vase-shaped, with rounded walls; aperture circular, slightly scooped on inner side; rim smooth. Perisarc of hydrotheca thin, that of internode moderately thick.

Only 2 corbulae present in slide on which description is based, these slightly deformed by compression; length of corbula about 4 mm, greatest diameter, at the base, is about 1.5 mm. The rachis of the corbula shows no or only indistinct division into internodes; it supports 5 to 6 pairs of flattened ribs (gonohydrocladia), each with a nematotheca at the base. Each gonohydrocladium is composed of 2 parts: a 'spur', pointing outwards, carrying 4 nematothecae, and a leaf-like portion, folding over the gonothecae but apparently not fused. The 'leaves' are slightly deformed in the slide, but they appear to have a large apical nematotheca; 3 or 4 large nematothecae along the frontal edge and a single nematotheca at the middle of the basal edge. The gonohydrocladia decrease in size apically. The pedicel of each corbula is composed of 2 internodes of normal length, inserting on an apophyses without mamelon (but with the usual pair of nematothecae). The hydrothecae on the 2 internodes of the pedicel are of reduced length; the proximal hydrotheca having 2 median nematothecae, the additional 1 being found on the extreme base of the internode. There are small, fully retracted hydranths inside the hydrothecae indicating that the specimen was captured alive.

MEASUREMENTS of *Aglaophenia subspiralis* (in μm):

	NZOI Stn D119 slide 2279
Stem, width at base	175 – 185
Axial internode, length	1610 – 2625
Diameter	140 – 175
Hydrocladium, length of internode	925 – 950
Diameter of internode	100 – 110
Hydrotheca, length bottom to margin	835 – 900
Diameter at rim	335 – 360
Median nematotheca, length internode to orifice	335 – 380
Width at orifice	55 – 80
Lateral nematotheca, length	145 – 150
Maximum width	70 – 95
Width at orifice	45 – 55
Depth first (basal) hydrotheca of pedicel	540
Diameter at rim	240
Depth second (distal) hydrotheca of pedicel	590
Diameter at rim	300
Corbula, length	3690 & 3450
Corbula, maximum diameter	1560 & 1475
Gonotheca, sex unknown, length	540 – 590
Maximum diameter	310 – 330

REMARKS: Evidently closely related to *Aglaophenia digitulus* sp. nov., in structure of the corbula and shape of

the hydrotheca. There is no trace of a hydrotheca on the gonohydrocladia and consequently the species is referred to *Aglaophenia*. The structure of the colony is remarkably loose and delicate, without secondary tubules along the primary axial tube. The gonohydrocladia, by gradual apical reduction along the corbula, give the corbula an undeveloped look; they nevertheless contain apparently mature gonothecae.

RECORDS FROM NEW ZEALAND: Found only at one locality in the Chatham Islands area, 43°45.00′ S, 178°40.00′ E, at 492 m depth.

DISTRIBUTION: Known only from one New Zealand locality in the Chatham Islands region.

ETYMOLOGY: The species name, *subspiralis*, refers to the similarity, particularly in structure of the hydrothecae, with *Lytocarpia spiralis* Totton, 1930.

Carpocladus gen. nov.

DIAGNOSIS: Aglaopheniid hydroids of the *Cladocarpus* group of genera, i.e., colonial hydroids with distinct stem and variously arranged hydrocladia, that are composed of internodes separated by distinct nodes, each internode having typically a frontally directed, elongated hydrotheca with 1 (exceptionally 2) median, sessile nematothecae and a pair of sessile laterials. Gonosome a phylactocarp springing from basal internode of normally developed hydrocladium and inserting between hydrothecal base and median nematotheca; pedicel composed of a number of internodes with a single nematotheca. Phylactocarp an open corbula, consisting of a number of fused internodes forming a rachis; each internode bears a distinct apophysis, various apophyses alternately directed obliquely left and right. From each apophysis spring 1 large gonotheca and a forked appendage composed of a hydrothecate internode with a prolongation bearing some nematothecae; and an additional nematophorous branch that springs from the hydrothecate internode between the hydrothecal base and the median nematotheca. The forked appendages of left and right side curve over the median row of gonothecae that open apically by means of a slit-shaped aperture with 2 lips.

TYPE SPECIES: *Carpocladus fertilis* sp. nov.

Carpocladus fertilis sp. nov. (Fig. 67A–G)

MATERIAL EXAMINED:

NZOI Stn U566 (holotype, H-776 in NIWA collection), single colony, 120 mm high, attached to dead bryozoans detached from vertical cliff. Several mature, male phylactocarps. RMNH-Coel. slide 2926, part of type series.

TYPE LOCALITY: Tasman Sea, Bellona Trough, 35°05.00′ S, 169°009.70′ E, 979–974 m.

DESCRIPTION (of holotype): Colony erect, composed of robust stem and widely spaced, pinnately arranged, long hydrocladia. Stem strongly polysiphonic, resulting from apposition of secondary tubes against a primary tube bearing frontal nematothecae and apophyses, the latter alternately pointing left and right and obliquely upwards. Base of stem firmly attached to dead bryozoan colony by means of strong stolonal fibres; first centimetre of stem flattened and with oblique hinge-joint permitting colony to rotate in a semicircle according to direction of water current; diameter of axis just above hinge about 1.8 mm. Apophyses of primary tube distinct, more or less globular, with axillar and basal nematotheca; all stem nematothecae more or less in same plane and frontally directed, flask-shaped with rounded basal portion and deeply scooped aperture; rim not everted. No mamelon. Division of primary tube into internodes indistinct, nodes indicated by shallow constriction in perisarc. No nematothecae on back of stem internodes. Hydrocladia 25–30 mm long, composed of up to 35 slender, indistinctly separated internodes; nodes, where visible, transverse. Each internode with fairly deep hydrotheca, covering upper three-quarters of internode.

Abcauline wall of hydrotheca with strong ledge at lower third, projecting into hydrothecal cavity. Curved perisarc thickenings run inside the hydrotheca and meet with thickening of frontal hydrothecal wall halfway between aperture of median nematotheca and hydrothecal rim. Abcauline hydrothecal wall concave above and below intrathecal ledge. Hydropore vertical, circular with thickened annulus from which radiate perisarc thickenings forming a striking feature when hydrotheca is inspected in frontal view. Hydrothecal aperture slightly tilted forwards, at an angle of about 80° with internodal axis. Rim with strong, thickened frontal cusp, rounded in frontal view. Front of hydrotheca carinated in many hydrothecae; carina hollow and forming a conspicuous curved, dagger-shaped projection on front of median cusp, damaged in many hydrothecae, completely absent from others. Typically, length of carina increases distally along hydrocladium, being completely absent from basal hydrotheca and of considerable length in distal part of hydrocladium. Hydrothecal rim with 4 pairs of rounded, more or less triangular lateral cusps of varied height. Fourth pair of cusps attached to lateral nematothecae; adcauline hydrothecal rim deeply scooped.

Median nematotheca, with exception of first internode, covering basal third of abcauline hydrothecal

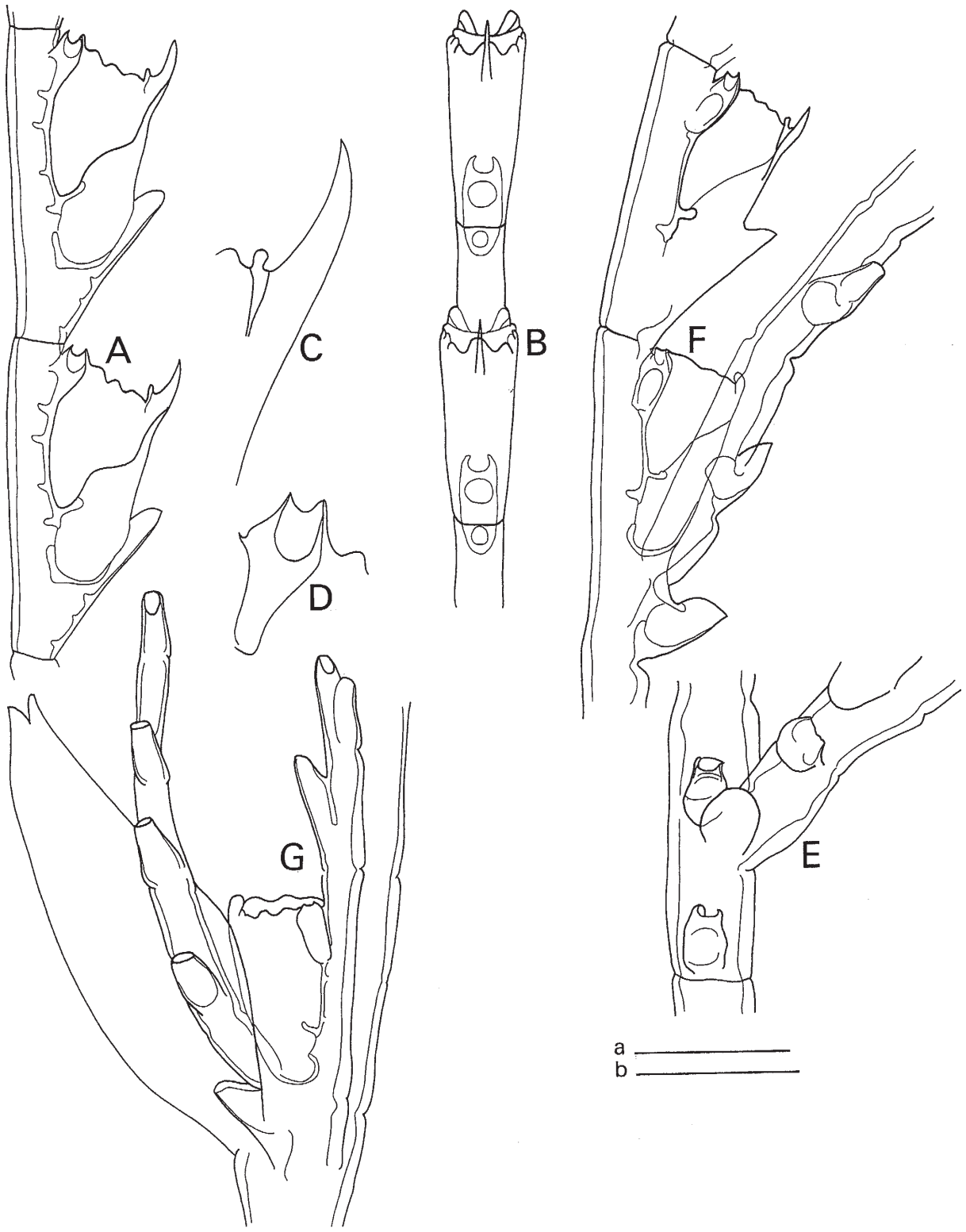

Fig. 67. A–G. ***Carpocladus fertilis*** sp. nov. **A**, hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, median marginal cusp of hydrotheca, lateral view. **D**, lateral nematotheca of hydrotheca, lateral view. **E**, insertion of hydrocladium on axis, showing arrangement of nematothecae in frontal view. **F**, insertion of phylactocarp on stem, showing part of pedicel, lateral view. **G**, portion of rachis of phylactocarp showing forked appendage with hydrotheca and nematothecae, and a gonotheca, in lateral view (NZOI Stn U566, holotype, slide 2926). Scales: a, 1 mm (A, B, E–G); b, 0.2 mm (C, D). W.V.

wall; aperture open, gutter-shaped. Communication with internode wide, with curved ridge; below this ridge 2 more weakly developed ridges. Median nematotheca of first internode more strongly sclerotised and larger than those on next internodes, nematotheca on proximal third of hydrotheca, almost completely adnate. Lateral hydrothecae small, flask-shaped, slightly swollen, just over-reaching hydrothecal rim, without internal septum, rim deeply scooped on inner side. Interior of internode, in addition to ridges under median nematotheca, with a maximum of 5 imperfect septa, of which 1 opposite intrathecal septum, 2 near lateral nematothecae, and 2 additional behind adcauline wall of hydrotheca. All septa, with exception of those at intrathecal septum and at base of laterals, varied in development or absent.

Phylactocarp about 20 mm long (pedicel included) springing from basal internode of normally developed hydrocladium, insertion between median nematotheca and hydrothecal base. Phylactocarp at end of pedicel about 5 mm long consisting of 10–12 internodes separated by distinct, transverse nodes, each with a large, frontally directed nematotheca with swollen basal portion and gutter-shaped aperture. Internodes forming a rachis; each internode with large apophysis with 2 small but quite distinct, more or less axillar nematothecae. Apophyses of rachis alternately directed obliquely upwards and left or right, supporting a forked appendage with at its base a large, elongate-oval gonotheca. Appendages of left and right side curve over the internal row of about 20 gonothecae, thus forming a very open corbula. Forked appendage composed of hydrothecate internode, comparable to first hydrocladial internode as hydrotheca and median nematotheca are separate, and an additional internode bearing 3 nematothecae. An additional nematophorous branch forks off between median nematotheca and base of hydrotheca; bearing 3 lateral nematothecae, all on same side, and a terminal nematotheca. Both length of additional internode and nematophorous branch slightly variable; number of nematothecae may vary from 4 to 5. Gonothecae large, oval, slightly compressed, narrowing apically and with a slit-shaped distal foramen with 2 distinct 'lips'. Phylactocarp ends with fully normal internode with hydrotheca and triplet of nematothecae.

COLOUR: Preserved specimen with yellowish-brown stem, deepening in colour towards base; hydrocladia silvery-white; phylactocarp yellow; gonothecae brown.

REMARKS: The new genus *Carpocladus* has distinct affinities with *Cladocarpus* Allman, 1874, type *Cladocarpus formosus* Allman, 1874; *Aglaophenopsis* Fewkes, 1881, type *Aglaophenopsis hirsuta* Fewkes, 1881; *Streptocaulus* Allman, 1883, type *Streptocaulus pulcherrimus* Allman, 1883; *Nematocarpus* Broch, 1918, type *Halicornaria ramulifera* Allman, 1874, and *Cladocarpoides* Bogle, 1984, type *Cladocarpoides yucatanicus* Bogle, 1984. Off all these genera it resembles *Cladocarpoides* most in the structure of the gonosome, with which it has in common the presence of a hydrotheca on the forked structures of the rachis. The morphological details of these structures, "modified hydrocladia" and "phylactogonia" in the terminology used by Bogle, show differences worthy of generic separation as for instance the strongly sclerotised condition of the dagger-shaped internode bearing the hydrotheca and the sclerotised condition of the forked appendage springing from the base of that hydrotheca in *Cladocarpoides yucatanicus*.

In spite of the fact that the specimen is fully reproductive as evidenced by the condition of the gonothecae, there are no remains of hydranths or coenosarc.

MEASUREMENTS of *Carpocladus fertilis* sp. nov. (in μm):

	NZOI Stn U566 slide 2926
Axial tube, diameter	225 – 280
Stem nematotheca, length	180 – 195
Maximum diameter	135 – 150
Diameter at rim	45 – 55
Hydrocladial internode, length	820 – 985
Diameter at node	145 – 195
Hydrotheca, total length	615 – 645
Diameter at rim	250 – 280
Median nematotheca, total length (measured from apex to septum)	335 – 365
Diameter at margin (measured in frontal view)	35 – 45
Lateral nematothecae, depth	225 – 230
Maximum diameter	85 – 90
Diameter at rim	28 – 34
Phylactocarp, length of pedicel	5000
Length of phylactocarp proper	15000 – 16000
Height	1300 – 1500
Phylactogonial hydrotheca, depth	560 – 570
Male gonotheca, total length	1470 – 1500
Maximum diameter	410 – 490

RECORDS FROM NEW ZEALAND: Known only from the Bellona Trough, Tasman Sea, depth 974–976 m.

ETYMOLOGY: The generic name, *Carpocladus* is an anagram of *Cladocarpus* which the type species, *Carpocladus fertilis*, resembles in structure of colony and gonosome. The specific epithet *fertilis* is taken from the Latin adjective 'fertilis' meaning fertile and refers to the large phylactocarps carrying many gonothecae.

Gymnangium Hincks, 1874

Gymnangium Hincks, 1874 [= *Halicornaria* Allman, 1874; *Taxella* Allman, 1874; *Halaria* Stechow, 1921f; *Halicetta* Stechow, 1921f; *Aglaophenoides* Fraser, 1944]

Type Species: *Aglaophenia pennatula* Hincks, 1868 [? *Aglaophenia pennatula* (Ellis & Solander, 1786)] = *Gymnangium montagui* (Billard, 1912), by subsequent designation (Stechow 1923d).

The following species have been considered and are commented upon.

(* = present name and/or generic designation; gonosome unknown unless state otherwise)

Gymnangium africanum (Millard, 1958) [= *Halicornaria africana* Millard (1958)]

Gymnangium allmanii (Marktanner-Turneretscher, 1890) [= *Halicornaria allmanii* Marktanner-Turneretscher, 1890]. Gonothecae described by Millard (1975).

Gymnangium allmanii var. *sibogae* (Billard, 1913) [= *Halicornaria allmani* var. *sibogae* Billard, 1913]

Gymnangium arcuatum (Lamouroux, 1816) [= *Halicornaria arcuatum* (Lamouroux, 1816), *Halicornaria cornuta* Allman, 1866]. Gonothecae described by Millard (1975).

Gymnangium arcuatum var. *epizooticum* (Millard, 1958) [= *Halicornaria arcuata* var. *epizootica* Millard, 1958]

Gymnangium ascidioides (Bale, 1882) (= *Halicornaria ascidioides* Bale, 1882). Gonothecae mentioned by Bale (1884), described here.

Gymnangium aureum (Watson, 1973) [= *Halicornaria aurea* Watson, 1973]

Gymnangium avicularis (Kirchenpauer, 1872) [= **Halicornopsis elegans* (Lamarck, 1816)]

Gymnangium baileyi (Bale, 1884) [= *Halicornaria baileyi* Bale, 1884]

Gymnangium balei (Marktanner-Turneretscher, 1890) [*Aglaophenia balei* Marktanner-Turneretscher, 1890; *Pentandra balei* (Marktanner-Turneretscher, 1890); *Halicornaria hians* var. *balei* Billard, 1913; **Gymnangium hians* var. *balei* (Marktanner-Turneretscher, 1890); *Halicornaria pansa* Stechow, 1919]

Gymnangium balei (von Lendenfeld, 1885) [= **Pentandra balei* von Lendenfeld, 1885a]

Gymnangium bipinnatum (Allman, 1876) [= *Halicornaria bipinnata* Allman, 1876; **Gymnangium eximium* (Allman, 1874)]

Gymnangium birostratum (Bale, 1914a) [= *Halicornaria birostrata* Bale, 1914]. Gonothecae described by Bale (1914a).

Gymnangium bryani (Nutting, 1905) [= *Halicornaria bryani* Nutting, 1905). Gonothecae described by Nutting (1905).

Gymnangium campanulatus (Ritchie, 1912) [= **Cladocarpus (?) campanulatus* Ritchie, 1912; *Halicornaria campanulata* (Ritchie, 1912); *Gymnangium (Aliaria) campanulata* (Ritchie, 1912)]

Gymnangium comes (Briggs, 1938) [= *Halicornaria intermedia* Bale, 1914a; *Halicornaria furcata* var. *intermedia* Bale, 1914a; *Halicornaria comes* Briggs, 1938]

Gymnangium constrictum (Allman, 1877) [= *Aglaophenia constricta* Allman, 1877]

Gymnangium copiosum (Jarvis, 1922) [= *Halicornaria copiosa* Jarvis, 1922; **Gymnangium eximium* (Allman, 1874)]

Gymnangium cornutum (Allman, 1866) [= **Gymnangium arcuatum* (Lamouroux, 1816)]

Gymnangium eximium (Allman, 1874) [= *Taxella eximia* Allman, 1874; *Halicornaria saccaria* Allman, 1876; *Halicornaria bipinnata* Allman, 1876; *Halicornaria setosa* Armstrong, 1879; *Lytocarpus longicornis* Allman, 1884; *Halicornaria flabellata* Marktanner-Turneretscher, 1890; *Halicornaria intermedia* Billard, 1913; *Halicornaria copiosa* Jarvis, 1922; *Gymnangium gracilicaule lignosum* Millard, 1975]. Gonosome described by Ryland and Gibbons (1991).

Gymnangium expansum (Jäderholm, 1903) [= *Halicornaria expansa* Jäderholm. 1903; *Halicornaria sibogae* Billard, 1918; *Halicetta expansa* (Jäderholm, 1903)]. Gonothecae described by Jäderholm (1903).

Gymnangium exsertum (Millard, 1962) [= *Halicornaria exserta* Millard, 1962]. Gonothecae described by Millard (1962).

Gymnangium excertum epizooticum (Millard, 1962) [= *Halicornaria excertum epizooticum* Millard, 1962]

Gymnangium ferlusi (Billard, 1901) [= *Halicornaria ferlusi* Billard, 1901; *Gymnangium (Haliaria) ferlusi* (Billard, 1901)]. Gonothecae described by Millard (1975).

Gymnangium ferlusi var. *brevis* (Jarvis, 1922) [= *Halicornaria ferlusi* var. *brevis* Jarvis, 1922]

Gymnangium flabellatum (Marktanner-Turneretscher, 1890) [= *Halicornaria flabellata* Marktanner-Turneretscher, 1890; *Gymnangium (Halicetta) flabellata* (Marktanner-Turneretscher, 1890); **Gymnangium eximium* (Allman, 1874)]

Gymnangium flavum (Nutting, 1905) [= *Halicornaria flava* Nutting, 1905; *Halicornaria balei* var. *flava* Ritchie, 1910b]. Gonothecae described by Nutting (1905).

Gymnangium furcatum (Bale, 1884) [= *Halicornaria furcata* Bale, 1884]

Gymnangium furcatum var. *intermedium* (Bale, 1914a) [= *Halicornaria intermedia* Bale, 1914a; **Gymnangium comes* (Briggs, 1930)]

Gymnangium goniodes (Briggs, 1915) l= *Halicornaria goniodes* Briggs, 1915]

Gymnangium gracilicaule (Jäderholm, 1903) [= *Lytocarpus gracilicaulis* Jäderholm, 1903; *Halicornaria gracilicaulis* (Jäderholm, 1903); *Halicetta gracilicaulis* (Jäderholm, 1903)]

Gymnangium gracilicaule var. *armatum* (Billard, 1913) [= *Halicornaria gracilicaulis* var. *armata* Billard, 1913]

Gymnangium gracilicaule lignosum Millard, 1975 [= **Gymnangium eximium* (Allman, 1874)]

Gymnangium haswellii (Bale, 1884) [= *Halicornaria haswellii* Bale, 1884]

Gymnangium hians (Busk, 1852) [= *Aglaophenia hians* (Busk, 1852); *Halicornaria hians* (Busk, 1852]

Gymnangium hians var. *balei* (Marktanner-Turneretscher, 1890) [= *Aglaophenia balei* Marktanner-Turneretscher, 1890; *Gymnangium balei* (Marktanner-Turneretscher, 1890); *Halicornaria hians* var. *balei* Marktanner-Turneretscher, 1890; *Aglaophenia (Macrorhynchia) pansa* Kirchenpauer, 1876]

Gymnangium hians var. *flava* (Nutting, 1905) [= *Halicornaria flava* Nutting, 1905; *Halicornaria hians* var. *flava* Nutting, 1905; **Gymnangium flavum* (Nutting, 1905)]

Gymnangium hians var. *laxum* (Ritchie, 1910b) [= *Halicornaria hians* var. *laxa* Ritchie, 1910b]
Gymnangium hians var. *profundum* (Ritchie, 1909b) [= *Halicornaria hians* var. *profunda* Ritchie, 1909b]
Gymnangium humile (Bale, 1884) [= *Halicornaria humilis* Bale, 1884; *Gymnangium (Halaria) humilis* (Bale, 1884)]
Gymnangium ilicistomum (Bale, 1882) [= *Halicornaria ilicistoma* Bale, 1882; *Gymnangium (Halaria) ilicistomum* (Bale, 1882)]
Gymnangium indivisum (Fraser, 1936b) [= *Halicornaria indivisa* Fraser, 1936; *Haliaria indivisa* (Fraser, 1936b)]
Gymnangium insigne (Allman, 1876) [= *Makrorhynchia insignis* Allman, 1874; *Halicornaria insignis* (Allman, 1876)]
Gymnangium integrum (G.O. Sars, 1873) [= **Cladocarpus integer* (G.O. Sars, 1874)]
Gymnangium intermedium (Billard, 1913) [= *Halicornaria intermedia* Billard, 1913; **Gymnangium eximium* (Allman, 1874)]
Gymnangium intermedium (Bale, 1914a) [= *Halicornaria intermedia* Bale, 1914a; *Halicornaria furcata* var. *intermedia* Bale, 1914a; *Halicornaria comes* Briggs, 1939; **Gymnangium comes* (Briggs, 1939)]
Gymnangium intermedium (Billard, 1913) [= *Halicornaria intermedia* Billard, 1913; **Gymnangium eximium* (Allman, 1874)]
Gymnangium ishikawai (Stechow, 1907) [= *Halicornaria ishikawai* Stechow, 1907]
Gymnangium japonicum Watson & Vervoort, 2001
Gymnangium longicaudum (Nutting, 1900) [= *Halicornaria longicauda* Nutting, 1900]
Gymnangium longicorne (Busk, 1852) [= *Plumularia longicornis* Busk, 1852; *Aglaophenia longicornis* (Busk, 1852); *Halicornaria longicornis* (Busk, 1852)]
Gymnangium longicorne var. *sibogae* (Billard, 1913) [= *Halicornaria longicornis* var. *sibogae* Billard, 1913]
Gymnangium longirostre (Kirchenpauer, 1872) [= *Aglaophenia longirostris* Kirchenpauer, 1872; *Halicornaria longirostris* (Kirchenpauer, 1872); *Aglaophenia thompsoni* Bale, 1882)]
Gymnangium magnirostre (Nutting, 1927) [= (?)*Halicornaria magnirostris* Nutting, 1927]
Gymnangium mammillatum (Fraser, 1943) [= *Aglaophenoides mammillata* Fraser, 1943]
Gymnangium mitratum (Allman, 1885) [= **Macrorhynchia filamentosa* (Lamarck, 1816)]
Gymnangium montagui (Billard, 1912) [= *?Sertularia pennatula* Ellis & Solander, 1786; *Halicornaria montagui* Billard, 1912]. Gonothecae briefly described by Cornelius (1995b).
Gymnangium pansum (Kirchenpauer, 1876) [= *Aglaophenia (Macrorhynchia) pansa* Kirchenpauer, 1876 = **Gymnangium hians* var. *balei* (Marktanner-Turneretscher, 1890)]
Gymnangium parvulum (von Lendenfeld, 1885a) [= **Pentandra parvula* von Lendenfeld, 1885a
Gymnangium pennatulum (Ellis & Solander, 1786) [= **Gymnangium montagui* (Billard, 1912)]
Gymnangium plumosum (Allman, 1883) [= *Halicornaria plumosa* Allman, 1883; **Gymnangium allmanii* (Marktanner-Turneretscher, 1890)]
Gymnangium plumosum (Armstrong, 1879) [= *Halicornaria plumosa* Armstrong, 1879; **Aglaophenia indica* Stechow, 1923d]
Gymnangium proliferum (Bale, 1882) [= *Aglaophenia prolifera* Bale, 1882; *Halicornaria prolifera* (Bale, 1882)]
Gymnangium ramuliferum (Allman, 1874] [= **Nematocarpus ramuliferus* (Allman, 1874); *Cladocarpus ramuliferum* (Allman, 1874); *Halicornaria ramulifera* Allman, 1874]
Gymnangium regalis (Totton, 1930) [= *Halicornaria regalis* Totton, 1930]
Gymnangium richardi (Bedot, 1921c) [= *Halicornaria richardi* Bedot, 1921c]
Gymnangium richardi var. [= *Halicornaria richardi* var.]
Gymnangium roretzi (Marktanner-Turneretscher, 1890) [= *Halicornaria roretzi* Marktanner-Turneretscher, 1890]
Gymnangium rostratum (Bale, 1924) [= *Halicornaria rostrata* (Bale, 1924)]
Gymnangium saccaria (Allman, 1876) [= *Halicornaria saccaria* Allman, 1876; **Gymnangium eximium* (Allman, 1874)]
Gymnangium segmentatum (Warren, 1908) [= *Halicornaria segmentata* Warren, 1908; **Macrorhynchia filamentosa* (Lamarck, 1816)]
Gymnangium setosum (Armstrong, 1879 [= *Halicornaria setosa* Armstrong, 1879; *Gymnangium (Halicetta) setosum* (Armstrong, 1879); **Gymnangium eximium* (Allman, 1874)]
Gymnangium sibogae (Billard, 1913) [= *Halicornaria sibogae* Billard, 1913; *Gymnangium (Halicetta) sibogae* (Billard, 1918); **Gymnangium expansum* (Jäderholm, 1903)]
Gymnangium sinuosum (Fraser, 1925) [= *Halicornaria sinuosa* Fraser, 1925]
Gymnangium speciosum (Allman, 1877) [= *Halicornaria speciosa* Allman, 1877]
Gymnangium superbum (Bale, 1884) [= *Halicornaria superba* Bale, 1884]
Gymnangium tenuirostre (Nutting, 1927) [= *Halicornaria tenuirostris* Nutting, 1927]
**Gymnangium tethidis* (Ritchie, 1911) [= *Halicornaria tethidis* Ritchie, 1911]
Gymnangium tubuliferum (Bale, 1914c) [= *Halicornaria tubulifera* Bale, 1914c; *Gymnangium (Halicetta) tubuliferum* (Bale, 1914c)]
Gymnangium twista (Rho & Park, 1984) [= **Gymnangium vegae* (Jäderholm, 1903)]
Gymnangium undulatum Watson, 2000
Gymnangium unjinense Watson, 2000
Gymnangium urceoliferum (Lamarck, 1816) [= *Plumularia urceolifera* Lamarck, 1816; *Gymnangium (Haliaria) urceoliferum* (Lamarck, 1816)]
Gymnangium urceoliferum var. *scandens* Bale, 1914 [= *Halicornaria urceolifera* var. *scandens* Bale, 1914]
Gymnangium variabile (Nutting, 1900) [= *Halicornaria variabilis* Nutting, 1900]
Gymnangium vegae (Jäderholm, 1903) [= *Halicornaria vegae* Jäderholm, 1903; *Gymnangium (Haliaria) vegae* (Jäderholm, 1903); *Halicornaria twista* Rho & Park, 1984]
Gymnangium sp. (von Campenhausen, 1896a) [= *Halicornaria* sp. von Campenhausen, 1896a; **Gymnangium gracilicaule* (Jäderholm, 1903]

Gymnangium arcuatum (Lamouroux, 1816)

Aglaophenia arcuata Lamouroux 1816: 167, pl. 4, fig. 4a, B.
Halicornaria arcuata: Billard 1907: 337, 366, 388, 390, fig. 13; Stechow 1912: 369; Bale 1913: 141–145, pl. 13, figs 1–4; Broch 1914: 26, fig. 3; Bedot 1921a: 346; Day *et al.* 1952: 404; Millard 1958: 218, fig. 15d, e; 1962: 307, fig. 10E; Redier 1967: 403.

Gymnangium arcuatum: Stechow 1923d: 236; Rees & Thursfield 1965: 169; Millard, 1973: 23, fig. 1; 1975: 436, fig. 135A–F; 1978: 192 *et seq*.; Bouillon *et al.* 1995: 35.
Halicornaria cornuta Allman 1885: 153, pl. 23 figs 1–4; Billard, 1907: 369.

See Remarks in discussion of *Gymnangium ascidioides* (Bale, 1882).

Gymnangium ascidioides (Bale, 1882) (Fig. 68A–D)

Aglaophenia ascidioides Bale 1882: 28, 32, 45, pl. 13, fig. 5.
Halicornaria ascidioides: Bale 1884: 176–177, pl. 13, fig. 2, pl. 16, fig. 1; Whitelegge 1899: 194; Bartlett 1907: 43; Bale 1913: 142–145, pl. 13, figs 5–6; Jäderholm 1917: 21, pl. 2, fig. 13; Briggs 1918: 34, 43, pl. 6, fig. 3; Bedot 1921a: 346; Shepherd & Watson 1970: 140.
Gymnangium ascidioides: Stechow 1923d: 236; Watson 1994a: 67; 1996: 79.

MATERIAL EXAMINED:

NZOI Stns: P84, about15 plumes, up to 120 mm high, with gonothecae, on shells. Length of hydrocladia about 12 mm. With a few small colonies of *Gymnangium humile* (Bale, 1884) arising from a stolon creeping on back of stem and on some of hydrocladia. 2 RMNH-Coel. slides 2902; **P100**, several bunches composed of a few about 80 mm high plumes. No gonothecae; **P101**, 3 plumes about 60 mm high; no gonothecae.

MEASUREMENTS of *Gymnangium ascidioides* (in μm):

	NZOI Stn P84 slides 2902
Axial tube, diameter	240 – 365
Length of internode (with 2 apophyses)	460 – 475
Stem nematotheca, length	95 – 105
Maximum diameter	55 – 78
Diameter of one of orifices at rim	11 – 15
Hydrocladial internode, length	245 – 257
Diameter at node	100 – 115
Hydrotheca, total depth	225 – 235
Diameter at rim	140 – 145
Median nematotheca, total length (measured from apex to node)	365 – 380
Length free part	180 – 195
Diameter at rim (measured in frontal view)	20 – 22
Lateral nematothecae, depth	78 – 95
Maximum diameter	73 – 78
Diameter of one of orifices at rim	19 – 20
Gonotheca, total length	740 – 788
Maximum diameter	425 – 525

TYPE LOCALITY: Queenscliff, Victoria, Australia (Bale 1882; syntypes, 2 microslides (MV F58901–2) and dry material (MV F59029) in MOV, Stranks 1993).

REMARKS: We have followed Bale (1913: 142 *et seq*.) in separating this species from *Gymnangium arcuatum* (Lamouroux, 1816), because of differences in the arrangement of the hydrocladia and morphology of the hydrothecae and their nematothecae. The stem, that may be as long as 120 mm, is monosiphonic over its whole length, though in the lower parts of the stem the division into internodes is completely lost and the walls are strongly sclerotised. Internodes are only visible in the higher parts of the stem where the arrangement of the hydrocladia is largely opposite, a slight shift of the apophyses occurring in some internodes. These are on the front of the stem and are directed obliquely upwards and laterally; they are well separated from the first hydrocladial internode and have two nematothecae on the front and one on the back, just visible frontally. These nematothecae, as well as the laterals are heart-shaped with two laterally directed, terminal apertures and a distinct transverse septum or ridge. The hydrothecae are set at an angle of about 45° to the axis of the internode and have well developed median abcauline and adcauline cusps, that on the adcauline side is even bigger. The hydrothecal rim, between the two cusps, has two pairs of blunt, triangular cusps, best seen in lateral aspect (fig. 68A). Median nematotheca large, running almost full length of abcauline hydrothecal wall, only a small part of the frontal cusp free; a big, subcircular foramen just behind the cusp; greatest diameter just above cusp, then rather sharply curving to continue as a narrowing tube with circular aperture reaching above level of the adcauline median cusp. The length of free part of the median nematotheca increases distally along internode. In frontal view the hydrothecal marginal cusps are only moderately directed outwards. The hydrotheca has a well developed internal septum running from the middle of the abcauline wall obliquely forwards towards the base of the lateral nematothecae; apex of the septum is thickened and rounded (fig. 68A).

Many, apparently male, gonothecae in the higher parts of some of the larger plumes of the material from NZOI Stn P84. Gonotheca cone-shaped, with rounded base and truncate apex; the pedicel is placed eccentrically and inserts on the axial apophysis. Gonothecae contain what appears to be a large ovoid mass of developing spermatocytes; the apex is flattened and surrounded by a halo of refringent cells, much resembling the (female) medusoids of *Macrorhynchia philippina* (Kirchenpauer, 1872) figured by Gravier (1970; fig. 1c). Bouillon (1985a: 165) indicates, on the authority of Gravier-Bonnet, that *Gymnangium ferlusi* (Billard, 1901) also liberates free eumedusoids.

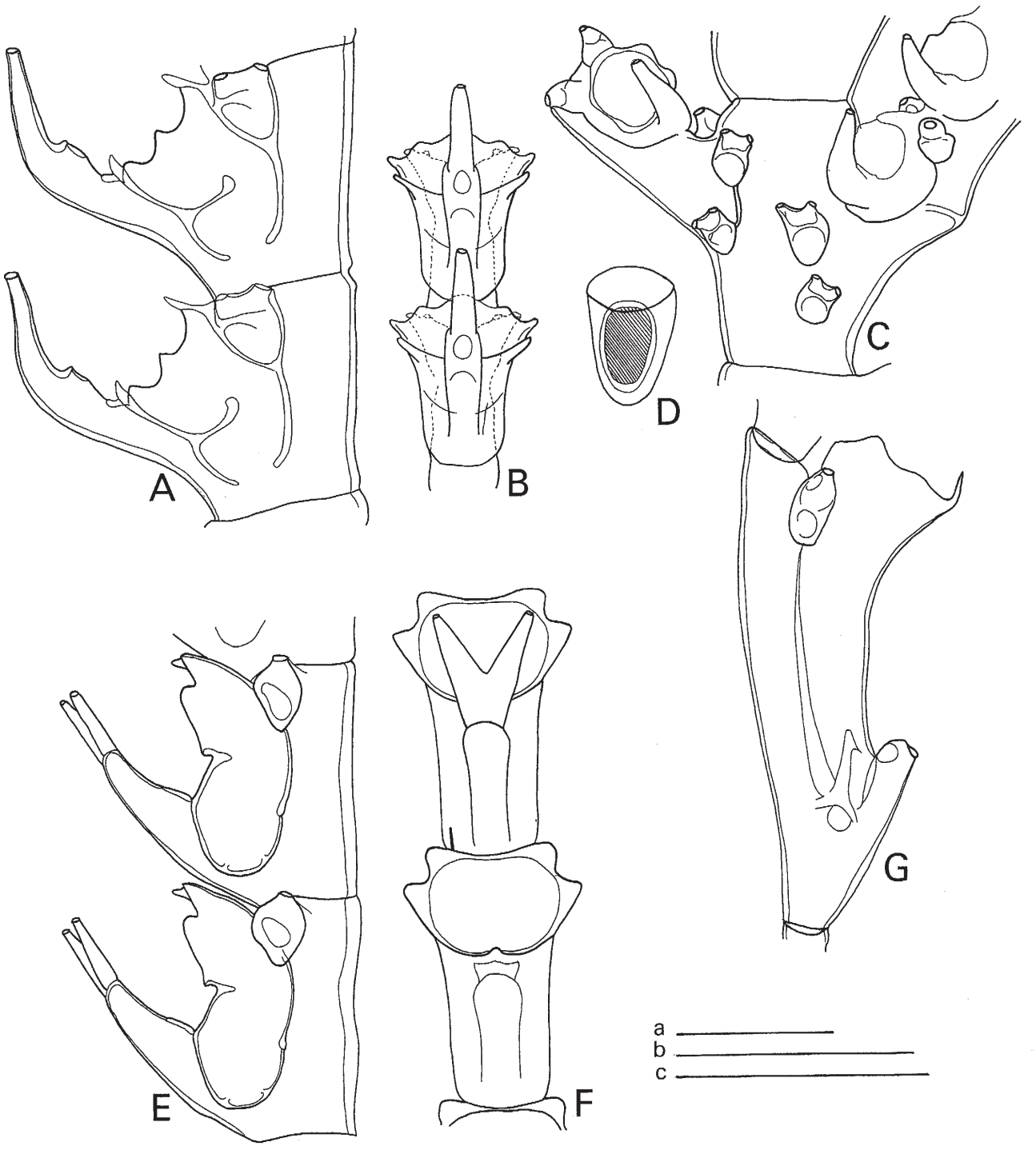

Fig. 68. A–D. ***Gymnangium ascidioides*** (Bale, 1882). **A**, hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, insertion of hydrocladia on stem internode, showing arrangement of nematothecae. **D**, outline of gonotheca (NZOI Stn P84, slide 2902). **E, F.** ***Gymnangium birostratum*** (Bale, 1914). **E**, hydrocladial hydrothecae, lateral view. **F**, the same, frontal view (NZOI Stn G875, slide 2879). **G**. ***Gymnangium expansum*** (Jäderholm, 1904), hydrocladial hydrotheca (NZOI Stn D159, slide 2850). Scales: a, 0.2 mm (A, B); b, 0.2 mm (D); c, 0.5 mm (C, E–G). W.V.

DISTRIBUTION: Originally described from Queenscliff, Victoria, Australia (Bale 1882; according to Briggs (1918) also recorded from Port Phillip Bay, Victoria). The species occurs in oceanic conditions at Port Phillip Heads (J.E. Watson, personal observation). Whitelegge (1899) found specimens at Maroubra and Coogee, New South Wales; Jäderholm (1917) mentioned specimens from the coast near Mount Dromedary, New South Wales. The species has also been recorded from West Island, South Australia (Shepherd & Watson 1970) and by Watson (1994a) from eastern Bass Strait, 16 m depth. The species is also mentioned in a review paper (Watson 1996) from the western Australian coast between Perth and Albany. The present specimens are all from the Lord Howe Island area, outside New Zealand coastal waters, and were obtained between 32 and 59 m depth; gonothecae occurred in May.

Gymnangium expansum (Jäderholm, 1903)
(Figs 68G; 69A)

Halicornaria expansa Jäderholm 1903: 303–304, pl. 14, figs 5–7; Stechow 1907: 200; 1909: 5, 103–104, fig. 8; 1913b: 10; Jäderholm 1919: 26, pl. 6, fig. 7; Bedot 1921a: 346; Stechow 1923b: 19; von Schenck 1965: 942; Rho & Park 1986: 100; Park 1992: 295.
Halicornaria sibogae Billard 1918: 25–26, fig. 4; van Soest 1976: 87.
Gymnangium (Halicetta) expansum: Stechow 1923d: 234.
Halicetta expansa: Yamada 1959: 83; Rho & Park 1980: 26–27, pl. 9, figs 1–5; Hirohito 1995 (English text): 293, fig. 103a.
Gymnangium expansum: Vervoort 1966: 165, figs 65–66; Rees & Vervoort 1987: 163, fig. 38a-b.

MATERIAL EXAMINED:

NZOI Stns: D159, single colony, 75 mm high, with characteristic mode of branching. No gonothecae. RMNH-Coel. slide 2840; **E822**, several top parts of colonies, about 60 mm high, RMNH-Coel. slide 2846.

TYPE LOCALITY: Southern Japan, 91–104 m; holotype in ZRS.

REMARKS: We have little to add to the descriptions of this characteristic species given by previous authors; the colonies from both localities having the peculiar helicoid structure with a pair of branches leaving the spirally twisted main stem at each turn. The two sets of colonies differ in the development of the perisarc and details of development of the cusps at the hydrothecal rim. The colonies from NZOI Stn D159 have fairly thick perisarc and consequently the hydrothecae in the slides are not mis-shapen. The abcauline hydrothecal wall is moderately thick and the median abcauline cusp at its end is firm. The hydrothecal margin has two pairs of rounded lateral cusps; the adcauline rim between the two posterior cusps has a rounded embayment. In slightly oblique position the abcauline intrathecal ridge appears like a narrow plate with rounded edge, pointing obliquely upwards; the hydropore, just beneath the base of the plate, is a circular foramen with thickened rim.

In the material from NZOI Stn E882 the perisarc is notably thin and as a result most of the hydrothecae in the slide are collapsed. The intrathecal ridge is sharp and pointed and is directed straight into the hydrothecal interior. The hydrothecal rim, between the two posterior marginal cusps, is elevated and shows as an obtuse cusp in lateral view (fig. 69A).

MEASUREMENTS of *Gymnangium expansum* (in μm):

	NZOI Stn D159 slide 2840	*Galathea* Stn 490 (Vervoort 1966)	John Murray Exped. Stn 124 (Rees & Vervoort 1987)
Axial internode, length	820 – 950	580 – 675	725 – 780
Diameter at node	310 – 390	245 – 260	340 – 390
Axial nematotheca, length	155 – 180	135 – 150	120 – 140
Maximum diameter	130 – 155	95 – 105	85 – 100
Diameter at rim	28 – 34		
Hydrocladial internode, length	885 – 985	865 – 950	815 – 885
Diameter at node	115 – 130	135 – 148	125 – 140
Hydrotheca, total depth	655 – 785	865 – 890	815 – 850
Diameter at rim	245 – 275	310 – 350	305 – 355
Median nematotheca, total length (measured from apex to bottom of hydrotheca)	220 – 225		
Length free part		55 – 65	55 – 60
Diameter at apex	20 – 22	40 – 48	28 – 36
Lateral nematotheca, depth	110 – 120	150 – 160	125 – 140
Diameter at rim	25 – 30	35 – 40	20 – 28

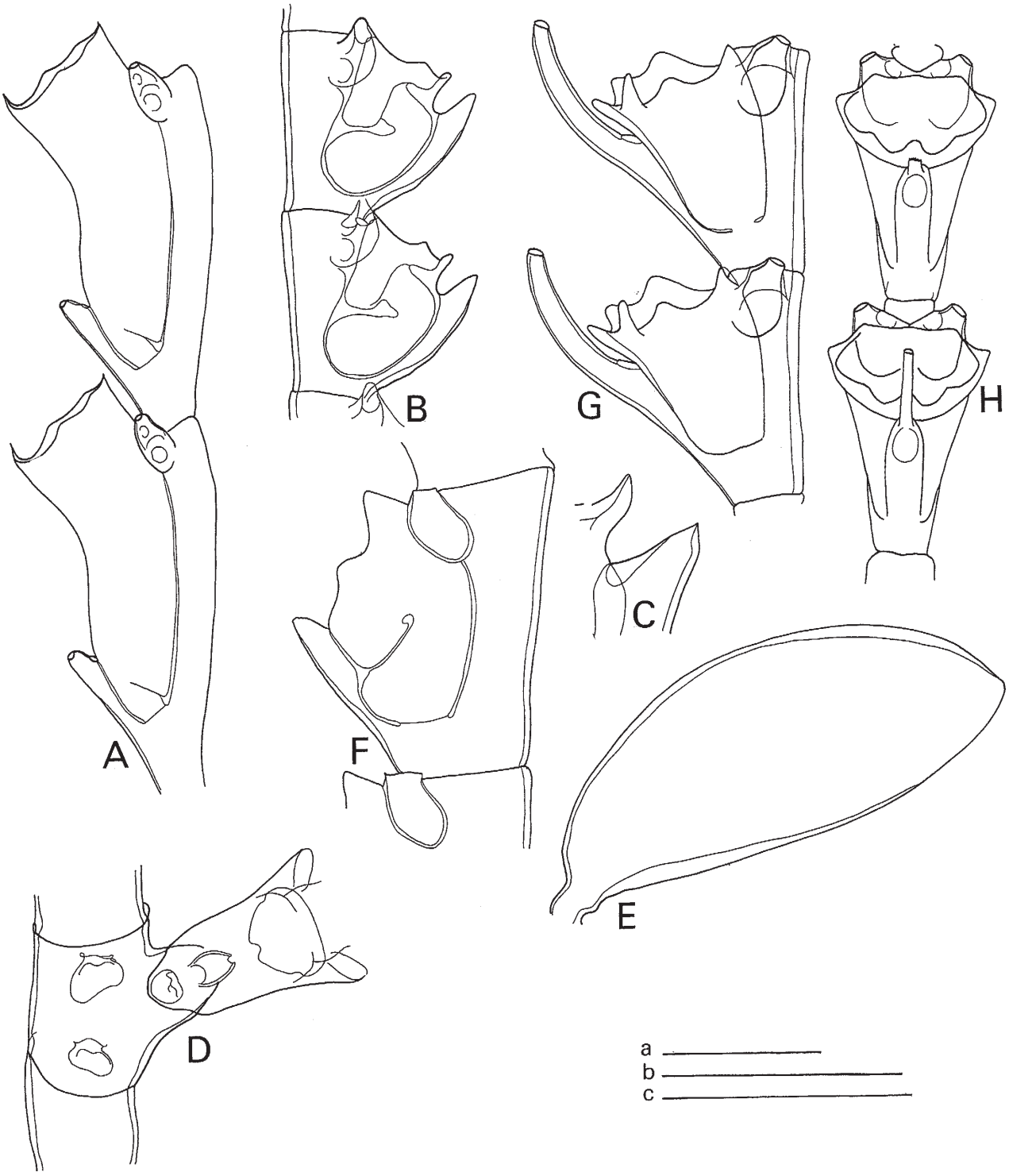

Fig. 69. A. ***Gymnangium expansum*** (Jäderholm, 1904), pair of hydrocladial hydrothecae, lateral view (NZOI Stn E822, slide 2846). **B–E.** ***Gymnangium explorationis*** sp. nov. **B**, pair of hydrocladial hydrothecae, lateral view. **C**, distal part median hydrothecal nematotheca. **D**, insertion of hydrocladium on stem, showing arrangement of nematothecae and hydrotheca in frontal view. **E**, gonothecae (NZOI Stn P7, holotype, slide 2219). **F.** ***Gymnangium hians*** (Busk, 1852), hydrocladial hydrotheca in lateral view (NZOI Stn I737, slide 2888). **G, H,** ***Gymnangium humile*** (Bale, 1884). **G**, pair of hydrocladial hydrothecae, lateral view. **H**, the same, frontal view (NZOI Stn P84, slide 2902). Scales: a, 0.2 mm (F–H); b, 0.2 mm (C, E); c, 0.5 mm (A, B, D). W.V.

All material has short median nematothecae with a minor, cone-shaped part free. There is a circular aperture at the apex and a small circular foramen where the nematotheca joins the abcauline hydrothecal wall. The lateral nematothecae have two apertures, one circular at the apex and a second slightly lower on the inside. There is a large foramen for communication with the internode. There are no internodal septa or ridges.

RECORDS FROM NEW ZEALAND: Waters south of Puysegur Point, South Island and the Macquarie Gap between Puysegur Trench and Solander Trough, 682–741 m.

DISTRIBUTION: The geographical distribution of this species has been discussed by Rees and Vervoort (1987); it is known from tropical and subtropical localities in the Indian and Pacific Oceans [Zanzibar area (Rees & Vervoort 1987); Bali Sea (Vervoort 1966), off the north-east point of Timor (Billard 1918), various localities in Japanese waters, including Sagami Bay (Stechow 1907, 1909; Jäderholm 1919, Hirohito 1995), and the Pacific south of Japan (Jäderholm, 1903)]. The present records extend the range of distribution in the Pacific considerably south- and eastward. The bathymetric distribution extends from shallow waters (Hirohito 1995, no exact depth stated) to at least 741 m depth (present record).

Gymnangium explorationis sp. nov. (Fig. 69B–E)

MATERIAL EXAMINED:

NZOI Stn P7, 2 large, forked colonies about 150 mm high, with many gonothecae, composed of 2 colonies, the holotype, H-777 in NIWA collection; the second, with slides, as RMNH-Coel. 27772, 5 slides 2219, is part of the type series.

TYPE LOCALITY: Southwest Pacific/Tasman Sea, Norfolk Ridge, west of Three Kings Islands, Wanganella Bank, 32°41.00′ S, 167°28.60′ E, 150 m.

DESCRIPTION: Type series composed of 2 large, fan-shaped colonies, highest about 250 mm, with thick, repeatedly branched stem, ramifications roughly in 1 plane, occasionally sub-opposite, but often dispersed, stem basally about 4 mm thick and strongly polysiphonic, gradually thinning apically; ultimate parts of stem monosiphonic, divided into distinct internodes by almost transverse nodes. Polysiphony of stem brought from apposition of secondary tubules running strictly parallel to primary tube and set with longitudinal rows of strongly diverging nematothecae: proximal parts of polysiphonic axes thus almost look like antipatharian axes. Internodes of primary axis with a large apophysis supporting a hydrocladium; apophyses alternately pointing left and right and obliquely upwards; hydrocladia 10–12 mm long, flexuous, directed upwards at less than 45°, branches plumose. Each stem internode with 2 frontal nematothecae: 1 above, 1 under apophysis; nematothecae saccate, with wide aperture, rim distinctly everted, scooped medially. No mamelon. In older internodes 1 pair of additional nematothecae on back, inserting close to node; nodes absent from proximal internodes, with nematothecae on their rear, contributing, together with those of secondary tubes, to 'spinous' character of the stem.

Hydrocladia composed of about 25 internodes separated by transverse, fine nodes. Internodes short, with frontal hydrotheca, occupying nearly whole of internode, and 1 unpaired median nematotheca and 2 laterals.

Hydrotheca saccate, length axis making an angle of about 10° with internode; basis broadly rounded, protruding into internode, with a conspicuous median adcauline ledge, thickened at its apex. In addition a thickened, semicircular perisarc belt runs on frontal wall of hydrotheca just above junction of abcauline wall with aperture of median nematotheca. This thickened belt in lateral view creates the impression of a second, abcauline ledge inside hydrotheca. Curved, thickened lines of perisarc run on inside of hydrotheca from apex of adcauline ledge to tip of abcauline belt. Aperture of hydrotheca slightly tilted forwards, making an angle of about 80° with internodal axis. Rim with strong, blunt median cusp and a pair of weak, rounded lateral cusps; adcauline part of rim rounded.

Median nematotheca adnate to most of curved abcauline wall of hydrotheca, becoming free a short distance below semicircle of thickened perisarc; aperture of nematotheca open, gutter-shaped, extreme distal part slightly crenulated. Lateral nematothecae saccate, with swollen proximal portion, narrowing apically and pointing upwards, surpassing hydrothecal rim by about one-third of their length; rim deeply scooped on median side.

No distinct septa or rings visible inside internode, indication of a septum at base of lateral nematothecae.

First internode of each hydrocladium with additional, curved median nematotheca; rim deeply scooped on median side.

Gonothecae large, more or less ovoid, with curved back and flattened, thickened front; aperture oval, at apex of frontal wall. Gonothecae inserting with a short pedicel on apophyses of stem internodes just below insertion of first hydrocladial internode. Sex female, with several developing eggs or planulae.

MEASUREMENTS of *Gymnangium explorationis* sp. nov. (in μm):

	NZOI Stn P7 slides 2219
Axial tube, diameter	195 – 200
Length axial internode	275 – 280
Stem nematotheca, length	112 – 128
Diameter at rim	90 – 95
Hydrocladial internode, length	380 – 415
Diameter at node	135 – 150
Hydrotheca, total depth	320 – 340
Diameter at rim	190 – 196
Median nematotheca, total length (measured from apex to base)	350 – 365
Diameter at rim (measured in frontal view)	17 – 23
Lateral nematotheca, depth	145 – 157
Diameter at rim	22 – 28
Gonotheca, total length, including pedicel	1065 – 1115
Maximum diameter	395 – 425

REMARKS: This species is characterised by the large, fan-shaped, much branched colonies and the thickened belt on the frontal part of the hydrothecal wall; in addition there is a dorsal (adcauline) septum.

RECORDS FROM NEW ZEALAND: Wanganella Bank, at the extreme southern end of the Norfolk Ridge, west of the Three Kings Islands, at a depth of 150 m, bearing mature female gonothecae in late January.

DISTRIBUTION: Known only from New Zealand waters.

ETYMOLOGY: The specific name is the genitive of the Latin noun *exploratio*, exploration, referring to the exploration of Wanganella Bank yielding many new and interesting hydroid species.

Gymnangium hians (Busk, 1852) (Fig. 69F)

Plumularia hians Busk 1852: 396.
Halicornaria hians: Stechow 1909: 101, pl. 1 fig. 11, pl. 6, figs. 16–17; Billard 1913: 68; Stechow 1913b: 10, 94, fig. 61; Jäderholm 1916: 8, fig. 15; Briggs 1918: 47; Stechow 1919: 125; Bedot 1921a: 347; Jarvis 1922: 355; Nutting 1927: 237; Vervoort 1941: 222, figs 7–8; Millard 1959: 219, fig. 15G, H; Pennycuik 1959: 186.
Aglaophenia hians: Hilgendorf 1911: 542, fig. 5.
Gymnangium hians: Stechow 1923b: 19; 1923d: 236, 239; 1925: 254; Yamada 1958: 51, 61; 1959: 84; Itô & Inoue 1962: 451, pl. 9, figs 100–103; Ooishi 1964: 191; Rees & Thursfield 1965: 171; Vervoort 1968: 114; Rho & Chang 1972: 101; Millard & Bouillon 1973: 9, 92; Rho & Chang 1974: 147; Millard 1975: 444, fig. 134G, H; Rho 1967: 346, fig. 6A, B; 1977: 279, 425, pl. 93, fig. 93; Vervoort & Vasseur 1977: 84, fig. 35; Millard 1978: 193 *et seq.*; Hirohito 1983: 77; Rees & Vervoort 1987: 172–175, fig. 41; Dawson 1992: 18; Park 1992: 294–295; Bouillon *et al.* 1995: 36; Hirohito 1995 (English text): 287–290, fig. 101a, b; Irving 1995: 324, appendix 2; Watson 1996: 79; 2000: 58–60, fig. 47A–E.

MATERIAL EXAMINED:

NZOI Stn I737, single plume, about 60 mm, no gonothecae. RMNH-Coel. slide 2888.

NMNZ: BS 581, strongly abraded, 30 mm high, regenerating plume; no gonothecae. NMNZ Co. 534; 1 RMNH-Coel. slide 3557.

TYPE LOCALITY: Prince of Wales Channel, Torres Strait, Australia (Busk 1852; holotype probably in NHM).

REMARKS: The only specimens in our collection are abraded, apparently dead colonies as the hydrothecae contain debris and no hydranths; there are no gonothecae. The shape of the hydrothecae, with two pairs of distinct cusps at the rim, a short, gutter-shaped median nematotheca and wide lateral nematothecae point towards this variable species, as also does the shape and position of the intrathecal, adcauline septum and the position of the hydropore at the bottom of the hydrotheca.

DISTRIBUTION: Though this species has repeatedly been recorded from Australian waters (Busk 1852; Bale 1884; Pennycuik 1959; Watson 1996, 2000) there are no records from waters bordering New Zealand. Hilgendorf (1911), nevertheless, recorded the species from the Kermadec Island region, a record quoted by Dawson (1992). The present records are from one of the seamounts north of Lord Howe Island in the Tasman Sea (NZOI Stn I737, 52 m, a locality far from the immediate vicinity of New Zealand), and from northwest of Napier Island, Kermadec Islands, 567–530 m, also outside New Zealand coastal waters.

Gymnangium humile (Bale, 1884) (Fig. 69G, H)

Halicornaria humilis Bale 1884: 182–183, pl. 13, fig. 8, pl. 16, fig. 6; Jäderholm 1917: 21, pl. 2, fig. 12; Bedot 1921a: 348; Hadzi 1925: 245; Stranks 1993: 11.
Gymnangium humile: Stechow 1923d: 237.
Gymnangium (Halaria) humilis: Stechow 1921f: 233.
Halicornaria humilis(?): Bartlett 1907: 43.

MATERIAL EXAMINED:

NZOI Stn P84, a few small colonies and separate hydrocladia arising from a stolon creeping on back of stem and on hydrocladia of *Gymnangium ascidioides* (Bale, 1882). 2 RMNH-Coel. slides 2902.

TYPE LOCALITY: Recorded by Bale (1884) from two Australian localities: Queenscliff and Schnapper Point, parasitic on *Gymnangium ascidioides, G. bayleyi* and *G. ilicistoma*. Probable syntypes are in MOV (MV F58845-6, three microslides; Stranks, 1993). One of these slides is marked 'cotype' in Bale's Register in MOV and originates from Queenscliff, Victoria, which locality is here considered to represent the type locality.

MEASUREMENTS of *Gymnangium humile* (in μm):

	NZOI Stn P84 slide 2902
Axial tube, diameter at node	200 – 215
Length of internode	280 - 335
Stem nematotheca, length	78 – 84
Maximum diameter	67 – 73
Diameter of one of orifices at rim	11 – 17
Hydrocladial internode, length	250 – 280
Diameter at node	78 – 90
Hydrotheca, total depth	220 – 230
Diameter at rim	190 – 200
Median nematotheca, total length (measured from apex to node)	280 – 285
Length free part	120 – 125
Diameter at margin (measured in frontal view)	19 – 23
Lateral nematotheca, depth	95 – 105
Maximum diameter	60 – 65
Diameter at rim	17 – 20

REMARKS: The few specimens of this species that have been found grow epizootically on *Gymnangium ascidioides* (Bale, 1882) and were observed after the slides had been made; a complete description, therefore, cannot be given from the present material. The stems, or in some cases the hydrocladia, arise from a stolon creeping on the back of the stem of *G. ascidioides*, following the main stem and occasionally the hydrocladia; stems and hydrocladial shoots usually occur between the hydrocladia of the host. Stem divided into distinct internodes by transverse septa; each internode with one almost terminal apophysis; apophyses alternately directed left or right. Each apophysis with three nematothecae: two on the front and one on back; nematothecae ovoid and with two terminal, circular apertures. Hydrocladia composed of 5–10 slender internodes separated by well marked transverse nodes. Hydrothecae fairly deep and slightly narrowing basally; hydropore in flat base of hydrotheca. Abcauline wall with a weakly developed carina running into a blunt but distinct median cusp. Hydrothecal rim with three pairs of cusps of which the abcauline pair best developed; the third, adcauline pair almost hidden by the lateral nematothecae. Marginal cusps blunt, separated by shallow, rounded embayments. Median nematotheca basally in open contact with basal part of internode, following abcauline hydrothecal wall, but becoming free and curving smoothly upwards, over-reaching level of distal node by one-third of length of free part. Median nematotheca with circular foramen above junction with hydrothecal wall and a circular aperture at apex. Free, curved part of nematotheca narrowing only slightly and gradually. Lateral nematothecae with a single, downwardly directed, circular aperture on a neck and a large, oval foramen for communication with the internode. The median nematotheca in the hydrothecae of hydrocladia rising directly from the stolon is usually shorter. The gonothecae of this species are still unknown.

Jäderholm (1917: 21) speculates on the possibility of this species being a form of *Gymnangium longirostre* (Kirchenpauer, 1872) from which it has been kept separate by Bale (1884: 183) because of distinct differences in the shape of the hydrothecae and the median nematotheca. On comparing our specimens with material of *G. longicorne* we can only confirm those differences and consequently follow Bale in upholding both species.

DISTRIBUTION: Bale's material was found epizootically on species of *Gymnangium* at Queenscliff and Schnapper Point, Victoria, Australia (Bale 1884). Jäderholm (1917) found it epizootically on *Aglaophenia macrocarpa* Bale, 1888 [= *A. crucialis* Lamouroux, 1816] off Lake Macquarie, New South Wales, Australia. The present specimens are from the Lord Howe Island area, outside New Zealand coastal waters, growing epizootically on *Gymnangium ascicioides* (Bale, 1882) at 59 m depth.

Gymnangium japonicum Watson & Vervoort, 2001 (Fig. 70A–F)

Halicetta sp. Hirohito 1995 (English text): 293, fig. 103e-g, pl. 13, fig. D.

Gymnangium japonicum Watson & Vervoort, 2001: 182–184, fig. 15a–g.

MATERIAL EXAMINED:

NZOI Stns: D175, 5 colonies about 50 mm high, on bryozoans. With empty gonothecae. RMNH-Coel. 28863, RMNH slides 2842 and 3476; **E822**, 6 stems 30–40 mm high, springing from a stolon; *Zygophylax sibogae* Billard, 1918, attached to a stem. 2 stems as RMNH-Coel. 27779, slide 2175; **F80**, 2 plumes 80 and 100 mm high, length of hydrocladia 10–12 mm, no gonothecae; **J680**, 3 colonies 15, 20, and 50 mm high attached to coral fragments; no gonothecae. RMNH-Coel. slides 2257, 3632; **S22**, about 25 plumes, attached to corals, no gonothecae. Length of plume up to 70 mm, occasionally branched. Length of hydrocladia about 10 mm. 4 colonies and 2 sides as RMNH-Coel. 27778, slides 2919 (2) and 3605 (2).

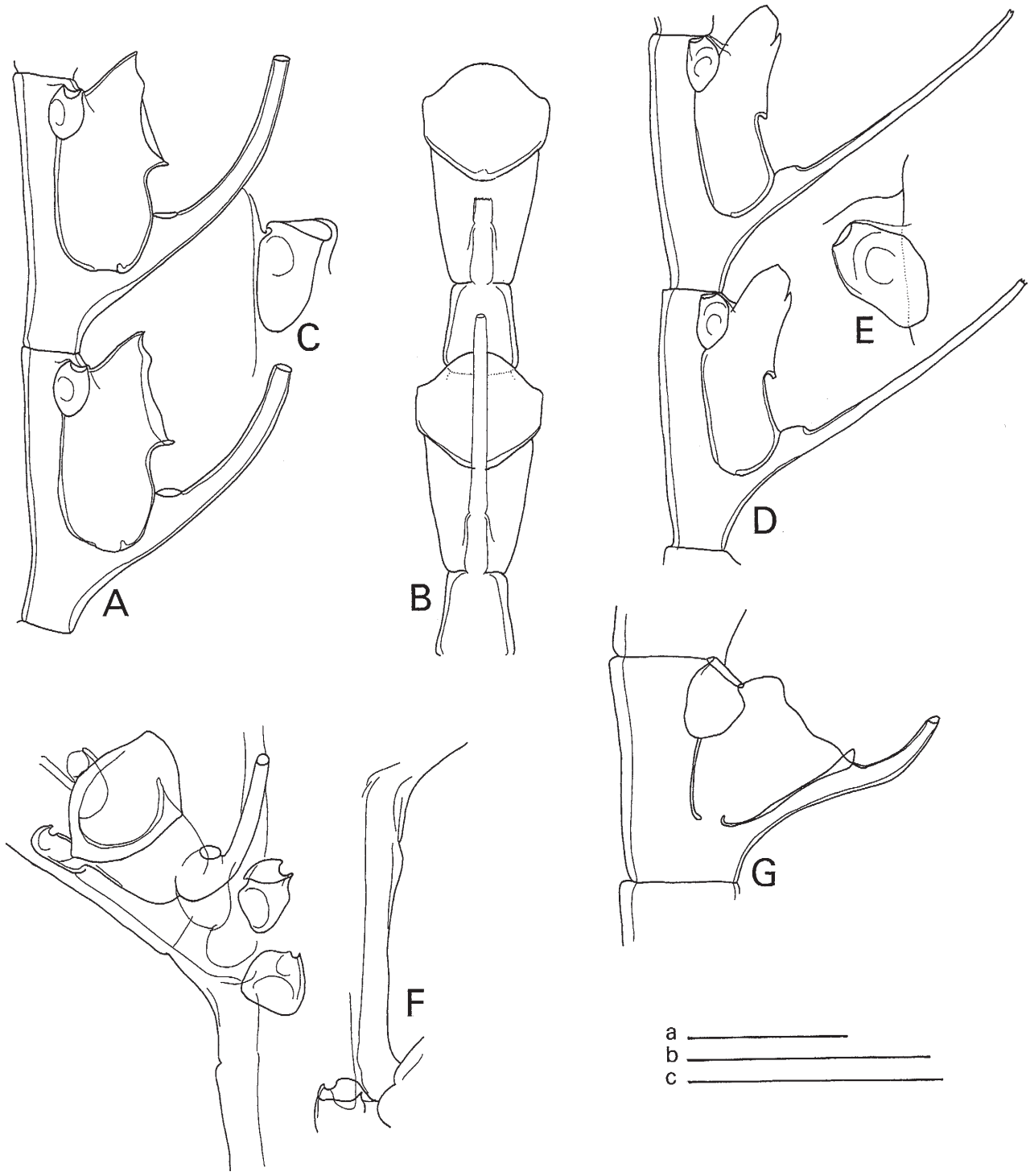

Fig. 70. A–F. ***Gymnangium japonicum*** Watson & Vervoort, 2001. **A**, pair of hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, lateral hydrothecal nematotheca, lateral view (NZOI Stn S22, slide 3605). **D**, pair of hydrocladial hydrothecae, lateral view. **E**, lateral hydrothecal nematotheca, lateral view (NZOI Stn J680, slide 3632). **F**, insertion of hydrocladium on stem, showing arrangement of nematothecae (NZOI Stn S22, slide 3605). **G.** ***Gymnangium prolifer*** (Bale, 1882), hydrocladial hydrotheca, lateral view (BS 907, slide 3493). Scales: a, 0.2 mm (G); b, 0.2 mm (C, E); c, 0.5 mm (A, B, D, F). W.V.

TYPE LOCALITY: 44.21° S, 147.05° E to 44.22° S, 147.05° E, 750–900 m, 70 km SSE of South East Cape, Tasmania, holotype in MOV, MV F83467 & MV F83468; RMNH-Coel. 29011, slide 4461, part of type series (Watson & Vervoort 2001).

DESCRIPTION: Colonies pinnate, unbranched, monosiphonic, up to 70 mm high, arising from thick stolon attached to coral fragments, with alternate, up to 10 mm long hydrocladia, directed obliquely laterally and upwards, rather widely spaced. Division of stem into internodes indistinct, even in higher parts of stem; nodes indicated by perisarc constrictions and approximately transverse; each internode with well developed apophyses, each supporting a hydrocladium and with 3 nematothecae: 2 on front and 1 on back. Stem nematothecae big, saccate, especially lower one on front, with deeply scooped aperture; upper nematotheca with partially everted rim. Nematotheca on back as upper on front, in frontal view just visible above axil of apophysis.

Hydrocladia composed of about 15 slender, slightly curved internodes without internal rings or septa; nodes slightly oblique; interior in direct communication with median nematotheca.

Hydrotheca fairly deep, with rounded bottom; distal part curved forward; plane of aperture almost parallel to internodal axis; rear of hydrotheca free from internode for considerable distance, thickened, straight or weakly curved. Frontal wall of hydrotheca also thickened and with sharp curve just under hydrothecal rim, running into a short, blunt cusp. Hydrothecal rim more or less circular, with a pair of weak, rounded cusps, placed fairly close to adcauline part of mid-line, distinctly everted in frontal view and rounded on adcauline side. Bottom of hydrotheca with a circular, basal hydropore; minor perisarc notch visible on frontal margin.

One pair of small, ovoid lateral nematotheca, slightly protruding above axil between adcauline hydrothecal wall and internode, with scooped internal margin and big foramen for communication with internode. Median nematotheca conspicuous, springing from internode below hydrotheca, adnate to abcauline wall for about two-thirds of wall and then continuing as a slightly curved to almost straight tube. Basal portion of tube with circular, occasionally slightly raised, circular foramen and from that part onward minutely narrowing into a circular aperture with smooth rim. Length of free part variable, in some hydrothecae reaching beyond next hydrocladial node, in others shorter and reaching level of lateral hydrothecal cusps. Length of lateral nematothecae variable, some internodes with quite short lateral nematothecae, probably as the result of damage.

Empty gonothecae occur in the material from NZOI Stn D175. These are barrel-shaped bodies with a flattened top and thickened rim. They are rounded basally and provided with a short eccentric pedicel inserting on stem apophysis.

MEASUREMENTS of *Gymnangium japonicum* (in μm):

NZOI	Stn S22 slide 2919 slide 3605	Stn D175 slide 2842 slide 3476
Axial tube, diameter at node	270 – 320	430 – 485
Length of internode	395 – 450	520 – 560
Stem nematotheca, length	140 – 145	220 – 295
Maximum diameter	85 – 105	110 – 125
Diameter of one of orifices at rim	15 – 17	30 – 35
Hydrocladial internode, length	505 – 530	740 – 755
Diameter at node	135 – 155	140 – 160
Hydrotheca, total depth	420 – 440	575 – 590
Diameter at rim	225 – 250	265 – 285
Median nematotheca, total length (measured from apex to node)	475 – 700	925 – 965
Length free part	115 – 425	480 – 495
Diameter at rim	22 – 28	35 – 45
Lateral nematotheca, depth	95 – 110	140 – 155
Maximum diameter	60 – 70	80 – 85
Diameter at rim	28 – 39	55 – 60
Gonotheca (empty), length		900 – 1150
Diameter at rim		460– 575

REMARKS: There can be no reasonable doubt that this is the species recorded by Hirohito (1995: 293) from deep water (250 m) of Sagami Bay, Japan; this material is figured (colony, part of stem and hydrothecae in lateral and frontal aspect); unfortunately it was not described in detail. The species was subsequently named and described by Watson and Vervoort (2001).

There is complete similarity of the hydrothecae in the New Zealand colonies with previously described and figured material. All NZOI specimens were alive when collected; the hydrothecae contain retracted hydranths. The colonies from NZOI Stn D175 have the typical, greatly lengthened, curved median nematotheca reaching a level halfway the aperture of the following hydrotheca. The hydrothecal rim in these colonies is parallel to internodal length axis. The material collected at the northernmost locality, NZOI Stn J680, is almost exactly like that figured by Hirohito in the position of the hydrothecal aperture and the development of a distinct pair of blunt, lateral cusps at the rim. The median nematotheca, however, is even longer and perfectly straight in the majority of hydrothecae; the apex ends in a small, circular aperture with finely crenulated rim.

Gymnangium birostratum (Bale, 1914) (= *Halicornaria birostrata* Bale 1914a: 49, pl. 4, fig. 5, pl. 7,fig. 6; 1915: 324; Bedot 1921: 346; Stranks 1993: 8-9; *Gymnangium birostratum*: Watson 1996: 79) resembles *G. japonicum* in the structure of the hydrothecae but differs by the bifurcated distal part of the median nematotheca. A number of unbranched plumes, about 80 mm long, occurs at NZOI Stn G875 on the stem of *Monoserius pennarius* (Linnaeus, 1758). Length of hydrocladia 8–10 mm; gonothecae are present (2 RMNH-Coel. slides 2879). The monosiphonic stem arises from an epizootic stolon; division into internodes is only visible in higher parts of stem, nodes transverse, each internode with one sub-terminal apophysis; apophyses alternately directed left or right and obliquely forward. Hydrocladia about 8 mm long, directed obliquely upwards at less than 45°, and forward, curving laterally; nodes distinct, transverse. Axial apophyses with 3 nematothecae: 2 on front (1 above and 1 under apophysis), and 1 on back almost in axil. Stem nematothecae with swollen basal part and 1 aperture on short conical funnel pointing away from apophysis. Hydrocladial internodes without internal septa or rings. Hydrotheca large, as long as or slightly longer than internode, long axis almost parallel to that of internode, basal part deep, rounded, with 2 perisarc pegs besides hydropore. Adcauline wall of hydrotheca smoothly curved, with thickened ledge which may represent remnant of internodal septum or ridge. Free part of abcauline hydrothecal wall straight, thickened, terminating in perisarc thickening that in some hydrothecae becomes a short intrathecal ledge. Upper part of hydrotheca curved frontally so that hydrothecal aperture is almost parallel to internode and part of adcauline hydrothecal wall is free, smoothly curved. Rim of hydrotheca with 2 pairs of lateral cusps (fig. 68E, F), rim slightly everted and between second pair of cusps a broad, rounded embayment. In frontal view abcauline wall of hydrotheca ends in a short, rounded median cusp, obscured by median nematotheca. Median nematotheca covers basal third of hydrotheca, free part pointing straight forward at less than 45°, narrowing apically, at about half free length split in 2 diverging tubes, at level of hydrothecal aperture. As far as could be seen all median nematothecae in present specimen end as pair of diverging tubes, their length and degree of basal fusion varying along hydrocladia; apertures small and circular. Communication between median nematotheca and internode visible as large, oval foramen at hydrothecal abcauline wall. Lateral nematothecae rather small, saccate, with downwardly directed funnel-shaped orifice; a large oval fenestra opens into internodal cavity. The gonothecae, inserted on stem apophyses are shrivelled and spent.

MEASUREMENTS of *Gymnangium birostratum* (in μm):

	NZOI Stn G875 slides 2879
Axial tube, diameter	340
Length of internode (with two apophyses)	370 – 475
Stem nematotheca, length	140 – 160
Maximum diameter	105 – 125
Diameter of orifices at rim	17 – 22
Hydrocladial internode, length	460 – 475
Diameter at node	145 – 155
Hydrotheca, total depth	440 – 455
Diameter at rim	160 – 190
Median nematotheca, total length (measured from apex to node)	475 – 560
Length free part (bifurcation included)	335 – 370
Length bifurcated part	40 – 170
Diameter at rim	22 – 28
Lateral nematotheca, depth	110 – 135
Maximum diameter	110 – 125
Diameter of orifices at rim	23 – 25
Gonotheca (shrivelled), total length	740 – 820
Maximum diameter	490 – 575

DISTRIBUTION (of *Gymnangium japonicum*): Originally recorded from Sagami Bay, Japan (250 m depth; Hirohito 1995); also recorded from the Tasmanian seamounts (Watson & Vervoort 2001) and Macquarie Island (Watson, unpublished).

Gymnangium birostratum appears to be a rare species, figured and described only by Bale (1914a) from the Great Australian Bight, 73–183 m where it occurred epizootically on *Aglaophenia (= Lytocarpia) megalocera* Bale, 1914. The present description differs from Bale's in minor details only (mode of development of the apical part of the median nematotheca, occasionally undivided in Bale's specimens).

Watson (1996) records the species from off the western Australian coast between Geraldton and Albany. Although *G. birostratum* does not occur in the New Zealand collections studied so far, its occurrence in the New Zealand waters cannot altogether be excluded.

RECORDS FROM NEW ZEALAND: The present records are from off North Island, South Kermadec, 328 m; the southern Tasman Sea, southwest of Puysegur Point, 682 m depth, and from three localities on the Campbell Plateau: south of Stewart Island (631 m) and northeast of Auckland Islands (400–426 m).

Gymnangium longirostre (Kirchenpauer, 1872)

Aglaophenia (Macrorhynchia) longirostris Kirchenpauer 1872: 28, 42, pl. 1, fig. 19, pl. 5, fig. 20.
Halicornaria longirostris: Bale 1884: 181, pl. 13, fig. 3, pl. 19, fig. 30; Bartlett 1907: 43; Briggs 1915a: 311–312; Jäderholm 1917: 20; Bedot 1921a: 347; Briggs & Gardner 1931: 195, fig. 6; Blackburn 1937: 369; Vervoort 1946a: 328; Hodgson 1950: 51, fig. 83; Millard 1961: 207; Ralph 1961b: 54–55, fig. 7h-i (*cum syn.*); von Schenck 1965: 917, 928; Ralph 1966: 159; Shepherd & Watson 1970: 140; Watson 1973: 197; 1975: 173.
Gymnangium longirostre: Stechow 1923d: 236; Millard 1975: 445; Blackburn 1942: 109; Dawson 1992: 18; Watson 1994: 67.
Gymnangium (Haliaria) longirostris: Stechow 1921f: 233.
Plumularia pennatula: Hutton 1873: 258; Coughtrey 1875: 289, pl. 20, fig. 37 (not *Sertularia pennatula* Ellis & Solander, 1786).
Aglaophenia pennatula: Coughtrey 1876a: 31
Aglaophenia huttoni Kirchenpauer 1876: 24; Bale, 1924: 257.
Aglaophenia zelandica Stechow 1921d: 260.

Material Examined:

NZOI Stns: C617, 1 plume of 60 mm length, no gonothecae; **C763**, many colonies, about 150 mm high, no gonothecae; **J970**, *Gymnangium longirostre* (Kirchenpauer, 1876) (J.E. Watson).

NMNZ Ralph Collection: Loc. 90, NMNZ Co. 946, single branch 35 mm long with 2 rows of closely packed about 6 mm long hydrocladia. RMNH-Coel. slide 3636.

Type Locality: Wilson's Promontory, Australia, parasitic on another species of *Aglaophenia* (*sensu lato*) (Kirchenpauer 1872; location of type unknown).

Remarks: The synonymy of this species has been unravelled by Ralph (1961b) and was largely composed from her inspection of the Hutton type slides in the Canterbury Museum, Christchurch. Hutton's most important collection of slides could not be traced during recent visits of both of us to the Canterbury Museum and must be considered lost. Inspection of the present sterile material adds nothing to Ralph's accurate description.

Records from New Zealand: Ralph (1961: 55), after the inspection of Hutton's material concluded that his 1873 record of *Plumularia pennatula* from Lyall Bay, Wellington, is based on this species, but she did not add further New Zealand records. The present records of this fairly well known species are from the Chatham Rise east of Banks Peninsula (302 m), from the Three Kings Islands region (73 m), and from northeast of Bay of Islands (86 m).

Distribution: Widely distributed in Australian waters (southeast Australia; south Australia; Tasmania) and known from some isolated localities in New Zealand.

Gymnangium prolifer (Bale, 1882) (Figs 70G, 71A–G)

Aglaophenia prolifera Bale 1882: 28, 34, 46, pl. 14, fig. 5.
Halicornaria prolifera: Bale 1884: 148, 174, 183, pl. 14, fig. 1, pl. 16, fig. 10; von Lendenfeld 1885a: 487, 627; 1885c: 642; 1887: 27; Whitelegge 1889: 193; Hartlaub 1905: 677; Bartlett 1907: 43; Ritchie 1911: 858, pl. 85, figs 2–3; Briggs 1918: 34, 44; Bedot 1921a: 348; Watson 1973: 197.
Gymnangium proliferum: Stechow 1923d: 237; Rees & Thursfield 1965: 172; Watson 1994: 67; 1996: 79.
Gymnangium (Haliaria) prolifera: Stechow 1921f: 233.
Halicornaria regalis Totton 1930: 241, fig. 70; Ralph 1961b: 55–56, fig. 7f, g; Dawson 1992: 18.

Material Examined:

NZOI Stns: E640, 2 bunches of about 15 stems, 150 mm high, no gonothecae. Attached to base of *Lytocarpia phyteuma* (Kirchenpauer, 1872). Part as RMNH-Coel. 27769; slides 2239 and 3556; **J680**, 3 colonies 25–30 mm high epizootically on *Lytocarpia chiltoni* (Bale, 1924). In addition 4 plumes about 80 mm high rising from stolon on old hydroid stem. No gonothecae. 3 RMNH-Coel. slides 3548.

NMNZ: BS 907, 2 stems, 1 about 80 mm high with branch, and a 35 mm high stem. No gonothecae. Associated with *Lytocarpia chiltoni* (Bale, 1924). NMNZ Co. 814; 2 RMNH-Coel. slides 3493.

Type Locality: Queenscliff, Victoria, Australia (Bale 1882; probable syntypes in MOV, 4 microslides (MV F59034–5 and MV F59064) and dry material (MV F59036), Stranks 1993).

Description (of specimens from NZOI Stn J680): The species occur in 2 forms, both plumose, 1 with a thin stem, completely divided into internodes (2 colonies), the second with a thick stem with short, incompletely separated internodes (1 colony). The first form has a flexuous colony, the second is stiff and erect. Stem with a longitudinal, frontal row of nematothecae that are slightly displaced towards the apophysis in the second form. Each internode with 3 nematothecae and a big apophysis slightly below the distal node, alternately directed left or right and supporting the hydrocladia. Apophyses with 2 axillar nematothecae, 1 on front and 1 on back; also a third nematotheca in the middle of the internode, this nematotheca, and that on the back, ovoid, with a circular aperture, deeply scooped on the inside. Frontal axillar nematotheca swollen, with 2 apertures with slightly everted margins. Nematothecae in the colony with thick stem may have 3 apertures with everted margins; the nematotheca in the middle of the internode is fairly large and has a deeply scooped, gutter-shaped aperture. No mamelon.

Hydrocladia 8–12 mm long in the first type, 3–4 mm in the second, divided into 12–20 internodes in the first type, 3–5 in the second; nodes transverse. Hydrocladial internodes moderately slender, with the exception of the first which is rather short. Hydrotheca saccate, on frontal aspect of internode; at an angle of about 45° with hydrocladial axis. Hydrothecal base rounded; no intrahydrothecal septum, presence of perisarc pegs could not be determined because of hydranth or tissue remnants. Rim produced into a rather conspicuous, rounded, thin frontal cusp, curved inwards, and with a rather deep, rounded embayment dorsally; sides with 3 broadly rounded cusps each, of which the adcauline is fairly prominent because of the presence of the dorsal embayment. Rim slightly everted. Plane of hydrothecal aperture perpendicular to hydrothecal long axis.

Median nematotheca tubular, distal free part variable in length, directed obliquely upwards; nematotheca fused to hydrotheca over nearly full length of abcauline hydrothecal wall, only a small fraction of hydrothecal wall, just under the base of the median cusp, free. At this point the median nematotheca curves slightly and has a small, circular foramen; the nematotheca then continuing as a tube, narrowing a little; apex with circular opening. Length of free part increasing along length of hydrocladium, from scarcely surpassing the median cusp to a length of half that of the fused part. Median nematotheca of first hydrocladial internode with deeply scooped rim on inner side, short, not surpassing the hydrothecal rim. Lateral nematothecae flask-shaped, with swollen basal portion, directed upwards and occasionally slightly outwards; apical portion curving upwards, with circular foramen with smooth rim, not surpassing hydrothecal rim. On close inspection apical, hyaline part of nematothecal border everted; best visible in stained microscopical preparations of the hydrocladia.

Remarks: Both forms are present in the material from NZOI Stn E640. Comparison of our material with descriptions and figures of *Gymnangium longicorne* (Kir- chenpauer, 1872), *G. prolifer* (Bale, 1881), *G. regale* (Totton, 1930) and *G. humilis* (Bale, 1881) reveals a best fit with *G. prolifer*, although generally the material described by Bale was larger and apparently not epizootic. Ritchie (1911) found his material, of which the largest colony measured 170 mm, was "associated with *Halicornaria furcata*". He drew attention to the variability in length of the free part of the median nematotheca and described the aberrant condition of the aperture of the nematotheca on the first internode of each hydrocladium, a condition also present in our material. After comparison of Totton's and Ralph's descriptions of *Halicornaria regalis* it appears to us that this species falls within the limits of variation of *Gymnangium prolifer* (Bale, 1882).

Measurements (in μm):

	G. prolifer (Bale, 1882) NZOI Stn J680 slides 3548	*G. regale* (Totton, 1930) (from Totton 1930)
Stem, diameter at base (first form)	250	250
Second form	600	
Stem internode, length (first form)	670 – 700	
Second form	575 – 705	
Stem internode, diameter at node (first form)	175 – 210	
Second form	530 – 590	
Normal stem nematotheca, length	100 – 110	
Maximum diameter	70 – 75	
Inflated axillary nemato- theca, length	105 – 115	
Maximum diameter	90 – 105	
Hydrocladial internodes, length	470 – 505	400
Diameter	90 – 130	70 – 100
Depth of hydrotheca, measured along abcauline wall, median cusp excluded	235 – 240	220
Diameter of hydrotheca at rim	220 – 235	250
Median nematotheca, length free part	30 – 185	200
Diameter at apex	22 – 25	
Lateral nematotheca, length	90 – 95	
Maximum diameter	60 – 70	
Diameter at rim	28 – 30	

According to Totton (1930: 242), *G. regale* differs by having smaller lateral nematothecae (which we cannot validate as no measurements are given), the finer and straighter median nematotheca, the less strongly everted lateral marginal teeth and the smaller anterior tooth. All these characters are considerably variable in our material, particularly the length and basal width of the median nematotheca and the backward curvature of the lateral nematothecae. The development of the median cusp of the hydrothecal border is more uniform, which does not apply to the lateral cusps bordering the median cusp.

With considerable development of the first pair of lateral cusps, as in Ralph's figure 7f, the median cusp appears small and almost obscured. If the lateral cusps are small, as in Totton's figure 70 and in the hydrothecae figured here, that median cusp is much more prominent. We have, therefore, synonymised both species.

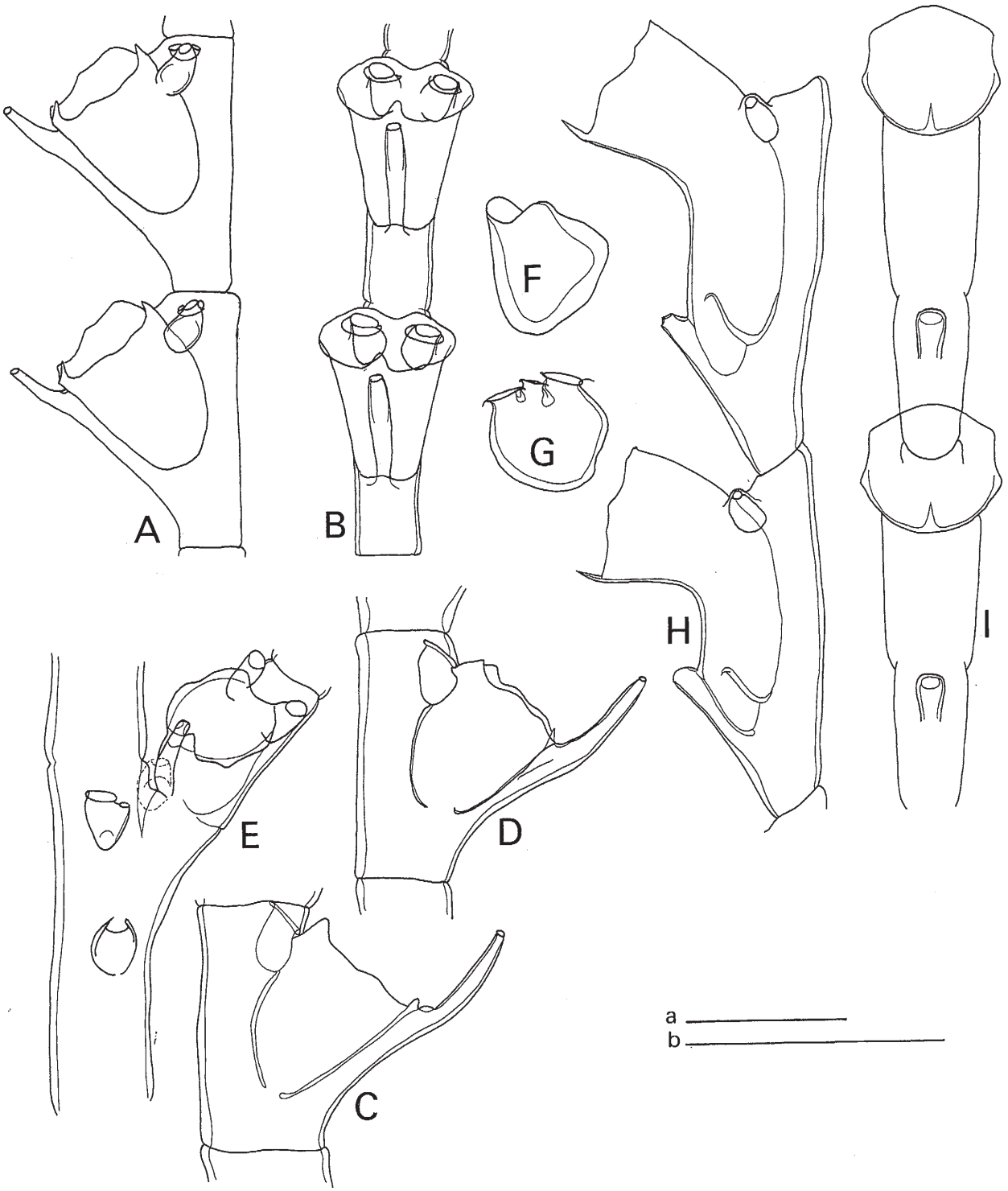

Fig. 71. A–G. ***Gymnangium prolifer*** (Bale, 1882). **A**, pair of hydrocladial hydrothecae from thick stem, lateral view. **B**, the same, frontal view (NZOI Stn J680, slide 3548). **C**, hydrocladial hydrotheca from thick stem, lateral view (NZOI Stn E640, slide 3556). **D**, the same from thin stem, lateral view (NZOI Stn E640, slide 2239). **E**, insertion of hydrocladium on thin stem, frontal view, showing position of nematothecae. **F**, stem nematotheca from thick stem. **G**, axillary nematotheca from thick stem (NZOI Stn J680, slides 3556). **H, I.** ***Gymnangium tubulifer*** (Bale, 1914). **H**, pair of hydrocladial hydrotheca, lateral view. **I**, the same, frontal view (NZOI Stn I351, slide 2147). Scales: a, 0.2 mm (F, G); b, 0.5 mm (A–E, H, I). W.V.

We have, at least for the present, left *Gymnangium humile* (Bale, 1884) separate, mainly because of the length of the free abcauline hydrothecal border above the basal aperture of the median nematotheca. We particularly draw attention to the fact that part of our material of *Gymnangium prolifer* was also found epizootic ('parasitic' in Bale's terminology). In our epizootic material of the latter there is practically no free abcauline hydrothecal border; the remaining characters listed by Bale (1884: 183) in our opinion are insufficient for specific distinction.

Records from New Zealand: The present specimens, from the Raukumara Plain and the Three Kings Islands region are from slightly greater depth (123–328 m) than previously recorded, and were epizootic, a condition observed in several species of *Gymnangium*.

Distribution: Queenscliff, Australia (Bale 1882, 1884); southern coast of New South Wales, Australia (Ritchie 1911); coast of western Australia between Perth and Albany (Watson 1996); lagoon, Lord Howe Island, Tasman Sea (Briggs 1918); Pearson Island, South Australia (Watson 1973); eastern Bass Strait (Watson 1994). Usually found at shallow depths.

Gymnangium tubulifer (Bale, 1914b) (Figs 71H, I; 72A, B)

Halicornaria tubulifera Bale 1914b: 187, pl. 36, fig. 3; 1915: 324; Bedot 1921a: 347; Stranks 1993: 14.
Halicornaria (Halicetta) tubulifera: Stechow 1921f: 234.
Gymnangium tubuliferum: Stechow 1923d: 237; Blackburn 1942: 109.

Material Examined:

NZOI Stns: E725, single colony with 2 ramifications. RMNH-Coel. slide 2246; **F876**, 2 colonies, 10 and 25 mm high, no gonothecae, on stem of *Lytocarpia subdichotoma* (Ralph, 1961); **I351**, single colony 75 mm high, no gonothecae. RMNH-Coel. slide 2147; **I366**, 1 colony 80 mm high with many gonothecae. [Slide 4170 JEW Colln]; **J21**, 2 repeatedly ramified colonies and some fragments. RMNH-Coel. 27780, slide 2232, some gonothecae visible in slide. [Slide 4171 JEW Colln]; **J23**, up to 25 mm high, unbranched colonies on *Lytocarpia subdichotoma* (Ralph, 1961). RMNH-Coel. slide 2233; **J27**, up to 100 mm high, repeatedly branched colonies and some fragments attached to *Lytocarpia subdichotoma* (Ralph, 1961); no gonothecae. 3 RMNH-Coel. slides 3552; **J31**, 5 much branched colonies up to 250 mm high, without gonothecae. RMNH-Coel. 27781. [Slide 4405 JEW Colln]; **J35**, single branched, 60 mm high colony with basal tuft of stolonal fibres; **P927**, *Gymnangium tubulifer* (Bale, 1914) (J.E. Watson); **S159**, 1 colony about 150 mm high, with the characteristic branching, but rather damaged. No gonothecae. 2 RMNH-Coel. slides 2313; **S174**, single colony in 3 fragments, about 120 mm high, no gonothecae. With the characteristic branching.

NMNZ: BS 210, colony, 8 mm high, on *Lytocarpia subdichotoma* (Ralph, 1961) (NMNZ Co. 574); **BS 668**, single small, mutilated colony about 35 mm high. No gonothecae present. NMNZ Co. 727; RMNH-Coel. 27652, slide 3352; **BS 854**, 2 colonies about 20 mm high attached to *Aglaophenia ctenata* (Totton, 1930); no gonothecae. NMNZ Co. 680.

Type Locality: Great Australian Bight, 293 m (Bale 1914); probable syntypes, 5 microslides, in MOV, MV F58408, Stranks 1993).

Description (of New Zealand specimens): This species occurs in 2 forms, an epizootic form and an independently growing colony. The epizootic form has unbranched stems rising from a stolon attached to the host; the stem is geniculate and more or less spiral, composed of the proximal parts of stem elements that at each geniculation turn aside to form a branch. At the same place the proximal element splits off to form 3 ramifications of which 1 continues as the 'stem', 1 as a branch pointing away from the original element, and 1 as a downwardly directed tube, covering the more proximal parts of the 'stem'. Thus the colonial stem is composed of successive proximal parts of branches while the polysiphony is brought about by downwardly developing tubes originating at each geniculation of the 'stem'. Stem and branches indistinctly divided into internodes; nodes slightly oblique and indicated by perisarc constrictions. Internodes of stem and branches with 1 proximal internode and 3 nematothecae, 2 on front of stem and 1 on back. 1 frontal nematothecae occurs at the axil, 1 at base of internode; nematotheca of back near axil. Proximal portions of branches with nematothecae but without apophyses; though apophyses on branches normally support hydrocladia, many stem apophyses lack such hydrocladia. Nematothecae on stem and branches fairly big, ovoid, with a small, circular aperture and a septal ridge.

Hydrocladia inserting on apophyses by means of oblique joint; 3–5 mm long, composed of about straight internodes separated by oblique septa, with 1 large hydrotheca, a pair of small laterals, and a short median nematotheca.

Hydrotheca covering three-fifths of internodal length; basal quarter of abcauline wall covered by base of median nematotheca. Hydrotheca horn-shaped, widening towards aperture, apical third to half suddenly curving outward; adcauline wall smoothly rounded, abcauline wall thickened, recurved below median cusp; length of hydrotheca beneath curvature variable in length.

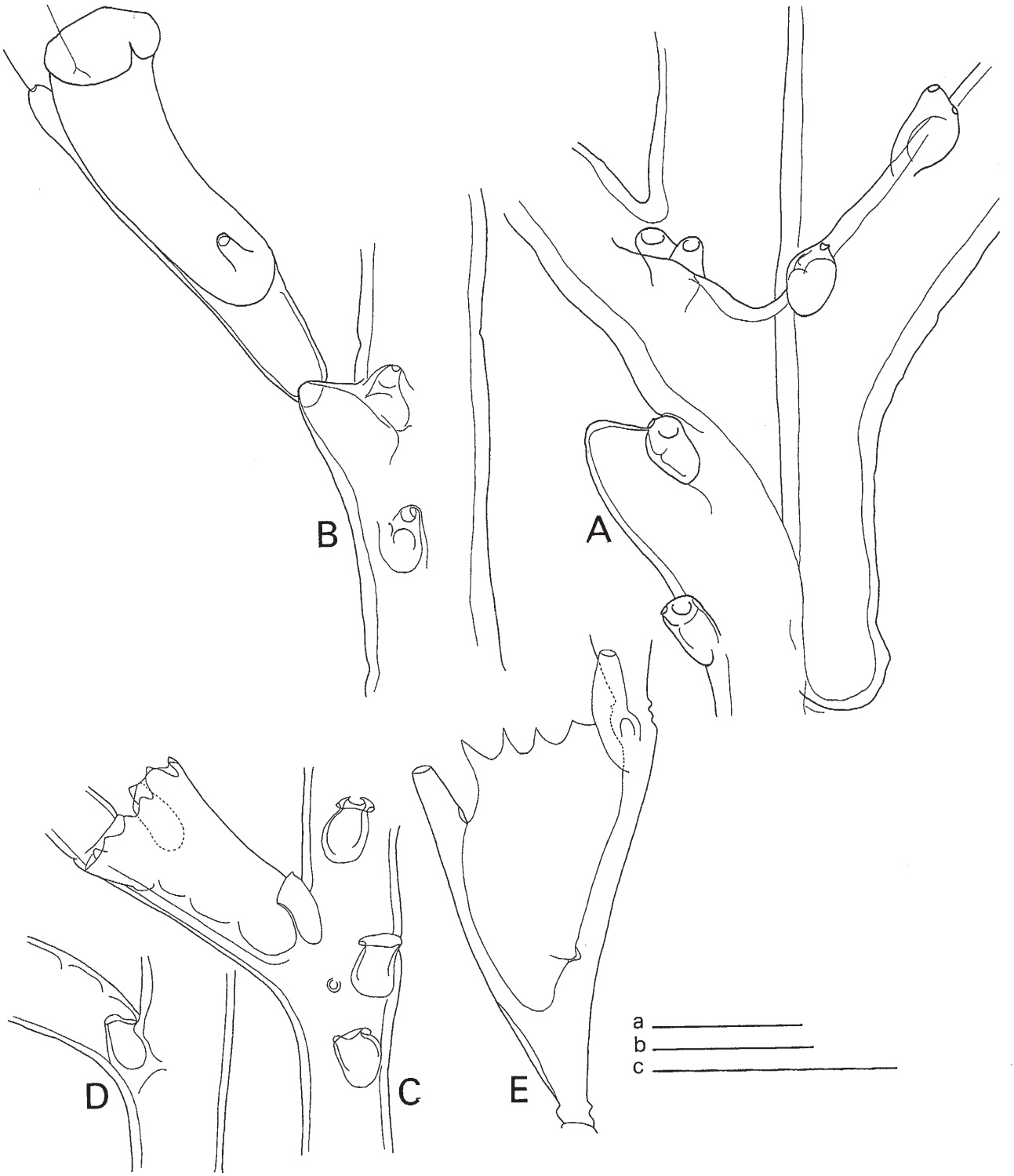

Fig. 72. A, B. ***Gymnangium tubulifer*** (Bale, 1914). **A**, threefold ramification of stem, frontal view. **B**, insertion of hydrocladium on branch, showing position of frontal nematothecae (NZOI Stn E715, slide 2246). **C, D.** ***Lytocarpia alata*** sp. nov. **C**, insertion of hydrocladium on stem, frontal view showing arrangement of frontal nematothecae. **D**, the same, view from back to show nematotheca on back of apophysis (NZOI Stn F127, holotype, slide 3549). **E.** ***Aglaophenia antarctica*** Jäderholm, 1903. Hydrocladial hydrotheca, lateral view (holotype, Museum of Natural History, Stockholm, Sweden no. 038). Scales: a, 1 mm (C, D); b, 0.2 mm (E); c, 0.5 mm (A, B).

Hydrothecal aperture circular, parallel to internodal axis or tilted upwards; rim with inwardly curved, acute median dagger-shaped cusp; 2 or 3 pairs of indistinct, obtuse marginal cusps may be present; abcauline wall entire, rounded. Hydropore in base of adcauline wall of hydrotheca, large, circular, upper margin produced into curved plate pointing obliquely upwards into hydrothecal cavity; top of plate curved and with some perisarc pegs. Many colonies have retracted polyps.

Lateral nematothecae quite small, projecting slightly above junction between internode and adcauline hydrothecal wall, with a small circular aperture and a big circular foramen for communication with the internode. Median nematotheca short, covering one-quarter to one-third of abcauline wall of hydrotheca, with 2 apertures, 1 at apex and 1 near hydrothecal wall; frontal wall of nematotheca thickened, without ridge or septum.

Gonothecae occur in the material from NZOI Stn J21 but are completely collapsed. They insert on the apophyses of stem and branches and appear to have been ovoid in shape, with the apical part truncated. They contain a yellow, ovoid mass of developing spermatozoa.

Remarks: This extraordinarily fragile species has been greatly damaged when taken in the trawl, many of the thin hydrothecae being filled with debris. Both epizootic and independently growing colonies are present, a habit not uncommon in this genus [cf. *Gymnangium arcuatum* (Lamouroux, 1816), *G. exsertum* (Millard, 1962) and *G. urceolifer* (Lamarck, 1816)]; both types of colonies have identical hydrothecae. The peculiar mode of branching of the independently growing colony has been described in detail by Bale (1914: 185–187) for *Gymnangium vegae* (Jäderholm, 1903); Bale (1914:188) referred to this description when describing *Gymnangium tubulifer*. In the drawings that accompany his description of the hydrothecae of his Great Australian Bight specimens (pl. 36, figs 3–4), these are even slenderer than those of the New Zealand material and the curvature of the abcauline hydrothecal wall is even more pronounced. Both characters, however, are quite variable in our material and as there is full agreement in many other details (shape of the hydrothecal rim, development of intrathecal plate, structure of lateral and median nematothecae, colony development, etc.) there can be no reasonable doubt that the New Zealand material belongs to Bale's quite characteristic species. In luxuriously developed colonies, as for instance that observed at NZOI Stn J27, the structure of the colony may become slightly irregular as the downward growing branches may develop their own side branches, either single or paired. The species has remained undiscovered since Bale's description.

Records from New Zealand: Found in deeper waters (508–1004 m) around New Zealand between about 35°–44° S and 173.5°–178°E (both Tasman Sea and Pacific side of North Island, including Cook Strait and Canterbury Bight off South Island). The depth record of NZOI Stn I352 (0 m) is almost certainly due to a mistake or mix of material. These are the first records of this species from the New Zealand seas.

Distribution: Originally described from the Great Australian Bight, 293 m, (Bale 1914) and until now found exclusively in Australian waters.

Measurements of *Gymnangium tubulifer* (in μm):

	Epizootic form NZOI Stn I351 slide 2147	Free living form NZOI Stn S159 slides 2313
Axial tube, diameter at node	155 – 168	240 – 265
Length of internode	505 – 560	615 – 645
Stem nematotheca, length	90 – 100	115 – 125
Maximum diameter	61 – 78	67 – 84
Diameter of orifices at rim	22 – 28	17 – 22
Hydrocladial internode, length	700 – 730	725 – 765
Diameter at node	80 – 86	112 – 125
Hydrotheca, total depth	615 – 645	670 – 700
Diameter at rim	290 – 300	265 – 280
Median nematotheca, total length (measured from apex to node)	335 – 340	370 – 380
Length free part	34 – 39	50 – 55
Diameter of apical aperture	15 – 17	15 – 17
Lateral nematotheca, depth	90 – 95	110 – 115
Maximum diameter	39 – 45	65 – 70
Diameter at rim	17 – 20	23 – 25

Lytocarpia Kirchenpauer, 1872

TYPE SPECIES: Although the description of the subgenus *Lytocarpia* by Kirchenpauer (1872: 13 *et seq*.) was largely based on *Aglaophenia myriophyllum* Linnaeus, 1758, other species were also included without a distinct type for the subgenus being indicated. Stechow (1923d) subsequently designated *Aglaophenia myriophyllum* the type of the genus *Lytocarpia* Kirchenpauer, 1872.

The following species of *Lytocarpia* have been considered (gonosome unknown unless otherwise indicated).
* = present generic designation.

Lytocarpia acuta Stechow, 1923a [= *Thecocarpus laxus* Billard, 1913 (not *Thecocarpus laxus* (Allman, 1876)]
Lytocarpia angulosa (Lamarck, 1816) [= *Plumularia angulosa* Lamarck, 1816; *Aglaophenia angulosa* Lamouroux, 1816; *Acanthocladium angulosum* (Lamarck, 1816); *Plumularia huxleyi* Busk, 1852; *Acanthocladium huxleyi* (Busk, 1852)]
Lytocarpia antarctica (Jäderholm, 1903) [=*Aglaophenia antarctica* Jäderholm, 1903]
Lytocarpia armata (Bale, 1914c) [= *Aglaophenia armata* Bale, 1914c]
Lytocarpia balei (Nutting, 1927) [= *Thecocarpus balei* Nutting, 1927]
Lytocarpia bathyalis Ryland & Gibbons, 1991
Lytocarpia benedicti (Nutting, 1900)
Lytocarpia bispinosa (Allman, 1877)
Lytocarpia brachiata (Lamarck, 1816) [= *Lytocarpia carinata* (Bale, 1894)]
Lytocarpia brevirostris (Busk, 1852)
Lytocarpia calycifera (Bale, 1914) [= *Aglaophenia calycifera* Bale, 1914]
Lytocarpia canepa (Blanco & Bellusci de Miralles, 1971) [= *Thecocarpus canepa* Blanco & Bellusci de Miralles, 1971]
Lytocarpia carinata (Bale, 1894) [= **Lytocarpia brachiata* (Lamarck, 1816)]
Lytocarpia chiltoni (Bale, 1924) [= *Thecocarpus chiltoni* Bale, 1924]
Lytocarpia clavicula (Whitelegge, 1899) [= *Aglaophenia clavicula* Whitelegge, 1899; **Lytocarpia phyteuma* Kirchenpauer, 1876]
Lytocarpia contorta (Nutting, 1900) [*Thecocarpus contorta* Nutting, 1900]
Lytocarpia crispata (Kirchenpauer, 1872). May be a species of *Monoserius*.
Lytocarpia ctenata (Totton, 1930) [= *Thecocarpus ctenatus* Totton, 1930; **Aglaophenia ctenata* (Totton, 1930)]
Lytocarpia delicatula (Busk, 1852). No description of adult corbula found; young corbula described by Millard & Bouillon (1973).
Lytocarpia distans (Allman, 1877) [= *Aglaophenia distans* Allman, 1877]
Lytocarpia divaricata (Busk, 1852) [= **Aglaophenia divaricata* (Busk, 1852)]
Lytocarpia flexuosa (Lamouroux, 1816) [= *Aglaophenia flexuosa* Lamouroux, 1816; *Thecocarpus giardi* Billard, 1907]
Lytocarpia flexuosa var. *perarmatus* Billard, 1907
Lytocarpia flexuosa plumifera (Kirchenpauer, 1872) [= *Aglaophenia plumifera* Kirchenpauer, 1872]
Lytocarpia flexuosa solida (Millard, 1958) [= *Thecocarpus giardi* var. *solidus* Millard, 1958]
Lytocarpia flexuosa umbellatus (Millard, 1962) [= *Thecocarpus flexuossus umbellatus* Millard, 1962]
Lytocarpia formosa (Busk, 1852) [= *Plumularia formosa* Busk, 1852; *Aglaophenia formosa* (Busk, 1852); *Thecocarpus formosus* (Busk, 1852)]
Lytocarpia formosa var. *inarmata* (Trebilcock, 1928) [*Thecocarpus formosus* var. *inarmatus* Trebilcock, 1928; * *Lytocarpia incisa* (Coughtrey, 1875)]
Lytocarpia furcata (Vervoort, 1941) [= *Thecocarpus furcatus* Vervoort, 1941]
Lytocarpia giardi (Billard, 1907) [= **Lytocarpia flexuosa* (Lamouroux, 1816)]
Lytocarpia giardi var. *solida* (Millard, 1958) [**Lytocarpia flexuosa solida* (Millard, 1958)]
Lytocarpia (?) *hjorti* (Broch, 1914). Described as *Cladocarpus hjorti* Broch, 1914, but hydrotheca almost as *Lytocarpia myriophyllum* (Linnaeus, 1758).
Lytocarpia howensis (Briggs, 1918) [= *Aglaophenia howensis* Briggs, 1918]
Lytocarpia incisa (Coughtrey, 1875) [= *Plumularia incisa* Coughtrey, 1875, *Aglaophenia incisa* (Coughtrey, 1875, *Thecocarpus incisus* (Coughtrey, 1875), *Halicornaria rostrata* Bale, 1924, *Thecocarpus rostratus* (Bale, 1924), *Thecocarpus formosus* var. *inarmatus* Trebilcock, 1928]
Lytocarpia laxa (Allman, 1876); [**Aglaophenia laxa* Allman, 1876]
Lytocarpia leopoldi (Leloup, 1930a) [*Thecocarpus leopoldi* Leloup, 1930a; ?*Lytocarpia phyteuma* (Kirchenpauer, 1876)]
Lytocarpia mammillata (Nutting, 1900). Corbula of this species described although not figured by Jarvis (1922); reference to Nutting's species exclusively on basis of resemblance of hydrothecae, that are poorly figured; ?*Aglaophenia latecarinata* Allman, 1877).
Lytocarpia megalocarpa (Bale, 1914a) [= *Aglaophenia megalocarpa* Bale, 1914a]
Lytocarpia multiplicata-pinnata (Kirchenpauer, 1876) nomen nudum?
Lytocarpia myriophyllum (Linnaeus, 1758) [= *Sertularia myriophyllum* Linnaeus, 1758; *Thecocarpus myriophyllum* (Linnaeus, 1758)]
Lytocarpia myriophyllum var. *angulatum* (Billard, 1913) [= *Thecocarpus myriophyllum* var. *angulatus* Billard, 1913]
Lytocarpia myriophyllum var. *bedoti* (Billard, 1922) [= *Thecocarpus myriophyllum* var. *bedoti* Billard, 1922]
Lytocarpia myriophyllum var. *elongatum* (Billard, 1922) [= *Thecocarpus myriophyllum* var. *elongatus* Billard, 1922]
Lytocarpia myriophyllum var. *orientalis* (Billard, 1908) [= *Thecocarpus myriophyllum* var. *orientalis* Billard, 1908]
Lytocarpia myriophyllum var. *perarmatum* (Billard, 1913) [= *Thecocarpus myriophyllum* var. *perarmatus* (Billard, 1913); **Lytocarpia perarmata* (Billard, 1913)]
Lytocarpia myriophyllum var. *radicellatum* (G.O. Sars, 1874); [= *Aglaophenia radicellata* G.O. Sars, 1874]
Lytocarpia myriophyllum vervoorti (Stepan'yants, 1979) [= *Thecocarpus myriophyllum vervoorti* Stepan'yants, 1979; **Lytocarpia canepa* (Blanco & Bellusci de Miralles, 1971)]
Lytocarpia nicpenny Ryland & Gibbons, 1991
Lytocarpia nigra (Nutting, 1905) [= *Thecocarpus niger* Nutting, 1905]
Lytocarpia normani (Nutting, 1900) [= *Thecocarpus normani* Nutting, 1900]

Lytocarpia parasitica (Warren, 1908) [=*Aglaophenia parasitica* Warren, 1908; **Lytocarpia formosa* (Busk, 1852)]
Lytocarpia perarmata (Billard, 1913) [= *Thecocarpus perarmatus* Billard, 1913]
Lytocarpia phyteuma (Kirchenpauer, 1876) [= *Aglaophenia (Lytocarpia) phyteuma* Kirchenpauer, 1872; *Lytocarpia clavicula* (Whitelegge, 1899)]
Lytocarpia radicellata (G.O. Sars, 1874) [= *Aglaophenia radicellata* G.O. Sars, 1874; **Lytocarpia myriophyllum radicellatum* (G.O. Sars, 1874)]
Lytocarpia rostrata (Bale, 1924) [= *Halicornaria rostrata* Bale, 1924; *Thecocarpus rostratus* (Bale, 1924); **Lytocarpia incisa* (Coughtrey, 1875)]
Lytocarpia spiralis (Totton, 1930) [= *Thecocarpus spiralis* Totton, 1930]
Lytocarpia subdichotoma (Ralph, 1961b) [= *Thecocarpus subdichotomus* Ralph, 1961b]
Lytocarpia tenuissima (Bale, 1914c) [= *Thecocarpus tenuissimus* Bale, 1914c]
Lytocarpia vitiensis Ryland & Gibbons, 1991.

Fourteen species of *Lytocarpia* are here recorded from New Zealand waters, of which one species could only be identified to generic level. Of those species, 6 are new, amongst which 2 are of uncertain generic allocation.

Lytocarpia formosa (Busk, 1852) (= *Plumularia formosa* Busk, 1852: 118) is mentioned by Ralph (1961b: 59). Of this species Bale (1924: 216) remarks: "Allman referred to the species as being known to him from Australia, New Zealand, and South Africa, and Billard adds Madagascar and Ceylon. I have never met with the species in collections from Australia or New Zealand". Allman's reference could not be checked [by either Vervoort (1946b) or Ralph (1961b)]; no reliable New Zealand material is known to us.

Lytocarpia alata sp. nov. (Figs 72C, D; 73A–F)

Material Examined:

NZOI Stn F127, about 75 mm high, pinnate colony, hydrocladia 25 mm long; 1 corbula (holotype, H-778 in NIWA collection). Top part of colony and some hydrocladia in 3 RMNH-Coel. slides 3549, along with corbula (part of type series).

Type Locality: Campbell Plateau, Southwest Pacific, 49°22.00′ S, 176°16.00′ E, 1280 m.

Description (of holotype): Colony erect, pinnate, composed of stem 80 mm high, polysiphonic over greater part of length, and alternate, widely spaced (about 2 mm on same side) hydrocladia, about 25 mm long. Polysiphony of stem due to apposition of secondary tubules originating from basal part of stem. Stem internodes indistinct with exception of distalmost part, where distinct internodes with several apophyses are separated by transverse nodes; otherwise nodes of primary axis only indicated by perisarc constrictions. Apophyses occur along whole length of primary axis, directed alternately left and right, short, only those of distal half of stem bearing hydrocladia; these alternately point straight left or right. Front of stem with a row of large, cup-shaped nematothecae of which usually 1 at base of apophysis and 1 on proximal part of internode; a small mamelon at base of apophysis. Back of stem in monosiphonic parts with axillar nematotheca, invisible where covered by secondary tubes. Frontal nematothecae with more or less gutter-shaped foramen and everted rim; rim of nematotheca at back also gutter-shaped but not everted. Hydrocladia thin, divided into distinct internodes by distinct, transverse nodes.

Hydrothecae deep and slender, covering almost full length of internode; aperture perpendicular to internodal axis. Abcauline wall of hydrotheca almost straight except for a slight bulge some distance above aperture of median nematotheca. Adcauline hydrothecal wall with short internal ledge at lower quarter of its length, below ledge hydrothecal base rounded; hydropore vertical. Interior of internode with 5 incomplete septa or rings: 1 just opposite intrathecal ledge, 1 below and 3 above that ledge, the highest covered by lateral nematothecae. Rim of hydrotheca with broad, slightly thickened median cusp and 4 pairs of triangular, rounded lateral cusps, separated by rounded embayments. Fourth pair of cusps behind lateral nematothecae but slightly protruding; adcauline wall of hydrotheca scooped out, no adcauline cusp present.

Median nematotheca short, covering basal third and completely adnate to abcauline wall of hydrotheca; aperture gutter-shaped, not prominent. Laterals slender, directed obliquely upwards, reaching as high as bottom of embayments of hydrothecal rim, slightly swollen, deeply scooped out on inside.

Proximal part of gonocladium shows transitions from a normal hydrocladial internode to internodes bearing gonohydrocladia as also happens in *Lytocarpia spiralis* (Totton 1930). First internode of 'pedicel' a normal internode with hydrotheca, mesial nematotheca and a pair of laterals. Second internode longer; median nematotheca on proximal part of internode below hydrotheca; laterals also shifted downwards. Third internode with 2 median nematothecae and an apophysis bearing a short 'leaflet' composed of a hydrotheca with 3 nematothecae; additionally there is an axillar nematotheca near the apophysis. Fourth internode short, with apophysis bearing a forked appendage of which 1 fork is a recognisable hydrotheca with its triplet of nematothecae; there is a median nematotheca on the internode, 1 axillar, near apophysis and at least 2 on remaining branch of forked appendage.

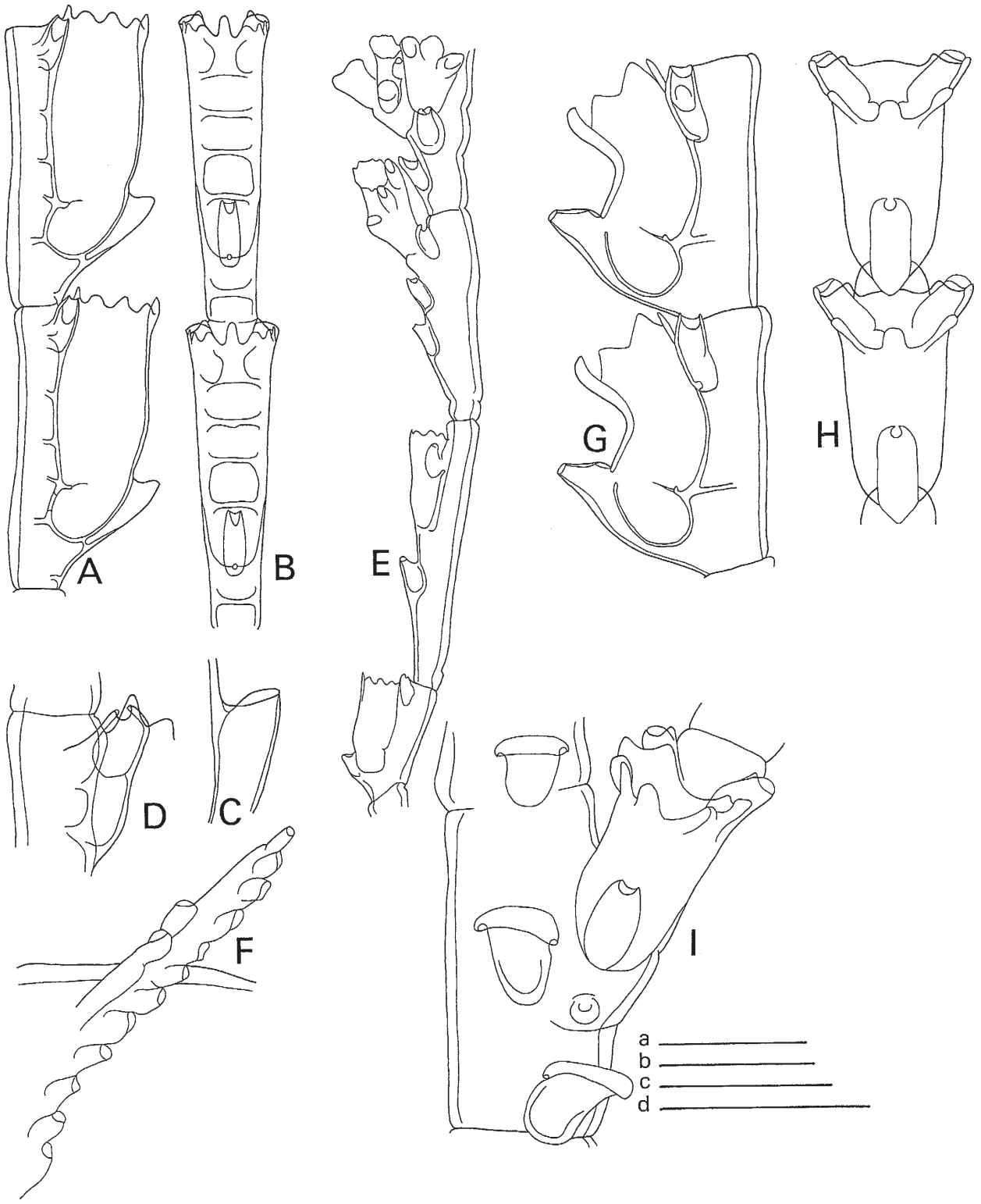

Fig. 73. A-F. ***Lytocarpia alata*** sp. nov. **A**, pair of hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, median hydrothecal nematotheca, lateral view. **D**, hydrothecal lateral nematotheca, lateral view. **E**, pedicel of corbula. **F**, 'spur' of gonohydrocladium, lateral view (NZOI Stn F127, holotype, slides 3549). **G–I,** ***Lytocarpia brevirostris*** (Busk, 1852). **G**, pair of hydrocladial hydrothecae, lateral view. **H**, the same, frontal view. **I**, insertion of hydrocladium on stem, frontal view, showing position of frontal nematothecae (NMNZ, off Anson Bay, Norfolk Island, slide 2991). Scales: a, 1 mm (A, B); b, 0.2 mm (C, D, G–I); c, 1 mm (F); d, 2 mm (E).

Rachis of corbula composed of a number of fused internodes; nodes only indicated by perisarc constrictions. There are at least 6 pairs of long and broad gonohydrocladia forming the corbula proper, each with a basal 'spur' pointing obliquely downwards and bearing a large hydrotheca with median nematotheca and 2 laterals on lengthened part of spur together with 2 smaller, free gonohydrocladia at end of rachis. Median part of gonohydrocladia fused to form a closed, oval 'body' enclosing 4 oval, apparently female gono-thecae; lines of fusion distinctly visible as thickened ridges. Free parts of gonohydrocladia directed outwards and upwards as broad wings; free edges set with a row of nematothecae with slightly gutter-shaped apertures.

MEASUREMENTS of *Lytocarpia alata* sp. nov. (in μm):

	NZOI Stn F127 slide 3549
Stem, diameter at base	1000
Axial tube, diameter	295 – 330
Stem nematotheca, length	175– 180
Maximum diameter	125 – 130
Diameter at rim	70 – 85
Axillar nematotheca on front, length	155 – 195
Diameter at rim	112 – 117
Axillar nematotheca on backside, length	190 – 196
Maximum diameter	125 – 168
Diameter at rim	95 – 112
Hydrocladial internode, length	250 – 320
Diameter at node	150 – 215
Hydrotheca, total depth	655 – 690
Diameter at rim	265 – 290
Median nematotheca, total length (measured from apex to septum)	270 – 310
Diameter at margin (measured in frontal view)	34 – 45
Lateral nematotheca, depth	180 – 200
Diameter at rim	22 – 28
Corbula, total length, excluding pedicel	4000
Maximum height of gonohydrocladium	3000
Nematotheca of costa, depth	155 – 170
Diameter at rim	45 – 55
Gonotheca, total length	700 – 800
Maximum diameter	390 – 410

COLOUR: Stem basally dark brown, colour fading to yellowish-brown apex; hydrocladia silvery-white (preserved specimen).

REMARKS: *Lytocarpia alata* sp. nov. has hydrothecae resembling those of *Lytocarpia spiralis* (Totton, 1930) with the following differences: dentition of the hydrothecal rim, which has 4 pairs of distinct lateral cusps in *L. alata* but has a greater number and lower cusps in *L. spiralis*; the habit of the colony in *L. alata* is totally different from the spiral structure observed in *L. spiralis*; there are also a number of differences in the structure of the corbula proper, that of *L. spiralis* being composed by a higher number of less prominent gonohydrocladia, while the 'spurs' have reduced hydrothecae. The structure of (the only) corbula of *L. alata* is remarkable by development of a long proximal pedicel of the gonocladium and a fully closed distal part with long and broad 'wings'. Its structure could, however, only be studied in a single corbula in a slightly compressed microslide preparation.

RECORDS FROM NEW ZEALAND: The specimen originated at considerable depth (1280 m) from the Campbell Plateau.

DISTRIBUTION: Known exclusively from southern waters of New Zealand.

ETYMOLOGY: The specific name *alata* has been taken from the Latin adjective 'alatus' meaning winged, referring to the condition of the corbula.

Lytocarpia brevirostris (Busk, 1852) (Fig. 73G–I)

Plumularia brevirostris Busk 1852: 397.
Aglaophenia brevirostris: Kirchenpauer 1872: 27; Bale 1884: 169; Kirkpatrick 1890a: 611; Bale 1913: 135, pl. 13, figs 7, 9.
Thecocarpus brevirostris: Billard 1910: 51, fig. 24; 1913: 89, fig. 75; Briggs 1918: 34, 45; Stechow 1919: 137, figs. A^2, B^2; Bedot 1921a: 332; 1922: 157; Jarvis 1922: 350, pl. 26, fig. 24; Pennycuik 1959: 187; Rees & Thursfield 1965: 186; Millard 1968: 254, 284–285, fig. 6B; Vasseur 1974: 158; Millard 1975: 454, fig. 139A–C; 1978: 199 *et seq*.; Tang 1991a: 32-33, fig. 6.
Lytocarpia brevirostris: Stechow 1922: 151; 1923d: 245; Ryland & Gibbons 1991: 545-546, fig. 15; Bouillon *et al.* 1995: 36; Irving 1995: 324, appendix 2.
Aglaophenia maldivensis Borradaile 1905: 843, pl. 69, fig. 8.

MATERIAL EXAMINED:

NZOI Stn Q72, small colony, 20 mm high, with *Modeeria rotunda* (Quoy & Gaimard, 1827). RMNH-Coel. slide 2907A.

NMNZ, off **Anson Bay, Norfolk Island**: 2 well-developed plumes, branched, and several smaller colonies. No corbulae. NMNZ Co. 497; 2 RMNH-Coel. slides 2991.

TYPE LOCALITY: Off Cumberland Islands, Queensland, Australia, 49 m, (Busk 1852; type probably in NHM).

DESCRIPTION: Colonies plumose, rather flexuous, smaller colonies unbranched, larger colonies with some irregularly placed branches originating from secondary tubules, all in 1 plane. Stem monosiphonic in higher parts, polysiphonic by apposition of secondary tubules in the lower parts; division into internodes irregular, transverse septa best developed in younger parts of colonies; stem internodes (in monosiphonic parts) with 1 apophysis, 2 frontal nematothecae and a mamelon. In older parts of colonies division into internodes indistinct; apophyses alternately pointing obliquely left and right, supporting fairly closely packed hydrocladia curving gracefully left and right. Stem nematothecae more or less in 1 frontal row, 1 at base of apophysis, second at base of internode; a raised and circular mamelon on basal portion of apophysis. Axial nematothecae large, saccate, with wide, oval aperture; rim slightly everted. No dorsal nematothecae observed. Hydrocladia about 8 mm long, composed of 15–20 internodes; nodes transverse.

Hydrothecae closely packed, all frontal on internodes; no reversion of hydrothecae observed. Hydrotheca slightly S-shaped, fairly narrow; adcauline wall smoothly curved, abcauline wall with prominent curve above insertion of median nematotheca. Knob-shaped adcauline ridge projecting into hydrothecal cavity at lower third of adcauline wall; interior of internode behind ridge with an incomplete septum. Along length of hydrocladium, internodal septum gradually placed in more apical position, occurring halfway along internode in upper internodes. Hydrothecal aperture at an angle of about 70° to axis of internode, rim with a prominent, rounded median cusp and 3 pairs of lateral cusps, of which the first 2 are large and triangular with rounded tip; third pair of lateral cusps may be almost hidden by lateral nematothecae; adcauline hydrothecal border rounded between left and right third cusp. Hydrothecal rim moderately everted. Frontal wall of hydrotheca sclerotised, thickening continuing in the median cusp and along rim.

Median nematotheca large, swollen at base, pointing forwards, with circular apical aperture and small oval fenestra near abcauline hydrothecal wall; communication with hydrothecal cavity distinct. Laterals elongate, with slight curvature; aperture almost circular; rim slightly scooped on the inside. An incomplete internodal septum near base of laterals, almost invisible in younger internodes.

No corbulae present.

COLOUR (of the preserved material): yellowish-brown.

REMARKS: The present material fits the descriptions of this widely distributed species; the shape of the hydrothecae makes recognition possible even in absence of the corbula. Reversion of the plane the hydrothecae are facing has been repeatedly observed. In our limited material all hydrothecae are frontally directed.

MEASUREMENTS of *Lytocarpia brevirostris* (in μm):

	NMNZ off Anson Bay slides 2991
Axial tube, diameter	145 – 155
Axillary nematotheca, length	128 – 140
Maximum diameter	105 – 155
Second nematotheca, length	100 – 105
Maximum diameter	115 – 120
Hydrocladial internode, length	285 – 300
Diameter at node	95 – 100
Hydrotheca, total depth	225 – 240
Diameter at rim	100 – 110
Median nematotheca, total length (measured from apex to septum)	140 – 168
Diameter at rim (measured in frontal view)	17 – 28
Lateral nematotheca, depth	95 – 100
Maximum diameter	40 – 45
Diameter at rim	23 – 28

DISTRIBUTION: Originally described from Queensland, Australia, at 49 m depth (Busk 1852). The species occurs over the whole of the tropical Indian and Pacific Oceans, including the Indian Ocean coasts of South Africa (Millard 1975), the Malay Archipelago (Billard 1913), tropical parts of Australia (Busk 1852), the South China Sea (Tang 1991a), Fiji (Ryland & Gibbons 1991), and the eastern Pacific (Irving 1995). The present locality, Norfolk Island, fits into the pattern of geographical distribution outlined above; the species being found at about 36 m depth.

Lytocarpia chiltoni (Bale, 1924) (Fig. 74E–I)

Thecocarpus chiltoni: Bale 1924: 261, fig. 16; Totton 1930: 240, fig. 69e; Ralph 1961b: 60–62, fig. 8a, b; Dawson 1992: 18; Stranks 1993: 9.

MATERIAL EXAMINED:

NZOI Stns: B93, several small colonies, the largest with some corbulae; **C758**, several colonies; **C763**, strongly branched colony about 80mm high, spread 100 mm, many corbulae; **E289**, large broken colony with many corbulae. Height at least 150 mm. RMNH-Coel. slide 2115; **E319**, 1 fine colony, about 200 mm high, with many corbulae. Stem forked. RMNH-Coel. slide 2160; **E325**, fragments of a large, broken colony, about 250 mm high. Some corbulae present; **F922**, several large colonies, 150 x 1200 mm, with corbulae

and fragments; **F924**, 1 damaged colony about 100 mm high with corbulae; **I14**, *Lytocarpia chiltoni* (Bale, 1924) (J.E. Watson). [Slide 4233 JEW Colln]; **I15**, *Lytocarpia chiltoni* (Bale, 1924) (J.E. Watson). [Slide 4235 JEW Colln]; **I19**, part of a pinnately branched colony, 40 x 45 mm, no corbulae; **I340**, fragment made up in RMNH-Coel. slide 2138; **I341**, small, feather-shaped colony with branched, polysiphonic stem, no gonosome. RMNH-Coel. slide 2143; **I371**, 2 branched colonies about 50 mm high with many corbulae. RMNH-Coel. slide 2154; **I377**, branched, plume-shaped colony with many corbulae. Stem polysiphonic, 2–3 mm thick; **J680**, single dichotomously branched colony about 50 mm high, spread 40 mm; with corbulae. With *Sertularella a. acutidentata* Billard, 1919. RMNH-Coel. slide 2259. Moreover 3 fan-shaped colonies 120 x 120 mm with many corbulae, 1 specimen with additional colonies of *Sertularella a. acutidentata* (Billard, 1919) and *Gymnangium prolifer* (Bale, 1884); **J954**, 5 colonies 100–300 mm high, strongly branched, with corbulae. RMNH-Coel. slide 2212; **J970**, *Lytocarpia chiltoni* (Bale, 1924) (J.E. Watson). [Slides 4210, 4225 JEW Colln]; **N369**, small colonies and some fragments, maximally 100 mm high, many corbulae.

NMNZ: T16, Zool. Dept. V.U.W., 2 large plumes, 150 x 100 mm, with many corbulae. NMNZ Co. 389; 2 RMNH-Coel. slides 2949; **BS 389**, 1 large colony, about 220 mm high, spread about 160 mm. Many corbulae. Smaller colony without corbulae. Stem covered by *Filellum serpens* (Hassall, 1848). NMNZ Co. 502. RMNH-Coel. slide 3560; **BS 390**, 140 mm high colony with many corbulae. NMNZ Co. 538; **BS 392**, 7 colonies varying in height between 60 and 200 mm, with abundant corbulae. NMNZ Co. 575; **BS 393**, large fan-shaped colony, composed of several plumes, about 280 mm high, spread about 250 mm. Abundant corbulae. NMNZ Co. 568; **BS 394**, 7 colonies, the largest 220–150 mm. Many corbulae present. NMNZ Co. 590. Also fragmentary colony 150 mm high, with corbulae. NMNZ Co. 666; **BS 396**, single branch about 70 mm long; no corbulae. NMNZ Co. 596; **BS 398**, about 80 mm high, strongly mutilated colony; no gonothecae. NMNZ Co. 510. Also 5 fan-shaped colonies, the largest 120 x 130 mm; many corbulae. NMNZ Co. 602; **BS 399**, several mutilated colonies, up to 120 mm high, some corbulae present. NMNZ Co. 629; **BS 402**, single colony about 150 mm high, branched in 1 plane; corbulae present. NMNZ Co. 513; **BS 742**, several plume-shaped as well as branched colonies, up to 50 mm high; no corbulae. NMNZ Co. 380. 2 stems made up in 2 RMNH-Coel slides 2944. Also plumose colonies up to 150 mm high and with a spread of about 100 mm; many corbulae. Colonies strongly damaged and from sample that has been deteriorated. Stems strongly polyphonic, basally 2–3 mm diameter; branching in single plane and sub-opposite. NMNZ Co. 738. 4 slides RMNH-Coel. 27700, slides 3400; **BS 899**, 2 colonies, the larger 170 x 140 mm; no corbulae. NMNZ Co. 446; **BS 905**, fragment, 30 mm high; no corbulae. NMNZ Co. 696; **BS 907**, 2 colonies, 150 and 100 mm high, as well as a number of fragments, all with many corbulae. NMNZ Co. 812, RMNH-Coel. slide 3492; **BS 911**, many large colonies with many corbulae, up to 250 mm high, spread 150 mm. NMNZ Co. 408. Also about 20 colonies varying in height between 80 and 150 mm, about same spread. NMNZ Co. 1018. 3 colonies as RMNH-Coel. 27645, 4 slides 3335; **BS 912**, 7 colonies, the largest 100 x 100 mm; some with corbulae. NMNZ Co. 580; **BS 913**, about 10 fan-shaped colonies up to 120 mm high, composed of stem with regularly disposed side branches, all in single plane. Hydrocladia up to 5 mm long, densely packed, with many corbulae that take the place of a hydrocladium. NMNZ Co. 797; 2 RMNH-Coel. slides 3345.

NMNZ Ralph Collection: Loc. 34, NMNZ Co. 904, about 6 mm long fragment of a cormoid of a dead specimen. RMNH-Coel. slide 3600. Poor slide in RSC as *Thecocarpus chiltoni*, no data; **Loc. 276**, NMNZ Co. 1123, a single plume, about 15 mm long with 3 corbulae. RMNH-Coel. slide 3802.

TYPE LOCALITY: 10 miles NW of Cape Maria van Diemen, North Island, New Zealand, 91.5 m, (Bale 1924; probable syntypes in MOV, MV F58221 and MV F60225, five microslides; Stranks 1993).

REMARKS: This material conforms in habit with Ralph's description of a fan-shaped colony with a thick, repeatedly branched main stem, basally up to 5 mm diameter; all ramifications in the same plane. Hydrocladia up to 6 mm long, closely set. Corbulae take the place of hydrocladia; completely closed. Stem continues beyond corbula proper as a short spur. This species resembles *Lytocarpia incisa* (Coughtrey, 1875) in the shape of the hydrothecae but differs in shape of the colony and structure of the corbula. The development of the cusps of the hydrothecal rim is almost identical in both species: there are four pairs of distinct lateral cusps with the first pair fairly strongly everted; the abcauline part of the hydrothecal rim is entire in both species and strongly curved inward in *L. chiltoni*, forming a more or less distinct fifth pair of cusps, plainly visible in that species in oblique lateral view of the hydrocladium. This 'fifth pair' is completely obscured by the lateral nematothecae in *L. incisa*. The median, adcauline cusp in *L. chiltoni* has a moderately developed carina while the cusp itself is low and broadly rounded. In *L. incisa* there is (usually) a conspicuous rostrum; the median cusps is distinctly visible at the base of that rostrum. The intrathecal, abcauline ridge in *L. incisa* is short and points straight into the hydrothecal cavity. In *L. chiltoni* that ridge divides into two chitinised carinae running obliquely upwards on the inside of the hydrotheca towards the insertion of the upper wall of the median nematotheca. That nematotheca, in *L. chiltoni*, leaves a greater part of the frontal hydrothecal wall uncovered.

Considerable differences exist in the shape of the colony: it is simple plume-shaped in *L. incisa*, with a maximum height of 100 mm and a spread of 15 mm; the axis is unbranched and monosiphonic throughout. The colony of *L. chiltoni* is fan-shaped, with repeated branching in one plane, the branches being opposite or sub-opposite. The stem may reach a considerable diameter basally, some well developed colonies have a stem of about 5 mm diameter.

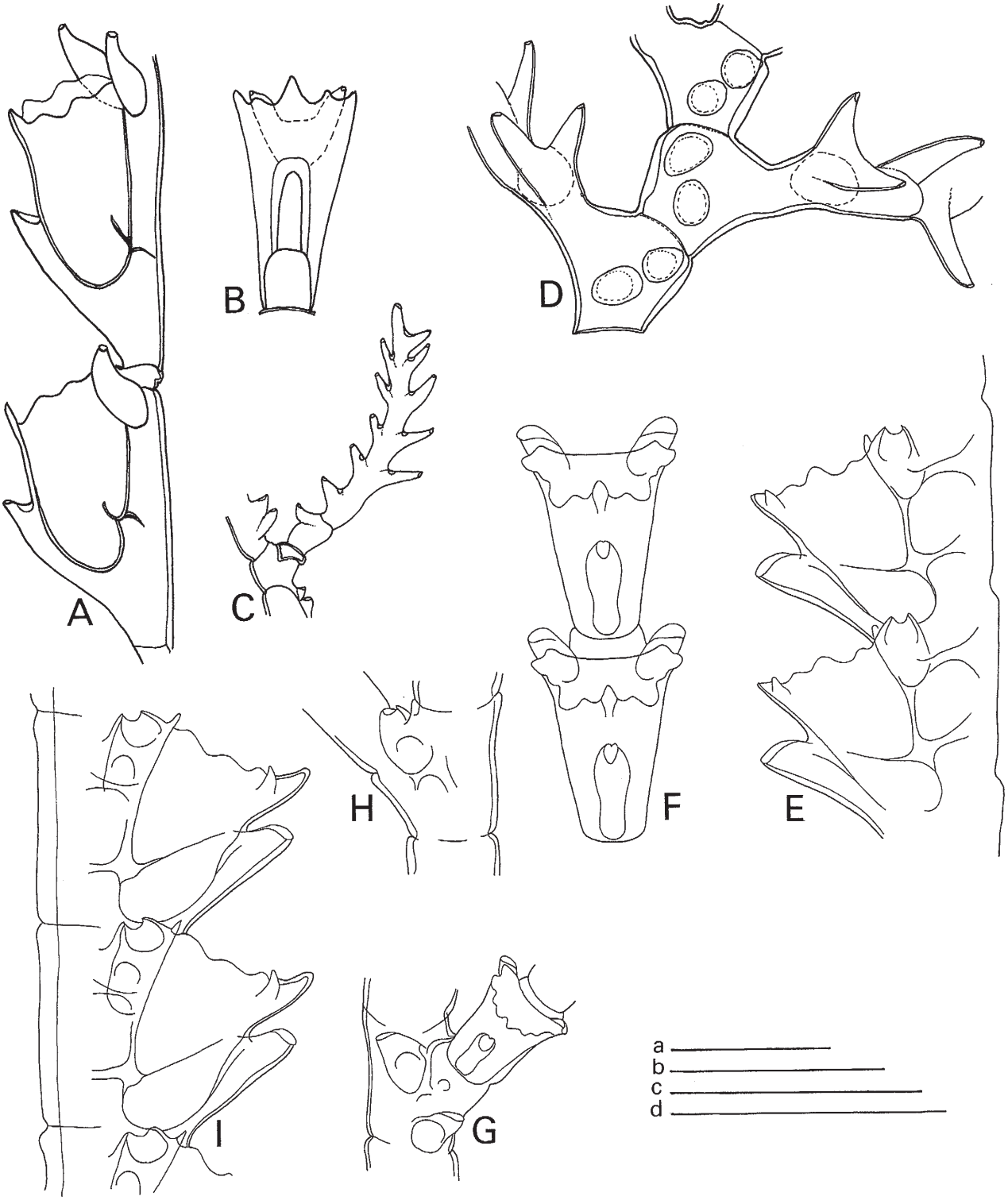

Fig. 74. A–D. ***Lytocarpia epizoica*** sp. nov. **A**, pair of hydrocladial hydrothecae, lateral view. **B**, hydrocladial hydrotheca, frontal view (NZOI Stn J970, holotype, slide 3468). **C**, part of corbula and gonohydrocladium. **D**, part of rachis of corbula with insertion of two gonohydrocladia (NZOI Stn J970, holotype, J.E.W. slide 4212). J.E.W. **E–I.** ***Lytocarpia chiltoni*** (Bale, 1924). **E**, pair of hydrocladial hydrothecae, lateral view. **F**, the same, frontal view. **G**, insertion of hydrocladium on stem, frontal view to show position of cauline nematothecae. **H**, the same, seen from back (BS 907, slide 3492). **I**, pair of hydrocladial hydrothecae, lateral view (Loc. 34, slide 3600). W.V.

The corbulae in *L. chiltoni* lack the considerable development of the spur of the gonohydrocladium observed in *L. incisa*; the hydrotheca on that portion of the gonohydrocladium is not reduced in size and easily visible without dissection of the corbula; in *L. incisa* that hydrotheca is reduced (with usually considerable development of the nematothecae) and best visible after dissection of the corbula.

We have observed a considerable variability in the depth of the hydrotheca of the various specimens studied, dependent, apparently, upon environmental conditions. The hydrotheca may become fairly long, as is the case in the specimens from BS 742, where it is combined with the presence of extra rings in the internode, intermediate between those at the base of the lateral nematothecae and those opposite the intrathecal ridge. The basal part of the hydrotheca may protrude strongly into the internodal cavity, though observation of this phenomenon depends much upon the angle of vision.

There are two types of corbulae in our material. Those presumably male have large apertures between the gonohydrocladial 'leaflets', while the nematothecae bordering the edges of those leaflets are fairly small. The presumed female corbula is completely closed and the nematothecae of the corbula leaflets are big, the corbula being surrounded by circular ribs with large, outwardly directed nematothecae. These corbulae contain four or five big, globular gonophores each with a developing egg.

Records from New Zealand: The species was first described by Bale (1924) from 10 miles northwest off Cape Maria van Diemen, depth 91.5 m. Additional records by Totton (1930) and Ralph (1961b: 62) are also from that area, though a drifted specimen was found after a storm at Napier foreshore. The present records show that the species seems to be restricted to an area north and northeast of North Island, between 34°–37.5° S and 171.5°–177° E, depths ranging between 55 and 604 m. No records from outside that area are known at present.

Distribution: Exclusively a New Zealand species.

Lytocarpia epizoica sp. nov. (Fig. 74A–D)

Material Examined:

NZOI Stn J970, several colonies epizootic on *Lytocarpia vulgaris* sp. nov. (holotype, H-779 in NIWA collection). Slides 4212 and 4223 in JEW Colln and RMNH-Coel. slide 3468 are all part of type series.

Type Locality: Southwest Pacific, off North Island, 35°08.60′ S, 174°21.10′ E, 86 m, 21.June.1981.

Description: Colony epizootic on *Lytocarpia vulgaris* sp. nov. Hydrorhiza tubular, running up the stem of the host. Single monosiphonic stems given off at intervals from the hydrorhiza. Stems lax, perisarc thin, proximal part of stem without hydrocladia or internodes but with a line of nematothecae, orifices facing upwards. Ahydrocladiate part of stem ending with 1 or 2 strong, oblique hinge joints, stem thereafter hydrocladiate.

Stem internodes long, thin, nodes slightly oblique, not well marked, hydrocladia well separated, given off from frontal aspect of stem on a short apophysis situated distally on the internode, adcauline side of apophysis swollen. On each stem internode 3 nematothecae ; 1 above, 1 below the apophysis, and 1 proximal.

Hydrocladia lax, with up to 8 hydrothecae. Hydrocladial internodes may be without septa or have 2 indistinct incomplete septa, 1 passing downward from the hydrotheca and the other downward from the base of the lateral nematotheca. A small hydropore connecting the base of the hydrotheca with the internode.

Hydrothecae elongate, lying parallel with the internode, basal part ovoid, adcauline wall flat, abcauline wall expanding a little to a forwardly facing margin. An intrathecal septum passing into the hydrotheca from the internode may or may not be present; if present, indistinct and curved toward the margin. Margin with a median pointed cusp, then 3 pairs of cusps, all similar in shape and size, cusps broader than the median cusp, separated by shallow embayments a little broader than the cusps.

Median nematotheca short, reaching about halfway along the hydrotheca, tapering proximally, completely adnate to the hydrotheca or with a very short free part, terminal orifice very small, a secondary orifice above the hydrotheca and a small orifice into the hydrotheca behind its junction with the nematotheca.

Lateral nematothecae flask-shaped, orifice small, on a short, narrow neck, a larger secondary orifice facing inwards.

Corbula up to 3 mm long, open, replacing a hydrocladium; up to 3 along stem. Pedicel of corbula with 1–3 hydrothecate internodes. Mature corbula with 12 alternate, arched ribs given off from blunt wedge-shaped internodes of rachis (anterior view), each internode with 2 nematothecae and a reduced hydrotheca with 2 nematotheca at the base of each rib. Ribs thereafter with a single unpaired nematotheca, facing distally, and up to 7 pairs of opposite to sub-opposite long, slender nematothecae each with a small terminal orifice and a small secondary orifice in the axil.

Colour: White to almost colourless.

MEASUREMENTS of *Lytocarpia epizoica* sp. nov. (in μm):

	NZOI Stn J970 slide 3468
Stem length of monosiphonic part	16.400 – 23.000
Width	130 – 148
Length of internodes	951 – 1115
Hydrocladium, length of internode	836 – 951
Width of internode	59 – 164
Hydrotheca, length, back to margin	254 – 273
Width at margin	59 – 98
Median nematotheca, length, internode to orifice	182 – 195
Width at orifice	29 – 42
Lateral nematotheca, length	98 – 130
Maximum width	35 – 46
Width at orifice	10 – 13
Corbula, maximum length of rib	1148
Length stem internode (anterior view)	117 – 143
Width of stem internode (anterior view)	72 – 117
Distance between nematothecae (tip to tip)	228 – 241

REMARKS: *Lytocarpia epizoica* is a particularly delicate species, the almost transparent, lax stems having no strength out of fluid. Since it was found on only one sample of *Lytocarpia vulgaris* sp. nov. from one station, it is not certain whether the species is an obligate epizoite of this species only, or also of other aglaopheniid species.

The colony consists of many stems intermingled with those of *L. vulgaris*, from which it can only be distinguished by careful inspection.

For such a small hydroid, the species is remarkably fertile, many stems bearing three corbulae. The sex of the colony could not be determined with certainty, but it is probably female.

RECORDS FROM NEW ZEALAND: Single New Zealand locality: Southwest Pacific, off North Island, 35°08.60′ S, 174°21.10′ E, 86 m.

DISTRIBUTION: Known exclusively from the one New Zealand locality.

ETYMOLOGY: The species name, *epizoica*, refers to the epizootic habit of this species.

Lytocarpia howensis (Briggs, 1918) (Fig. 75A–D)

Halicornaria sp. nov. Whitelegge 1889b: 41.
Aglaophenia howensis Briggs 1918: 27–29, pl. 5, figs 1–2, pl. 6 fig. 1: Bedot 1921a: 339.

MATERIAL EXAMINED:

NZOI Stns: I731, 1 plume, 180 mm long, with 1 corbula. RMNH-Coel. slide 2887; **Q72**, about 20 plumes on calcareous rock. Length up to 150 mm. No corbulae. RMNH-Coel. slide 2907B.

DESCRIPTION (of the NZOI Stn Q72 material): Colony consists of unbranched, erect plumes rising from a few thick stolonal fibres attached to calcareous rock. Stem monosiphonic, divided into internodes by transverse nodes, almost invisible in basal part of plumes, which are devoid of hydrocladia; nodes indicated by shallow constrictions of perisarc. Each internode with distal apophysis; apophyses alternately directed left and right and with 3 large nematothecae 2 of which occur on frontal parts of internode; 1 on the back. Frontal nematothecae consist of large axillary nematotheca with 2 gutter-shaped apertures and a large, elongate nematotheca at base of apophysis, opening directed upwards, scooped internally, rim slightly everted. In addition there is a raised mamelon almost hidden by axillary nematotheca near axil of apophysis. Nematotheca on back oval, with large, gutter-shaped foramen. Apophyses supporting hydrocladia of about 8 mm length, composed of about 18 internodes and directed upwards at an angle of about 45°; hydrocladia closely packed and in 1 plane. Nodes on hydrocladia distinct and transverse, perisarc of internodes thick.

Hydrothecae on front of internodes, occupying nearly whole of internode, saccate, lumen slightly S-shaped, long axis at about 30° to internodal axis; no reversion of direction has been observed in available material. Base of hydrotheca with distinct hydropore surrounded by perisarc ridges, these either almost perpendicular to hydrothecal long axis or tilted to more oblique position, depending upon position along length of internode. Distinct abcauline septum projects straight into hydrothecal cavity slightly above aperture of median nematotheca; end of septum thickened, curving upwards. Hydrothecal aperture slightly tilted distally, rim thickened, with a large, rounded median cusp and 4 pairs of lateral cusps, greatly differing in development. Median cusp slightly curved inwards, with a hollow median carina, increasing in length and development along length of hydrocladium, being quite small to practically absent on the first internode to large and surpassing rim of median cusp in distal internodes. First pair of lateral cusps strongly sclerotised, curved strongly outwards; second pair moderately sclerotised, rounded, curved inwards. Third pair variable in shape, low and rounded in some hydrothecae, low and with distinct incision on others. Cusps of fourth pair fairly strongly sclerotised, just visible beside lateral nematotheca, connected by median ridge of perisarc.

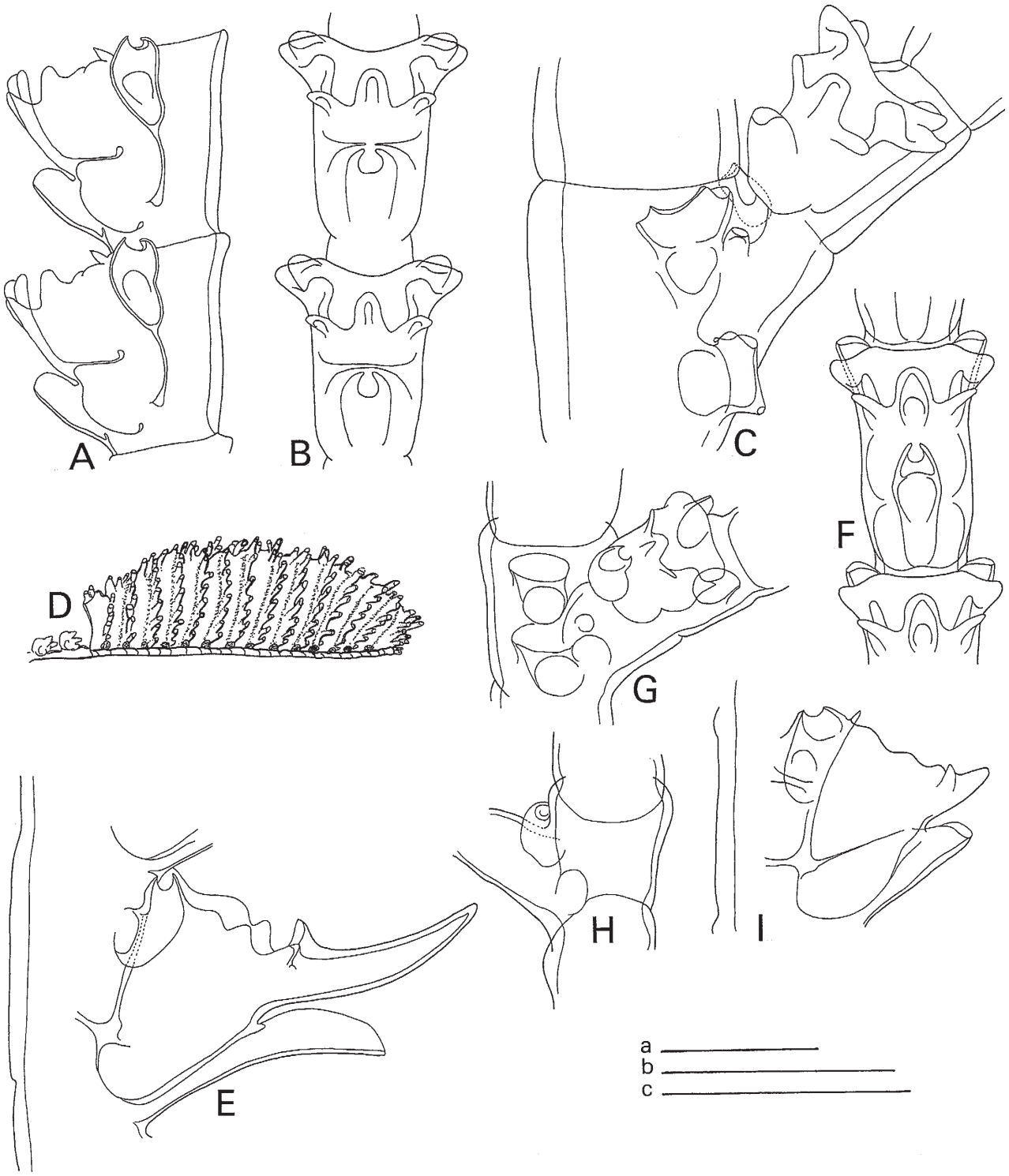

Fig. 75. A–D, *Lytocarpia howensis* (Briggs, 1918). **A**, pair of hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, insertion of hydrocladium on stem, showing position of cauline nematothecae, frontal view (NZOI Stn I731, slide 2907) W.V. **D**, corbula, lateral view (Norfolk Island, slide 1459 JEW Colln) J.E.W. **E–I. *Lytocarpia incisa*** (Coughtrey, 1875). **E**, hydrocladial hydrotheca with much developed median spine, lateral view. **F**, the same, frontal view. **G**, insertion of hydrocladium on stem, showing arrangement of nematothecae, frontal view. **H**, the same, seen from back (NZOI Stn C814, slide 2101). **I**, hydrocladial hydrotheca, with little developed median spine, lateral view (BS 678, slide 3322). Scales: a, 0.2 mm (A–C, E, F, I); b, 2.5 mm (D); c, 0.5 mm (G, H). W.V.

Median nematotheca covering basal half of hydrothecal abcauline wall; aperture deeply gutter-shaped; rim broadly rounded; an imperfect internal septum almost at base. Laterals slender, slightly curved outwards, with deeply scooped aperture, almost gutter-shaped on inner side. No internal septum observed but the large fenestra for communication with interior of internode may easily give that impression. Imperfect septum or ridge present at base of laterals.

No corbulae present.

MEASUREMENTS of *Lytocarpia howensis* (in μm):

	NZOI Stn Q72 slide 2907B
Axial tube, diameter	300
Axillary nematotheca, length	140 – 168
Maximum diameter	80 – 100
Second frontal nematotheca, length	155 – 160
Maximum diameter	95 – 105
Hydrocladial internode, length	235 – 385
Diameter at node	265 – 275
Hydrotheca, total depth	210 – 225
Diameter at rim	135 – 145
Median nematotheca. total depth (measured from apex to septum)	105 – 115
Diameter at margin (measured in frontal view)	22 – 28
Lateral nematotheca, depth	90 – 100
Maximum diameter	50 – 55
Diameter at rim	22 – 28

REMARKS: There are small deviations from Brigg's original description of this rare species, of which the more important is the great development of the median carina on the frontal hydrothecal cusp. None of the hydrotheca in our present material has such a prominent carina ('external longitudinal hollow chamber' in Briggs's description), though this condition is approached by some of the distal hydrothecae. The lateral cusps show some differences with Brigg's figure (pl. V, fig. 1), though variability is evident from our material; they much resemble the frontal aspect in Briggs's plate V, figure 2. A certain stylisation visible in the figures illustrating Briggs's (1918) report may very well account for the differences mentioned, the more so since the general appearance of the colony and of its hydrothecae, with the single abcauline internal ledge, agrees well with Briggs's species.

The specimen from NZOI Stn I731 has a much more developed median carina and closely approaches Briggs's figure. The corbula of this specimen, unfortunately, remains unstudied.

This species, in the morphology of the hydrotheca, approaches *Lytocarpia chiltoni* (Bale, 1924), *Lytocarpia incisa* (Coughtrey, 1875) and *Lytocarpia formosa* (Busk, 1851); consequently it has been classified here as a species of *Lytocarpia* rather than *Aglaophenia*.

The type material of this species has been studied by J.E. Watson. This type material consists of three microslide preparations, held in the Australian Museum, Sydney. The specimens are Canada Balsam mounted, labelled (Briggs' handwriting) *Aglaophenia howensis* Briggs, portion of holotype, Middle Beach, Lord Howe Island, 1913. Two slides, Y554 and Y555, are hydrocladiate parts of a stem, the third slide, Y556 is a single detached empty corbula, sex indeterminate. Brigg's description of the species is thorough. His photograph (pl. 6, fig. 1) is typical.

One microslide and preserved material is in the J.E. Watson collection (J.E. Watson no. 1459, reef, Norfolk Island, under ledge, 22 m, 01.i.1976). The material is fertile with many female corbulae.

RECORDS FROM NEW ZEALAND: The present specimens were taken at the northern end of the Lord Howe Seamount Chain at 65 m and 68 m depth, outside New Zealand coastalwaters.

DISTRIBUTION: Briggs founded the species on a single colony from Middle Beach, Lord Howe Island, Tasman Sea; the species being reported from Lord Howe Island earlier by Whitelegge (1899, as *Halicornaria* sp. nov.); the distribution being now extened to the northern end of the chain. Additional material from the *Chevert* Expedition (Australian Tasman coast, exact locality unknown) is also listed by Briggs; moreover the species also occurs at Norfolk Island (J.E. Watson, personal observation).

Lytocarpia incisa (Coughtrey, 1875) (Figs 75E–I; 76A, B)

Plumularia incisa Coughtrey 1875: 290, pl. 20, figs 40–41;
Aglaophenia incisa: Coughtrey 1876a: 31.
Thecocarpus incisus: Ralph 1961b: 58–59, fig. 8c-g; Gordon & Ballantine 1977: 100; Dawson 1992: 18.
Halicornaria rostrata Bale 1924: 265, fig. 18.
Thecocarpus formosus var. *inarmatus* Trebilcock 1928: 26, pl. 5, fig. 6.
Thecocarpus formosus inarmatus Stranks 1993: 11, 23.
Thecocarpus rostratus: Totton 1930: 237, fig. 69b.

MATERIAL EXAMINED:

NZOI Stns: C763, 1 colony about 50 mm high, no gonosome, top part as RMNH-Coel. slide 2098; **C814**, gear GOL, 60 mm high colony with 1 side branch and 3 corbulae.

RMNH-Coel. slide 2101; **E108**, about 10 plumes on bryozoans, the largest plume about 50 mm high, with 2 corbulae. RMNH-Coel. slide 2299; **E312**, about 25 plumes and branched plumes up to 75 mm high; no corbulae. RMNH-Coel. slide 2122; **E838**, 2 stems 40 and 60 mm high, no corbulae; **E841**, 1 stem, 60 mm high, no corbulae; **F922**, a number of erect and some damaged stems about 50 mm high, no corbulae; **I341**, 2 tufts about 40 mm high, each composed of several plumes, no corbulae. RMNH-Coel. slide 2141.

NMNZ: Kapiti Island, coll. V. Hoogard, 12 stems between 50 and 130 mm high, detached from substratum; no corbulae. NMNZ Co. 555; **BS 389**, a fair number of plumes, attached to bryozoans, up to 100 mm high. 1 single corbula present. NMNZ Co. 508; **BS 392**, a fair number of plumes between 40 and 100 mm long; corbulae present. NMNZ Co. 576; **BS 393**, 4 plumes 120 mm high; no corbulae. NMNZ Co. 569; **BS 678**, single colony 60 mm high with 3 corbulae, basal 15 mm without hydrocladia; length of hydrocladia up to 8 mm. NMNZ Co. 733. 2 RMNH-Coel. slides 3322. Additional material under NMNZ Co. 822 consists of 60–80 mm high plumes with many corbulae; RMNH-Coel. 27745, 2 slides 3499; **BS 679**, numerous plumes up to 80 mm high, some corbulae present. NMNZ Co. 841; **BS 769**, unbranched stems (plumes) up to 70 mm high on stem of *Lytocarpia vulgaris* sp. nov.; no corbulae observed. 3 RMNH-Coel slides 3507; **BS 838**, numerous colonies up to 100 mm high on bryozoans, etc., also young colonies present. Many corbulae. NMNZ Co. 438. In addition many colonies up to about 100 mm high and with many corbulae, sometimes as many as 3 per colony. NMNZ Co. 758; RMNH-Coel. 27703, 5 slides 3403; **BS 840**, many plumes, up to 100 mm high, rising from creeping stolon on bryozoans and Porifera. NMNZ Co. 392; 2 RMNH-Coel. slides 2951. Also about 10 colonies up to 100 mm high attached to stone (with corbulae) and 2 smaller colonies about 20 mm high on bryozoans (no corbulae). NMNZ Co. 768; RMNH-Coel. 27713, 4 slides 3413, 2 from large colonies (top part and hydrocladium) and 2 from smaller colonies (1 complete colony and some hydrocladia).

NMNZ Ralph Collection: Loc. 11, NMNZ Co. 888, 3 cormoids about 15-20 mm high rising from detached stolon; 2 cormoids with corbulae. Live specimens with hydranths. 2 RMNH-Coel slides 3587; **Loc. 161**, NMNZ Co. 1019, 4 plumes 10–20 mm high, 1 with 4 corbulae, 1 with 2 corbulae. 3 RMNH-Coel. slides 3689. Also poor slide in RSC, re-numbered 723 as *Thecocarpus incisus*, no data; **Loc. 243**, NMNZ Co. 1087, Bale's material of *Thecocarpus rostratus*: *Lytocarpia incisa* (Coughtrey, 1875), about 40 mm long stem fragment and some smaller parts. RMNH-Coel. slide 3759; **Loc. 300**, NMNZ Co. 1143, 15 stems, 15–30 mm high, unbranched, majority with 1 or 2 corbulae, RMNH-Coel. slides 3826. Also poor slide in RSC, re-numbered 710, as *Thecocarpus incisus*,with data: good for rachis; **Loc. 418**, NMNZ Co. 1203, 1 complete plume, 65 mm high and a slightly mutilated, smaller plume; no corbulae. RMNH-Coel. slide 3886. Also fair slide, re-numbered 713, in RSC as *Thecocarpus incisus*, with data: V.U.C. Zool. Dept; **Loc. 548**, NMNZ Co. 1266, about 10 colonies up to 8 mm high, partly detached, partly attached to stolon on thick stapes of algae. RMNH-Coel. slide 3941; **Loc. 645**, NMNZ Co. 1334, a few damaged plumes up to 15 mm high and many fragments; no corbulae. RMNH-Coel. slide 4017; **Loc. 668** (also numbered 711), fair slide in RSC as *Thecocarpus incisus*, with data: Cook Strait, Stn 96; **Loc. 710**, poor slide in RSC, re-numbered from 300, as *Thecocarpus incisus*, with data: good for rachis; **Loc. 711** (also numbered 668), fair slide in RSC as *Thecocarpus incisus*, with data: Cook Strait, Stn 96; **Loc. 712**, reasonable slide, re-numbered 736, as *Thecocarpus incisus*, with data: May.1950, Kawhia Har.; **Loc. 713**, fair slide, re-numbered from 418, as *Thecocarpus incisus*, with data: V.U.C. Zool. Dept; **Loc. 722**, fair slide in RSC as *Thecocarpus incisus*, with data: Cook Strait, Stn 98, male corbula shows good theca at base; **Loc. 723**, A283, wharf block. Poor slide, re-numbered from 161(?) as *Thecocarpus incisus*, no data; **Loc. 736**, also reasonable slide 712, re-numbered 736 as *Thecocarpus incisus*, with data: May.1950, Kawhia Har.

TYPE LOCALITY: *Plumularia incisa*: Lyall Bay, Wellington, New Zealand (Coughtrey 1875). *Halicornaria rostrata*: 10 miles northwest. of Cape Maria van Diemen, North Island, New Zealand, 91.5 m, (Bale 1924; probable syntypes in MOV, MV F58222 and F60226 (five micro-slides) (Stranks 1993)). *Thecocarpus formosus* var. *inarmatus*: Island Bay, Wellington (Trebilcock 1928); location of type unknown.

REMARKS: The present, abundant material of this species confirm the variability in hydrothecal morphology noted by Ralph (1961b: 59). The length of the frontal prominence of the median adcauline cusp of the hydrothecal rim is extremely variable within the same colony, usually becoming longer along the hydrocladia, the greatest length being found at the top of each hydrocladium. Besides there is a great difference between length and shape of that prominence in specimens from various localities. Ralph refers to Cook Strait specimens as usually having a long rostral spine; this we are unable to confirm as this species is absent from the large Cook Strait collections that we have seen. In the material from NZOI Stn C814 the rostral spine is unusually long and slender, moreover it is only weakly curved; the median nematotheca is also lengthened. This nematotheca is open over the whole length of its free part, being widened at the point where it becomes free and at the apex, where it becomes broadly gutter-shaped.

The stem, though basally it may become rather thick and strongly sclerotised, remains monosiphonic and the division into internodes is only marked by indistinct perisarc constrictions. In the top parts of younger colonies there is complete division into short internodes by means of transverse nodes; each internode bears one strong apophysis supporting a hydrocladium with as many as 25 hydrothecate internodes.

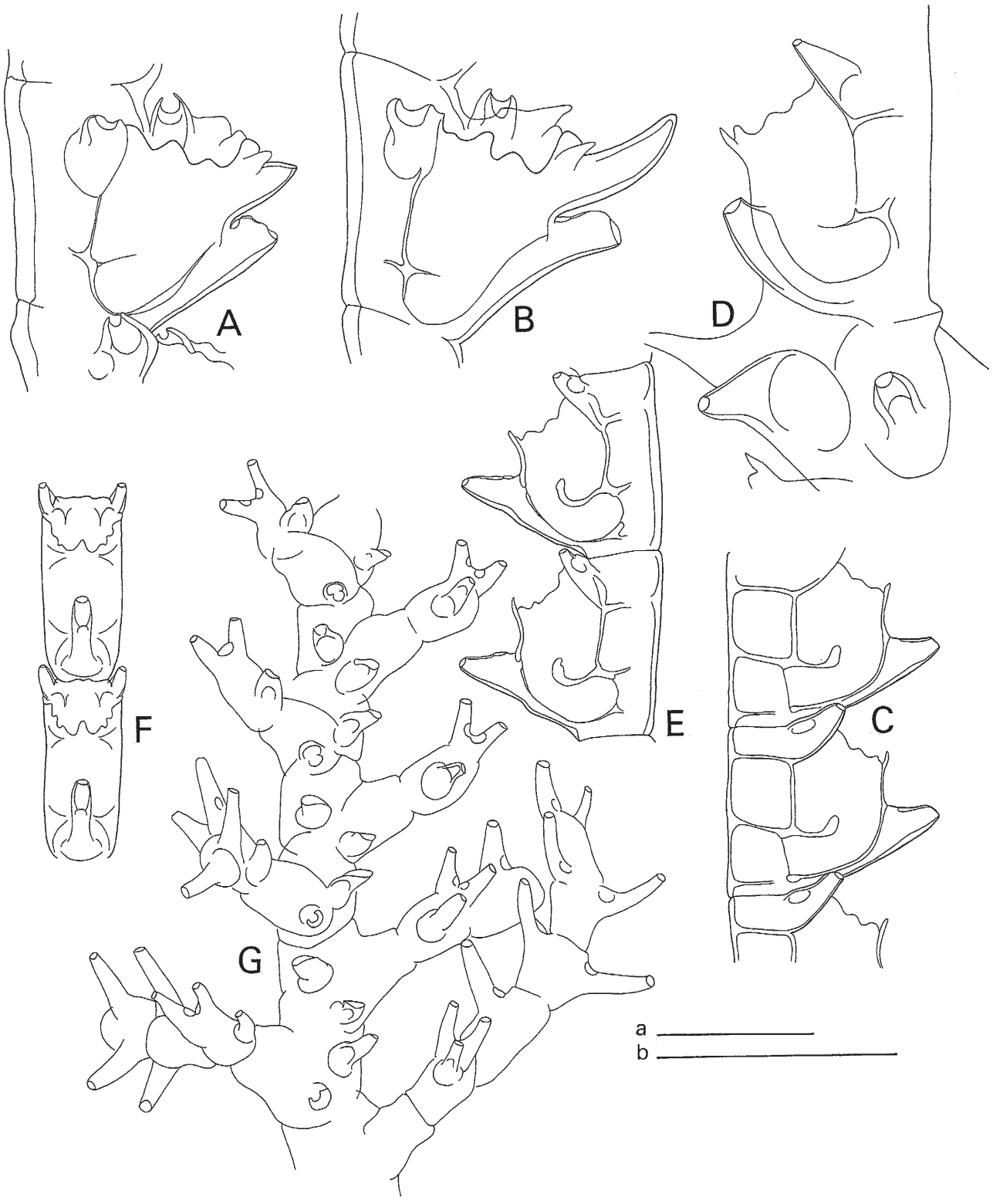

Fig. 76. A, B. ***Lytocarpia incisa*** (Coughtrey, 1875). **A**, second hydrocladial hydrotheca, lateral view. **B**, fifteenth hydrotheca from same hydrocladium, lateral view. (BS 678, slide 3322). **C–G.** ***Lytocarpia* (?) *rigida*** sp. nov. **C**, hydrocladial hydrotheca, lateral view. **D**, insertion of hydrocladium on axis showing position of cauline nematothecae (BS 882, holotype, slide 3329). **E**, hydrocladial hydrothecae, lateral view. **F**, the same, frontal view. **G**, (sterile) corbula, inside view, showing rachis and insertion of gonohydrocladia (BS 886, paratype, slide 4279). Scales: a, 0.2 mm (A, B, D); b, 0.5 mm (C, E–G). W.V.

The various apophyses are alternately arranged and point laterally and obliquely upwards; the hydrocladia are moderately spaced. There are three nematothecae on each internode; one, with gutter-shaped aperture on the back and two, of which one is intimately associated with the apophysis, on the front, both with a slightly everted, circular aperture. In addition there is a slightly raised mamelon at the base of each apophysis.

There is also considerable variability in the development of the spurs of the gonohydrocladia of the corbulae; these bear a triplet of nematothecae at the top (not mentioned in Ralph's description of the corbula!). In some specimens the 'spurs' are lengthened and the apical nematothecae of considerable size, giving the corbula a 'prickly' appearance.

The synonymy of the species is discussed by Ralph (1961b: 58, 59) and is not repeated here; it is based on Ralph's inspection of Coughtrey's type slide in the Canterbury Museum, Christchurch; Bale's type slide of *Halicornaria rostrata*, unfortunately, is lost, but there is no doubt concerning the correctness of Ralph's conclusions. The whereabouts of Trebilcock's material is unknown (Stranks 1993: 11, 23).

Records from New Zealand: This species was originally described from material collected at Lyall Bay, Wellington, and sent to Coughtrey by Hutton; additional records from New Zealand waters are from off Cape Maria van Diemen (Bale 1924, as *Halicornaria rostrata*) and Island Bay, Wellington (Trebilcock 1928, as *Thecocarpus formosus* var. *inarmatus*). No further records are in Ralph's (1961b) paper, but her collection contains drift, live material from Matapouri Beach (20 Nov 1950), from Te Awaite, east coast (17 May 1951) and from Makara Beach (25 Aug 1952). The present records mainly concern the area off Cape Maria van Diemen, around the Three Kings Islands, and off East Cape, particularly Ranfurly Bank. There is one record from off Kapiti Island west of North Island and from the Chatham Rise, off the Chatham Islands. The species appears to need a solid substrate, either rocks, bryozoans, or the stems of large hydroids. It was found between 49 and 1288 m depth; corbulae occur in abundance in January, February, and August, but also in May, October, and November.

Distribution: Known only from New Zealand.

Lytocarpia phyteuma (Kirchenpauer, 1876)

Aglaophenia phyteuma Kirchenpauer 1876: 23 no. 3a.
Thecocarpus phyteuma: Stechow 1919: 139–143, figs C^2, D^2; Pennycuik 1959: 187; Millard & Bouillon 1973: 95–97, fig. 11E–F; Vervoort & Vasseur 1977: 86–89, fig. 36.
Lytocarpia phyteuma: Stechow 1922: 151; Ryland & Gibbons 1991: 548–552, figs 18–19; Bouillon *et al.* 1995: 37; Watson 2000: 65–67, fig. 52A–G.
[Not *Thecocarpus phyteuma*: Garcia-Corrales *et al.* 1978: 66-67, fig. 32; Boero & Bouillon 1993: 263 [= *Aglaophenia kirchenpaueri* (Heller, 1868)].
Aglaophenia clavicula Whitelegge 1899: 373–374, pl. 23 figs 4–6 (*Plumularia clavicula* in explanation of plate).
Thecocarpus clavicula: Bedot 1921a: 333.
Lytocarpia clavicula: Stechow 1922: 151; 1923d: 245.
Thecocarpus leopoldi Leloup 1930a: 1–3, fig. 1; 1930b: 11–14, figs 8–9, pl. 2 figs 2–3.

Material Examined:

NZOI Stn E640, 2 colonies about 120 mm high, stem with side branch; many corbulae. RMNH-Coel. slides 2238 and 3555.

NMNZ: BS 869, single colony about 130 mm high, spread 110 mm. NMNZ Co. 775; 3 slides RMNH-Coel. 3340.

Type Locality: *Aglaophenia phyteuma*: Tonga Islands (Kirchenpauer 1876). *Aglaophenia clavicula*: Funafuti, Ellice Islands (Whitelegge 1899). *Thecocarpus leopoldi*: Sorong, Dampier Strait, West Irian, 5 m depth (Leloup 1930a).

Remarks: The colony is composed of a slender stem with opposite branches both with fairly widely spread, hydrocladia about 10 mm long. There are a number of corbulae that take the place of hydrocladia, have a long pedicel with three or four internodes with hydrothecae and a distinct hydrotheca at the base of each 'blade'. Hydrothecae with distinct abcauline marginal cusp and adcauline septum.

Records from New Zealand: Found at only two localities: Raukumara Plain, east of Coromandel Peninsula, 130 m, and off Rangaunu Bay, North Island, 63 m.

Distribution: Tonga Islands, Pacific (Kirchenpauer 1876; Stechow 1919); Funafuti, Ellice Islands, Pacific (White-legge 1899); Hardy Reef and Heron Island, Queensland, Australia (Pennycuik 1959); Mahé, Seychelles, Indian Ocean, 15 m (Millard & Bouillon 1973); Moorea, French Polynesia, 2–14 m (Vervoort & Vasseur 1977); Fiji Islands, 0.5–13 m (Ryland & Gibbons 1991); Sorong, Dampier Strait, West Irian, 5 m depth (Leloup 1930a, b), Beagle Gulf and Darwin, Northern Territory, Australia (Watson 2000). Ryland and Gibbons also cite 'Tuvalu'; we are unable to trace that locality.

Lytocarpia* (?)*rigida sp. nov. (Fig. 76C–G)

Material Examined:

NMNZ: BS 882, about 60 mm high colony with 3 branches, basal part invested by other organisms, and a branched stem about 70 mm high bearing a few isolated hydrocladia (holotype, NMNZ Co. 779; RMNH-Coel. 27771, 4 slides 3329, part of type series); **BS 886**, well developed colony about 200 mm high, regularly branched; stem basally about 5 mm thick, thinning out rapidly, and covered with colonies of *Synthecium subventricosum* Bale, 1914; *S. elegans* Allman, 1872; *Billardia novaezealandiae* Totton, 1930 and *Parascyphus simplex* (Lamouroux, 1816); also some hydrothecae of *Filellum serratum* (Clarke, 1879). Some corbulae present (paratype NMNZ Co. 522; 3 RMNH-Coel. slides 3644, 2 slides 4279).

Type Locality: Wanganella Bank, Norfolk Ridge, 32°31.8′ S, 167°29.5′ E, east slope, 437–422 m.

Description (of holotype): Stem erect, 60 mm high, polysiphonic by apposition of secondary tubes against a fairly thick primary stem, basal part invested by other organisms, possibly bryozoans, a few stolonal fibres at the base. 2 side branches originate from secondary tubules. Division of primary axis into indistinct internodes, nodes only visible on higher, monosiphonic part of stem, each internode with an apophysis and 2 nematothecae. Apophyses alternately directed left and right, supporting closely packed hydrocladia of 8–10 mm length, stiff, directed obliquely upwards at an angle of about 45°. Big, retort-shaped nematotheca with aperture directed outwards at base of apophysis; second, smaller nematotheca on the apophysis; no mamelon. Perisarc of primary tube and apophysis moderately thick.

Hydrocladia composed of about 15 short internodes; first internode well separated from apophysis, remaining nodes transverse, clearly visible. Each internode with short, cup-shaped hydrotheca and triplet of nematothecae: 1 median and a pair of laterals.

Hydrotheca short, slightly inflated basally; frontal wall thickened, terminating in a short, well produced cusp. Hydrothecal aperture oblique, making an angle of about 80° with internodal axis; rim with 3 pairs of low, rounded cusps separated by shallow embayments; no adcauline median cusp. Interior of hydrotheca with prominent ledge with swollen, upturned distal part, springing from adcauline wall at lower third; hydropore vertical, directly beneath insertion of ledge.

Median nematotheca conspicuous, cone-shaped, with circular terminal aperture and foramen near frontal wall of hydrotheca. An oval foramen leading from interior of nematotheca to hydrothecal cavity visible in oblique view of hydrotheca; abcauline wall of nematotheca thickened. Median nematotheca covering about half of frontal wall of hydrotheca; free portion of abcauline hydrothecal wall only slightly variable in length.

Lateral nematothecae slightly swollen near insertion, cone-shaped, directed obliquely upwards and laterally, considerably surpassing hydrothecal rim. Aperture circular; an oval foramen in basal part of nematothecae connects with interior of hydrotheca. Both lateral and median nematothecae armed with large, elongated nematocysts. Interior of internode with 3 strong perisarc rings or septa, 1 at base of laterals, 1 opposite hydrothecal ledge, and 1 some distance from proximal node, the latter with a large foramen to permit passage of coenosarc.

All hydrothecae have a fully contracted hydranth in the hydrothecal cavity under the ledge with about 12 filiform tentacles.

No corbulae present on this material, but the colony from BS 886 has many corbulae. Each corbula is an open structure, about 5 mm long, taking the place of a hydrocladium of terminal parts of the colony. The corbula is composed of 30–35 internodes following each other in a nearly straight line, the pedicel is formed by a single internode with a normally developed hydrotheca with median nematotheca and a pair of lateral nematothecae. Internodes of corbula well separated, each with a distinct apophysis and 2 nematothecae: 1 axillary, and 1 on basal part of apophysis, the first with gutter-shaped aperture, the second shorter. Apophyses alternately directed left and right and supporting a curved branch (gonohydrocladium) curving inward over the gonothecae and forming an open basket. Each gonohydrocladium is composed of 8–10 internodes of which the first has a median nematotheca and a pair of laterally directed nematothecae, the second internode has either a single nematotheca or a pair of laterally directed nematothecae, following internodes each with a pair of laterally directed nematothecae. All nemato-thecae tubular with circular terminal aperture and a second opening near their base. Towards the end of the corbula the gonohydrocladia become shorter and have fewer segments, the distal ones being composed of the apophysis supporting a single internode with a triplet of tubular nematothecae. In the present specimen all gonothecae(spent male?) are sac-shaped, inserting on the internodes of the rachis in front of the nematotheca.

Colour: The stem of the (preserved) specimen is dark brown, the hydrocladia are yellowish brown.

Remarks: The present new species approaches certain forms of *Lytocarpia myriophyllum* (Linnaeus, 1758). We have kept it separate from that species because:

MEASUREMENTS of *Lytocarpia* (?) *rigida* sp. nov. (in µm):

NMNZ	BS 882 slides 3329	BS 886 slides 3644 & 4279
Axial tube, diameter	210 – 225	275 – 295
Nematotheca opposite apophysis, length	140 – 170	205 – 215
Maximum diameter	85 – 110	110 – 115
Diameter at rim	17 – 23	22 – 40
Hydrocladial internode, length	320 – 335	435 – 475
Diameter at node	150–– 155	110 – 175
Hydrotheca, total depth	290 – 300	355 – 385
Diameter at rim	145 – 170	145 – 185
Median nematotheca, total length (measured from apex to base)	305 – 315	355 – 370
Length free part		95 – 135
Diameter at orifice	23 – 25	30 – 40
Lateral nematotheca, depth	140 – 180	185 – 200
Diameter at orifice	22 – 25	30 – 35

1. The hydrotheca has a distinctly titled aperture with a conspicuous frontal cusp; the intrahydrothecal ledge is quite prominent and different from any we have observed in the large material of *L. myriophyllum* inspected.
2. The median nematotheca is closed, cone-shaped and frontally directed, quite different from the short, gutter-shaped median nematotheca usually observed in *L. myriophyllum*.
3. The lateral nematothecae also are cone-shaped with circular aperture and project upwards and laterally; we have never seen that condition in *L. myriophyllum*.

This new species also has characters in common with *Lytocarpia vulgaris* sp. nov., particularly in structure of the corbulae, of which the gonohydrocladia have almost identical morphology. The median nematotheca leaves almost half the abcauline hydrothecal wall free (only a fraction free in *L. vulgaris*) and points obliquely forward; the hydrothecae are generally shorter and more bulky; the connection with the interior of the internode is wide and the infrahydrothecal septum has a different shape.

The corbula, although resembling that of *L. vulgaris* sp. nov., is much bigger, reaching a length of over 5 mm. The first internode of each gonohydrocladium could be construed as representing a hydrocladial internode of which the hydrotheca has completely disappeared. This makes its inclusion in the genus *Lytocarpia* Kirchenpauer, 1872, somewhat uncertain.

There are 6 species in *Aglaophenia/Lytocarpia* that have morphologically identical corbulae and share a number of characters in the structure of the hydrocladial internode, viz.:

1. Conical medial nematotheca with circular terminal aperture and second opening at axil with frontal wall hydrotheca.
2. Thickened frontal wall of hydrotheca and prominent and thickened frontal cusp.
3. Conical lateral nematotheca with circular terminal aperture and second aperture opening into hydrotheca.
4. Plate-like structure of intrahydrothecal ledge.
5. Wide, circular, and vertical hydropore (foramen) opening from hydrothecal cavity into interior of internode.

The species are *Aglaophenia divaricata* (Busk, 1852) and its varieties; *A. laxa* Allman, 1876; *A. acanthocarpa* Allman, 1876; *A. whiteleggei* Bale, 1888; *Lytocarpia* (?) *rigida* sp. nov. and *L. vulgaris* sp. nov. These species should be placed in a separate genus.

DISTRIBUTION: So far known only from two localities at Wanganella Bank, Norfolk Ridge, 113–437 m depth.

ETYMOLOGY: The specific name *rigida* has been taken from the Latin adjective 'rigidus', stiff, indicating the condition of the upwardly directed, stiff hydrocladia.

Lytocarpia (?) similis sp. nov. (Fig. 77A–C)

MATERIAL EXAMINED:

NZOI Stn W257, about 10 colonies 120 mm high, branched, no corbulae (holotype, H-780 in NIWA collection). 2 RMNH-Coel. slides 2938, are part of the type series.

TYPE LOCALITY: Southwest Pacific, Chatham Rise, 43°22.5′ S, 179°00.0′ E, 400–390 m.

DESCRIPTION (of holotype): Colony of 10 stems about 120 mm high, with side branches. Stem composed of a thick primary stem; polysiphony brought about by apposition of secondary tubules that are responsible for formation of side branches and that are present over greater part of stem. Primary stem divided into regular internodes by slightly sloping nodes, best visible in higher (monosiphonic) parts of stem; internodes each with small, short apophysis and 2 frontal nematothecae. Stem apophyses alternately directed left and right, supporting about 8 mm long, rather closely packed hydrocladia, directed alternately left and right and making an angle of about 45° with the stem. 1 nematotheca on stem internode situated at base of apophysis, this nematotheca with wide, oval aperture; basal part rounded; a second nematotheca on distal part of internode, cone-shaped, with narrow, circular aperture; basal portion sunken into internode. No mamelon.

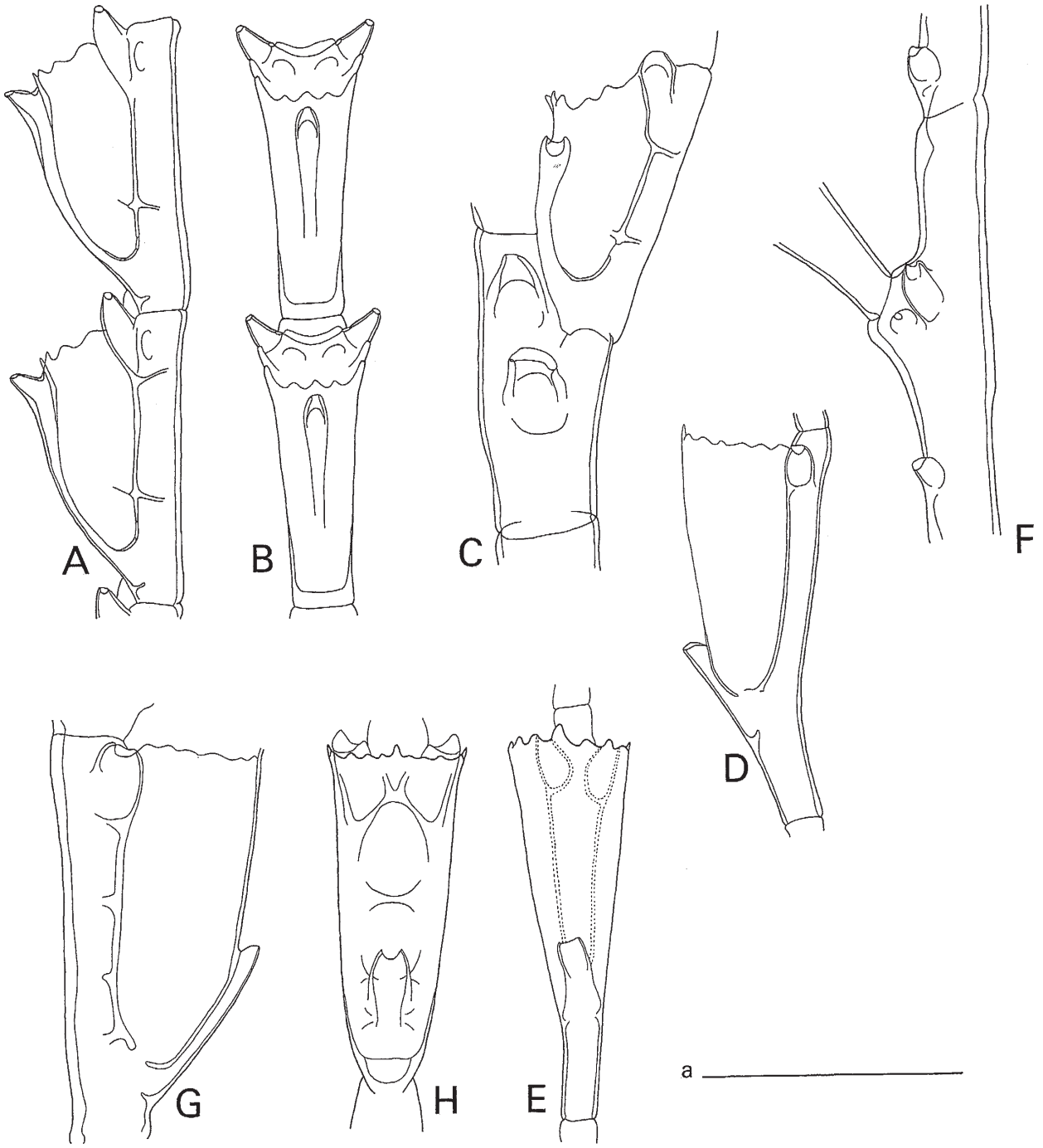

Fig. 77. A–C. ***Lytocarpia*** **(?)** ***similis*** sp. nov. **A**, pair of hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, insertion of hydrocladium on stem, showing position of cauline nematothecae (NZOI Stn W257, holotype, slide 2938). **D–H,** ***Lytocarpia spiralis*** (Totton, 1930). **D**, hydrocladial hydrotheca, lateral view. **E**, the same, frontal view. **F**, insertion of hydrocladium on stem, showing arrangement of cauline nematothecae (NZOI Stn V270, slide 2934). **G**, hydrocladial hydrotheca, lateral view. **H**, the same, frontal view (NZOI Stn I341, slide 2144). Scale: a, 0.5 mm (A–H). W.V.

Hydrocladia composed of 15–20 slender internodes separated by distinct though thin nodes, each with a frontally directed hydrotheca, a median nematotheca and 2 laterals. Interior of internode with 2 incomplete septa or rings of variable development, 1 at base of lateral nematothecae, 1 opposite thickening of adcauline hydrothecal wall. A third ring occasionally indicated at the base of the internode.

Hydrotheca long and notably slender, occupying greater part of internode, frontally directed, adcauline wall straight, abcauline wall bulging slightly at about halfway along length. Interior of hydrotheca with thin ledge projecting into interior from thickening of adcauline wall at lower third of its length; hydropore small, vertical, some distance under thickening of adcauline wall. Hydrothecal aperture tilted downwards, at an angle of about 80° with internodal axis; rim with a distinct, thickened median cusp and 3 pairs of lateral cusps of which first is slightly higher than median cusps; remaining marginal cusps rounded, gradually becoming smaller; no adcauline cusp. All hydrothecae with small, retracted polyp.

Median nematotheca covering greater part of frontal hydrothecal wall, becoming free some distance under hydrothecal rim and directed obliquely upwards and outwards; free part short, with circular foramen at apex and a second aperture at junction with hydrothecal frontal wall. Lateral nematothecae long, apical portion conical, with small circular foramen; a second circular foramen visible in frontal aspect at place of fusion with hydrothecal rim. Laterals projecting above hydrothecal rim for about half their length.

REMARKS: The present specimens agree best with Jäderholm's description of *Aglaophenia antarctica* [*Aglaophenia antarctica* Jäderholm, 1903: 295–296, pl. 13, figs 8–9; Bedot 1921a: 341; Blanco 1967a: 293] from the Strait of Magellan, in the long hydrocladial internodes, slender, deep hydrotheca, almost completely adnate median nematotheca, and the long, slender laterals, projecting far above the tilted hydrothecal rim. Jäderholm also described and figured seven marginal cusps (one median cusp and three pair of lateral cusps), though these are figured as fairly sharp and triangular. A further difference is the presence of two (incomplete) internodal rings or septa, though the development varies in our specimens; however this character is notoriously variable in the various species of both *Aglaophenia* and *Lytocarpia*.

We inspected the holotype of Jäderholm's *Aglaophenia antarctica* (fig. 72E) by the kind cooperation of Dr Karin Sindemark, Curatorial Assistant of the Department of Invertebrate Zoology, Swedish Museum of Natural History, Stockholm, Sweden. The type series bears number 038 of the General Catalogue (Hydroidea) and the label "*Aglaophenia antarctica* n. sp. Elof Jäderholm, no. 137 E(ugenie) E(xpedition), Mag(alhães) Sund på algae samte *Hypanthea*". It consists of a 17 mm high colony and a slide with three (carmine) stained hydrocladia.

The following description is based on inspection of hydrocladia in the slide; all are slightly distorted by pressure of the cover glass.

MEASUREMENTS (in μm):

	Lytocarpia (?) similis sp. nov. NZOI Stn W257, slides 2938	*Aglaophenia antarctica* Jäderholm, 1903
Axial tube, diameter	210 – 240	
Length of stem internode	505 – 530	
Upper stem nematotheca, length	170 – 180	
Maximum diameter	95 – 115	
Diameter at orifice	33 – 39	
Lower stem nematotheca, length	135 – 155	
Maximum diameter	112 – 125	
Diameter at orifice	50 – 55	
Hydrocladial internode, length	505 – 515	530 – 615
Diameter at node	100 – 105	39 – 50
Hydrotheca, total depth	390 – 410	380 – 395
Diameter at rim	190 – 200	175 – 185
Median nematotheca, total length (measured from apex to top thickening)		320 – 300
Length free part		55 – 67
Median nematotheca, total length (measured from apex to septum)	390 – 395	
Diameter at orifice (measured in frontal view)	17 – 22	28 – 31
Lateral nematotheca, depth	140 – 150	100 – 115
Maximum diameter	45 – 50	
Diameter at rim	17 – 20	25 – 28

The colony has a monosiphonic stem with a few basal stolonal fibres; the basal part of the stem has a prosegment with three nematothecae; the rest of the stem is divided into internodes, only visible in the distalmost part. The prosegment is followed by an unsegmented part of the stem with five hydrothecae, continued by a series of nematothecae on the front of the stem. There are fifteen alternately arranged apophyses, pointing left or right and obliquely upwards, only seven still have hydrocladia with a maximum of six internodes. The apophyses are separated by one, occasionally two, frontal nematothecae and each have an axillar nematotheca and a distinct mamelon. The hydrocladial internodes are quite thin, long and slender, weakly S-shaped and projecting some distance under and above the hydrotheca; there are some undulations or indistinct rings at the extreme base and apex. Only some hydrothecae in the slide are undamaged, quite slender and elongated, with a short, thin adcauline ledge at the basal fourth; behind the ledge with the indication of an internal ridge. Hydrothecal aperture slightly tilted downwards, at an angle of about 80° with the internodal axis, rim with seven acutely pointed cusps separated by deep, rounded embayments, of which one median and three pairs of laterals. As far as could be seen, no median adcauline cusp present, lateral wall of hydrotheca fused to lateral nematothecae. Median nematotheca covering almost the whole of the frontal hydrothecal wall, with a thickening of perisarc where it reaches the hydrothecal base; apex free and pointing obliquely upwards, tube-shaped, with circular aperture and smooth rim. Additional oval foramen in free portion of median nematotheca near its fusion with abcauline hydrothecal wall. Laterals long, conical with rounded base, projecting far above hydrothecal rim; aperture circular and with smooth rim. Basal part of laterals with big oval fenestra opening in internodal cavity or hydrotheca.

The species has never been re-discovered. The differences between Jäderholm's specimen of *Aglaophenia antarctica*, a fairly distinct *Aglaophenia*, and the NZOI specimens from the Chatham Rise are such that the latter must be considered to represent another species that has provisionally —in absence of the gonosome — been placed in *Lytocarpia.*

Records from New Zealand: The specimens of *Lytocarpia* (?) *similis* sp. nov. originate from the Chatham Rise, 43°22.5′ S, 179°00.0′ E, depth 400–390 m; the substrate is unknown.

Distribution: Known only from a single New Zealand locality.

Etymology: The specific name *similis*, Latin adjective *similis*, meaning similar, refers to the great resemblance with *Aglaophenia antarctica* Jäderholm, 1903.

Lytocarpia spiralis (Totton,1930) (Figs 77D–H; 78A–E)

Thecocarpus spiralis Totton 1930: 238, fig. 69c, d.
Thecocarpus spiralis: Ralph 1961b: 59–60, figs. 8i-j, 10d; Naumov & Stepan'yants 1962: 101, figs. 21, 22; Stepan'yants 1979: 121, pl. 22 figs. 4A, B.

Material Examined:

NZOI Stns: A830, 1 colony about 145 mm high with basal tuft and 2 corbulae; **A915**, single colony 120 mm high, with basal tuft of fibres and 1 corbula. Colony fine and thin, stem more or less dichotomously branched; **B666**, *Lytocarpia spiralis* (Totton, 1930) (J.E. Watson). [Slide 4177 JEW Colln]; **C620**, 2 colonies about 100 mm high, 1 with corbulae; **D116**, 2 colonies, 250 and 100 mm, both with basal tuft of fibres; no corbulae; **D117**, single colony, in 3 parts, about 100 mm high, no corbulae; **D118**, single colony 85 mm high; 1 corbula; **D868**, 1 young colony, 80 mm high, regenerating from old stem, composed of monosiphonic stem and pinnately arranged hydrocladia. No corbulae; **E74**, 4 colonies up to 120 mm high, all with basal tuft, some with corbulae; **E413**, single colony 80 mm high, several mature and developing corbulae; **E425**, 2 colonies with many corbulae, 300 and 250 mm high; **E429**, 1 colony, 300 mm high, with some corbulae; **E433**, single colony, about 250 mm high, no corbulae; **E744**, 2 colonies, 130 and 100 mm high, with basal tuft of fibres, no corbulae. Stem distally spirally curved with monoseriate hydrocladia following the twists of the stem (as in *Streptocaulus* Allman, 1883); **E748**, 2 damaged colonies about 100 mm high, with dichotomously branched stem and hydrothecae agreeing with those of the specimens from Stn E744; **E893**, *Lytocarpia spiralis* (Totton, 1930). (J.E. Watson). [Slide 4176 JEW Colln]; **F925**, remains of 1 or several colonies; no corbulae; **F926**, tangled remains of at least 130 mm high colony. No corbulae; **F933**, stem fragment about 150 mm long, branches with many corbulae; **G35** colony 180 mm high, with basal bunch of fibres. No corbulae; **G189**, single colony 170 mm high with basal tuft and 3 corbulae; **G651**, 3 colonies, 1, 300 mm high and with several corbulae, 2, 150 mm high. RMNH-Coel. slide 2853; **G696**, fragments of 1 or several colonies. No corbulae; **G924**, single colony, 200 mm high, several corbulae; **I342**, fair colony 70 mm high; no gonosome. RMNH-Coel. slide 2144; **P16**, single colony about 150 mm high. No corbulae; **P61**, *Lytocarpia spiralis* (Totton, 1930). (J.E. Watson). Female colony with corbulae. [Slide 4175 JEW Colln]; **P64**, 2 colonies, 150 and 120 mm high, with basal tuft anchored in black sand; **P65**, *Lytocarpia spiralis* (Totton, 1930) (J.E. Watson). Female colony with corbulae; **S16**, Haul 4, 10 colonies, 65–270 mm. No corbulae; **S16**, Haul 5, 9 colonies, 180–320 mm,1 with corbula; **S895**, *Lytocarpia spiralis* (Totton, 1930) (J.E. Watson); **T88**, top part about 150 mm high from a larger colony with some female corbulae. Also some loose hydrocladia from amongst other hydroids.

RMNH-Coel. 28861, slide 2921. Also additional female specimen, slide 4213 JEW Colln, and NNM-Coel. slides 3553; **V372**, single colony in 2 parts, 70 mm high, no corbulae; **V373**, 1 hydrocladium, in NNM-Coel. slide 2937; **V376**, young colony, 30 mm high. No corbulae; **W259**, single colony, about 120 mm high, no corbulae; **W260**, 5 colonies 40–100 mm, no corbulae; **W261**, 2 colonies about 100 mm, no corbulae. 1 colony, quite dirty; **W262**, 1 colony 90 mm high, in 2 parts. No corbulae; **W263**, 70 mm long colony, no corbulae; **Z2364**, top part of colony with abundant corbulae. Also about 150 mm high colony without corbulae. First appears to be a male colony with corbulae differing from those of female. RMNH-Coel. 28860, 6 slides 3554; **Z2366**, 180 mm high colony consisting of thick basal portion and a regenerating thin colony; no corbulae.

NMNZ: Off Hokianga, 12.Jan.1971, 1 colony, 210 mm high, with 4 corbulae, probably male. NMNZ Co. 463; **BS 352**, 1 colony, 180 mm high; 1 corbula. NMNZ Co. 533; **BS 479**, 2 colonies, 50 and 80 mm high, the latter with 3 corbulae. NMNZ Co. 567; **BS 559**, single colony, 200 mm high, no corbulae. NMNZ Co. 483; **BS 571**, single colony; no corbulae?; **BS 805**, complete colony 200 mm high, no corbulae. NMNZ Co. 702; **BS 854** , single, complete colony, 550 mm high, no corbulae. NMNZ Co. 681; **BS 861**, mutilated colony 220 mm high, no corbulae. NMNZ Co. 698; **BS 886**, single rather mutilated colony about 100 mm high with spiral structure; no corbulae. NMNZ Co. 1009. 2 RMNH-Coel. slides 3645, slide 4281; **BS 904**, about 500 mm high spirally built colony with many corbulae. NMNZ Co. 437; RMNH-Coel. 28862, 4 slides 2964; **BS 912**, beautifully developed colony 220 mm high; lower part of stem devoid of hydrocladia; several corbulae present. NMNZ Co. 581.

NMNZ Ralph Collection: Loc. 620, NMNZ Co. 1328: Completely fragmented colony with many corbulae. Material has been dried out at some time. RMNH-Slide 4011. Poor slide in RSC as *Thecocarpus spiralis*, no data.

PMBS: Papanui Canyon, 375–345 fms, in sandy mud. Colour: yellowish. Agassiz trawl. (Taken from card register).

MATERIAL INSPECTED: **Mu 67–43, Hyd 10a**,vial contains a mutilated colony with corbula (detached); **Mu 67–60**, 1 colony with basal tuft of fibres about 120 mm high, with mature corbula (N.B. the corbula described by Totton, copied by Ralph, apparently is immature). The tube also contains a colony of *Lytocarpia subdichotoma* (Ralph, 1961), from which the slide has been made; **Mu 67–61**, sample consists of about 10 colonies, judged by the basal tufts, that are partly broken. 1 corbula observed. Hydrothecae in these specimens larger and longer than in specimens Mu 67–60. Some colonies in this material are still juvenile. RMNH-Coel. 27264, slide 2681. Second sample contains 2 large colonies with corbulae and some fragments.

DESCRIPTION: This characteristic New Zealand species has been adequately described by Totton (1930) and Ralph (1961b); it is well represented in the collection. It is primarily characterised by the characteristic colony structure [a 'dextral scorpioid cyme', according to Totton (1930: 238)], in which the upper part of the stem is formed by the basal parts of successive pinnate branches, 40–60 mm long, with fairly widely spaced hydrocladia (10–25 mm long), stem and branches with secondary tube or tubes that communicate with the primary axis. The internodes of the branches are indistinctly separated and occasionally fused; the apophyses have the usual 3 nematothecae (2 in front, 1 on back) and have a small, slightly raised mamelon. There are 1 or 2 additional nematothecae per internode. The hydrotheca is deep; the median nematotheca leaves about two-thirds of the abcauline wall free; aperture gutter-shaped with a smooth or crenulated rim. Hydrothecal aperture perpendicular to the internodal axis; median cusp acute, prominent, and 6 or 7 pairs of marginal cusps with acute or rounded tips.

The corbula described by Totton is probably male and is comparable to that of *Lytocarpia tenuissima* (Bale, 1914) with which it is also compared by Totton; corbulae occur in the material from NZOI Stn Z2364, off North Island, and replace hydrocladia in otherwise normal pinnate branches. The pedicel or proximal part of the gonocladium is composed of a variable number of internodes, the first 1 or 2 being normal hydrocladial internodes with 'normal' hydrotheca with 2 lateral and 1 median nematotheca, the latter usually of reduced size. Towards the corbula 'proper' the internodes gradually change in character, the hydrotheca attached to a spur springing from a distinct apophysis on the internode becoming gradually smaller. The number of nematothecae on the internode may increase; the spur gradually develops into a leaf-like structure with at its base a much reduced hydrotheca and set with a row of nematothecae along its upper border. The first 3 or 4 pairs of spurs are not part of the formation of the corbula, but the following spurs broaden into leaf-like structures, becoming imbricated to form a hollow, elongated structure, the free edges of the leaf-like spurs, with their row of nematothecae, directed outward. The corbula proper has only some of the 12–14 pairs of spurs; length of corbula 7–8 mm; pedicel 2–3 mm.

The (probably) female corbula occurs in the colonies from BS 904, NMNZ Co. 437, from northeast of Three Kings Islands; it is a slender, cigar-shaped structure of about 9 mm in length on a pedicel 5–6 mm long. The transformation of the normal, hydrothecae and nematothecae bearing internode into internodes with a leaf-like spur (costa) is more gradual and the resulting leaves or spurs are smaller and more strongly curved, firmly overlying the narrow space inside the corbula proper, that in our specimens contain about 8 gonothecae each with a developing egg. The leaves closely fit together, are set with small nematothecae along their free border and have a distinct costal apophysis.

In the material from BS 904 there is a fully retracted but intact, small hydranth with 12–15 tentacles in the basal part of the hydrotheca, attached to the hydro-

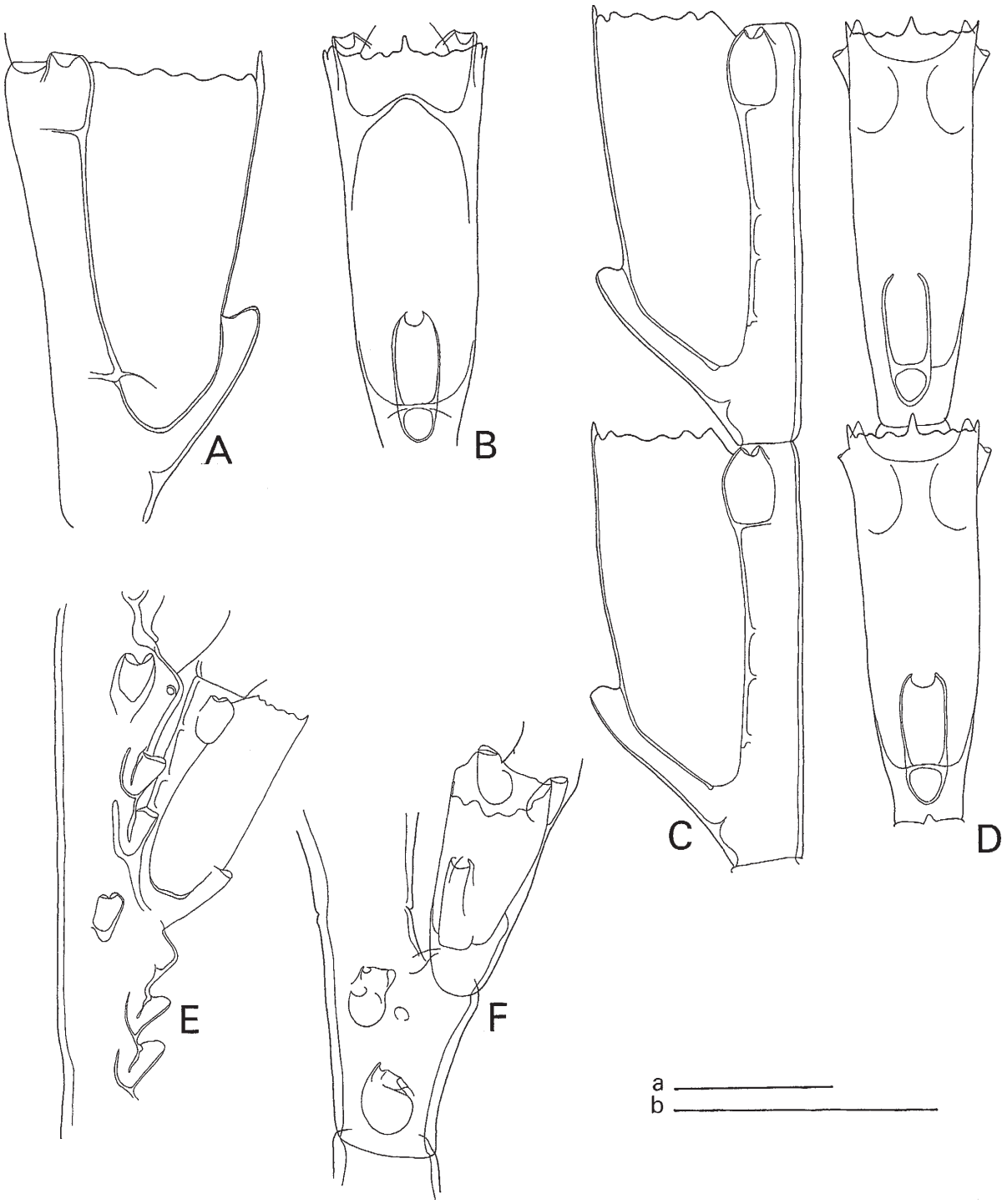

Fig. 78. A–E. ***Lytocarpia spiralis*** (Totton, 1930). **A**, hydrocladial hydrotheca, lateral view. **B**, the same, frontal view (NZOI Stn T88, slide 3553). **C**, pair of hydrocladial hydrothecae, lateral view. **D**, the same, frontal view. **E**, proximal part of corbula (BS 904, slide 2964). **F.** ***Lytocarpia subdichotoma*** (Ralph, 1961). Insertion of hydrocladium on stem, showing position of cauline nematothecae (NZOI Stn E433, slide 2163). Scales: a, 1 mm (E); b, 0.5 mm (A–D, F). W.V.

thecal bottom where there is a hydropore for communication with the internode. In the material from NZOI Stn Z2364 there are also remnants of hydranths; the internal lateral walls of the extreme hydrothecal base each have a fine, curved perisarc ridge apparently serving for attachment of the hydranth.

MEASUREMENTS of *Lytocarpia spiralis* (in μm):

	NMNZ BS 437 slides 2964	New Zealand (Ralph 1961b)
Axial tube, diameter	1500 – 2000	2000 – 3000
Stem nematotheca, length	192 – 207	
Maximum diameter	89 – 96	
Diameter at orifice	81 – 89	
Diameter subsidiary branch	1500 – 1600	
Hydrocladial internode, length	960 – 1000	800 – 900
Diameter at node	185 – 207	100 – 150
Hydrotheca, total depth	830 – 890	700 – 750
Length abcauline wall	590 – 680	
Diameter at rim	333 – 362	200 – 250
Median nematotheca, total length (measured from apex to septum)	235 – 355	
Diameter at orifice (measured in frontal view)	60 – 75	
Lateral nematotheca, depth	177 – 200	
Diameter at orifice	52 – 60	

REMARKS: The colonies have two rather different types of corbulae, one of which agrees fairly closely with Totton's account of the single corbula so far observed; the second type has much in common with the (only type of) corbula observed in *Lytocarpia subdichotoma*, though presenting distinct differences.

The material from NZOI Stns G651 and T88 differs from that described above in a few respects and was at first thought to represent another species. Although the colony structure is similar there are differences in the morphology of the internodes, where an incomplete septum (or perisarc ring) is only found at the base of the lateral nematothecae and just above the hydropore in the hydrothecal bottom. The interior of the hydrotheca has a distinct but thin ledge serving as attachment for the hydranth. The hydranth is quite small in the Stn G651 material, as it is also in the majority of the material, but the hydranth is conspicuously larger in the colonies from Stn T88; however the state of preservation of this material is very bad. The lateral nematothecae in colonies from both stations are slightly longer and project some distance above the hydrothecal rim. The median cusp, finally, is long and acute. The hydrothecae seem to be wider at the rim, though this may also be due to pressure of the cover glass in the slides we have inspected.

Inspection of the colony from NZOI Stn I342 revealed that the internodes have four incomplete septa or rings, one at the bottom of the hydrotheca, just above the foramen, one under the lateral nematothecae, and two intermediate, one of which is quite small. The material generally has thick perisarc; the aperture of the lateral nematothecae is fairly wide.

This type of hydrotheca is not uncommon in both *Lytocarpia* and *Aglaophenia* and care should be taken not to confuse this species with its allies by using a combination of characters for their discrimination.

MEASUREMENTS of *Lytocarpia spiralis* (in μm):

NZOI	Stn I342 slide 2144	Stn T88 slides 3553
Diameter subsidiary branch	235 – 245	275 – 295
Hydrocladial internode, length	910 – 935	1170 – 1195
Diameter at node	148 – 163	200 – 300
Hydrotheca, total depth	650 – 760	825 – 910
Length abcauline wall (including median cusp)	460 – 505	700 – 710
Diameter at rim	290 – 310	440 – 465
Median nematotheca. total length (measured from apex to septum)	405 – 420	375 – 405
Diameter at rim (measured in frontal view)	45 – 60	55 – 60
Lateral nematotheca, depth	160 – 165	215 – 225
Diameter at rim	75 – 90	75 – 88
Maximum diameter	160 – 180	

Some of the colonies from the Portobello Marine Biological Station collection (Mu 67–61) are immature and approach the juvenile material of *Lytocarpia spiralis* described below; they are, in certain respects, intermediate between the colonies bearing corbulae and described above and the quite young colony from NZOI Stn V370. The internodes are intermediate in length, the primary axis is thicker and the development of secondary tubes is greater. Measurements of this material is given below under juvenile *L. spiralis*.

RECORDS FROM NEW ZEALAND: This species is exclusively known from deeper waters (102–1126 m) around New Zealand, including the Three Kings Islands area, the Chatham Rise and Chatham Islands, Stewart Island and the Campbell Plateau, covering an area extending from 29.5° to 53.5° S and 167° E–174.5° W, on bottoms of sand and sandy mud. The majority of records is from the Pacific side of New Zealand, particularly from the

Chatham Rise. Corbulae were observed in all months with the exception on June, August, November, and December.

DISTRIBUTION: Known only from New Zealand waters.

Lytocarpia spiralis (Totton, 1930): juv. (?)

MATERIAL EXAMINED:

NZOI Stn V370, very young colony about 30 mm high and a detached fragment. RMNH-Coel. slide 2934.

DESCRIPTION: The material consists of a stem 30 mm long, with basal remnants of stolonal tubes, and a 15 mm long fragment, which may represent the top part of the same colony. Stem composed of a nematothecate main stem, with an accessory tube in the basal 20 mm. Main tube divided into internodes of different length by means of slightly oblique nodes, bearing a number of nematothecae and 1, occasionally 2, apophyses on each internode supporting 10–13 mm long hydrocladia. Stem nematothecae arranged in 1 row on front of main axis; apophyses alternately directed left and right and pointing obliquely upwards and bearing 2 nematothecae, 1 on each side of internode, and 1 slightly raised mamelon. Axial nematothecae 1-chambered, with large, gutter-shaped aperture; the axillary nematothecae slightly larger. No nematothecae on the accessory tube.

Hydrocladia with 7–12 slender internodes; nodes transverse. Hydrothecae almost as in adult *L. spiralis*, described above, but free portion of abcauline hydrothecal wall comparatively longer; they are placed on distal part of internode. Proximal part of internode, free from hydrotheca and median nematotheca about one-third the length of remaining part of internode. Median nematotheca short, with gutter-shaped aperture; lateral nematothecae moderately swollen, not surpassing hydrothecal rim, with adcauline wall deeply evaginated. Hydrothecal rim with a slightly raised, fairly acute median cusp and 5 or 6 pairs of lateral cusps with rounded tip. There is no ledge at the bottom of the hydrotheca; a foramen gives passage to the coenosarc in the internode. Many hydrothecae have a well preserved but fully contracted, small hydranth at their bottom.

REMARKS: With the exception of the length of the internodes the cormidia of this specimen from NZOI V370, are so much similar to those of *Lytocarpia spiralis* (Totton, 1930) that we are inclined to consider this material as being a juvenile colony of that species, particularly as it occurs in its area of distribution. The resemblance also holds for the shape of the hydrothecae.

MEASUREMENTS of juvenile *Lytocarpia spiralis* (in μm):

	NZOI Stn V370 slide 2934	Portobello Mu 67-61 slide 2681
Axial tube, diameter	163 – 192	260 – 295
Axial nematotheca, length	133 – 190	162 – 192
Maximum diameter	74 – 89	111 – 126
Diameter at rim	44 – 59	52 – 74
Axillary nematotheca, length	163 – 185	163 – 185
Maximum diameter	89 – 96	110 – 115
Diameter at rim	30 – 44	65 – 74
Hydrocladial internode, length	1520 – 1735	1215 – 1365
Diameter at node	118 – 133	103 – 133
Hydrotheca, total depth	975 – 1020	1020 – 1105
Diameter at rim	445 – 480	445 – 488
Median nematotheca, total length (measured from apex to septum)	348 – 405	407 – 430
Diameter at rim (measured in frontal view)	59 – 67	59 – 67
Lateral nematotheca, depth	177 – 185	180 – 190
Maximum diameter	89 – 104	96 – 126
Diameter at rim	44 – 52	67 – 82

For notes on the Mu 67–61 material, see under *Lytocarpia spiralis*, p. 322.

Lytocarpia striata sp. nov. (Fig. 79A–F)

MATERIAL EXAMINED:

NZOI Stns: D149, 9 young colonies, between 10 and 30 mm high, plume-shaped, no corbulae, partly attached to small stones. RMNH-Coel. slide 2838; **D159**, 7 plume-shaped colonies, 12–25 mm high, 2 with corbulae. 3 RMNH-Coel. slides 2839; **D175**, 5 colonies about 40 mm high on bryozoans; no corbulae. 3 RMNH-Coel. slides 3476; **E821**, several colonies, about 60 mm high and some fragments; many corbulae. Attached to bryozoans. Holotype, H-781 in NIWA collection. 2 colonies as RMNH-Coel. 27765 and 4 slides 2173, are part of the type series; **S22**, 2 plumes, attached to corals, 25 and 45 mm high; no corbulae. RMNH-Coel. slides 3606.

N.B. The colonies from NZOI Stns D149, D159, D175, and S22, are here indicated as paratypes; P-1233, 1234, 1235, and 1236 in NIWA collection.

TYPE LOCALITY: Southwest slope South Island, 46°43.50′ S, 165°46.50′ E, 220–159 m.

DESCRIPTION (of holotype): Erect, pinnate stems 50–75 mm high, with weakly polysiphonic stem, occasionally with a single branch. Stem composed of fairly thin main tube with quite indistinct division into internodes; polysiphony from apposition of slightly thicker secondary tube. Primary axial tube with frontal row of nematotheca and apophyses, these alternately

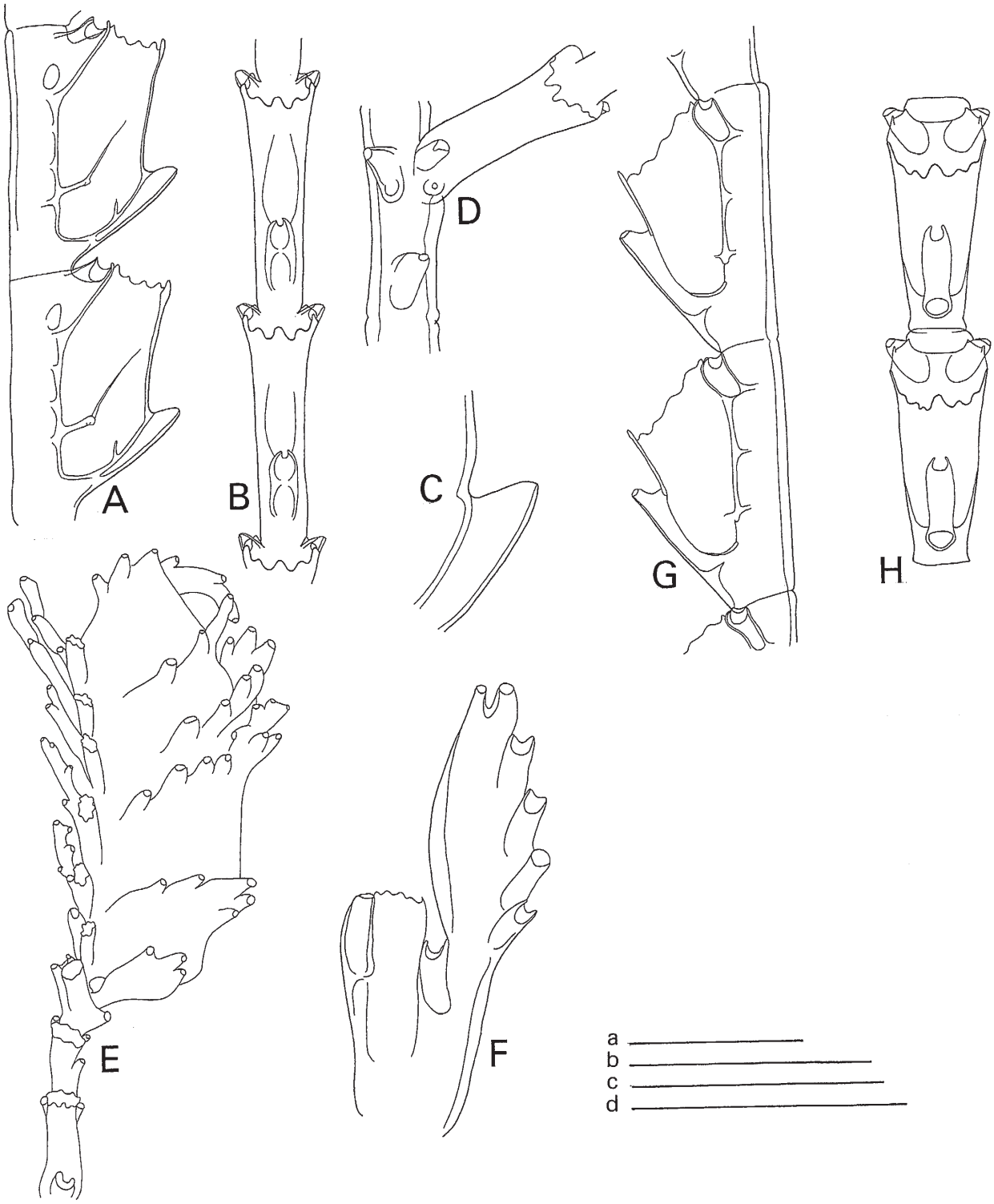

Fig. 79. A–F. ***Lytocarpia striata*** sp. nov. **A**, pair of hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, distal part median hydrothecal nematotheca, lateral view. **D**, insertion of hydrocladium on stem, showing arrangement of cauline nematothecae. **E**, female corbula, lateral view (NZOI Stn E821, holotype, slide 2173). **F**, first (free) gonohydrocladium of female corbula, lateral view (NZOI Stn D159, slide 2839). **G, H.** ***Lytocarpia subdichotoma*** (Ralph, 1961). **G**, pair of hydrocladial hydrothecae, lateral view. **H**, the same, frontal view (NZOI Stn E433, slide 2163). Scales: a, 0.4 mm (F); b, 0.2 mm (C); c, 0.5 mm (A, B, D, G, H); d, 2 mm (E). W.V.

directed left or right; each apophyses with 3 nematothecae: 2 axillary and 1 below apophysis; 1 nematotheca between 2 successive apophyses. Stem nematothecae large, retort-shaped, i.e., with swollen basal portion. narrowing apically; apical portion curving laterally. In the 2 axillary nematothecae apical part narrows considerably, aperture circular, narrow. Intermediate nematothecae with much wider, circular aperture, alternately directed left or right. All nematothecae with large circular basal foramen opening into interior of axial tube. Base of apophysis with small, raised mamelon. Hydrocladia inserting on apophyses, alternately directed left or right, length 8–15 mm, indistinctly divided into internodes by slightly oblique nodes. Internodes slender but with fairly thick perisarc, each with large, slender hydrotheca and 3 nematothecae: 1 unpaired median and 2 lateral. Interior of internode with 4 or 5 imperfect internal perisarc rings, 1 at base of lateral nematothecae, 1 at level in hydrothecal ledge, and 2 or 3 behind abcauline hydrothecal wall; these 2 or 3 rings may be quite indistinct.

Interior of hydrotheca fairly narrow; abcauline wall almost parallel to internodal axis, only very slightly diverging; free portion almost straight, apically slightly thickened and running into distinct but not lengthened abcauline median cusp, squarish in frontal view. Hydrothecal rim making angle of about 80° with internodal axis, with 4 rounded cusps on each side; fourth cusp just visible between lateral nematothecae, back of rim open. Interior of hydrotheca with conspicuous, strong, typically rounded adcauline ledge at one-third of adcauline wall. From thickening, 2 perisarc ridges of internal hydrothecal wall point obliquely upwards, gradually fading out apically. A second ledge projecting into interior of hydrotheca from the middle of wall separating hydrothecal base and median nematotheca. Striae visible on outside of hydrotheca.

Median nematotheca covering slightly less than half abcauline hydrothecal wall; free part short, aperture gutter-shaped. No opening into interior of hydrotheca; base of nematotheca with incomplete septum. Lateral nematothecae swollen basally, narrowing apically, just surpassing median adcauline cusp; rim semicircular laterally but with deep scoop on median side, opening into interior of internode by means of large oval foramen, visible in basal part. Median nematotheca of first hydrocladial internode swollen.

Corbula replacing a hydrocladium, several on each cormoid, each corbula supported by a basal pedicel of 1, occasionally 2, hydrothecate internodes, developed as first internodes of 'normal' hydrocladium. Internodes of rachis indistinct. Female corbula closed, composed of 5–8 pairs of costae with a gonohydrocladium externally at its base, gonohydrocladial 'spurs' fairly long, carrying 1 hydrotheca with a complement of 3 nematothecae:1 median inferior and 2 lateral that can become much displaced as spur lengthens; some additional nematothecae may occur on the lengthened spur. Hydrothecae on spurs smaller with undulated to smooth rim. Costae imbricate and partly fused, margin set with small, cup-shaped nematothecae; first pair of costae free; occasionally a free costa at apex of corbula. About 5 gonothecae inside female corbula. All corbulae thought to be female with exception of 1 from NZOI Stn D159. This corbula is about 2.5 mm long and 1 mm across; the costae are not fused and are elongate oval, the margin set with some large nematothecae. The gonohydrocladium is short and has a hydrotheca with the usual 3 nematothecae: 1 median and 2 lateral. The corbula is empty but the exact structure could not be discerned because of the presence of much dirt and some foraminiferans.

MEASUREMENTS of *Lytocarpia striata* sp. nov. (in μm):

	NZOI Stn E821 slides 2173
Stem, width at base	310 – 325
Hydrocladium, length of internode	615 – 675
Width of internode	85 – 100
Hydrotheca, length bottom to margin	590 – 615
Width at rim	225 – 250
Median nematotheca, length, internode to orifice	390 – 420
Width at tip	34 – 45
Lateral nematotheca, length	195 – 225
Maximum width	90 – 100
Width at orifice	38 – 42
Corbula, length	3500 – 4500
Diameter	1230 – 1330

COLOUR: In the preserved specimen the hydrocladia and corbulae are white; the stems are ochre coloured.

REMARKS: This species is easily recognised by the internal ridges of the hydrotheca as well as by the structure of the corbula. The hydrotheca in general appearance resembling that of *Lytocarpia subdichotoma* but differing considerably by the development of the adcauline internal ridge. It approaches *Lytocarpia phyteuma* (Kirchenpauer, 1876) in the shape of the hydrotheca, differing in this respect by the greater length of the free abcauline hydrothecal wall (though this length varies considerably in *L. phyteuma*), the narrower hydrothecal aperture and the presence of interior ribs and/or ridges. There are also differences in the shape of the corbula, which is not unlike that of *Lytocarpia perarmata* described by Billard (1913: 97,

text-figs 84–85), though the gonohydrocladial 'spurs' are longer in *Lytocarpia striata* sp. nov.

RECORDS FROM NEW ZEALAND: Restricted to a fairly small area of the Tasman Sea-South Pacific, southeast of Puysegur Point, South Island, depth 159–741 m. Corbulae occurred in January and October.

DISTRIBUTION: Known only from New Zealand.

ETYMOLOGY: The species name *striata* has been taken from the Latin adjective *striatus*, meaning ribbed, corrugated and refers to the external appearance of the hydrotheca.

Lytocarpia subdichotoma (Ralph, 1961) (Figs 78F; 79G, H)

Thecocarpus subdichotomus Ralph 1961b: 62-63, figs 9c-e, 10e; 1961c: 104; 1961d: 236; Hicks *et al*. 1991: 7; Dawson 1992: 18.

MATERIAL EXAMINED:

NZOI Stns: B683, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **C620**, *Lytocarpia subdichotoma* (Ralph, 1961). 3 fragmented colonies, about 50 mm. RMNH-Coel. slide 2805; **C636**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson). **D100**, 1 colony, 60 mm high, no corbulae; **D133**, 1 colony from dried out sample, about 150 mm high and 2 young colonies about 40 mm high. No corbulae; **D149**, single young colony about 35 mm high, attached to bryozoans; **D155**, young colony 15 mm high, attached to fragment of old hydroid stem; **D233**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **D904**, 1 colony and 1 additional colony with corbulae, 150 mm high; **E80**, 2 fine specimens 170 and 140 mm high, both with basal tuft and many corbulae; **E83**, remnants of at least 4 colonies with corbulae; **E111**, 1 colony, 70 mm high, small basal tuft of fibres. Composed of primary axis and spirally arranged hydrocladia, 15 mm long. No corbulae; **E120**, 4 colonies with basal tuft, 70–80 mm high, no corbulae; **E431**, 1 colony 100 mm high, no corbulae; **E433**, 3 colonies 150–200 mm high, no corbulae. RMNH-Coel. slide 2163; **E719**, 2 colonies, 150 and 200 mm high, no corbulae; **E735** (dried out sample), 1 colony about 100 mm high, no corbulae; **E740**, single mutilated colony about 100 mm high, no corbulae; **E840**, top parts from 2 colonies about 40 mm high, with many mature corbulae; **F91**, 2 young colonies, unbranched, 60 mm high, hydrocladia along stem, no corbulae; **F99**, single young colony, unbranched, 60 mm high, hydrocladia along stem, no corbulae. RMNH-Coel. slide 3475; **F101**, 130 mm long colony with characteristic way of branching, no corbulae; **F107**, very young colony, 25 mm high, no corbulae; **F227**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **F871** (dried out sample), small, about 50 mm high plume-shaped colony without corbulae; **F876**, young colony 60 mm high, no corbulae; **F900**, 1 young, damaged colony 40 mm high, no corbulae; **G172**, single colony 120 mm high, with basal tuft and 1 corbula; **G276A**, single colony about 150 mm high and some fragments; no corbulae; **G364**, beautiful colony, about 200 mm high, many corbulae; **G651**, single colony, 90 mm high, no corbulae. RMNH-Coel. slide 2854; **G652**, single colony, 190 mm high, spirally built, with several corbulae. 1 branch cut off for RMNH-Coel. slide 2855; **G688**, 1 colony, 150 mm high and a top part. No corbulae; **G697**, 1 young colony, 35 mm high, all in RMNH-Coel. slide 2868; **G834**, *Lytocarpia subdichotoma* (Ralph, 1961), female colony (J.E. Watson); **G937**, 1 colony, 230 mm high, with several corbulae. RMNH-Coel. slide 420. On stem eggs of squid; **I25**, 2 small colonies, 25 and 45 mm high, with basal tuft of fibres, no corbulae, still plume-shaped; **I353**, fragmen-tary colony consisting of top part 25 mm high and base, a few corbulae. RMNH-Coel. slide 2149; **J22**, *Lytocarpia sub-dichotoma* (Ralph, 1961) (J.E. Watson). [Slide 4172 JEW Colln]; **J23**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson). [Slide 4173 JEW Colln]; **J24**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson). [Slide 4174 JEW Colln]; **J27**, *Lytocarpia sub-dichotoma* (Ralph, 1961) (J.E. Watson). With *Gymnangium tubulifer* (Bale, 1914); J29, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **J30**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **J31**, *Lytocarpia subdichotoma* (Ralph, 1961) [Slide 4405 JEW Colln]; **J32**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **J33**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **J35**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **J676**, 4 colonies, 2 large (80 mm) and branched sub-dichotomously; 2 pinnate and smaller (40mm); no corbulae; **J679**, 1 large, 150 mm high colony, irregularly branched and partly invested by a sponge, and several smaller colonies, about 80 mm high, more or less dichotomously branched. Corbulae present; **P927**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **Q720**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **S16, Haul 3**, 2 colonies, 150 mm high, 1 severely damaged. No corbulae; **S16, Haul 4**, 4 colonies, 80–130 mm; no corbulae; **S16, Haul 5**, 7 colonies, 40–130 mm; no corbulae; **S197**, 2 fine colonies 150 mm high, with basal tuft of fibres anchoring in sand; young corbulae present. Top part of 1 of colonies detached; **S198**, 2 colonies about 120 mm high, with basal tuft; no corbulae; **S377**, *Lytocarpia subdichotoma* (Ralph, 1961) (J.E. Watson); **U227**, 3 colonies with basal tuft of fibres, 100, 120 and 220 mm high; no corbulae; **V367**, 1 colony about 120 mm, basal part with Cirripedia; **V369**, 1 top part 80 mm, 1 additional colony in 2 parts. 2 young colonies about 40 mm. No corbulae; **V371**, sample consists of about 10 fragmented colonies without corbulae, but all with basal tuft; **V383**, 100 mm high colony in 2 parts; **V391**, 4 colonies, 80–150 mm, no corbulae; **V393**, 1 abraded colony, 120 m high, no corbulae; **W252**, 4 colonies, 70–150 mm high, no corbulae; **W258**, about 25 colonies, varying between quite young colonies, 40 mm high and fully developed, spirally ones, about 150 mm high. No corbulae; **W259**, 10 colonies between 60 and 120 mm high; no corbulae; **W260**, 1 colony, 100 mm high; no corbulae; **X521**, single colony about 200 mm high with large basal tuft of fibres; no corbulae.

NMNZ: BS 210, 2 small, plume-shaped colonies about 50 mm high. NMNZ Co. 573, 2 RMNH-Coel. slides 3015. A colony with *Kirchenpaueria bonnevieae* (Billard, 1906) and *Gymnangium tubulifer* (Bale, 1914) attached to stem; **BS 479**, single colony, 190 mm high; no corbulae. NMNZ Co. 566; **BS 559**, 1 colony, 120 mm high and a young, plume-shaped colony, about 30 mm high; no corbulae.

NMNZ Co. 703; **BS 742,** 1 colony about 100 mm high; no corbulae. NMNZ Co. 381; **BS 819**, top part of a colony, 180 mm high, no corbulae. NMNZ Co. 697; 37°30.16′ S, 176°38.06′ E, ***Kaharoa*, 9301/13**, 1 fine colony about 120 mm high and 1 detached branch. Colony with distinct spiral structure and with many corbulae, especially in the higher branches. NMNZ Co. 799; RMNH-Coel. 27660, 2 slides 3360.

Ralph Chatham Island Collection: Stn 52, "rest illegible, disintegrated". 2 corbulae and 4 hydrocladia. RMNH-Coel. slides 4411. This station is the type locality of *Thecocarpus subdichotomus* Ralph, 1961b; the type material is discussed below.

PMBS: Chatham Rise Stn. Identified by P.M. Ralph (Taken from card register).

MATERIAL INSPECTED: **Mu 67–43, Hyd 8**, fragments only in this sample, viz., a top part of a stem with 1 branch and a fragment with 2 corbulae. The characters, however, are quite distinct and make the fragments identifiable. There is a second sample containing 2 fragments of apparently 1 larger colony, with several corbulae; **Mu 64–43, Hyd 10a**, single rather poor colony about 120 mm high. No corbulae; **Mu 67–60,** colony of *Lytocarpia spiralis* (Totton, 1930), with basal tuft of fibres about 120 mm high, 1 mature corbula (the corbula described by Totton, copied by Ralph, apparently is immature). The tube also contains a colony of *Lytocarpia subdichotoma* (Ralph, 1961), from which slide RMNH-Coel. 27263, slide 2680.

TYPE LOCALITY: Chatham Islands Expedition, Stn 52, Chatham Rise ,44°04′ S, 178°04′ W, 476 m, 10.Feb.1954. The holotype of *Thecocarpus subdichotomus* Ralph, 1961, is a carmine stained Canada Balsam slide with the following labelling: "Holotype no. 24 (Co. 180), *Thecocarpus subdichotomus* Ralph, 1961, Type. Chatham Rise, Stn 52, 260 fathoms, 10 Feb. 1954, Chatham Is Expedition — 1951". On the slide are two fragments of branches and three corbulae. The corbulae are of the same sex and apparently female (cannot be made out with certainty), the corbula is closed and has 10 or 11 pairs of ribs; it agrees with the description given by Ralph. Length 5 mm, pedicel excluded. This pedicel has two or three normally developed hydrothecae; only the first corbula 'leaflet' is slightly reduced in size. Compared to the present material Ralph's type has remarkably small hydrothecae (see also table of measurements).

REMARKS: We have little to add to the comprehensive description of this characteristic New Zealand species given by Ralph (1961b: 62–63, figs 9c-e, 10e). The species is primarily characterised by the colony structure, being a helicoid spiral in which the stem is formed by the succession of basal parts of branches: the primary axis divides dichotomously, one branch forming a pinnate plume with alternate hydrocladia, the other again dividing dichotomously after about 8 mm repeating the process of branching. The resulting

MEASUREMENTS of *Lytocarpia subdichotoma* (in μm):

	NMNZ *Kaharoa* slides 3360	Chatham Islands (Ralph 1961b)
Axial tube, diameter	1125	
Axial nematotheca, length	100 – 115	
Maximum diameter	61 – 67	
Diameter at orifice	23 – 28	
Hydrocladial internode, length	530 – 560	400 – 450
Diameter at node	125 – 130	120 – 150
Hydrotheca, total depth	380 – 390	
Length abcauline wall	335 – 365	
Diameter at rim	225 – 240	
Median nematotheca, total length (measured from apex to septum)	210 – 225	
Diameter at rim (measured in frontal view)	17 – 23	
Lateral nematotheca, depth	100 – 110	95 – 120
Diameter at rim	15 – 23	10
Corbula, maximum length of costa	8000 – 9000	8000 – 9000

stem and the lower branches are polysiphonic by apposition of secondary tubules; only the primary axis bears hydrocladia, absent from the basal part of the stem. Alhough some colonies may reach a height of 200 mm, the colony retains its flexibility and slenderness of stem, this is in contradistinction to *Lytocarpia tenuissima*, which has the same colony structure but the basal part of the stem may attain a diameter of 15 mm (cf. Bale, 1914c: 180).

The corbula described and figured by Ralph (1961b) is young. The older corbula retains its partly open character, but may have as many as 25 leaflets (costae). The pedicel has four or five normal hydrothecae, that may occasionally be on a short branchlet. The blunt 'spur' of each gonohydrocladium is short but well developed; it has a normal hydrotheca with three nematothecae, projecting slightly beyond the hydrotheca. Nearly all gonocladial leaflets have a distinct, rounded apophysis without nematothecae. The nematothecae along the rim of the leaflets are widely spaced and small; the leaflets have no wing-shaped expansion.

Ralph compared her material with *Lytocarpia calycifera* (Bale, 1914), absent from the present collection. For differences between both species, concerning mainly the development of the (lateral) nematothecae, we refer to Ralph (1961b: 63).

The material was mixed with *Lytocarpia tenuissima* (Bale, 1914c), with which it can easily be confused if

the latter is not fully grown or corbulae are absent. We refer to the description of *L. tenuissima* (p. 330–332) for the principal differences.

RECORDS FROM NEW ZEALAND: This species was originally described from the Chatham Rise (Chatham Islands Expedition, Stn 52, 475 m); it appears to be distributed in the deeper waters (140–975 m) all around New Zealand, between 33°–50° S and 166.5° E–175° W. The species is probably restricted to bottoms composed of sand or a mixture of sand and mud. Corbulae were found in September and January.

DISTRIBUTION: Apparently a New Zealand species restricted to the deeper waters around the islands.

Lytocarpia tenuissima (Bale, 1914c) (Fig. 80A–D)

Aglaophenia tenuissima Bale 1914c: 179–181, pl. 37, figs 1-2; 1915: 322–323; Briggs 1915a: 317–318, pl. 11, fig. 2; Hodgson 1950: 55, fig. 86; Kramp 1956: 18, figs 4-5; Balyaev 1972: 60; Dawson 1992: 18; Stranks 1993: 14.
Aglaophenia (Thecocarpus) tenuissima: Bale 1915: 322.
Thecocarpus tenuissimus: Bedot 1921a: 334; Blackburn 1942: 110; Vervoort 1966: 147, fig. 47; Dawson 1992: 18.
Lytocarpia tenuissima: Stechow 1922: 151; 1923d: 245.

MATERIAL EXAMINED:

NZOI Stns: S14, 2 colonies, 300 and 400 mm high, many corbulae. RMNH-Coel. slides 3547; **Z2363**, top part of a large colony with many (empty) corbulae. Each hydrocladiate branch is about 80 mm long, hydrocladia up to 10 mm long, hydrothecae large. RMNH-Coel. slides 3550.

NMNZ: BS 761, 3 tangled colonies between 100 and 200 mm high, complete with rooting tuft and some corbulae (NMNZ Co. 743). 2 RMNH-Coel. slides 3324.

TYPE LOCALITY: Great Australian Bight (no further data, Bale, 1914c; Stranks (1993) listed probable syntypes in MOV (MV F58403 and MV F58404, 12 microslides); however, a lectotype from the Great Australian Bight, 1913 and in Bale's collection in NHM had previously been designated by Vervoort (1966: 148); this lectotype bears the number 1919.10.14.40.

DESCRIPTION: This species, since the original description by Bale (1914c: 179–181, pl. 37 figs 1–2) redescribed by Kramp (1956) and Vervoort (1966), has almost the same colony structure as *Lytocarpia subdichotoma* (Ralph, 1961) and also resembles that species in hydrothecal morphology. None of the present specimens reaches the considerable size ('a foot and more in height') at which, according to Bale (1914c: 180) the basal part of the stem may have a diameter of 15 mm. Our largest complete specimen is about 400 mm high. In this specimen the stem has a basal diameter of about 3 mm.

In the absence of corbulae this species can easily be confused with *L. subdichotoma*; the structure of the stem internodes is almost identical. Both species have 2 large nematothecae and a small, raised mamelon on the front of the apophysis as well as a third, large nematotheca in the axil on the back (covered by secondary tubules in the older stem internodes). The hydrotheca is wider and more saccate, with 5 pairs of lateral cusps that may be fairly acutely pointed (fifth pair hidden behind lateral nematothecae). The unpaired median cusp is acutely pointed. The rim of the lateral nematotheca is deeply scooped on the inside;

MEASUREMENTS of *Lytocarpia tenuissima* (in μm):

	NZOI Stn S14 slides 3547	Great Australian Bight, NHM 1919.10.14.40	*Galathea* Expedition Stn 626 (Vervoort 1966)
Axial tube, diameter	1800		
Axial nematotheca, length	115 – 125		
Maximum diameter	78 – 90		
Diameter at rim	23 – 28		
Hydrocladial internode, length	455 – 470	350 – 390	400 – 495
Diameter at node	105 – 115	93 – 102	80 – 125
Hydrotheca, total depth	310 – 315	315 – 350	420 – 430
Length abcauline wall	345 – 355		
Diameter at rim	195 – 220	175 – 180	150 – 165
Median nematotheca, total length (measured from apex to septum)	200 – 210		
Diameter at rim (measured in frontal view)	22 – 28		
Lateral nematotheca, depth	90 – 105	100 – 115	120 – 125
Diameter at rim	22 – 25	35 – 38	40 – 45
Corbula, maximum length of costa	4500 – 8000		

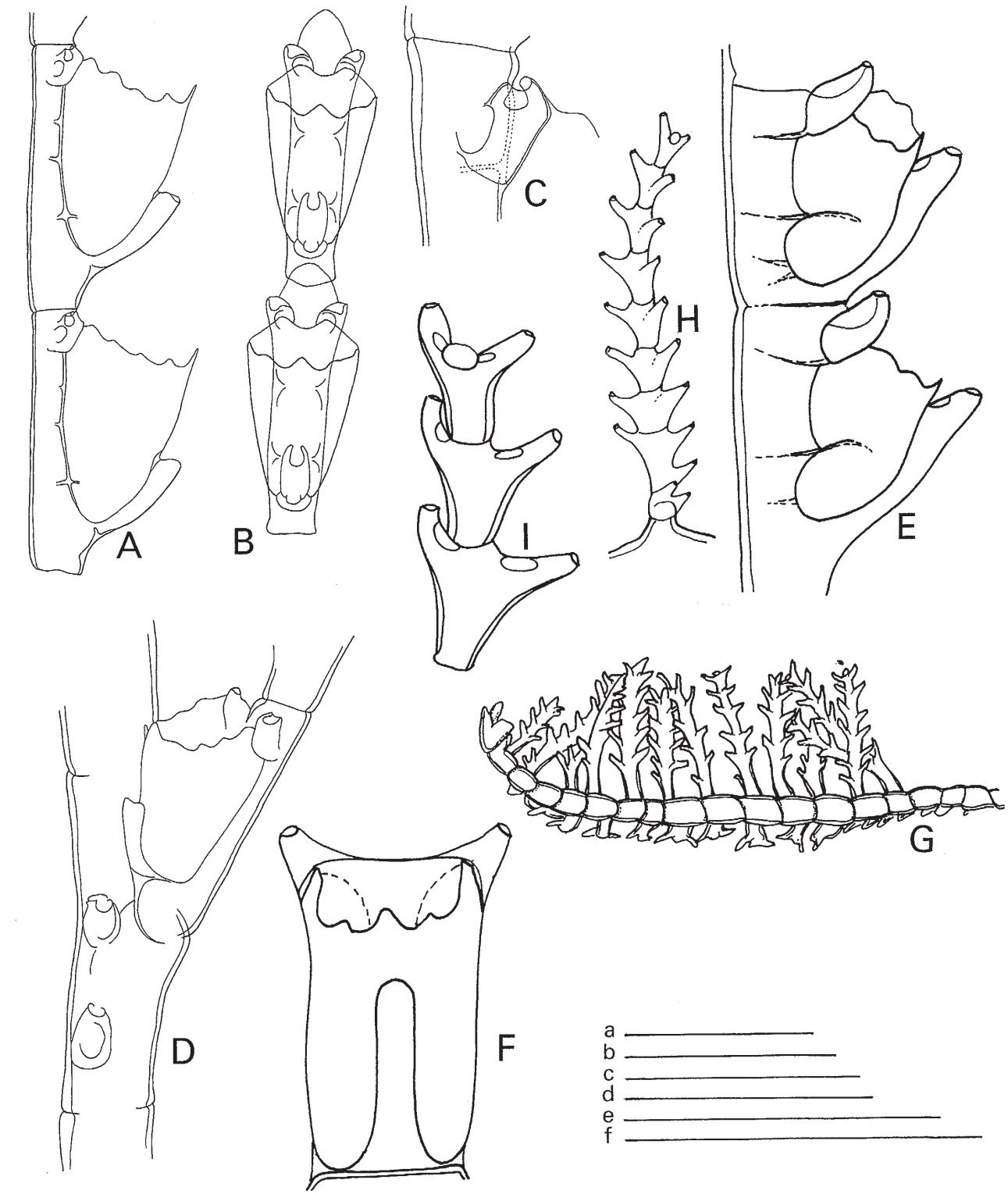

Fig. 80. A–D. ***Lytocarpia tenuissima*** (Bale, 1914). **A**, pair of hydrocladial hydrothecae, lateral view. **B**, the same, frontal view. **C**, lateral hydrothecal nematotheca, lateral view (NZOI Stn Z2363, slide 3550). **D**, insertion of hydrocladium on stem, showing position of cauline nematothecae (BS 761, slide 3342). W.V. **E–I.** ***Lytocarpia vulgaris*** sp. nov. **E**, pair of hydrocladial hydrothecae, lateral view (NZOI Stn I347, slide 2145). **F**, hydrocladial hydrotheca, frontal view. **G**, corbula, lateral view. **H**, gonohydrocladium, lateral view. **I**, part of gonohydrocladium showing arrangement of the nematothecae (NZOI Stn C957, holotype, slide 2810). J.E.W. Scales: a, 0.5 mm (H); b, 2 mm)G); c, 0.2 mm (C); d, 0.3 mm (E), 0.5 mm (A, B, D); e, 0.5 mm (I); f, 0.3 mm (F).

there are 4 pairs of imperfect septa in the internode , of which the upper is almost hidden by the laterals. The principal difference is in the corbulae. The spurs of the gonohydrocladia are well developed and leaf-like, with a fully developed hydrotheca at their base; in addition to the 2 lateral nematothecae of that hydrotheca there are additional nematothecae along the rim of the leaflet. The costae of the gonohydroclades form a fully closed, big corbula; the margins of the costae are considerably extended beyond the actual corbula by means of wing-shaped extensions set with nematothecae of normal size.

Remarks: As in *Lytocarpia subdichotoma* (Ralph, 1961), this species has a bunch of fine stolonal fibres at the base of the stem, for anchorage in soft bottoms.

Records from New Zealand: The present records are from the Bay of Plenty, off North Island, about 37.5° S, 176.5° E, depth 34–66 m, and from south of Stewart Island at 607 m depth. Corbulae occur in September and January.

Distribution: The species has been described from the Great Australian Bight, where it was taken between 126°45.25′ and 130°40′ E, 292–585 m depth (Bale 1914a, 1915); additional specimen(s) are recorded from Eastern slope, Bass Strait, 146–549 m (Bale 1915). Briggs (1915a) recorded the species from off Thouin or Wine-glass Bay, Freycinet Peninsula, Tasmania, at 146 m. The *Galathea* Expedition found specimens in the Ker-madec Trench (Stn 658, 35°51′ S, 178°31′ W, 6660– 6770 m, Kramp 1956), in the South China Sea (Stn 408, 12°47′ N, 116°24′ E, 4330 m, Vervoort 1966), and in the Tasman Sea (Stn 626, 42°10′ S, 170°10′ E, 610 m, Ver-voort 1966).

Lytocarpia vulgaris sp. nov. (Fig. 80E–I)

Material Examined:

NZOI Stns: C957, several large, strongly branched colonies, up to 300 mm high; many corbulae (holotype, H-782 in NIWA collection). 3 RMNH-Coel. slides 2810, part of type series; **D90**, 2 isolated plumes 35 and 20 mm high. Paratype P-1237 in NIWA collection, RMNH-Coel. slide 2825; **E108**, 2 top parts of colonies, irregularly branched, about 50 mm high; no corbulae observed. From dried out sample and very brittle. RMNH-Coel. slides 2302, 3454, 3465; **G67**, 3 plumes, about 120 x 150 mm. RMNH-Coel. 27738, slide 2312; **I347**, fragment or top part of a colony 50 x 55 mm, no corbulae. RMNH-Coel. slide 2145; 3 additional slides 3464, after bleaching; **J970** [Slides 4212, 4223 and 4224 JEW Colln].

NMNZ: Between **Cape Reinga and Three Kings Islands**, 28.Oct.1962 (previously preserved in formalin and as a result extremely brittle), damaged colony about 100 mm high with only few plumes left; no corbulae. With *Filellum serpens* (Hassall, 1848). NMNZ Co. 715; RMNH-Coel. 27626, slide 3376; **BS 398**, small stem about 50 mm high with some side branches; no corbulae. NMNZ Co. 718; RMNH-Coel. 27666, slide 3366; **BS 678**, 2 colonies 150 and 100 mm high; no corbulae. NMNZ Co. 824; RMNH-Coel. 27776, 2 slides 3501; **BS 769**, large colony about 150 mm high and forked at base, sympodially branched, with many plumes; no corbulae. NMNZ Co. 827; 2 RMNH-Coel. slides 3506. Additional large colony with repeatedly forked stem, intimately associated with *Corhiza scotiae* (Ritchie, 1907). NMNZ Co. 867, RMNH-Coel. 27750, slide 3526. Part of this material basally with many plumes of *Lytocarpia incisa* (Coughtrey, 1875); **BS 869**, 2 rather mutilated colonies 120 and 200 mm high, terminally bearing a few branches with hydrocladia; no corbulae present. NMNZ Co. 776; 2 RMNH-Coel. slides 3341; **BS 911**, single 150 mm high colony, spread 120 mm, no corbulae. NMNZ Co. 405; 2 RMNH-Coel. slides 2956.

Type Locality: Southwest Pacific, off South Island, 43º09.00′ S, 175º15.00′ E, 123 m.

Description (of holotype): Fragments of colonies from 70 to 200 mm high. 1 colony arising from a tangled hydrorhiza. Colonies lax, branching irregularly alternate, re-branched once or twice.

Main stem fascicled, parallel tubes running almost up to the tips of the branches. Hydrocladia up to 6 mm long, given off from a short apophysis on a wide frontal tube, hydrocladia directed upwards at an angle of about 45°; 2 outwardly facing nematotheca on the frontal tube below the hydrocladial apophysis. Hydrocladial internodes short, very wide, nodes moderately distinct, each internode with 2 strongly marked internal septa, 1 passing through the internode into the hydrotheca and the other passing downwards through the internode from the base of the lateral nematotheca.

Hydrothecae saccate, base flat, abcauline wall convex near base, becoming slightly concave distally, a vertical or slightly upwardly curved septum passing about half way into the hydrotheca from the internode. Hydrothecal margin with a single tongue-shaped median cusp (frontal view) flanked by 3 pairs with rounded cusps and shallow embayments between, the third pair broad and obscured by the lateral nematothecae.

Median nematotheca tapering to the base, abcauline wall slightly convex, adcauline wall adnate to the hydrotheca for most of its length, free part either ending level with or extending slightly beyond hydrothecal margin, narrowing to the orifice. Terminal orifice small, circular, a small secondary orifice above the hydrotheca; occasionally the terminal and secondary orifices meet in a single gutter-like aperture.

Lateral nematotheca sub-rectangular, extending to or past hydrothecal margin, narrowing to a small circular terminal orifice; a large secondary orifice facing inwards beyond the margin of the hydrotheca.

Corbula replacing a hydrocladium, up to 5 mm long including length of basal internodes. Rachis divided

into internodes, the first 1–3 internodes hydrothecate. Mature corbula open, consisting of 12 alternate arched ribs on each side, 1 on each internode, internode with 2 distally facing nematothecae with large orifices. A hydrotheca with reduced marginal dentition and 2 lateral nematothecae at the base of each rib, followed by a single distally facing nematotheca then up to 8 paired, upwardly directed tubular nematothecae, each with an outwardly-facing terminal orifice and a secondary proximal orifice, facing upward.

MEASUREMENTS of *Lytocarpia vulgaris* sp. nov. (in μm):

	NZOI Stn C957 slides 2810
Stem internodes, length	164 – 312
Width at node	197 – 246
Hydrocladial internode, length	286 – 312
Width at node	72 – 130
Hydrotheca, length, measured along internode	228 – 280
Width at rim	130 – 163
Median nematotheca, length	260 – 293
Length free part	33 – 55
Width at orifice	16 – 20
Lateral nematotheca, length	111 – 130
Width at orifice	39 – 52
Corbula, maximum length of rib	1476
Length internode of rachis	130 – 169
Width internode of rachis, anterior view	182 – 195
Length of nematotheca at adcauline wall	111 – 130
Length of rib internode	202 – 219
Width of rib internode	78 – 111

COLOUR: Stems dark brown, hydrocladia pale greyish-brown.

REMARKS: The unusually wide primary tube bearing the hydrocladia and the deep hydrocladial internodes with distinct internodal septa are a characteristic and constant feature of the species.

Both the median and lateral nematothecae are rather variable in length, the median nematothecae in some colonies reaching only to the hydrothecal margin while in others the nematotheca is somewhat longer, arching a little beyond the margin. On these colonies, the lateral nematothecae are also longer and the marginal dentition is also more deeply incised.

The structure of the corbula is similar to the figure of Ralph (1961b) of *Lytocarpia acanthocarpa*, except in that species there are two, not one unpaired nematotheca at the base of each corbula rib.

RECORDS FROM NEW ZEALAND: Recorded from isolated localities in the Three Kings Islands region; off Rangaunu Bay, Ranfurly Bank, off East Cape, and the Chatham Rise, 49–399 m. Corbulae occur in March.

DISTRIBUTION: Known exclusively from New Zealand.

ETYMOLOGY: Species name *vulgaris* from the Latin adjective *vulgaris,* meaning common and referring to the rather wide distribution of this new New Zealand species.

Lytocarpia sp. (Fig. 81A–C)

MATERIAL EXAMINED:

NZOI Stns: G701, fragments of 1 or more colonies; no corbulae; **P7**, single forked 130 mm high stem with 5 or 6 plumes and a few open corbulae. On stem 2 colonies of *Synthecium subventricosum* Bale, 1914. RMNH-Coel. slide 2220.

DESCRIPTION: 1 colony about 130 mm high arising from a small hydrorhizal plug. 1 corbula present. Stem polysiphonic, 2 mm thick at the base, bifurcating into 2 branches 30 mm above the base, 1 branch without hydrocladia, the other sparingly branched and rebranched distally. Ultimate branches monosiphonic, up to 20 mm long, perisarc thick, proximal part ahydrocladiate, with a row of paired nematothecae, then a strong V-shaped joint; internodes thereafter hydrocladiate with 1 nematotheca beside, and 1 above the hydrocladial apophysis and 2 proximal on the stem internode.

Hydrocladia closely set, directed upwards at an acute angle to the stem, with up to 20 hydrothecae, apophysis very short, internodes well marked, nodes transverse, with 2 distinct, entire septa, 1 at the base of the lateral nematotheca and the other passing into the hydrotheca; another indistinct septum sometimes near the posterior margin of the hydrotheca.

Hydrotheca elongate, parallel to internode narrowing to an elliptical base, adcauline wall flat, abcauline wall slightly sinuous, aperture facing forward and somewhat oblique to the internode; a strong, vertical internal septum with a club-shaped apex passing from the base about halfway across the hydrotheca. Margin with a moderately long rounded median cusp, flanked by 3 pairs of low cusps, the embayments between the same shape and size as the cusps.

Median nematotheca tapering proximally, adnate for about half its length, free part conical, terminal orifice circular, a secondary orifice just above the hydrotheca. Lateral nematothecae long, tubular, facing forward and outward, terminal orifice circular, a

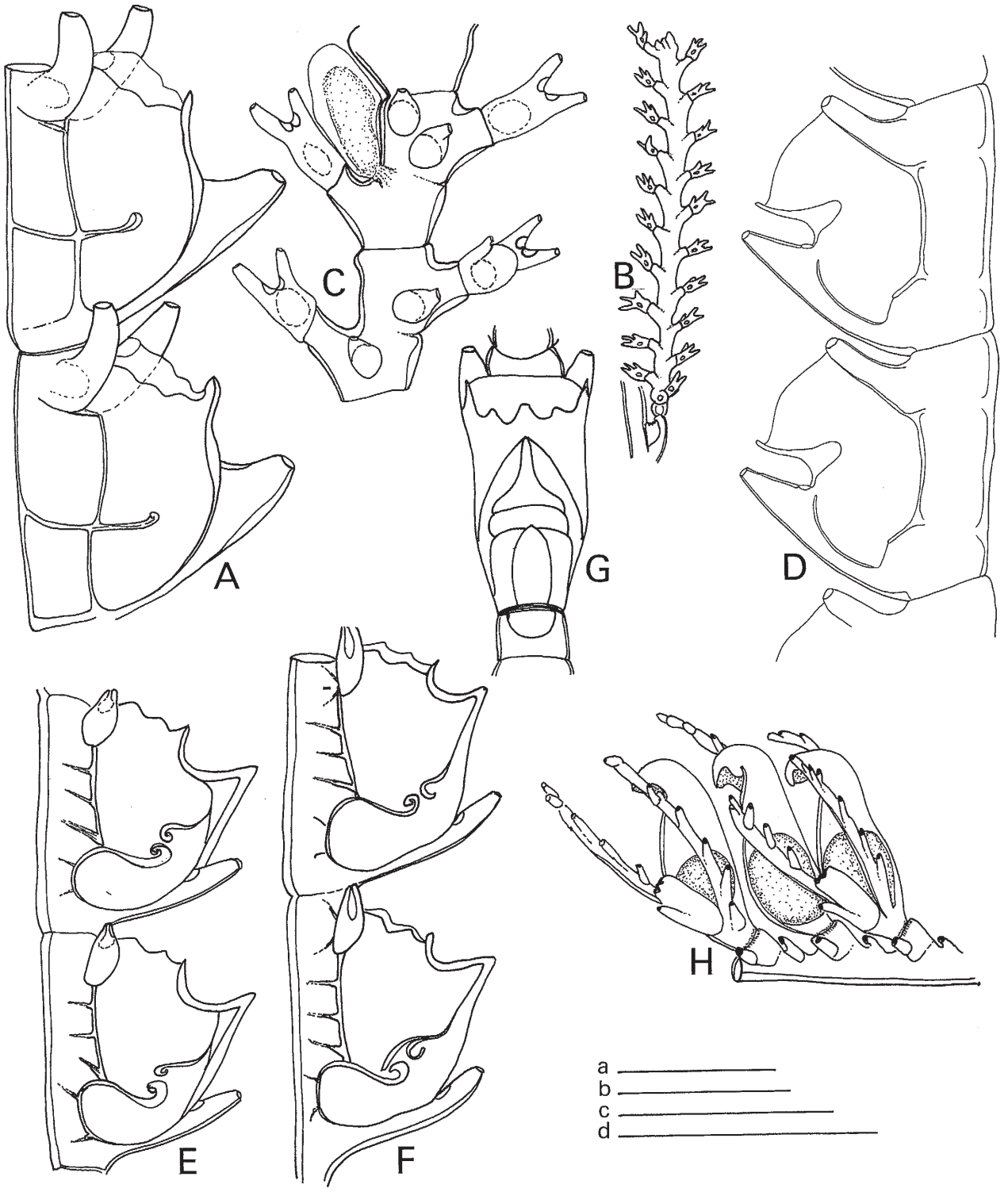

Fig. 81. A–C. ***Lytocarpia*** sp. **A**, pair of hydrocladial hydrothecae, lateral view. **B**, corbula, inside view. **C**, part of rachis, four gonohydrocladia and an immature gonotheca (NZOI Stn G701, slide 2220). J.E.W. **D.** ***Macrorhynchia philippina*** (Kirchenpauer, 1872), pair of hydrocladial hydrotheca, lateral view (NMNZ, off Anson Bay, Norfolk Island, slide 2947). W.V. **E–H.** ***Wanglaophenia longicarpa*** sp. nov. **E, F**, pairs of hydrothecae from different hydrocladia, lateral view. **G**, hydrocladial hydrotheca, frontal view. **H**, part of corbula, showing part of rachis with three gonohydrocladia with one gonotheca each, lateral view (BS 886, holotype, slide 3447). J.E.W. Scales: a, 0.2 mm (D); b, 1 mm (H); c, 0.5 mm (C, E, F, G), 2 mm (B); d, 0.3 mm (A).

large, secondary orifice facing inward at the base of the nematotheca.

Corbula 3.8 mm long, replacing a hydrocladium; corbula with 1 hydrotheca on the basal pedicel, and 10 alternate ribs on each side of the rachis. Internodes of axis wide, nodes transverse, indistinct, with a large apophysis supporting a reduced hydrotheca with no marginal dentition, 2 lateral nematothecae, and a median nematotheca.

MEASUREMENTS of *Lytocarpia* sp. (in μm):

	NZOI Stn P7 slide 2220
Stem, length of internode	574 – 623
Width at node	118 – 241
Hydrocladium, length of internode	358 – 377
With at node	78 – 91
Hydrotheca, length through hydrotheca from base to marginal anterior cusp	299 – 319
With at rim	130 – 150
Median nematotheca, length base to orifice	228 – 247
Height from hydrotheca to orifice	65 – 72
Lateral nematotheca, length	130 – 143
Maximum width	52 – 65
Corbula, length of internode (anterior view)	332 – 358
Length of apophysis at adcauline side	104 – 143
Width of apophysis at distal node	72 – 98
Length reduced hydrotheca, including nematotheca	234 – 247

COLOUR: Stem brown, hydrocladia golden-brown.

REMARKS: As the colony appears to be fully grown it is possible that the corbula, although broken apically, is mature. Since the truncated ribs show no sign of broken or lost ribs, we conclude that this is the normal structure of the corbula.

However, because of the small amount of material available for study and the single, possibly incomplete corbula, we hesitate to ascribe the specimen to a new species. The corbula contains several crushed gonothecae, several containing gonophores, sex indeterminate.

Macrorhynchia Kirchenpauer, 1872
(= *Nematophorus* Clarke, 1879; *Pleurocarpa* Fewkes, 1881; *Lytocarpus* Allman, 1883)

TYPE SPECIES: *Macrorhynchia savignyana* Kirchenpauer, 1872, by original designation.

The following species have been considered (* = present name and/or generic designation):

Macrorhynchia allmani (Nutting, 1900) [= *Aglaophenia ramosa* Allman, 1877; *Lytocarpus allmani* Nutting, 1900; *Macrorhynchia berbudensis* Stechow, 1920; *Aglaophenia longiramosa* Fraser, 1945]. Gonosome unknown.

Macrorhynchia annandalei (Ritchie, 1909b) [= *Lytocarpus annandalei* Ritchie, 1909b]. Gonosome described by Ritchie, 1909b, 1910b.

Macrorhynchia aurita (Busk, 1852) [= *Plumularia aurita* Busk, 1852; *Lytocarpus auritus* (Busk, 1852) = **Macrorhynchia phoenicea* (Busk, 1852)]

Macrorhynchia balei (Nutting, 1905) [= *Lytocarpus balei* Nutting, 1905; ?*Aglaophenia graeffii* Kirchenpauer, 1876 (*nomen nudum*); *Lytocarpia* (?) *graeffei* Stechow, 1919]. Gonosome described by Nutting (1905).

Macrorhynchia clarkei (Nutting, 1900) [= *Lytocarpus clarkei* Nutting, 1900; *Nematophorus clarkei* (Nutting, 1900)]. Gonosome described by Nutting (1900).

Macrorhynchia crispata (Kirchenpauer, 1872) [= **Monoserius pennarius* (Linnaeus, 1758)]

Macrorhynchia crosslandi (Ritchie, 1907b) [= *Lytocarpus crosslandi* Ritchie, 1907b]. Gonosome described by Ritchie (1907b).

Macrorhynchia curta (Nutting, 1900) [= *Lytocarpus curtus* Nutting, 1900; *Nematophorus* (?) *curtus* (Nutting, 1900)]. Gonosome unknown.

Macrorhynchia dallii Clark, 1876 [= **Nuditheca dallii* (Clark, 1876)]

Macrorhynchia disjuncta (Pictet, 1893) [= *Aglaophenia disjuncta* Pictet, 1893; **Macrorhynchia phoenicea* (Busk, 1852)]

Macrorhynchia filamentosa (Lamarck, 1816) [= *Plumularia filamentosa* Lamarck, 1816; *Lytocarpus filamentosus* (Lamarck, 1816); *Aglaophenia ligulata* Kirchenpauer, 1872; *Aglaophenia fusca* Kirchenpauer, 1872; *Aglaophenia patula* Kirchenpauer, 1872; *Halicornaria segmentata* Warren, 1908]. Gonosome described, among others, by Millard, 1975.

Macrorhynchia furcata (Nutting, 1900) [= *Lytocarpus furcatus* Nutting, 1900]. Gonosome described by Vervoort (1968).

Macrorhynchia fusca (Kirchenpauer, 1872) [= **Macrorhynchia filamentosa* (Lamarck, 1816)]

Macrorhynchia fusus (Busk, 1852) (see Bouillon *et al.* 1995: 38). A microslide, IG 11365, from the collections of the 'Institut royal des Sciences naturelles de Belgique', Brussels, from Namibia and donated by H. Broch, is mentioned under that name. No species of such name has been described by Busk, neither as *Aglaophenia fusus* or *Plumularia fusus*. Also there is no mention of this species in Broch's 1914 paper. *Macrorhynchia fusus*, therefore, is a *nomen nudum*.

Macrorhynchia (?) graeffei Stechow, 1919 [= **Macrorhynchia balei* (Nutting, 1905)]

Macrorhynchia grandis (Clarke, 1879) [= *Nematophorus grandis* Clarke, 1879; *Lytocarpus grandis* (Clarke, 1879)]. In the description of this species Nutting stated: "Gonosome. – Unknown". It is illustrated, nevertheless, on plate 32, figs 2–4. Gonosome described and figured by Versluys (1899) and Fraser (1944).

Macrorhynchia grandis var. *unilateralis* (Ritchie, 1907b) [= *Lytocarpus grandis* var. *unilateralis* Ritchie, 1907b; *Nematophorus*

(?) *grandis* var. *unilateralis* (Ritchie, 1907b)]. Gonosome unknown.

Macrorhynchia gravelyi Mammen, 1965 [= *Lytocarpus* sp. nr. *graeffei* (Kirchenpauer, 1872)]. Gonosome unknown.

Macrorhynchia hawaiensis (Nutting, 1905) [= *Lytocarpus hawaiensis* Nutting, 1905]. Gonosome described by Nutting (1905).

Macrorhynchia hornelli (Thornely, 1904) [= *Aglaophenia multiplicato-pinnata* Kirchenpauer, 1876 (*nomen nudum*); *Lytocarpus hornelli* Thornely, 1904; *Lytocarpia* (?) *multiplicato-pinnata* Stechow, 1923d]. Gonosome unknown.

Macrorhynchia ligulata (Kirchenpauer, 1872) [= **Macrorhynchia filamentosa* (Lamarck, 1816)]

Macrorhynchia longicornis (Busk, 1852) [= *Plumularia longicornis* Busk, 1852; *Aglaophenia longicornis* (Busk, 1852); *Lytocarpus longicornis* (Busk, 1852)]. Gonosome unknown.

Macrorhynchia longicornis var. *intermedia* (Billard, 1913) [= *Lytocarpus longicornis* Allman, 1883 (not *Plumularia longicornis* Busk, 1852); *Halicornaria intermedia* Billard, 1913; *Lytocarpus longicornis* var. *intermedia* (Billard, 1913)]. Gonosome unknown.

Macrorhynchia longicornis var. *sibogae* (Billard, 1913) [= *Halicornaria longicornis* var. *sibogae* Billard, 1913; *Lytocarpus longicornis* var. *sibogae* (Billard, 1913)]. Gonosome unknown.

Macrorhynchia (?) *mercatoris* (Leloup, 1937a) [= *Aglaophenia* (?) *mercatoris* Leloup, 1937a]. Gonosome unknown.

Macrorhynchia moebii (Schulze, 1874) [= **Cladocarpus integer* (G.O. Sars, 1874)]

Macrorhynchia mulderi (Bartlett, 1907) [= *Aglaophenia mulderi* Bartlett, 1907; *Lytocarpus mulderi* (Bartlett, 1907)]. Gonosome described and figured by Watson (1973).

Macrorhynchia (?) *multiplicatopinnata* (Kirchenpauer, 1876) [= **Macrorhynchia hornelli* (Thornely, 1904)]

Macrorhynchia nuttingi (Hargitt, 1927) [= *Lytocarpus nuttingi* Hargitt, 1927; = **Aglaophenia whiteleggei* Bale, 1888, see Huang Meijun (1990)]

Macrorhynchia patula (Kirchenpauer, 1872) [= **Macrorhynchia filamentosa* (Lamarck, 1816)]

Macrorhynchia pennarius (Linnaeus, 1758) [= **Monoserius pennarius* (Linnaeus, 1758), *Lytocarpus secundus* (Kirchenpauer, 1872)]

Macrorhynchia philippina (Kirchenpauer, 1872) [= *Aglaophenia philippina* Kirchenpauer, 1872; *Aglaophenia urens* Kirchenpauer, 1872; *Aglaophenia perforata* Kirchenpauer, 1876 (*nomen nudum*); *Lytocarpus philippinus* (Kirchenpauer, 1872); *Lytocarpus crosslandi* Ritchie, 1907b; *Lytocarpus philippinus atlanticus* Billard, 1913; *Aglaophenia perforata* Stechow, 1919]. Gonosome described by Vervoort (1968); Millard (1975); Ryland & Gibbons (1991) *et al*.

Macrorhynchia philippina atlantica (Billard, 1913) [= **Macrorhynchia philippina* (Kirchenpauer, 1872)]

Macrorhynchia philippina singularis (Billard, 1908a) [= **Macrorhynchia singularis* (Billard, 1908a)]

Macrorhynchia phoenicea (Busk, 1852) [= *Plumularia phoenicea* Busk, 1852; *Plumularia aurita* Busk, 1852; *Aglaophenia phoenicea* (Busk, 1852); *Lytocarpus phoeniceus* (Busk, 1852); *Lytocarpus spectabilis* Allman, 1883; *Aglaophenia rostrata* Kirchenpauer, 1872. Gonosome described by Bale (1888); Allman (1883, as *Lytocarpus spectabilis*), and Ryland & Gibbons (1991).

Macrorhynchia phoenicea aurita (Busk, 1852) [= **Macrorhynchia phoenicea* (Busk, 1852)]

Macrorhynchia plumosa (Thornely, 1904) [= *Lytocarpus plumosus* Thornely, 1904; *Aglaophenia tornelyi* Bedot, 1921a (lapsus for *A. thornelyi*)]. The gonosome described and figured by Thornely (1904) is a branched phylactocarp; maybe a species of *Cladocarpus*.

Macrorhynchia protecta (Antsulevich, 1991) [= *Lytocarpus protectus* Antsulevich, 1991]. Almost certainly a species of *Cladocarpus*.

Macrorhynchia racemifera (Allman, 1883) [= *Lytocarpus racemiferus* Allman, 1883)]. Gonosome, a branched phylactocarp, described by Allman (1883), Nutting (1900), and Vervoort (1968).

Macrorhynchia ramosa (Fewkes, 1881) [= *Pleurocarpa ramosa* Fewkes, 1881; *Lytocarpus ramosus* (Fewkes, 1881); *Nematophorus ramosus* (Fewkes, 1881)]. Gonosome described by Nutting (1900).

Macrorhynchia rubens (Kirchenpauer, 1872) [= *Aglaophenia rubens* Kirchenpauer, 1872]. Doubtful species with unknown gonosome.

Macrorhynchia saccaria (Allman, 1876a) [= **Gymnangium eximium* (Allman, 1874)]

Macrorhynchia savignyana Kirchenpauer, 1872 [= *Aglaophenia pennaria sensu* Savigny & Audouin (1809); not *Aglaophenia pennaria* (Linnaeus, 1758)]. Doubtful species with unknown gonosome.

Macrorhynchia secunda (Kirchenpauer, 1872) [= *Aglaophenia (Lytocarpia) secunda* Kirchenpauer, 1872; *Lytocarpus secundus* (Kirchenpauer, 1872), **Monoserius pennarius* (Linnaeus, 1758)]

Macrorhynchia sibogae (Billard, 1913) [= *Lytocarpus sibogae* Billard, 1913). Gonosome described by Gravier-Bonnet & Fontaine (1981).

Macrorhynchia similis (Nutting, 1905) [= *Lytocarpus similis* Nutting, 1905)]. Gonosome described by Nutting (1905).

Macrorhynchia singularis (Billard, 1913) [= *Lytocarpus philippinus* var. *singularis* Billard, 1908a; *Lytocarpus singularis* Billard, 1908a]. Gonosome described by Billard (1913).

Macrorhynchia spectabilis (Allman, 1883) [= **Macrorhynchia phoenicea* (Busk, 1852)]

Macrorhynchia squarrosa (Kirchenpauer, 1872). Doubtful species with unknown gonosome.

Macrorhynchia thornelyi (Bedot, 1921a). See *Macrorhynchia plumosa* (Thornely, 1904; probably a species of *Cladocarpus*.

Macrorhynchia urens (Kirchenpauer, 1872) [= **Macrorhynchia philippina* (Kirchenpauer, 1872)]

Macrorhynchia whiteleggei Bale, 1888 [= **Aglaophenia whiteleggei* Bale, 1888]

Macrorhynchia sp. (von Campenhausen, 1897) [= **Macrorhynchia philippina* (Kirchenpauer, 1872)]

Macrorhynchia philippina (Kirchenpauer, 1872) (Fig. 81D)

Aglaophenia (Macrorhynchia) Philippina Kirchenpauer 1872: 29, 45–46, pl. 1, fig. 26, pl. 2, fig. 26, pl. 7, fig. 26.

Lytocarpus philippinus: Ljubenkov 1980: 50; Boero 1984: 99;

Bouillon 1984: 106; Russell 1984: 105; Rho & Park 1986: 18; Bandel & Wedler 1987: 38; Mergner 1987: 187; Southcott 1987: 81, fig.; Park 1992: 296; Marsh 1993: 22; Allen & Steene 1994: 51, fig.; Kalk 1995: 259, fig. 9.9a.

Lytocarpus (Macrorhynchia) philippinus: Boero & Bouillon 1987: 242, fig. 21.7A.

Macrorhynchia philippina: Calder, 1983: 23–24, fig. 13; 1986b: 139–140, pl. 39; Rees & Vervoort 1987: 177–180, fig. 43; Vervoort 1987: 86; Cairns *et al*. 1991: 29; Ryland & Gibbons 1991: 553–555, fig. 22; Calder 1993: 68 *et seq*.; Vervoort 1993: 550; Bouillon *et al*. 1995: 38; Hirohito 1995 (English text): 297–299, fig. 105d-g; Watson 1996: 97; 2000: 67–68, fig. 53A–D.

Macrorhynchia phillipina: Bakus *et al*. 1994: 176 (incorrect subsequent spelling)

[Not *Macrorhynchia philippina*: Rees & Vervoort 1987: 177–180, fig. 43 (= *Gymnangium eximium* (Allman, 1874)].

Material Examined:

NZOI Stn I89, 3 colonies to about 60 mm high; no gonothecae. Partly with *Monotheca pulchella* (Bale, 1882) and other hydroids on *Symplectoscyphus odontiferus* sp. nov. RMNH-Coel. slide 4764b.

NMNZ: 1.5 miles southwest of **Anson Bay, Norfolk Island,** G.S. *Matai*: Large, well branched colony, 120 mm high, spread about 70 mm; no gonothecae. NMNZ Co. 387; 2 RMNH-Coel. slides 2947.

Type Locality: Manilla, Philippine Islands (Kirchenpauer, 1972; location of type unknown.

Remarks and Distribution: This species is distributed circumglobally in tropical and subtropical parts of Indian, Pacific, and Atlantic Oceans (Rees & Vervoort 1987; Calder 1997) , and northern Australia (Watson 2000) with a depth distribution extending to 411 m at least (Billard 1913). The present records are from the Norfolk Island region. The species does not belong to the New Zealand fauna proper and is not further discussed.

Macrorhynchia phoenicea (Busk, 1852)

Plumularia phoenicea Busk 1852: 398-399.

Aglaophenia phoenicea: Bale 1884: 159, pl. 15, figs 1–5, pl. 17, figs 1–4, pl. 19, fig. 31.

Lytocarpus phoeniceus: Stechow 1909: 97; Billard 1913: 74, fig. 60; Stechow 1913b: 10, 95, figs 62-64; Jäderholm 1916: 7, fig. 4; Briggs 1918: 47; Jäderholm 1919: 25; Bedot 1921a: 320; 1922: 151; Jarvis 1922: 354; Jäderholm 1923: 5; Nutting 1927: 233; Leloup 1930b: 10, text-fig. 7, pl. 2, fig. 1; Briggs & Gardner 1931: 194, fig. 5; Stephenson *et al*. 1931: 67; Leloup 1938b: 21; Vervoort 1946a: 328; Pennycuik 1959: 187; Redier 1964b: 147; Rees & Thursfield 1965: 177; von Schenck 1965: 942; Redier 1966: 93; Millard 1968: 254, 284; Millard & Bouillon 1973: 94; Millard 1975: 451, fig. 137D; 1978: 195 *et seq*.; Bouillon 1984: 106; Russell 1984: 105; Southcott 1987: 81.

Macrorhynchia phoenicea: Stechow 1923b: 19; 1923d: 241; 1925a: 259; Hakushi *et al*. 1957: 217, pl. 108, fig. 11; Yamada 1958: 51, 62; 1959: 85; Itô & Inoue 1962: 452, pl. 8, figs 88–93; Mammen 1967: 313, figs 108–109; Rho 1967: 347–348, fig. 8A–B; Hirohito 1969: 26; Edwards 1973: 587; Rho & Chang 1974: 147; Rho 1977: 279, 425, pl. 94, fig. 94; Hirohito 1983: 80; Rho & Park 1986: 102; Park 1990: 84; Ryland & Gibbons 1991: 555–557, fig. 23; Park 1992: 295; Bouillon *et al*. 1995: 38; Hirohito 1995 (English text): 299, fig. 106a-e; Irving 1995: 324, appendix 2; Watson 1996: 79; 2000: 68–70, fig. 59A–F.

Macrorhynchia phoenacea: Bakus *et al*. 1994: 176 (incorrect subsequent spelling).

Lytocarpus phoenicus: Allen & Steene 1994: 51, fig. (incorrect subsequent spelling).

Lytocarpus spectabilis Allman 1883: 43, fig. 2, pl. 15.

Material Examined:

NZOI Stn P967, 2 colonies, 100 mm high, no gonothecae.

Type Locality: Moreton Island (according to the label on Busk's specimen in NHM), Prince of Wales Channel, Torres Strait, 16 m; holotype probably in NHM. Stranks (1193) mentioned three possible syntypes from the Bale collections in MOV, MV F57959 and F59328 (three microslides).

Remarks and Distribution: The sole specimen of this species in the collections originates from the region of Raoul Island, Kermadec Ridge.

Macrorhynchia phoenicea is a species from the tropical Indo-Pacific, frequenting coral reefs, but penetrating to greater depths (up to 411 m, Billard 1913).

Monoserius Marktanner-Turneretscher, 1890
[= *Hemicarpus* Billard, 1913]

Type Species: *Aglaophenia secunda* Kirchenpauer, 1872 [= *Sertularia pennaria* Linnaeus, 1758).

In this genus the following species have been considered:

Monoserius banksii (Gray, 1843) [= *Plumularia banksii* Gray, 1843; *Aglaophenia banksii* (Gray, 1843); *Hemicarpus banksii* (Gray, 1843)]. Gonosome unknown. Probably a synonym of *Monoserius pennarius* (Linnaeus, 1758).

Monoserius fasciculatus (Thornely, 1904) [= *Lytocarpus fasciculatus* Thornely, 1904; *Hemicarpus fasciculatus* (Thornely, 1904)]. Gonosome described by Billard (1913).

Monoserius pennarius (Linnaeus, 1758) [= *Sertularia pennaria* Linnaeus, 1758; *Aglaophenia spicata* Lamouroux, 1816; *Aglaophenia (Lytocarpia) secunda* Kirchenpauer, 1872; *Aglaophenia (Lytocarpia) crispata* Kirchenpauer, 1872; *Lytocarpus secundus* (Kirchenpauer, 1872)]. Synonymy based on Billard's inspection of a slide presumed to be from Linnaeus's type of *Sertularia pennaria*. Gonosome described by Allman, 1883; Stechow, 1919.

Monoserius secundus (Kirchenpauer, 1872) [= **Monoserius pennarius* (Linnaeus, 1758)]

Monoserius pennarius (Linnaeus, 1758) (Fig. 82A)

Sertularia pennaria Linnaeus 1758: 813 (for synonymy see Bedot, 1910: 238–239).
Lytocarpus pennarius: Jäderholm 1919: 25; 1920: 9; Nutting 1927: 234; Russell 1984: 105.
Hemicarpus pennarius: Stechow 1919: 136; Bedot 1921a: 321; Stechow 1923b: 20.
Monoserius pennarius: Bedot 1923: 233; Nutting 1927: 234; Leloup 1937: 5, 49, fig. 33; Dawydoff 1952: 56; Rees & Thursfield 1965: 183; Tang 1991b: 257; Bakus *et al*. 1994: 176; Bouillon *et al.* 1995: 38.
Aglaophenia spicata Lamouroux 1816: 166.
Aglaophenia (Lytocarpia) secunda Kirchenpauer 1872: 35–36, pl. 1, fig. 15, pl. 2, fig. 15, pl. 3 fig. 15.
Aglaophenia (Lytocarpia) crispata Kirchenpauer 1872: 36–37, pl. 1, fig. 16, pl. 2, fig. 16.
?*Plumularia banksii* Gray 1843: 294.
?*Aglaophenia banksi*: Bale 1887: 103
?*Hemicarpus banksi*: Bale 1924: 263, fig. 17a.
?*Monoserius banksii*: Ralph 1961b: 56–57, fig. 8h.
?*Monoserius buski* Dawson 1992: 18 (incorrect subsequent spelling).

Type Locality: *Sertularia pennaria*: "In M. Pacifico. Steller" (Linnaeus 1758). The combination of the collector (Steller) and the locality (Mare Pacifico) seems most unlikely. *Plumularia banksii*: Dusky Bay, New Zealand (Gray 1843).

Remarks and Distribution: *Monoserius banksii* (Gray, 1843) received separate treatment in Ralph's (1961b) paper, where it is re-described and figured; both description and figure having been taken from Bale (1924); the species has never been re-discovered since Gray's description. Billard (1910: 48) referred to a type slide in the collections of the British Museum (Natural History) (now The Natural History Museum) under no. 94.5.4.1. After inspection of this slide he claimed it to be identical with *Lytocarpus pennarius* [= *Monoserius pennarius* (Linnaeus, 1758)]; a syntype slide from the same (Banks) collection and from the same locality (Dusky Bay, New Zealand) is in MOV (MV F59300, Stranks, 1993). All this material, unfortunately, was not available to us at the time the New Zealand Aglaopheniidae were studied. The species, if not identical with, is certainly closely related to *Monoserius pennarius* (Linnaeus, 1758); the question, nevertheless, must remain open until indisputable New Zealand material of *M. pennarius* is discovered and Gray's material has been inspected.

Two unmistakable specimens of the characteristic *Monoserius pennarius* are present in the NIWA collections, both originate from localities far outside New Zealand waters: the Indian Ocean off Sumatra [NZOI Stn G874, 62 m depth, one colony, 800 mm high, with empty (hemi) corbulae (two RMNH-Coel. slides 2878) and off Cape Leeuwin, Australia (NZOI Stn G875, 155 m depth, large colony, completely fragmented, with empty (hemi)corbulae; stem basally about 5 mm in diameter]. The characteristic hydrothecae have been figured (fig. 82A).

Wanglaophenia gen. nov.

Diagnosis: Large, erect colonies with branched, polysiphonic stem and main branches. Polysiphony being brought about by apposition of secondary tubes against a frontal primary tube, indistinctly divided into internodes, with alternate apophyses bearing the hydrocladia and 1 longitudinal row of nematothecae. Each apophysis with 3 nematothecae: 1 above, 1 beneath the insertion of the apophysis, as well as a reduced nematotheca on the apophysis itself. Hydrocladia divided into internodes; each internode with 1 hydrotheca, 2 lateral nematothecae and 1 unpaired, median nematotheca. Median nematotheca on first hydrocladial internode detached from hydrotheca.

Gonosome an aberrant corbula, given off from the first thecate internode of a hydrocladium. Axis of corbula divided into nematothecate internodes, bearing alternate protective branches surrounding the gonothecae. Protective branches bifurcated from the base, set with tubular nematothecae, that project over the gonotheca and curve inwardly; 1 normally developed hydrotheca just above the bifurcation on one of the branches. Gonotheca swollen, with downward curved apical neck, aperture of gonotheca with bilobate rim.

Type Species: *Wanglaophenia longicarpa* sp. nov.

Remarks: The genus *Wanglaophenia*, as defined above, has affinities with both *Aglaophenopsis* and *Cladocarpus*, but differs conspicuously in development of the gonosome. As the genus *Cladocarpus* already represents an amalgamation of aglaopheniid genera, recently merged by Bouillon (1985a), differing mainly in the development of the gonosome, we here define *Wanglaophenia* as an intermediate generic unit. *Wanglaophenia* nov. gen., of which at present there are two species, *Wanglaophenia longicarpa* sp. nov., and *Wanglaophenia rostriforns* sp. nov., approaches *Aglaophenopsis cornuta* (Verrill, 1879) in the shape of the hydrotheca but differs fundamentally in the development of the gonosome. The median and lateral nematothecae in *Wanglaophenia* are similar to those observed in the related genera *Aglaophenopsis* and *Cladocarpus*.

Etymology: The generic name *Wanglaophenia* is a combination of the geographical name Wanganella Bank, and the type genus (*Aglaophenia*) of the family. Gender: feminine.

Wanglaophenia longicarpa sp. nov. (Fig. 81E–H)

MATERIAL EXAMINED:

NMNZ: BS 886, large, forked colony with many corbulae, holotype, Colln NMNZ 527. Branch and 3 slides as RMNH- Coel. 27735, slides 3447, part of type series.

TYPE LOCALITY: Wanganella Bank, Norfolk Ridge, east slope, 32°35.3′ S, 167°41.8′ E to 32°34.0′ S, 167°39.0′ E, 437-422 m.

DESCRIPTION: Colony 18 cm high and 5 mm thick at base, irregularly branched in 1 plane, the longest branch 140 mm long. Hydrorhiza a small plug of fascicular tubes running down from the stem. Lower stem divided into 2 segments, consisting of a short fasciculated segment 30 mm long attached to the hydrorhiza and connected to the main stem by a flexible V-shaped web of parallel tubes.

Hydrocaulus polysiphonic, perisarc thick, consisting of many parallel tubes bearing nematothecae at regular intervals. Hydrocladia given off a conspicuous apophysis of the primary tube, 2 nematothecae associated with the apophysis, 1 at the base and 1 just above. Hydrocladia closely approximate, up to 15 mm long, flexuous, nodes indistinct, with 3–5 incomplete internodal septa passing only a short distance transversally into the internode from the base of the hydrotheca.

Hydrotheca elongate, laying parallel to the internode, the first hydrotheca on the hydrocladium without a median nematotheca, this being replaced by a nemato-theca similar to the laterals, situated proximally on the internode near the apophysis. Hydrotheca divided into 2 distinct 'cells', the proximal 'cell' with a rounded base, inserted well down into the internode and a distal 'cell' with slightly convex base. Distal part of abcauline wall of the hydrotheca produced into a thorn-shaped crest with a concave wall passing down the frontal wall of the hydrotheca. Margin of hydrotheca with 1 upwardly curved anterior tooth (lateral view), showing a rounded cusp in frontal view, followed by a pair of teeth with large, lobed cusps (lateral view), then a deep incision and 3 pairs of shallow, rounded cusps. Hydrotheca with 2 intrathecal septa, 1, hook-shaped, passing up from the base to almost level with the margin, and another, club-shaped passing down into the 'cell' from the distal crest, both almost meeting.

Median nematotheca tubular, adnate to the hydrotheca for about two-thirds of its length, diverging at a slight angle where it becomes free of the hydrotheca. Terminal orifice narrow and a small secondary orifice above the junction with hydrotheca. Lateral nematothecae sac-shaped, terminal orifice narrow, a secondary orifice connected to the terminal orifice by a narrow channel.

Corbula given off from the first internode of a hydrocladium. Rachis of corbula not clearly divided into internodes, proximal part bearing a row of up to 8 nematothecae. Proximal branch single, short, nematothecate, the next branch forked with a row of nematothecae along 1 side and 2 sub-opposite nematothecae at the tip, a hydrotheca in the axil of the branch. Thereafter corbula with up to 22 gonothecae, each borne on an apophysis with 1 proximal nematotheca and 1 at the base of the apophysis, a forked branch arising beside each gonotheca, on alternate sides of the rachis. Gonothecae in a row along the rachis, large, upright, swollen proximally, narrowing to a downward curved neck, orifice facing distally, with a bilobate margin.

MEASUREMENTS of *Wanglaophenia longicarpa* sp. nov. (in μm):

	NMNZ BS 886 slides 3447
Length of stem apophysis (adcauline side)	85 – 150
Stem, distance between hydrocladia on same side	656 – 820
Width of primary tube	202 – 247
Hydrotheca, height, base to crest (measured vertically)	325 – 390
Length along internode	507 – 553
Width at rim	195 – 228
Distance from anterior marginal cusp to crest	156 – 182
Median nematotheca, base to orifice	345 – 364
Width of terminal orifice	20 – 26
Lateral nematotheca, length	156 – 169
Maximum width	85 – 98

COLOUR: Stem and branches deep golden-brown, hydrocladia light honey-brown.

REMARKS: *Aglaophenopsis cornuta* (Verrill, 1879), from the western Atlantic most closely resembles the present specimen. However, it differs in the greater number of marginal cusps, the median nematotheca being at a more obtuse angle to the hydrotheca and numerous intranodal septa in the hydrocladium.

The full marginal dentition of the hydrotheca can only be seen by examination from several aspects, some of the cusps being obscured in either lateral or frontal aspect.

The flexible web of perisarc at the base of the colony has been previously noted in some colonies of *Cladocarpus* and *Lytocarpia* by one of us (W.V.) This torsion joint is an adaptation to allow a large colony such as *Wanglaophenia longicarpa*, with a weak hydrorhiza, to rotate axially thus preventing detachment from the substrate in current flow.

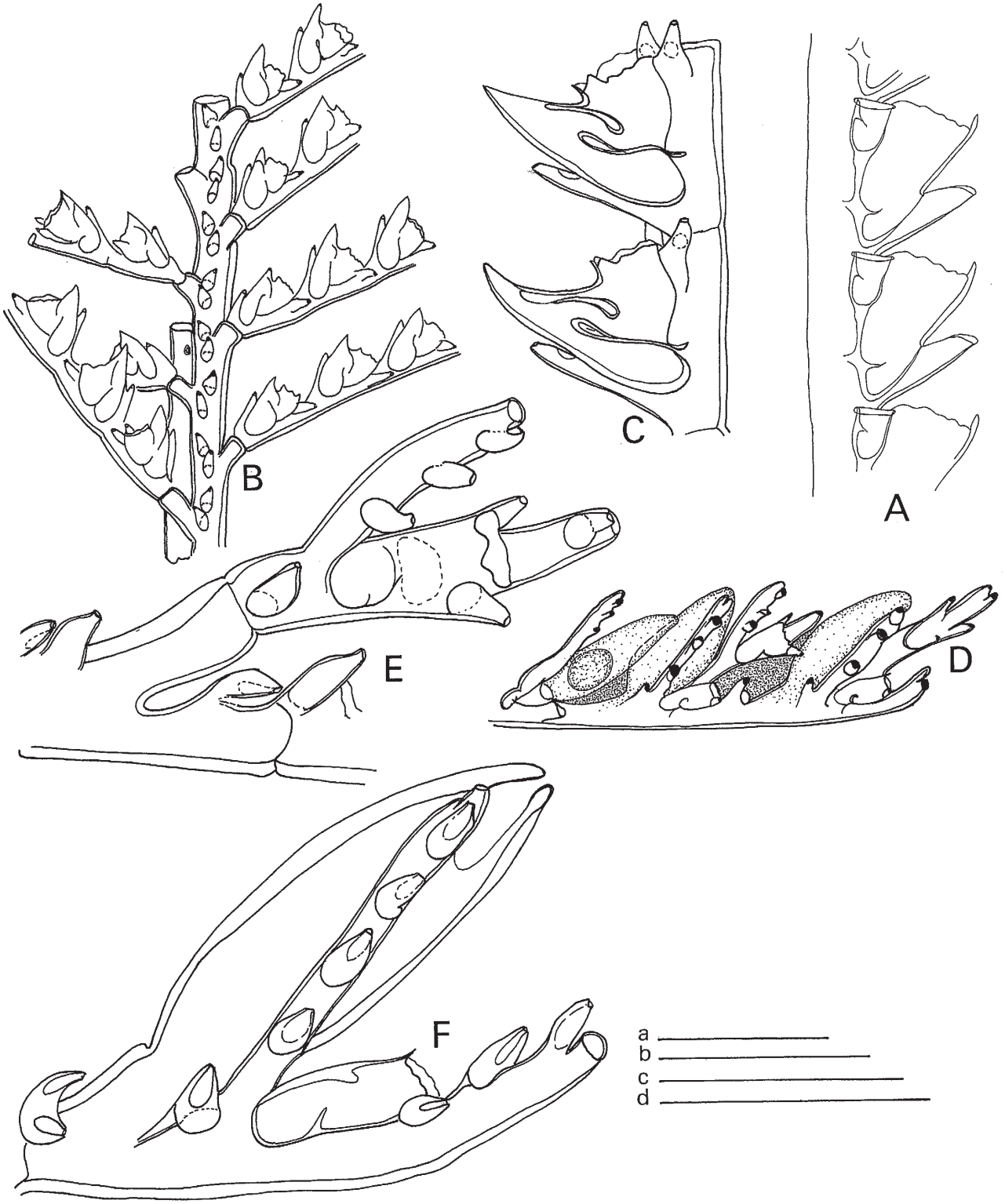

Fig. 82. A. ***Monoserius pennarius*** (Linnaeus, 1758). Hydrocladial hydrothecae, lateral view (NZOI Stn G874, slide 2878). W.V. **B–F.** ***Wanglaophenia rostrifrons*** sp. nov. **B**, top part of branch, showing insertion of hydrocladia on branch and position of the cauline nematothecae. **C**, pair of hydrocladial hydrothecae, lateral view. **D**, distal part of corbula, lateral view. **E**, gonohydrocladium, inside view. **F**, distal end of corbula with gonohydrocladium ('rib') and gonotheca (NZOI Stn E849, paratype, slide 2185). J.E.W. Scales: a, 1 mm (B); b, 0.5 mm (C, E, F); c, 0.5 mm (A); d, 2 mm (D).

RECORDS FROM NEW ZEALAND: Recorded from a single locality at Wanganella Bank, Norfolk Ridge, east slope, 32°35.3′ S, 167°41.8′ E to 32°34.0′ S, 167°39.0′ E, 437–422 m.

DISTRIBUTION: Known only from Wanganella Bank, New Zealand.

ETYMOLOGY: The specific name is a combination of the Latin adjective *longus*, long, and the Latinised form of the Greek substantivum *karpos* (carpus), fruit, and referring to the exceptionally long corbula.

Wanglaophenia rostrifrons sp. nov. (Fig. 82B–F)

MATERIAL EXAMINED:

NZOI Stns: E849, 1 fertile colony with many corbulae 220 mm high, stem 3 mm wide at the base, without hydrorhiza, a torsion joint 20 mm long at the base (paratype, P-1245 in NIWA collection). RMNH-Coel. slide 2185 is part of type series; **F928**, 1 sterile, unbranched colony, 55 mm high on a fragment of bryozoan, no corbulae (holotype, H-783, in NIWA collection). 2 slides as RMNH-Coel. 27734, slides 2249 and 3455, part of type series.

TYPE LOCALITY: Southwest Pacific, slope northeast of North Island, 34°06.20′ S, 172°06.80′ E, 388–406 m.

DESCRIPTION: No true hydrorhiza present; hydrorhizal tubes running up the stem. At 5 mm above the base in both colonies, the stem bifurcates into 2 separate parts connected by a flexible V-shaped web of parallel tubes (torsion joint); 1 part ends above the web in a blunt apex, the other part becoming the main stem bearing hydrocladia. Main stem polysiphonic; tubes bear nematothecae at regular intervals from the base to the distal end of the colony.

Hydrocladiate stem internodes defined only by an indistinct indentation in the perisarc. Hydrocladia alternate, lax, up to 12 mm long, given off from an apophysis, with 2 nematothecae, the same as the laterals, 1 at the base, and 1 just above the apophysis, pointing outwards. Hydrocladial internodes without septa, hydrothecae elongate, almost parallel with the internode, basal part inserted well down into the internode, aperture facing upwards. Hydrotheca with 2 very thick internal septa, 1 passing upwards from the base to a level at or above the margin of the hydrotheca, the other, club-shaped, passing downwards into the hydrotheca behind the margin. Frontal part of hydrotheca produced into a very large conical rostrum (lateral view) surpassing the margin. Rim of hydrotheca with a single upturned anterior cusp, flanked by a pair of lobe-shaped cusps, followed by 2 pairs of shallowly indented cusps, and a pair of more sharply pointed cusps, these behind the lateral nematotheca.

Median nematotheca tubular, straight, adnate to the hydrotheca for most of its length, narrowing slightly to the terminal orifice. Terminal orifice small, circular, a secondary aperture present just above the junction with the hydrotheca. Lateral nematotheca flask-shaped, facing forward, terminal orifice small, connected by a very narrow channel to an inwardly-facing secondary orifice.

Corbula to 11 mm long, on a hydrocladial pedicel with up to 7 internodes each with a centrally or proximally placed nematotheca. Corbula typically with up to 10 ribs alternately arranged on each side of the rachis; rachis terminating in a blunt distal end. Corbula ribs and gonothecae inserting on a long apophysis, each rib unequally forked from base onward, a median nematotheca proximal to the fork. 1 arm of fork short, pointing forward along axis of corbula, a hydrotheca in the axil and 2 distal median nematothecae, 1 superior to the hydrotheca and 1 surpassing blunt apex of rib. Hydrotheca reduced in size, without rostrum or median nematotheca, but with 2 lateral nematothecae; margin almost edentulate. Longer arm of fork pointing upwards

MEASUREMENTS of *Wanglaophenia rostrifrons* sp. nov. (in mm):

NZOI	Stn F928 slides 2249 & 3455	Stn E849 slide 2185
Length of stem apophysis (adcauline side)	117 – 143	
Stem, distance between hydrocladia on same side	585 – 683	
Width of primary tube	358 – 455	
Hydrotheca, height, base to crest of rostrum (measured vertically)	325 – 429	
Hydrotheca, length along internode	345 – 377	
Width at rim	156 – 169	
Distance from anterior marginal cusp to crest of rostrum	143 – 260	
Median nematotheca, base to orifice	312 – 364	
Width of terminal orifice	20 – 26	
Lateral nematotheca, length	130 – 143	
Maximum width	65 – 85	
Corbula, length of internode of peduncle		246 – 492
Width of peduncle at node		163 – 189
Length of internode		574 – 640
Gonotheca, length		1066 – 1197
Width		328 – 459
Primary (hydrothecate) rib, length		1443 – 1640
Width across hydrotheca on rib		208 – 293

beside gonotheca, reaching or just surpassing apex of gonotheca; this rib with a row of 5 nematothecae on side opposite gonotheca and ending in a blunt apex.

Rib nematothecae all of the same shape and size, similar to lateral nematothecae of hydrotheca, terminal orifice small, merged with a large keyhole-shaped secondary orifice.

Gonotheca given off beside each rib, long, slipper-shaped, perisarc very thick, a nematotheca with 2 orifices pointing outwards from the rachis, proximally on the apophysis. Gonothecal aperture a purse-shaped apical lip.

COLOUR: Preserved material, stem pale honey-brown, hydrocladia white.

REMARKS: *Wanglaophenia rostrifrons* is characterised by the a nose-shaped rostrum on the frontal part of the hydrotheca and its large abcauline, internal septum. The purse-shaped gonothecal aperture, which is apparently forced open by the escaping reproductive products, is unusual.

The species is closely related in characters of both trophosome and gonosome to *Wanglaophenia longicarpa* sp. nov.

RECORDS FROM NEW ZEALAND: Two localities in northern New Zealand waters: northeast slope North Island, about 34° S, 172° E, 388–406 m, and WNW of Three Kings Islands, 36° S, 171.4° E, 216 m. Corbulae with gonothecae occur in March.

DISTRIBUTION: Known only from New Zealand waters.

ETYMOLOGY: The specific name is a Latinised version of the most distinctive character of the species, the frontal rostrum on the hydrotheca. Derived from the Latin substantiva *rostrum*, beak and *frons*, forehead.

Family **HALOPTERIDIDAE** Millard, 1962
Antennella Allman, 1877

TYPE SPECIES: *Antennella gracilis* Allman, 1877

For this genus we have followed Schuchert's (1997) concept and his definitions of the following species (in alphabetical sequence):

Antennella allmani Armstrong, 1879
Antennella avalonia Torrey, 1902
Antennella biarmata Nutting, 1927
Antennella campanulaformis (Mulder & Trebilcock, 1909)
Antennella compacta Fraser, 1938b
Antennella curvitheca Fraser, 1937
Antennella kiwiana Schuchert, 1997
Antennella microscopica (Mulder & Trebilcock, 1909)
Antennella quadriaurita Ritchie, 1909a
Antennella recta Nutting, 1927
Antennella secundaria (Gmelin, 1791)
Antennella sibogae (Billard, 1910
Antennella siliquosa (Hincks, 1877)
Antennella tubulosa (Bale, 1894)
*Antennella va*rians (Billard, 1911)

Antennella kiwiana Schuchert, 1997 (Fig. 83A–E)

Antennella kiwiana Schuchert 1997: 27-29, fig. 8.

MATERIAL EXAMINED:

NZOI Stns: C957, colonies, to 15 mm high, on stem of *Lytocarpia vulgaris* sp. nov. A few empty and crumpled female gonothecae present. 2 RMNH-Coel. slides 2811; **D145**, bunch of about 12 mm high colonies on bryozoans, rather mutilated; no gonothecae. RMNH-Coel. slide 2836; **F82**, large bunch of colonies on sponge about 35 mm high. Female gonothecae present. RMNH-Coel. slide 2850.

NMNZ: BS 838, 2 small stems on stem of *Crateritheca zelandica* (Gray, 1843); no gonothecae (NMNZ Co. 760). RMNH-Coel. 27704, 2 slides 3404.

NMNZ Ralph Collection: Loc. 64, NMNZ Co. 923, 2 sponge fragments with 8 mm high stem; RMNH-Coel. slide 3618; **Loc. 65**, NMNZ Co. 924, sponge fragment with several stems attached, 3 in RMNH-Coel. slide 3619; material in poor condition; **Loc. 188**, NMNZ Co. 1043, fragments of this species present in tube labelled *Halopteris campanula* in Ralph's register. One cormoid in RMNH-Coel. slide 3709, with a few cormoids of *Antennella secundaria* (Gmelin, 1791).

TYPE LOCALITY: Echinoderm Reef, Leigh Marine Biological Station, intertidal; holotype in RMNH, RMNH-Coel. 27609 (Schuchert 1997).

DESCRIPTION: Unbranched, to 30 mm long stems rising from ramified, tubular stolon without nematothecae, composed of basal, athecate part with a few transverse nodes and oblique, terminal hinge-joint, followed by regular succession of thecate and athecate internodes separated by regular succession of oblique and transverse nodes, the latter often very indistinct. Basal portion of stem occasionally with a few nematothecae; first thecate internode proximally with oblique node, distally with indistinct transverse node, bearing a big hydrotheca and 3 nematothecae: an immovable median inferior nematotheca and 1 pair of lateral nematothecae, each on a distinct apophysis. Athecate internode proximally with indistinct transverse node, distal oblique node, and 1 frontal nematotheca. Athecate internode occasionally split into 2 short internodes by means of a slightly oblique node, each part carrying 1 frontal nematotheca. Median inferior nematotheca firmly attached to internode, bithalamic, adcauline wall deeply scooped, diaphragm transverse

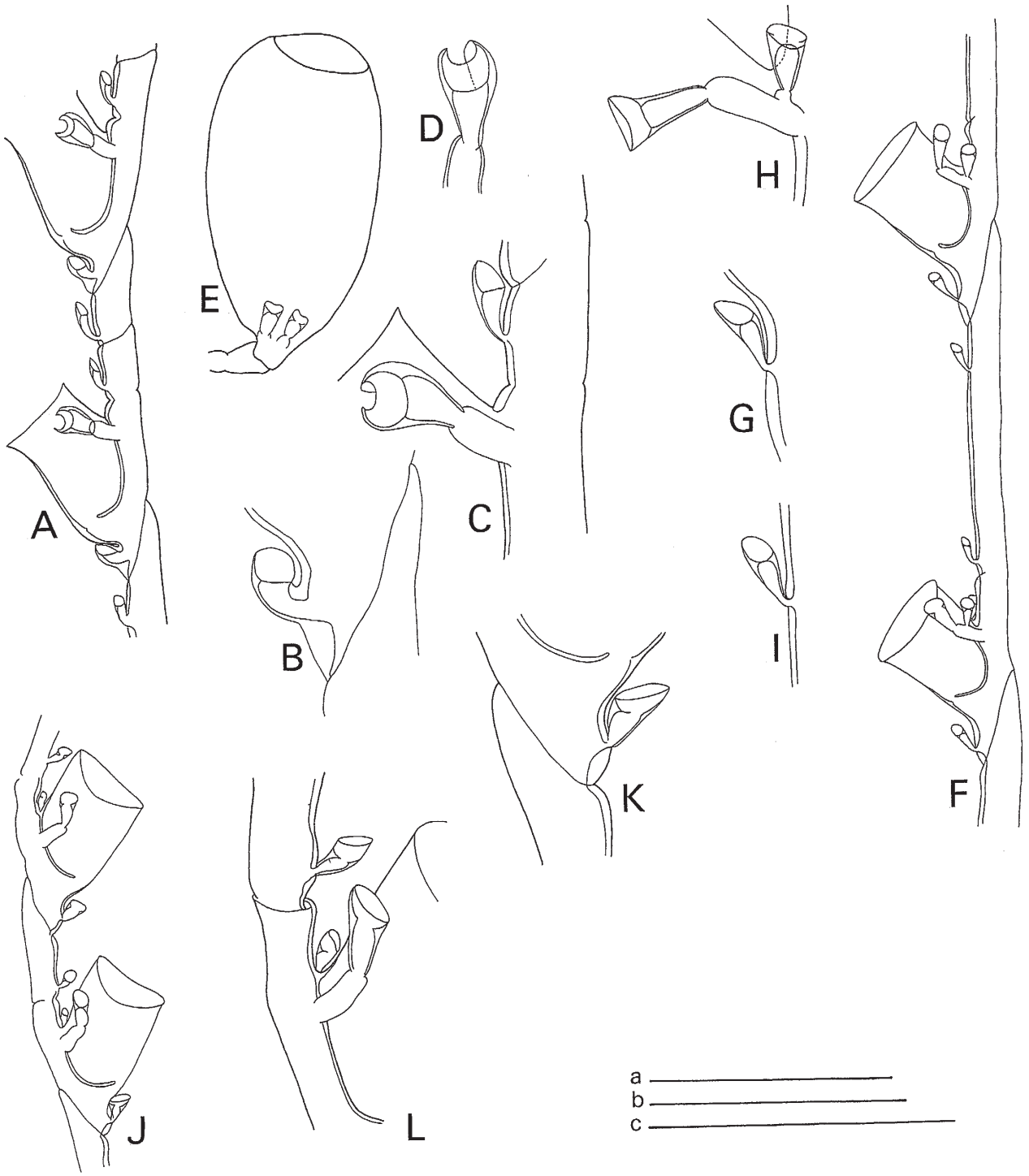

Fig. 83. A–E. ***Antennella kiwiana*** Schuchert, 1997. **A**, part of stem. **B**, median inferior nematotheca. **C**, one of lateral nematothecae and median nematotheca of athecate internode (BS 838, slide 3404). **D**, one of lateral nematothecae. **E**, female gonotheca (NZOI Stn F82, slide 2850). **F–I.** ***Antennella quadriaurita*** Ritchie, 1909. **F**, part of stem. **G**, median inferior nematotheca. **H**, lateral nematothecae from one side of hydrotheca. **I**, median nematotheca from athecate internode (BS 697, slide 3363). **J–L.** ***Antennella secundaria*** (Gmelin, 1791). **J**, part of stem. **K**, median inferior nematotheca. **L**, one of lateral nematothecae, axillary nematotheca and median nematotheca of athecate internode (BS 519, slide 3487). All figures represent lateral views. Scales: a, 0.2 mm (B–D, G–I, K, L); b, 0.5 mm (A, F, J); c, 2 mm (E). W.V.

and distinct; wall of internode below nematothecae strongly sclerotised. Nematothecae of lateral pair slightly longer than apophyses, not reaching hydrothecal rim, 'spanner'-shaped, terminal part rounded; adcauline wall deeply scooped, abcauline wall with deep, rounded incision, diaphragm concave, distinct. No axillary nematotheca. Frontal nematothecae of athecate internodes and basal part stem bithalamic, movable, slightly curved, with deeply scooped adcauline wall and distinct diaphragm.

Hydrotheca big, cylindrical, proximal part of abcauline wall rounded, with fairly thick perisarc; rim circular, perpendicular to hydrothecal length axis, slightly everted.

Only 1 female gonothecae in good condition; large, elongated ovoid, narrowing basally into short pedicel of 2 small internodes, attaching gonotheca to lateral part of stem just below hydrothecal base; top of gonotheca flattened. 2 movable nematothecae are attached to narrowed, basal part of gonotheca.

MEASUREMENTS of *Antennella kiwiana* (in μm):

	Holotype (Schuchert 1997)	BS 838 slide 3404
Thecate internode, length	390 – 310	420 – 450
Athecate internode, length	350 – 400	280 – 335
Diameter at node	100 – 140	73 – 95
Hydrotheca, length abcauline wall	270 – 290	270 – 295
Length free adcauline wall	130 – 150	130 – 140
Diameter at rim	170 – 200	195 – 210
Lateral nematotheca, length apophysis		50 – 56
Length nematotheca		95 – 100
Female gonotheca, total length	1120 – 1200	1280*
Maximum diameter		655*

* NZIO Stn F82, slide 2850

REMARKS: Easily recognised by a combination of characters, viz., the big, cylindrical hydrotheca with rounded base and slightly everted rim, the firmly attached, deeply scooped median inferior nematotheca and the highly distinctive 'spanner'-shaped lateral nematothecae that do not surpass the hydrothecal rim. There is no axillary nematotheca and one nematotheca on the athecate internodes. Some of the present colonies have much longer stems than those described by Schuchert (30 mm cf. 20 mm); the number of hydrothecae in the longest stems is 38–40 mm.

RECORDS FROM NEW ZEALAND: Originally described from Echinoderm Reef near Leigh Marine Biological Station. Additional material from Ranfurly Bank off East Cape, from Doubtless Bay, from off Moeraki on the southeast coast of South Island and from three Southwest Pacific localities, one off South Island near the Chatham Rise and two on the Campbell Plateau. Depth records varying between 34 and 366 m. Schuchert's Leigh specimens had male and female gonothecae in August; the only ripe gonotheca in the present material occurred in January.

DISTRIBUTION: So far exclusively recorded from New Zealand waters.

Antennella quadriaurita Ritchie, 1909a (Fig. 83F–I)

Antenella quadriaurita Ritchie 1909a: 66, 68, 90, 92–93, fig. 9; 1913a: 7; Leloup 1932: 162, pl. 16, fig. 2.
Antennella quadriaurita: Bedot 1917a: 123; Stechow 1919: 113; Bedot 1921b: 5; 1923: 216, fig. 2; Fraser 1944a: 316–317, pl. 66, fig. 301; 1944b: 40; Deevey 1954: 271; Rees & Thursfield 1965: 157, 195; Millard 1966b: 492; Vervoort 1968: 107; Berrisford 1969: 394; Smaldon *et al.* 1976: 21; Millard 1977: 107, 123, fig. 8; 1978: 188; 1980: 132; Cairns *et al.* 1991: 27; Calder 1997: 27–29, fig. 6; Schuchert 1997: 29–32, fig. 9.
Antenella quadriaurata: Bouillon *et al.* 1995: 48 (incorrect subsequent spelling).
Halopteris quadriaurita: Stepan'yants 1979: 124, pl. 23, fig. 2A–G.
Antenella quadriaurita f. *africana* Broch 1914: 26.
Antennella quadriaurita f. *africana*: Bedot 1917a: 124; 1921b: 5.
Antenella africana f. *africana*: Buchanan 1957: 367.
Antenella quadriaurata f. *africana*: Bouillon *et al.* 1995: 48 (incorrect subsequent spelling).
Antennella africana: Eyre 1939: 303; Millard 1957: 226; Ralph 1961b: 23–25, fig. 1a-c, f-g, k; Millard 1962: 274; Day *et al.* 1970: 13; Millard 1968: 254, 273; Rho & Chang 1972: 100; Millard 1973: 30; Rho & Chang 1974: 146; Millard 1975: 331, fig. 107A–E; Gordon & Ballantine 1977: 100; Rho 1977: 273, 423, pl. 89, fig. 88; Rho & Park 1986: 91; Dawson 1992: 16; Park 1992: 294.
Antenella africana: Stechow 1923a: 13; 1923c: 111; 1923d: 223; Rho 1967: 4–5, fig. 4A, B; 1969: 165.
Antennella serrata Totton 1930: 212, fig. 53; Ralph 1961b: 25.
Antennella variabilis Fraser 1936: 52, pl. 2, fig. 6; Arai, 1977: 28 (location of holotype).
Antenella variabilis: Yamada, 1959: 77.
[Not *Schizotricha variabilis* (Bonnevie, 1899)].

MATERIAL EXAMINED:

NZOI Stn C924, *Antennella* cf. *quadriaurita* Ritchie, 1909 (J.E. Watson). [Slide 4191 JEW Colln, as *Corhiza*].

NMNZ: BS 697, 4 stems up to 12 mm high on bryozoan fragment; no gonothecae. RMNH-Coel. 27663, slide 3363.

TYPE LOCALITY: *Antennella quadriaurita*: Gough Island, South Atlantic, 183 m (Ritchie 1909a). *Antenella quadriaurita* var. *africana*: tropical West Africa; two localities mentioned, no distinct type locality indicated (Broch 1914); *Antennella serrata*: *Terra Nova* Stn 90, off Three Kings Islands, 183 m, and Stn 144, off Cape Maria van Diemen, 64-73 m (Totton, 1930); no holotype designated, the first locality is here considered to represent the type locality.

DESCRIPTION (of BS 697 material): 12 mm high stems arising from tortuous, tubiform stolon; stem composed of basal part and 10–12 thecate and athecate internodes. Basal part with some transverse nodes and terminal, oblique hinge-joint, separating basal part from first thecate internode. Remainder of stem a succession of thecate and athecate internodes separated by alternately oblique and transverse nodes, the latter immediately following hydrothecae and either poorly developed or completely absent. Thecate internode with large hydrotheca and 5 nematothecae: 1 median infracalycine and a pair on both sides of hydrotheca, 1 on a long apophysis and the second on base of apophysis almost in axil of hydrotheca. Median inferior nematothecae bithalamic and movable, cone-shaped with rim lowered on adcauline side; diaphragm distinct. Lateral nematotheca bithalamic, conical, movable with cup-shaped apical chamber and distinct diaphragm; one on an apophysis reaching halfway hydrotheca, apical chamber surpassing hydrothecal rim, the other short, without apophasis.

Hydrotheca fairly big, walls widening almost imperceptibly distally; rim smooth, even and circular, perpendicular to hydrothecal length axis; a trace of eversion.

Athecate internode long, occasionally completely fused with thecate internode, with 2 movable, bithalamic nematothecae, 1 almost proximal, the second a short distance from oblique terminal node, morphologically similar to mesial infracalycine nematotheca.

Gonothecae absent.

MEASUREMENTS of *Antennella quadriaurita* (in μm):

	Combined measurements from Schuchert (1997)	NMNZ BS 697, near White Island
Combined length thecate and athecate internodes	300 – 680	1150 – 1300
Hydrotheca, length abcauline side	160 – 360	200 – 210
Length free adcauline side	110 – 220	125 – 140
Diameter at rim	230 – 370	225 – 250

REMARKS: From Schu-chert's (1997) description and synonymy *Antennella quadriaurita* appears to be a polymorphic species, variable in length of internodes and morphology of the nematothecae, particularly the lateral pairs. The lateral nematothecae in the small sample from near White Island are all conical with a little reduced, cup-shaped apical chamber; no nematothecae of the 'spanner' type were observed. Development of the nodes in this material is varied: a stem may possess only a few oblique nodes and some irregularly distributed transverse nodes. The length of the internodes greatly exceeds that recorded by Schuchert.

RECORDS FROM NEW ZEALAND: Previously recorded from New Zealand by Totton (1930) and Ralph (1961) as *Antennella serrata* and *A. africana*: off Three Kings Islands; off Cape Maria van Diemen, from submarine cable in Doubtless Bay, and Tamaki Strait, Auckland, depth varying between 18 and 183 m. Ralph's (1961b) records off Moeraki are of *Antennella kiwiana* Schuchert, 1997 and *Corhiza scotiae* (Ritchie, 1907) shown by inspection of her material. The material in NMNZ originates from near White Island, about 37°25′ S, 177°11′ E, 318–288 m. There is also a doubtful specimen from Pelorus Sound, Cook Strait in the NIWA collection.

DISTRIBUTION: Bermuda; Cuba; Tristan da Cunha; tropical West Africa; Vema Seamount; South Africa; India; New Zealand; Japan and Korea (Schuchert 1997).

Antennella secundaria (Gmelin, 1791) (Fig. 83J–L)

[Restricted synonymy, mainly Indo-Pacific records}

Sertularia secundaria Gmelin 1791: 3854.

Antennella secundaria: Rees & Vervoort 1987: 113–117, fig. 23a, b; Yamada & Kubota 1987: 40; Gili *et al.* 1989: 83, fig. 11A; Altuna & García Carrascosa 1990: 55 *et seq*., fig.; Cornelius & Ryland 1990: 152, fig. 4.21; Park 1990: 84; Cairns *et al*. 1991: 27; Castric-Fey 1991: 523; Ryland & Gibbons 1991: 525–527, fig. 1; Antsulevich 1992: 215; Cornelius 1992a: 257; 1992b: 82 *et seq*.; Park 1992: 294; Ramil & Vervoort 1992: 143–145, fig. 37a-d; Boero & Bouillon 1993: 263; Calder 1993: 68 *et seq*.; Altuna Prados 1994: 54; Watson 1994a: 67; Álvarez-Claudio & Anadón 1995: 239; Cornelius 1995b: 121–124, fig. 28; Hirohito 1995 (English text): 236–238, fig. 79a-c; Park 1995: 15; Calder 1977; 29–32, fig. 7; Schuchert 1997 14–18, figs 3–4; Watson 2000: 45–46, fig. 34A–D.

Antenella secondaria: Bakus *et al*. 1994: 176 (incorrect subsequent spelling).

Antenella secundaria: Bouillon *et al*. 1995: 48.

Halopteris secundaria: Antsulevich 1983: 1145, fig. 1v; 1987: 117, fig. 34.

Antennella gracilis Allman 1877: 38, pl. 22, figs 6–7; Nutting 1900: 77, pl. 13, fig. 5; Stechow 1909: 85; 1913b: 9; Bedot 1917a: 125; 1921: 4; Hargitt 1924: 500; Fraser, 1938b: 10, 58; 1938d: 135; 1939c: 161 *et seq*.; 1944a: 315–316, pl. 66, fig. 300; 1947: 12; 1948: 263; Deevey 1954: 271; Rees & Thursfield 1965: 157; Vervoort 1968: 107; Bandel & Wedler 1987: 38; Cairns *et al*. 1991: 27.

Antenella gracilis: Fraser 1944b: 40.

Antennella dubiaformis Mulder & Trebilcock 1911: 119, pl. 2, fig. 7; Bedot 1917a: 124.

Antennella secundaria f. *dubiaformis*: Watson 1973: 183, figs 45, 46.

Antennella paucinoda Fraser 1935: 110, pl. 2, fig. 10; Arai 1977: 28 (location of holotype); Peden & Green 1982: 158; Hirohito 1995 (English text): 235, fig. 78d-g.

Antenella paucinoda: Yamada 1959: 77.

MATERIAL EXAMINED:

NZOI Stns: C617, 2 tufts about 8 mm high on basal part of *Corhiza scotiae* (Ritchie, 1907); no gonothecae. RMNH-Coel. slide 2804.

NMNZ: BS 519, many small colonies on various hydroids. Length of the unbranched hydrocladia (stems) 8–10 mm; no gonothecae. NMNZ Co. 809; RMNH-Coel. slide 3487.

NMNZ Ralph Collection: Loc. 188, NMNZ Co. 1043, fragmentary colonies, with a stem of *Antennella kiwiana* Schuchert, 1997 in RMNH-Coel. slide 3709, from tube labelled *Halopteris campanula*.

TYPE LOCALITY: *Antennella secundaria*: Naples, Mediterranean Sea (Gmelin 1791); *Antennella gracilis*: off Carysfort Reef, Florida, 6110 m, (Allman 1877, holotype in MCZ); *Antennella dubiaformis*: Queenscliff, Breamcreek and Torquay (Mulder & Trebilcock 1911); no distinct type locality indicated and holotype probably lost (Stranks 1993); *Antennella paucinoda*: off shore near Hayama, Sagami Bay (Fraser 1935a); holotype in BCPM (Arai 19770).

DESCRIPTION (of specimen from BS 519): Stems 8–10 mm high, arising from tubular stolon attached between other hydroids on fragment of alga; stem composed of athecate basal part and thecate distal parts with 8–10 hydrothecae. Basal part only slightly shorter than thecate part, with a few transverse nodes and some frontal nemato-thecae, separated from first internode of thecate part by oblique hinge joint. Thecate part a regular succession of thecate and athecate internode separated by oblique and transverse, poorly developed nodes; thecate internode proximally with oblique, distally with transverse node. Thecate internodes with big hydrotheca with cylindrical or slightly widening walls and 4 nematothecae: 1 median inferior below hydrotheca, 2 lateral nematothecae on distinct apophyses and a reduced bithalamic axillary nematotheca. Median nematotheca movable, bithalamic, upper chamber cut off obliquely, not scooped, diaphragm distinct. Lateral nematothecae in present specimen same length as apophyses, not reaching hydrothecal rim; upper chamber cut off obliquely, walls not scooped. Axillary nematotheca small, with deeply scooped abcauline wall; diaphragm usually difficult to observe although present in all specimens inspected. Athecate internodes with 1 or more rarely with 2 movable nematothecae; morphology identical with that of median inferior nematotheca.

Walls of hydrotheca with thin perisarc, easily collapsed; rim not everted, lowered on both sides; abcauline wall of hydrotheca straight.

Gonothecae absent.

MEASSUREMENTS of *Antennella secundaria* (in μm):

	Combined measurements given by Schuchert (1997)	NMNZ BS 519 slide 3487
Thecate internode, length	260 – 760	335 – 380
Athecate internode, length	230 – 1280	225 – 270
Diameter at node	60 – 180	67 – 84
Hydrotheca, length abcauline wall	140 – 390	225 – 240
Length adcauline wall	90 – 180	170 – 185
Diameter at rim	150 – 290	190 – 210
Lateral nematotheca, length apophysis		78 – 95
Length nematotheca		78 – 100

REMARKS: The species is much more variable than appears from the above description of New Zealand colonies. For a discussion of variability and synonymy see Schuchert (1997: 14–18). The specimen from NZOI Stn C617 has two nematothecae on the athecate internodes and some nematothecae on the stolonal tubes. The axillar nematotheca is small and bithalamic.

RECORDS FROM NEW ZEALAND: Doubtless Bay; Pelorus Sound, Cook Strait; between Cape Jackson and Mana Island, Cook Strait Narrows, and Southwest Pacific near Chatham Islands. Not previously recorded from New Zealand though present in one of Ralph's samples.

DISTRIBUTION: Circumglobal with preference for temperate and warmer seas; typically in the sublittoral zone but occurring as deep as 1250 m (Schuchert 1997).

Antennellopsis Jäderholm, 1896

TYPE (AND SOLE) SPECIES: *Antennellopsis integerrima* Jäderholm, 1896.

Antennellopsis integerrima Jäderholm, 1896 (Fig. 84A–E)

Antennellopsis integerrima Jäderholm 1896: 16–17, pl. 2, figs 7–8; 1919: 20; Stechow 1923: 232; Rho & Chang 1972: 101, pl. 3, figs 10–11; Schuchert 1997: 136–137.
Antennellopsis Dofleini Stechow 1907: 196; 1909: 86–88, pl. 2, fig. 4, pl. 6, fig. 6.
Antennella integerrima: Stechow 1907: 196; 1909: 87; Bedot 1921b: 4; Rho 1974: 146; Rho & Park 1986: 91; Park 1992: 295; Hirohito 1995 (English text): 233-234, fig. 78a-c.

MATERIAL EXAMINED:
NZOI Stns: E841, 1 colony, 80 mm high, no gonothecae. RMNH-Coel. slide 2179; **E876**, top part of colony, hydrocladia 40 mm long; 2 gonothecae. RMNH-Coel. slide 2194.

TYPE LOCALITY: *Antennellopsis integerrima*: Strait Hirudo (Hirado, Nagasaki Prefecture, Kyushu, Japan, 33°05′ N, 129°16′ E (Jäderholm 1896); *Antennellopsis Dofleini*: Sagami Bay, Japan, 45 m (Stechow 1907, 1909) (first mentioned locality for this species).

DESCRIPTION: Stems (hydrocladia) unbranched, 35–40 mm long, inserted on short apophysis attached to tubular stolon without nematothecae; stolonal tubes forming a loose, intertwining and anastomosing mass; it has not the character of a rhizocaulomic stem or stem fragment. Basal part of stem composed of 1 or several athecate internodes with a row of frontal nematothecae, if several internodes are present these separated by transverse nodes, with exception of ultimate node which is always a steeply oblique hinge-joint, typically the only oblique node of the hydrocladium. Rest of hydrocladium undivided, with a frontal row of nematothecae and hydrothecae; 1 nematotheca between oblique node and first hydrotheca; 2 nematothecae between following pairs.

Hydrotheca cylindrical with rounded base; adcauline wall completely adnate; thick, curved upward at base and leaving a wide diaphragm open; abcauline wall shallowly sinuous, convex basally. Hydrothecal rim circular, smooth, slightly everted abcaudally. Each hydrotheca with a pair of lateral nematothecae, basally firmly attached to distal half of hydrothecal wall and consequently immovable, median nematothecae similarly attached. All nematothecae bithalamic; apical chamber of median nematothecae deeply scooped on adcauline side, and on inner side in lateral nematothecae. Basal chamber of median nematothecae firmly attached to internode, communication with interior of internode through wide opening in perisarc. Basal chamber of lateral nematothecae communicating with interior of hydrotheca; distal chamber not reaching hydrothecal rim.

Perisarc firm, particularly on internode; adcauline wall of hydrotheca moderately thick.

Several gonothecae present on lower parts of some hydrocladia, judging from their size, female. Gonothecal shape elongated saccate, rounded apically; no operculum, basally narrow, with 4 firmly attached bithalamic nematothecae with deeply scooped inner wall of apical chamber. Pedicel of gonothecae short, with 2 segments, inserted on side of internode just below base of hydrotheca.

MEASUREMENTS of *Antennellopsis integerrima* (in μm):

NZOI	Stn E841 slide 2179	Stn E876 slide 2194
Diameter of hydrocladium at first node	225 – 250	
Hydrotheca, length adnate adcauline wall	440 – 460	405 – 490
Length abcauline wall	450 – 480	410 – 475
Depth of hydrotheca	450 – 465	380 – 485
Diameter at rim	280 – 290	195 – 240
Distance between two successive hydrothecae, measured from base to base	950 – 985	835 – 900
Median nematotheca, length adcauline wall	55 – 85	56 – 67
Length abcauline wall	130 – 140	135 – 140
Diameter at rim	78 – 84	67 – 79
Lateral nematotheca, length	115 – 125	84 – 105
Diameter at rim	115 – 135	115 – 130
Female gonotheca, total length (exclusive pedicel)		1725
Maximum diameter		540
Diameter at apex		425

REMARKS: In the Japanese material described by Hirohito the lateral nematothecae have a distally narrowed apical chamber reaching the hydrothecal margin. In the New Zealand material the lateral nematothecae have a much wider apical chamber and are placed more proximally along the abcauline hydrothecal border.

DISTRIBUTION: So far only known from Japanese and South Korean waters; the New Zealand records mean a considerable southern extension of distribution.

RECORDS FROM NEW ZEALAND: Two localities in the vicinityof the Three Kings Islands, 34°–34.5° S, 172° E, 216–262 m depth; female gonothecae observed in March.

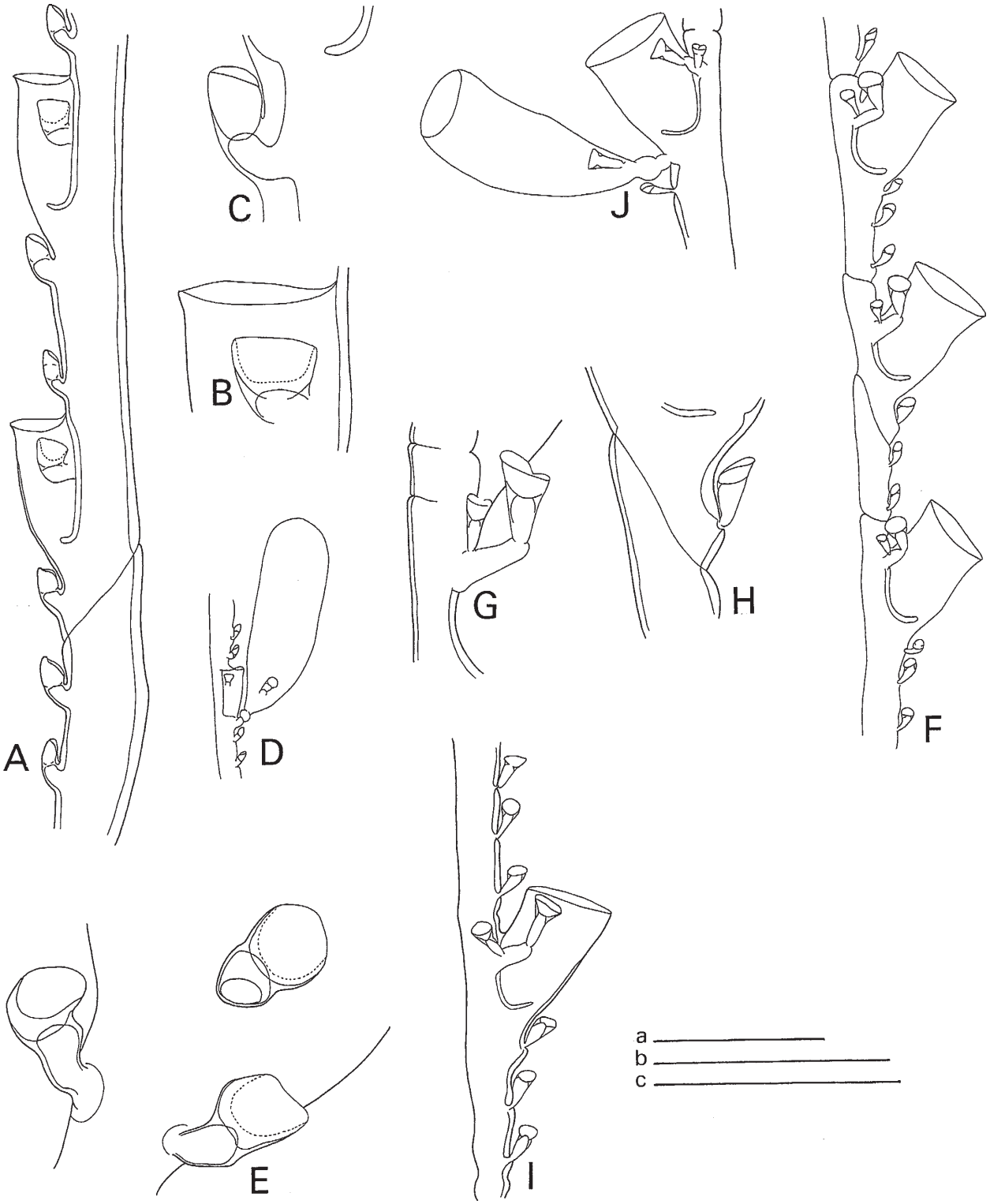

Fig. 84. A–E. ***Antennellopsis integerrima*** Jäderholm, 1896. **A**, part of stem. **B**, lateral hydrotheca. **C**, median inferior nematotheca. **D**, gonotheca. **E**, proximal part of gonotheca, showing arrangement of nematothecae (NZOI Stn E876, slide 2194). **F–J.** ***Corhiza scotiae*** (Ritchie, 1907). **F**, hydrocladium with distinct separation of internodes. **G**, lateral nematotheca from one side of hydrotheca. **H**, median inferior nematotheca (BS 398, slide 3372). **I**, hydrocladium with indistinctly developed nodes (NZOI Stn E849, slide 2187). **J**, gonotheca and its insertion under hydrotheca (BS 673, slide 3357). All figured represent lateral views. Scales: a, 1 mm (D): b, 0.2 mm (B, C, E, G, H); c, 0.5 mm (A, F, I, J). W.V.

Corhiza Millard, 1962

TYPE SPECIES: *Antennopsis scotiae* Ritchie, 1907a.

The following species of this genus have been considered.

Corhiza bellicosa Millard, 1962
Corhiza complexa (Nutting, 1905)
Corhiza fascicularis (Allman, 1883)
Corhiza pannosa Millard, 1962
Corhiza scotiae (Ritchie, 1907a)
Corhiza sociabilis Millard, 1980
Corhiza suensoni (Jäderholm, 1896)
Corhiza valdiviae (Stechow, 1923)

We agree with Schuchert (1997: 137) that the inclusion of *C. valdiviae*, with pinnately arranged hydrocladia, renders the taxon polyphyletic; it probably deserves separate generic rank.

Corhiza scotiae (Ritchie, 1907a) (Figs 84F–J; 85A, B)

Antennopsis scotiae Ritchie 1907a: 543–544, pl. 3, figs 3, 3A; 1913b: 7; Bedot 1921b: 34; Millard 1957: 235.
Corhiza scotiae: Millard 1962: 281, fig. 3C; 1968: 254, 276; Day *et al.* 1970: 13; Rees & Thursfield 1965: 156, 195; Millard 1970: 276; 1973: 30; 1975: 338–340, fig. 109A–E; Smaldon *et al.* 1976: 22; Millard 1978: 190; 1980: 132.
Antennella ritchiei Totton 1930: 211–212, fig. 52a-b; Ralph 1961b: 23, fig. 1d-e, h.
Antennella ritchei: Dawson 1992: 16 (incorrect subsequent spelling).

MATERIAL EXAMINED:

NZOI Stns: B482, single stem, about 80 mm; **C617**, many stems up to 100 mm high, no gonothecae. RMNH-Coel. slide 2802; **C926**, *Corhiza scotiae* (Ritchie, 1907) (J.E. Watson). [Slide 4190 JEW Colln]; **C929** (material dried, condition poor): *Corhiza scotiae* (J.E. Watson). [Slide 4192 JEW Colln]; **D90**, several stems 45–80 mm high, no gonothecae observed; **D138**, 2 stems about 50 mm high, attached to small stone; no gonothecae; **D144**, fragmented colonies, composed of about 10 stems. No gonothecae; **D871**, 2 colonies, composed of several stems, 60 mm, and another 150 mm high; some gonothecae. 2 RMNH-Coel. slides 2280; **D896**, 2 fragments, 40 mm high, with *Filellum serpens* (Hassall, 1848). RMNH-Coel. slide 2297; **D899**, 1 fragment, 50 mm high; **E821**, fragments of a large, broken colony with gonothecae. RMNH-Coel. slide 2172; **E849**, single, 20 mm high colony with gonothecae. RMNH-Coel. slide 2187; **E861**, 3 stems, about 80 mm high, with gonothecae. RMNH-Coel. slide 2188; **E864**, 3 fragmentary stems, about 40 mm, gonothecae present; **E866**, fragment of 20 mm length, no gonothecae, may belong here; **F78**, 55 mm long stem, nearly all hydrocladia damaged. In addition dried out sample, mainly composed of damaged stems; **F93**, dead colonies with few hydrocladia left, partly overgrown by algae and bryozoans; **I340**, fragment about 30 mm high, all in RMNH-Coel. slide 2139; **I341**, fragment of colony about 30 mm high, with polysiphonic stem from which hydrocladia spring irregularly. Gonothecae present. RMNH-Coel. slide 2140; **I371** (dried out sample), 1 polysiphonic stem fragment; hydrocladia about 4–5 mm long, with some gonothecae. RMNH-Coel. slide 2155; **J975**, fragments of an upright stem about 80 mm high; no gonothecae. RMNH-Coel. slide 2266; **N369**, 4 fragments of a large colony about 150 mm high, no gonothecae. 2 RMNH-Coel. slides 2215; **P7**, 4 fragments of about 80 mm high stem with many small (male?) gonothecae. RMNH-Coel. slide 2223; **Q25**, some fragments 10–15 mm high in poor condition; top parts of colonies. RMNH-Coel. slide 2319; **W257**, 4 regenerating stems, about 40 mm high. RMNH-Coel. slide 2939.

NMNZ: BS 398, 3 bunches each composed of basally branched stem up to 60 mm high with many hydrocladia. No gonothecae observed. NMNZ Co. 724; RMNH-Coel. 27672, slide 3372. Also single, rather mutilated colony, about 100 mm high, covered with bryozoans; no gonothecae. NMNZ Co. 604; **BS 399**, single stem, 110 mm high, no gonothecae; **BS 480**, about 10 stems up to 100 mm high, partly abraded. No gonothecae observed. NMNZ Co. 419; **BS 482**, 3 colonies 50 mm high on pebble; no gonothecae. NMNZ Co. 863; **BS 630**, 40 mm high fragment with gonothecae. In addition several complete colonies up to 120 mm high. NMNZ Co. 424, 2 RMNH-Coel. slides 2960; **BS 673**, 2 stems up to 160 mm high on worm tube, many male gonothecae. NMNZ Co. 731. Fragment RMNH-Coel. 27657, slide 3357; **BS 678**, 3 colonies about 100 mm high and some fragmentary stems; no gonothecae. NMNZ Co. 823, 2 RMNH-Coel. slides 3500; **BS 679**, 3 stems about 80 mm high, in poor condition and covered by bryozoans. Some empty gonothecae present. NMNZ Co. 847; **BS 742**, 3 stems about 80 mm high, only 1 in good condition. No gonothecae. NMNZ Co. 740. Fragment as RMNH-Coel. 27702, slide 3402; **BS 769**, 2 stems about 170 mm high, covered with bryozoans; no gonothecae. NMNZ Co. 831. In addition many basally branched stems up to 100 mm high intimately associated with *Lytocarpia vulgaris* sp. nov., male gonothecae present. NMNZ Co. 868; RMNH-Coel. slide 3527; **BS 834**, 6 stems up to 120 mm high; no gonothecae. NMNZ Co. 750; RMNH-Coel. 27689, slide 3389; **BS 840**, 2 stems about 40 mm high, basal portion fused with that of *Salacia bicalycula spiralis* (Trebilcock, 1928). NMNZ Co. 771. Also 2 mutilated stems about 100 mm high. NMNZ Co. 398; RMNH-Coel. 27716, slides 3416, 4422; **BS 882**, 1 stem about 50 mm high bearing a few damaged hydrocladia; no gonothecae. NMNZ Co. 778; 2 RMNH-Coel. slides 3328.

NMNZ Ralph Collection: Loc. 57, NMNZ Co. 916: 3 fragments of a larger colony; no gonothecae. RMNH-Coel. slide 3613. 3 good Canada Balsam slides as *Antennella ritchiei*, no data.

TYPE LOCALITY: *Corhiza scotiae*: Entrance to Saldanha Bay, Cape Province, South Africa, 46 m (Ritchie 1907a), lectotype (1921.143.1373) and paratypes in Royal Scottish Museum, Edinburgh (see Rees & Thursfield, 1965: 156–157 for numbers); also paratypes in NHM (1964.8.7.189-190). *Antennella ritchiei*: off Three Kings Islands, Terra Nova Stn 91, 549 m (Totton, 1930).

DESCRIPTION: Stem composed of bundle of adhering, parallel tubes with interconnections, reaching a length of about 200 mm and a diameter of about 2 mm,

running basally into stolonal tubes that attach colony to firm substrate; arrangement of tubes more irregular in upper, growing part of colony. Stems frequently branched in lower parts of colony; branches running upwards, parallel to main stem. Hydrocladia arising from tubes of stem in all directions, but always directed obliquely upwards, in well developed colonies as long as 15 mm, inserted on short apophysis of tube from which separated by transverse node. Basal part of hydrocladium composed of varying number of athecate internodes separated by transverse nodes and with greatly varying number of nematothecae on upper surface. Last athecate internode proximally transverse, distally with steeply oblique hinge-like node; rest of hydrocladium composed of thecate and athecate internodes; thecate internodes basally with steeply oblique, distally with transverse node. Thecate nodes with hydrotheca and 5 nematothecae of which 1 median inferior and 2 pairs of laterals beside hydrotheca. Athecate internodes with 1, 2, or more nematothecae; all nematothecae of athecate internodes and median inferior nematotheca of thecate internode in single row on upper surface. All nematothecae in median plane movable, bithalamic, more or less inverted conical with slightly curved base and deeply scooped adcauline wall; diaphragm distinct.

First pair of lateral nematothecae on big apophyses halfway along adcauline hydrothecal wall and reaching middle of hydrotheca, each carrying a slender, conical, bithalamic nematotheca, reaching or surpassing hydrothecal rim and with slightly scooped inner wall. Base of apophyses with second pair of laterals, smaller than first pair, but also bithalamic and with deeply scooped inner wall. No axillar nematotheca.

Hydrotheca big, deep cup-shaped to nearly cylindrical, length of free adcauline wall slightly less than adnate wall; abcauline wall straight to slightly bulging proximally. Hydrothecal rim smooth, circular, perpendicular to hydrothecal length axis, making an angle of about 75° with length axis of internode, occasionally with minor constriction some distance under rim and slightly everted. Base of hydrotheca firm, rounded to steeply curved, with distinct frontal diaphragm.

Perisarc of internodes well developed, frontal (abcauline) wall of hydrothecal fairly thick.

Male gonothecae occurring in profusion in some colonies, saccate, about twice as long as hydrotheca, curving and narrowing at their base and attached by means of short, 2-jointed pedicel to side of internode just under hydrothecal base. Base of gonotheca with a pair of bithalamic nematothecae, comparable to biggest pair of lateral nematothecae. Apex of gonotheca truncated, opening by means of circular operculum. Ripe gonophore a globular mass of spermatocytes.

MEASUREMENTS of *Corhiza scotiae* (in μm):

NMNZ	BS 398 slide 3372	BS 882 slide 3328
Length of normally developed thecate internode	375 – 390	590 – 645
Length of normally developed athecate internode	280 – 365	475 – 530
Diameter at node	73 – 78	125 – 130
Hydrotheca, length free adcauline wall	135 – 145	67 – 80
Length abcauline wall	185 – 195	200 – 210
Total depth	225 – 235	215 – 225
Diameter at rim	185 – 195	175 – 190
Median nematotheca, length	67 – 78	78 – 95
Diameter at rim	34 – 45	61 – 73
First pair lateral nematothecae, length	84 – 95	130 – 140
Diameter at rim	45 – 56	61 – 78
Second pair lateral nematothecae, length	45 – 56	78 – 84
Diameter at rim	28 – 34	62 – 72
Apophysis, length	82 – 85	100 – 115
Male gonotheca, total length (incl. pedicel)*	530 – 590	
Maximum diameter*	275 – 280	
Diameter at apex*	210 – 235	

* taken from BS 673, slide 3357

REMARKS: Structure of hydrocladia in individual colonies as well as in colonies from various localities greatly varied in the number of basal, athecate internodes and the number of nematothecae, as well as the rest of the hydrocladium, where straight as well as oblique nodes tend to disappear almost completely, resulting in thecate internodes with a varied number of hydrothecae and nematothecae per internode.

The material from NZOI Stn D871 and NMNZ BS 673 has long thecate and athecate internodes; oblique nodes are almost absent and the number of nematothecae on the athecate internodes is three or occasionally more. The thecate internodes of the colonies from BS 882 have long apophyses and long slender nematothecae at the apex of the apophyses, surpassing the hydrothecal rim; the second pair, inserting at the base of the apophyses, is also quite big and slender, being only slightly smaller than the apical pair.

In colonies from NZIO Stn E849 the hydrothecae are strictly cylindrical, rim not everted, lateral nematothecae slender, reaching hydrothecal rim; nodes practically absent from hydrocladia.

Totton (1930: 211) described the hydrocladia of *Antennella ritchiei* as springing "from a stem-like bundle of thirty hydrorhizal tubes 7 cm in length", the hydrocladia in structure agreeing with *Antennopsis scotiae*

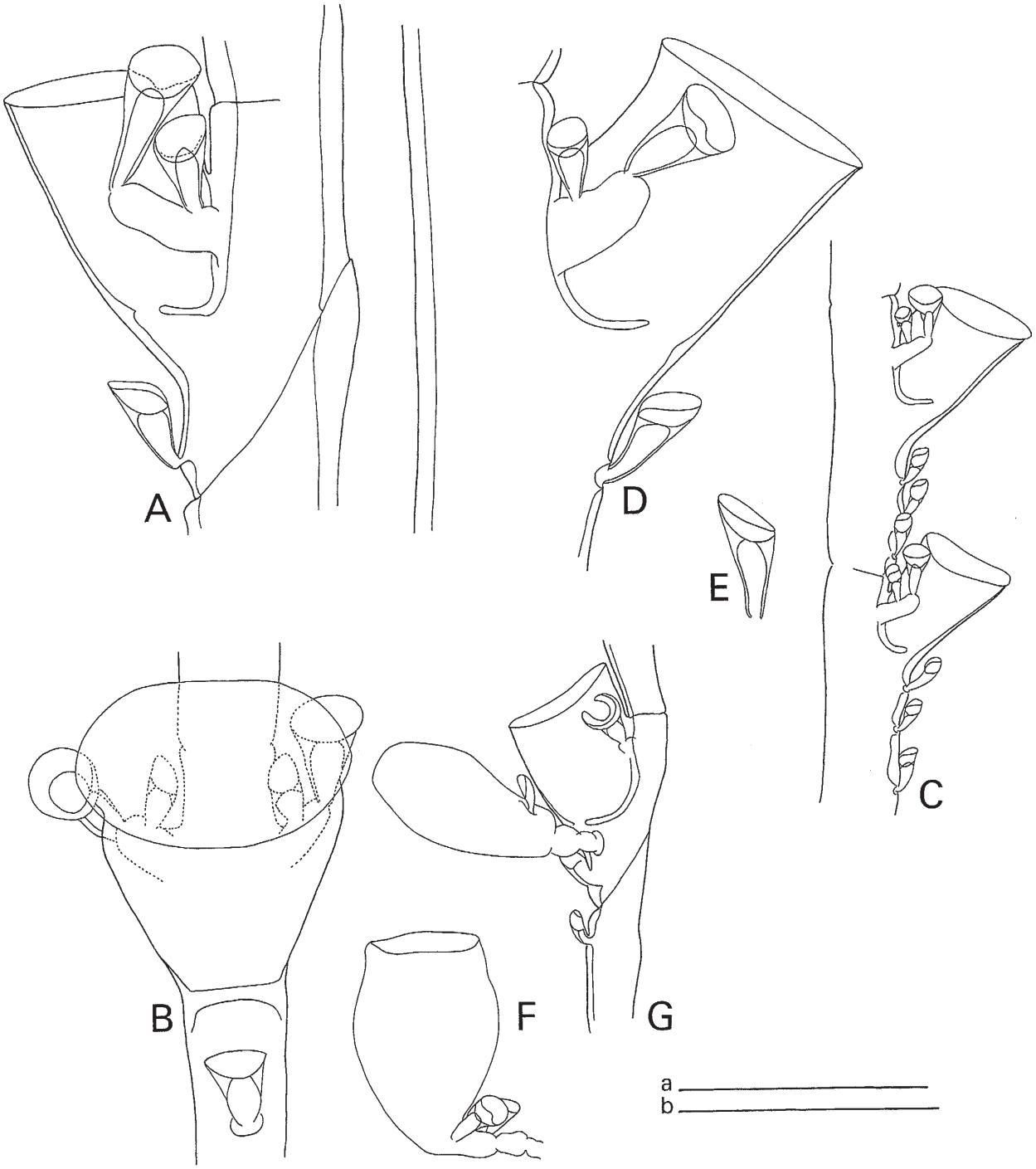

Fig. 85. A, B. ***Corhiza scotiae*** (Ritchie, 1907). **A**, hydrothecate internode, lateral view (BS 882, slide 3328). **B**, the same, frontal view (BS 678, slide 3500). **C–F.** ***Corhiza splendens*** sp. nov. **C**, part of hydrocladium, lateral view. **D**, hydrothecate internode, lateral view. **E**, median inferior nematotheca, lateral view. **F**, gonotheca, lateral view (BS 905, holotype, slide 4772). **G.** ***Halopteris campanula*** (Busk, 1852). Hydrothecate internode bearing male gonotheca (NMNZ, Chatham Island Exped., Stn 37, slide 4419). Scales: a, 0.2 mm (A, B, D, E); b, 0.5 mm (C, F, G). W.V.

Ritchie, 1907 [now *Corhiza scotiae* (Ritchie, 1907)]. This convincingly demonstrates that the two are conspecific. *Antennella ritchiei* has therefore been removed from the synonymy of *Antennella quadriaurita* Ritchie, 1907, where it was placed by Stepan'yants (1979) and Schuchert (1997). We see no reasons to separate the New Zealand material from the well described South African material with which it agrees in all morphological characteristics.

Records from New Zealand: Distributed over deeper water all around New Zealand, from 32.5° to 48.5° S and 166° E to 175.5° W, including both Tasman Sea and southern Pacific localities around the Three Kings Islands and records from the banks off East Cape, from the Chatham Rise and from the Stewart Island region. Depth records range from 91 m down to 668 m; gonothecae present in January, March, October, and November.

Distribution: Considered endemic for South African waters by Millard (1975); found to occur plentifully in waters around New Zealand.

Corhiza splendens sp. nov. (Fig. 85C–F)

Material Examined:

NMNZ: BS 905, about 10 stems, 150–200 mm high, hydrocladia, except for higher parts, directed in 2 opposite directions making colony feather-like (holotype, NMNZ Co. 690. 1 specimen 170 mm high (RMNH-Coel. 29127) and 3 slides (RMNH-Coel. 4772) are part of type series.

Type Locality: King Bank, northeast of Three Kings Islands, 33°57.4′ S, 172°19.4′ E, 128–123 m.

Description (of holotype): Colony upright with thick, unbranched stem, about 5 mm wide at base and gradually narrowing apically, composed of largely parallel and anastomosing stolonal fibres that give rise to numerous about 25 mm long hydrocladia inserted on short apophyses. Hydrocladia curve laterally to both sides, resulting in feather-shaped colony with closely packed, gracefully outwardly curved, long hydrocladia. Basal part of hydrocladium composed of 1–5 athecate internodes with variable number of nematothecae along upper surface; last athecate internode with steeply oblique hinge-like node separating it from first thecate internode; remainder of hydrocladium with indistinct transverse nodes and an occasional oblique node; transverse nodes a perisarc constriction on upper surface of hydrocladium. Thecate internodes with a big hydrotheca and 3 median inferior nematothecae on upper surface; 2 pairs of lateral nematothecae beside hydrotheca; all nematothecae bithalamic and movable. Median inferior nematothecae with deeply scooped adcauline rim; upper median nematotheca not reaching hydrothecal base. First pair of lateral nematothecae at end of big apophyses inserting halfway along fused portion adcauline hydrothecal wall; rim cut off obliquely, uneven, just reaching hydrothecal rim. Second pair of laterals inserted near base of apophyses, smaller and shorter than first pair; rim oblique, even. No axillar nematotheca.

Hydrotheca big, cylindrical, slightly widening apically, rim smooth, circular, not everted. Fused adcauline wall as long as free wall, smoothly curved proximally towards hydrothecal base; diaphragm near moderately thickened, abcauline wall of hydrotheca.

Male gonothecae profuse along upper surface of hydrocladia. Gonotheca about twice as long as hydrotheca, ovoid with truncated apex and opening by a circular operculum. Base of gonotheca narrowed and curving laterally, attached to side of internode just under hydrothecal floor by a short pedicel composed of 2 short internodes. A large bithalamic nematotheca on each side of narrow part of gonotheca.

Measurements of *Corhiza splendens* sp. nov. (in mm):

	NMNZ BS 905 slide 4772
Length of normally developed thecate internode	590 – 615
Diameter at node	125 – 135
Hydrotheca, length free adcauline wall	110 – 125
Length abcauline wall	250 – 260
Total depth	270 – 280
Diameter at rim	235 – 250
Median nematotheca, length	95 – 100
Diameter at rim	45 – 56
First pair lateral nematothecae, length	100 – 115
Diameter at rim	67 – 78
Second pair lateral nematothecae, length	84 – 90
Diameter at rim	50 – 56
Apophysis, length	90 – 100
Male gonotheca, total length (exclusive pedicel)	530 – 615
Maximum diameter	335 – 405
Diameter at apex	250 – 280

Remarks: Principally characterised by the feathery colony, the long hydrocladia and the absence of supplementary oblique hydrocladial nodes. There are additional characters in the length of the free adcauline hydrothecal border and shape of the hydrotheca.

These characters are, however, variable in *Corhiza scotiae* (Ritchie, 1907a) and as we have seen specimens of *Corhiza splendens* sp. nov. from only a single locality they may also demonstrate the same variability.

RECORDS FROM NEW ZEALAND: King Bank, northeast of Three Kings Islands, depth 128-123 m, ripe male gonothecae occurring in February.

DISTRIBUTION: Known only from the type locality in New Zealand waters.

ETYMOLOGY: The specific name has been taken from the Latin adjective *splendens* meaning beautiful, referring to the shape of the colony.

Halopteris Allman, 1877

TYPE SPECIES: *Halopteris carinata* Allman, 1877.

The genus has recently been revised by Schuchert (1997) who recognised the following species:

Halopteris alternata (Nutting, 1900)
Halopteris billardi (Vannucci, 1951a)
Halopteris buskii (Bale, 1884)
Halopteris campanula (Busk, 1852)
Halopteris carinata Allman, 1877
Halopteris catharina (Johnston, 1833)
Halopteris concava (Billard, 1911)
Halopteris crassa (Billard, 1911)
Halopteris diaphana (Heller, 1868)
Halopteris diaphragmata (Billard, 1911)
Halopteris everta (Mulder & Trebilcock, 1909)
Halopteris gemellipara Millard, 1962
Halopteris geminata Allman, 1877)
Halopteris glutinosa (Lamouroux, 1816)
Halopteris gracilis (Clarke, 1879)
Halopteris infundibulum Vervoort, 1966
Halopteris jedani (Billard, 1913)
Halopteris liechtensterni (Marktanner-Turneretscher, 1890)
Halopteris minuta (Trebilcock, 1928)
Halopteris opposita (Mulder & Trebilcock, 1911)
Halopteris peculiaris (Billard, 1913)
Halopteris plagyocampa (Pictet, 1893)
Halopteris platygonotheca Schuchert, 1997
Halopteris polymorpha (Billard, 1913)
Halopteris pseudoconstricta (Millard, 1975)
Halopteris regressa (Billard, 1918)
Halopteris rostrata Millard, 1975
Halopteris tenella (Verrill, 1873)
Halopteris tuba (Kirchenpauer, 1876)
Halopteris zygocladia (Bale, 1914)

For a discussion and for the synonymy of these species we refer to Schuchert's 1997 paper.

Halopteris campanula (Busk, 1852) (Figs 85G; 86A–E)

Plumularia campanula Busk 1852: 401; Bale 1884: 124, pl. 10, fig. 5; 1887: 22; 1888: 776, pl. 20, figs 1–6; Marktanner-Turneretscher 1890: 255; Bartlett 1907: 42; Bale 1913: 133; Billard 1913: 17–18, pl. 1, figs 11–13 (*cum syn.*); Bale 1915: 295; Jäderholm 1919: 22, pl. 5, fig. 4; Hodgson 1950: 40, fig. 69; Stechow 1921d: 260; 1923a: 15; 1923b: 18; 1923d: 233; Yamada 1959: 82; Hirohito 1969: 25; 1974: 33, fig. 15.
Schizotricha campanula: Bedot 1921b: 12; Blackburn 1942: 107; Mammen 1967: 303.
Thecocaulus campanula: Billard 1933: 22; Dollfus 1933: 129.
Halopteris campanula: Pennycuik 1959: 156, 177; Schmidt 1972a: 43; Hirohito 1983: 61–62; Rees & Vervoort 1987: 124–129, fig. 26; Dawson 1992: 17; Watson 1994: 67; Bouillon *et al.* 1995: 49; Hirohito 1995 (English text): 246–248, fig. 83a-c; Schuchert 1997: 99–102.
Halopteris campanula var. *campanula* Ralph 1961b: 47; Watson 1973: 184; 1975: 170.
Halopteris campanula var. *geelongensis* Mulder & Trebilcock 1916: 76, pl. 11, figs 2–2c.
Schizotricha campanula var. *geelongensis*: Bedot 1921b: 12.
Halopteris campanula var. *zelandica* Totton 1930: 219, fig. 57; Ralph 1961d: 236.
Plumularia indivisa Bale 1882: 39, 46, pl. 15, fig. 1; Stranks, 1993: 11.
Plumularia laxa Allman 1883: 19-20, pl. 1, figs 5–6.
Plumularia rubra von Lendenfeld 1885a: 476–477, pl. 13, figs 11–12, pl. 14, fig. 15; Bale 1888: 778, pl. 20, figs 1–6.
Plumularia torresia von Lendenfeld 1885a: 477, pl. 13, figs 13–14, pl. 14, fig. 16.

MATERIAL EXAMINED:

NZOI Stns: B482, many stems up to 35 mm high. 2 RMNH-Coel. slides 313; **C344**, *Halopteris campanula* (Busk, 1852) (J.E. Watson). [Slide 4221 JEW Colln]; **D896**, several colonies to 80 mm high composed of basally adnate stems bearing occasionally branched hydrocladia; male gonothecae present. RMNH-Coel. 29129, slide 2295; **G695**, about 10 stems about 30 mm high on old hydroid stem, no gonothecae. RMNH-Coel. slide 2866; **O170**, *Halopteris campanula* (Busk, 1852) (J.E. Watson). [Slide 4218 JEW Colln].

NMNZ: BS 368, 3 bunches of stems up to 80 mm high with young gonothecae; **BS 379**, fair number of stems about 40 mm high detached from substratum; no gonothecae; **BS 389**, single forked colony, 30 mm high, with some gonothecae; **BS 392**, bunch of colonies about 40 mm high, party fused at base. No gonothecae observed; **BS 512**, unbranched colonies up to 30 mm high on various bryozoans and shells, no gonothecae. NMNZ Co. 848; RMNH-Coel. slide 3519; **BS 514**, fair number of up to 60 mm high stems, some fused at base, without gonothecae. NMNZ Co. 553; **BS 561**, large bunch of colonies up to 40 mm high on sponge. No gonothecae; **BS 769**, several small bunches of up to 40 mm high colonies on *Lytocarpia vulgaris* sp. nov.; many gonothecae. NMNZ Co. 870; RMNH-Coel. slide 3529; **BS 834**, fragment only, RMNH Coel. 27692, slide 3392. With *Synthecium subventricosum* Bale, 1914 and *Monotheca hyalina* (Bale, 1882); **BS 838**, bunch of colonies up to 45 mm high, basely fused. Many gonothecae. NMNZ Co. 445; 3 RMNH-Coel. slides 2966.

NMNZ Ralph Collection: Loc. 188, reasonable slide as *Halopteris campanula*; no data; **Loc. 191**, poor slide in RSC as *Halopteris campanula*; no data; **Loc. 571**, NMNZ Co. 1280, about 8 mm high top part and a few loose hydrocladia. No gonothecae. RMNH-Coel. slide 3958. Poor slide as *Halopteris campanula*, no data; **Loc. 613**, NMNZ Co. 1322, several colonies about 40 mm high, some detached basal parts with stems 0.8 mm thick, no gonothecae. RMNH-Coel. slide 4003; **Loc. 615**, NMNZ Co. 1324, rather mutilated colony about 70 mm high; stems confluent at the base. With *Plumularia setacea* (Linnaeus, 1758) and *Sertularia unguiculata* Busk, 1852. RMNH-Coel. slide 4005.

Ralph's Chatham Islands Expedition Collection: Stn 23, about 5 stems and some top parts, up to 25 mm high, no gonothecae. NMNZ Co. 1342; RMNH-Coel. slide 4412; **Stn 37**, several about 20 mm high stems on sponge, with *Sertularia tumida* Allman, 1877; no gonothecae. NMNZ Co. 1350; RMNH-Coel. slide 4419.

PMBS: Material Inspected: **Mu 66–48, Hyd 34**. This material does not entirely fits the description given by Ralph (1961): it is much larger, being about 50 mm high, with irregular division of hydrocladia, some being only composed of thecate internodes, others with some or many athecate intermediate nodes. Also many of the primary hydrocladia bear secondary ones. A few immature gonothecae present. **Mu 67–40, Hyd 11** (on card): This material is even more luxuriously developed than that described above. Basal parts of stems are weakly polysiphonic and partly confluent. Height up to about 60 mm; no gonothecae. Some of stems thickly covered by *Filellum serpens* (Hassall, 1848). RMNH-Coel. 27250, slide 2667.

Type Locality: *Plumularia campanula*: Bass Strait, Australia (Busk 1852); *Plumularia indivisa*: Williamstown (Port Phillip Bay, Victoria, Australia (Bale 1882); *Plumularia laxa*: *Challenger* Stn 163, 36°56′ S, 150°30′ E, off New South Wales coast, Australia (Allman 1883); *Plumularia rubra*: Port Jackson, New South Wales (von Lendenfeld 1884a); *Plumularia torresia*: Torres Strait (von Lendenfeld 1884a).

Description: Stem monosiphonic, erect, to 50 mm high, basally with some athecate internodes separated by transverse nodes and some irregularly twisted stolonal tubes; some nematothecae placed in straight line on front of internodes, last athecate internode separated from first thecate internode by oblique node. Remainder of stem composed of thecate internodes separated by oblique nodes, each internode with almost proximal hydrotheca, a pair of lateral nematothecae, an inferior median nematotheca and 1 or more superior nematothecae. Hydrocladia arise laterally beside hydrothecae on thecate stem internodes, 10–15 mm long, arrangement pinnate with exception of some of basal hydrocladia that may be opposed. First internode of hydrocladium with oblique distal node and some nematothecae on upper surface; occasionally an almost proximal transverse node present. Remainder of internode composed of thecate and athecate internodes in regular succession; thecate internodes with a proximal oblique and distal transverse node, latter may be indistinct to absent in proximal part of hydrocladium. Branching of hydrocladia present in some colonies, branches arising from internode beside hydrotheca.

Hydrothecae of stem and branches identical, fairly big, almost cylindrical, walls slightly narrowing towards hydrothecal base, adcauline and abcauline walls straight; slightly less than half of adcauline wall free. Rim circular, slightly deepened on adcauline side, not everted, perpendicular to hydrothecal length axis, angle with length axis of internode 45–50°; adcauline wall thickened, notably in basal part.

Lateral nematothecae of 'spanner' type, bithalamic, movable, close to hydrothecal axil on small apophysis, reaching halfway or slightly farther along free adcauline hydrothecal wall. Apical chamber globular, scooped on both sides, much more deeply on inner side; basal chamber small. Median inferior nematotheca strongly attached to internode; upper chamber deeply scooped on adcauline side. Other nematothecae on stem and hydrocladia smaller than median inferior ones and apparently movable, with apical chamber deeply scooped on adcauline side.

Male and female gonothecae occurring on same colony, male usually near base of colony. Female gonotheca laterally compressed and slightly curved, ovoid in outline with flattened top and oval operculum. Basal part narrowing to pedicel of 2 short internodes, inserted on internode on side of hydrothecal base; occasionally 2 gonothecae on same internode, 1 on each side of a hydrothecae. 2 big nematothecae with deeply scooped inner wall of upper chamber on basal front of gonothecae. Male gonothecae smaller than female, though of same general shape and with a single frontal nematotheca. Gonothecal nematothecae apparently immovable.

Remarks: We have followed Schuchert (1997) in not recognising *H. campanula* var. *geelongensis* Mulder & Trebilcock, 1916 and *H. campanula* var. *zelandica* Totton, 1930. These varieties are based on characters that in ours as well as Schuchert's material proved to be quite variable. Living material of this species is characterised by its bright yellow, deep-orange or brick-red colour. The colour normally fades in preserved colonies.

Records from New Zealand: Sparingly distributed in all New Zealand waters between about 34°–46° S, 166°–179° E and at the Chatham Islands. Depth range considerable, between 33 and 1280 m, but usually in the deeper part of the sub-littoral zone. Gonothecae present in January (plentifully), February, and March.

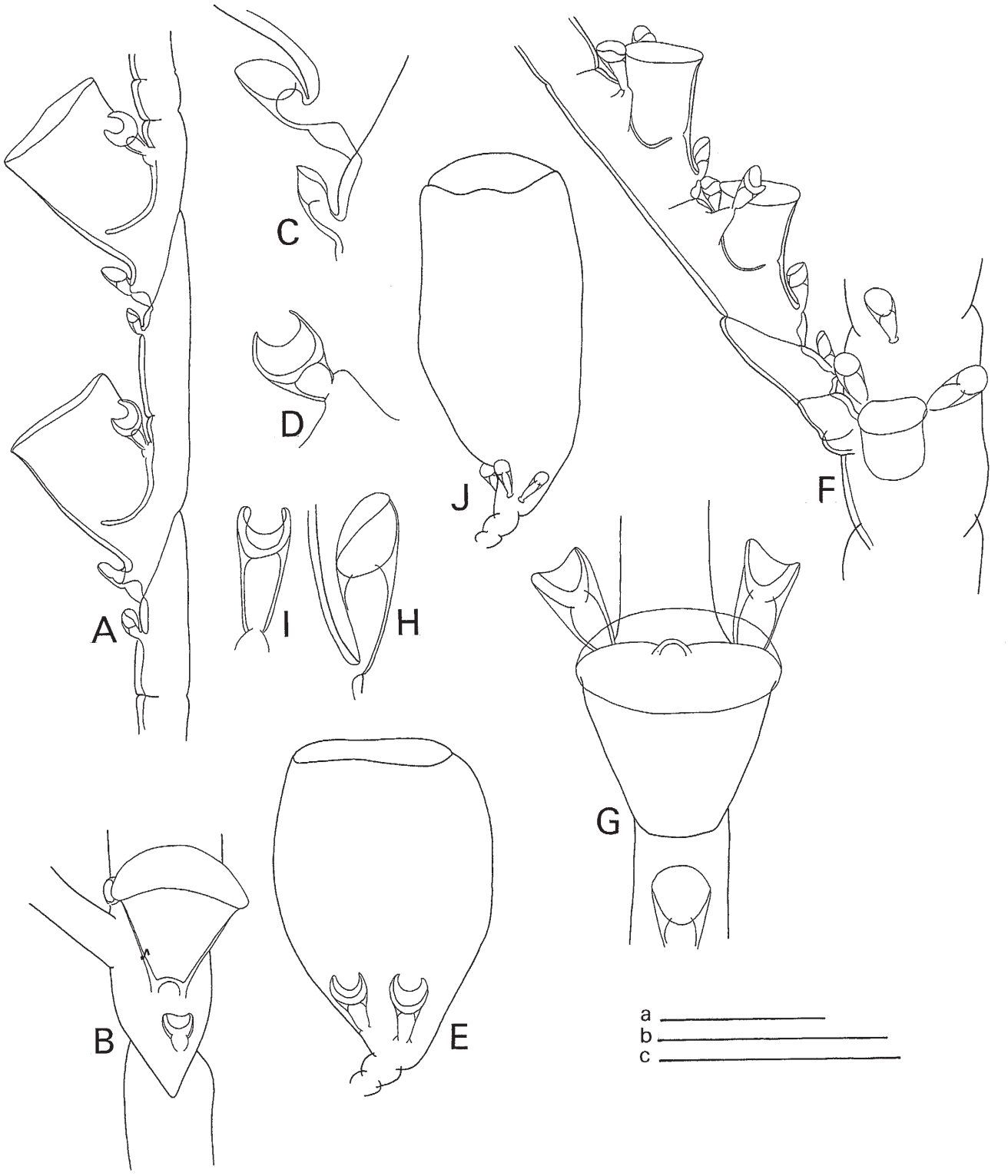

Fig. 86. A–E. ***Halopteris campanula*** (Busk, 1852). **A**, part of hydrocladium, lateral view. **B**, cauline hydrotheca and insertion of hydrocladium, frontal view. **C**, median inferior nematotheca and nematotheca from ahydrothecate internode, lateral view. **D**, one of lateral hydrothecae, lateral view (NMNZ, Chatham Island Exped., Stn 37, slide 4419). **E**, female gonotheca, lateral view (BS 838, slide 2966). **F–J.** ***Halopteris crassa*** (Billard, 1911). **F**, part of stem with insertion of hydrocladium, frontal view. **G**, hydrocladial internode, frontal view. **H**, median inferior nematotheca of hydrothecate internode, lateral view. **I**, one lateral nematothecae of hydrocladial hydrotheca (BS 913, slide 3346). **J**, female gonotheca, lateral view (NZOI Stn P7, slide 2222). Scales: a, 1 mm (J); b, 0.2 mm (C, D, G–I); c, 0.5 mm (A, B, E, F). W.V.

MEASUREMENTS of *Halopteris campanula* (in μm):

	Chatham Island Exped. Stn 37 slide 4419	NMNZ BS 838 slide 2966
Length of thecate stem internode	1395 – 1720	900 – 1150
Diameter at node	180 – 195	185 – 195
Length of thecate hydrocladial internode	420 – 490	445 – 460
Length of athecate hydrocladial internode	215 – 420	405 – 445
Diameter at node	115 – 130	100 – 110
Hydrotheca, length adnate adcauline wall	210 – 230	225 – 240
Length free adcauline wall	160 – 185	210 – 220
Length abcauline wall	280 – 310	285 – 330
Total depth	295 – 325	335 – 360
Diameter at rim	285 – 300	325 – 335
Lateral nematotheca, length	115 – 130	105 – 115
Maximum diameter of apical chamber	73 – 84	73 – 85
Median inferior nematotheca, length	84 – 90	100 – 110
Diameter at rim	45 – 56	56 – 67
Superior nematotheca, length	56 – 73	84 – 90
Diameter at rim	28 – 39	56 – 62
Female gonotheca, total length, including pedicel		985 – 1015
Maximum diameter		510 – 625
Male gonotheca, total length, including pedicel	620 – 630	
Maximum diameter	260 – 270	

DISTRIBUTION: Indo-West Pacific, including Japan, New Zealand, Australia, Malay Archipelago, Gulf of Aden, Red Sea, Gulf of Suez.

Halopteris crassa (Billard, 1911) (Figs 86F–J; 87A, B)

Plumularia crassa Billard 1911: lxvii, fig. 9; 1913: 26, figs 17–19, pl. 1, fig. 18; Bedot 1923: 220, fig. 13; van Soest 1976: 88.
Thecocaulus crassus: Bedot 1921b: 8.
Heterotheca crassa: Stechow 1923a: 15.
Halopteris crassa: Schuchert 1997: 79–84, figs 26–28.
Thecocaulus heterogona Bale 1924: 255, fig. 13; Trebilcock 1928: 25; Stranks 1993: 11.
Halopteris heterogona: Totton 1930: 217, fig. 56b-d; Ralph 1961b: 45–46, fig. 6h-i; Rees & Vervoort 1987: 123–124, fig. 25c, d; Dawson 1992: 17.

MATERIAL EXAMINED:

NZOI Stns: E283, single 40 mm high colony amongst bryozoans. RMNH-Coel. slide 2108; **E325**, bundles of stems, about 80 mm high, in very poor state. No gonothecae; **E848**, about 25 stems, 150 mm high rising from communal base. Many female gonothecae present. RMNH-Coel. slide 2183; **E849**, 2 colonies about 50 mm high, 1with female gonothecae; **E876**, 6 colonies 70 mm high. No gonothecae; **J954**, large bunch of colonies with communal fused basal portion about 150 mm long; plumes about 80 mm, no gonothecae. RMNH-Coel. slide 2213; **P7**, large colony composed of communal mass about 150 mm high with hydrocladia springing in all directions along length of 'axis'. Hydrocladia with large, empty gonothecae. RMNH-Coel. slide 2222.

NMNZ: BS 398, numerous colonies about 120 mm high, forming about 10 bundles of stems, fused at their base. No gonothecae; **BS 886**, about 150 mm high rhizocaulomic structure from top of which spring up to 80 mm long stems; no gonothecae. NMNZ Co. 528; RMNH-Coel. slides 3448; **BS 905**, bundle of about 20 colonies without gonothecae, about 120 mm high. NMNZ Co. 689; **BS 913**, 2 bunches of many erect stems up to 120 mm high, stem basally slightly polysiphonic, hydrocladia alternate, pointing obliquely upwards, up to 6 mm long, monomerously segmented; no gonothecae. NMNZ Co. 798; 2 RMNH-Coel. slides 3346.

NMNZ Ralph Collection: Loc. 243, NMNZ Co. 1087, Bale's material of *Thecocarpus rostratus*: 1 plume amongst fragments of *Dictyocladium monilifer* (Hutton, 1873) and *Lytocarpia incisa* (Coughtrey, 1875). RMNH-Coel slide 3760; **Loc. 417**, NMNZ Co. 1202, Bale's 1924 material, via G. Knox: 2 stem fragments about 20 mm high with some hydrocladia. With *Amphisbetia fasciculata* (Kirchenpauer, 1864). RMNH-Coel. slide 3885. Perfect slides as *Plumularia/Halop-teris heterogona*, with data 415/419.

TYPE LOCALITY: *Plumularia crassa*: Anchorage off Jedan Island, Aru Islands, Arafura Sea (*Siboga* Stn 273), 13 m (Billard 1911, 1913); syntypes in ZMA, ZMA-Coel. 4066, designated lectotype by Schuchert (1997); *Thecocaulus heterogona*: 10 miles northwest of Cape Maria van Diemen, N.Z., 91 m (Bale 1924), probable syntypes in MOV (MV F58220, 5 microslides, Stranks 1993).

DESCRIPTION: Stem upright, unbranched, up to 150 mm long but usually shorter, monosiphonic, basally with bunch of interwoven stolonal filaments that may occasionally develop into rhizocaulomic stem of *Corhiza* type, with stems arising from distal portion, length up to 200 mm. Proximal part of individual stems without hydrothecae or nematothecae, with some transverse nodes; athecate part ending in steeply oblique hinge-joint; additional steeply oblique hinge-joints may be present in basal part of stem, separating thecate or athercate internodes. Remainder of stem divided into thecate internodes by slightly oblique nodes, usually only visible in distal part of stem. Thecate stem internodes with hydrotheca, a lateral apophysis supporting a laterally directed hydrocladium and typically 5 nematothecae:

1 unpaired median infracalycine nematotheca, a pair of lateral nematothecae and a pair of nematothecae on distal part of internode. In addition a naked sarcostyle in axil between free part adcauline hydrothecal wall and internode, occasionally provided with scale-shaped, greatly reduced nematotheca.

Hydrocladia inserted on apophyses of thecate stem internodes, alternately arranged, 10–15 mm long, basally with a short athecate internode separated by transverse nodes and slightly longer internodes with proximal transverse and distal steeply oblique node carrying a frontal nematothecae. Remainder of hydrocladium composed of thecate internodes separated by indistinct transverse nodes, occasionally intercalated by some short athecate internodes. Hydrocladial internodes each with a hydrotheca, a median inferior nematotheca, a pair of lateral nematothecae on distinct apophyses and a naked axillar sarcostyle, occasionally with a small, scale-shaped nematotheca. No nematotheca-bearing athecate internodes in hydrocladia.

All nematothecae conical, bithalamic and movable; the median inferior nematotheca in certain colonies with stronger basal attachment. All nematothecae with deeply scooped inner wall of apical chamber; pair of lateral nematothecae with outer wall occasionally scooped to lesser degree. On thecate hydrocladial internodes median inferior nematotheca does not reach base of hydrotheca; apophyses of lateral nematothecae not reaching hydrothecal rim; lateral nematothecae projecting far beyond hydrothecal rim. Axillar sarcostyle sometimes difficult to see, but hole in wall of internode at axil visible in frontal view of internode.

Stem hydrotheca on short but distinct elevation, smaller than hydrocladial hydrothecae; walls parallel or slightly widening; rim even, circular, not everted. Hydrocladial hydrothecae widening moderately from base onwards, walls straight; rim not everted, circular, smooth; axis of hydrotheca at an angle of about 45° with internodal length axis; plane of aperture perpendicular to hydrothecal axis; frontal wall slightly thickened; free adcauline wall about half as long as adnate wall, straight or slightly concave; adnate wall basally curving into hydrothecal base; diaphragm on frontal side, distinct, wide.

Female gonothecae inserting on thecate internodes of stem at side of hydrothecal base, big, balloon-shaped with more or less flattened top and with circular operculum narrowing basally; base with 3–5 fairly big, bithalamic, movable nematothecae same as lateral nematothecae. Pedicel short, composed of 2 internodes.

REMARKS: There is considerable variability in development of the nematothecae of the thecate stem internodes. There may be two or no median inferior nematothecae. The nematotheca of the lateral pair occurring between apophysis and hydrotheca is small or even absent. One of the pair of nematothecae on the distal part of the internode may be absent. All nematothecae are movable and are easily shed when handling the colony; their former presence is usually shown by a thin spot in the perisarc.

MEASUREMENTS of *Halopteris crassa* (in μm):

NMNZ	BS 886 slide 3448	BS 913 slide 3346
Diameter of stem at base	625 – 705	
Length of stem internode	740 – 870	575 – 705
Diameter at node	130 – 140	250 – 310
Stem hydrotheca, diameter at rim	270 – 280	205 – 215
Diameter at base	225 – 235	180 – 195
Total depth	200 – 215	165 – 185
Length first internode of hydrocladium	120 – 125	100 – 105
Diameter at node	115 – 120	95 – 100
Length second internode of hydrocladium	320 – 330	225 – 265
Thecate hydrocladial internode, length	700 – 840	505 – 535
Diameter at node	125 – 150	110 – 125
Hydrocladial hydrotheca, length free adcauline wall	115 – 140	85 – 95
Length adnate adcauline wall	200 – 225	180 – 185
Length abcauline wall	235 – 245	185 – 195
Diameter at base	130 – 140	120 – 125
Diameter at rim	265 – 275	240 – 250
Median inferior nematotheca, length	110 – 135	95 – 105
Diameter at rim	67 – 73	50 – 67
Lateral nematotheca, length apophysis	62 – 84	45 – 56
Length nematotheca	135 – 155	115 – 125
Diameter at rim	67 – 155	50 – 56
Female gonotheca, total length, including pedicel*	2870	
Maximum diameter*	1245 – 1295	

* = NZOI Stn P7, slide 2222

The material from Stn P7 and BS 886 is remarkable because of the presence of a dense network of stolonal tubes, forming a rhizocaulomic stem about 180 mm long, about 8 mm thick at its base and gradually tapering apically, where axes with hydrocladia arise from the stolonal tubes. The material is otherwise identical with isolated stems arising from stolonal tubes found at other localities except that in basal parts of the axes there are two median inferior nematothecae, one beside the other, occurring some distance under the base of cauline hydrothecae, while one of the nematothecae in the superior pair may be missing; in upper parts of the axes there is the typical single median inferior

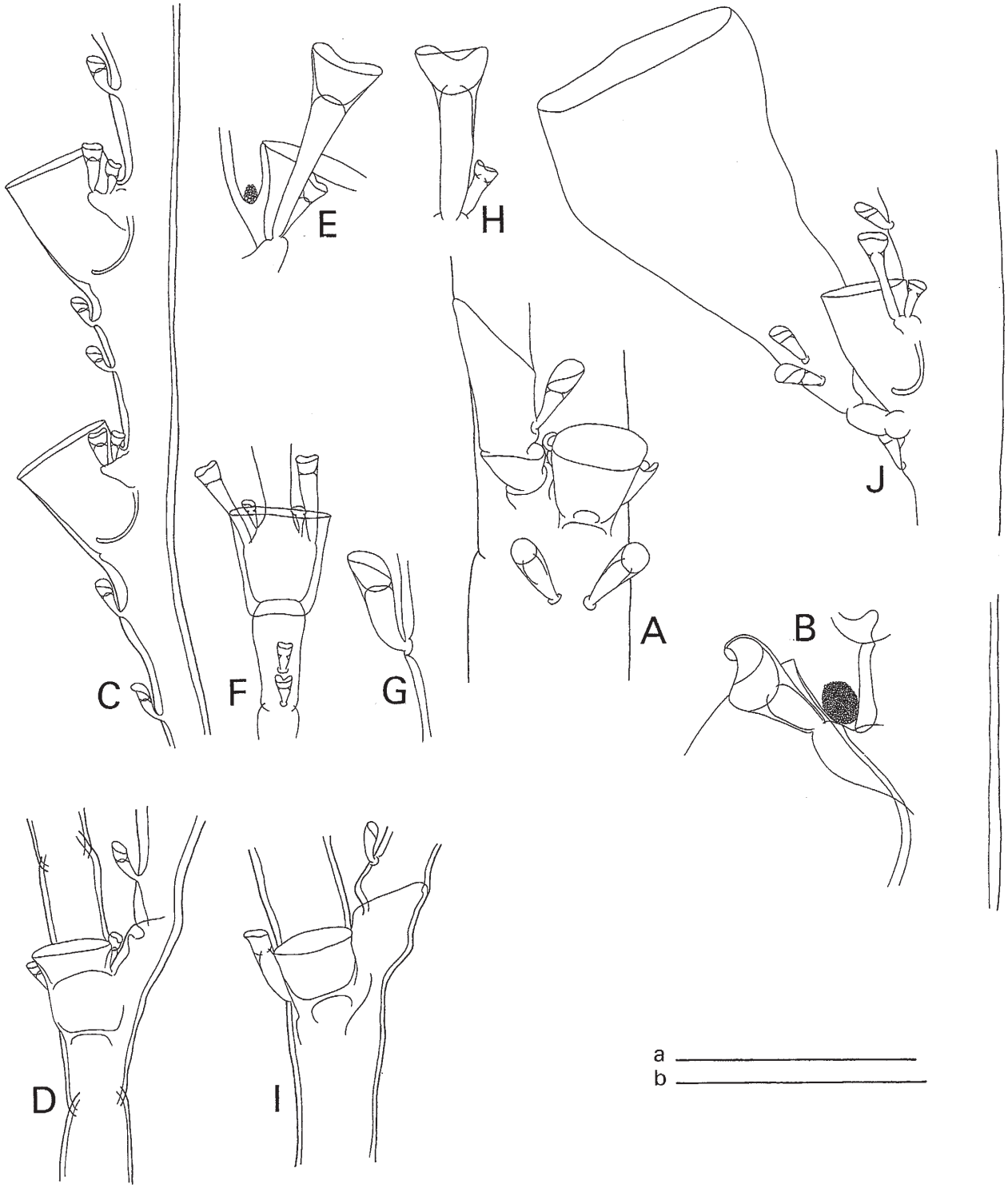

Fig. 87. A, B. ***Halopteris crassa*** (Billard, 1911). **A**, part of stem with cauline hydrotheca, nematothecae and insertion of hydrocladium, frontal view (BS 886, slide 3448). **B**, part of hydrocladial hydrotheca showing one of lateral nematothecae and reduced axillary nematotheca (BS 913, slide 3346). **C–J.** ***Halopteris infundibulum*** Vervoort, 1966. **C**, part of hydrocladium, lateral view. **D**, part of stem with cauline hydrotheca and insertion of hydrocladium, frontal view. **E**, part of hydrocladial hydrotheca showing one set of lateral nematothecae and reduced axillary nematotheca, lateral view (NZOI Stn G305, slide 2309). **F**, hydrocladial hydrotheca, frontal view. **G**, median inferior nematotheca, lateral view. **H**, lateral nematothecae, lateral view. **I**, Part of stem showing cauline hydrotheca, nematothecae and insertion of hydrocladium, frontal view. **J**, female gonotheca and its insertion on hydrocladial internode (NZOI Stn G697, slide 2867). Scales: a, 0.2 mm (B, E, G, H); b, 0.5 mm (A, C, D, F, I, J). W.V.

nematotheca and the pair of superior nematothecae on the cauline internodes. Because of the absence of gonothecae it seems wise to include this aberrant specimen in the very variable *Halopteris crassa* (Billard, 1911).

Records from New Zealand: Available records suggest that the species is restricted to a small area in the Three Kings-North Cape area between 32.5°–34.5° S, 167.5°–172.5° E, 79–250 m depth. First recorded from New Zealand waters by Totton (1930) from two *Terra Nova* stations in the Three Kings area and off Cape Maria van Diemen. Ralph studied and re-described Bale's original material of *Thecocaulus heterogona* Bale, 1924 from off Cape Maria van Diemen. Female gonothecae were found on material collected in January and March, the first being empty, the second in mature condition.

Distribution: Known only from one locality in the Arafura Sea (*Siboga* Stn 273, see above) and from a restricted area in New Zealand waters.

Halopteris infundibulum Vervoort, 1966

(Fig. 87C–J)

Halopteris infundibulum Vervoort 1966: 133–134, fig. 36; Schuchert 1997: 121–123, fig. 44.

Material Examined:

NZOI Stns: E409, single, 70 mm high colony; no gonothecae. RMNH-Coel. slide 2161; E413, single 70 mm high stem, with 2 side branches, no gonothecae; **E803**, mutilated, about 100 mm high colony, no gonothecae. RMNH-Coel. slide 2845; **G305**, single colony, 50 mm high, no gonothecae. RMNH-Coel. slide 2309; **G697**, about 50 colonies, in height varying between 20 and 120 mm. Male gonothecae present. 2 RMNH-Coel. slides 2867; **I707**, 1 colony, 90 mm high, no gonothecae.

NMNZ: BS 559, 1 stem about 80 mm high, with some male gonothecae. NMNZ Co. 484.

Type Locality: Tasman Sea, 42°10′ S, 170°10′ E, 610 m (*Galathea* Stn 626); holotype in Zool. Mus. Univ. Copenhagen, Denmark; RMNH-Coel. slide 3757 is part of type series.

Description: Stem up to 120 mm high, basally with some secondary tubules running up the stem; a bunch of irregularly branched stolonal filaments anchoring colony in soft sediment. Basal part of stem with hydrothecae or nematothecae, terminated by steeply oblique node (hinge-joint), remainder of stem with hydrothecae set regularly apart; hydrothecae pointing slightly alternately left and right with in upper parts of stem with slight geniculation between succeeding hydrothecae; division of upper stem into internodes by slightly oblique nodes sometimes visible.

Stem hydrothecae on moderately developed apophysis, smaller and less deep than hydrocladial hydrothecae, with 2 pairs of lateral nematothecae, a median inferior nematotheca and a small axillar sarcostyle; some hydrotheca may have 2 median inferior nematothecae, 1 above the other. An apophysis next to each stem hydrotheca, supporting a 10–25 mm long hydrocladium, separated from apophysis by an oblique node; apophyses alternately directed left and right; hydrocladia consequently pinnately arranged and more or less in 1 plane.

Hydrocladia largely unsegmented; nodes, if present, only occur in the upper parts and slightly oblique. Hydrothecae set in 1 frontal row, deep cup-shaped to almost cylindrical; abcauline wall proximally convex, very distinctly so in some colonies, in others with moderate convexity. About one-third of adcauline wall free, slightly convex; fused part basally curved; diaphragm placed frontal, small. Hydrotheca at an angle of about 30° with hydrocladial long axis; rim circular, smooth, perpendicular to long axis. Each hydrotheca with double pair of lateral nematothecae, 1 or 2 longitudinally arranged median inferior nematothecae and a small, almost invisible sarcostyle in axil between free part adcauline wall and internode. Pair of lateral nematothecae placed on distinct apophysis just under axil; apical nematotheca largest, reaching hydrothecal margin or projecting considerably beyond; second pair smaller and shorter, not reaching hydrothecal rim. Lateral nematothecae bithalamic; apical chamber large, rim with rounded emargination on inner side; diaphragm quite thin. Adcauline wall of upper chamber of median nematothecae deeply scooped, diaphragm distinct; upper (or only) median nematotheca not reaching base of hydrotheca.

Male gonothecae occur plentifully in the material from NZOI Stn G697 and some also present in material from NMNZ BS 559. Gonothecae attached to side of basal hydrocladial hydrothecae; shape an inverted cone, narrowing basally and with flattened, circular top, containing a gonophore with a large, globular mass of developing spermatocytes. Narrowed basal portion with 2 movable nematothecae with deeply scooped inner wall of the apical chamber. Pedicel composed of 2 short internodes. Gonotheca probably not fully mature.

Remarks: The development of colony perisarc and length of the lateral nematothecae is very variable in the material studied. In the material from G697 the perisarc is extremely thin and is much folded in the microslides. In this material and that from E409 the first pair of lateral nematothecae are quite long, projecting far beyond the hydrothecal rim.

All nematothecae are extremely brittle, easily damaged and fall off when handled. The second pair of lateral nematothecae may be almost completely hidden by the larger first pair and only become visible in frontal view of the hydrocladium. In all colonies the top of the stem apophysis may be developed as a separate, small internode with a proximal transverse and an distal oblique node.

MEASUREMENTS of *Halopteris infundibulum* (in μm):

NZOI	Stn G305 slide 2309	Stn G697 slide 2867
Stem, diameter at base		450
Diameter under hydrocladial apophysis	195 – 240	225 – 235
Stem hydrotheca, depth	90 – 100	90 – 95
Diameter at rim	200 – 245	210 – 215
Length of longest lateral nematotheca	90 – 100	100 – 115
Hydrocladium, diameter	140 – 170	110 – 125
Hydrocladial hydrotheca, length		
free adcauline wall	84 – 90	73 – 90
Length adnate wall	190 – 195	195 – 220
Length abcauline wall	285 – 290	275 – 285
Diameter at rim	245 – 255	220 – 250
Longest lateral nematotheca, length	110 – 125	140 – 150
Diameter at rim	45 – 51	40 – 45
Shortest lateral nematotheca, length	56 – 67	70 – 75
Diameter at rim	23 – 28	23 – 25
Median inferior nematotheca, length	90 – 95	78 – 80
Diameter at rim	45 – 56	50 – 54
Male gonotheca, total length, including pedicel		1150 – 1230
Maximum diameter		520 – 525
Nematotheca near gonothecal base, length		100 – 130
Diameter at rim		56 – 62

RECORDS FROM NEW ZEALAND: Known from a few localities south of 43° S in the seas around the southern part of South Island and the Chatham Islands; depths 512–1006 m. Gonothecae occur in January and September.

DISTRIBUTION: Only known from the southern Tasman Sea and the Southwest Pacific.

Halopteris minuta (Trebilcock, 1928)

Thecocaulus minutus Trebilcock 1928: 25, pl. 7, figs 6, 6a; Stranks 1993: 12.
Halopteris minuta: Ralph 1961b: 45, fig. 6f; Blanco 1973: 77; Dawson 1992: 17; Schuchert, 1997: 91–94, fig. 32.
Halopteris constricta: Totton 1930: 227, fig. 56a; Ralph 1961b: 43, fig. 6a-e; 1961c: 109; Vervoort & Vasseur 1977: 68, figs 29, 30a, b; Dawson 1992: 17.
[Not *Halopteris constricta*: Millard, 1957: 227, fig. 14a; 1962: 282, fig. 4G; 1966b: 493 [= *H. pseudoconstricta* Millard, 1975].
[Not *Halopteris constricta*: Park, 1990: 83-84, fig. 5; Park, 1992: 294 [= *Halopteris diaphana* (Heller, 1868)].

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 377, poor slide as RSC as *Halopteris minuta*; no data. Slide useless; **Loc. 729**, poor slide in RSC as *Halopteris minuta*; no data. Slide useless; **Loc. 730**, 4 good slides in RSC as *Halopteris constricta*, with data: Russell; **Loc. 732**, perfect slide in RSC as *Halopteris constricta, P. setacea*, no data (= new number 732).

TYPE LOCALITY: *Thecocaulus minutus*: St Clair, Dunedin (Trebilcock 1928) possible syntypes in MOV, F57899, 2 microslides (Stranks 1993)]; *Halopteris constricta*: *Terra Nova* Stn 144, off Cape Maria van Diemen, 64-73 m (Totton 1930); holotype (1929.10.28.183) and paratype (1929.10.28.184) in NHM.

REMARKS: We concur with Schuchert (1997) that *Thecocaulus minutus* (Trebilcock, 1928) and *Halopteris constricta* Totton, 1930 are conspecific and should be merged as *Halopteris minuta* (Trebilcock, 1928). In contradistinction to the view expressed by Schuchert after re-inspection of the material we consider that *Halopteris constricta* recorded from Moorea by Vervoort & Vasseur (1977: 68, figs 29, 30a, b) belongs here. *H. constricta* was recorded by Ralph (1961b) from two New Zealand localities: Glendowie, Auckland, on the brown alga *Sargassum* sp., and Island Bay, Cook Strait, on the crab *Paramithrax peronii*. *H. minutus*, according to Ralph (1961b) was found in Tolaga Bay, east coast of North Island, in storm drift. No material of *Halopteris minuta* occurs in the present collection; the four slides in NMNZ Ralph Collection labelled *Halopteris constricta* confirm Schuchert's conclusion concerning the identity of this species with *H. minuta*.

RECORDS FROM NEW ZEALAND: St Clair, Dunedin (Trebilcock 1928); Russell, North Island (Ralph's Loc. 730).

DISTRIBUTION: Besides New Zealand the species has only been found at Moorea, French Polynesia (Vervoort & Vasseur 1977).

Halopteris prominens sp. nov. (Fig. 88A–C)

MATERIAL EXAMINED:

NZOI Stn S159, young colony 35 mm high, no gonothecae, made up in slide (holotype, H-784 in NIWA collection).

TYPE LOCALITY: Canterbury Bight, Southwest Pacific, 44°19.32′ S, 173°35.52′ E.

DESCRIPTION: Single colony consisting of basal portion 20 mm long from which emerge 2 stems about 25 mm long; stems, basally fused, surrounded by secondary tubules and some stolonal tubes. Each stem basally with 2 or 3 athecate internodes separated by transverse nodes and bearing some frontal nematothecae; remainder of stems heteromerously segmented; first thecate internode proximally with slightly oblique and distally with transverse node; athecate internodes longer than thecate internodes and proximally with transverse, distally with slightly oblique node. Each thecate node with big basal apophysis bearing hydrotheca, 1 median inferior nematotheca and 2 apophyses on both sides of hydrotheca and supporting hydrocladia about 10 mm long. Stem apophyses and hydrothecae on frontal part of axes; hydrocladia directed laterally and obliquely upwards. Athecate stem internodes with two or three frontal nematothecae.

Hydrocladia heteromerously segmented; basally with 2 quite short internodes followed by first athecate internode with proximal transverse and distal oblique node. Athecate and thecate internodes following in regular succession. Athecate internodes with 2 frontal nematothecae; shorter thecate internodes with 1 hydrotheca, a median inferior nematotheca, a pair of lateral nematothecae and a much reduced axillar nematotheca. Nematothecae bithalamic; median inferior nematotheca with scooped adcauline wall of upper chamber. Lateral nematothecae fairly big, wineglass-shaped, placed on long, slender apophysis and surpassing slightly the hydrothecal rim. Perisarc of apical chamber very thin; rim circular, not scooped. Axillar nematotheca scale-shaped, adcauline wall remaining, occasionally with remnant of diaphragm.

Stem hydrothecae cylindrical, walls only very slightly widening, with fairly thick perisarc; rim circular, flat, perpendicular to hydrothecal length axis. Hydrocladial hydrothecae wider and longer, gradually widening from base onward; rim circular, perpendicular to hydrothecal length axis; base rounded; diaphragm small, near abcauline side. Median inferior nematotheca not reaching hydrothecal base.

Perisarc of stems fairly thick and yellowish-brown; that of hydrocladia and hydrothecae fairly thin, hyaline. Gonothecae absent.

MEASUREMENTS of *Halopteris prominens* sp. nov. (in μm):

	NZOI Stn S159 holotype
Communal stem fragment, diameter	615
Individual stem, diameter at base	210 – 225
Athecate stem internode, length	985 – 1230
Thecate stem internode, length	530 – 590
Diameter at node	245 – 255
Stem apophysis, length	140 – 175
Stem hydrotheca, depth	195 – 205
Diameter at rim	245 – 270
Hydrocladium, length thecate internode	515 – 525
Length athecate internode	570 – 575
Diameter at node	85 – 125
Hydrocladial hydrotheca, length adnate adcauline wall	210 – 245
Length free adcauline wall	140 – 160
Length abcauline wall	265 – 275
Diameter at rim	275 – 285
Unpaired nematotheca, length	73 – 95
Diameter at rim	39 – 56
Lateral nematotheca, length apophysis	79 – 84
Length nematotheca	100 – 115
Diameter at rim	67 – 78

REMARKS: This species does not fit into the group of *Halopteris* species with opposite hydrocladia (*H. catharina* (Johnston, 1833); *H. gemellipara* Millard, 1962; *H. gracilis* (Clarke, 1879); *H. geminata* (Allman, 1877); *H. opposita* (Mulder & Trebilcock, 1911; *H. plagiocampa* (Pictet, 1893), and *H. zygocladia* (Bale, 1914); see Schuchert 1997: 107, tab. 27).

RECORDS FROM NEW ZEALAND: Known only from the type locality: 44°19.32′ S, 173°35.52′ E, 525 m.

DISTRIBUTION: Known only from a single New Zealand locality.

ETYMOLOGY: Taken from Latin noun *prominens*, protrusion, and refers to the striking appearance of the species.

Halopteris pseudoconstricta Millard, 1975 (Fig. 88D–G)

Halopteris constricta: Millard 1957: 227, fig. 14A; 1962: 282, fig. 4G; 1966b: 493.

[Not *Halopteris constricta* Totton, 1930 = *Halopteris minuta* (Trebilcock, 1928)]

Halopteris pseudoconstricta Millard 1975: 355–357, fig. 114D–G; 1978: 193.

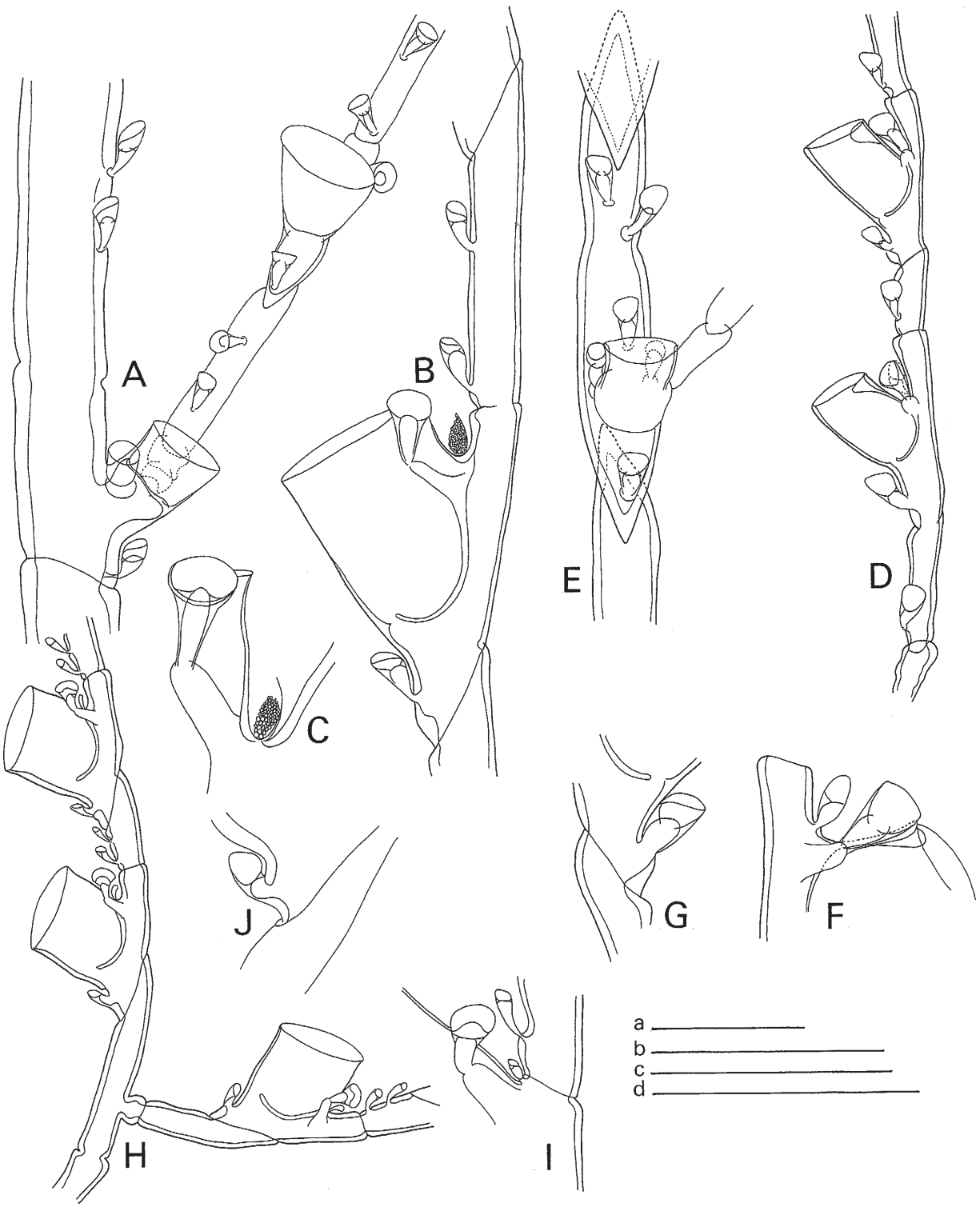

Fig. 88. A-C. ***Halopteris prominens*** sp. nov. **A**, part of stem with cauline hydrotheca and hydrocladium, lateral view. **B**, part of hydrocladium, showing thecate and athecate internode, lateral view. **C**, one of lateral nematothecae of hydrotheca and reduced axillary nematotheca, lateral view (NZOI Stn S159, holotype, slide 2315). **D–G.** ***Halopteris pseudoconstricta*** Millard, 1975. **D**, hydrocladium, lateral view. **E**, frontal view of stem with cauline hydrotheca and insertion of hydrocladium. **F**, one of lateral hydrothecal nematothecae and median superior nematotheca, lateral view. **G**, median inferior nematotheca, lateral view (NZOI Stn E283, slide 2107). **H–J.** ***Monostaechas quadridens*** (McCrady, 1859). **H**, part of stem. **I**, one of lateral hydrothecal nematothecae, axillary nematotheca and median inferior nematotheca of next internode. **J**, median inferior nematotheca of hydrothecate internode; all lateral view (NZOI Stn T75, slide 2131). Scales: a, 0.2 mm (B, D, E); b, 0.2 mm (C, I, J); c, 0.5 mm (A, H); d, 0.2 mm (F, G). W.V.

MATERIAL EXAMINED:

NZOI Stn E283, single 6 mm high colony on bryozoans. RMNH-Coel. slide 2107.

TYPE LOCALITY: Intertidal region at Melkbosstrand, Table Bay, South Africa (Millard 1975, 1978); holotype in SAM (SAM-H542).

DESCRIPTION: Stem monosiphonic, about 8 mm high, basally with some tubiform stolonal fibres not carrying nematothecae. Basal part of axis composed of some internodes of unequal length separated by straight nodes and without nematotheca, this part ending in an oblique hinge-joint. Following internode with terminal oblique hinge-joint and 3 frontal nematothecae not placed in 1 row. Rest of stem heteromerously segmented; thecate internodes basally with steeply oblique node and apically with indistinct transverse node. Thecate stem internodes with hydrotheca on basal part and 4 nematothecae: 1 on apical part of internode, 2 laterals next to hydrotheca, and 1 superior almost axillary nematothecae. Each thecate internode also with apophysis next to hydrotheca, supporting short hydrocladia; apophyses and hydrocladia alternately directed left or right. Athecate stem internodes with 2 nematothecae not strictly in 1 line.

Hydrocladia with short proximal internode without hydrotheca or nematothecae, remainder of hydrocladium heteromerously segmented; athecate internodes proximally with transverse, apically with oblique node. First internode athecate, thecate internode with hydrotheca seated in mid region and 4 nematothecae: 1 median inferior, 2 laterals next to hydrotheca and a slightly reduced superior nematotheca in almost axillar position. Athecate internodes variable in length, with 1 nematotheca.

Median inferior nematothecae firmly attached, immovable; lateral nematothecae movable, on short but distinct apophyses, reaching hydrothecal rim. Superior nematotheca on stem apparently normally developed, that on thecate hydrocladial internodes small and deeply scooped on adcauline side. All nematothecae bithalamic, with distinct diaphragm, all, with exception of reduced superior nematothecae of hydrocladia, obliquely truncated at top.

Stem hydrotheca cylindrical, walls fairly thick, no adcauline notch present, on moderately high apophysis. Hydrocladial hydrothecae fairly cylindrical, with fairly thick walls, particularly around hydrothecal rim; adcauline wall with apical carina projecting into interior of hydrotheca. Free and adnate adcauline walls of almost same length; free adcauline wall and abcauline wall straight, parallel, except for slight concavity that may be present in free adcauline wall. Diaphragm quite small, on abcauline side.

Perisarc of stem internodes firm and fairly thick yellowish, that of hydrocladia thin and almost hyaline, with exception of hydrothecal wall that is thicker and yellowish.

Gonothecae absent.

MEASUREMENTS of *Halopteris pseudoconstricta* (in μm):

	South Africa (Schuchert 1997)	NZOI Stn E283 slide 2107
Diameter of stem at base		90
Thecate stem internode, length		420 - 460
Athecate stem internode, length		310 - 335
Diameter at node		85 - 110
Stem hydrotheca, diameter at rim		115 - 125
Total depth		62 - 84
Length first athecate hydrocladial internode		84 - 100
Diameter at node		45 - 50
Athecate hydrocladial internode, length	130 – 220	240 - 250
Thecate hydrocladial internode, length	310 – 380	280 - 295
Hydrocladial hydrotheca, length free adcauline wall	60 – 90	90 - 95
Length adnate adcauline wall		105 - 115
Length abcauline wall	150 – 180	145 - 155
Total depth	110 – 160	155 - 165
Diameter at rim		100 - 105
Median inferior nematotheca, length		67 - 78
Diameter at rim		34 - 39
Lateral nematothecae, length		73 - 78
Diameter at rim		45 - 50
Median superior nematotheca, length		40 - 45
Diameter at rim		28 - 34

REMARKS: Typically the thecate and athecate internodes of the stem are completely fused, the node being indicated by a constriction in the perisarc. The median superior nematotheca is distinctly reduced and almost axillary, differing in that respect from South African material described by Millard (1975) and Schuchert (1997). The adcauline notch was present in all hydrocladial hydrothecae but absent from the stem hydrothecae; the concavity in the adcauline wall varies in depth, in some hydrothecae the wall is almost straight. The shape of the hydrotheca, with its apical notch on the adcauline side is so characteristic that even in the absence of gonothecae the species can be correctly identified.

RECORDS FROM NEW ZEALAND: Known only from the Pacific off Three Kings Islands and found on a bryozoan colony at 79 m depth.

DISTRIBUTION: South Africa, Table Bay and False Bay, intertidal to a depth of about 5 m (Millard 1975; Schuchert 1997). Additional records are from Angola and the Vema Seamount, South Atlantic (Millard 1975).

Monostaechas Allman, 1877

TYPE SPECIES: *Monostaechas dichotoma* Allman, 1877 [= *Plumularia quadridens* McCrady, 1859].

Monostaechas quadridens (McCrady, 1859)

(Fig. 88H–J)

Plumularia quadridens McCrady 1859: 199–200.
Monostaechas dichotoma Allman 1877: 37, pl. 22 figs 1–5.
Monostaechas quadridens: Nutting 1900: 75, pl. 13, figs 1–4; 1905: 952; Ritchie 1907b: 508, pl. 25, fig. 4; Stechow 1909: 83; Jäderholm 1919: 20; Stechow 1925a: 252; Fraser 1938b: 61; 1944a: 334, fig. 343; 1948: 274; Pennycuik 1959: 178, pl. 3, fig. 6; Mammen 1965: 302, figs 98-99; Vervoort 1968: 61, fig. 28; Millard & Bouillon 1973: 85; 1974 9; Millard 1975; 365, fig. 11D–F; 1978; 195; Calder 1983: 17, fig. 9; Schuchert 1997: 130–132, fig. 47.
Monostaechas fisheri var. *simplex* Billard 1913: 16, text-fig. 7, pl. 1, fig. 10; van Soest 1976: 86.
Monostaechas quadridens f. *stechowi* Leloup 1935b: 2, figs 2–3.
Antennella diaphana var. *typica* p.p van Gemerden Hoogeveen 1965: 49.

MATERIAL EXAMINED:

NZOI Stns: **I73**, small fragments among bryozoans, no gonothecae. Rather mutilated material; may belong here. RMNH-Coel. slide 2129; **I75**, fragments found between *Synthecium subventricosum* Bale, 1914. RMNH-Coel. slide 2131.

TYPE LOCALITY: *Plumidaria quadridens*: Charleston Harbour, South Carolina, U.S.A.; location of holotype unknown (McCrady, 1859). *Monostaechas dichotoma*: off Pacific Reef, Florida, 518 m, location of holotype unknown (Allman, 1877). *Monostaechas fisheri* var. *simplex*: 2 *Siboga* expedition stations: Stn 80, Boreo Bank, 40–50 m and Stn 133, off Lirung, Island Salibabu, Indonesia, 36 m, syntypes in ZMA, ZMA Coel. 4167 & 4168 (Billard, 1913; van Soest, 1976: 86). *Monostaechas quadridens* f. *stechowi*: on floating algae in the Atlantic or Pacific Ocean, no distinct type locality specified and no type material preserved (Leloup, 1935b).

DESCRIPTION: Branched colonies with 5–7 mm high stems forming scorpioid sympodia arising from tubular stolonal tubes attached to other hydroids, or fragment of algae.

Basal part of colony composed of 1 or several internodes with transverse nodes, without nematothecae; last athecate internode with transverse basal node, and apical oblique node (hinge-joint), and with small apophysis supporting another hydrocladium. Primary stem continuing as succession of thecate and athecate internodes; first internode thecate with basal oblique and distal transverse node.Thecate internodes with big, rather shallow hydrotheca and 4 nematothecae: 1 median inferior, 2 laterals on distinct apophyses, and a small axillar nematotheca. Median inferior nematotheca in material from Stn I75 immovable, bithalamic, with deeply scooped adcauline wall, that from Stn I73 distinctly movable, with slender base, resembling lateral nematothecae, in both samples a widening apical chamber with scooped lateral walls ('bivalved nematothecae' of Schuchert, 1997), on apophyses of approximately equal length, not reaching rim of hydrotheca. Axillar hydrotheca very small, almost scale-shaped.

Hydrothecal walls almost imperceptibly widening, abcauline wall with thick perisarc; rim circular and flat, not everted, perpendicular to hydrothecal length axis.

Gonothecae absent.

MEASUREMENTS of *Monostaechas quadridens* (in μm):

	Combined measurements from Schuchert (1997)	NZOI Stn I75 slide 2131
Thecate internode, length	340 – 530	310 – 435
Athecate internode, length	320 – 540	250 – 390
Diameter at node		85 – 100
Hydrotheca, length abcauline wall	190 – 250	185 – 195
Length free part adcauline wall	100 – 150	155 – 170
Diameter at rim	210 – 310	230 – 240
Lateral nematotheca, length pedicel		67 – 84
Length of nematotheca		78 – 95

REMARKS: This material generally conforms to Schuchert's description of the species, though slightly differing in colony structure .

RECORDS FROM NEW ZEALAND: Not found in New Zealand waters. The present records are from the Pacific off Norfolk Island, about 29° S, 168° E, depth 51–70 m.

DISTRIBUTION: Circumglobal in tropical, subtropical and temperate waters.

Family **KIRCHENPAUERIIDAE** Millard, 1962

Halicornopsis Bale, 1882

TYPE (AND SOLE) SPECIES: *Aglaophenia avicularis* Kirchenpauer, 1872 [= *Halicornopsis elegans* (Lamarck, 1816)].

Halicornopsis elegans (Lamarck, 1816)

Plumularia elegans Lamarck 1816: 129; van Praët 1979: 923, fig. 78.
Aglaophenia elegans Lamouroux 1816: 169.
Halicornopsis elegans: Ritchie 1911a: 855, pl. 89, fig. 1; Bale 1914a: 56; 1915: 303; Bedot 1916: 645; Mulder & Trebilcock 1916: 75–76; Bedot 1921b: 17; Totton 1930: 214, fig. 54a-b; Hodgson 1950: 48, fig. 79; Ralph 1961b: 52-54, fig. 7c-e (*cum syn.*); Rees & Thursfield 1965: 168; Dawson 1992: 17; Watson 1994a: 67; Bouillon *et al.* 1995: 50.
Aglaophenia avicularis Kirchenpauer 1872: 27, 33, pl. 1, pl. 3, fig. 3.
Halicornopsis avicularis: Bale 1882: 185, pl. 10, figs 1–2, pl. 19, fig. 32.
Azygoplon rostratum Allman 1883: 54, pl. 19, figs 1–3.
Plumularia banskii: Hutton 1873: 259; Coughtrey 1875: 289.
[Not *Plumularia banksii* Gray, 1843 = *Monoserius banksii* (Gray, 1843)]
Plumularia huttoni Coughtrey 1876: 290.

TYPE LOCALITY: *Plumularia elegans*: Indian Ocean (?); syntypes in MNHN (Lamarck, 1816; van Praët, 1979). *Aglaophenia elegans*: Indian Ocean, holotype apparently in MNHN (Lamouroux, 1816; Billard, 1907b). *Aglaophenia avicularis*: Hobartstown, Tasmania and Bass Strait, Australia; type material probably in Zoological Museum, Hamburg (Kirchenpauer, 1872). *Azygoplon rostratum*: *Challenger* Stn 161, 'off entrance to Port Philip' (Port Phillip Bay), Australia, 69 m; holotype in NHM (Allman, 1883).

RECORDS FROM NEW ZEALAND: Lyall Bay, Wellington (Hutton 1873), as *Plumularia banksii*. This is the only New Zealand record so far. Ralph's description and figures were based on Hutton's material (apparently slides in the Canterbury Museum, Christchurch that may now be lost), Hodgson's description and Allman's material of *Azygoplon rostratum* in the Natural History Museum. London. No material of this species occurs in the present collections.

DISTRIBUTION: Indian Ocean, Australian, and Tasmanian waters.

Kirchenpaueria Jickeli, 1883

TYPE SPECIES: *Sertularia pinnata* Linnaeus, 1758.

Kirchenpaueria bonnevieae (Billard, 1906)
(Fig. 89A–C)

Plumularia rubra Bonnevie 1899: 90, 91, 94, pl. 7, fig. 2.
Plumularia Bonnevieae Billard 1906: 331.
Plumularia bonneviae: Bedot 1921b: 26; 1923: 219, 227, fig. 8.
Ventromma bonneviae: Stechow 1923d: 220.
Kirchenpaueria bonneviae: Billard 1930: 80;
Kirchenpaueria bonnevieae: Ramil & Vervoort 1992: 151–156, figs 39d-g, 40b, e (*cum syn.*); Bouillon *et al.* 1995: 50.
Plumularia triangulata Totton 1930: 225–226, fig. 61; Ralph 1961b: 41–42, fig. 5f-g.
Kirchenpaueria triangulata: Dawson 1992: 17.

MATERIAL EXAMINED:

NZOI Stns: D90, epizootic colony with gonothecae on a large, branched stem of *Nemertesia ciliata* Bale, 1914. 1 of RMNH-Coel. slides 2824; **F127**, fragmentary specimen on *Lytocarpia alata* sp. nov., may belong to ssp. *simplex* Billard, 1930; RMNH-Coel. slides 3549; **F915**, 2 colonies 15 and 18 mm high on *Plumularia tenuissima* Totton, 1930; many ripe male gonothecae present. RMNH-Coel. slide 2196.

NMNZ: BS 210, 25 mm high colony epizootic on stem of *Lytocarpia subdichotoma* (Ralph, 1961); spent gonothecae present. NMNZ Co. 573; RMNH-Coel. slide 3015.

TYPE LOCALITY: *Plumularia bonnevieae*: Bay of Biscay (Billard 1906); holotype in MNHN, L 1055; *Plumularia triangulata: Terra Nova* Stn 91, off Three Kings Islands, 549 m, on *Plumularia tenuissima* Totton, 1930 (Totton 1930); holotype in NHM.

DESCRIPTION: Colonies 15–25 mm high, with monosiphonic stems, arising from tubiform stolon attached to axes of other hydroids [*Lytocarpia alata* sp. nov.; *L. subdichotoma* (Ralph, 1961)]. Stem monomerously segmented, nodes transverse, internodes in straight line; in basal part of stem nodes absent to very indistinct, indicated by constrictions in perisarc. Each internode with large distal apophysis supporting hydrocladium and 3 nematothecae; apophyses directed obliquely upwards and alternately left and right, with big mamelon on upper surface. 1 nematotheca on proximal part of internode, 1 above mamelon, and 1 at base of apophysis; all nematothecae on front of colony. Internodes long, slender and flexuous, monomerously segmented, 7–10 thecate internodes present. Each internode with 1 hydrotheca and 2 nematothecae, all on upper surface of internode.

Hydrotheca small, cup-shaped, situated slightly below middle of internode; walls slightly narrowing basally, rim flat, circular, plane of aperture slightly tilted forwards, half of adcauline wall adnate with internode. 1 nematotheca halfway between hydrothecal floor and base of internode, the other slightly below middle of upper part internode. All nematothecae elongate, cup-shaped, with circular rim, narrowing basally and movable, easily damaged or shed.

MEASUREMENTS of *Kirchenpaueria bonnevieae* (in μm):

	New Zealand (Ralph 1961b)	NMNZ BS 210 slide 3015
Stem internodes, length	800	920 – 985
Diameter at node	250	145 – 170
Stem apophysis, length		140 – 150
Hydrocladial internodes, length	800	900 – 1330
Diameter at node	90	95 – 100
Hydrotheca, diameter at rim	100	130 – 160
Diameter at base		105 – 115
Total depth	80	90 – 105
Nematotheca, length	50 - 62	85 – 90
Maximum diameter		31 – 40
Gonotheca, total length*	2200	1035 – 1394
Maximum diameter*	700	380 – 440

* taken from NZOI Stn F915, slide 2196

Ripe gonothecae occur in the material from NZOI Stn F915; gonothecae an elongate, inverted cone, flattened dorsofrontally, inserted in stem apophyses below the mamelon and containing a large ripe gonophore with a cap of developing spermatocytes.

REMARKS: The specimen from NZOI Stn F127 is very incomplete; it may belong to spp. *simplex* Billard, 1930.

RECORDS FROM NEW ZEALAND: First recorded off Three Kings Islands by Totton (1930; *Terra Nova* Stn 91). Now recorded from four widely separated localities: Campbell Plateau, 49°22′ S, 176°16′ E, 1280 m; Chatham Rise, 53°50.00′ S, 179°00.00′ E, 399 m; NE slope North Island, 34°58.70′ S, 174°18.00′ E, 251 m, and NE of Mayor Island, 37°10′ S, 176°23.5′ E, 732 m. This species occurs exclusively epizootic on larger hydroids (Sertulariidae,Aglaopheniidae) and may easily be overlooked; its actual distribution in New Zealand waters may be much wider.

DISTRIBUTION: Several records from the northeastern Atlantic (Trondhjem Fjord, Norway; between the Faroe and Shetland Islands, and Bay of Biscay), the Atlantic north of Rabat, Morocco, the Mediterranean, and the Indian Ocean off southern Africa (Ramil & Vervoort 1992).

Pycnotheca Stechow, 1919

TYPE SPECIES: *Diplocheilus mirabilis* Allman, 1883.

Three species:

Pycnotheca mirabilis (Allman, 1883) [= *Diplocheilus mirabilis* Allman, 1883]

Pycnotheca producta (Bale, 1888) [= *Plumularia producta* Bale, 1882]

Pycnotheca biseptata Blackburn, 1938

Pycnotheca mirabilis (Allman, 1883) (Fig. 89D–J)

Diplocheilus mirabilis: Allman 1883: 49, pl. 8, figs 4-7; Ritchie 1911: 854; Stechow 1913b: 9, 88, figs 55-56; Bedot 1916: 646.

Kirchenpaueria mirabilis: Bartlett 1907: 43; Mulder & Trebilcock 1909: 34, pl. 1, fig. 8; Briggs 1915: 308-309; Bedot 1921b: 20; Blackburn 1938: 317; 1942: 106; Hodgson 1950: 50, figs 81-82; Millard & Harrison 1954: 176.

Plumularia mirabilis: Billard 1910: 37-38.

Diplocheilus (Kirchenpaueria) mirabilis: Bedot 1913: 221, figs 14-15.

Plumularia (Diplocheilus) mirabilis: Jäderholm 1919: 23.

Pycnotheca mirabilis: Stechow 1919: 111; 1923b: 17; 1923d: 215; Totton 1930: 216, fig 55b-e; Millard 1957: 234; 1958: 213; Yamada 1958: 51, 59; 1959: 76; Ralph 1961c: 109; Nishihira 1965: 77; Rees & Thursfield, 1965: 155; Millard, 1966: 494; Rho 1967: 350, text-fig. 11A–B, pl. 1, figs 2–3; Berrisford 1969: 394; Day, Field & Penrith 1970: 14; Gravier 1970: 116; Millard & Bouillon 1974: 10; 1975: 3; Rho & Chang 1974: 148; Millard 1975: 377, fig. 120D–G; Mergner & Wedler 1977: 20, pl. 5, fig. 33; Rho 1977: 278, 424, pl. 92, fig. 92; Millard 1978: 196 et seq.; Hirohito 1983: 66; Rho & Park 1986: 94; Park 1990: 84; Dawson 1992: 18; Park 1992: 295; Bouillon, Massin & Kresevic 1995: 51; Hirohito 1995 (English text): 256-258, fig. 86a-e; Park 1995: 16.

Kirchenpaueria (Pycnotheca) mirabilis: Stechow 1925a: 241.

Pycnotheca mirabilis var. *mirabilis*: Ralph 1961b: 50–52, fig. 7a–b; Watson 1975: 170, fig. 28.

Diplochelus mirabilis: Stranks 1993: 12 (incorrect subsequent spelling).

MATERIAL EXAMINED:

NZOI Stns: D57, fragmentary colony on stem of *Synthecium* sp., with 2 gonothecae, no hydrothecae. RMNH-Coel. slide 4352; **D62**, mutilated specimen with large, black gonothecae on *Synthecium* sp. RMNH-Coel. slide 4353; **D127**, 3 plumes, about 30 mm long. RMNH-Coel. slide 2828; **G672**, about 20 colonies up to 40 mm high, no gonothecae. RMNH-Coel. slide 2860; **J54**, many colonies about 40 mm high, from sample that apparently has been dried out previously; **Q174**, single stem, 12 mm high on bryozoans. RMNH-Coel. slide 2916.

NMNZ: Spencer Bay, Queen Charlotte Sound, 10.Nov. 1961, numerous colonies, up to 80 mm high, branched or developing on each other, with numerous gonothecae. NMNZ Co. 383; RMNH-Coel. 29128, slide 2945; **BS 769**, 3 bunches of about 70 mm high colonies with many gonothecae, on stem of *Lytocarpia vulgaris* sp. nov. NMNZ Co. 869; RMNH-Coel. 27752, slide 3528.

NMNZ Ralph Collection: Loc. 188, NMNZ Co. 1043, fragments of *Pycnotheca mirabilis* (Allman, 1883) (RMNH-Coel. slide 3708), *Antennella kiwiana* Schuchert, 1997, *Antennella secundaria* (Gmelin, 1791), *Synthecium* sp. and *Hebellopsis scandens* (Bale, 1888) in a tube with that number and *Halopteris campanula* in the list.

TYPE LOCALITY: *Challenger* Stn 162, off Moncœur Island, Bass Strait, 70–73 m (Allman 1883); holotype (probably) in NHM.

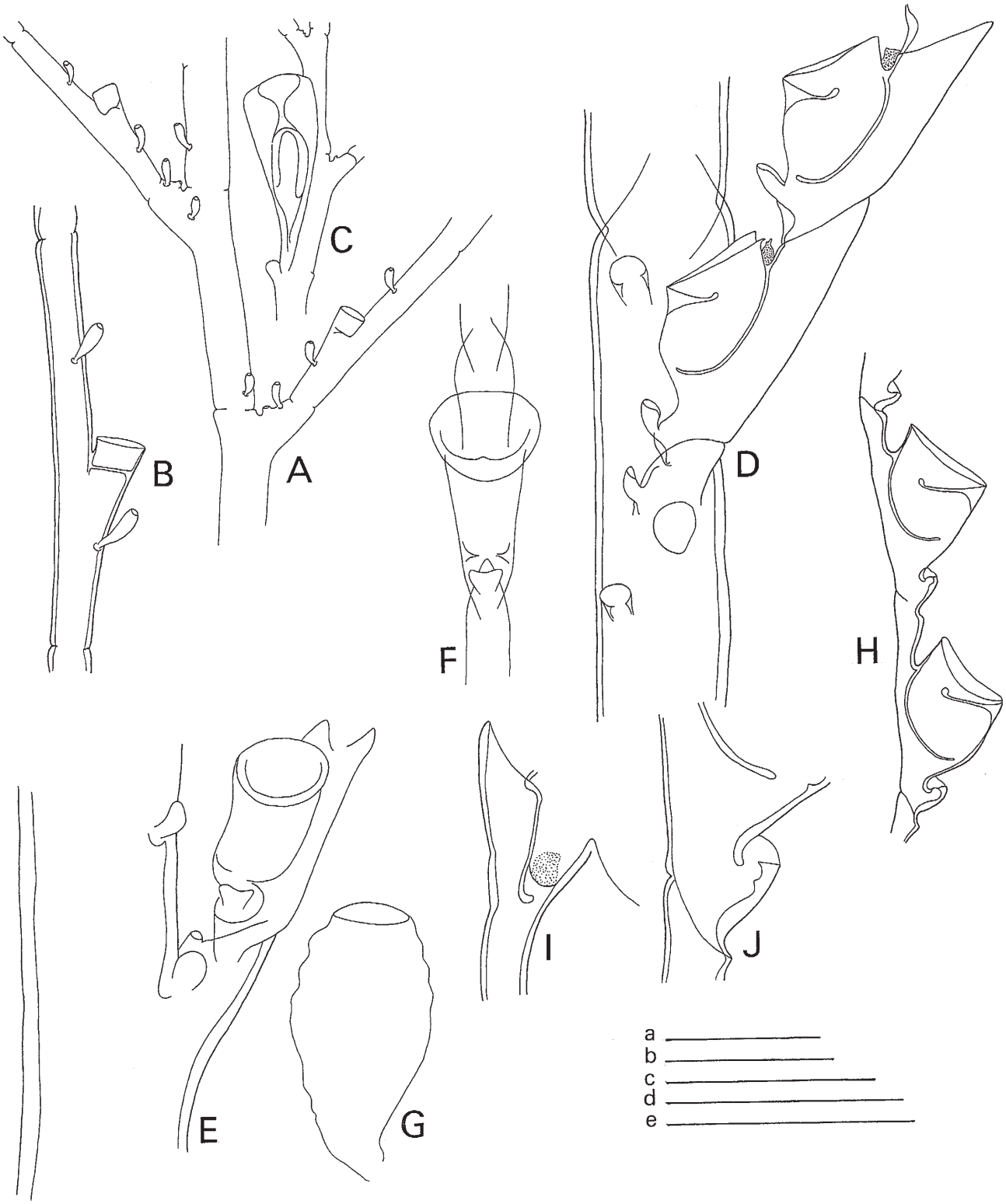

Fig. 89. A–C. ***Kirchenpaueria bonnevieae*** (Billard, 1906). **A**, part of stem with two hydrocladia, frontal view. **B**, hydrothecate internode, lateral view (BS 210, slide 3015). **C**, male gonotheca, lateral view (NZOI Stn F915, slide 2196). **D–J.** ***Pycnotheca mirabilis*** (Allman, 1883). **D**, part of stem with insertion of hydrocladium, showing arrangement of nematothecae, frontal view. **E**, the same, slightly oblique lateral view. **F**, hydrothecate hydrocladium, frontal view. **G**, gonotheca, lateral view (NMNZ, Spencer Bay, slide 2945). **H**, two internodes from hydrocladium. **I**, reduced axillary nematotheca of hydrotheca. **J**, median inferior nematotheca; all lateral view (Loc. 188, slide 3708). Scales: a, 0.2 mm (A); b, 1 mm (C); c, 2 mm (G); d, 0.2 mm (B, I, J); e, 0.5 mm (D–F, H). W.V.

DESCRIPTION: Monosiphonic pinnate stems to 45 mm high arising from tubiform stolon attached to firm substrate. Hydrocladia alternately and gracefully curving laterally. Stem basally with a few internodes without nematothecae and with transverse septa; remainder of stem composed of athecate internodes with oblique nodes, some of which may be developed as hinge-joints; no hydrothecae occur on the stem. Stem internodes typically with 2 strong apophyses, 1 near base of internode; higher numbers of apophyses per internode may occur. Apophyses alternate, pointing obliquely upwards, distinctly frontal, supporting hydrocladia about 10 mm long. Each stem apophysis with large, tall mamelon on upper surface; front of apophysis with scale-shaped, monothalamic nematotheca some distance below mamelon; additional similar nematothecae present on front of internode, 1 invariably some distance above apophysis.

Hydrocladia monomerously segmented; internodes separated by steeply oblique nodes, including proximal oblique node separating apophysis from first thecate internode. Each internode with 1 hydrotheca, occupy-ing major part of internode, 1 monothalamic median inferior nematotheca and a large, naked sarcostyle behind the hydrotheca. Median inferior nematotheca with solid base confluent with basal part of internode and a hyaline cup-shaped upper part shielding the nematophore. Sarcostyle in axil between free part of adcauline hydrothecal wall and internode, shrivelled in most colonies but still distinctly visible; basal part invested by shallow hyaline cup.

Hydrotheca more or less saccate, most of adcauline wall adnate with internode, only small part of variable length free. Abcauline wall moderately to distinctly convex; hydrothecal rim subcircular, slightly deepened laterally; plane of aperture decidedly tilted forwards, angle with axis of internode 30–45°. Interior of hydrotheca with crescent-shaped septum near apex of abcauline wall; free edge of plateau thickened and slightly upturned, visible in lateral view as a narrow triangle with upturned top, pointing towards interior of hydrotheca. Occasional renovations of hydrothecae present.

Perisarc of stem strong, thick, yellowish-brown; perisarc of hydrocladia much thinner, rapidly thinning out along hydrothecal walls that are easily damaged.

Gonothecae very large and strongly sclerotised, ovoid with flattened top with circular operculum; narrowing basally into a short pedicel attaching gonotheca to internode just below hydrocladial apophyses, leaving a clearly marked scar when shed. Walls of gonotheca irregularly wrinkled into 5 or 6 transverse, rounded ribs. No sexual differences observed.

MEASUREMENTS of *Pycnotheca mirabilis* (in μm):

	NMNZ Spencer Bay slide 2945	Ralph's Loc. 188; Doubtless Bay, slide 3708
Stem internode, length	1720 - 1885	420 - 475
Diameter at node	340 - 350	85 - 100
Apophysis, length	140 – 150	67 - 85
Height of mamelon	28 - 56	39 - 50
Hydrocladial internode, length	560 - 590	450 - 530
Diameter at node	90 - 100	50 - 67
Hydrotheca, length adnate adcauline wall	280 - 290	220 - 230
Length free adcauline wall	45 - 56	95 - 100
Length abcauline wall	200 - 235	160 - 185
Diameter at rim	230 - 240	200 - 220
Gonotheca, total length	3115 - 3280	
Maximum diameter	1550 - 1560	

REMARKS: This species was split by Totton (1930: 216) into two geographically based subspecies: *Pycnotheca mirabilis mirabilis* (Allman, 1883) [= *Diplocheilus mirabilis* Allman, 1883] and *P. mirabilis warreni* Totton, 1930 [= *Kirchenpaueria mirabilis sensu* Warren, 1908], the first being distributed over the Indo-Pacific, the second restricted to South African coastal waters. The closely allied *Pycnotheca producta* (Bale, 1882), which is not sharply delimited from *P. mirabilis*, was split up into three sub-species, viz., *P. producta producta* (Bale, 1882) [= *Plumularia producta* Bale, 1882] from Australia, *P. producta allmani* (Torrey, 1904) [= *Diplocheilus mirabilis* sensu Torrey, 1904] from the West Pacific, and *P. producta inabai* Totton, 1930 [= *Plumularia producta sensu* Inaba, 1891], from Japanese waters. As the differences between the two species and the various subspecies are based on such variable characters as size of the colony, diameter of stem and hydrocladia, thickness of perisarc, number of apophyses per stem internode, size and morphology of hydrotheca, development of the intrathecal ledge, length of free adcauline hydrothecal wall and morphology of the median inferior nematotheca, we have, for the present, recognised only the two nominotypical species *P. mirabilis* (Allman, 1883) and *P. producta* (Bale, 1882); we leave *Pycnotheca biseptata* Blackburn, 1938 out of consideration here. In our opinion the specific differences between *P. mirabilis* and *P. producta* are not (yet) clearly established. In the material from Doubtless Bay the top part of the hydrocladial internode is occasionally split off by a transverse node to form a separate athecate internode. In its small size and in the shape of the median inferior nematotheca this material approaches *P. producta*.

Pycnotheca mirabilis is mainly an epizooitic species, and *Pycnotheca producta* is epiphytic (J.E. Watson, personal observations).

The colonies from Ranfurly Bank (NMNZ BS 769; RMNH-Coel. slide 3528) are particularly well preserved;

the large polyps are in varies stages of contraction and have 14–16 long tentacles around a dome-shaped proboscis. When extended they curve forward over the crescent-shaped hydrothecal ledge but can be withdrawn fully into the proximal part of the hydrotheca under that ledge.

The gonothecae, in all our fertile colonies, spring from the apophyses of stem internodes and not from the stolon. The basal part of the gonotheca narrows into a short but quite distinct, curved pedicel; some gonothecae are closely pressed against the stem but are never adnate. The perisarc of the gonothecae is particularly thick and very opaque, their sex, consequently, could not be determined. Hirohito indicated that an acrocyst is produced to shield the eggs.

Records from New Zealand: First recorded from the Three King regions and off North Cape by Totton (1930, *Terra Nova* Stns 90, 134, and 144, 20–183 m). Further records are from Doubtless Bay, from Ranfurly Bank, East Cape, from Cook Strait and vicinity, from Canterbury Bight, from the Chatham Islands neighbourhood, from the Macquarie Gap and from the Southwest Pacific south of Stewart Island. Recorded depths are between 3.5 and 102 m. Gonothecae occur in January, May, and November; opaqueness of the gonothecal perisarc prevents commenting on the condition of the gonophores.

Distribution: Coastal waters of South Africa, Vema Seamount (southern Atlantic); India; Australia; New Zealand.

Family **PLUMULARIIDAE** Hincks, 1868

Monotheca Nutting, 1900

Type Species: *Monotheca margaretta* Nutting, 1900.

In this genus the following species have been considered.

Monotheca epibracteolosa Watson, 1973
Monotheca flexuosa Bale, 1894
Monotheca hyalina (Bale, 1882)
Monotheca margaretta Nutting, 1900
Monotheca obliqua (Johnston, 1847)
Monotheca posidoniae Picard, 1952b
Monotheca pulchella (Bale, 1882)
Monotheca spinulosa (Bale, 1882)
Monotheca togata Watson, 1973
Monotheca vervoorti (Leloup, 1971)

The identification of the species of this genus depends very much on characters of the general shape of the hydrothecae that are difficult to describe.

Monotheca epibracteolosa Watson, 1973

(Fig. 90A–E)

Monotheca epibracteolosa Watson 1973: 189–191, figs 56–60.

Material Examined:

NMNZ Ralph Collection: Loc.205, NMNZ Co. 1054, some small, 2–3 mm high colonies on stem of *Sertularella integra* Allman, 1876, with *Hebellopsis scandens* (Bale, 1888). RMNH-Coel. slide 3717; **Loc. 289**, NMNZ Co. 1134, about 7 mm high colonies arising from stolonal tubes firmly attached to fronts of algae. No gonothecae observed. RMNH-Coel. slide 3814. Poor slide in RSC as *Plumularia spinulosa*, no data; **Loc. 294**, NMNZ Co. 1139, some small colonies on algae. RMNH-Coel. slide 3821, with *Plumularia setaceoides* Bale, 1882.

Type Locality: Pearson Island, Great Australian Bight, on *Sargassum bracteolosum*, 50 m depth (Watson 1993; holotype in MOV, MV F42101 (formalin preserved sample) and MV F42046 (microslide); six paratype microslides numbered MV F42047-52 (Stranks 1993).

Description: Stems to 3 mm high, arising from matting of flattened stolonal tubes radiating from basal part of stem and provided with internal perisarc pegs; firmly attached to algal substratum. Stem monosiphonic, with a short basal internode of variable length and without nematothecae; remainder of stem composed of hydrocladiate internodes of various lengths socketed into each other and separated by almost transverse nodes. Stem internodes with almost distal apophysis; apophyses alternately directed left and right, each supporting a short hydrocladium with a single hydrotheca. Perisarc of stem internodes thick, with 2–4 internal septa of varied development. Axil of apophysis with distinct mamelon almost flush with surface of apophysis and 1 bithalamic nematothecae on back.

Hydrocladium composed of 1 or 2 basal internodes and 1 hydrothecate internode. Typically 1 short, athecate proximal internode with 1 imperfect internal septum, with transverse basal node and slightly oblique distal node; thecate internode fairly deeply socketed into basal internode. In some colonies a slender, fairly long internode with incomplete proximal and distal septa occurs between this internode and the apophysis. Hydrothecate internode with median inferior nematotheca and a pair of lateral nematothecae on rounded top of internode behind free part of hydrothecal abcauline wall. Median inferior nematotheca on produced, rounded basal part of internode, bithalamic, with foreshortened abcauline wall and distinct diaphragm, top just reaching base of hydrotheca. Lateral nematothecae invisible in frontal view of internode, hidden behind free adcauline hydrothecal wall, tumbler-shaped with fairly wide apical chamber and narrow basal chamber; diaphragm distinct. Rim of apical chamber transverse, slightly inclined adaxially. Internode with 2 or 3 imperfect

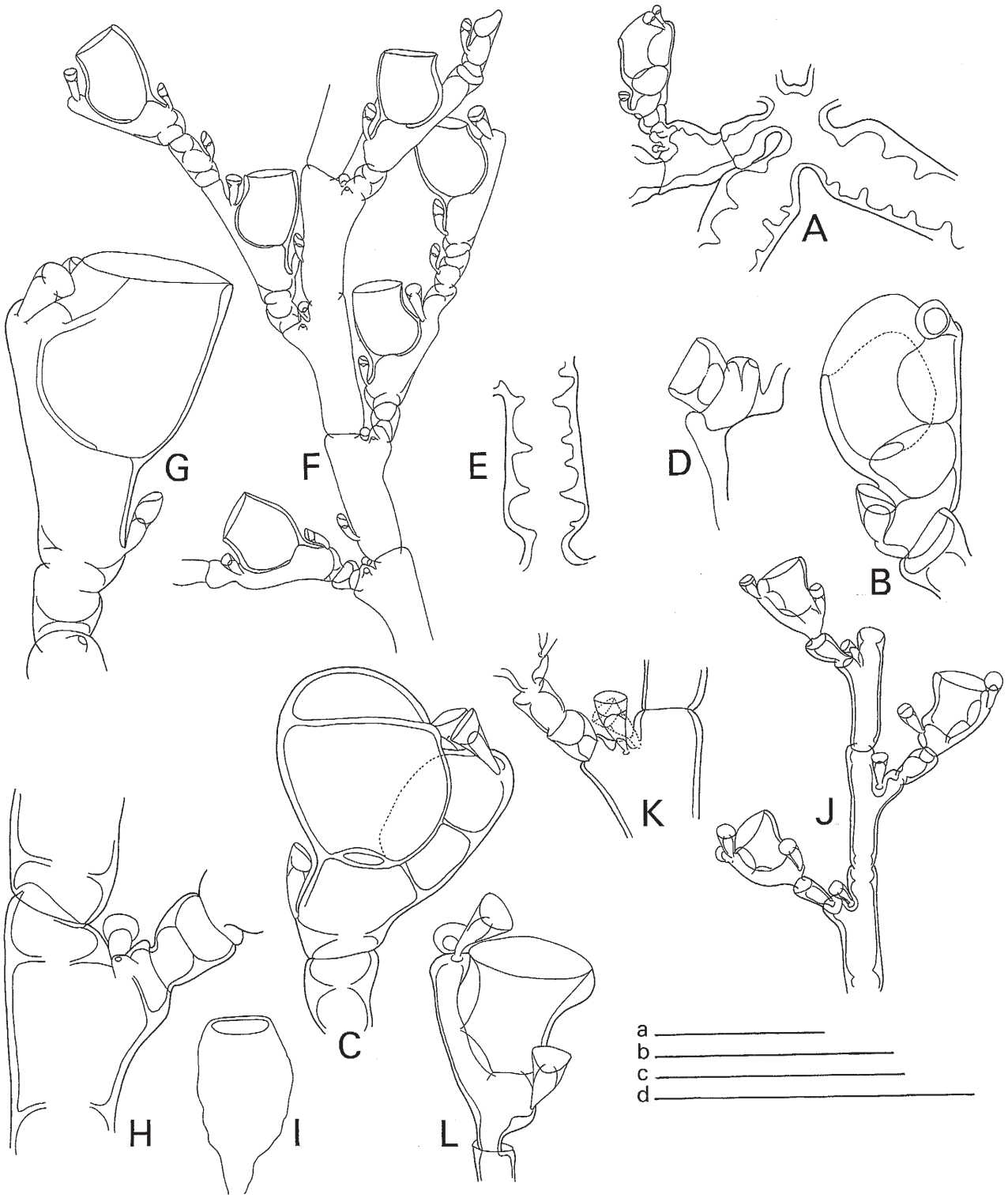

Fig. 90. A-E. ***Monotheca epibracteolosa*** Watson, 1973. **A**, colony, showing one stem and branched stolon. **B**, hydrocladium, lateral view (Loc. 294, slide 3821). **C**, hydrocladium, lateral view (Loc. 205, slide 3717). **D**, insertion of hydrocladium on stem apophysis, lateral view. **E**, part of stolon showing internal perisarc ridges (Loc. 294, slide 3821). **F–I.** ***Monotheca hyalina*** (Bale, 1882). **F**, part of stem with four hydrocladia. **G**, terminal internode of hydrocladium, lateral view (BS 838, slide 3404). **H**, insertion of internode on stem, lateral view. **I**, gonotheca, lateral view (Loc. 420, slide 3888). **J–L.** ***Monotheca pulchella*** (Bale, 1882). **J**, part of stem with three hydrocladia. **K**, insertion of internode on stem, lateral view. **L**, hydrothecate internode, lateral view (Loc. 258, slide 3781). Scales: a, 1 mm (I); b, 0.2 mm (B–D, F, H, K, L); c, 0.5 mm (A, E, J); d, 0.2 mm (G). W.V.

MEASUREMENTS of *Monotheca epibracteolosa* (in μm):

	Ralph's Loc. 205 slide 3717	Ralph's Loc. 289 slide 3814	Ralph's Loc. 294 slide 3821
Stem internode, length	405 – 590	265 – 335	210 – 215
Diameter at node	100 – 110	55 – 70	100
Basal hydrocladial internode, length	73 – 95	28 – 90	50
Diameter at node	45 – 56	39 – 56	50
Intermediate hydrocladial internode (if present), length		100 – 105	
Diameter at node		45 – 50	
Hydrocladial internode, length	255 – 280	170 – 180	240 – 250
Diameter at node	67 – 73	45 – 47	60 – 65
Hydrotheca, length free adcauline wall	73 – 84	70 – 73	40 – 45
Length adnate wall	110 – 115	84 – 100	105 – 115
Length abcauline wall	155 – 160	140 – 150	100 – 105
Diameter at rim	140 – 150	110 – 140	100 – 105
Median inferior nematotheca, length	67 – 73	–	67 – 70
Diameter at rim	39 – 45	–	28 – 34
Lateral nematotheca, length	73 – 78	55 – 60	55 – 60
Diameter at rim	45 – 50	34 – 40	34 – 39

internal septa; 1 in proximal part of internode, and 1 or 2 behind abcauline wall of hydrotheca.

Hydrotheca set on 2 cushion-shaped prominences of wall of internode, more or less cup-shaped, with thickened, convex adcauline wall; rim of hydrotheca thickened, curved, highest parts of curve in middle of lateral walls, steeply curving towards free part adcauline wall; this part slightly longer than adnate adcauline wall. Diaphragm very distinct in base of hydrotheca; rim of diaphragm thickened.

Gonothecae absent.

REMARKS: No additional nematothecae have been observed on stem internodes but material is limited and such nematothecae are easily shed when handling the colonies. The colonies from Ralph's Loc. 205 (slide 3717) may not have originated from algae, the stolonal tubes are not flattened and have no internal perisarc pegs. In the colonies from Loc. 289 the first hydrocladial internode is fairly long and a long intermediate internode may have developed between the apophysis and this much shorter internode. The stem internodes are long and the internal perisarc rings are only just visible. The hydrocladia have a fairly long intermediary internode with a weakly developed proximal and distal internal septum. Development of perisarc on the hydrothecal walls is weaker than in the two remaining samples from Ralph's Loc. 289 (slide 3814) and 294 (slide 3821). General outline of the hydrothecae is identical in the three samples but those from Loc. 205 are bigger.

RECORDS FROM NEW ZEALAND: This species was twice found on drifted algae: Island Bay and Breaker Bay, Cook Strait. Live specimens originate from Foveaux Strait oyster beds, depth unknown.

DISTRIBUTION: Known only from Pearson Island, Great Australian Bight, and from New Zealand waters.

Monotheca hyalina (Bale, 1882) (Fig. 90F–I)

Plumularia hyalina Bale 1882: 41, pl. 15, fig. 9; 1884: 141, pl. 12, figs 4–5; von Lendenfeld 1885a: 475, 626; Bale 1887: 78; Bartlett 1907: 422; Bedot 1921b: 28; Trebilcock 1928: 24, pl. 6, fig. 6; Ralph 1961b: 41, fig. 5a-b; 1961c: 109; 1961d: 236; Morton & Miller 1973: 154; Watson 1975: 170, fig. 29; Dawson 1992: 17; Stranks 1993: 11.

Plumularia ? hyalina: Poore 1968: 590.

Monotheca hyalina: Stechow 1921d: 260; Watson 1997: 529.

MATERIAL EXAMINED:

NZOI Stn B223, gear GLO: Many colonies on algae; no gonothecae. RMNH-Coel. slide 2758.

NMNZ: On algal holdfast, **Lyall Bay**, 31.July.1954: 7 stems, 3–5 mm high, no gonothecae. NMNZ Co. 621; **BS 838**, with *Antennella kiwiana* Schuchert 1997 on stems of *Crateritheca zelandica* (Gray, 1843). About 10 stems of *M. hyalina* (NMNZ Co. 759) and 2 quite small stems of *A. kiwiana*. No gonothecae. RMNH-Coel. 27704, 4 slides 3404: 2 x 3404a (*M. hyalina*), 3404b (*M. hyalina* and *A. kiwiana*), 3404c (*Crateritheca zelandica*).

NMNZ Ralph Collection: Loc. 14, NMNZ Co. 889, various colonies several millimetres high on fragment of alga. No gonothecae. RMNH-Coel. slide 3588. General condition of sample suggests that it has been dried out; **Loc. 232**, NMNZ Co. 1077, many up to 12 mm high stems on remains of bryozoans; no gonothecae. RMNH-Coel. slide 3744. With some stems of *Turritopsis nutricula* McCrady, 1857. Poor slide as *Plumularia hyalina, Tubiclava rubra*, no data; **Loc. 328**, NMNZ Co. 1161, numerous dead colonies about 8 mm high on algae, some (but few) with gonothecae. 2 RMNH-Coel. slides 3838, one with gonotheca; **Loc. 377**, poor slide in RSC

as *Plumularia hyalina*, with data: with one h/per i; **Loc. 420**, NMNZ Co. 1205, fair number of 8–10 mm high stems on fragment of alga; no gonothecae. RMNH-Coel. slide 3888; **Loc. 714**, fair slide in RSC as *Plumularia hyalina* with data: St Heliers Reef, 3.Jun.50, pl. 5; **Loc. 715**, reasonable slide in RSC as *Plumularia hyalina*, with data: Pennularian, Russell, (*Carpophyllum*), 22.Aug.50.

Type Locality: Queenscliff, Victoria, Australia (Bale 1882); probable syntype in MOV, MV F59053, 1 microslide (Stranks 1993).

Description: Monosiphonic, flexible stem up to 15 mm high, arising from wrinkled and branched stolonal tubes without nematotheca and without internal perisarc pegs. Stem made up of hydrocladiate internodes, basally with 1 or several nodes of varied length without hydrocladia. Remaining internodes of more or less uniform length and with distal apophysis; apophyses alternately directed left and right. Internodes socketed into each other by slightly oblique nodes; typically with up to 3 incomplete internal septa. Apophysis truncated obliquely at top, frontal surface provided with distinct, mound-shaped mamelon, projecting above level of internode; a bithalamic nematotheca slightly below axil on back. A nematotheca on proximal part of internode on opposite side from apophysis.

Hydrocladia inserted on apophysis on short basal internode without nematotheca but with internal septum; hydrocladium composed of 1 or 2 thecate internodes. Hydrocladia with 2 segments have the thecate internodes separated by a short internode with 1 nematotheca and 2 internal septa; first thecate internode lengthened beyond insertion of lateral nematothecae and with 1 septum; second thecate internode with rounded apex directly above insertion of lateral nematothecae. Each thecate internode with cup-shaped hydrotheca, a median inferior nematotheca placed on slightly bulging part of internode; an internal septum below insertion of nematotheca.

All nematotheca bithalamic and movable, that near stem apophysis small, rim straight, not lowered. Lateral nematothecae fairly big, with straight rim, reaching hydrothecal rim or slightly shorter, almost hidden in cavity between free adcauline hydrothecal wall and internode; unpaired nematothecae curved, rim scooped on inner side.

Hydrotheca cup-shaped, about half or slightly less than half of adcauline side free and concave; adnate part smoothly curving towards large, well marked diaphragm. Abcauline wall convex, rather bulging. Plane of aperture at an angle of about 75° with internodal length axis, smooth. Perisarc of hydrotheca fairly thick; rim not thickened.

Female gonothecae barrel-shaped; apex flat, with circular operculum. Walls irregularly undulated; basal part rather suddenly narrowing into a short pedicel inserting on apophysis of stem internode.

Measurements of *Monotheca hyalina* (in μm):

	Ralph's Loc. 420 slide 3888	NMNZ BS 838 slide 3404
Axial internode, length	310 – 450	280 – 310
Diameter at node	90 – 100	61 – 95
Basal hydrocladial internode, length	95 – 110	73 – 84
Diameter at node	67 – 78	45 – 50
First hydrocladial internode, length	385 – 425	280 – 300
Diameter under insertion mesial inferior nematotheca	95 – 100	84 – 95
Intermediate internode, length	170 – 180	84 – 110
Second (or only) hydrocladial internode, length	295 – 310	305 – 335
Hydrotheca, length free adcauline wall	62 – 67	78 – 84
Length adnate part	125 – 135	110 – 130
Length abcauline wall	160 – 185	170 – 185
Diameter at rim	145 – 160	105 – 130
Median inferior nematotheca, length	56 – 84	70 – 73
Diameter at rim	28 – 50	23 – 34
Lateral nematotheca, length	62 – 84	54 – 56
Diameter at rim	45 – 50	43 – 45
Female (?) gonotheca, length with pedicel*	1265	
Maximum diameter*	690	
Diameter at apex*	490	

*Ralph's Loc. 328, slide 3838

Remarks: Hydrocladia composed of two hydrothecate internodes, connected by an intermediate athecate internode, are a normal occurrence in the New Zealand material of this species and are usually, although not exclusively, found at the basal part of the stem. Condition of intermediate internode varied: in the colonies from BS 838 there may be two short intermediate internodes, of which one or both have a nematotheca. The upper portion of the first thecate internode may be split off to form an additional intermediate internode without nematotheca. Development of the internal septa is much varied, even in the same colony; in the stem internodes there may be as many as four: one on both ends and two in intermediate position.

Records from New Zealand: First recorded from New Zealand by Trebilcock (1928): Island Bay, Wellington; St Clair, Dunedin, and Bluff. Additional records are from Russell, Bay of Islands; Browns Bay, Auckland;

reef St Helliers Bay, Auckland; Ohope beach, Whakatane (drift); Opotiki beach (drift); Ranfurly Bank, East Cape; Lyall Bay, Wellington (drift); Palliser Bay, Cook Strait, on crayfish appendages; Taylor's Mistake, Christchurch; reef Portobello Marine Biological Laboratory; Little Papanui, Otago Peninsula, and Chatham Islands. Much of this material is from drifted algae; reliable depth records put the occurrence of live specimens between 34 and 54 m. This species probably occurs commonly in the deeper parts of the littoral zone of eastern New Zealand coast attached to algae, bryozoans, and other fixed objects, often with *Plumularia setaceoides* Bale, 1882.

DISTRIBUTION: Southeast and western Australia and eastern coasts of New Zealand.

Monotheca pulchella (Bale, 1882) (Fig. 90J–L)

Plumularia pulchella Bale 1882 42-43, pl. 15, fig. 6; 1884: 140, pl. 12, fig. 6, pl. 19, fig. 37; Bartlett 1907: 43; Mulder & Trebilcock 1911: 120; Bedot 1921b: 28; Trebilcock 1928: 24; Totton 1930: 221–222, fig. 58a-d; Blackburn 1942: 108; Hodgson 1949: 41, fig. 71; Day *et al.* 1952: 404; Millard 1957: 232; Pennycuik 1959: 180; Ralph 1961b: 39–41, fig. 5c-e; 1961c: 109; Millard 1962: 300; 1966b: 493; Berrisford 1969: 394; Day *et al.* 1970: 14; Blanco 1973: 73–76, figs 1–3; Morton & Miller 1973: 154; 1978: 196 *et seq*.; 1980: 133; Izquierdo *et al*. 1986b: 54, fig. 5; Genzano 1990: 50–52, figs 16–17; Genzano & Zamponi 1992: 58–59, fig. 24; Stranks 1993: 13; Genzano 1994: 5; Watson 1994a: 67.
Plumularia pulchella(?): Mulder & Trebilcock 1916: 78–79.
[Not *Plumularia pulchella*: Millard 1975: 398–399, fig. 125C–D; Watson, 1996: 79 = *Monotheca flexuosa* (Bale, 1894)].
Monotheca pulchella: Stechow 1921d: 260; 1923d: 224; Medel & Vervoort 1995: 58–61, fig. 25 (*cum syn*.); Dawson 1992: 17.
Monotheca sp. Castric-Fey 1970: 8-12, figs 10-14.
Plumularia oblica: Patriti 1970: 58-59, fig. 83.
Plumularia femina García-Corrales *et al*. 1978: 57-61, fig. 26.

MATERIAL EXAMINED:

NZOI Stn I89, many colonies, partly branched, to 10 mm high, on *Symplectoscyphus odontiferus* sp. nov.; no gonothecae; 3 RMNH-Coel. slides 4764; 2 x 4764a *Monotheca pulchella*; 4764b *M. pulchella* and *Macrorhynchia philippina* (Kirchenpauer, 1872).

NMNZ Ralph Collection: Loc. 70, reasonable slide in RSC as *Plumularia pulchella*, no data; **Loc. 177**, NMNZ Co. 1033, numerous colonies up to 15 mm high on fronds of algae. With *Plumularia setaceoides* Bale, 1882. RMNH-Coel. 27782, 2 slides 3699; **Loc. 258**, NMNZ Co. 1106, many colonies up to 8 mm high on front of green alga; no gonothecae. 2 RMNH-Coel. slides 3781. Unstained slide in RSC as *Plumularia pulchella*, with data: good, single hydrot.

TYPE LOCALITY: Queenscliff, Victoria, Australia (Bale 1882); probable syntype in MOV, MV F59052, 1 microslide (Stranks 1993).

DESCRIPTION: Fine, flexible, monosiphonic, occasionally branched colonies 10–15 mm high, rising from tubular stolon without nematothecae attached to algae, bryozoans, and other hydroids. Stem basally with a few internodes without nematothecae, remainder of stem composed of slender internodes separated by transverse nodes and each with conspicuous apophysis some distance below distal end of internode; consecutive apophyses alternately directed left and right, all in 1 plane. Stem between apophysis and distal part of internode with a mamelon, perforating thick perisarc of axil and flush with external surface. 2 fairly big, bithalamic, elongated conical nematothecae flank the mamelon, 1 on the front, the other on back; both nematothecae slightly curved in opposed directions, the frontal facing upwards, that on back facing obliquely outwards and upwards. A third nematotheca occurs about halfway along the internode, inserting on surface opposed to apophysis. Nematothecae on stem internodes easily lost; axils in upper parts of present colonies invariably have a single nematotheca. Interior of stem internodes with 2 incomplete septa, 1 proximal, 1 distal. Ramifications of stem develop from lateral surface of stem apophyses and have a structure identical with the primary axis.

Hydrocladia borne on apophyses, composed of 1 or 2 athecate internodes and a single, terminal thecate internode. Intermediate, athecate internode(s) with imperfect internal septum. Thecate internode moderately curved, considerably swollen under hydrothecal base and with a big, bithalamic nematotheca with strong diaphragm level with hydrothecal base.

Hydrotheca bell-shaped; internode at base and back forms cushion-like expansions covering a minor length of hydrothecal wall. Adcauline wall of hydrotheca completely adnate, concave; abcauline wall convex and considerably thickened, particularly distally, giving hydrotheca an almost carinated appearance. Hydrothecal margin not everted; rim circular, smooth, plane of aperture almost perpendicular to long axis of hydrocladium or slightly tilted forwards. Lateral nematothecae inserted close to top of internode, big, projecting far beyond hydrothecal rim; apical chamber with perfectly smooth, circular rim; diaphragm distinct.

Gonothecae absent. Described by Ralph (1961: 39) as being "six or seven times the length of the hydrotheca, ovate, obliquely truncate distally; large smooth internal teeth just below the aperture; length of gonotheca approximately 0.60 mm; width 0.290–0.375 mm".

MEASUREMENTS of *Monotheca pulchella* (in μm):

	NZOI Stn I89 I89, slide 4764 a & b	Ralph's Loc. 258 slide 3781
Stem internode, length	225 – 285	290 – 315
Diameter at node	22 – 34	45 – 50
Basal hydrocladial internode, length	45 – 78	45 – 95
Diameter at node	28 – 31	45 – 67
Hydrocladial thecate internode, length	125 – 145	140 – 145
Diameter at insertion median inferior nematotheca	36 – 39	56 – 62
Hydrotheca, length adcauline wall	78 – 90	95 – 110
Length abcauline wall	95 – 105	115 – 125
Diameter at rim	100 – 115	110 – 125
Median inferior nematotheca, length	50 – 59	73 – 78
Diameter at rim	25 – 28	34 – 39
Lateral nematotheca, length	60 – 65	67 – 73
Diameter at rim	31 – 34	39 – 45

REMARKS: There may be one or two basal athecate internodes in the hydrocladia of the same colony. The development of hydrothecal perisarc is varied, thickest in the upper part of the frontal wall, probably much dependent upon water movement.

Monotheca flexuosa (Bale, 1884) is here considered to represent a separate species (cf. Watson, 2000: 48–49, fig. 37A, B).

RECORDS FROM NEW ZEALAND: First recorded from Bluff, South Island, by Trebilcock (1928); also found off North Cape, North Island (*Terra Nova* Stn 134); depth 20–37 m (Totton 1930). Additional records are from southeast of Norfolk Island; Menzies Bay, Christchurch; channel between Quarantine Island and Portobello Marine Biological Station at about 3.5 m, and the vicinity of the station, on algae, presumably in the littoral zone. Probably more widely distributed along the eastern coasts of New Zealand on algae in the littoral zone.

DISTRIBUTION: Temporate and subtropical parts of eastern and western Atlantic, including the Mediterranean; South African coastal waters; coastal waters of southern Australia; eastern coastal waters of New Zealand.

Monotheca spinulosa (Bale, 1882)

Plumularia spinulosa Bale 1882: 30, pl. 15, fig. 8; 1884: 139, pl. 12, figs 11–12; Bartlett 1907: 43; Mulder & Trebilcock 1911: 123–124, pl. 3, figs 9, 9a; 1916: 81, pl. 11, fig. 4; Briggs 1918: 34, 43; Bedot 1921b: 29; Blackburn 1937: 368; Eyre *et al.* 1938: 109; Blackburn 1942: 116; Pennycuik 1959: 180; Ralph 1961c: 109; Millard 1962: 301; 1966: 494; Berrisford 1968: 394; Day *et al.* 1970: 14; Morton & Miller 1973: 154; Watson 1973: 188, figs 54–55; Millard 1975: 401, fig. 125E–J; 1978: 196 *et seq*; Watson 1979: 234; Rho & Park 1986: 98-99, text-fig. 4a, pl. 1, fig. d; Watson 1994a: 67; Hirohito 1995: 278–279, fig. 96a-c; Stranks 1993: 13.
Monotheca spinulosa var. *typica* Stechow 1923d: 225.
Plumularia spinulosa var. *typica*: Millard 1958: 212.
Plumularia spinulosa var. *spinulosa*: Ralph 1961b: 37–39, fig. 4i-j.
Plumularia (Monotheca) spinulosa: Stechow 1925a: 246.
Monotheca spinulosa: Stechow 1921d: 260; 1923b: 17; Leloup 1932: 160; Dawson 1992: 17.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 716, reasonable slide in RSC as *Plumularia spinulosa* with data: Coromandel, 18.5.50, Pl. 7.

PMBS: *Plumularia ? spinulosa*. Identified by R. Kulka (taken from card register).

TYPE LOCALITY: Queenscliff, Victoria, Australia (Bale 1882, probable syntype in MOV, MV F59053, microslide; Stranks 1993).

REMARKS: There is no additional material in the present collection. Mentioned by Ralph (1961: 39) from three New Zealand localities: Coromandel Peninsula (Loc. 716); Island Bay, Cook Strait, drift (Loc. 289), and Makara Beach, drift (Loc. 304). Loc. 716 has been traced; the tube from Loc. 304 contains an unidentifiable species of *Monotheca* and the *Monotheca* from Loc. 289 is *Monotheca epibracteolosa* Watson, 1973. Ralph's figures 4i and 4j are unmistakably *M. spinulosa* but the provenance of the material on which the drawings are based is not given in the text but has probably been drawn from the specimens in the slide in RSC. The species is likely to occur more widely in New Zealand coastal waters.

Monotheca togata Watson, 1973 (Fig. 91A–E)

Monotheca togata Watson 1973: 191–193, figs 65–67.

MATERIAL EXAMINED:

NMNZ: BS 834, 2 small colonies on bryozoan colony with *Synthecium subventricosum* Bale, 1914 and *Halopteris campanula* (Busk, 1852). NMNZ Co. 753; RMNH-Coel. 27692, slides 3392 and 3396.

TYPE LOCALITY: Pearson Island, Great Australian Bight, on algae (*Metagoniolithon charoides*), 30–33 m (Watson 1973); holotype (microslide, MV F42061) and paratypes (5 microslides, MV F42062-6 and preserved sample, MV F42105) in MOV (Stranks 1993).

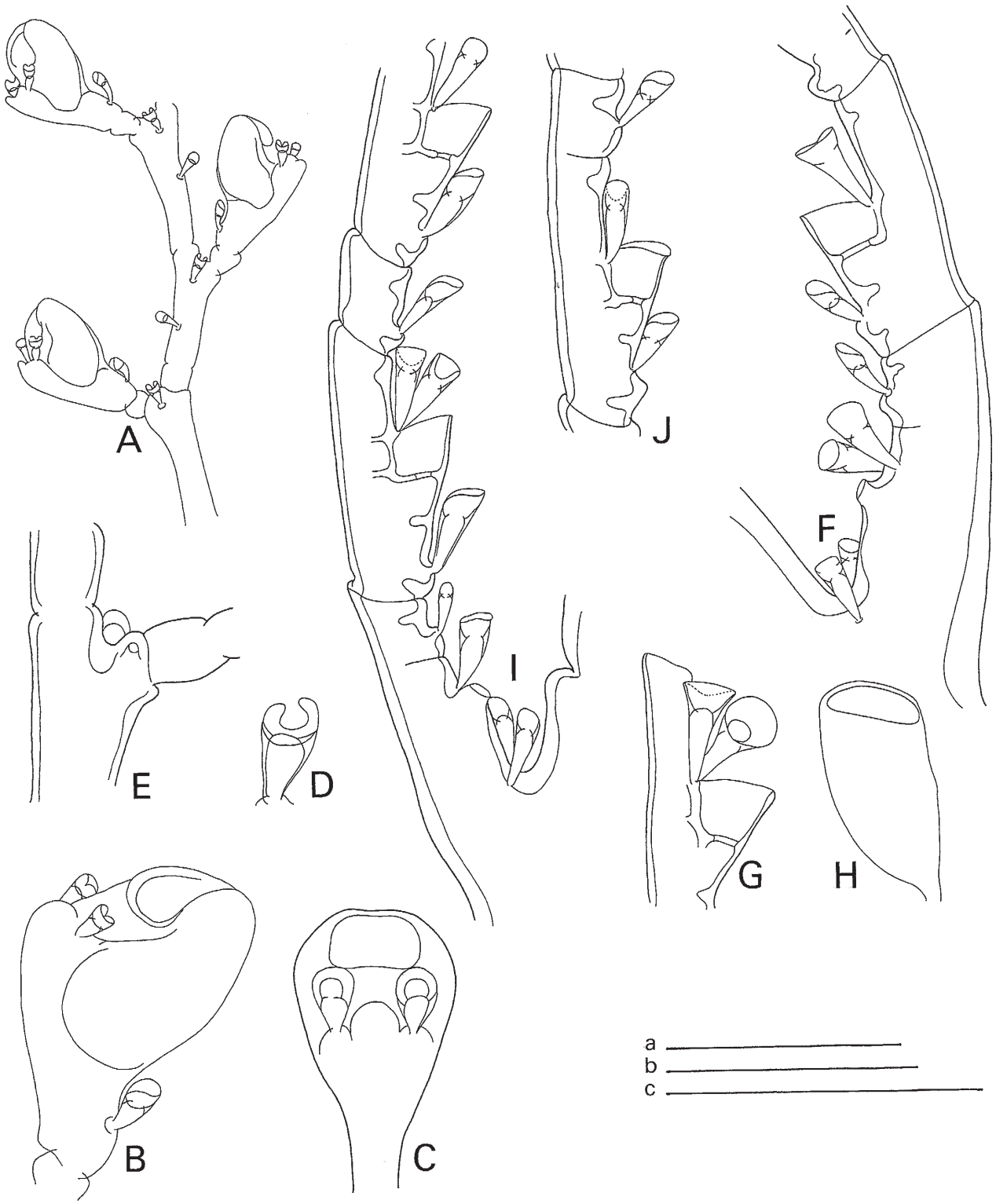

Fig. 91. A–E. ***Monotheca togata*** Watson, 1973. **A**, part of stem with three hydrocladia. **B**, hydrothecate internode, lateral view. **C**, the same, seen from back. **D**, one of lateral nematothecae, oblique lateral view (BS 834, slide 3396). **E**, insertion of hydrocladium on stem, lateral view (BS 834, slide 3392). **F–H.** ***Nemertesia ciliata*** Bale, 1914. **F**, stem apophysis and insertion of hydrocladium, lateral view. **G**, hydrotheca and lateral nematothecae, lateral view. **H**, gonotheca, lateral view (B581, slide 2788). **I, J,** ***Nemertesia cymodocea*** (Busk, 1851). **I**, stem apophysis and insertion of hydrocladium, lateral view (BS 398, slide 3018). **J**, hydrothecate internode and imperfectly separated ahydrothecate internode (NMNZ, between Cape Reinga and Three Kings Islands, slide 3377). Scales: a, 0.2 mm (B, C, E–G, I, J); b, 0.5 mm (A, H); c, 0.2 mm (D). W.V.

DESCRIPTION: Stem arising from network of flattened stolonal tubes with internal perisarc pegs, attached to a bryozoan colony, geniculate, 3–6 mm high and composed of slender internodes with slightly oblique nodes; first stem internode with transverse proximal node and with oblique distal node; no nematothecae. Remaining stem internodes with big apophysis some distance under apex, alternately directed left or right and arranged in 1 plane; axillary perisarc thick, perforated on back by conical mamelon shifted towards apophysis. Frontal surface of axil with slightly curved, conical, bithalamic nematotheca, facing upwards, rim of upper chamber deeply scooped. A second nematotheca, identical to axillar nematotheca, occurs at about half-way the internode on surface opposed to apophysis.

Hydrocladia inserted on stem apophyses, composed of 2 internodes: a short basal internode without nematotheca and a slightly curved thecate internode with 1 hydrotheca, a median inferior nematotheca and a pair of lateral nematothecae. Median inferior nematotheca conical, curved, bithalamic, rim deeply scooped on inner side, just reaching or slightly shorter than hydrothecal base. Lateral nematothecae shorter than other nematothecae, inserting on rounded part of internode behind free part of adcauline hydrothecal wall, completely invisible in frontal view of internode. Apex of hydrothecate internode occasionally with rounded prominence between base of lateral nematothecae.

Hydrotheca slipper-shaped; two-thirds of adcauline wall adnate, strongly concave, free part of adcauline wall forming a flattened expansion on top of hydrotheca; lateral nematothecae typically inclined towards that flattened surface.

MEASUREMENTS of *Monotheca togata* (in μm):

	NMNZ BS 834 slide 3396
Stem internode, length	250 – 365
Diameter at node	50 – 55
Basal hydrocladial internode, length	50 – 62
Diameter at node	39 – 45
Hydrocladial thecate internode, length	250 – 295
Diameter at insertion median inferior nematotheca	73 – 78
Hydrotheca, length adnate adcauline wall	150 – 155
Length free adcauline wall	67 – 78
Length abcauline wall	205 – 225
Diameter at rim	95 – 100
Median inferior nematotheca, length	65 – 70
Diameter at rim	22 – 24
Lateral nematotheca, length	60 – 62
Diameter at rim	34 – 45

Abcauline wall of hydrotheca convex, considerably produced frontally; aperture narrowed, plane of opening curved, hydrothecal rim with thickened perisarc septum.

Gonothecae absent.

REMARKS: The presence of internal perisarc rings could not unambiguously be observed in the (heavily) stained slides, but there appears to be a ring in the basal hydrocladial internode and in the axial apophysis.

RECORDS FROM NEW ZEALAND: 37°36.7′ S, 178°51.6′ E, Ranfurly Bank, East Cape, 56–63 m, on bryozoans.

DISTRIBUTION: Pearson Island, Great Australian Bight, on algae (*Metagoniolithon charoides*, 33 m); Ranfurly Bank, New Zealand.

Monotheca sp.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc.304, NMNZ Co. 1146,: a few colonies on stem of *Aglaophenia acanthocarpa* (Allman, 1876); no gonothecae. Poor slide in RSC as *Plumularia spinulosa, Aglaophenia acanthocarpa (?)*, no data.

Nemertesia Lamouroux, 1812

TYPE SPECIES: *Sertularia antennina* Linnaeus, 1758 (monotypy).

Nemertesia ciliata Bale, 1914c (Fig. 91F–H)

Nemertesia ciliata Bale 1914c: 170, pl. 36, fig. 1; 1915: 298; Briggs 1915: 307–308, pl. 18, fig. 3; Bedot 1917a: 43; Jäderholm 1919: 23; Bedot 1921b: 35; Stechow 1923b: 18; Hodgson 1950: 47, fig. 78; Yamada 1959: 82; Millard 1962: 297, fig. 7E–G; 1968: 254, 278; 1975: 383, fig. 121F–K; 1978: 195 *et seq.*; 1980: 133; Hirohito 1983: 68; Gili *et al.* 1989: 83–86, fig. 11B; Stranks 1993: 9; Hirohito 1995 (English text): 266–268, text-fig. 90a-c, pl. 13, fig. A.

MATERIAL EXAMINED:

NZOI Stns: B581, 2large colonies, 300 x 200 mm and many fragments. Gonothecae present. RMNH-Coel. slide 2788; **D20**, 1 colony about 200 m high in 2 parts. No gonothecae. RMNH-Coel. slide 2816; **D90**, fragments of large, branched colony; branching in 1 plane, at more or less right angles to stem, etc., fragments about 40 x 30 mm, colony must have been much bigger; gonothecae present. With *Kirchenpaueria bonnevieae* (Billard, 1906) and its gonothecae. 2 RMNH-Coel. slides 2824; **D132**, 2 well developed and some smaller colonies, attached to calcareous rock, no gonothecae. Colonies about 250 mm high with a spread of about 150 mm, very regularly branched, branches curving upwards and ending at about same height. Hydrocladia in decussate verticils of 3, about 5 mm long. RMNH-Coel. slide 2832; **D145**, 3 large colonies about 200 mm high attached to sponge.

No gonothecae. RMNH-Coel. slide 2837; **D175**, mutilated colony. RMNH-Coel. slide 2843. May belong here, fragmentary material; **D267**, about 200 mm high colony, spread 150 mm; no gonothecae. [Slide 4162 JEW Colln]. Originally identified as *Nemertesia elongata* Totton, 1930; **E255**, 1 large colony in fragments; no gonothecae. RMNH-Coel. slide 2104. May belong here; **E279**, colony, in 2 parts, about 180 mm high, no gonothecae. RMNH-Coel. slide 2159. May belong here; **F933**, 2 colonies about 150 mm high, spread about 120 mm. No gonothecae. RMNH-Coel. slide 2203. May belong here; **F936**, strongly mutilated large colony, completely fragmented; no gonothecae. RMNH-Coel. slide 2205. May belong here; **J28**, *Nemertesia* cf. *ciliata* Bale, 1914 (J.E. Watson). [Slide 4408 JEW Colln]. RMNH-Coel. slide 4362. Juvenile and fragmentary colony, may well belong here; **U227**, 3 colonies, 80, 150, and 200 mm high. Branching profuse in 2 biggest colonies; no gonothecae. 2 RMNH-Coel. slides 2924.

NMNZ: **Foveaux Strait, Oysterbeds**, Sept.1937, colony 120 mm high, spread about 60 mm; no gonothecae. Stem branched, especially in lower parts, branches running upwards, parallel to stem. NMNZ Co. 706; RMNH-Coel. 27655, slide 3355; 4.5 miles E. **Tory Channel**, Cook Strait, 15.Aug.1963: monosiphonic, branched specimen, practically no hydrocladia left. May belong here. NMNZ Co. 644; **BS 482**, 3 colonies of which highest about 150 mm, and some fragments. No gonothecae. Branching all in 1 plane. NMNZ Co. 857, 2 RMNH-Coel. slides 3521; **BS 496**, 3 colonies, 400, 200, 100 cm high and a stem fragment without hydrocladia; no gonothecae observed. NMNZ Co. 819; RMNH-Coel. 27743, slide 3497; **BS 510**, about 10 colonies up to 550 mm high and a number of fragments. Branching all in 1 plane. Main stem inflexible, basally about 7 mm thick. No gonothecae observed. NMNZ Co. 818; RMNH-Coel. 27742, slide 3496; **BS 519**, numerous fan-shaped colonies up to 100 mm high, with branched axes, branches usually running upwards. No gonothecae observed. NMNZ Co. 806; RMNH-Coel. 27741, slide 3484; **BS 668**, single small colony of pinnate construction, about 80 mm high. NMNZ Co. 729; RMNH-Coel. 27654, slide 3354. May belong here; too young for proper identification. **BS 742**, large number of colonies up to 150 mm high, spread about 100 mm and many fragments; from deteriorated sample. Stems strongly polysiphonic, 2–3.5 mm thick, branching in 1 plane and sub-opposite. Partly attached to coral fragments. Ultimate hydrocladia opposite and decussate; no gonothecae. NMNZ Co. 739; RMNH-Coel. 27701, slides 3401; **BS 840**, 3 colonies, up to 100 mm high. Many gonothecae. NMNZ Co. 395; 2 RMNH-Coel. slides 2953; **BS 894**, single mutilated colony about 90 mm high, main stem in 3 pieces, of which basalmost with bunch of rooting filaments anchoring colony in sand. Distalmost part with 2 about 30 mm long branches bearing closely packed hydrocladia about 6 mm long, monomerously segmented. No gonothecae. 2 RMNH-Coel. slides 3349. Mutilated colony in various parts, may belong here. NMNZ Co. 783; **BS 908**, 2 colonies, the first plume-shaped and ramified colony snapped off just above basal tuft; branching all in 1 plane, height about 200 mm, spread about 120 mm. The second with 3 stems emerging from dense, cone-shaped bundle of thin rooting filaments, branching repeated and all in 1 plane. No gonothecae. NMNZ Co. 791; RMNH-Coel. 27712, 3 slides 3412.

NMNZ Ralph Collection: Loc. 512, NMNZ Co. 1246, basal fragment about 15 mm long, with bundle of fibres, and 2 top parts, 15 mm long. RMNH-Coel. slide 3923. [As *Nemertesia cymodocea* (Busk, 1851)]; **Loc. 610**, NMNZ Co. 1319, 40 mm high top part with 3 side branches and some fragments. No gonothecae. RMNH-Coel. slide 4000. [As *Nemertesia cymodocea* (Busk, 1851)]; **Loc. 611**, NMNZ Co. 1320, fragments of a large colony, stem basally at least 2 mm diameter; no gonothecae. RMNH-Coel. slide 4001.

TYPE LOCALITY: OysterBay, Tasmania, 100 m (Bale 1914); probable syntype in MOV, MV F58338 (Stranks 1993).

DESCRIPTION: Axes arising from thick carpet of fine, intertwining stolonal filaments densely mixed with sediment particles anchoring colonies in soft bottom. Colonies fan-shaped, composed of repeatedly branched, polysiphonic stem and side branches, branching from base onwards; branches and side-branches typically straight and set at an angle of 45–80°. Polysiphony produced by thick secondary tubules with nematothecae, running up stem and branches to near end. Internodes separated by transverse nodes but division often obscured, only visible in the upper (youngest) parts of colony. In younger parts side branches are pinnately arranged, monosiphonic, occasionally opposite, and formed by the secondary tubules. Internodes with 1 or 2 whorls of 2–4 apophyses in decussate arrangement; in youngest parts occasionally 1 apophysis per internode, alternately arranged. Nematothecae sometimes on basal part of stem internodes. Nodes absent over considerable length of stem. Apophysis of considerable length, slightly swollen basally and with thick perisarc. Mamelon on swelling of apophysis, of moderate diameter, projecting some distance beyond apophysis; 2 pairs of nematothecae, 1 in axil, the second pair just above mamelon; in addition an unpaired nematotheca on front of upper part. Paired nematothecae bithalamic, fairly long, slender, with cup-shaped upper chamber with rim slightly scooped on inner side. Unpaired nematotheca with deeply scooped rim on adcauline side. Apophysis greatly lengthened from fusion with first athecate node of hydrocladium; a weak line of fusion visible while in some apophyses the separation is still complete.

Hydrocladia 3–5 mm long, composed of thecate and athecate internodes in regular succession, separated by slightly oblique nodes; 5–8 thecate internodes per hydrocladium. Athecate internode with unpaired nematotheca; thecate internode 3.5 times longer than athecate internode, with unpaired median inferior nematotheca and pair of quite long lateral nematothecae. Unpaired nematotheca same as that on apophysis; lateral nematothecae long, almost reaching node at end of thecate internode; basal chamber long, slender; upper chamber widening to form a shallow cup; rim slightly scooped on inner side. Lateral nematothecae inserted on small prominences close to each side of hydrothecal margin; development of prominence quite variable among colonies,

MEASUREMENTS of *Nemertesia ciliata* (in μm):

	NZOI Stn B581 slide 2788	NMNZ BS 742 slide 3401	NMNZ BS 840 slide 2953
Length of axial internode	575 – 1560	705 – 2950	820 – 1560
Diameter at node	170 – 195	130 – 160	135 – 160
Length of apophysis with unpaired apical nematotheca	280 – 365	250 – 280	280 – 335
Length of paired nematothecae on apophysis	73 – 84	62 – 67	73 – 78
Diameter at terminal node	84 – 95	56 – 67	67 – 73
Length of thecate internode	325 – 350	320 – 370	235 – 310
Length of athecate internode	140 – 155	160 – 170	140 – 150
Diameter at node	45 – 56	45 – 50	42 – 45
Hydrotheca, length abcauline wall	45 – 56	51 – 56	42 – 48
Length adcauline wall	39 – 50	42 – 51	36 – 39
Diameter at rim	67 – 78	56 – 62	56 – 64
Paired lateral nematothecae, total length	105 – 110	80 – 85	78 – 95
Diameter at rim upper chamber	56 – 67	45 – 50	45 – 50
Male gonotheca, length	450 – 475		380 – 400
Diameter at apex	170 – 225		210 – 235
Maximum diameter	220 – 250		235 – 245
Female gonotheca, length	460 – 505		
Diameter at apex	200 – 250		
Maximum diameter	235 – 245		

occasionally stretching some distance alongside hydrothecal wall.

Hydrotheca small, seated well below middle of internode, widening somewhat from base, abcauline wall straight, fairly thick, margin slightly convex and slightly tilted downwards towards internode.

Thecate and athecate internodes regularly alternate; in case of fusion of athecate internode with apophysis the first hydrocladial internode thecate, but there may also be a hydrocladium beginning with an athecate internode on shorter apophysis. Many hydrocladia with two basal thecate internodes below the regular sequence; short internodes without nematotheca may be intercalated at various places along the hydrocladium.

Internal septa, of very variable development, in both athecate and thecate internodes, being restricted in the first to 1 above insertion of median nematotheca, in the second they occur below and above insertion of median nematotheca and just under apical node. Perisarc of hydrocladia firm, but thinner under insertion of lateral nematothecae and at base of the hydrotheca.

Male and female gonothecae occur on same colony, inserting on apophyses next to mamelon, leaving a small, circular scar when shed. Both male and female gonothecae elongated drum-shaped, apex slightly obliquely truncated, operculum large, circular; gonotheca basally narrowed into short, eccentrically placed pedicel.

Male gonophore a compact, globular mass of developing spermatocytes, female gonophore containing 10–12 large, orange-yellow eggs clustered around a central spadix.

REMARKS: The colonies are usually dark brown but some are yellowish brown. The pattern of branching is quite uniform and rather closely in one plane, the resulting colony being fan-shaped; there is, never-theless, a considerable variability in the length and diameter of the branches, resulting in a morphological range from quite compact to thinly branched colonies. Such adaptations probably depend upon depth, temperature, and water movement.

RECORDS FROM NEW ZEALAND: In deeper water all around New Zealand, from 34.5° to 49.5° S and 164° to 179° E, depth 53–448 m, including Three Kings Islands region, North Cape area, Ranfurly Bank off East Cape, Bay of Plenty, Challenger Plateau, Tasman Basin, Kapiti Channel, Cook Strait, Otago canons, Foveaux Strait, Stewart Island region and area between Stewart and Auckland Islands.

DISTRIBUTION: Oyster Bay and Wineglass Bay, Tasmania (Bale 1914; Briggs 1915; Hodgson 1950); various localities in Japanese waters (Jäderholm 1919; Yamada 1959; Hirohito 1983, 1995) and waters around southern Africa, ranging from Lüderitz Bay on the west coast to Port Elisabeth on the east coast (Millard 1975; Gili *et al.* 1989).

Nemertesia cymodocea (Busk, 1851) (Fig. 91I, J)

Antennularia cymodocea Busk 1851: 119.

Nemertesia cymodocea: Bedot 1917a: 43; 1921: 35; Millard 1957: 234; Leloup 1960: 236; Millard 1961: 207; Ralph 1961b: 49–50, fig. 6K; Millard 1962: 299; Redier 1964b: 148; Rees & Thursfield 1965: 166, 195; Millard 1968: 254, 278; Day *et al*. 1970: 14; Vervoort 1972: 231, fig. 82; Millard 1975: 384, fig. 122A–C; 1978: 195 *et seq*.; Stepan'yants 1979: 119, pl. 20 fig. 8; Dawson 1992: 17; Blanco 1994a: 157; 1994b: 207; 1994c: 234–235, figs 22-25; Bouillon *et al*. 1995: 59; Genzano & Zamponi 1997: 293.

Nemertesia (Antennularia) decussata Kirchenpauer 1876: 52, pl. 2, fig. 24, pl. 3, fig. 24, pl. 7, fig. 24.

Antennularia decussata: Marktanner-Turneretscher 1890: 258, pl. 6, fig. 7.

Antennularia hartlaubi Ritchie 1907a: 542, pl. 3, fig. 4a, b.

Material Examined:

NZOI Stns: A444B [samples that have been dried out, now in alcohol and in very poor condition, marked: A 444 x 1, A 444 x 2, etc. probably from one large sample]: *Nemertesia cymodocea* (Busk, 1851) (J.E. Watson); **A489**, *Nemertesia cymodocea* (Busk, 1851) (J.E. Watson). [Slide 4165 JEW Colln]; **B670**, *Nemertesia cymodocea* (Busk, 1851) (J.E. Watson); **B672**, *Nemertesia cymodocea* (Busk, 1851) (J.E. Watson); **C118**, *Nemertesia cymodocea* (Busk, 1851) (J.E. Watson); **C125**, *Nemertesia cymodocea* (Busk, 1851) (J.E. Watson); **D232**, *Nemertesia cymodocea* (Busk, 1851) (J.E. Watson). [Slide 4159 JEW Colln].

NMNZ: North of Kapiti, 5.Sept.1956: single forked colony, 320 mm high, no gonothecae. 1 fork broken. NMNZ Co. 462; **Middle Bank, Kaikoura**, 21.Nov.1956, 2 top parts of larger colonies, about 300 mm long. No gonothecae. NMNZ Co. 489; Between **Cape Reinga and Three Kings Islands**, 28.Oct.1962 (previously preserved in formalin and as a result extremely brittle), many fragments of large colony, about 250 mm high. NMNZ Co. 711. RMNH-Coel. 27677, 2 slides 3377; **BS 168**, young unbranched colony, 48 mm long; hydrocladia alternating in lower part of stem, in alternating, opposite pairs in upper part. Distinction between thecate internodes and athecate internodes (with 1 nematotheca) indistinct; **BS 180**, 350 mm high colony and a 250 mm long top part. No gonothecae. NMNZ Co. 494; **BS 396**, top part of colony, with irregularly arranged, short side branches of 50–60 mm length. No gonothecae. NMNZ Co. 593; **BS 398**, 2 young, stiff colonies, 110 and 150 mm high. NMNZ Co. 607; 2 RMNH-Coel. slides 3018. Also 2 large colonies about 400 mm high; branches long, running parallel to stem, whole of colony more or less in 1 plane. Branches occur from basal part of stem upwards, re-branching frequent. No gonothecae. NMNZ Co. 723; RMNH-Coel. 27671, slide 3371; **BS 432**, 4 colonies, between 350 and 250 mm; no gonothecae. NMNZ Co. 512; **BS 480**, numerous colonies between 80 (quite young) and 250 mm (nearly full grown). No gonothecae. NMNZ Co. 409; **BS 561**, 1 colony, 100 mm high, nogonothecae. NMNZ Co. 678; **BS 835**, 2 colonies, 700 and 900 mm high, no gonothecae observed. NMNZ Co. 584; **BS 840**, 3 large colonies with big basal disk, up to 250 mm high, branches directed upwards. NMNZ Co. 394; 2 RMNH-Coel. slides 2952; **BS 911**, 3 large colonies up to 500 mm high, branches short, all along stem. NMNZ Co. 406.

NMNZ Ralph Collection: Loc. 68, NMNZ Co. 927, 3 stem fragments with hydrocladia; no gonothecae. RMNH-Coel. slides 3621. Poor slide as *Nemertesia cymodocea* with data: "very good"; **Loc. 287**, NMNZ Co. 1133, about 100 mm high, branched top part and a fragment. RMNH-Coel. slide 3813. Poor slide as *Nemertesia cymodocea*; no data; **Loc. 568**, NMNZ Co. 1276:, about 60 mm high colony in 4 pieces, basal fragment with tuft of fibres; no gonothecae. RMNH-Coel. slide 3954. May belong here. Poor slide in RSC as *Nemertesia cymodocea*; no data; **Loc. 583**, NMNZ Co. 1292, many fragments of larger colony or colonies, about 30 mm long, some branched, no gonothecae. RMNH-Coel. slide 3969; **Loc. 669**, good slide in RSC as *Nemertesia cymodocea*, no data; **Loc. 670**, fair slide in RSC as *Nemertesia cymodocea*, no data.

PMBS: ESE of **Taiaroa Heads**, 30 fathoms, in grey mud. Identified by E.J. Batham. (Taken from card register).

Material Inspected: Thec. xii, in card. Taiaroa Heads, Otago, 55 m, grey mud, 09.Jan.1954, A. Black's trawl-dredge (brought back alive). Skeleton yellow-horny colour, hydranths unpigmented. Material consists of a single colony composed of about 15 mm long stem with several irregularly arranged side-branches, distinctly set off from the stem. RMNH-Coel. 27271, slide 2688.

Type Locality: *Antennularia cymodocea* and *Nemertesia (Antennularia) decussata*: Cape of Good Hope (Busk 1851; Kirchenpauer 1876; location of types unknown); *Antennularia hartlaubi*: Entrace to Saldanha Bay, South Africa [Ritchie 1907a; lectotype (1921.143.1372C), six paratypes (1921.143.1372A, B, D–G) and a 'schizolectotype' slide (1959.33.668) in Royal Scottish Museum Edinburgh, Scotland (Rees & Thursfield 1965).

Description: Tall colony of striking appearance, consisting of thick, polysiphonic stem with long branches produced just above base; branches re-branching basally into long, upwardly directed shoots, resulting in an assemblage of axes, up to 400 mm long, in the shape of a flattened broom. Main stem basally 3–5 mm thick, arising from carpet or conical mat of fine stolonal filaments intimately interwoven and adhering to sediment particles, anchoring the colony in soft bottom sediment.

Terminal part of axes and branches monosiphonic, divided into internodes by clearly visible, transverse nodes. Each internode with 1 or 2 whorls of 3 or 4 apophyses in decussate arrangement, without nematothecae. Stem internodes overgrown by secondary tubules with longitudinally arranged rows of nematothecae.

Apophyses slender, partially separated from first athecate node of hydrocladium, with big mamelon on upper surface, protruding slightly above level of apophysis, with a pair of nematothecae in the axil and 1 nematotheca inserted immediately above mamelon. Axillar nematothecae bithalamic, elongated conical and slender, rim of upper chamber only slightly scooped on inner side.

MEASUREMENTS of *Nemertesia cymodocea* (in μm):

	NMNZ BS 398 slide 3018	Otago Peninsula slide 2688	New Zealand (Ralph 1961a)
Length of stem internode	490 – 985		850 – 1250
Diameter at node	170 – 195	240	200 – 300
Length of apophysis with unpaired apical nematotheca	225 – 335	250 – 335	250 – 400
Length of paired nematothecae on apophysis	85 – 95		
Diameter at terminal node	67 – 84	90 – 100	
Length of thecate internode	270 – 320	325 – 420	275
Length of athecate internode	85 – 140	140 – 155	100
Diameter at node	50 – 56	62 – 73	
Hydrotheca, length abcauline wall	50 – 57	50 – 62	
Length adcauline wall	45 – 50	39 – 50	70
Diameter at rim	73 – 78	70 – 73	90 – 100
Paired lateral nematothecae, total length	84 – 90	78 – 85	60 – 75
Diameter at rim upper chamber	39 – 51	39 – 45	20 – 25
Female gonotheca, length			about 1100*
Diameter at apex			about 150*
Maximum diameter			about 600*

* calculated from Millard (1975, fig. 122).

Nematotheca on first, almost fused internode of hydrocladium of same shape as axillar but much smaller. Apophyses arranged in decussate whorls of 3 or 4 per internode, but internodes may fuse and have 3 or 4 whorls. Younger parts of colony may have decussate pairs of opposite apophyses.

Hydrocladia directed upwards and aligned to stem, 3–5 mm long, segmented, 5–8 internodes in heteromerous succession. First internode athecate, partially fused with apophysis. Thecate internodes with hydrotheca in middle of inner wall, 1 median inferior nematotheca and a pair of lateral nematothecae at the hydrothecal rim. All nematothecae bithalamic, elongated conical, inner wall of upper chamber deeply scooped; median inferior nematotheca just reaching bottom of hydrotheca; lateral nematothecae on small prominence at hydrothecal rim, reaching beyond distal node.

Hydrotheca small, widening slightly from base onwards; plane of aperture straight to slightly convex, slightly tilted adcaudally; abcauline wall fairly thick. Interior of thecate internode with 3 incomplete septa: 1 proximal, 1 distal, and 1 halfway between median inferior nematotheca and hydrothecal base. 2 well developed septa, 1 at hydrothecal base, and 1 at insertion of lateral nematothecae. Athecate internodes, with exception of first, with 2 imperfect septa, 1 proximal, 1 distal; nematotheca on these internodes smaller than those on thecate internodes. First athecate internode with 1 apical septum.

Fusions between thecate and athecate internodes occur regularly; sometimes intercalation of short internodes without nematothecae.

Gonothecae do not occur in present material.

REMARKS: The species is primarily characterised by its mode of growth and the unusual gonothecae, approaching the morphology of *Plumularia* as *P. setacea* and its allies.

Gonothecae were described by Millard (1975: 385) as being "without nematothecae, smooth, compressed, flask-shaped and often curved in side view, with terminal aperture on a short tubular neck, held parallel to branch". They inserted on hydrocladial apophyses.

RECORDS FROM NEW ZEALAND: Deeper waters around New Zealand between 34°and about 46° S and 172°–179° E, including the Three Kings Islands area, off North Cape, Ranfurly Bank off East Cape, Cook Strait, Kaikoura area, Otago Peninsula, Tasman Sea and off Kapiti Island, depth 55–695 m.

DISTRIBUTION: Atlantic and Indian Oceans around southern Africa (Saldanha Bay–East London; Millard 1975), New Zealand waters and southwestern Atlantic (Leloup 1960; Blanco 1994a, b).

Nemertesia elongata Totton, 1930 (Fig. 93A–C)

Nemertesia elongata Totton 1930: 229, fig. 64; Ralph 1961b: 48–49, fig. 5h-i, 6j; Dawson 1992: 17.

MATERIAL EXAMINED:

NZOI Stns: A444B [samples that have been dried out, now in alcohol and in very poor condition, marked: A444 x 1, A444 x 2, etc. Probably from 1 large sample]: *Nemertesia elongata* Totton, 1930? (J.E. Watson). [Slide 4163 JEW Colln]; **B93**, fragments from large colony; no gonothecae. May belong here; fragmentary; **C52**, colony 90 mm high and fragment, with gonothecae. RMNH-Coel. slide 2795; **C58**, 2 colonies, 120 mm high, some fragments, with gonothecae; **C60**, 2 completely fragmented colonies, with gonothecae; **C266**, ?*Nemertesia elongata* Totton, 1930 (J.E. Watson); **C450**, 1 young, unbranched colony, 70 mm long, no gonothecae; **C812**, 250 mm high colony in 2 parts, few branches present. No gonothecae; **E72**, young colony with 1 branch, 60 mm high. May belong here; **E336**, 1 colony about 250 mm high, in 2 parts; no gonothecae. Young colony in poor condition and without gonothecae; may belong here. RMNH-Coel. slide 2116; **E757**, single greatly damaged colony 80 mm high, no gonothecae, may belong here; **E848**, 3 colonies with thick, polysiphonic stems, side branches about 40 mm long, arranged in loose spiral; set with 4–5 mm long hydrocladia on all sides of branch. No gonothecae. 2 RMNH-Coel. slides 2184; **E850**, top part of a larger colony about 100 mm long; many gonothecae; **J958**, 3 slender, forked colonies, ramifications running upwards; stems and principal branches polysiphonic. Hydrocladia set along length of stem and branches in irregular spiral, on short apophyses. No gonothecae. RMNH-Coel. slide 2260; **Q116**, *Nemertesia elongata* Totton, 1930 (J.E. Watson). [Slide 4160 JEW Colln]; **Q135**, *Nemertesia elongata* Totton, 1930 (J.E. Watson). [Slide 4164 JEW Colln]; Spirits Bay, tip of North Island, with *Crateritheca novaezelandiae* (Thompson, 1879) and *Gonaxia* sp. nov.

NMNZ: 12 miles off **Turakirae Head**, Palliser Bay, 09.April.1960, single colony about 350 mm long, composed of elongated stem about 1.25 mm diameter basally, but probably snapped off above rooting filaments. Branches in upper part of stem, about 50 mm long; no further branching. NMNZ Co. 710; 2 RMNH-Coel. slides 3331; Between **Cape Reinga and Three Kings Islands**, 28.Oct.1962, top part and some branches. NMNZ Co. 712; RMNH-Coel. 27678, slide 3378; **BS 509**, 17 young colonies, between 3 and 17 cm high may belong here. Stems canaliculated and basally thin and brown; hydrocladia opposite, in 1 plane, length maximally about 8 mm, some stems with 1 or 2 side branches. Gonothecae present. NMNZ Co. 820; RMNH-Coel. 27744, slide 3498; **BS 543**, 3 colonies, 1 complete and 80 cm long; no gonothecae. 1 younger colony about 200 mm long. NMNZ Co. 801; RMNH-Coel. 27740, 2 slides 3479; **BS 621**, 1 colony, 30 mm high, with parallel side branches; many gonothecae. NMNZ Co. 471; 2 RMNH-Coel. slides 2982; **BS 630**, very young colony with single branch, 50 mm high. May belong here. NMNZ Co. 428; **BS 678**, 3 colonies about 300 mm high, 1 distinctly this species; hydrocladia in other 2 lie closely to stem and ramifications stiff. NMNZ Co. 826, 2 RMNH-Coel. slides 3504; **BS 679**, 4 colonies, 3 complete, up to 350 mm high; no gonothecae. NMNZ Co. 872; **BS 742**, several young, branched colonies, up to 60 mm high, no gonothecae. NMNZ Co. 382; **BS 769**, fragments of 2 or 3 colonies of median height; 1 basal fragment present, no gonothecae. NMNZ Co. 835. In addition 2 colonies 300–350 mm high; no gonothecae; 1 colony without basal portion. NMNZ Co. 866; **BS 798**, 500 mm long colony with big basal tuft of fibres for anchoring in sand. Branches irregularly distributed along stem, about 70 mm long. 2 RMNH-Coel. slides 3026; **BS 834**, perfect specimen 105 cm long in 2 parts: large basal tuft of fine fibres from which emerges about 3 mm thick stem, and upper portion, gonothecae plentiful. NMNZ Co. 745. RMNH-Coel 27673, slide 3373. Also single stem about 120 mm high of young colony. NMNZ Co. 757. RMNH-Coel. 27695, slide 3395; **BS 841**, completely mutilated colony, composed of 2 stem fragments, 1 with basal tuft, and 4 side-branches. No gonothecae. May belong here. NMNZ Co. 656; **BS 907**, large colony in fragments: basal part with thick bundle of fibres, top part and fragments; no gonothecae. NMNZ Co. 816; RMNH-Coel. slide 3491.

NMNZ Ralph Collection: Loc. 726, perfect slide in RSC as *Nemertesia elongata*, no data. Good slide as *Nemertesia elongata*, no data.

TYPE LOCALITY: *Terra Nova* Stn 90, off Three Kings Islands, 183 m; holotype in NHM no. 1929.10.10.9 (Totton 1930).

DESCRIPTION: Tall colony arising from a thick carpet or conical mat of fine stolonal filaments anchoring colony in soft bottom sediment. Main stem 800 mm long, almost straight, basal diameter 3–4 mm, forked basally into 1 or more additional axes. Stems with branches 60–90 mm long in an irregular spiral, directed upwards and occasionally re-branched. Basal parts of axes without branches.

Stem and branches strongly polysiphonic, structure best visible in upper parts. Primary axis composed of internodes of variable length separated by transverse nodes and bearing 1–3 whorls each of 3–4 decussate apophyses. Insertion of apophyses not in a circle perpendicular to length axis of internode, but in an oval making in extreme cases a sharp angle with length axis. Proximal part of internode with a few nematothecae. Thick secondary tubules set with irregularly distributed nematothecae covering internodes of axes and secondary branches. Apophyses strong, with thick yellowish perisarc, basally slightly swollen, notably so in the presence of gonothecae, fairly long, extending into first athecate internode of hydrocladium; line of fusion invisible. Mamelon conical, slightly below middle of upper surface of apophysis. A pair of nematothecae in axil beside mamelon. A pair of nematothecae or a single 1 occurs at end of inner margin of apophysis. 2 incomplete septa, 1 halfway between mamelon and insertion of terminal nematotheca(e), 1 almost at apex of apophysis.

Hydrocladia 5–8 mm long, curving upwards; first 3–5 internodes thecate and long, resulting from fusion

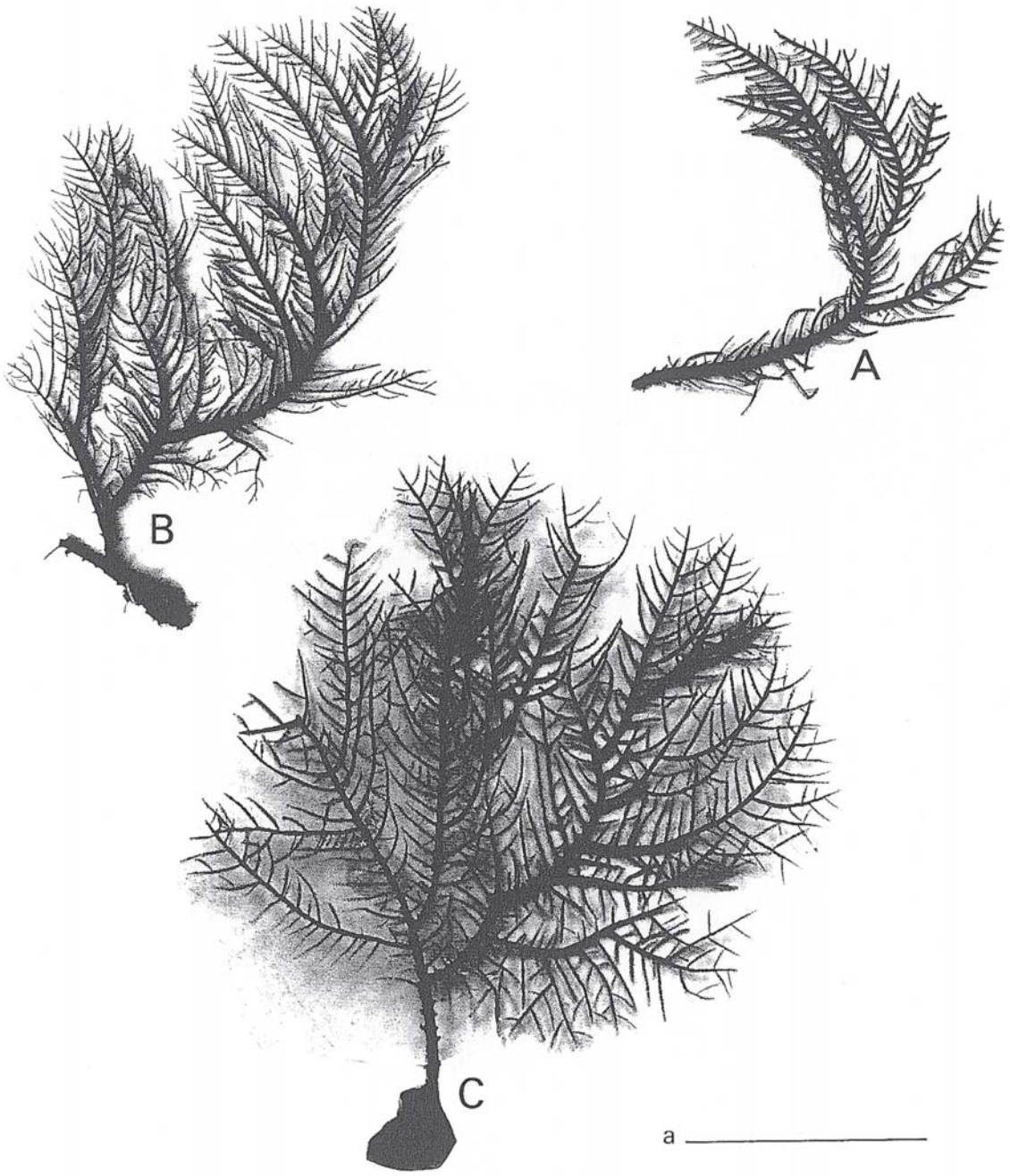

Fig. 92. A–C. ***Nemertesia pinnatifida*** sp. nov. **A**, holotype (BS 911). **B**, part of colony (NZOI Stn E312). **C**, complete colony (BS 682). Scales: a, 50 mm. W.V.

MEASUREMENTS of *Nemertesia elongata* (in μm):

	NMNZ BS 834 slide 3373	NMNZ BS 543 slide 3479	New Zealand (Ralph 1961a)
Length of stem internode	1265 – 1800		400 – 1200
Diameter at node	215 – 230	225	200 – 300
Length of apophysis without fusion with athecate internode	335 – 390	250 – 260	400
Length of apophysis with fused athecate internode	365 – 450	365 – 390	
Length of axillary nematotheca on apophysis	70 – 75	73 – 84	
Diameter at terminal node	100 – 105	95 – 105	100
Length of fused thecate and athecate internodes	365 – 465	390 – 420	350 – 450
Length of thecate internode	240 – 255	320 – 335	250 – 360
Length of athecate internode	100 – 115	130 – 145	
Diameter at node	56 – 73	84 – 90	
Hydrotheca, length abcauline wall	78 – 84	67 – 73	70
Length adcauline wall	62 – 73	56 – 62	
Diameter at rim	85 – 100	78 – 90	70
Paired lateral nematothecae, total length	84 – 90	78 – 84	75 – 100
Diameter at rim upper chamber	45 – 73	34 – 45	25 – 32
Female gonotheca, length	740 – 820	600	
Longest diameter of aperture	215 – 230	200	
Maximum diameter	260 – 295	300	

of thecate and athecate internodes; remainder of internode a regular succession of thecate and athecate internodes; nodes moderately oblique. Thecate internodes with frontal hydrotheca, a median inferior nematotheca and a pair of lateral nematothecae; athecate internodes with single frontal nematotheca. Thecate internode with 4 internal septa: 1 proximal, 1 distal, and 2 behind abcauline wall of hydrotheca, 1 at bottom, 1 at rim. Athecate internode with single distal septum

Hydrotheca set slightly below middle of thecate internode, rather big, with straight, thick abcauline wall and completely fused adcauline wall; aperture straight to very slightly convex, perpendicular to internodal length axis.

All nematothecae, with exception of lateral pair, slightly curved, widening from base onward, almost horn-shaped; inner wall of upper chamber rather deeply scooped. Laterals flanking hydrotheca straight, conical; upper chamber narrow, inner wall scooped; inserting on a prominence about halfway along both sides of adcauline wall of hydrotheca; nematothecae projecting above rim of hydrotheca by about half their length.

Female gonothecae present. Gonothecae inserting on (swollen) apophysis next to mamelon. Juvenile gonothecae on basal parts of stems drum-shaped, slightly obliquely truncated at top; narrowing basally into slightly eccentric pedicel. Gonophore an agglomeration of developing oocytes. Ripe female gonotheca more elongated; aperture latero-terminal, oval, closed by operculum. Gonophore with about 30 eggs surrounding a club-shaped spadix. Site of shed gonothecae a big, round scar.

REMARKS: This species is best characterised by its mode of growth and its female gonothecae. The apophyses generally result from fusion with the first athecate hydrocladial internode; in the hydrocladium the first three to five internodes result from fusion of a thecate and an athecate internode; the remainder of the hydrocladium being heteromerously segmented. The big almost banana-shaped female gonotheca is quite characteristic; it is cut off obliquely at the top and there with a large oval operculum. Development of nematothecae on internodes of axis and branches as well as on the secondary tubules varies considerably: some colonies have many scattered nematothecae, others are almost devoid of nematothecae.

RECORDS FROM NEW ZEALAND: Records of this species cluster around the Three Kings Islands, on Ranfurly Bank off East Cape, and in Cook Strait, including Palliser Bay. All are based on adult specimens that show the characteristic mode of growth. Juvenile colonies, that may easily be confused with juveniles of the remaining three New Zealand *Nemertesia* species, are also known from the Tasman Sea off North Island, from the Chatham Islands and from Hokitika Trench off South Island, indicating that the distribution of this characteristic New Zealand species extends as far south as 42.5° S. Depth records 27–1125 m; gonothecae present in March and June.

DISTRIBUTION: Known only from New Zealand waters.

Nemertesia pinnatatifida sp. nov. (Figs 92A–C; 93D–H)

MATERIAL EXAMINED:

N**ZOI Stns: B314**, *Nemertesia pinnata* sp. nov. (J.E. Watson). RMNH-Coel. slide 2121. [Originally identified as *Plumularia procumbens* (Spencer 1891)]; **E312**, large, at least 250 mm high colony, spread about 200 mm; no gonothecae. Paratype P-1238 in NIWA collection. RMNH-Coel. 29131, slide 2118; **J953**, 1 large, branched colony about 250 mm high, stem basally about 3.5 mm, no gonothecae. Paratype P-1239 in NIWA collection. RMNH-Coel. slide 2208; **J974**, 100 mm high colony, pinnate, branches sub-opposite, hydrocladia placed alternately; no gonothecae. Paratype P-1240 in NIWA collection.; RMNH-Coel. slide 2262.

NMNZ: BS 682, single well developed colony 120 x 120 mm; male gonothecae present. NMNZ Co. 802; RMNH-Coel. slide 3480; **BS 911**, 2 colonies, broken at base, about 100 mm high, no gonothecae observed. NMNZ Co. 407, paratypes. Single colony about 150 mm high, spread 50 mm. NMNZ Co. 792, holotype. Hydrocladia in verticils of 3 each, placed alternately; distinct accessory tube even in smaller branches. 3 RMNH-Coel. slides 3336, part of type series.

TYPE LOCALITY: Southeast of Three Kings Islands, 34°20.2′ S, 172°21.8′ E, 121 m.

DESCRIPTION (of holotype): Main stem of colony polysiphonic, erect, with several primary branches, directed upwards. All branches and main stem in 1 plane, the whole resulting in fan-shaped colony; main stem 2 or 3 mm thick at base, springing from irregular mass of intertwining and anastomosing stolonal tubes attaching colony to firm substrate. Secondary branches along main stem and primaries fairly short (10–20 mm), pinnately arranged in opposite or sub-opposite pairs; some secondaries longer and bearing tertiary branchlets arranged in same fashion as secondaries. All branches and stem made up of internodes variable in length, separated by distinct, transverse nodes, but rapidly becoming covered by irregular layer of thick accessory tubules running upwards from basal part of stem to near top of branchlets so that original structure can only be observed at their apices. Stem internodes, as well as those of primaries, secondaries and tertiaries, with 1–3 long apophyses arranged singly, in loose pairs or in irregular whorls, the various apophyses being decussate. This more or less regular structure rapidly lost in lower parts of branches by development of apophyses on accessory tubules. Number of longitudinal rows of apophyses consequently quite irregular.

Apophyses with thick perisarc, fairly long, pointing away from internode at an angle of about 45°, without internal septum, a big, raised mamelon and varied number of nematothecae on upper (adcauline) surface, supporting 1 or 2 mm long hydrocladia directed away from internode at same angle of 45°. All nematothecae conical, bithalamic, with fairly spacious upper chamber of which internal margin is distinctly though not deeply scooped. 1 or a pair may occur in the axil, 1 halfway mamelon, 1 or a pair above mamelon, and 1 on slight elevation almost at end of apophysis. No other nematothecae on internodes or on accessory tubules.

Hydrocladia heteromerously segmented with a maximum of 5 thecate internodes, first internode thecate, though occasionally 1 or 2 ring-shaped internodes without nematothecae may be intercalated, possibly as the result of sustained damage. All hydrocladial internodes long and slender; thecate internodes with hydrotheca below middle of inner (adcauline) surface, a median inferior nematotheca and a pair of flanking nematothecae; athecate internode with a single basal nematotheca.

Hydrotheca small, cup-shaped; rim circular, non-everted, plane of aperture slightly tilted downwards adcaudally; abcauline wall thick. Median inferior nematotheca with distinctly scooped inner wall, not reaching base of hydrotheca. Lateral nematothecae long and slender, narrow tumbler-shaped, inserting on small swelling next to hydrotheca, not reaching end of thecate internode, rim scarcely scooped. Incomplete septa at both ends in thecate internode, just above insertion of median inferior nematotheca and at base of hydrotheca. Athecate internode two-thirds length of thecate internode, with a nematotheca on swelling in lower half and an incomplete internal septum at both ends.

Two female gonothecae in holotype: 1 mature with 2 large eggs, and 1 immature with a body probably developing into an egg. Both gonothecae insert on basal hydrocladial internodes, adult on an athecate internode, taking place of a nematotheca; immature gonotheca on a thecate internode between median inferior nematotheca and hydrothecal base. Both gonothecae small, elongated ovoid, narrowing to the apex, pedicel short, eccentric in the adult gonotheca.

The specimen from BS 682 is male, gonothecae inserting on the apophysis beside the mamelon. Gonotheca elongate drum-shaped, with a circular operculum; basally gonotheca narrows into a slightly eccentric, short pedicel. Gonophore filled with irregular masses of developing spermatocytes.

No nematothecae on male or female gonothecae.

REMARKS: The species is characterised by shape of the colony, structure of hydrocladia, absence of nematothecae on stem internodes (with exception of axillary nematothecae) and accessory tubules, and by shape of the gonothecae. Structure of the hydrocladia is rather

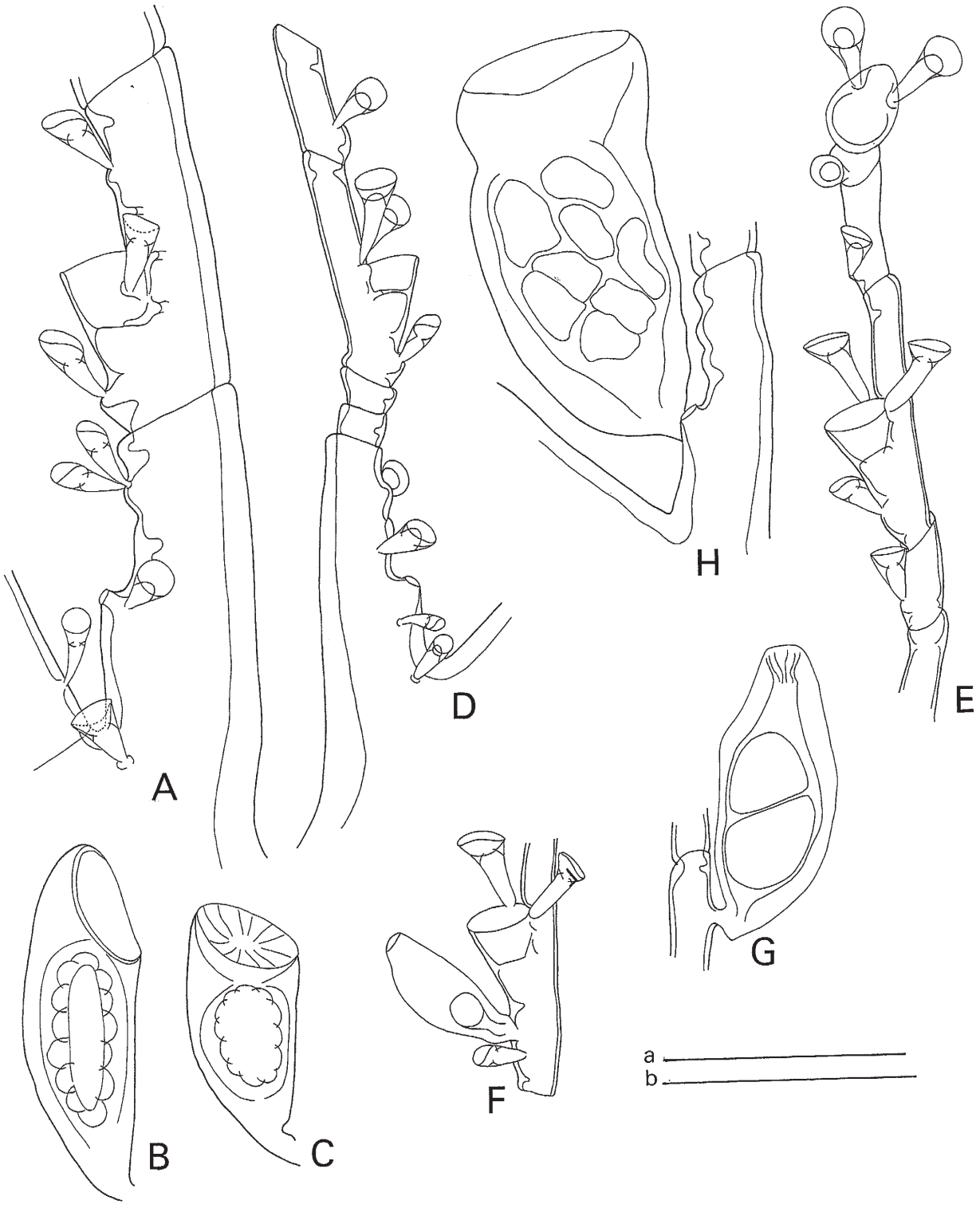

Fig. 93. A–C. ***Nemertesia elongata*** Totton, 1930. **A**, proximal part hydrocladium and its insertion on stem apophysis, lateral view. **B**, mature female gonotheca. **C**, developing female gonotheca (BS 834, slide 3373). **D–H.** ***Nemertesia pinnatifida*** sp. nov. **D**, proximal part hydrocladium and its insertion on stem apophysis, lateral view. **E**, distal part hydrocladium, oblique lateral view. **F**, developing female gonotheca and hydrocladial internode, oblique lateral view. **G**, female gonotheca, lateral view (BS 911, slide 3336). **H**, male gonotheca and its insertion on apophysis, lateral view (BS 681, slide 3480). Scales: a, 0,2 mm (A, D–H); b, 0.5 mm (B, C). W.V.

MEASUREMENTS of *Nemertesia pinnatatifida* sp. nov. (in μm):

	NMNZ BS 911 slide 3336	NMNZ BS 682 slide 3480	NZOI Stn E312 slide 2118
Length of stem internode	330 – 785	few nodes	330 – 985
Diameter at node	135 – 205	145 – 155	110 – 140
Length of apophysis	195 – 280	280 – 335	195 – 250
Length of axillary nematotheca of apophysis	56 – 67	73 – 84	80 – 85
Diameter at terminal node	45 – 50	55 – 62	62 – 73
Length of thecate internode	210 – 240	295 – 310	225 – 310
Length of athecate internode	125 – 140	140 – 165	100 – 125
Diameter at node	40 – 45	34 – 40	45 – 51
Hydrotheca, length abcauline wall	34 – 39	39 – 45	34 – 36
Length adcauline wall	28 – 34	39 – 42	34 – 36
Diameter at rim	45 – 56	62 – 67	56 – 62
Paired lateral nematothecae, total length	67 – 90	95 – 100	95 – 100
Diameter at rim upper chamber	50 – 56	45 – 51	39 – 45
Male gonotheca, length		310 – 390	
Diameter at aperture		140 – 150	
Maximum diameter		160 – 170	
Female gonotheca, length	125		
Maximum diameter	45		

irregular as short accessory internodes may intercalate between thecate and athecate internodes while many hydrocladia start with an athecate internode with a single nematotheca.

RECORDS FROM NEW ZEALAND: Recorded from several localities in the Three Kings Islands region, from Ranfurly Bank off East Cape, and from the Tasman Sea, about 39.5° S, 172° E; depth records between 119 and 270 m. Gonothecae occur in January and February.

DISTRIBUTION: So far known exclusively from New Zealand.

ETMYOLOGY: The specific name has been taken from the Latin adjective *pinnatus*, feathered, and the Latin verb *findere*, to split, to divide, indicating the arrangement of the hydrocladia. *Pinnatifida* is an adjective in female gender.

Nemertesia sp.

MATERIAL EXAMINED:

NZOI Stns: A712 (dried out and very dirty sample), colony fragment, length about 90 mm; **A715**, 3 fragments, 20, 8, and 7 mm long. RMNH-Coel. slide 2719; **A740**, 1 colony in 2 parts, length about 90 mm; **B228**, gear DIS, fragments of a large colony at least 150 mm high, no gonothecae; **C380**, *Nemertesia* sp. (J.E. Watson); **G307A**, 2 fragments, 70 and 35 mm high. No gonothecae; **I39**, *Nemertesia* sp .(J.E. Watson). [Slide 4161 JEW Colln, questionable specimen, very young, on slide none of hydrocladia complete].

NMNZ: BS 368, single colony, 100 x 100 mm, in poor condition, no gonothecae. NMNZ Co. 654; **BS 390**, single colony, 100 x 100 mm, no gonothecae. NMNZ Co. 539; **BS 396**, 2 colony fragments, 80 and 110 mm long, no gonothecae. NMNZ Co. 592; **BS 630**, 2 large colonies, 160 x 160 mm, no gonothecae. NMNZ Co. 422; **BS 673**, 2 colonies up to 160 mm high composed of thin, erect stem with large basal tuft of filaments. Several branches standing at right angle to main stem; hydrocladia not strictly pinnate, about 5–6 mm long; no gonothecae. NMNZ Co. 730; RMNH-Coel. 27656, slide 3356; **BS 902**, 1 plume-shaped colony, 110 x 110 mm, no gonothecae. NMNZ Co. 469.

NMNZ Ralph Collection: Loc. 109, NMNZ Co. 964, strongly fascicled stem fragment about 10 mm long, with hydrocladia in bad condition. No slide.

REMARKS: None of this material could be properly identified. *Nemertesia antennina* (Linnaeus, 1758) (= *Sertularia antennina* Linnaeus 1758: 1310), a species widely distributed in the temperate and boreal Atlantic, has been recorded from Lyall Bay, Wellington by Hutton (1873: 258, as *Antennularia antennina*); this record is cited by Ralph (1961b: 48). This is probably a misidentification; Pacific records of this species so far have proved to be unreliable.

Plumularia Lamarck, 1816

TYPE SPECIES: *Sertularia setacea* Linnaeus, 1758 (by subsequent designation, Calder & Cornelius (1997)).

Plumularia anonyma sp. nov. (Fig. 94A–C)

MATERIAL EXAMINED:

NMNZ: BS 398, 3 plumes about 35 mm high on bryozoans at the base of *Crateritheca novaezelandiae* (Thompson, 1879). No gonothecae. RMNH-Coel. 27665, slide 3365; **BS 621**, 40 mm high stems. NMNZ Co. 473, holotype; RMNH-Coel. slide 2984, part of type series.

NMNZ Ralph Collection: Loc. 231, NMNZ Co. 1076, several colonies up to 35 mm high, some with gonothecae (paratype). With *Salacia bicalycula* (Coughtrey, 1876); *Sertularella robusta* Coughtrey, 1876, and *Plumularia opima* Bale, 1924 (on slide). 2 RMNH-Coel. slides 3742; **Loc. 234**, NMNZ Co. 1079, several 25 mm high colonies with gonothecae; with *Symplecto-scyphus j. johnstoni* (Gray, 1843). RMNH-Coel. slide 3750; **Loc. 285**, NMNZ Co. 1132, many about 25 mm high stems scraped from substrate with bryozoans; no gonothecae. RMNH-Coel. slide 3812.

TYPE LOCALITY : Cook Strait, 41°18.42′ S, 174°21.33′ E, 120 m.

DESCRIPTION: Monosiphonic stems to 40 mm high arising from thin, tubular, non-anastomosing stolon on solid objects. Stem divided into regular internodes by transverse nodes, best visible on distal parts of stem, each bearing an apophysis on distal third. Apophyses strong, alternately directed left and right and obliquely upwards, in 1 plane, not surpassing distal node, making an angle of about 45° with length axis of internode. Distal part of apophysis with incomplete internal septum; upper surface with small, circular mamelon slightly elevated above level of lower third of apophysis and obscured by 3 large nematothecae, of which 1 inserting above mamelon, second and third forming a pair inserting in axil below mamelon. Upper nematotheca slightly curved towards hydrocladium; wall of upper chamber facing hydrocladium scooped. Pair of nematothecae facing stem internode slightly inwardly curved, wall of upper chamber scooped on adcauline side. Fourth nematotheca on lower quarter of internode opposite to apophysis, wall of upper chamber scooped on inner side. All stem nematothecae big, with spacious upper chamber and thick diaphragmatic ring.

Hydrocladia 3–5 mm long, heteromerously segmented, attached to apophysis by means of short internode without nematothecae and 2 imperfect internal septa; proximal node strongly oblique, distal node slightly oblique, directions opposed; 3–5 thecate internodes per hydrocladium; proximal node slightly oblique, distal node transverse; hydrotheca in middle of upper surface, cup-shaped, with straight, thin abcauline wall, smooth circular rim and with aperture slightly tilted downwards. 3 nematothecae on each thecate intenode, 1 median inferior, and a pair at hydrothecal rim. Median inferior nematotheca big, on a distinct swelling of internode, wall of upper chamber scooped, rim not reaching bottom of hydrotheca. Lateral nematothecae on slight swelling near hydrothecal rim, slender, rim of upper chamber circular, not scooped, not reaching distal node. 5 incomplete internal septa: 1 at proximal end of internode, 1 at insertion of median nematothecae, 1 at base of hydrotheca, 1 slightly above insertion of lateral nematothecae, and 1 at distal end. Athecate internode one-third length of thecate internode, with nematotheca on middle of upper surface and 3 imperfect septa: 1 at proximal end, 1 at distal end, and 1 slightly above insertion of inter-node.

Perisarc thick and yellowish-brown on internodes of stem, thinning out along hydrocladia; septa nevertheless rather prominent.

Only empty female gonothecae present, elongated sac-shaped, walls slightly wrinkled, narrowing basally into a short pedicel inserting gonotheca on apophysis under mamelon; a big circular scar when shed. Apex with large, slightly oblique circular aperture, operculum absent. Male gononothecae slightly bigger than female, conical, narrowing basally into short pedicel, attaching gonotheca to apophysis just under mamelon; apex truncate, with big aperture closed by circular operculum. Gonophore with large yellowish mass of developing spermatocytes. 2 sexes on separate colonies.

MEASUREMENTS of *Plumularia anonyma* sp. nov. (in μm):

	NMNZ BS 621 slide 2984	Ralph's Loc. 231 slide 3742
Diameter of stem at its base	175 – 210	155 – 205
Length stem internode	315 – 375	295 – 380
Diameter at node	100 – 130	100 – 110
Length of apophysis	85 – 115	100 – 110
Diameter at node	62 – 67	67 – 73
Length first athecate internode	84 – 95	105 – 115
Diameter at node	62 – 73	45 – 56
Length thecate internode	270 – 350	240 – 310
Diameter at node	45 – 56	45 – 50
Hydrotheca, length abcauline wall	62 – 67	67 – 73
Length adcauline wall	67 – 73	78 – 89
Diameter at rim	78 – 95	100 – 115
Lateral nematotheca, length	67 – 78	73 – 78
Diameter at rim	39 – 45	45 – 50
Athecate internode, length	110 – 125	125 – 155
Diameter at node	39 – 50	40 – 42
Female gonotheca, length		980 – 1010
Maximum diameter		330 – 420
Male gonotheca, length*		985 – 1065
Maximum diameter*		410 – 425

* taken from slide 3742

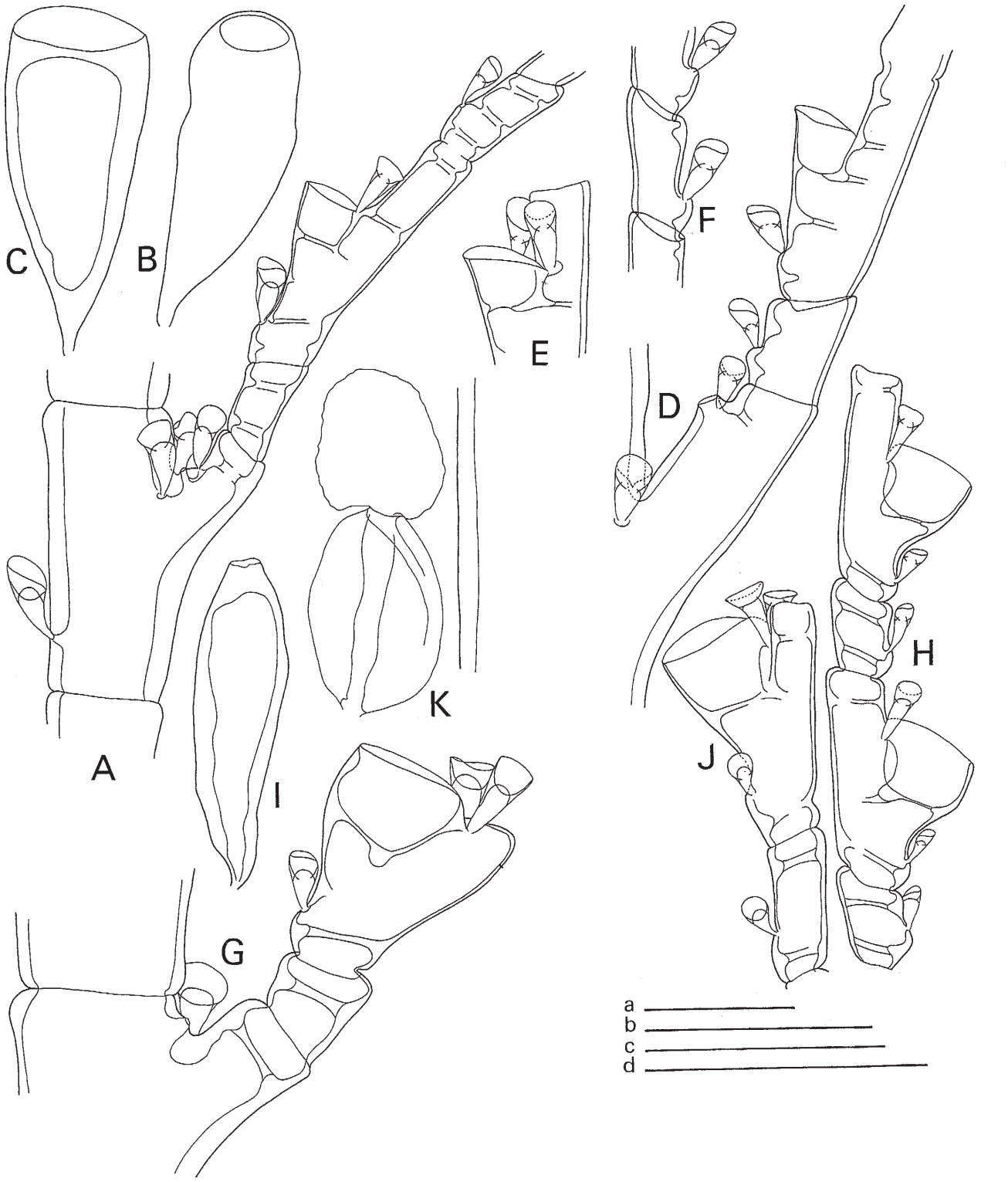

Fig. 94. A–C. ***Plumularia anonyma*** sp. nov. **A**, stem internode and proximal part of hydrocladium with its insertion on stem apophysis, lateral view (BS 621, holotype, slide 2984). **B**, empty female gonotheca (Loc. 231, paratype, slide 3742). **C**, male gonotheca (Loc. 234, slide 3750). **D–F.** ***Plumularia brachiata*** Totton, 1930. **D**, proximal part hydrocladium and its insertion on stem apophysis, lateral view. **E**, hydrotheca and lateral nematothecae. **F**, ahydrothecate internode of hydrocladium (BS 361, slide 2993). **G–K.** ***Plumularia caliculata*** Bale, 1888. **G**, proximal part hydrocladium and its insertion on stem apophysis, lateral view. **H**, part of hydrocladium, lateral view. **I**, male gonotheca (Loc. 425, slide 3892). **J**, hydrothecate and ahydrothecate internodes of hydrocladium, lateral view. **K**, outline of female gonotheca with marsupium (NMNZ, off Anson Bay, slide 2990). Scales: a, 0.2 mm (H); b, 0.2 mm (A, D–G, J); c, 0.5 mm (B, C, K); d, 2 mm (I). W.V.

REMARKS: This species resembles *Plumularia setacea* (Linnaeus, 1758) but differs in the constant presence of three big nematothecae in the axils of the stem apophyses, the strong development of the internal septa in the apophyses and hydrocladial internodes, and the shape of female and male gonothecae.

Although the development of the internal septa is a variable character in *P. setacea* and the number of axillar nematothecae may be one or two, making the presence of three axillar nematothecae unlikely, the different shape of the gonothecae cannot be neglected. The absence of an operculum of the female gonotheca is probably accidental.

Irregularities occur in the segmentation of the hydrocladia: several short athecate internodes may be present preceding the first thecate internode, one of these internodes may have a nematotheca. Occasionally the basal part of a thecate internode has been split off to form an additional or only intermediate, athecate internode.

RECORDS FROM NEW ZEALAND: So far known from four localities: off Cape Reinga, 88 m; Cook Strait, 120 m; Menzies Bay, depth unknown, and Half Moon Bay, Stewart Island, presumably in the littoral zone. This species may have a wider distribution in New Zealand and may have been confused with *Plumularia setacea* (Linnaeus, 1758) which it closely resembles.

DISTRIBUTION: So far known only from New Zealand.

ETYMOLOGY: Name taken from the Greek *anonymos*, without name, referring to the fact that the species was previously undescribed.

Plumularia brachiata Totton, 1930 (Fig. 94D–F)

Plumularia brachiata Totton 1930: 226, fig. 62a, b; Ralph 1961b: 36–37, fig. 4e-f; Dawson 1992: 17.

MATERIAL EXAMINED:

NMNZ: BS 361, several colonies up to 240 mm long, stem polysiphonic, side branches short, more or less parallel to stem. No gonothecae. NMNZ Co. 499; RMNH-Coel. 29132, 2 RMNH-Coel. slides 2993.

NMNZ Ralph Collection: Loc. 297, poor slide in RSC as *Nemertesia* & polysiphonic *Plumularia ?brachiata*; data unreadable. Slide useless.

TYPE LOCALITY: Off North Cape, New Zealand, *Terra Nova* Stn 96, 128 m (Totton 1930); holotype in NHM.

DESCRIPTION: Colony composed of erect, branched stem, basally about 1250 µm thick, polysiphonic, arising from a bunch of intertwining stolonal filaments about 10 mm from proximal end, gradually narrowing apically and becoming monosiphonic. Branches few and long, directed upwards, almost parallel to main stem; a few short secondary branches directed obliquely upwards, leaving primary branch at an angle of about 60°; pattern of ramification mainly, but not exclusively in 1 plane. Division into internodes visible in monosiphonic parts of stem and branches; nodes transverse, internodes bearing 1–3 apophyses, alternately arranged in 2 opposite series. Secondary tubules running upwards from basal parts of stem and branches, some originating from apophyses in lower parts of colony; in younger parts running only on front and back of internodes, initially leaving apophyses free. Section of stem or branch in that region oval; secondary tubules on both sides with row of closely approximate nematothecae.

Apophyses short, directed upwards at less than 30°, with big mamelon in almost terminal position projecting some distance above apophysis, a pair of axillar nematothecae and a pair of nematothecae on upper surface inserting just above mamelon; imperfect internal septum at base of nematothecae. A nematotheca on internode some distance above and on same side as apophysis, occasionally separated from apophysis by a node.

Hydrocladia short, 1.5–2 mm long, heteromerously segmented, with 3–5 thecate internodes; occasional short internodes without nematotheca may be intercalated; fusion of thecate and following athecate internode common. First internode of hydrocladium an athecate internode which may be fused with apophysis. Athecate internodes fairly short, with proximal and distal internal septum and a nematotheca placed on elevation of upper wall of lower half of internode; first athecate internode shorter than other athecate internodes. Thecate internodes with hydrotheca in middle of upper surface, a nematotheca on slight elevation of upper surface of proximal part; a pair of nematothecae flanking hydrotheca, inserted close to hydrothecal rim. Imperfect internal septa occur at both ends of thecate internode, some distance above insertion of infracalycine nematotheca, at hydrothecal base and at insertion of lateral nematothecae.

Hydrotheca small, broadly cup-shaped, widening from base onwards, abcauline wall straight; rim laterally elevated, dipping towards internode, slightly everted.

All nematothecae fairly short and stubby, with broad base sharply narrowing into insertion, bithalamic; unpaired nematothecae with scooped internal wall; paired nematothecae slightly longer, almost reaching distal node, inner wall scooped.

Perisarc thick, particularly on stem, branches and apophyses, yellowish-brown, stem and principal branches dark brown.

Gonothecae absent.

MEASUREMENTS of *Plumularia brachiata* (in μm):

	NMNZ BS 361 slide 2993	Off North Cape (Totton 1930)
Diameter of basal part of stem	1250	3000 x 4000
Diameter internodes in monosiphonic parts	155 – 240	180 – 200
Length apophysis (without fused internode)	195 – 225	
Diameter at distal end	73 – 84	
Length first athecate internode	84 – 115	110 – 160
Length thecate internode	265 – 310	200 – 320
Length athecate internode	125 – 140	110 – 160
Diameter at node	45 – 51	50 – 70
Distance between two apophyses on same side	1065 – 1150	
Hydrotheca, length adcauline wall	73 – 78	70 – 73
Length adcauline wall	56 – 62	
Diameter at rim (in lateral view)	67 – 73	77 – 80
Infracalycine nematotheca, length	56 – 67	110
Diameter at rim	31 – 34	50
Lateral nematotheca, length	78 – 84	80
Diameter at rim	34 – 39	40

REMARKS: The above description is based on a dead specimen without gonothecae; many nematothecae are missing. Yet it agrees in all essential details with Totton's description of 'the apical part of a large specimen, 30 cm in length', our largest specimen measuring 24 cm. The general appearance is that of a species of *Nemertesia*, although the apophyses are consistently arranged in two opposed longitudinal rows and alternate. The presence of secondary tubes on front and back of ultimate branchlets is quite characteristic, as is also the double longitudinal row of closely packed nematothecae on those tubes. The arrangement of secondary tubules is more uniform in older parts of the colonies, the cross section of the basal part of the stem being almost circular.

RECORDS FROM NEW ZEALAND: Off North Cape, New Zealand, 128 m and south of Hen Island, 36°05.5' S, 174°45'E, 51–57 m.

DISTRIBUTION: Known only from the two localities mentioned above in New Zealand waters.

Plumularia caliculata Bale, 1888 (Fig. 94G–K)

Plumularia caliculata Bale 1888: 780–781, pl. 20, figs 9–11; 1919: 348; Stechow 1923b: 17; Yamada 1959: 79; Hirohito 1969: 26; 1995 (English text): 271–273, fig. 92a-e.
Plumularia sp.: Inaba 1890: 144, figs 11–13.
Plumularia lagenifera: Stechow 1913: 90, figs 57–58.
[Not *Plumularia lagenifera* Allman 1886: 157, 158, pl. 26, figs 1-3.]

TYPE LOCALITY: Bondi Bay, Port Jackson, New South Wales, Australia (Bale 1888); probable syntypes in MOV, nos MV F58774, F58772 and F58773, all microslides (Stranks 1993).

MATERIAL EXAMINED:

NMNZ: Off **Anson Bay, Norfolk Island**, Oct.1953: Many up to 18 mm high stems on algae. Gonothecae present. NMNZ Co. 496; 2 RMNH-Coel. slides 2990.

NMNZ Ralph Collection: Loc. 98, NMNZ Co. 953, 2 fragments about 8 mm long and very fragile; some gonothecae present. RMNH-Coel. slide 3639. (As *Plumularia setaceoides* Bale, 1882); **Loc. 425**, NMNZ Co. 1210, many 10–15 mm high plumes on algae, with gonothecae. RMNH-Coel. slide 3892. Poor slide as *Plumularia setacea opima*, no data.

DESCRIPTION: Stems up to 15 mm long, arising from anastomosing, tubular stolon attached to algae; stolonal tubes with internal perisarc pegs. Stem divided into short internodes separated by transverse nodes; first stem internode attached to short apophysis of stolonal network, each internode with fairly long apophysis with almost terminal internal septum; apophyses alternately pointing left or right, obliquely upwards and frontally at an angle of about 90° or slightly less. A basal and an apical internal septum occur in each stem internode; perisarc of stem internodes thick, brownish in colour and almost opaque making observation difficult. Axil between stem internode and apophysis with greatly thickened perisarc perforated by small, low mamelon; a nematotheca on frontal surface and 1 on opposite wall of stem internode, near base.

Hydrocladia attached to apophyses by short athecate internode without nematotheca, with 1 internal septum, a transverse basal node and an oblique terminal hinge-type node. Hydrocladia 3 or 4 mm long, heteromerously segmented, with 4 or 5 thecate internodes. Thecate internodes fairly short, basal node oblique and hinge-like, distal node transverse. Thecate internodes with considerable frontal elevation bearing a cup-shaped hydrotheca; wall of elevation continuing smoothly in abcauline wall of hydrotheca. Distal part of abcauline wall of hydrotheca slightly convex to almost straight; perisarc of wall fairly thick. Rim of hydrotheca thin, in lateral view slightly convex, dipping adcaudally towards insertion of lateral nematothecae; aperture of hydrotheca fairly wide. Adcauline wall of hydrotheca completely adnate, base of hydrotheca with big circular diaphragm and considerable thickening of perisarc adcaudally.

Median inferior nematotheca not reaching hydrothecal base, seated on raised part of internode; upper chamber scooped. Lateral nematothecae slender, projecting far above hydrothecal rim; diaphragm distinct; inner wall of upper chamber slightly scooped. Thecate internode with distinct proximal and distal internal septum and an imperfect septum near hydrothecal base. Athecate internode with nematotheca on prominence of frontal wall of proximal half and with 2 internal septa; nematotheca as median inferior nematotheca on thecate internode.

Distal hydrocladiate thecate internode foreshortened, scarcely projecting above or flush with hydrothecal rim. An occasional internal septum may be developed at insertion of lateral nematothecae on this internode only. Female and male gonothecae on separate colonies. Female gonothecae occurring in profusion, forming a continuous row on front of stem, attached to successive apophyses just under mamelon. Gonotheca globular; gonophore with developing eggs; a marsupium emergent through circular distal aperture. Male gonothecae attached in same way as female, elongated sac-shaped, with irregularly rounded aperture; gonophore filled with a mass of developing spermatocytes.

MEASSUREMENTS of *Plumularia caliculata* (in μm):

	Off Anson Bay slide 2990	Ralph's Loc. 425, slide 3892
Diameter of stem at its base	175	210
Length of stem internode	310 – 365	335 – 390
Diameter at node	115 – 130	170 – 195
Length of apophysis	85 – 110	125 – 140
Diameter at node	67 – 90	95 – 100
Length first athecate internode	90 – 110	90 – 100
Diameter at node	50 – 62	67 – 78
Length thecate internode	310 – 335	265 – 310
Diameter at node	56 – 62	84 – 95
Hydrotheca, length adcauline wall	67 – 84	73 – 78
Length abcauline wall	45 – 62	62 – 73
Diameter at rim	90 – 100	110 – 115
Lateral nematotheca, length	56 – 67	73 – 90
Diameter at rim	39 – 45	39 – 50
Athecate internode (with 1 nematotheca), length	105 – 115	100 – 115
Diameter at node	56 – 62	67 – 73
Female gonotheca, total length	395 – 420	
Greatest diameter	280 – 310	
Male gonotheca, total length		985 – 1050
Greatest diameter		280 – 295

REMARKS: This species is primarily characterised by the female marsupium, a fairly rare occurrence in the genus *Plumularia*. Sterile colonies can easily be confused with certain forms of *P. setacea* in which the apophyses are more or less frontally directed and the hydrothecae are fairly low. The colony structure is an adaptation to water movement in the tidal zone. Empty male gonothecae become greatly flattened but remain attached to colony.

The material from Loc. 98, between Tomahawk and Sandfly, Nov.1880, is fragmentary and in bad condition: it has hesitatingly been referred to this species.

RECORDS FROM NEW ZEALAND: Off Anson Bay, Norfolk Island, well developed specimens with male and female gonothecae on algae. Additional sterile specimens originate from Muriwai Beach, north of Auckland (dead specimens washed ashore on algae) and from Little Papanui, near Christchurch (living specimens with gonothecae on *Gigartina* sp.). These are the first records from New Zealand.

DISTRIBUTION: Port Jackson, New South Wales, Australia (Bale 1888, 1919) and Sagami Bay, Japan (Inaba 1890; Stechow 1913b, 1923b; Yamada 1959; Hirohito 1969, 1995).

Plumularia congregata sp. nov. (Fig. 95A, B)

MATERIAL EXAMINED:

NZOI Stns: C601, many bushy colonies up to 70 mm high, no gonothecae. Basal parts covered by bryozoans and sponge tissue. Paratype, P-1241 in NIWA collection. 3 RMNH-Coel. slides 4782; **D1**, about 15 colonies, up to 65 mm high, no gonothecae. Paratype, P-1242 in NIWA collection. RMNH-Coel. slide 2812; **D74,** about 15 stems, up to 35 mm high on sponge, no gonothecae (holotype, H-786 in NIWA collection). 2 RMNH-Coel. slides 2823, part of type series; **D876**, 2 colonies, about 50–70 mm high, composed of dichotomously branched axis, bearing bundles of stems. RMNH-Coel. slide 2289. Paratype, P-1242 in NIWA collection.

NMNZ: **BS 512**, 3 plumes about 25 mm high, rising from communal stem. Paratype. NMNZ Co. 856.

TYPE LOCALITY: South of Stewart Island, 50°55.65′ S, 165°54.80′ E, 168 m.

DESCRIPTION(of holotype): Colonies composed of bundles of monosiphonic stems, basally adnate and surrounded with a thin layer of slender secondary tubules bearing numerous elongate nematothecae; tubules present only in basal parts of colonies and do not cover that part of axes bearing apophyses. Basal parts of fused stem may have a diameter of several millimetres and may be invested by bryozoans or sponges. Axes perfectly straight and tubular, narrowing very gradually towards apex; transverse nodes only visible in younger parts, internodes, where visible, with subdistal apophysis; apophyses

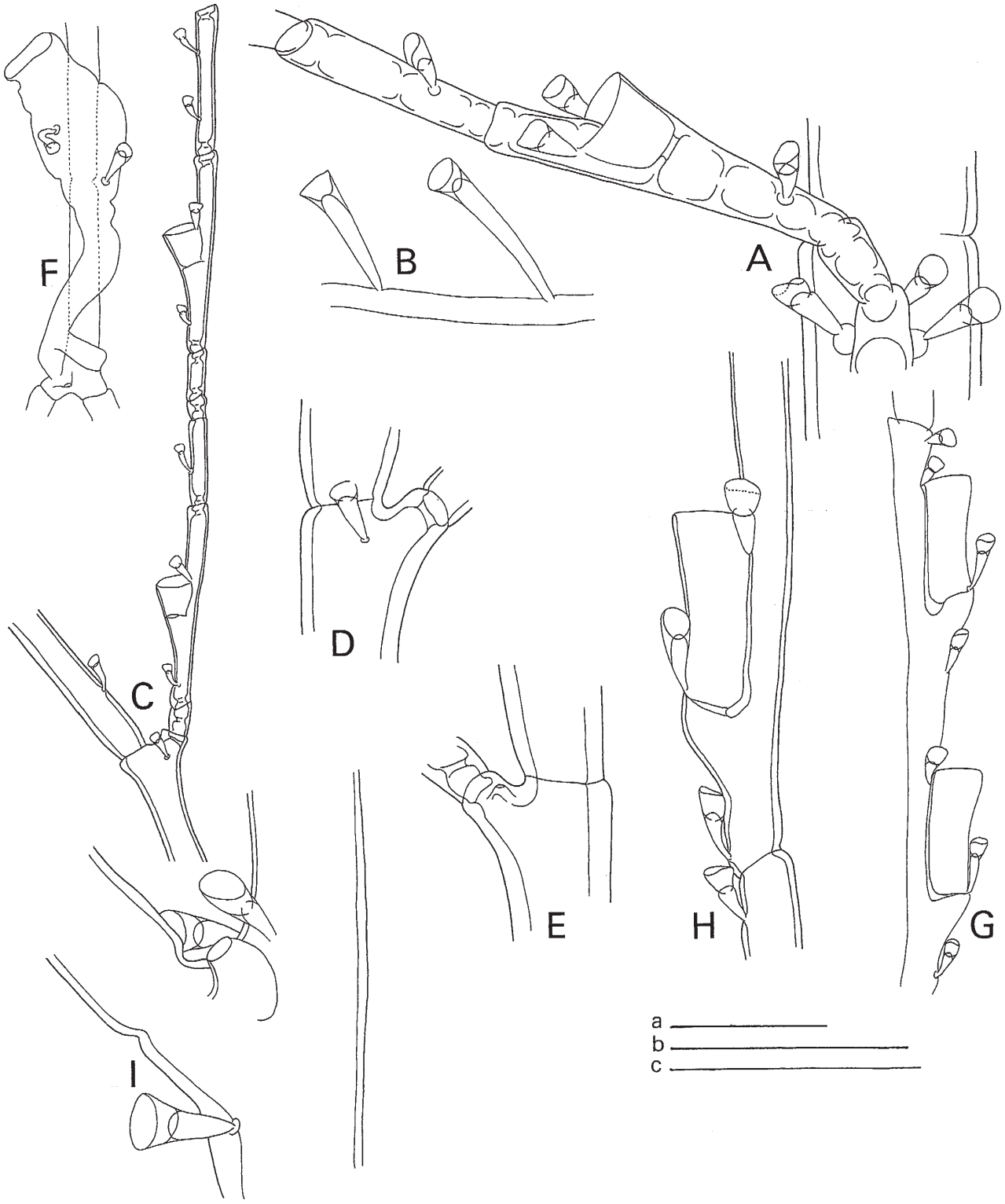

Fig. 95. A, B. ***Plumularia congregata*** sp. nov. **A**, proximal part of hydrocladium and its insertion on stem internode. **B**, nematothecae from secondary tubules (NZOI Stn D74, holotype, slide 2823). **C–F.** ***Plumularia filicula*** Allman, 1877. **C**, proximal part hydrocladium and its insertion on stem apophysis. **D**, stem apophysis, frontal view. **E**, the same, view from back. **F**, empty gonotheca, lateral view (BS 697, slide 3364). **G–I.** ***Plumularia*** cf. ***insignis*** Allman, 1883. **G**, part of hydrocladium. **H**, hydrotheca. **I**, insertion of hydrocladium on stem, all figures in lateral view (NZOI Stn P239, slide 4783). Scales: a, 0.2 mm (H); b, 0.2 mm (A, B, D, E, I); c, 0.5 mm (C, F, G). W.V.

alternately upwardly directed obliquely left or right, supporting a delicate, about 5 mm long hydrocladium. Apophyses and hydrocladia in 1 plane, though in older parts of colony these show a to shift towards front.

Apophyses with 3 nematothecae: a pair flanking the apophysis, a third above apophysis; insertion of each nematotheca surrounded by halo of thin, transparent perisarc. Nematothecae of unequal size, bithalamic, wall of upper chamber scooped on adcauline side; diaphragma strongly developed. A fourth nematotheca at base of each stem internode on wall opposite apophysis.

Hydrocladia delicate, heteromerously segmented, attached to internode by short, athecate internode with 2 imperfect internal septa; proximal node transverse, distal node slightly oblique; this arrangement of nodes continued along hydrocladium. Thecate and athecate internodes of hydrocladium long and slender, about 5 thecate internodes per hydrocladium. Hydrotheca slightly distal to mid region of internode, cup-shaped, with straight, fairly thin abcauline wall; aperture circular, rim smooth, slightly tilted downwards. 3 nematothecae on thecate internode: 1 median infracalycine on basal part of internode, and a pair of lateral nematothecae close to hydrothecal rim; 5 imperfect internal septa: 1 proximal, 1 near insertion of median nematotheca, 1 halfway between that point and base of hydrotheca, 1 at hydrothecal base, and 1 at distal end of internode. A much less developed septum at base of lateral nematothecae. Athecate internode only slightly shorter than thecate, with 1 nematotheca in lower third of internode; 3 imperfect internal septa: 1 proximal, 1 intermediate, and 1 at distal end.

MEASUREMENTS of *Plumularia congregata* sp. nov. (in μm):

	NZOI Stn D74 slide 2823
Diameter of stem at its base	160 – 170
Length stem internode	420 – 500
Diameter at node	130 – 140
Length of apophysis	85 – 95
Diameter at node	40 – 45
Length first athecate internode	120 – 125
Diameter at node	60 – 64
Length thecate internode	400 – 410
Diameter at node	45 – 47
Hydrotheca, length abcauline wall	77 – 81
Length adcauline wall	84 – 95
Diameter at rim	99 – 115
Lateral nematotheca, length	57 – 62
Diameter at rim	31 – 35
Athecate internode, length	260 – 265
Diameter at node	39 – 45

All nematothecae fairly big and sturdy, conical, slightly curved basally, with prominent diaphragmatic ring and spacious apical chamber; rim scooped adcaudally.

Nematothecae on secondary tubules and basal part of colony with greatly elongated proximal chamber; diaphragm distinct, rim smooth, not scooped.

Gonothecae absent.

REMARKS: The colony structure of this new species is very striking, approaching that of many species of *Corhiza*; the structure of the individual stems, however, is almost as in *Plumularia setacea*. The stems, nevertheless, are strongly built, the division into internodes being only visible apically. The hydrocladia are quite fragile and thin in comparison to the firm axial perisarc and are easily damaged; they are frequently lost from lower parts of the colonies.

RECORDS FROM NEW ZEALAND: So far known from Cook Strait, off west coast of D'Urville Island, 40°47′ S, 173°48′ E, 62 m; off Chatham Islands, 43°20′ S, 176°50′ W, 148 m, and three localities in southern New Zealand waters, viz., 44°18.00′ S, 176°16.00′ E, 144 m; 44°18.00′ S, 176°10.00′ E, 141 m, and 50°55.65′ S, 165°54.80′ E, 168 m.

DISTRIBUTION: Known only from New Zealand.

ETYMOLOGY: The specific name has been taken from the Latin verb *congrego*, bringing together, uniting, referring to the condition of the stem.

Plumularia filicula Allman, 1877 (Fig. 95C–F)

Plumularia filicula Allman 1877: 29–30, pl. 18, figs 1–2; Nutting 1900: 58–59, pl. 2, fig. 2; Fraser 1944a: 344–345, pl. 74, fig. 332; Hirohito 1983: 68, fig. 35; Ramil & Vervoort 1992a: 183–186, fig. 47a-e; Hirohito 1995 (English text): 275, fig. 94a.

MATERIAL EXAMINED:

NMNZ: BS 697, 4 colonies on bryozoan remains, up to 30 mm long; with gonothecae. NMNZ Co. 736; RMNH-Coel. 27664, slide 3364.

TYPE LOCALITY: Off Alligator Reef, Florida, U.S.A., 161 m (Allman 1877). Type material probably in MCZ (as *Halecium filicula* Allman, 1877 in our copy of list of Hydrozoa type specimens in MCZ but no such species described by Allman in his 1877 paper).

DESCRIPTION: Delicate, about 30 mm long plumes rising from tubular stolon attached to a bryozoan. Stem thin, divided into internodes by transverse nodes, slightly geniculate between nodes, internodes with exception of basalmost provided with nearly apical apophysis;

apophyses alternately directed left or right and obliquely upwards, diminishing in length towards apex of stem. Stem internodes long and slender; each apophysis with 1 frontal nematotheca, a mamelon on the back, on end of a slightly raised cone, and an internal, almost distal septum. Stem internodes with 2 nematothecae opposite apophysis. All stem nematothecae slender, conical, slightly curved, with distinct ring-shaped diaphragm, spacious apical chamber and slightly scooped adcauline part of rim.

Hydrocladia long and slender, to about 8 mm, with 7 hydrothecate internodes, attached to apophysis by short internode with transverse proximal node, oblique distal node and an internal septum. Hydrocladium heteromerously segmented; thecate and athecate internodes long and slender; thecate internode proximally with an oblique node and with more or less transverse distal node; athecate internodes sometimes quite indistinct by irregularities in segmentation. Thecate internode with hydrotheca in middle of upper wall, 1 almost basal inferior median nematotheca and a pair of lateral nematothecae near hydrothecal rim. Hydrotheca small, cup-shaped, abcauline wall straight, thin; rim smooth, circular, aperture slightly tilted downwards. Lateral nematothecae slender, conical, with slightly widening apical chamber; inner part of rim almost imperceptibly scooped. Thecate internode with proximal and distal internal septa. Athecate internode with 2 median nematothecae on upper wall and 2 internal septa, 1 proximal, 1 distal. Many irregularities among the hydrocladia of 1 stem, resulting in segmentation of athecate internodes into several shorter internodes with or without nematotheca. Hydrocladia may also have several short proximal internodes without nematothecae.

Perisarc thin throughout colony, thickest along walls of stem internodes and quite thin along hydrocladia.

Only 1 empty gonotheca present. Gonotheca elongated sac-shaped, indistinctly wrinkled, gradually narrowing towards base, attached to apophysis below mamelon; 2 nematothecae on widest part. Top with subcircular aperture displaced slightly to 1 side.

Measurements of *Plumularia filicula* (in μm):

	NMNZ BS 697 slide 3364
Diameter of axis at its base	150
Length stem internode	770 – 1000
Diameter at node	90 – 135
Length of apophysis	84 – 110
Diameter at node	62 – 67
Length first athecate internode	84 – 90
Diameter at node	51 – 56
Length thecate internode	550 – 565
Diameter at node	54 – 57
Hydrotheca, length abcauline wall	90 – 95
Length adcauline wall	100 – 105
Diameter at rim	100 – 108
Lateral nematotheca, length	73 – 78
Diameter at rim	34 – 39
Athecate internode (with two nematothecae), length	390 – 430
Diameter at node	34 – 39
Gonotheca, length	820
Greatest diameter	230

Remarks: The present specimens differ from descriptions of Atlantic material by the constant presence of a single nematotheca in the axil of the apophysis and the displacement of the mamelon towards the opposite wall. Only one gonotheca was in the present material, its structure being in reasonable agreement with the gonotheca of the Atlantic specimens. No nematothecae have previously been reported in association with the gonothecae; in the slide the gonotheca is directed downwards along the stem internode, which probably is not its normal position. We therefore consider the identity of the New Zealand specimens is somewhat doubtful. A number of Pacific species of *Plumularia* has been described by Nutting (1905) and Fraser(1938, 1948) that are rather ill-defined and need re-examination.

Records from New Zealand: Recorded only in New Zealand from the Bay of Plenty, off White Island, 318–388 m.

Distribution: Mainly known from the subtropical western Atlantic and the Atlantic coasts of the United States, but also found in the temperate eastern Atlantic off Cape São Vicente and off Rabat, Morocco (Ramil & Vervoort 1992). Pacific records are scarce: Hirohito (1983, 1995) listed this species from Japanese waters.

Plumularia cf.***insignis*** Allman, 1883 (Fig. 95G–I)

Plumularia insignis Allman 1883: 21, pl. 2; Murray 1896: 415; Billard 1910: 32–34, fig. 14; Bedot 1921b: 28; von Schenck 1965: 901, fig. 4b; Millard 1977a: 42, fig. 12D–E; Stepan'yants 1979: 117, pl. 22, fig. 2; Branch & Willams 1993: 12, fig.; Stranks 1993: 11; Blanco 1994a: 157; 1994b: 208; 1994c: 239–241, fig. 30; Genzano 1994b: 6; Zamponi *et al.* 1998: 12.

Diplopteron insigne: Ritchie 1913a: 7.

Plumularia flabellum Allman 1883: 19, pl. 1, figs 1–4; Stechow 1923a: 13; 1923d: 225; Stranks 1993: 10.

Plumularia insignis var. *flabellum*: Billard 1910: 34–35, fig. 15; Bedot 1921b: 28.

Plumularia abietina Allman 1883: 21, pl. 3; Stranks 1993: 7.
Plumularia insignis var. *abietina*: Billard 1910: 35-36; Bedot 1921d: 28.
Plumularia insignis var. *conjuncta*: Billard 1913: 49, figs 42, 43; Bedot, 1921b: 28; van Soest 1976: 89.
Plumularia insignis var. *gracilis* Billard 1913: 47, text-fig. 41, pl. 3, figs 29–30; Bedot 1921b: 28; van Soest 1976: 89.
Plumularia sp. Naumov & Stepan'yants 1962: 99, fig. 19.

Material Examined:

NZOI Stn P239, about 150 mm high colony in 2 parts, no gonothecae. [Slide P239 JEW Colln]. 3 RMNH-Coel. slides 4783.

Type Locality: *Plumularia insignis*: 46°40′ S, 37°50′ E, 567 and 274 m, *Challenger* Stn 145; holotype in NHM; three slides in MNHN as part of type series, 1278–1280. *Plumularia flabellum*: off Marion Island, 91-137 m, *Challenger* Expedition; holotype in NHM; slide in MNHN as part of type series, 1282. *Plumularia abietina*: off Prince Edward's Island, 274 m?; holotype in NHM; two slides in MNHN as part of type series, 1179 and 1281. (All Allman 1883).

Description: Colony plumose, with distinct, polysiphonic main stem, primary tube on front, repeatedly branched, with secondary, tertiary, etc. branches roughly in 1 plane and more or less pinnate; polysiphony continued in smallest ramification. Stem basally about 1.5 mm thick, with small bunch of fine stolonal tubes probably attaching colony in soft sediment. Primary tube with transverse nodes forming internodes of variable length bearing short, alternately arranged apophyses, pointing left or right, obliquely upward, orientated towards front of colony, supporting 5–8 mm long laterally curving hydrocladia. Each apophysis with distinct, conical mamelon, a pair of axillar nematothecae and a nematotheca at its base. Hydrocladia so irregularly divided into internodes that it is difficult to describe a typical arrangement. First internode of hydrocladium usually a thecate internode. Following internodes, frequently all hydrothecate, are long and thin, with 2 hydrothecae and a number of unpaired nematothecae as well as paired lateral nematothecae. 1 or 2 median unpaired nematothecae occur at proximal and distal end of internode and between the hydrothecae. An additional median unpaired nematotheca sometimes frontally at the base of the hydrotheca. All unpaired nematothecae fairly long and slender, slightly curved, with big apical chamber with scooped adcauline wall; frontal wall of unpaired nematothecae thickened. Paired nematothecae inserting on internode some distance below hydrothecal rim and projecting far beyond; general shape conical with fairly wide apical chamber only minutely scooped; no basal prominence.

Hydrotheca very deep, about 2.5 times width at rim, seated on a conspicuous elevation of internode; adcauline wall completely adnate, thick, broadly rounded basally, with wide diaphragm at hydrothecal bottom. Abcauline wall slightly concave; rim flat, slightly tilted downwards.

Perisarc well developed considering slenderness of hydrocladial internodes, of a light horny colour.

Gonothecae absent.

Measurements of *Plumularia* cf. *insignis* (in μm):

	NZOI Stn P239 slide 4783
Diameter of stem at its base	1900
Diameter of branch from which stems apophysis	110 – 120
Length of apophysis	73 – 84
Diameter at node	78 – 82
Thecate internode (with two hydrothecae)	1090 – 1315
Diameter at node	45 – 50
Hydrotheca, length adcauline wall	225 – 230
Length abcauline wall	225 – 235
Diameter at rim	100 – 110
Nematotheca at base of hydrotheca, length	95 – 100
Diameter at rim	45 – 47
Lateral nematotheca, length	78 – 84
Diameter at rim	45 – 50

Remarks: Shape of colony deformed from long storage in narrow tube. The structure of the hydrocladia is very irregular; though usually formed by a succession of long internodes with two hydrothecae, monothecate internodes are occasionally present, while the distal part of an internode may be split off as an athecate internode with one or two nematothecae. The additional unpaired median nematotheca is absent in a number of internodes; this may be due to damage.

The specimen agrees with some of the varieties of *Plumularia insignis* Allman, 1883 in the general shape of the hydrothecae, though none so far described has a frontal nematotheca at the base of the hydrotheca. Varieties with hydrocladia exclusively made up of thecate internodes have been described e.g., by Millard (1977a), but we have not seen descriptions of forms with two hydrothecae per internode. The classification of this specimen with *Plumularia insignis* is provisional pending the discovery of more material. The irregularity in the construction of the internodes and the absence of the gonosome preclude us from describing it as a new species of the quite specious genus *Plumularia*.

RECORDS FROM NEW ZEALAND: Recorded from one locality in the Tasman Sea, 36°41.50′ S, 156°11.50′ E, 140 m.

DISTRIBUTION: *Plumularia insignis s.l.* is distributed over the southern Atlantic and southern Pacific (Prince Edward Islands, Marion Island, Kerguelen, Heard Island, cf. Millard 1977a, Blanco 1994a, b, c). Billard (1913) described material from the eastern part of the Malay Archipelago as two separate varieties. This may be the first record from the Tasman Sea, but the identification is by no means certain.

Plumularia opima Bale, 1924 (Fig. 96A–F)

Plumularia setacea var. *opima* Bale, 1924: 254; Batham 1956: 456; Ralph 1961b: 36, figs. 3d, 4b; Dawson 1992: 17; Stranks 1993: 12.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 197, NMNZ Co. 1046, numerous colonies up to 15 mm high on fronds of algae; no gonothecae observed. RMNH-Coel. slide 3712. Partly dried out slide as *Cryptolaria prima* Busk, no data. Poor slide as *Plumularia setacea*, *Sertularella robusta* + smaller *Sertularia*, no data; **Loc. 198**, NMNZ Co. 1047, 3 isolated colonies without gonothecae, height about 15 mm. RMNH-Coel. slide 3713; **Loc. 231**, NMNZ Co. 1076, a few stems with developing male and empty female gonothecae. With *Plumularia anonyma* sp. nov.; 1 of RMNH-Coel. slides 3742.

TYPE LOCALITY: Tomahawk Beach, Dunedin (Bale 1924. Holotype and paratype slides (52 and 52A) in Canterbury Museum, Christchurch, but not found and probably lost. Probable syntype slide in MOV (MV F60243, Stranks 1993).

DESCRIPTION: Monosiphonic stems 15–20 mm high arising from anastomosing stolonal tubules attached to algae, interior of stolon with occasional perisarc pegs. Stem divided into short internodes, separated by transverse, distinct septa; internodes from base onwards with almost apical apophysis supporting 2 or 3 mm long hydrocladium; apophyses alternate and pointing obliquely upwards, with one apical imperfect internal septum, a small mamelon at upper wall of apophysis and a single axillar nematotheca frontally. A second nematotheca on wall of stem internode opposite apophysis well above proximal node; sometimes 2 axillary nematothecae present.

Hydrocladia gracefully curved downward, heteromerously segmented, attached to apophysis by means of short athecate internode without nematotheca and with single internal septum; 3 or 4 hydrothecate internodes per hydrocladium. Both thecate and athecate internodes short and stubby; cup-shaped hydrotheca seated on considerably elevated part in middle of frontal wall of internode, both abcauline and adcauline walls of hydrotheca thickened; rim smooth and thin, slightly tilted downwards. Adcauline wall of hydrotheca 'socketed' into body of internode, which forms 2 rounded swellings on each side of hydrotheca. In oblique lateral view adcauline wall of hydrotheca is seen not completely fused to internode, a small portion, between the base of the lateral nematothecae, free. Thecate internode with 3 nematothecae: a median inferior nematotheca on rounded prominence, laterals implanted on inflated part of internode below hydrothecal rim; 4 distinct internal septa: 1 at proximal end of internode,1 slightly beyond insertion of median inferior nematotheca, 1 at hydrothecal base, and 1 at distal end of internode. A weakly developed septum at base of lateral nematothecae. All unpaired nematothecae, including those of stem, elongated conical, rather big, slightly curved, with strong, ring-shaped diaphragm and adcauline wall of upper chamber slightly scooped. Lateral nematothecae long, almost reaching distal node; apical chamber with smooth, entire rim. Proximal node of thecate internode oblique; distal node transverse. Athecate internodes short, width same as length or to 1.5 times width; nematotheca in middle; internode with 2 septa, 1 proximal, 1 distal.

Perisarc thick, yellowish, particularly along walls of stem internodes but also along walls of thecate and athecate internodes of hydrocladia.

MEASUREMENTS of *Plumularia opima* (in μm):

Ralph's	Loc. 198 slide 3713	Loc. 231 slide 3742
Diameter of stem at its base	150 – 165	
Length stem internode	295 – 450	335 – 365
Diameter at node	100 – 135	90 – 100
Length of apophysis	85 – 100	105 – 115
Diameter at node	62 – 73	67 – 78
Length basal athecate internode	95 – 100	73 – 78
Diameter at node	67 – 78	62 – 67
Length thecate internode	295 – 335	280 – 310
Diameter at node	45 – 51	51 – 56
Hydrotheca, length abcauline wall	100 – 105	84 – 90
Length adcauline wall	106 – 118	90 – 110
Diameter at rim	115 – 125	105 – 115
Lateral nematotheca, length	78 – 85	75 – 80
Diameter at rim	39 – 45	45 – 50
Length athecate internode (with nematotheca)	110 – 115	115 – 140
Diameter at node	67 – 73	56 – 62
Female gonotheca, length		915 – 920
Greatest diameter		295
Male gonotheca, length		540 – 575
Greatest diameter		215 – 260

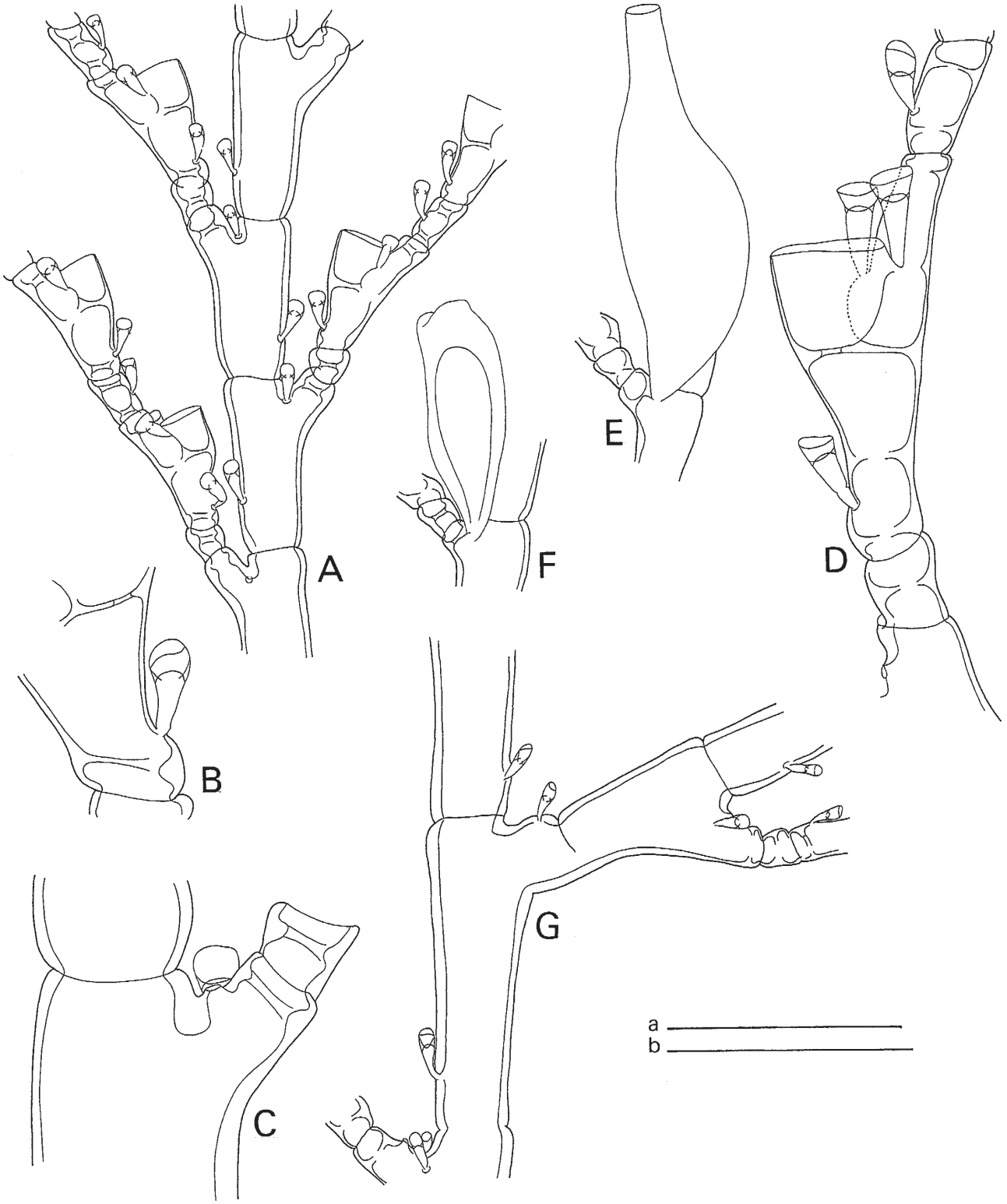

Fig. 96. A–F. ***Plumularia opima*** Bale, 1924. **A**, part of stem with three hydrocladia, frontal view. **B**, proximal part of hydrothecate internode, lateral view. **C**, stem apophysis and insertion of internode, view from back (Loc. 198, slide 3713). **D**, part of hydrocladium, lateral view. **E**, female gonotheca. **F**, male gonotheca (Loc. 231, slide 3742). **G.** ***Plumularia setacea*** (Linnaeus, 1758), branched form, part of stem with insertion of a secondary stem, frontal view (NMNZ, Spencer Bay, slide 2946). Scales: a, 0.2 mm (B–D); b, 0.5 mm (A, E–G). W.V.

Empty female and male gonothecae occur in specimens from Ralph's Loc. 231. Gonothecae occur in a row along 1 stem, female gonothecae below; male above. Both insert on stem apophyses just under mamelon. Female gonothecae not substantially different from those of *P. setacea* (L., 1758), being more or less flask-shaped, with asymmetrically swollen lower portion, narrowing apically into a long neck with circular orifice. Male gonotheca much smaller, elongated ovoid, narrowing basally, rounded apically, aperture oval; gonophore with ovoid mass of developing spermatocytes.

The material from Locs 197 and 198 is exceptionally well preserved with fully extended polyps with 14-16 tentacles.

REMARKS: Originally described by Bale (1924) as a variety of *Plumularia setacea* (Linnaeus, 1758) and raised to subspecific rank by Ralph (1961a). It is, nevertheless, separated from *P. setacea* by distinct characters of the structure of the thecate internode, the hydrotheca and the lateral nematothecae. It occurs chiefly on algae in association with the epiphytic form of *P. setacea* from which it is distinguished by its coarse structure with thick stem internodes, short, thick hydrocladial internodes and a sturdy hydrotheca. It is here been raised to specific rank as *Plumularia opima* Bale, 1924.

RECORDS FROM NEW ZEALAND: First recorded from Tomahawk Bay, Dunedin (Bale 1924); also known from Menzies Bay, Christchurch, occurring there on algae. Material from another locality mentioned by Ralph (1961b, Little Papanui, on *Gigartina* sp.) in our opinion rather belongs to *Plumularia caliculata* Bale, 1888. The species is probably occurs more widely on algae in the New Zealand littoral zone; it is easily confused with *P. caliculata, P. setacea* and *P. setaceoides*.

DISTRIBUTION: Known only from New Zealand.

Plumularia setacea (Linnaeus, 1758) (Figs 96G; 97A–G; 98A)

Indo-Pacific records mainly.

Sertularia setacea Linnaeus 1758: 813.

Plumularia setacea: Farquhar 1896: 466; Hilgendorf 1898: 214–215, pl. 21, figs 1, 1a-d; Bartlett 1907: 43; Stechow 1909: 79; Hilgendorf 1911: 541; Ritchie 1911: 851; Billard 1913: 32, fig. 24; Stechow 1913b: 9, 89; Jarvis 1922: 348; Stechow 1923b: 17; Bale 1924: 252, fig. 11; Trebilcock 1928: 24; Johnson & Snook 1935: 65, figs 48–49; Fraser 1937: 191–192, pl. 44, fig. 231; Eyre *et al.* 1938: 109; Fraser 1938b: 10, 66; 1938c: 111; 1938d: 136; Stephenson *et al.* 1938: 19; Fraser 1939c: 161 *et seq.*; 1940c: 497; 1948: 287; Hodgson 1950: 43, fig. 73; Kulka 1950: 80, fig. 13a, b; Dawydoff 1952: 55; Day *et al.* 1952: 404; Yamada 1955: 4, pl. 2, figs 1–2; Day & Morgans 1956: 301; Millard 1957: 232; Hakushi *et al.* 1957: 217, pl. 108, fig. 10; Millard 1958: 212; Skerman 1958: 224; Millard 1959: 252; Pennycuik 1959: 180; Yamada 1959: 78; Naumov 1960: 465–466, fig. 354; Ralph 1961d: 236; Millard 1962: 301; Ricketts & Calvin 1964: 415; Yamada 1965: 362; Grindley & Kensley 1966: 6; Millard 1966b: 493; 1967: 187; Hirohito 1969: 27; Rho 1969: 167; Day *et al.* 1970: 14; Schmidt 1972: 41, 43; Morton & Miller 1973: 152, fig. 54 no. 8; Hirohito 1974: 41; Leloup, 1974: 49, fig. 43; Millard & Bouillon 1974: 9; Rho & Chang 1974: 148; Cooke 1975: 104, pl. 6, fig. 3; Millard 1975: 399, fig. 124E–K; Cooke 1977: 101, fig. 28; Gordon & Ballantine 1977: 100; Rho 1977: 281, 426, pl. 95, fig. 96; Vervoort & Vasseur 1977: 76, fig. 32; Millard 1978: 196 *et seq.*; Hirohito 1983: 70; Zhang Liangxing *et al.* 1984: 548; Austin 1985: 59; Rho & Park 1986: 11-12; Cairns *et al.* 1991: 28; Tang 1991a: 31; Dawson 1992: 17; Park 1992: 295; Watson 1994a: 67; Bouillon *et al.* 1995: 62; Cornelius 1995a: 158–161, fig. 37; Hirohito 1995 (English text): 278, fig. 95c, d; Kalk 1995: 200, fig. 7.22; Park 1995: 16; Calder 1997: 17–21, fig. 4 (*cum syn.*); Zamponi *et al.* 1998: 12; Watson 2000: 53–54, fig. 41A, B.

Plumularia setacea β Linnaeus 1767: 1312.

Plumularia setacea var. *setacea*: Ralph 1961b: 33–36, figs 3e, 4a, c-d.

Sertularia templetoni Fleming 1828: 543.

Plumularia tripartita von Lendenfeld 1885a: 477, 478, pl. 12, figs 8–10.

Plumularia multinoda Allman 1885: 157, pl. 26, figs 4–6.

Plumularia turgida Bale 1888: 779, 780, pl. 20, figs 12–13.

Plumularia corrugata Nutting 1900: 64, pl. 6, figs 1–3.

Plumularia palmeri Nutting 1900: 65, pl. 6, figs 4–5.

Plumularia milleri Nutting 1905: 951, pl. 5, fig. 1, pl. 12, figs 6–7.

Plumularia diploptera Totton 1930: 222, fig. 59a, b; Ralph 1961b: 32–33, fig. 3f-j; 1961d: 236; Vervoort 1966: 143; Morton & Miller 1973: 154; Gordon & Ballantine 1977: 100; Rees & Vervoort 1987: 137–139, fig. 29; El Beshbeeshy 1991: 271–273, fig. 68; Dawson 1992: 17.

MATERIAL EXAMINED:

NZOI Stns: A502, *Plumularia setacea* (Linnaeus, 1758) (J.E. Watson) [as *Plumularia diploptera,* JEW Colln]; **A507**, *Plumularia setacea* (Linnaeus, 1758).[Slide 4193 JEW Colln]; **A898**, 7 stems up to 50 mm high on worm tube; no gonothecae. Condition poor; **A917**, about 8 colonies, up to 60 mm high, no gonothecae; **B220**, gear DD/GLO, about 10 stems, up to 50 mm on bryozoans. No gonothecae. RMNH-Coel. slide 2743; **B226**, gear DIS, 2 stems about 40 mm. RMNH-Coel. slide 2761; **B230**, many stems up to 70 mm on stones and mussel shell. Some gonothecae. On stem *Clytia hemisphaerica* (Linnaeus, 1767). RMNH-Coel. slide 2763; **B258**, about 20 stems on worm tube, height 30–60 mm, no gonothecae. RMNH-Coel. slide 2770; **B260**, 6 stems 30–40 mm high, no gonothecae; **B264**, many stems up to 40 mm high on small stone or concretion; no gonothecae; **B265**, gear GLO, several mutilated stems on bryozoans; **B265**, gear DD, mutilated stems, no gonothecae; **B268**, some mutilated stems on bryozoans; **B568**, 10–15 mm high colonies on base of *Tubularia* stems. With *Halecium beanii* (Johnston, 1838). RMNH-Coel. slide 2785; **B580**, several stems on stones, about 50 mm high, no gonothecae; **B581**, 2 colonies 80 mm high, 1 with *Salacia bicalycula spiralis* Trebilcock, 1928. RMNH-Coel.

slide 2789; **B582**, about 10 stems, up to 70 mm high, on bryozoans. No gonothecae; **B620**, *Plumularia ?setacea* (Linnaeus, 1758) (J.E. Watson); **C259**, 1 stem, 40 mm long, no gonothecae; **C699**, *Plumularia setacea* (Linnaeus, 1758) (J.E. Watson). [Slide 4194 JEW Colln]; **C765**, 1 stem 35 mm high with female gonothecae; **C785**, many stems, up to 200 mm long, no gonothecae. 2 RMNH-Coel. slides 2808. N.B. Branched stems; **C863**, remnants of several stems, no gonothecae; **C924** (material dried out, condition poor), *Plumularia setacea* (Linnaeus, 1758) (J.E. Watson); **C925**, *Plumularia setacea* (Linnaeus, 1758) (J.E. Watson); **C929** (material dried out, condition poor), *Plumularia setacea* (Linnaeus, 1758)(J.E. Watson); **D90**, 3 stems on bryozoans, length about 30 mm; no gonothecae; **D127**, 1 plume about 45 mm. RMNH-Coel. slide 2830; **D173**, 2 stems about 45 mm high, on bryozoans. No gonothecae; **D176**, stems 20 and 45 mm, in poor condition. No gonothecae; **D273** (bottle no. 1), *Plumularia setacea* (Linnaeus, 1758) (J.E. Watson). Very tiny colony mixed with ascidian *Periphonia hutchinsonia*; **E252**, 2 sterile colonies 25 and 35 mm high on shell fragment. Long and slender internodes. RMNH-Coel. slide 2103; **E291**, single 35 mm high colony; no gonothecae. RMNH-Coel. slide 2109; **G250**, some about 30 mm high stems on old hydroid stem. No gonothecae; **G307A**, some stems, about 35 mm high, on worm tube; **G692**, numerous stems up to 150 mm long, arising from unidentifiable soft substrate; no gonothecae. (RMNH-Coel. slide 2873). [Branched stems]; **G693**, 3 bunches of colonies, greatest length 200 mm, anchoring in bottom, by means of compact system of fibres. No gonothecae. [Branched stems]; **I378**, many about 40 mm high stems on sponge. Thick perisarc, no gonothecae. RMNH-Coel. slide 2157; **J28**, *Plumularia setacea* (Linnaeus, 1758). [Slide 4195 JEW Colln]; **J953**, small stem on *Synthecium megathecum* Billard, 1925; **J975**, several stems on *Dictyocladium monilifer*, no gonothecae; **O326**, colonies about 15 mm high on algae, no gonothecae. 2 RMNH-Coel. slides 2216; **Q31**, small colonies 10–15 mm high on worm tubes. With *Filellum serpens* (Hassall, 1848). No gonothecae; **Q35**, 2 colonies 80 and 100 mm high on bryozoan, with female gonothecae.

NMNZ: In crayfish pot off **Bench Islands**, Foveaux Strait, 18.Nov.1955, 2 stems 50–60 mm high, no gonothecae. NMNZ Co. 493; **Spencer Bay, Queen Charlotte Sound**, 10.Nov.1961, weakly branched stem, up to 100 mm high, no gonothecae. NMNZ Co. 384. 2 RMNH-Coel. slides 2946. [Branched stems]; **Day's Bay, Wellington**, Aug. 1964. coll. L.D. Ritchie, numerous colonies up to 50 mm high on a mussel. No gonothecae. Basal parts invested by a sponge. NMNZ Co. 645; **BS 457**, several, 60 mm high stems, gonothecae plentiful. NMNZ Co. 531. 2 RMNH-Coel. slides 3002; **BS 482**, monosiphonic and sparingly branched stems up to 85 mm high on shells and stones. Hydrocladia all pinnately arranged; no gonothecae. Branched stems. NMNZ Co. 861, RMNH-Coel. slide 3523; **BS 486**, 3 stems 25 mm high detached from substratum; no gonothecae. NMNZ Co. 838, RMNH-Coel. slide 3516; **BS 514**, a moderate number of stems up to 70 mm high, some with several side branches. Gonothecae present, inserting on apophyses of stem internodes. NMNZ Co. 554; **BS 519**, single about 10 mm high stem between other hydroids, single young gonotheca present. RMNH-Coel. slide 3490; **BS 838**, single 30 mm high stem, detached from substratum, with empty gonothecae. RMNH-Coel. 27711, slide 3411; **BS 904**, epizootic colonies, 5–8 mm high, on *Hydrodendron mirabile* (Hincks,1866). RMNH-Coel. slides 2963; **BS 905**, epizootic colonies 5-10 mm high, with gonothecae, on *Hydrodendron mirabile* (Hincks, 1866). NMNZ Co. 688, 2 of RMNH-Coel. slides 3033.

NMNZ Ralph Collection: Loc. 134, NMNZ Co. 987, numerous colonies up to 20 mm high, with many developing gonothecae. RMNH-Coel. slide 3667. Reasonable slide as *Plumularia setacea* var.?, no data; **Loc. 147**, NMNZ Co. 998, 7 stems up to 25 mm long; no gonothecae. RMNH-Coel. slide 3673. Fair slide as *Plumularia setacea*, no data; **Loc. 222**, NMNZ Co. 1068, about 15 stems 10–15 mm high with many gonothecae. RMNH-Coel. slide 3731; **Loc. 238**, NMNZ Co. 1083, Some colonies with female gonothecae. Poor slide as *Plumularia setacea*, with data: female gonothecae; **Loc. 250**, NMNZ Co. 1094, numerous 25–30 mm high stems some with basal ramification, richly bearing gonothecae. RMNH-Coel. slides 3769. [Branched stems]; **Loc. 253A**, NMNZ Co. 1100, large number of colonies detached from substratum but with basal filaments and many gonothecae. RMNH-Coel. slides 3775; **Loc. 265**, NMNZ Co. 1113. Basal part of stem with *Symplectoscyphus j. johnstoni* (Gray, 1843). RMNH-Coel. slide 3792. Partly dried out slide as *Hebella calcarata* (L. Agassiz), no data. Good slide as *Sertularella johnstoni*, no data; **Loc. 312**, NMNZ Co. 1152, 3 detached plumes, highest about 10 mm; no gonothecae. RMNH-Coel. slide 3831; **Loc. 321**, poor slide as *Plumularia setacea*, with data: Muriwai; **Loc. 390**, NMNZ Co. 1181, large sample of stems varying in height between 15 and 40 mm, with plentiful gonothecae. RMNH-Coel. slides 3855. [Branched stems]; **Loc. 394**, NMNZ Co. 1185, several detached stems 35 mm high, with gonothecae; RMNH-Coel. slide 3862. With *Turritopsis nutricula* (McCrady, 1857) and *Symplectoscyphus irregularis* (Trebilcock, 1928). [Branched stems]; **Loc. 439**, NMNZ Co. 1219, from stolon reptant on leg of crab. A few small colonies without gonothecae, mixed with *Plumularia setaceoides* Bale, 1882. RMNH-Coel. slide 3895. Perfect slide as *Halopteris constricta, P. setacea*, no data (= new number 732); **Loc. 455**, NMNZ Co. 1222, sample consists of bunch of colonies about 25 mm long, with many gonothecae and tangled and fragmented colonies of *Obelia* sp. RMNH-Coel. slide 3898; **Loc. 515**, NMNZ Co. 1249, about 15 colonies 35–40 mm high. Gonothecae absent. RMNH-Coel. slide 3925. Poor slide as *Plumularia diploptera*, no data; **Loc. 547**, NMNZ Co. 1265, a few colonies up to 25 mm high on small stone. 1 plume with gonothecae. RMNH-Coel. slide 3940. Sample also includes 2 small decapods on which no recognisable hydroids found; **Loc. 570**, NMNZ Co. 1278, 1279 (second sample!), 2 quite young colonies, 12 and 20 mm high. RMNH-Coel. slide 3957. Fair slide as *Plumularia diploptera*, with data (?)new sample; **Loc. 576**, NMNZ Co. 1285, about 15 stems up to 150 mm high with thick axis and many gonothecae, also many detached gonothecae and hydrocladia. RMNH-Coel. slide 3963. Good slide as *Plumularia diploptera* (?). with data: 'interesting'; **Loc. 615**, NMNZ Co. 1324, bundle of stems in poor condition. With *Halopteris campanula* and *Sertularia unguiculata* Busk, 1852. RMNH-Coel. slide 4006; **Loc. 712**, reasonable slide as *Plumularia setacea*, with data: Rangitoto, 6.6.50; **Loc. 725**, reasonable slide as *Plumularia diploptera*, with data: dredged Motuihe, 21.8.49; **Loc. 728**, good slide *Plumularia setacea* with data: Wharf Pile Oceanographic Institute; **Loc. 732**, perfect slide as *Halopteris constricta, P. setacea*, no data (= new number 732).

PMBS: (No locality record). Identified by P.M. Ralph; Shelf of New Zealand. Identified by: P.M. Ralph. (Taken from card register); **Mu 66–12, Hyd 23** (on card). Blueskin Bay, 15 m, Otter trawl, 8.Nov.1966. Identified by P.M. Ralph. (Taken from card register).

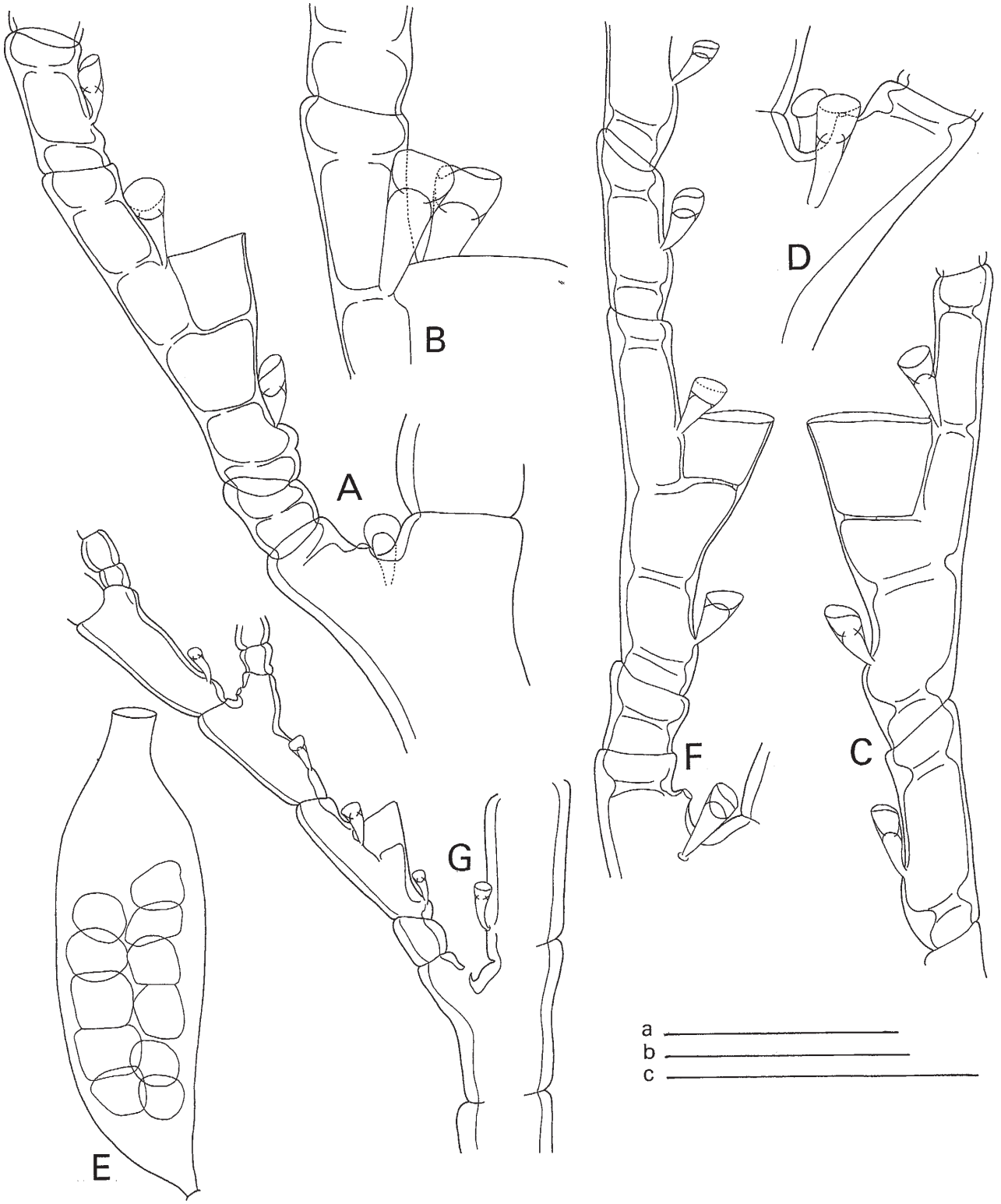

Fig. 97. A–G. ***Plumularia setacea*** (Linnaeus, 1758). **A**, proximal part hydrocladium and its insertion on stem apophysis, frontal view of stem (NZOI Stn B230, slide 2763). **B**, lateral nematothecae, lateral view (NZOI Stn D127, slide 2830). **C**, hydrothecate and ahydrothecate internodes of hydrocladium, lateral view. **D**, stem apophysis and pair of axillary nematothecae, frontal view. **E**, mature female gonotheca, lateral view (NZOI Stn B581, slide 2789). **F**, proximal part hydrocladium and its insertion on stem apophysis, lateral view (Loc. 615, slide 4006). **G**, part of stem and branch of branched colony, frontal view of stem (Loc. 390, slide 3855). Scales: a, 0.2 mm (A, C, D, F); b, 0.5 mm (E, G); c, 0.2 mm (B). W.V.

MATERIAL INSPECTED: **Mu 66–48, Hyd. 35**. No locality record, 59 m, other half identified by P.M. Ralph. 3 about 80 mm high colonies, basally attached to fragment of bryozoan. Tall colony, with division of stem into internodes scarcely visible. Stem apophyses fairly long, alternate, in 2 strictly opposite rows, long, with 2 flanking nematothecae. No gonothecae observed. RMNH-Coel. 27254, slide 2671; **Mu 66–62, Hyd 24**. Blueskin Bay, 15 m, 9.Nov.1966, Otter trawl. Together with *Amphisbetia fasciculata* (Kirchenpauer, 1864). Distinct stem from which diverge branches set with hydrocladia. RMNH-Coel. 27265, slide 2682. [Branched stems]; **Mu 67–13, Hyd 27**. Off Clutha mouth, 10 m, 07.Feb.1967, Agassiz trawl (other half colony to P.M. Ralph). Bunch of about 60 mm high colonies, basally fused but individually all monosiphonic. No septa in hydrocladial internodes. Gonothecae present. RMNH-Coel. 27253, slide 2670. [Branched stems].

Otago Museum, Dunedin: I**v. 753. A.99:38**. Many colonies up to 25 mm high, without gonothecae. Apophyses of stem internodes with single nematotheca. RMNH-Coel. 27247, slide 2664. [Branched stems].

TYPE LOCALITY: *Plumularia setacea*: Brighthelmstone, England (*fide* Ralph, 1961b). *Sertularia templetoni*: seas around British Isles (Fleming, 1828, location of type unknown). *Plumularia tripartita*: Port Phillip, Australia and Timaru, New Zealand (von Lendenfeld, 1885a; syntype in MOV F59278, Stranks, 1993). *Plumularia turgida*: Littleton, New Zealand (Bale, 1888; probable syntypes, in MOV F59338 and F58739, Stranks, 1993). *Plumularia corrugata*: 22-23°S 40'W and 10 miles east of Petros Island (Nutting, 1900; syntypes in NMNH nos 18609 and 18610, Nutting, 1900). *Plumularia palmeri*: San Diego, California, U.S.A. (Nutting, 1900, syntypes in NNINH nos 18624 and 18625). *Plumularia milleri*: north coast of island Maui, Hawaiian Islands (Nutting, 1905; possible holotype, an alcohol-preserved specimen, in NMNH 22160). *Plumularia diploptera*: two *Terra Nova* Expedition stations from northern New Zealand waters, Stn 144 and Stn 134 (Totton, 1930); the material from Stn 134, off North Cape, 20–37 m, has been designated lectotype by Rees & Vervoort, 1987, BMNH 1929.10.28.195 and 1929.10.28.195A).

DESCRIPTION: Monosiphonic stem rising from a mat of tubular filemants attached to algae, solid objects or other hydroids, axis monosiphonic, unbranched and to 80 mm high; if branched (see Remarks) up to 120 mm high. Stems divided into internodes that may be indistinct on basal part of stem becoming more distinct on upper parts; nodes transverse. Each internode with exception of some basal internodes, with almost distal apophysis; apophyses alternate, given off at an angle of 45° or less in 1 plane or somewhat inclined towards front of stem, angle between 2 planes always obtuse. Upper surface of apophysis with a distinct mamelon with circular aperture, raised slightly above surface, sometimes turned towards front of stem. Axil of apophysis with 1 or 2 nematothecae; if only 1 nematotheca, this usually inserted in front of mamelon, if 2 these may obscure mamelon. Place of insertion of nematothecae on colonies with thick perisarc marked by a circular halo of thin perisarc. A third nematotheca inserted on proximal part of internode opposite apophysis. All cauline nematothecae conical with slightly curved base; distal chamber rather spacious, adcauline part of rim scooped to varied degree. An internal, incomplete septum at distal end of apophysis. Hydrocladia 6–10 mm long, heteromerously segmented and inserting on apophysis by a short, athecate internode with transverse proximal node; distal node oblique. No nematotheca on basal athecate internode; imperfect internal septum present. Hydrocladium thereafter a regular succession of thecate and athecate internodes. Thecate internode fairly long, proximal node oblique, distal node transverse; hydrotheca placed slightly above middle of upper margin, cup-shaped, abcauline and adcauline walls of equal length or abcauline wall slightly shorter in which case hydrothecal aperture very slightly tilted downwards. Rim of hydrotheca even or slightly convex in lateral view; a very slight eversion sometimes noticeable at end of abcauline wall; wall typically thin. 3 nematothecae per thecate internode: 1 almost basal and placed on slightly elevated part of internode; a pair of lateral nematothecae near hydrothecal rim. Median inferior nematotheca same as stem nematothecae; laterals elongate, inserting on minor elevation of peri-sarc some distance below hydrothecal rim, not reaching apical node and scarcely scooped at their rim. 4 distinct internal septa visible: 1 proximal, 1 at level of rim of median inferior nematotheca, 1 at insertion of lateral nematothecae, and 1 almost at end of internode. At level of hydrothecal base an additional complete or partial septum visible. Athecate internode about half as long as thecate internode, with median nematotheca on proximal half, inserting on raised part of internode; 2 imperfect internal perisarc septa, 1 at base, and 1 at end of internode.

Ripe female gonotheca elongate flask-shaped, basally narrowing into a short pedicel and apically narrowing into a slightly curved, short tube with circular aperture. 10–15 eggs present in gonophore. Gonothecae inserting on apophyses below mamelon; sometimes 1 on each side, leaving a large circular scar when shed. Male gonothecae smaller, without tube, not observed in present material.

REMARKS: This widely distributed species has an enormous range of variability in nearly all features. Quite remarkable amongst these are the branched variety and the epizootic form. In the branched form the apophyses may develop directly into a segmented secondary stem complete with apophyses and hydrocladia or it may have a few thecate and/or athecate internodes of normal appearance and then develop into a stem. Colonies of this type may reach a considerable size (up to 120 mm) or remain small with just a few short branches. They are indicated above in the list of localities ("branched colonies"). The epizootic form is a dwarfed type of colony in which all dimensions are much reduced and the perisarc is quite thin. In New Zealand this form has so far only been found on *Hydrodendron mirabile* (Hincks, 1866).

MEASUREMENTS of *Plumularia setacea* (in μm):

	NZOI Stn B230 slide 2763	NZOI Stn B581 slide 2789	NMNZ Ralph Loc. 615 slide 4006
Diameter of stem at its base	265 – 275	205 – 220	225 – 270
Length stem internode	350 – 430	530 – 700	380 – 645
Diameter at node	115 – 150	180 – 220	180 – 210
Length of apophysis	140 – 170	140 – 195	155 – 180
Diameter at node	67 – 84	95 – 100	90 – 100
Length first athecate internode	84 – 100	105 – 115	95 – 105
Diameter at node	84 – 95	85 – 95	67 – 85
Length thecate internode	335 – 390	430 – 520	360 – 405
Diameter at node	56 – 67	73 – 85	62 – 67
Hydrotheca, length abcauline wall	77 – 81	88 – 93	95 – 105
Length adcauline wall	81 – 88	95 – 99	98 – 105
Diameter at rim	92 – 95	100 – 105	105 – 110
Lateral nematotheca, length	67 – 84	73 – 84	67 – 73
Diameter at rim	39 – 45	34 – 39	34 – 39
Athecate internode, length	170 – 180	225 – 250	190 – 210
Diameter at node	67 – 73	56 – 62	51 – 67
Female gonotheca, total length		1180 – 1295	
Greatest diameter		360 – 410	

Plumularia diploptera Totton, 1930 has been separated from *Plumularia setacea* (Linnaeus, 1758) because of differences in the angle at which the stem apophyses point forward (lateral in *P. diploptera* and towards front of stem in *P. setacea*); development of ridges or septa (typically best developed in *P. setacea*), and number of axillary nematothecae (one in *P. setacea*; two in *P. diploptera*). In the large Pacific and Atlantic material that we have examined it has proved impossible to use these characters for species discrimination: the disposition of the apophyses (and hydrocladia) may be different in axes rising from the same stolon; the development of perisarc is very much dependent upon the conditions of the environment (wave action, exposure to water currents, etc.) and the presence of one or two axillary nematothecae varies in stems rising from the same colony. Furthermore, as there is absolutely no difference in the morphology of the gonosome we have included *P. diploptera* in the synonymy of *P. setacea*.

RECORDS FROM NEW ZEALAND: *Plumularia setacea* was first recorded from Lyttelton by Bale (1889, as *Plumularia turgida*) and was subsequently recorded from Timaru and Dunedin by Hilgendorf, 1898. Further New Zealand records are given by Bale (1924), Trebilcock (1928), Totton (as *Plumularia diploptera*) and Ralph (1961) (as *P. diploptera* and *P. setacea* var. *setacea*). Present records show that the species occurs on suitable substrates all around New Zealand, between 34° and 51° S, 166.5° E–177° W, depth 17–567 m. Gonothecae found in January, February, March, May, and November.

DISTRIBUTION: Generally considered a cosmopolitan species. However, it would be better to define its distribution as circumglobal in tropical, subtropical, temperate Atlantic, Pacific, and Indian Oceans, preferably in the littoral zone. It penetrates far to the north and the south without occurring under purely arctic or antarctic conditions.

Plumularia setaceoides Bale, 1882 (Figs 98B–I; 99A–F; 100A–D)

Plumularia setaceoides Bale 1882: 40, 47, pl. 15, fig. 4; 1884: 136, pl. 11, fig. 8, pl. 19, fig. 36; von Lendenfeld 1885a: 474, 626; Bale 1887; 78, 96; 1888: 776, 781, pl. 20, figs 7–8; Bartlett 1907: 43; Mulder & Trebilcock 1909: 33, pl. 1, figs 12-13; Fraser 1912: 382, fig. 51; Mulder & Trebilcock 1916: 78, pl. 10, fig. 2; Fraser 1918: 333, 362; Bedot 1921b: 29; Fraser 1921: 179, fig. 107; Stechow 1925: 249; Hargitt 1927: 513; Trebilcock 1928: 24; Blackburn 1937: 368; Burkenroad 1939: 24; Ling 1938: 362, figs 21–22; Blackburn 1942: 116; Fraser 1943: 96; Kramp 1943: 44; Fraser 1944a: 353, pl. 76, fig. 343; 1947: 14; Hodgson 1950: 44, fig. 74; Picard 1951a: 112; Deevey 1954: 271; Yamada 1959: 78; Ralph 1961b: 30–31, fig. 2b-e; 1961c: 109; 1961d: 236; 1966: 159; Vervoort 1968: 110; Morris & Mogelberg 1973: 22, fig. 32a-c; Morton & Miller 1973: 154; Gordon & Ballantine 1977: 100; Staples & Watson 1987: 218; Cairns *et al.* 1991: 28; Dawson 1992: 17; Stranks 1993: 13; Watson 1994a: 67; Bouillon *et al.* 1995: 62.

?Plumularia delicatula Bale 1882: 40, pl. 15, fig. 2; 1884: 137, pl. 11, fig. 5.

[Not *Plumularia delicatula* Busk, 1852; not *Plumularia delicatula* Quelch, 1885a].

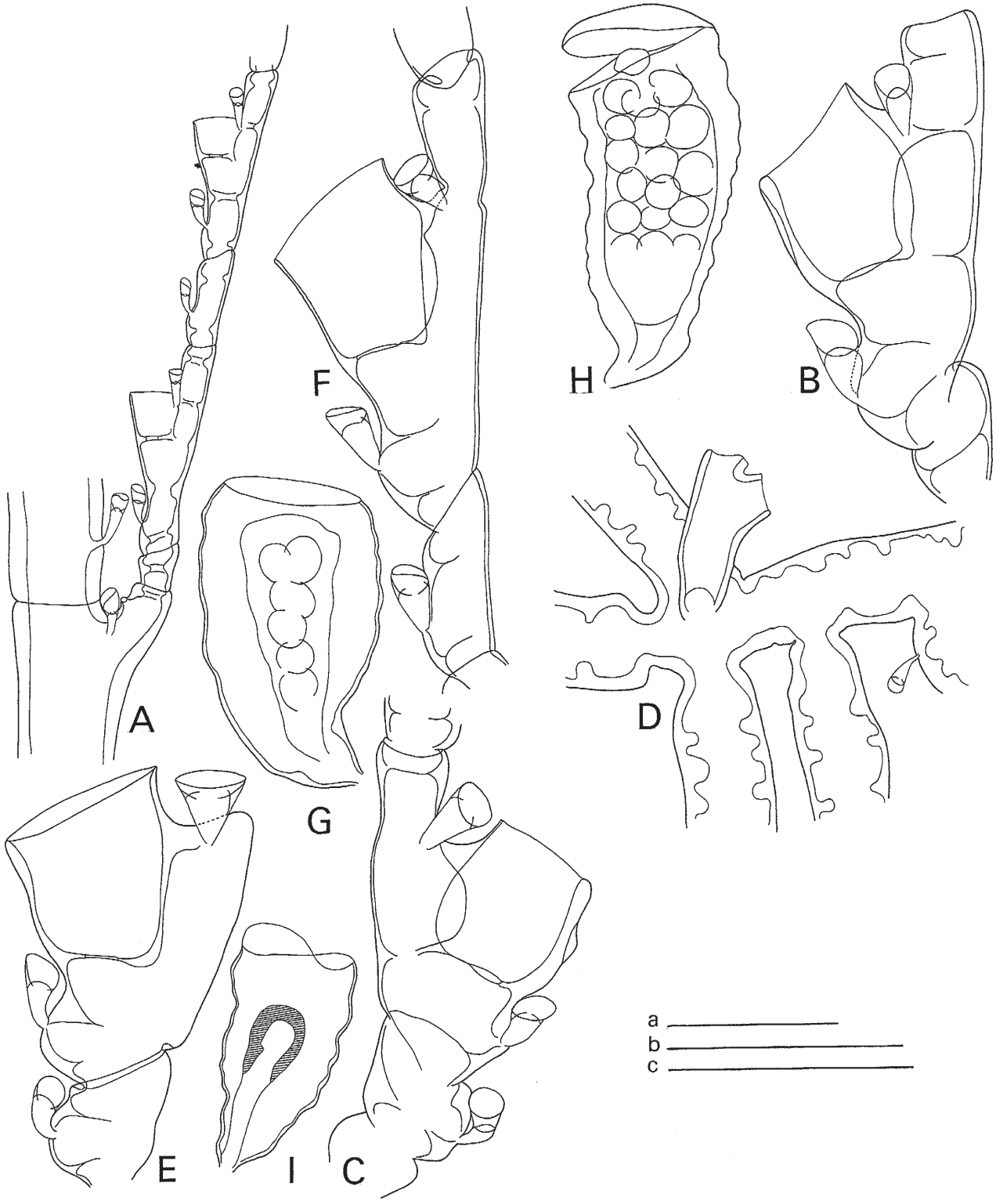

Fig. 98. A. ***Plumularia setacea*** (Linnaeus, 1758), proximal part of hydrocladium and its insertion on stem apophysis, frontal view of stem (NZOI Stn B581, slide 2789). **B–I.** ***Plumularia setaceoides*** Bale, 1882. **B**, hydrothecate internode of hydrocladium, lateral view (Loc. 180, slide 3578). **C**, proximal part of hydrocladium, lateral view. **D**, branched stolon with proximal part of stem, seen from above (Loc. 230, slide 3740). **E**, hydrothecate and ahydrothecate hydrocladial internodes, lateral view (Loc. 233, slide 3746). **F**, the same, lateral view (Loc. 546, slide 3939). **G**, developing female gonotheca, lateral view (Loc. 28, slide 3595). **H**, mature female gonotheca, lateral view (Loc. 264, slide 3790). **I**, developing male gonotheca, lateral view (Loc. 180, slide 3578). Scales: a, 1 mm (H, I); b, 0.2 mm (B–F); c, 0.5 mm (A, G). W.V.

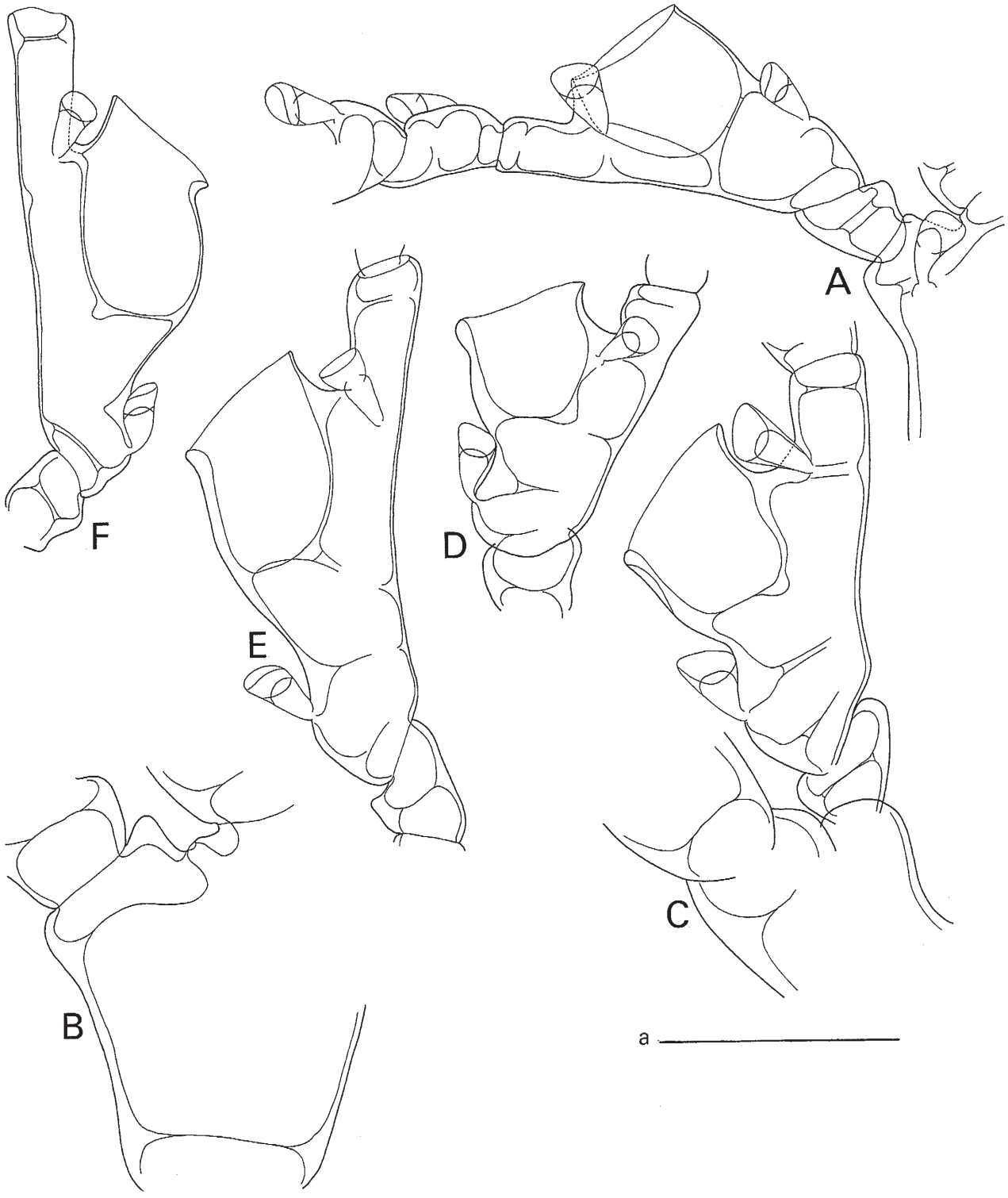

Fig. 99. A–F. ***Plumularia setaceoides*** Bale, 1882. **A**, proximal part hydrocladium and insertion on stem, lateral view. **B**, stem internode and apophysis, frontal view (NMNZ, off Green Island, Otago, slide 3022). **C**, proximal part hydrocladium, lateral view (NMNZ, between Dees Head and Tucker Point, slide 2972). **D**, hydrocladial hydrothecate internode, lateral view (Loc. 28, slide 3595). **E**, the same, lateral view (Loc. 66, slide 3794). **F**, Ralph's '***Plumularia wilsoni***', hydrocladial hydrothecate internode, lateral view (Loc. 501, slide 3917). Scale: a, 0.2 mm (A–F). W.V.

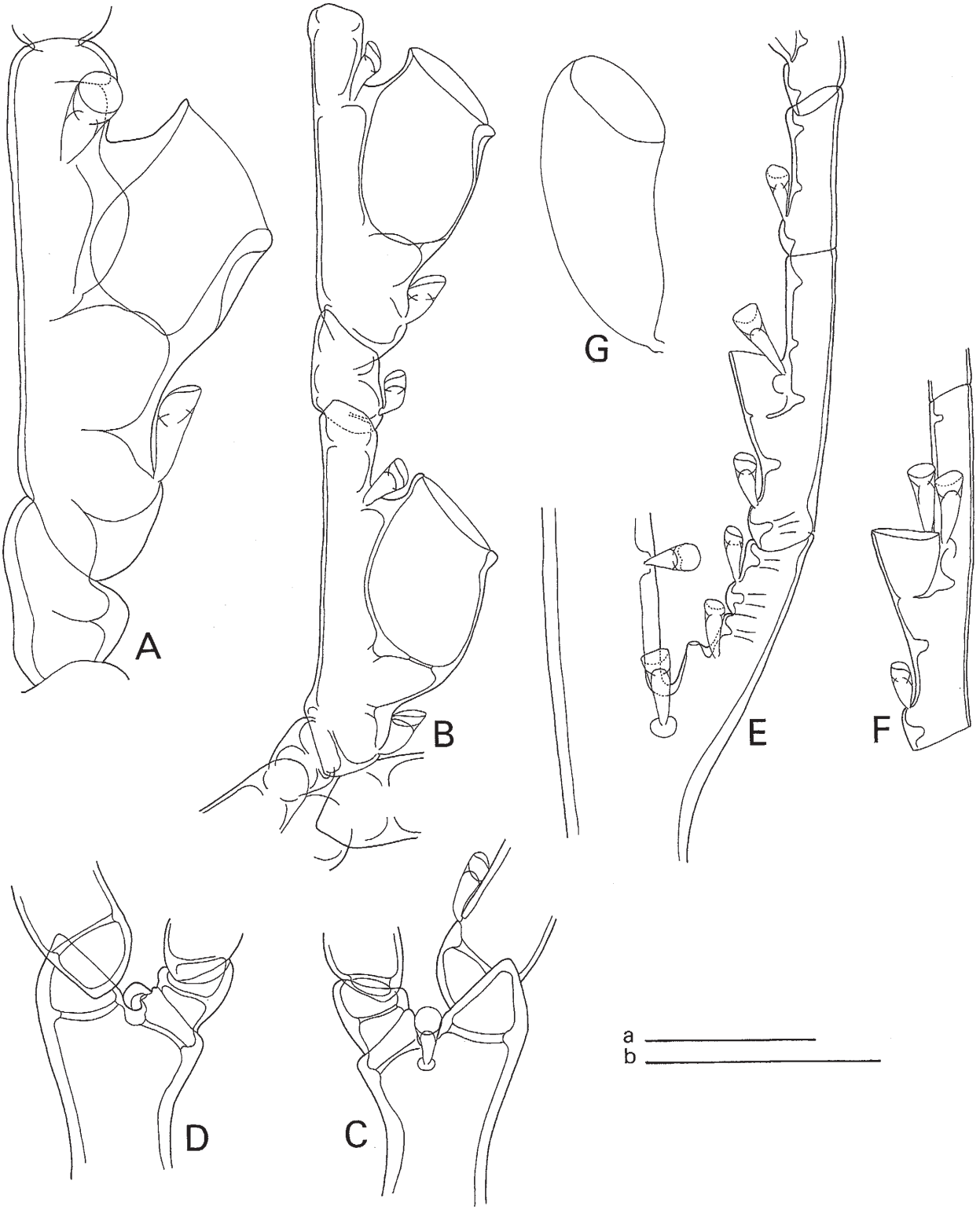

Fig. 100. A–D. ***Plumularia setaceoides*** Bale, 1882. **A**, proximal part hydrocladium, lateral view (Loc. 263, slide 3787). **B**, Ralph's '***Plumularia wilsoni***', proximal part hydrocladium and insertion on stem internode, lateral view. **C**, the same, stem internode with apophysis and insertion of hydrocladium, frontal view. **D**, the same, stem internode with apophysis and insertion of hydrocladium, view from back (Loc. 439, slide 3895). **E–G.** ***Plumularia tenuissima*** Totton, 1930. **E**, monosiphonic part of stem with apophysis and insertion of hydrocladium, frontal view of stem. **F**, hydrothecate hydrocladial internode, slightly oblique lateral view. **G**, gonotheca (NMNZ, Bay of Plenty, between Motuhora and White Islands, slide 3030). Scales: a, 1 mm (G); b, 0.2 mm (A–F). W.V.

?*Plumularia wilsoni* Bale 1926: 21.
Plumularia wilsoni Ralph 1961b: 31, fig. 2a, 3a-c; 1961c: 109; Dawson 1992: 17.

MATERIAL EXAMINED:

NZOI Stn G659, numerous colonies, 5–15 mm high on sponge. No gonothecae. Badly preserved, probably dried out material. With *Amphisbetia operculata* Linnaeus, 1758. 2 RMNH-Coel. slides 2857.

NMNZ: Off Green Island, Otago, 30.Jan.1955, small tufts of colonies, detached from substratum, about 6 mm high. Gonothecae present, sex indeterminate. NMNZ Co. 622; 2 RMNH-Coel. slides 3022; Trawled between **Dees Head and Tucker Point**, Auckland Islands, Jan.1963, many colonies 20–25 mm high, developing from stolon creeping on frond of algae. No gonothecae. NMNZ Co. 453; 2 RMNH-Coel. slides 2972; Between **Dees Head and Tucker Point**, Auckland Islands, Jan.1963, small numbers of about 8 mm high stems developing from stolon on algae. No gonothecae. NMNZ Colln 455.

NMNZ Ralph Collection: Loc. 28, NMNZ Co. 898, a fair number up to 15 mm high colonies with female gono-thecae, on algae. 2 RMNH-Coel. slides 3595. Reasonable slide as *Plumularia setaceoides*; no data; **Loc. 180**, NMNZ Co. 878, numerous colonies about 10 mm high from a stolon creeping on algae, mixed with *Aglaophenia plumosa* Bale, 1882. Gonothecae present. 3 RMNH-Coel. slides 3578; **Loc. 210**, NMNZ Co. 1057, numerous colonies up to 10 mm high with male many gonothecae, detached from substratum. Hydrothecae *wilsoni*-type. 3 RMNH-Coel. slides 3720; **Loc. 215**, NMNZ Co. 1062, 6 colonies up to 10 mm high detached from substratum; no gonothecae. RMNH-Coel. slide 3725; **Loc. 230**, NMNZ Co. 1075, fragment of alga with a few colonies about 5 mm high, without gonothecae. RMNH-Coel. slide 3740. 3 reasonable slides; no data, on label (uni). Reasonable slide as *Plumularia setaceoides*, no data (many septa on label); **Loc. 233**, NMNZ Co. 1078, large number of colonies 10–15 mm high with many gonothecae, on algae; 2 RMNH-Coel. slides 3746. Mixed with *Amphisbetia minima* (Thompson, 1879) and *Orthopyxis caliculata* (Hincks, 1853). Poor slide as *Plumularia setaceoides, Campanularia, Sertularia minima* with data: short, broad stem internodes; **Loc. 263**, NMNZ Co. 1111, partly decomposed algae to which are attached many up to 15 mm high stems without gonothecae springing from stolonal tubules. With *Amphisbetia minima* (Thompson, 1879) and *Sertularella simplex* (Hutton, 1883). 2 RMNH-Coel. slides 3787; **Loc. 264**, NMNZ Co. 1112, fragments of algae with stolonal fibres of *Plumularia setaceoides* Bale, 1882 and many detached stems; ripe female gonothecae attached to basalmost part of stem or to stolons. With *Amphisbetia trispinosa* (Coughtrey, 1875). RMNH-Coel. slide 3790; **Loc. 266**, NMNZ Co. 1114, sample consists of fragments of algae with *Plumularia setaceoides* Bale, 1882, *Obelia geniculata* (Linnaeus, 1758) and *Opercularella* sp., stems of first about 10 mm high, no gonothecae. RMNH-Coel. slide 3794; **Loc. 294**, NMNZ Co. 1139, fragments only, of which largest on fragment of alga. RMNH-Coel. slide 3821; **Loc. 302**, poor slide as *Plumularia setaceoides*, no data; **Loc. 320**, NMNZ Co. 1156, small, about 8 mm high colonies on algae; no gonothecae. Brittle material, dead, no tissue left. RMNH-Coel. slide 3835; **Loc. 331**, NMNZ Co. 1162, 2 stolonal networks to which attached remnants of stems with some hydrocladia. RMNH-Coel. slide 3839; **Loc. 348**, NMNZ Co. 1171, about 8 mm high, fragile colonies attached to fragment of algae; some gonothecae present, sex indeterminate. RMNH-Coel. slide 3847; **Loc. 439**, NMNZ Co. 1219, many about 8 mm high stems rising from stolon reptant on legs of *Paramithrax* (?) *peronii*; no gonothecae. Hydrothecae of *wilsoni*-type. With *Plumularia setacea* (Linnaeus, 1758). RMNH-Coel. slide 3895. Perfect slide as *Halopteris constricta, P. setacea*, no data (= new number 732); **Loc. 501**, NMNZ Co. 1238, about 10 colonies from stolon reptant on brown algae, highest about 10 mm, no gonothecae. Hydrothecae of *wilsoni*-type. RMNH-Coel. slide 3917. Poor slide as *Plumularia wilsoni*, no data; **Loc. 510**, NMNZ Co. 1244, scarcely recognisable fragment left, not made up in slide. Poor slide as *Plumularia setaceoides*, no data; **Loc. 546**, NMNZ Co. 1264, numerous up to 20 mm long plumes on brown algae, with many male gonothecae. RMNH-Coel. slide 3939; **Loc. 713**, poor slide as *Plumularia setaceoides*, no data; **Loc. 724**, reasonable slide as *Plumularia setaceoides*, with data: male and female, narrow neck, 6.5.1950.

PMBS: Aquarium Point, around wharf. Common on *Cystophora*, also on *Macrocystis*. Colour whitish. Medusae being freed, 04.April.53 (!!!) looks very fine, feathery, delicate. Bulge on internode in this variety. Identified by P.M. Ralph. (Taken from card index).

MATERIAL INSPECTED: On card: 6/1–6/4, **Aquarium Point,** PMBS, low tide, common on *Cystophora*, also on *Macrocystis*. 02.April.1953. Numerous colonies up to 30 mm high arising from stolon on algae; with many male gonothecae. RMNH-Coel. 27262, slides 2679.

TYPE LOCALITY: *Plumularia setaceoides*: Williamstown, Port Phillip Bay, Victoria, Australia (Bale 1882); probable syntype in MOV, MV F58777, two microslides (Stranks 1993).

DESCRIPTION: Monosiphonic, plumose stems rising from creeping stolon on algae, stolon variable from tubular with small internal perisarc pegs to broadly ribbon-shaped with many strong internal perisarc pegs; with or without anastomoses and with occasional nematothecae. Stem divided into internodes by oblique, hinge-like nodes, first internode attached to short, cylindrical stolonal apophysis, usually at ramification of stolon, basal node transverse, terminal node oblique; remaining stem internodes all with proximal and distal oblique hinge-like nodes, a proximal and distal internal septum and a sub-terminal apophysis supporting a hydrocladium. Apophyses starting at first stem internode, alternately directed left and right and obliquely upwards; hydrocladia curving gracefully laterally and downwards. Stem apophyses directed somewhat frontally, with internal septum, a small mamelon almost at end of adcauline wall of apophysis and a frontal axillary nematotheca. A second stem nematotheca near base of stem internode facing apophysis.

Hydrocladia 2–5 mm long, heteromerously segmented, with up to 4 thecate internodes; basal hydrocladia may have a single thecate internode, number increasing along stem. First athecate internode of hydrocladium short, proximal and distal nodes

oblique in opposite directions, without nematotheca and with internal septum. Thecate internodes with oblique proximal node, distal node more or less transverse; hydrocladial internodes socketed into each other, the joint permitting considerable movement. Thecate internode with big hydrotheca on upper surface, a median inferior nematotheca on a strongly raised part of internode, a pair of lateral nematothecae just reaching the hydrothecal rim, almost hidden in deep recess between free part of adcauline hydrothecal wall and internode. Hydrotheca cylindrical to almost saccate, seated on conspicuous prominence of internodal wall; distal part of abcauline wall slightly everted and thickened; abcauline wall of hydrotheca thickened to varied degree with thickened hyaline strip along abcauline wall. Base of hydrotheca firm, with big, circular diaphragm, running backwards into thickening of perisarc, part of an incomplete internal septum. Adcauline wall of hydrotheca almost completely adnate and concave, one-third to one-fifth free, free part and wall of internode a spacious rounded recess with hollow, considerably thickened base, almost concealing lateral nematothecae. Aperture of hydrotheca circular, rim perfectly flat, plane of aperture strongly tilted forwards, making an angle of about 60° with long axis of internode. Median inferior nematotheca short and squat, not reaching level of floor of hydrotheca, base curved to internode. Lateral nematothecae short, with upper chamber widening distally and strong diaphragm, nematothecae not reaching hydrothecal rim to projecting slightly beyond. All nematothecae bithalamic, with strong diaphragm; inner side of wall upper chamber of unpaired nematothecae deeply scooped. Part of internode projecting beyond hydrotheca short; incomplete internal septa occur above insertion of median inferior nematotheca, at the hydrothecal base and at insertion of lateral nematothecae. Athecate internodes short, with 1 curved, squat nematotheca and 2 internal septa.

Female and male gonothecae in present material occur on separate colonies, inserting on apophyses of basal stem internodes or, occasionally, on the stolon. Immature and mature gonotheca top-shaped, with smooth walls and cut off squarely apically. Mature gonotheca with furrowed walls and a circular distal operculum, narrowing basally into a short, curved pedicel. Male gonophore a big yellow mass of developing spermatocytes around a central spadix; mature female gonophore with a large number of small eggs.

Remarks: Irregularities occur in the segmentation of the internodes; the first athecate internode attaching the first thecate internode to the apophysis, may be represented by two or three well separated, short internodes without nematothecae but each with an internal septum. Tendrils develop at the end of stems or hydrocladia in certain colonies, others have one or two hydrothecae-bearing internodes at the end of the stem.

We have, at least for the time being, incorporated Ralph's records of *Plumularia wilsoni* Bale, 1926 in *Plumularia setaceoides* Bale, 1882, pending the study of more material of the former. *Plumularia setaceoides*, as defined here, shows a considerable variability in development of the perisarc, influencing the ultimate shape of the stem internodes, the development of internal septa and the ultimate shape of the hydrotheca. Some of the more characteristic hydrothecae are figured, demonstrating the wide variability. This can to a certain extent be explained by the preference of the species to live on algae in the tidal and shallow subtidal zone, under strong influence of water movement, for which the species is well adapted. The typically flattened stolon firmly attaches the colonies to algal thalli and the structure of stem and hydrocladia with their hinge-jointed internodes permit maximum movement.

The contents of the gonothecae of *P. setaceoides* are released by tearing away of the entire top of the gonotheca (J.E. Watson, personal observation).

Records from New Zealand: First recorded from St Clair, Dunedin and Bluff by Trebilcock (1928). Widely dis-tributed at suitable habitats along the Pacific coasts of North and South Island (Leigh, Russell, Cook Strait, Kaikoura, Christchurch, Otago Peninsula, Stewart Island, and Auckland Islands) on algae in the littoral zone, down to a depth of about 18 m. Attached to drifting algae it is carried around the coast and deposited on beaches, as probably occurred for the specimens from Muriwai Beach, the only record so far from the Tasman Sea coast of North Island. Gonothecae occur in January, March, May, and November.

Distribution: On algae in the littoral zone of southeast Australia and eastern Bass Strait (Bale 1882, 1884, 1888; von Lendenfeld 1885; Bartlett 1907; Mulder & Trebilcock 1909, 1916; Staples & Watson 1987; Watson 1994a). It has also been recorded from Chinese seas (Hargitt 1927; Ling 1938) but we have been unable to verify those records. The species has also been recorded from floating algae (notably *Sargassum* spp.) in the tropical and subtropical western Atlantic, records that largely stem from Fraser's records (Fraser 1912, 1918, 1944a, and cited by various authors, as for example Morris & Mogelberg 1973). As neither accurate descriptions nor detailed figures of Atlantic material are available confusion with other species of *Plumularia* cannot be excluded. We are inclined to consider Atlantic records of this mainly Pacific species with reserve.

MEEASUREMENTS of *Plumularia setaceoides* (in μm):

Hydrothecae of *setaceoides* type	Ralph's Loc. 230 slide 3740	Off Gran Island slide 3022	Ralph's Loc. 546 slide 3939
Diameter of stem at its base	140 – 145	140 – 170	150 – 170
Length stem internode	290 – 335	295 – 380	450 – 505
Diameter at node	90 – 100	95 – 100	135 – 160
Length of apophysis	95 – 115	45 – 56	84 – 95
Diameter at node	67 – 78	95 – 100	84 – 90
Length first athecate internode	105 – 110	95 – 105	105 – 115
Diameter at node	85 – 90	78 – 84	67 – 84
Length thecate internode	310 – 320	360 – 365	410 – 460
Diameter at node	56 – 67	43 – 45	73 – 78
Hydrotheca, length adnate adcauline wall	95 – 110	95 – 100	105 – 130
Length free adcauline wall	45 – 56	28 – 39	45 – 56
Diameter at rim	115 – 125	125 – 130	115 – 135
Lateral nematotheca, length	67 – 73	65 – 68	73 – 78
Diameter at rim	50 – 56	55 – 57	45 – 50
Athecate internode (with one nematotheca), length	95 – 100	115 – 120	155 – 190
Diameter at node	34 – 45	38 – 40	34 – 39
Female gonotheca, total length*	1965 – 2050		
Greatest diameter	935 – 965		
Male gonotheca, total length**		1640 – 1725	
Greatest diameter		740 – 885	

* = taken from slide 3790, Loc. 264
** = Taken from slide 3578, Loc. 180

Hydrothecae of Ralph's *Plumularia wilsoni*	Loc. 439 slide 3895	Loc. 501 slide 3917
Diameter of stem at its base		135
Length stem internode	265 – 450	300 – 390
Diameter at node	73 – 90	73 – 110
Length of apophysis	45 – 56	73 – 84
Diameter at node	73 – 78	78 – 95
Length first athecate internode	78 – 95	95 – 105
Diameter at node	78 – 84	90 – 105
Length thecate internode	380 – 420	420 – 450
Diameter at basal node	39 – 73	50 – 62
Hydrotheca, length adnate adcauline wall	130 – 140	145 – 155
Length free adcauline wall	50 – 62	50 – 62
Diameter at rim	125 – 130	110 – 115
Lateral nematotheca, length	56 – 67	56 – 62
Diameter at rim	34 – 39	34 – 39
Athecate internode (with a nematotheca)	110 – 135	135 – 140
Diameter at node	45 – 50	39 – 45

Plumularia spirocladia Totton, 1930 (Fig. 100a)

Plumularia spirocladia Totton, 1930: 224–225, fig. 60; Ralph, 1961b: 28–30, fig. 2f-g; Dawson, 1992: 17.

MATERIAL: A New Zealand species but not represented in present collections.

TYPE LOCALITY: Described by Totton (1930) from two localities in New Zealand waters, viz., *Terra Nova* Stn 134, near North Cape, 20–37 m, and Stn 144, off Cape Maria van Diemen, 64–73 m; no distinct holotype being indicated. All material in NHM.

DESCRIPTION (taken from Ralph 1961b): A plumularian of medium height with stem up to 5.5 cm in length, simple, monosiphonic, with the hydrocladia carried on a stem apophysis at the distal end of the internode; sometimes 2 hydrocladia to an internode; hydrocladia at base of stem alternate, but spirally arranged in the medial and distal regions so that in every 2 ascending turns there are 5 hydrocladia, the base of the sixth hydrocladium being in line with the first hydrocladium of the spiral; apophysis with small mamelon in the centre of the upper surface; apophysis 0.12 mm long;

nodes of stem transverse; stem internodes approximately 0.57 mm in length and 0.175–0.28 mm in width; nodes of the hydrocladia slightly oblique and dividing each hydrocladium into short athecate and longer thecate internodes; 2 short internodes between stem apophysis and the first thecate internode; length of short internode 0.10–0.27 mm; length of long internodes 0.32–0.52 mm; width of hydrocladia 0.05–0.10 mm; proximal region of hydrothecate internode swollen; a proximal and distal septal ridge on the short internodes and in addition to these on the longer internodes a subhydrothecal ridge; hydrothecae campanulate, margin entire, smooth, but not level, dipping down to meet the wall of the hydrocladium; abcauline length of hydrotheca approximately 0.10 mm; width at the margin, viewed laterally, approximately 0.11 mm, and at the base of the hydrotheca approximately 0.06 mm; nematothecae bithalamic, conical 0.067–0.070 in length and 0.032–0.035 mm in width measured at the margin; a single nemathotheca on each stem internode about one-third of the distance from the base and facing the hydrocladium; a pair of lateral nematothecae at the base of each hydrocladium, flanking the axil; a single nematotheca on each short athecate internode and a single subhydrothecal nematotheca and 2 nematothecae, 1 on either side above the hydrotheca reaching nearly the end of the thecate internode: gonotheca, arising from the side of the stem apophysis, elongate, oval, tapering distally into a narrow neck, proximally into a short stalk; female gonotheca 1.24–1.40 mm in length, and 0.32–0.37 mm in maximum width; aperture 0.10–0.11 mm in width; male gonotheca slightly smaller than female, 0.98–1.20 mm in length and 0.30 in greatest width; aperture 0.05 mm in width.

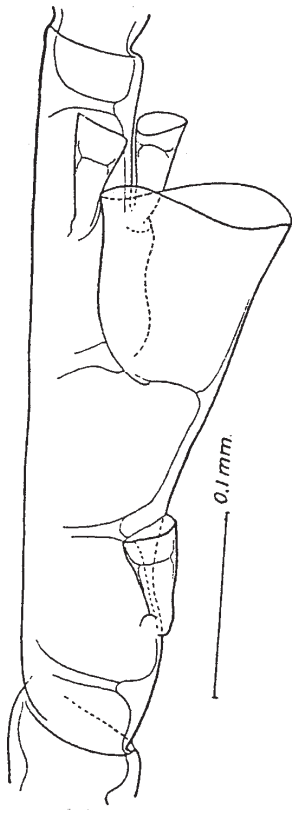

Fig. 100a. ***Plumularia spirocladia*** Totton, 1930 (from Totton, 1930). Part of hydrocladium of paratype (*Terra Nova* Stn 134).

Distribution: Known only from the New Zealand region.

Plumularia tenuissima Totton, 1930 (Fig. 100E–G)

Plumularia tenuissima Totton 1930: 228, fig. 63a, b; Ralph 1961b: 37, fig. 4g-h; Edwards 1973: 586; Dawson 1992: 17.

[Not *Plumularia tenuissima* Fraser 1938c: 117, pl. 18, fig. 10; 1938d; 136; 1939: 161, 167; 1948: 189, 277; Arai, 1977: 29 (location of type)].

Material Examined:

NZOI Stns: C770, 1 colony, 170 mm high with basal tuft of fibres, about 8 branches bearing hydrocladia. RMNH-Coel. slide 2100; **F905**, 1 colony about 100 mm high, no gonothecae. RMNH-Coel. slide 2195; **F915**, 5 colonies 100–300 mm high, no gonothecae. With *Kirchenpaueria bonnevieae* (Billard, 1906). RMNH-Coel. slide 2196; **F916**, single colony 300 mm high, no gonothecae.

NMNZ: Bay of Plenty, between Motuhora and White Islands, 117 m, 02. May.1990, 8 colonies up to 180 mm long. NMNZ Co. 659; 2 RMNH-Coel. slides 3030.

Type Locality: Off Three Kings Islands, *Terra Nova* Stn 91, 549 m (Totton 1930); holotype in NHM.

Description (specimen from Bay of Plenty): Flexuous, about 170 mm high colony composed of moderately polysiphonic, branched stem arising from bundle of fine, anastomosing stolonal filaments anchoring colony in fine, muddy sediment. Some slender secondary tubules running up stem and branches to near top, main branches directed upwards. Few internodes, some transverse nodes occasionally visible. Apophyses on branches and upper part of stem, in 2 series on both sides of branch, alternate, directed upwards at less than 30°, a septum at end of apophysis; fairly long apophysis often fused with first athecate internode of hydrocladium, with prominent, slightly raised mamelon on upper surface. A nematotheca on branch some distance from apophysis, a pair in axil of apophysis, and a pair just above mamelon. Hydrocladia about 4 mm long, heteromerously segmented, with 8–10 thecate internodes and same number of athecate internodes; nodes slightly oblique; first athecate internode fused, imperfectly separated or separate from apophysis, with 1 frontal nematotheca and 2 internal septa at both ends; remaining athecate

internodes fairly long, with single nematotheca on proximal half and 3 internal septa. Thecate internodes long and slender; hydrotheca seated halfway along, fairly big, widening from base onwards; abcauline wall straight; rim smooth, aperture slightly tilted backwards on adcauline side. Infracalycine median nematotheca on elevated proximal part of internode. Lateral pair seated on a small protuberance halfway along adcauline wall of hydrotheca, long and slender, projecting far above hydrothecal rim but not reaching distal node. All nematothecae elongated cylindrical, bithalamic; paired nematothecae scooped on inner side of rim of upper chamber; unpaired nematothecae slightly curved, fairly deeply scooped on adcauline side of upper chamber. 5 partially developed internal septa in thecate internode: 1 at proximal end, 1 halfway between insertion of infracalycine nematotheca and base of hydrotheca, 1 behind and 1 just above hydrotheca, and 1 at distal end of internode.

Perisarc moderately thick on stem and branches, thin along hydrocladia. Colour of perisarc on stem and principal branches light horn-yellow; finer branches and hydrocladia hyaline.

MEASUREMENTS of *Plumularia tenuissima* (in μm):

	NMNZ between Motuhora & White Islands	*Terra Nova* Stn 91 (Totton 1930)
Diameter of basal part stem	500	750
Diameter of monosiphonic upper part stem	155	110
Length of apophysis (without fused internode	140	150
Diameter at distal end	62 - 73	
Distance between two apophyses on same side	1875 - 2500	
Length first athecate internode	110 - 125	110
Length thecate internode	335 - 365	370
length athecate internode	155 - 170	190
Diameter at node	60 - 63	40
Hydrotheca, length abcauline wall	78 - 84	
Length adcauline wall	60 - 73	50
Diameter at rim (in lateral view)	73 - 84	60
Infracalycine nematotheca, length	56 - 62	
Diameter at rim	34 - 37	
Lateral nematotheca, length	90 - 100	
Diameter at rim	34 - 39	
Female gonotheca, total length	785 - 850	
Maximum diameter	295 - 345	
Diameter of terminal aperture	260 - 290	

Female gonothecae in all stages of development abundantly present, big, saccate, top oblique with large circular operculum, gonotheca narrowing basally into short, slightly asymmetrically placed pedicel. Gonothecae inserted on apophyses directly below mamelon, occasionally on both sides of apophysis. Ripe gonophore with about 5 big, globular, orange-yellow eggs.

REMARKS: Totton (1930) described and figured a 10 mm long stem fragment with branches, part of a hydrocladium and incomplete gonothecae; all in good agreement with our material. By careful comparison of the present specimen with Totton's description and that given by Ralph (1961) from the same material we believe to have rediscovered Totton's rare species. The above description is taken from complete specimens that in structure and shape of the gonothecae approach species of the genus *Nemertesia* Lamouroux, 1812.

RECORDS FROM NEW ZEALAND: The specimens originate from a relatively small area in northern New Zealand waters (34°38.50′ S, 173°28.00′ E; 34°39.90′ S, 173°20.50′ E; 35°25.00′ S, 174°48.50′ E; 34°58.70′ S, 174°18.00′ E) and from the Bay of Plenty, between Motuhora and White Islands; depth records varying between 117 and 251 m. Gonothecae observed in May and July. Totton's material originated from the Three Kings Islands region.

DISTRIBUTION: Known only from New Zealand localities.

Plumularia wattsii Bale, 1887 (Fig. 101A–C)

Plumularia wattsi(i) Bale 1887: 95-96; Bartlett 1907: 43; Bedot 1921b: 29; Bale 1924: 254, fig. 12; Ralph 1961b: 27–28, fig. i-j; 1961c: 108; 1966: 159; Dawson 1992: 17; Stranks 1993: 14.

Nemertesia wattsi: Watson 1994a: 67.

MATERIAL EXAMINED:

NZOI Stn S13, *Plumularia* cf. *wattsii* Bale, 1887 (J.E. Watson). [Slide 4229 JEW Colln].

NMNZ: Off Portobello Station Wharf, Otago Heads, 14.Aug.1955, several colony fragments, the longest approximately 250 mm. No gonothecae. NMNZ Co. 481.

NMNZ Ralph Collection: Loc. 79, NMNZ Co. 935, about 5 fragments, the longest probably top parts and about 20 mm long; no gonothecae. RMNH-Coel. slide 3628; **Loc. 81**, NMNZ Co. 937, fragments of branch. RMNH-Coel. slide 3631. Poor slide in RSC as *Plumularia wattsi*, with data A99.38; **Loc. 182**, NMNZ Co. 1037, many fragments of colony or colonies; no gonothecae. RMNH-Coel. slide 3704; **Loc. 226**, partly dried out slide in RSC as *Plumularia* sp. (*wattsi)*, no data; **Loc. 260**, NMNZ Co. 1108, top part of colony. With *Plumularia setacea* (Linnaeus, 1758). RMNH-Coel. slide 3783; **Loc. 723**, poor slide in RSC as *Plumularia wattsi*, with data PMBS.

PMBS: End Beach, Aquarium Point; Port Chalmers wharf piles. A very fine, irregularly branched species. Irregular spiralling of branches coming off stem is a specific feature among New Zealand plumularians. No polyps on first order side branches, only on side stems of these (also these side stems themselves spiral off the first order side branches. (Taken from card register).

MATERIAL INSPECTED: **End Beach, Aquarium Point**, low tide neap, on *Hormosira*, 23.May.1960, about 120 mm high bunch of apparently monosiphonic colonies on algae. No gonothecae; **Port Chalmers, Otago Harbour**, low spring tide, 07.Mar.1962, many stems up to 200 mm high on algae. RMNH-Coel. no. 27725, 3 slides 2652.

Otago Museum, Dunedin: **Iv. 773. A.52:50**. A fair number of largely monosiphonic colonies up to 150 mm high. Hydrocladia in present specimen damaged, usually only basal internodes being present. No gonothecae. RMNH-Coel. 27243, slide 2660.

TYPE LOCALITY: South Channel, Port Philip Bay, Victoria, Australia (Bale 1887); possible syntypes in MOV: MV F59338, F58739 (3 microslides); F58746 (1 microslide) (Stranks 1993).

DESCRIPTION: Colonies composed up to 300 mm long, monosiphonic, flexuous stems with hydrocladiate side branches up to 30 mm long, attached to solid objects by flattened hydrorhizal filaments; stem formed by a series of internodes of varied length; first internodes annulated; following internodes each with a side branch or an apophysis carrying a side branch; branches and apophyses almost distal on internode and arranged in an irregular spiral, curving outwards. Side branches divided into regular internodes by transverse nodes; each internode provided with near-distal apophysis pointing laterally and obliquely upwards, apophyses in loose and irregular spiral, each supporting a hydrocladium several millimetres long. Axil of apophysis of side branch with a mamelon, often quite difficult to see and 1 nematotheca; 1 or 2 additional nematothecae may be on internode. A fairly distinct internal septum occurs proximally in the internode and a small septum in the apophysis.

Hydrocladia heteromerously segmented; usually but not always with first athecate internode without nematotheca. First internode with 1 internal septum. Thecate internode with cup-shaped hydrotheca seated slightly beyond middle of internode; abcauline wall straight; adcauline wall nearly fully adnate, free part hidden between proximal part of lateral nematothecae; rim circular and even, aperture slightly tilted forwards. Lateral nematothecae on small elevation at end of adnate adcauline hydrothecal wall, slender, projecting far above hydrothecal rim, almost reaching end of internode; distal chamber symmetrical; rim not scooped. Median inferior nematotheca on a slight elevation almost at proximal end of internode, reaching halfway to hydrothecal base, adcauline part of rim scooped. Thecate internode with 2 internal septa: 1 proximal, 1 distal. Athecate internode shorter than thecate internode, with an almost basal median nematotheca and 2 internal septa: 1 proximal, 1 distal.

Gonothecae not present in our material. The female gonotheca is described by Ralph (1961b: 28) as: "elongate oval produced distally into a long narrow neck and carried on a short stalk at the base of a secondary branch; length of gonotheca approximately 0.80 mm and 0.30–0.35 mm in maximum width; stalk approximately 0.10 mm; distal aperture 0.055 mm approximately".

Perisarc comparatively thick, yellowish-brown on internodes of stem and side branches; perisarc of hydrocladia hyaline and very thin.

MEASUREMENTS of *Plumularia wattsii* (in μm):

	Otago Museum no. 773, slide 2660
Stem internodes, length	1115 – 1330
Diameter at node	185 – 190
Side branch, length of internode	460 – 820
Diameter at node	115 – 135
Length of apophysis	110 – 135
Diameter at node	80 – 90
Thecate internode of hydrocladium, length	390 – 505
Diameter at node	65 – 80
Hydrotheca, length abcauline wall	100 – 105
Length adnate adcauline wall	80 – 85
Length free adcauline wall	17 – 20
Diameter at rim	105 – 115
Lateral nematothecae, length	62 – 73
Diameter at rim	34 – 40
Median inferior nematotheca, length	80 – 85
Athecate internode with one nematotheca, length	185 – 195
Diameter at node	50 – 56

REMARKS: This is a species of very characteristic appearance; the tall colonies are easily detached and are transported by currents over great distances, becoming tangled and losing most of the hydrocladia. They are deposited on New Zealand beaches in considerable quantities together with species of *Amphisbetia*. In our material only colonies taken direct from a ship's hull are in good condition and have undamaged hydrocladia; unfortunately this material is sterile. The species seems to prefer hard bottom in open water with a good current flow; it is preferably epilithic, but it has also been observed on large algae.

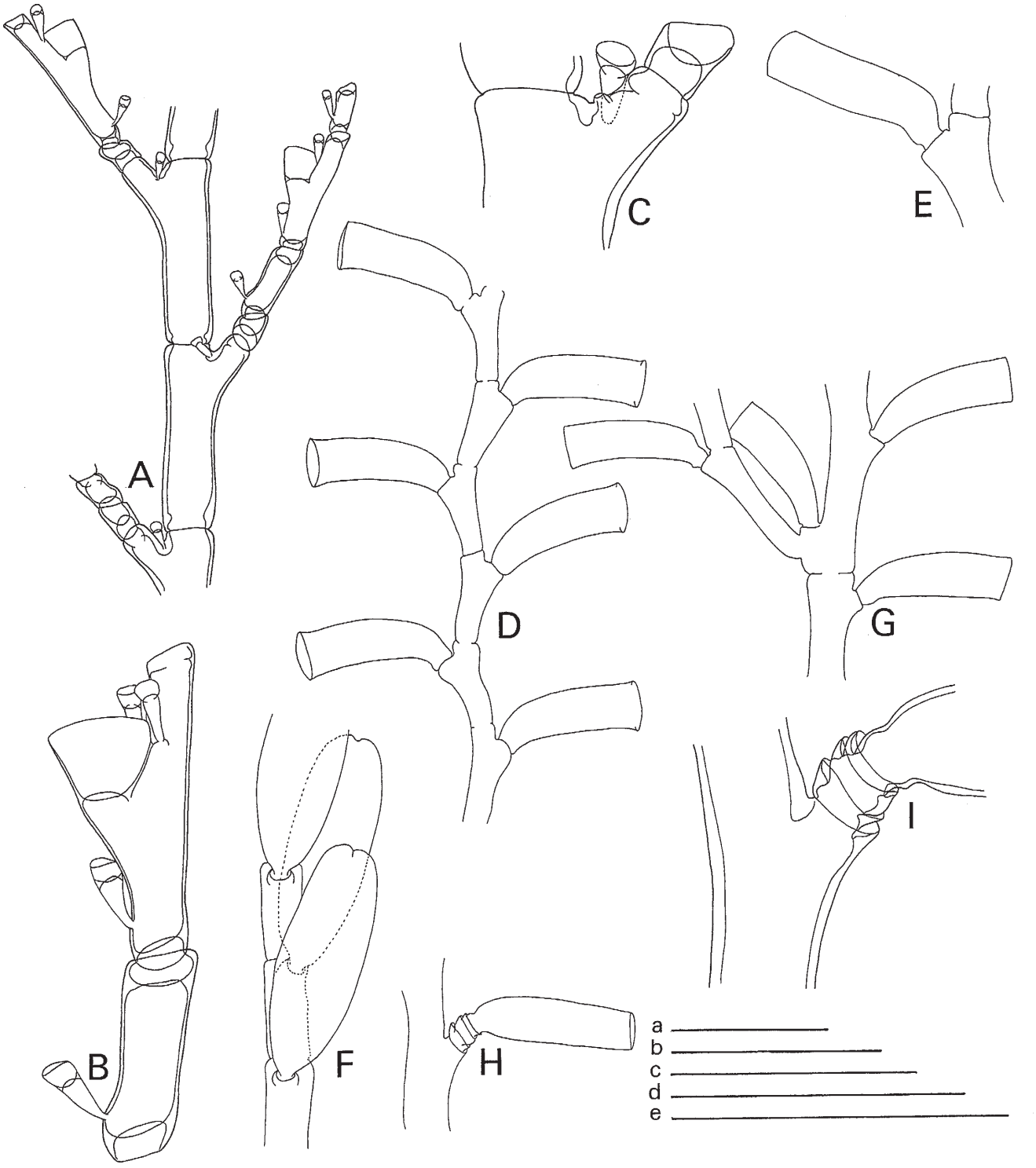

Fig. 101. A–C. ***Plumularia wattsii*** Bale, 1887. **A**, part of stem with insertions of three hydrocladia, frontal view of stem. **B**, proximal part of hydrocladium, lateral view. **C**, insertion of hydrocladium on stem internode, frontal view of stem (Otago Museum, Iv. 773. A.52:50, slide 2660). **D–I.** ***Billardia novaezealandiae*** Totton, 1930. **D**, part of stem, frontal view. **E**, hydrotheca, lateral view. **F**, gonothecae, lateral view (Loc. 519, slide 3928). **G**, ramification of stem with axillary hydrotheca. **H**, repeatedly renovated hydrotheca, lateral view. **I**, proximal part of repeatedly renovated hydrotheca, lateral view (BS 886, slide 3641). Scales: a, 0.2 mm (B, C); b, 2 mm (D, F, G); c, 0.5 mm (I); d, 2 mm (A); e, 2 mm (E, H). W.V.

RECORDS FROM NEW ZEALAND: Tasman Sea off South Island, 42°36.30′ S, 170°38.40′ E; Napier foreshore, drifted specimens (Ralph 1961b), and several localities at the Otago Peninsula (Port Chalmers, wharf piles; wooden test blocks at Portobello Marine Biological Station; Aquarium Point, Portobello; channel between Quarantine Island and Portobello Marine Biological Station, and from ship's bottoms in Otago Harbour). Present records suggest that the main area of occurrence of this species in New Zealand is in the seas around the Otago Peninsula.

DISTRIBUTION: Victoria, Australia (Bale 1887; 1924), eastern Bass Strait (Watson 1994a); New Zealand (Ralph 1961b, present records).

Plumularia sp.

MATERIAL EXAMINED:

NZOI Stns: A739, about 15 colonies about 70 mm high, no hydrocladia left; **D131** (dried out sample), mutilated colonies without hydrocladia; **D139** (dried out sample), 2 stems about 50 mm high; **D144**, 10 stems about 80 mm on shell fragments. No hydrocladia or gonothecae; **D200**, 3 stem fragments from dried out sample; **E400** (dried out sample), some colonies; **G694,** 5 mutilated stems from dirty sample; **G708**, bunch of small stems, about 15 mm high, attached to shell. In poor condition. No gonothecae.

NMNZ Ralph Collection: Loc. 96, NMNZ Co. 951, few stem fragments and a gonotheca. Might be *P. setaceoides* Bale, 1882. No slide.

Plumularia/Corhiza

MATERIAL EXAMINED:

NMNZ: BS 480, bunch of colonies, united at base, about 40 mm length. No hydrocladia left. NMNZ Co. 411; **BS 630**, 30 mm high bunch of colonies. No hydrocladia, no gonothecae. NMNZ Co. 429.

Order **PROBOSCOIDA** Broch, 1910
Suborder CAMPANULARIIDA Johnston, 1836
Superfamily CAMPANULARIOIDEA Johnston, 1836

Family **CAMPANULARIIDAE** Johnston, 1836
Billardia Totton, 1930

TYPE SPECIES: No type designated by Totton, but *Billardia novaezealandiae* Totton, 1930 is the first mentioned species and is here designated as the type of *Billardia*.

In this genus there are three species:

Billardia subrufa (Jäderholm, 1904a)
Billardia novaezealandiae Totton, 1930
Billardia intermedia Blanco, 1967b.

A fourth species is described below as *Billardia hyalina* sp. nov.

Billardia hyalina sp. nov. (Fig. 102A–C)

MATERIAL:

NZOI Stn P34: Many colonies 40–50 mm high of which 2 with gonothecae. Holotype, H-787; 4 RMNH-Coel. slides 2227 are part of type series. With *Modeeria rotunda* (Quoy & Gaimard, 1827).

TYPE LOCALITY: Pacific Ocean south of Norfolk Island, 28°57.80′ S, 167°45.80′ E, 370 m.

DESCRIPTION (of holotype): Colony lax, sympodial, up to 50 mm high, monosiphonic, with internodes of stem and branches (hydrocladia) long and slender, variable in length, perisarc moderately developed. Stem internodes with alternate apophyses and hydrocladia; each internode with 1 or more apophyses and 1 or more side branches inserted on apophysis below a hydrotheca. No secondary ramification; internodes of side branches thin, first internode of considerable length. Apophyses tilted downwards, with 2 or 3 cup-shaped proximal parts of renovated hydrothecae, perisarc ring at half height; succeeding renovation attached to this ring.

Hydrothecae arising direct from apophysis, or from ultimate renovation, elongated and cylindrical, directed laterally and slightly upwards; perisarc, except for proximal part, thin, hyaline and easily collapsible. Hydrothecae very gradually widening from base onwards, slightly asymmetrical, adcauline wall slightly more convex than abcauline wall. Hydrothecal rim almost imperceptibly everted, circular, smooth. Pedicel very short, typically hidden in last renovation.

MEASUREMENTS of *Billardia hyalina* sp. nov. (in μm):

	NZOI Stn P34 slide 2227
Basal diameter of stem	490
Length of stem internode	2870 – 3200
Diameter at node	215 – 375
Approximate length of apophysis	82 – 115
Diameter at insertion of hydrotheca	180 – 195
Hydrotheca, total length	1230 – 1395
Basal diameter	130 – 145
Diameter at rim	325 – 345

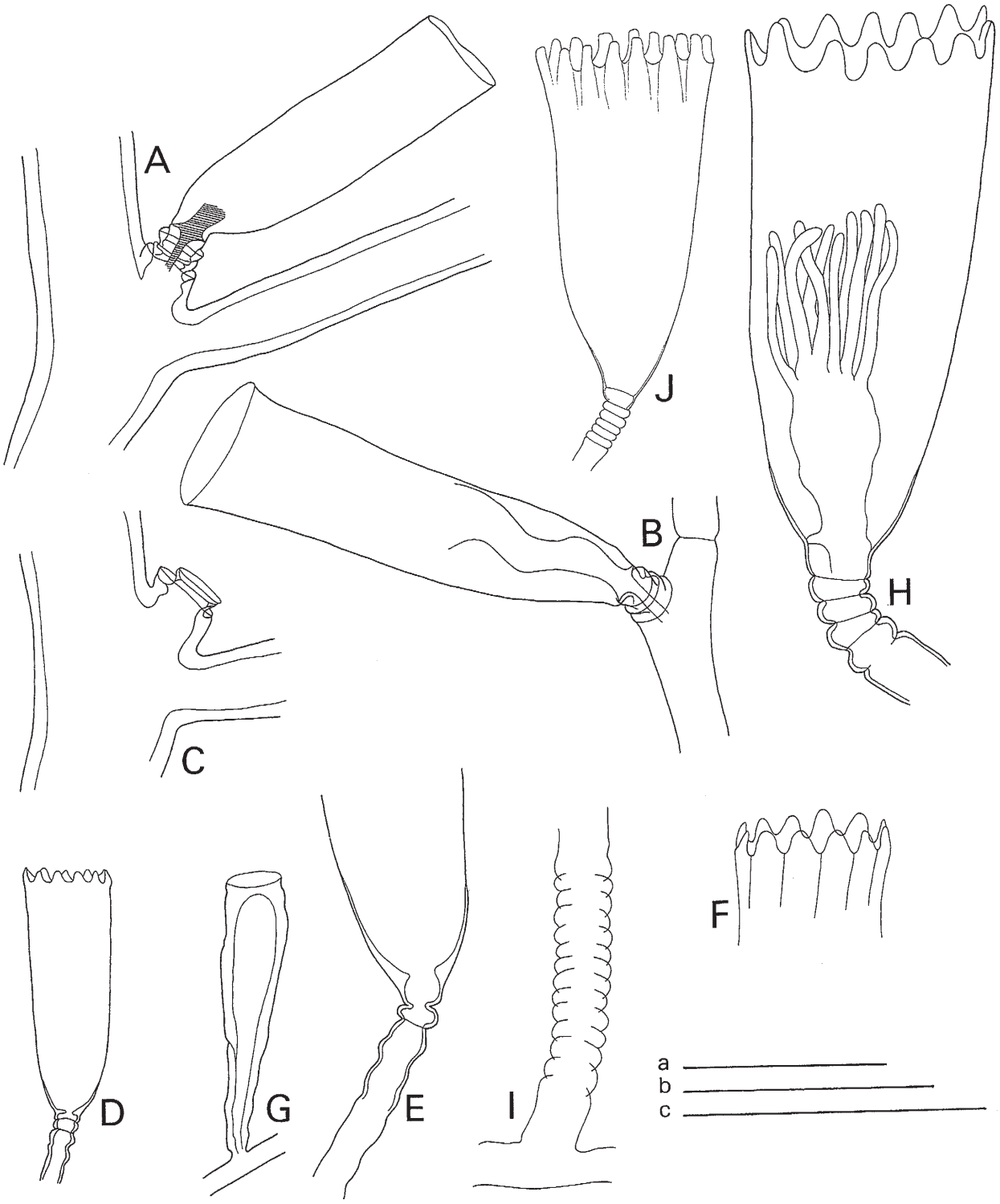

Fig. 102. A–C. ***Billardia hyalina*** sp. nov. **A**, part of stem with insertion of hydrocladium and axillary hydrotheca, frontal view of stem. **B**, renovated hydrotheca, lateral view. **C**, proximal part of (shed) axillary hydrotheca with renovations of pedicel, lateral view (NZOI Stn P34, holotype, slide 2227). **D–G.** ***Campanularia hicksoni*** Totton, 1930. **D**, hydrotheca. **E**, proximal part hydrotheca. **F**, hydrothecal rim. **G**, gonotheca; all in lateral view (BS 480, slide 2958). **H, I.** ***Clytia elongata*** Marktanner-Turneretscher, 1890. **H**, hydrotheca and hydranth, lateral view. **I**, proximal part of hydrothecal pedicel (Loc. 531, slide 3935). **J.** ***Clytia gigantea*** (Hincks, 1866), hydrotheca, lateral view (NMNZ, Chatham Islands Exped., Stn 7, slide 4416). Scales: a, 1 mm (J); b, 0.5 mm (E, F, H, I); c, 2 mm (A–D, G). W.V.

Nearly all hydrothecae contain a big, contracted hydranth, filling about half hydrothecal cavity, attached in basal, narrow part of hydrotheca (i.e., the 'pedicel'); no desmocytes visible. About 20, fairly long tentacles, with distinct apical aggregation and transverse whorls of nematocysts along length; tentacles surrounding a ring-shaped, gaping oral opening, no trace of a conical proboscis.

Colour of perisarc along stem and branches yellowish; perfectly hyaline and colourless along hydrothecae.

REMARKS: The species resembles *Billardia novaezealandiae* Totton, 1930, in colony structure but the internodes are longer and thinner; the hydrothecae are almost perfectly cylindrical, without the basal curvature typical in *B. novaezealandiae*; they are also longer. The species is remarkable for the presence of cup-shaped structures on many apophyses, these apparently represent hydrothecal renovations, also observed in *B. novaezealandiae* and that are comparable to the renovated hydrothecae seen in Haleciidae. *Billardia hyalina* shares the family character of a large hydranth fully retractable into the spacious hydrotheca.

RECORDS FROM NEW ZEALAND: Norfolk Ridge south of Norfolk Island, 370 m depth.

DISTRIBUTION: Known only from the Norfolk Island area.

ETYMOLOGY: Name taken from the Latin *hyalinus*, transparent, hyaline, referring to the hydrothecae.

Billardia novaezealandiae Totton, 1930

(Fig. 101D–I)

Billardia novaezealandiae Totton 1930: 150, fig. 8a (*Billardia novaezealandia* in explanation of figure); Ralph 1957: 818, figs 1a, 1A nos a-d; Blanco 1967b: 119; Stepan'yants 1979: 39, pl. 7, fig. 3; Dawson 1992: 13.

MATERIAL EXAMINED:

NZOI Stn E864, many tangled colonies, up to 50 mm high, no gonothecae. RMNH-Coel. slide 2192.

NMNZ: BS 512, numerous colonies arising from stolonal tubes in intimate association with large bryozoans. No gonothecae. Colonies unbranched, up to 25 mm high. NMNZ Co. 849; RMNH-Coel. 27749, slide 3520; **BS 886**, 3 small colonies on stem of *Lytocarpia rigida* sp. nov. 3 RMNH-Coel. slides 3641; **BS 899**, several colonies up to 50 mm high, attached to base of *Tasmanaria edentula* (Bale, 1924). No gonothecae. NMNZ Co. 449; RMNH-Coel. 29135, 2 slides 2968.

NMNZ Ralph Collection: Loc. 446, partly dried out slide in RSC, as *Billardia novaezealandiae*, with data: V.U.W., Zool. Dept; **Loc. 519**, NMNZ Co. 1252, many colonies up to 35 mm high arising from a detached stolon. RMNH-Coel. slide 3928. Unstained Canada Balsam slide in RSC as *Billardia novaezelandiae*, with data: V.U.W., Zool. Dept.

TYPE LOCALITY: Three Kings Islands, New Zealand, *Terra Nova* Stn 90, 183 m (Totton 1930), holotype in NHM (no. 29.10.10.12).

DESCRIPTION: Colonies up to 40 mm high, with sympodial main stem with side branches (hydrocladia), rising from thick stolonal tube attached to firm substratum. Stem in present material invariably monosiphonic; branches composed of internodes variable in length separated by transverse, thin nodes, in many cases only indicated by moderate constriction of perisarc. Each internode with low, sub-terminal apophysis, alternately directed left or right and obliquely upwards; longer internodes may carry more than 1 apophysis. Stem and branches in upper parts of colonies may be slightly geniculate. Branches (hydrocladia) spring from stem internode just below apophysis, slightly displacing axillar hydrotheca from that apophysis.

Hydrothecae big; perisarc quite thin, resulting in many collapsed or damaged hydrothecae, basal part may have a weak abcauline thickening. Base of hydrotheca widening gradually into a smoothly concave adcauline wall and rather deeply convex base of abcauline wall. Remainder of hydrotheca cylindrical or very slightly widening towards thin, fragile rim, in some hydrothecae with minor eversion. Rim of hydrotheca circular, perpendicular to length axis or slightly tilted inwards.

Remnants of hydranths present in much of material, but too badly preserved to describe structure or count number of tentacles.

Renovations of hydrothecae common in certain colonies, up to 4 low basal collars of perisarc may be present. Collars internally reinforced by a ring of perisarc, resembling species of *Halecium* with repeatedly renovated hydrothecae.

Gonothecae present in several colonies, always replacing hydrothecae in lower parts of the stem. One of colonies with series of gonothecae along both sides of basal portion of stem; all gonothecae directed upwards. Gonothecae elongate ovoid, slightly bilaterally compressed, narrowing basally into a short pedicel, apically broadly rounded, with median slit-like depression and opening along a median fissure. Some gonothecae of more irregular appearance, with indistinct transverse constrictions or furrows in the thin perisarc. Condition of preservation prevents observations of contents.

Perisarc fairly thin and weak, the colonies collapsing when taken out of fluid. Perisarc best developed along walls of internodes, of moderate development at hydrothecal floor and thinning out considerably along walls; apical parts perfectly hyaline.

MEASUREMENTS of *Billardia novaezealandiae* (in μm):

	BS 512 slide 3520	BS 899 slide 2968	Ralph's loc. 519 slide 3928
Basal diameter of stem	360 – 395	420 – 430	360 – 365
Length of stem internode	575 – 655	1650 – 1965*	770 – 805
Diameter at node	215 – 245	295 – 330	215 – 295
Approximate length of apophysis	80 – 115	130 – 165	145 – 165
Diameter at insertion of hydrotheca	180 – 215	145 – 195	195 – 215
Hydrotheca, total length	920 – 985	790 – 915	1065 – 1115
Basal diameter	115 – 130	130 – 145	145 – 165
Diameter at rim	310 – 330	280 – 295	295 – 345
Gonotheca, total length	1560		2130 – 2150
Greatest diameter	425		575 – 590
Length of pedicel	33 – 49		50 – 66
Diameter of pedicel	98 – 115		115 – 130

* internode with 3-4 apophyses

REMARKS: The present specimens agree with descriptions by Totton (1930) and Ralph (1957), but show no sign of polysiphony as mentioned by these authors.

RECORDS FROM NEW ZEALAND: Recorded from some isolated localities in the Three Kings Islands region, from Wanganella and Middlesex Banks, and from Cook Strait, depth 73–437 m. Gonothecae present in February and March.

DISTRIBUTION: Known only from New Zealand waters.

Campanularia Lamarck, 1816

TYPE SPECIES: *Sertularia volubilis* Linnaeus, 1758.

Campanularia carduella Allman, 1885

Campanularia carduella Allman 1885: 132–133, pl. 17, figs 1–2; Hutton, 1904: 319.
?*Campanularia carduella*: Ralph 1957: 819; Dawson 1992: 13.

TYPE LOCALITY: New Zealand; no further specification, on the alga *Melanthlia abscissa.* Location of holotype unknown.

REMARKS: Described after dry material and never described since Allman's original diagnosis. The species should be considered extremely doubtful.

Campanularia hicksoni Totton, 1930 (Fig. 102D–G)

Campanularia laevis: Hickson & Gravely 1907: 25–26, pl. 4, fig. 26; Ritchie 1913b: 19, fig. 5; Vanhöffen, 1910: 298, fig. 18.
[Not *Campanularia laevis* Hartlaub 1905: 565–567, fig. P[1]].
Campanularia volubilis var. *antarctica* Ritchie 1913b: 22, fig. 6.
Campanularia antarctica Stechow 1923a: 3; Briggs 1938: 17.
Campanularia hicksoni Totton 1930: 148–150, fig. 7; Briggs 1938: 15–16; Rees & Thursfield 1965: 90, 195; Blanco & Bellusci de Miralles 1972: 10, pl. 1, figs 6–10, pl. 2, figs 11–17, pl. 3, figs 18–19; Naumov & Stepan'yants 1972: 37; Stepan'yants, 1972: 67, fig. 12; 1979: 29–30, pl. 5, fig. 1; Blanco 1984a: 18–20, pl. 13, figs 29–31; El Beshbeeshy 1991: 94–97, fig. 22a; Blanco 1994a: 159; 1994b: 192.

MATERIAL EXAMINED:
NMNZ: BS 480, about 10 hydrothecae arising from stolon on *Eudendrium* sp., 1 male gonotheca. NMNZ Co. 420; RMNH-Coel. slide 2958.

TYPE LOCALITY: McMurdo Sound, Antarctica (Hickson & Gravely 1907, as *Campanularia laevis* Hartlaub, 1905).

DESCRIPTION: Pedicels arising from tubiform stolon attached to stem of *Eudendrium* sp. Pedicel moderately long, a few rings basally, perisarc wrinkled over remainder of length, a distinct, slightly flattened spherule directly below basal chamber of hydrotheca. Hydrotheca long and slender, about 3 times as long as wide at aperture, proximal third smoothly curving towards distinct basal chamber, upper part of hydrotheca almost imperceptibly widening towards rim set with about 12 rounded cusps separated by broad, rounded incisions; cusps slightly turned inwards. Basal part of embayments between marginal cusps slightly curved outwards; cross section of hydrotheca just below rim sinuous, not perfectly circular; marginal elevations visible as indistinct ridges running downward on upper third of hydrotheca.

MEASUREMENTS of *Campanularia hicksoni* (in μm):

	Terra Nova Exped. (Totton 1930)*	Patagonia (El Besbeeshy, 1991)	NMNZ BS 480 slide 2958
Diameter of stolon			90 – 95
Estimated length of pedicel		2560 – 3346	1560 – 2130
Basal diameter of pedicel		60 – 84	73
Hydrotheca, total length	680 – 1220	860 – 1160	740 – 755
Diameter at rim	300 – 610	406 – 464	290 – 300
Male gonotheca, total length	2680 – 3300		820
Maximum diameter			185
Diameter at rim	290 – 310		155

* 'smallest' forms of Totton (1930)

Perisarc of hydrotheca thin and easily damaged, thickening in basal part of hydrotheca as a ring-shaped diaphragm for attachment of the hydranth.

One, presumably immature, male gonotheca. Gonotheca club-shaped, attached to stolon by a very short, scarcely perceptible pedicel. Perisarc of walls indistinctly wrinkled; top truncated, forming a circular platform surrounded by a ring of slightly thickened perisarc; operculum circular. Gonophore a club-shaped mass of developing spermatocytes surrounding a scarcely visible central spadix.

REMARKS: The variability in size of the hydrotheca is conspicuous, so much so that more than one species under the name *Campanularia hicksoni* Totton, 1930 might be suspected. The gonotheca in the present sample is evidently immature; the ripe male being much longer with a better defined apical platform.

RECORDS FROM NEW ZEALAND: 5–6 miles south of Wellington Harbour, 41°26.5′ S, 174°46.5′ E, 106–99 m.

DISTRIBUTION: Chiefly Antarctic (Totton 1930; Briggs 1938; Naumov & Stepan'yants 1972; Stepan'yants 1979, Blanco & Bellusci de Miralles 1972), although El Beshbeeshy (1991) recorded the species as far north as 30°59′ S along the coast of southern Argentina.

Clytia Lamouroux, 1812

TYPE SPECIES: *Campanularia johnstoni* Alder, 1856a [= *Clytia hemisphaerica* (Linnaeus, 1767) by subsequent designation (Mayer 1910), see Cornelius (1982: 70–71).

Clytia elongata Marktanner-Turneretscher, 1890 (Fig. 102H, I)

?Clytia elongata Marktanner-Turneretscher 1890: 215, pl. 3, fig. 11; Farquhar 1896: 461; Hutton, 1904: 319; Ritchie 1911: 815; Ralph 1957: 822–823, fig. 1g; 1961c: 108; Rees & Thursfield 1965: 96; Dawson 1992: 13.

[Not *Clytia elongata* Warren, 1908: 339–341, fig. 20 [= *Clytia warreni* Stechow, 1919: 48]].

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 531, NMNZ Co. 1260, several hydrothecae on long pedicels arising from a stolon on a worm tube, together with *Salacia bicalycula* (Coughtrey, 1876a). No gonothecae. RMNH-Coel. slide 3935.

TYPE LOCALITY: Auckland, New Zealand, on *Halecium parvulum* Bale, 1888 (Marktanner-Turneretscher 1890); holotype (probably) in NMW.

DESCRIPTION: Slender hydrothecae on long pedicels arising from tubular stolon on *Salacia bicalycula* (Coughtrey, 1876a). Hydrotheca about twice as long as wide at aperture, gradually narrowing towards basal chamber; walls not absolutely straight but basally slightly convex; basal chamber spacious and well formed, without any thickening of perisarc, but internally marked by broad, ring-shaped attachment of hydranth. Hydrothecal rim with about 12 big, rounded cusps separated by deep, rounded embayments; no striae running downwards from base of embayments.

Hydrothecal pedicel long, apically with 4 or 5 rings below basal chamber, pedicel with about 12 distinct proximal rings, intermediate part smooth, wrinkled.

Hydranth big, with about 10 tentacles, in contracted condition filling basal half of hydrothecal interior.

No gonothecae present.

MEASUREMENTS of *Clytia elongata* (in μm):

	Auckland (Marktanner-Turneretscher 1890)	New South Wales (Ritchie 1911)	Ralph's Loc. 531 Cook Strait
Stolon, diameter	30 – 60	40 – 60	95 – 100
Pedicel, estimated length	380 – 1170	380 – 1170	1885 – 3935
Diameter at base		48 – 60	100 – 110
Hydrotheca, total length, incl. basal chamber	410 – 870	660 – 870	1080 – 1090
Diameter at rim	120 – 250	190 – 250	425 – 435
Number of marginal cusps	10 – 12	10 – 11	11 – 12

REMARKS: In spite of Ritchie's re-description from Australian specimens this remains a poorly known species; gonothecae never having been found. The present specimens are referred doubtfully to this species; although agreeing in general structure the hydrothecae of the present specimens are much bigger. Unfortunately, although perfectly preserved, the Cook Strait material is sterile.

RECORDS FROM NEW ZEALAND: Auckland, New Zealand, on *Halecium parvulum* Bale, 1888 (Marktanner-Turneretscher 1890) and Cook Strait, 128 m, on worm tube (present record).

DISTRIBUTION: New Zealand waters and coastal waters of New South Wales, Australia; depth not recorded (Ritchie 1911).

Clytia gigantea (Hincks, 1866a) (Fig. 102J)

Campanularia(?)*gigantea* Hincks 1866a: 297; 1868: 174, pl. 35, fig. 1; Fraser 1944a: 119, pl. 21, fig. 90.
Campanularia gigantea: Jäderholm 1909: 69, pl. 7, fig. 1; Fraser 1946: 60, 196.
?*Campanularia gigantea*: Nutting 1915: 44, pl. 6, fig. 3; Fraser 1937: 62, pl. 13, fig. 54.
Laomedea gigantea: Leloup 1947: 25.
Clytia gigantea: Rees & Thursfield 1965: 96; Leloup 1974: 13, fig. 12; Hirohito 1995 (English text): 61–63, fig. 18a-b.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 550, NMNZ Co. 1339, isolated hydrothecae on long pedicels developing on *Halecium ralphae* Watson & Vervoort, 2001. RMNH-Coel. slides 4396.

Ralph's Chatham Island Expedition Collection: Stn 7, many branched stems on calcareous object, probably shell of lamellibranch, but fully disintegrated. No gonothecae. NMNZ Co. 1346; RMNH-Coel. slide 4416.

TYPE LOCALITY: Lamlash Bay, Arran, Scotland. Holotype in NHM, no. 1899.5.1.106.

DESCRIPTION: Colony composed of single or branched pedicels arising from stolon attached to fixed objects or other hydroids; pedicels up to 10 mm long; branching, if present, consisting of a single upwardly directed branch about halfway along primary pedicel; branching may be repeated once or twice. Pedicels with about 5 flattened rings immediately under hydrotheca and with some less distinct rings near the base; branched pedicel may have a few ring below branch. Perisarc of pedicel smooth and almost hyaline.

Hydrotheca big, about twice as long as wide, almost cylindrical, narrowing into spacious basal chamber, set off from body of hydrotheca by a ring of perisarc in which suspended the membranous attachment of the large hydranth. Rim of hydrotheca with about 14 characteristic cusps, square across top but with rounded angles and separated by deep, rounded embayments; bottoms of embayments considerably produced outwards so that cross section of hydrotheca just under rim is strongly undulated while in lateral aspect hydrotheca shows the outwardly produced sections as downward folds descending from rim. Perisarc of hydrotheca very thin and perfectly hyaline; many hydrothecae damaged or folded.

REMARKS: A very characteristic species with large hydrothecae with almost castellate cusps. The dry holotype of *Campanularia* ?*gigantea* was inspected by Cornelius, but we do not support his conclusion that this species is conspecific with *Clytia hemisphaerica* (Linnaeus, 1767), even though the latter shows a considerable degree of variability. The highly characteristic cusps differ considerably from the acuminate cusps of *Clytia hemisphaerica*. Moreover, the gonotheca, described by Leloup (1974), is different, being elongated cylindrical with flattened top, narrowing basally into a short, ringed pedicel.

RECORDS FROM NEW ZEALAND: So far known only from the Chatham Islands, Chatham Rise, 43°42′ S, 179°55′ E, 512 m.

MEASUREMENTS of *Clytia gigantea* (in μm):

	Sagami Bay (Hirohito 1995)	Chile (Leloup 1974)	Chatham Is. Exped. Stn 7, slide 4416
Estimated length of pedicel	7000	8300	10000 – 16000
Diameter		100	130 – 145
Hydrotheca, total depth	1120 – 1290	1450	1650 – 1885
Maximum diameter	420 – 670	750	985
Gonotheca, length		1600	
Maximum diameter		450	

DISTRIBUTION: Deeper waters (down to at least 512 m, present records) of the North Atlantic and North Pacific; also Sagami Bay, Japan (Hirohito 1995), and southern Chile (Leloup 1974). The present records extend the South Pacific distribution to the Chatham Islands region.

Clytia gregaria (L. Agassiz, 1862)

Oceania gregaria L. Agassiz 1862: 353.
Phialidium gregarium: Kramp 1961: 167; Roosen-Runge 1970: 203–220, figs 11–25.
Clytia gregaria: Bouillon 1995a: 224, 236; Bouillon & Barnett 1999: 99, fig. 101.

DESCRIPTION: Bell hemispherical to lens-shaped, diameter about 12–22 mm. Manubrium small, on short peduncle, attached perradially, with 4 long, curved and fringed lips. Gonads linear, along distal half to two-thirds of radial canals, not reaching circular canal. 60–80 closely placed marginal tentacles with large, spherical bulbs; 1 or 2 statocysts between successive tentacles, each with single concretion. (After Kramp 1961 and Bouillon & Barnett 1999).

REMARKS: Polyp cultivated, among others, by Roosen-Runge (1970) from Puget Sound medusae: a *Clytia hemisphaerica*-like hydroid with 8–13 marginal hydrothecal cusps, not identifiable with any of the Puget Sound *Clytia*'s. Roosen-Runge (1970) reared polyps and medusae through complete life-cycles. Cultures produced gonangia and medusae three to seven weeks after fertilisation of the egg. Gonosome development was preceded by a burst of hydroid development five to nine days previously. Liberation of medusae took place four or five days after appearance of the gonangia; sexual maturity was reach in about three weeks, the life span of the medusa not exceeding three months.

RECORDS FROM NEW ZEALAND: Off North Cape (NZOI Stn N365, 35°07.40′ S, 174°16.40′ E); Cook Strait area (Stn N406, 41°38.50′ S, 175°20.30′ E; Stn N422, 41°22.80′ S, 174°46.60′ E, and Stn Z3258, 42°26.00′ S, 173°48.50′ E), and Tasman Basin off Puysegur Point (Stn N452, 45°56.80′ S, 166°39.40′ E; Stn N453, 46°00.80′ S, 166°36.40′ E).

Clytia hemisphaerica (Linnaeus, 1767)

(Fig. 103A–C)

(Mainly Pacific records)

Medusa hemisphaerica Linnaeus 1767: 1098.
Clytia hemisphaerica: Millard 1966a: 478, fig. 14A–F; 1968: 253, 258–259; Day *et al.* 1970: 12; Millard & Broekhuysen 1970: 298; Millard & Bouillon 1973: 7, 54; Cooke 1975: 93, pl. 2, fig. 3; Millard 1975: 217, fig. 72A–D; Cooke 1977: 89, 90, fig. 17; Millard 1978: 190; 1980: 131; Cornelius 1982: 73–82, fig. 9; Gibbons & Ryland 1989: 402–404, figs 19–21 (aberrant forms, fig. 21); Cornelius & Ryland 1990: 131, fig. 4.10; Dawson 1992: 13; Park 1994: 202, table 1; Watson 1994a: 67; Bouillon 1995a: 224, 236; Bouillon *et al.* 1995: 80; Bouillon & Barnett 1999: 100, fig. 102; Cornelius 1995b: 252–255, fig. 57; Medel & Vervoort 2000: 34–38 (*cum syn.*).
Clytia ?hemisphaerica: Watson 1994b: 151–153, fig. 2A–E.
Clytia (Phialidium) hemisphaericum: Bouillon 1984b: 26.
Campanularia johnstoni Alder, 1856a: 359, pl. 13, fig. 8.
Clytia johnstonii Fraser 1937: 74–75, pl. 15, fig. 71; 1938b: 8, 30; 1939: 158 *et seq.*; 1948: 208; Ralph 1957: 823–824, figs 1h-u, 3a-f; Mammen 1965: 22, fig. 51.

MATERIAL EXAMINED:

NZOI Stn B230, colony attached to stem of *Plumularia setacea* (Linnaeus, 1758); no gonothecae. RMNH-Coel. slide 2763; **C926**, *Clytia hemisphaerica* (Linnaeus, 1767) (J.E. Watson); **G835**, small colony with gonothecae on *Salacia bicalycula* (Coughtrey, 1876a); Stn I1, *Clytia hemisphaerica* (Linnaeus, 1767) (J.E. Watson). [Slide 4203 JEW Colln].

NMNZ: BS 172, a few hydrothecae on *Obelia* stems. No gonothecae; **BS 621**, epizootic colonies on *Salacia bicalycula* (Coughtrey, 1876a). 3 RMNH-Coel. slides 2983.

NMNZ Ralph Collection: Loc. 19, unstained Canada Balsam slide in RSC as *Clytia johnstoni* (Alder), with data: V.U.W., Zoology Dept; **Loc. 21**, NMNZ Co. 891, badly damaged remains. Also unstained Canada Balsam slide in RSC, as *Clytia johnstoni* (Alder), with data: V.U.W., Zoology

Dept; **Loc. 111**, 3 slides in RSC, of which 2 partly dried out and 1 unstained Canada Balsam slide, as *Clytia johnstoni* (Alder), data: V.U.W., Zoology Dept; **Loc. 175**, partly dried out slide in RSC as *Clytia johnstoni* (Alder), with data: V.U.W., Zoology Dept; **Loc. 280**, NMNZ Co. 1127, isolated hydrothecae on axis of *Halecium delicatulum* Coughtrey, 1876a, mixed with some stems of *Symplectoscyphus simplex* (Hutton, 1873); RMNH-Coel. slide 3806; **Loc. 470**, partly dried out slide in RSC, as *Clytia johnstoni* (Alder), with data: V.U.W., Zoology Dept; **Loc. 471**, unstained Canada Balsam slide in RSC as *Clytia johnstoni* (Alder), with data: V.U.W., Zoology Dept; **Loc. 481**, NMNZ Co. 1230, 1 hydrotheca on branch of *Aglaophenia laxa* Allman, 1876a.

PMBS: *Clytia ? johnstoni* (may also be *edwardsi*, gonophores wanted). Large and solitary; stalk ringed top and bottom, sometimes intermediate, also variable number of rings. Teeth on hydrotheca largish and rounded. (Taken from card register).

TYPE LOCALITY: The type of *Medusa hemisphaerica* has not been traced; Linnaeus' description was based on description and figures by Gronovius (1760: 38, pl. 4, fig. 7) of material from 'Belgian seas' (see Cornelius 1982: 75), probably indicating material originating from the North Sea. The type locality of *Campanularia johnstoni* is Cullercoats, Northumberland, on seaweeds, zoophytes and shells, from between tide-marks to deep water (cf. Cornelius & Garfath 1980: 283).

DESCRIPTION (of polyp phase): Colony stolonal or slightly and irregularly branched. Stolon attached to algae, to fixed objects or other hydroids. Stolon flattened, sometimes with flange of perisarc. Hydranth pedicels considerably varied in length, base and top with several rings, intermediate portion smooth. Branches, if present, rather abruptly directed upwards, frequently parallel to original pedicel. Hydrothecae vary from inverted conical to almost cylindrical shape, base rounded; a distinct basal chamber with straight diaphragm and small hydropore. Hydrotheca 2–2.5 times as long as maximum width, rim circular, with 7–15 triangular marginal cusps, variable in height, separated by rounded embayments. Apex of cusps pointed or rounded. Hydranth with about 16 filiform tentacles and trumpet-shaped proboscis, fully retractable into hydrotheca.

Gonotheca usually attached to stolon, occasionally to hydrothecal pedicel, elongate ovoid, with short smooth or annulated pedicel and flattened top. Exterior may be almost smooth or strongly ribbed; number of ribs 8–15, ribs transverse. Gonophore a free swimming medusa that matures in the plankton.

DESCRIPTION (of medusa phase): Bell hemispherical to slightly flattened, up to 20 mm across, jelly rather thin, velum narrow, about one-sixth bell radius. Manubrium quadrate, short, base small, no peduncle. Mouth with 4 short, simple lips. Radial canals straight, typically numbering 4, but a higher number occasionally present; circular canal narrow. Gonads elongated oval to linear, along distal third of radial canals, without median furrow. Marginal tentacles typically 32 in adult stage, less in young medusae, smooth, hollow, with prominent spherical bases. Few partially developed marginal bulbs present; cirri absent. Statocysts closed, with single concretion, 1–3 between successive tentacles (after Russell 1953a and Bouillon & Barnett, 1999).

REMARKS: The great variability of this species has been commented upon by many authors; Cornelius (1995b) suspects the presence of sibling species over its enormous geographical range. Ralph (1957) studied the variability of pedicel length and cusp development in New Zealand waters; we refer to Ralph's (1957) paper for further details.

RECORDS FROM NEW ZEALAND: The species is here recorded from a number of localities distributed over New Zealand coastal and sub-littoral waters. As the species prefers shallow water and most of the material inspected here is from deeper waters the present records give a biased impression of its actual distribution, which covers littoral and sub-littoral areas all around New Zealand. The distribution of the medusa has recently been summarised by Bouillon and Barnett (1999) and includes oceanic localities in both the Tasman Sea and the Southwest Pacific, as well as a number of coastal localities (Whangateau Harbour; Leigh Marine Reserve and Avon Heathcote Estuary near Christchurch). The species is well distributed around eastern Australia (J.E. Watson, personal observations).

DISTRIBUTION: Near-cosmopolitan in coastal waters, probably not under purely Arctic and Antarctic conditions.

Clytia malayense (Kramp, 1961)

Phialidium pacificum: Maas 1906: 91, pl. 23, fig. 7.
[Not *Phialidium pacificum* (A. Agassiz & Mayer, 1902)]
Phialidium malayense Kramp 1961: 170.
Clytia malayense: Bouillon 1995a: 236: Bouillon & Barnett 1999: 100, fig. 103.

TYPE LOCALITY: Amboina, Malay Archipelago (Maas, 1906, as *Phialidium pacificum*; location of type unknown).

MATERIAL EXAMINED:

Not in any collection in New Zealand. One record from *Galathea* Stn 611, 44°37′ S, 167°55′ E, Tasman Basin off southern part of South Island, no depth record.

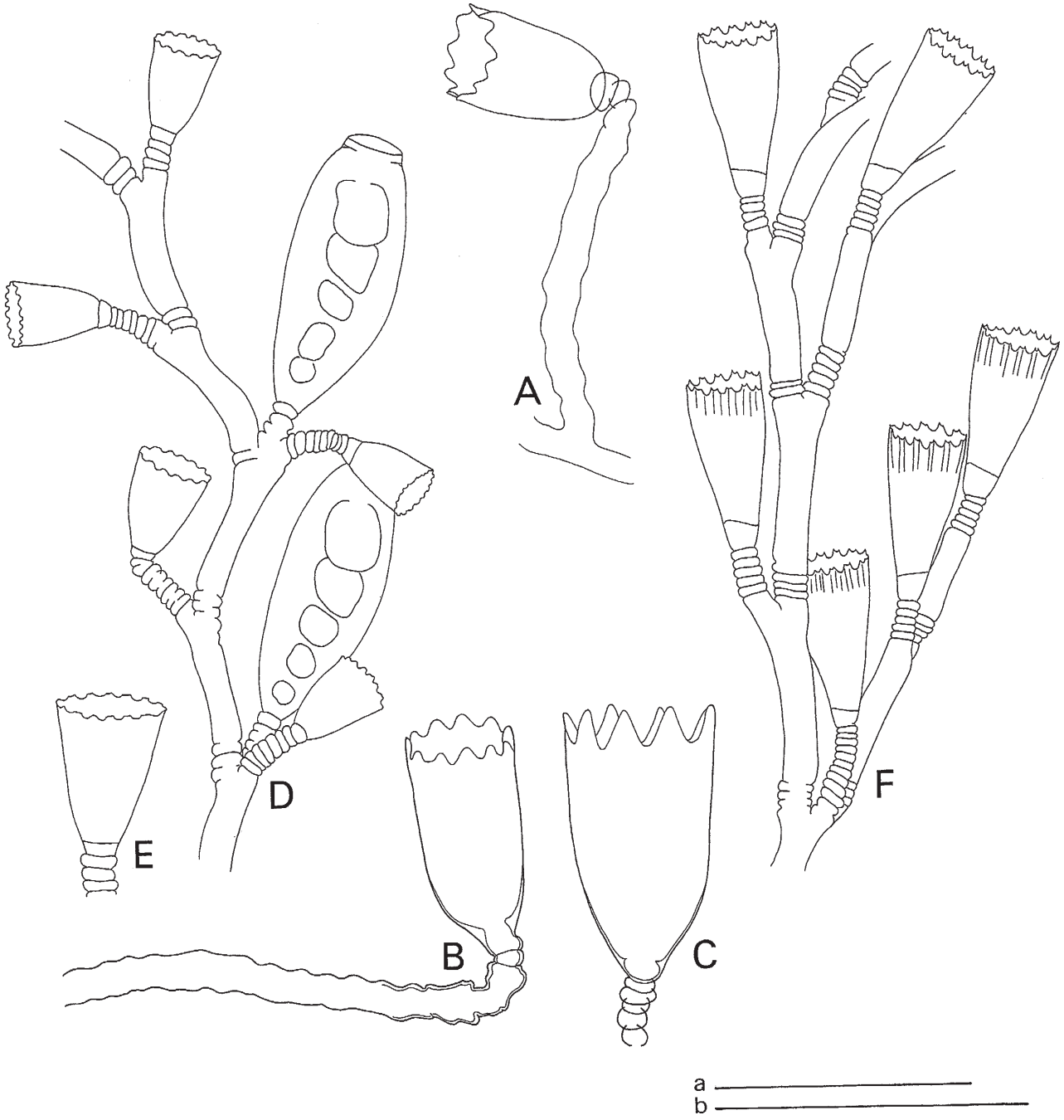

Fig. 103. A–C. ***Clytia hemisphaerica*** (Linnaeus, 1767). **A**, hydrotheca and pedicel, oblique lateral view (NZIO Stn B230, slide 2763). **B**, hydrotheca and part of pedicel, oblique lateral view (BS 621, slide 2983). **C**, hydrotheca, lateral view (Loc. 280, slide 3806). **D, E.** ***Hartlaubella gelatinosa*** (Pallas, 1766). **D**, part of branch with hydrothecae and gonothecae, lateral view. **E**, hydrotheca, oblique lateral view (Loc. 242, slide 3758). **F.** ***Obelia bidentata*** Clarke, 1875, part of branch, lateral view (NZOI Stn 324, slide 2217). Scales: a, 0.5 mm (A–C, E); b, 2 mm (D, F). W.V.

DESCRIPTION: Diameter of bell 5–7 mm, hemispherical, mesoglea fairly thin, velum narrow. Manubrium large, globular, cruciform at its base; mouth with 4 prominent recurved lips. Gonads large, oval to cylindrical, covering middle third of 4 radial canals. 32 or more equally spaced tentacles with big, broadly based marginal bulbs. Number of statocysts between successive tentacles 0–2. Polyp phase unknown (after Kramp1961 and Bouillon & Barnett 1999).

DISTRIBUTION: Indo-Westpacific and northern Australia.

Clytia rangiroae (A. Agassiz & Mayer, 1902)

Epenthesis rangiroae A. Agassiz & Mayer 1902: 145, pl. 1, fig. 4.
Phialidium rangiroae: Kramp 1953: 273; 1961: 171.
Clytia rangiroae: Bouillon 1995a: 236; Bouillon & Barnett 1985: 100–101, fig. 104.

TYPE LOCALITY: Rangiroa, Tuamotu Islands, southern central Pacific (A. Agassiz & Mayer 1902; location of type unknown).

MATERIAL EXAMINED:
Not in any formal collection in New Zealand.

DESCRIPTION: Bell 7 mm diameter, a slightly flattened hemisphere, mesoglea of varied thickness; velum broad. Manubrium short, quadrate in cross section, not cruciform; mouth with 4 slightly recurved lips. Gonads small, oval, placed along radial canals near umbrellar margin; female specimens having a few large, prominent eggs. 16–32 well developed tentacles with large, conical bulbs, single statocyst with 1 concretion between successive tentacles. Polyp phase unknown (after Kramp 1961 and Bouillon & Barnett 1999).

RECORDS FROM NEW ZEALAND: Leigh Marine Reserve (Barnett 1985); Auckland Harbour; Whangateau Harbour (Bouillon & Barnet, 1999).

DISTRIBUTION: Southern Pacific and northern Australian waters.

Clytia simplex (Browne, 1902a)

Phialidium simplex Browne 1902a: 282; Kramp 1959: 149, 227, 230, 232, 234–235, 237, 267, 269, fig. 189; 1961: 171–172.
Clytia simplex: Bouillon 1995a: 224, 236; Bouillon & Barnett 1999: 101, fig. 105.

TYPE LOCALITY: Falkland Islands, Southwest Atlantic (Browne 1902a; type probably in NHM).

DESCRIPTION: Umbrella up to 22 mm wide and 10 mm high, watchglass-shaped, mesoglea thin. Manubrium short, with 4 lobe-like perradial thickenings, no peduncle; mouth with 4 large, fimbriated lips. Gonads thin, linear, slightly folded along distal half to three-quarters of radial canals, not reaching circular canal. 60–85 marginal tentacles with prominent globular bulbs and a few developing bulbs in between. 1 statocyst between successive tentacles, occasionally 2, each with single concretion. Specimens with 3 or 6 radial canals have been observed. Polyp phase unknown (after Kramp 1961 and Bouillon & Barnett 1999).

RECORDS FROM NEW ZEALAND: Three Kings Islands region (NZOI Stn N371); Campbell Plateau (*Galathea* Stns 580 and 596); Whangateau Harbour, and Leigh Marine Reserve (Bouillon & Barnett 1999).

DISTRIBUTION: Atlantic (coast of Brazil, south coast of Africa, Benguela Current); Indo-Pacific (northeast Australia), and Subantarctic region (Falkland Islands).

Gonothyraea Allman, 1864

TYPE SPECIES: *Laomedea loveni* Allman, 1859.

Gonothyraea loveni (Allman, 1859)

(Mainly Pacific records)

Laomedea loveni Allman 1859: 138–140.
Gonothyraea loveni: Linko 1911: 212–216, fig. 40; Ralph 1957: 824–826, fig. 3g-k; Millard 1975: 224, fig. 74A–F; 1978: 192 *et seq.*; Cornelius 1982: 92–94, fig. 15; Cornelius & Ryland 1990: 131, fig. 4.12; Cairns *et al.* 1991: 23; Dawson 1992: 13; Park 1994: 202, table 1; Cornelius 1995b: 262–265, fig. 60.
Gonothyraea (Laomedea) loveni: Deryugin 1915: 309.
Obelia loveni: Naumov 1960: 264–265, figs 16i, 152.
Calycella parkeri Hilgendorf 1898: 205–206, pl. 17, figs 3, 3a-d, pl. 18.
Gonothyraea parkeri: Bale 1924: 231.
Gonothyraea hyalina: Hodgson 1950: 6, fig. 10.

TYPE LOCALITY:*Laomedea loveni*: Firth of Forth, Scotland, U.K. (Cornelius 1982: 93; location of holotype unknown); *Calycella parkeri*: Dunedin Harbour, on piles (Hilgendorf 1898; type material probably lost).

MATERIAL EXAMINED:
Not present in any New Zealand collection. Known only from wharf piles in Dunedin Harbour (Hilgendorf 1898, as *Calycella parkeri*) and not recorded since.

DESCRIPTION: Hydrocalaus monosiphonic, branched, attaining a height of about 3 cm; stem flexuous, jointed, giving rise to a branch, hydrotheca or both at each joint; stem annulated at the base and distal to each joint as are the branches; hydrothecae alternate, elongate, campanulate, hyaline; aperture circular, margin castellated, the denticles being indented at the top; hydrothecae are borne on annulated (up to 20 rings), slightly tapering pedicels: sexes separate; gonotheca large, axillary to the branch or hydrotheca, urn-shaped with a flattened top, supported by a ringed pedicel; gonophores become extra-capsular at maturity but are not liberated.

REMARKS: We follow Ralph (1957) in including this species in *Gonothyraea*.

DISTRIBUTION: Widely distributed in boreal and temperate areas of Atlantic and Pacific Oceans; typically in the littoral zone.

Hartlaubella Poche, 1914

TYPE SPECIES: *Sertularia gelatinosa* Pallas, 1766.

Hartlaubella gelatinosa (Pallas, 1766)

(Fig. 103D, E)

(Mainly Pacific records)

Sertularia gelatinosa Pallas 1766: 116.
Obelaria gelatinosa: Nutting 1915: 87, pl. 24, figs 1–5.
Campanularia gelatinosa: Fraser 1937: 61–62, pl. 13, fig. 53; Ralph 1957: 820, fig. 1b-f.
Hartlaubella gelatinosa: Cornelius 1982: 95–97, fig. 16; Austin 1985: 53; Cornelius & Ryland 1990: 131, fig. 4.10; Harris 1990: 239, fig. 11.5a, b; Cairns *et al*. 1991: 23; Bouillon *et al.* 1995: 82; Cornelius 1995b: 266–269, fig. 61.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 242, NMNZ Co. 1086, well developed colonies with polysiphonic stem about 25 mm high; many gonothecae present, containing developing planulae. 3 RMNH-Coel. slides 3758. Also partly dried out P.V.A. slide in RSC as *Campanularia gelatinosa* (Pallas), with data: V.U.W., Zoology Dept.

TYPE LOCALITY: Belgian coast; probably indicating North Sea coast of Holland (Pallas 1766; type material not located).

DESCRIPTION: Flexuous sympodial colony, composed of polysiphonic stem and many short, repeatedly branched, monosiphonic or polysiphonic side branches; full grown colonies up to several centimetres long and shaped like a fluffy tail. Monosiphonic branches or monosiphonic parts of branches geniculate; internodes curved, with a few basal rings; pedicel of hydrotheca completely annulated or with basal and terminal rings separated by a smooth section, next internode inserted on short apophysis at base of hydrothecal pedicel. Another hydrotheca or gonotheca on a short, ringed pedicel may spring from axil between hydrothecal pedicel and following internode.

Hydrotheca graceful, widening from base onwards; wall slightly convex in basal half, almost cylindrical in upper half; perisarc fragile, thinning out strongly along walls; rim consequently almost fully hyaline and easily collapsed or abraded; with castellate margin, 12–14 blunt cusps separated by rounded embayments. Each cusp of the castellate margin may be slightly bicuspi-date but difficult to observe and very variable. Basal chamber of hydrotheca spacious, separated from hydrotheca proper by a thin ring of perisarc supporting a membranous diaphragm for attachment of the polyp. Hydranth fully retractable into the hydrothecal cavity. About 16 long tentacles in extended condition.

Gonothecae big, 2.5–3 times as long as hydrotheca, elongated ovoid; greatest diameter slightly above middle, apically narrowing into a fairly wide, rounded aperture surrounded by a low collar; aperture closed by circular operculum. In New Zealand material the female gonothecae are either empty or contain 5 or 6 developing planulae; no male gonothecae observed.

MEASUREMENTS of *Hartlaubella gelatinosa* (in μm):

	Gt Britain (Cornelius 1995)	Ralph's Loc. 242 slide 3758
Length of branch internode	600 – 750	420 – 505
Diameter		62 – 90
Hydrotheca, total depth	250 - 400*	295 – 310
Diameter at rim	15 – 200	175 – 185
Length of pedicel	200 – 300	85 – 225
Diameter of pedicel		55 – 78
Gonotheca, total length	800 – 1000	885 – 900
Maximum diameter	250	335 – 365
Length of pedicel		85 – 110
Diameter of pedicel		90 – 100

* basal chamber excluded

REMARKS: This is a euryhaline species which can tolerate detritus and growth of diatoms. Although the New Zealand colonies were reportedly collected from amongst drift material the hydranths and gonothecae are well preserved, indicating a short distance of transport.

RECORDS FROM NEW ZEALAND: Lake Ellesmere, near mouth of Selwyn River, drift (only New Zealand record).

DISTRIBUTION: Widely distributed in the European and American boreal and temperate Atlantic (Cornelius 1995). Also known from the Mediterranean and the Atlantic coast of southern Argentina.

Obelia Péron & Lesueur, 1810b

TYPE SPECIES: *Obelia spaerulina* Péron & Lesueur, 1810b.

REMARKS: There are at least four medusa-producing *Obelia* species in New Zealand waters, viz. *Obelia bidentata, O. dichotoma, O. geniculata* and *O. longissima.* So far there are no reliable diagnostic characters to separate the *Obelia* medusae of these four species. Zamponi and Genzano (1990) distinguish between the medusae of *O. dichotoma* and *O. longissima* by characters based on the composition of the cnidome, but Bouillon and Barnett (1999) rejected their conclusions.

The '*Obelia*' problem has given rise to long discussions in Leptolid literature, for a survey of which we refer to Cornelius (1975, 1982, 1995b). In northwestern Atlantic waters the discussions range particularly concerning *Obelia lucifera* (Forbes, 1848) and *O. nigra* Browne, 1900, of which the former has been reared to maturity from both *O. dichotoma* and *O. geniculata. Obelia nigra* is said to be larger and more darkly pigmented around the bases of the tentacles; this 'species' is exclusively known from the plankton. Although a final answer to this complicated question is far from resolved, recent evidence suggests that the distinction between *O. lucifera* and *O. nigra* is purely based on physiological conditions during transport of the young medusae and that the ultrastructure of certain elements of the cnidome might eventually create a possibility to discriminate between the medusae produced by the various *Obelia* species.

Obelia bidentata Clark, 1875 (Fig. 103F)

Obelia bidentata Clark 1875: 58–59, pl. 9, fig. 2; Cornelius 1975: 260, fig. 2; Millard 1978: 195; 1980: 131; Cornelius 1982: 113–117; Austin 1985: 53; Gibbons & Ryland 1989: 405–406, fig. 23; Cornelius & Ryland 1990: 133, fig. 4.11; Cairns *et al.* 1991: 23; Watson 1994a: 67; Bouillon *et al.* 1995: 84; Cornelius 1995b: 292–295, fig. 68; Medel & Vervoort 2000: 46-49, fig. 12 (*cum syn.*).

Obelia bicuspidata Clark 1875: 58, pl. 9, fig. 1; Fraser 1937: 83, pl. 16, fig. 82; Millard 1975: 226, fig. 75C–E; Hirohito 1983: 5, 16; Rho & Park 1983: 42–43, pl. 3, figs 3–5, pl. 4, fig. 1; Hirohito 1995 (English text): 71–73, fig. 21a-b, pl. 5, fig. A; Park 1995: 11.

MATERIAL EXAMINED:

NZOI Stns: O324, colonies up to 20 mm high on algae; no gonothecae. RMNH-Coel. slide 2217; **Q31**, small, 15–20 mm high colonies on worm tubes. No gonothecae and in bad shape. With *Filellum serpens* (Hassall, 1848).

TYPE LOCALITY: *Obelia bidentata*: Greenport, Long Island, Atlantic coast U.S.A. (Clark 1875); *Obelia bicuspidata*: Thimble Islands, Long Island Sound, Atlantic coast U.S.A. (Clark 1875). Location of types unknown.

DESCRIPTION: Full-grown colonies several centimetres high, composed of a polysiphonic stem with many short, polysiphonic, and monosiphonic side branches that, as whole colony, are sympodially built and are often arranged in pairs, standing off perpendicularly from stem. Internodes weakly curved, hydrothecal pedicels completely annulated or ringed on both ends with a smooth part in between.

Hydrothecae big, gradually widening from base onwards, slightly convex in upper half, rim bicuspidate, with about 10 cusps separated by deep, rounded embayments, each of cusps bimucronate with apical incision of varied depth, lateral edges of each cusp produced into a fine point. Embayments slightly curved outwards, cross section of hydrotheca below rim consequently undulated, fine raised ribs descending downwards from cusps. Basal chamber spacious; hyaline diaphragm in a faintly raised oblique perisarc ring. Perisarc of hydrothecae thin and hyaline.

Gonothecae absent from present material.

MEASUREMENTS of *Obelia bidentata* (in μm):

	Gt Britain (Cornelius 1995)	NZOI Stn O324 slide 2217
Length of branch internodes		490 – 640
Diameter		78 – 100
Hydrotheca, total depth	320 – 490*	505 – 550
Diameter at rim	120 – 280	195 – 225
Length of pedicel	70 – 580	110 – 420
Diameter of pedicel		56 – 67
Gonotheca, total length	550 – 600	
Maximum diameter	220 – 260	

* basal chamber excluded

REMARKS: Species of much the same appearance and colony structure as *Hartlaubella gelatinosa* (Pallas, 1766), although it varies considerably in detailed structure of the hydrotheca, so much so that its variability suggests that several taxa may be included under the specific name *Obelia bidentata*.

The medusa of this species complex is generally considered indistinguishable from that of the other species of *Obelia* but is actually too poorly known to reach that conclusion. Recent research of the nematocysts of species of *Obelia* suggests that this field of study may open new perspectives on the tangled taxonomy of this genus (cf. Östman 1988, 1999).

Whole colony may have the same fluffy appearance as that of *Hartlaubella gelatinosa* (Pallas, 1766), from which it differs in longer internodes and bigger hydrothecae; moreover the gonophores in *O. bidentata* produce free medusae. Detailed observation of hydrothecal rim requires staining or phase contrast observations. Gonothecae, absent here, have been described from European and other material as big, more or less conical structures, having their greatest diameter closely under the flattened top which carries a short, broad funnel with circular opening closed by a circular lid. The gonophore produces free medusae of the *Obelia* type, closely resembling those of other species in his genus [*Obelia dichotoma* (Linnaeus, 1758), *O. longissima* (Pallas, 1766) and *O. geniculata* (Linnaeus, 1758)].

Records from New Zealand: So far known only from Rangaunu Harbour, Doubtless Bay, 34°58.05′ S, 173°14.50′ E, 2 m and the Southwest Pacific, Chatham Rise, 44°15.78′ S, 176°54.78′ W, 340 m. The species is likely to be more widely distributed in New Zealand waters.

Distribution: Temperate, subtropical and tropical parts of the Atlantic, Indian and Pacific Oceans, including the Mediterranean.

Obelia dichotoma (Linnaeus, 1758) (Fig. 104A–E)

Sertularia dichotoma Linnaeus 1758: 812.

Obelia dichotoma: Medel & Vervoort 2000: 49–53, fig. 10c-d (*cum syn.*)

Obelia australis: von Lendenfeld 1885a: 604, 920, pl. 43, figs 19- 22; Bartlett 1907: 42; Mulder & Trebilcock 1916: 81; Bale 1924: 231; Trebilcock 1928: 2; Blackburn 1937b: 175, fig. 6; 1938: 324; Briggs 1938: 14; Blackburn 1942: 106; Dakin *et al.* 1948: 208; Allen & Wood 1950: 98; Hodgson 1950: 4, figs 5–7; Ralph & Hurley 1952: 8; Dakin 1953: 128, fig. 14c; Ralph 1957: 830, fig. 4a-h; Pennycuik 1959: 170; Dakin *et al.* 1960: 128, fig. 14c; Mammen 1965: 11; Ralph 1966: 158; Morton & Miller 1973: 152; Cooke 1977: 89; Gordon & Ballantine 1977: 100; Stephenson & Sutherland 1981: 66; Stranks 1993: 4; Watson 1994a: 66.

Obelia nodosa Bale 1924: 230, fig. 1; Ralph 1957: 832, fig. 5i–k; Pennycuik 1959: 171; Ralph 1961: 109; Straughan 1968: 33; Stranks 1993: 5.

Material Examined:

NZOI Stns: A695, sample consists largely of algae and has at one time or the other been dried out. Isolated several colonies with gonothecae. RMNH-Coel. slide 2708; **T803**, several colonies, up to 40 mm high, on shells and barnacles: no gonothecae. 2 RMNH-Coel. slides 2922; **T808**, a few colonies about 25 mm high found in sample largely consisting of bryozoans and algae. 3 RMNH-Coel. slides 2923.

Additional Material: **Bauza Island, Doubtful Sound**, 04.April.1994, 20 m, leg. J.E. Watson. Several bunches of about 50 mm high, monosiphonic colonies with developing gonothecae. RMNH-Coel. 27856, slide 4036.

NMNZ Ralph Collection: Loc. 89, partly dried out slide in RSC as *Obelia australis* von Lendenfeld; no further data; **Loc. 226**, NMNZ Co. 1071, 2 small stems, 5 and 8 mm high, with badly preserved hydrothecae; no gonothecae. RMNH-Coel. slide 3734; **Loc. 237**, NMNZ Co. 1082, some detached stems in sample with *Turritopsis nutricula* McCrady, 1857; **Loc. 247**, NMNZ Co. 1091, several dense bunches of about 10 mm high colonies, all with monosiphonic stems and with many gonothecae. 3 RMNH-Coel. slides 3766; **Loc. 329A**, partly dried out slide in RSC, as *Obelia australis* von Lendenfeld, no further data; **Loc. 437**, 5 stained Canada Balsam slides in RSC, as *Obelia australis* von Lendenfeld, with data: Wharf Block.

Type Locality: *Obelia dichotoma*: coast of southwest England (cf. Cornelius 1975a: 267); *Obelia australis*: Sumner, Christchurch, New Zealand, in the laminarian zone (von Lendenfeld 1885a).

Description: Flexuous, generally monosiphonic, sympodial colonies of medium height (up to about 80 mm), rising from stolonal, tubiform network attached to most solid substrates. Main stem slightly geniculate to almost straight, composed of slender, slightly curved to almost transverse internodes ending in a hydrotheca on a ringed pedicel; a slightly laterally directed apophysis supporting the next internode; the hydrotheca and its annulated pedicel may be replaced by a short side branch of similar structure as the main stem, a hydrotheca on a ringed pedicel sometimes in axil of side branch and succeeding stem internode. All internodes basally with 3–6 rings; hydrothecal pedicels with about 10 rings, often with short smooth part in middle. Side branches variable in length; if colony long and bushy, this caused by development of a short branch replacing the axillary hydrotheca.

Hydrotheca conical, widening from base, basal half slightly convexly swollen; upper half gradually widening towards slightly everted, circular aperture; rim thin, difficult to observe, but typically with about 16 very flat cusps; incisions between cusps slightly raised and descending downwards some distance on exterior of hydrotheca as very fine lines; cross section of hydrotheca polygonal at that level. Basal chamber spacious, separated from hydrothecal cavity by a thin diaphragm suspended in a ring of perisarc, transverse to oblique (see Remarks). Perisarc deep horn coloured; side branches typically colourless.

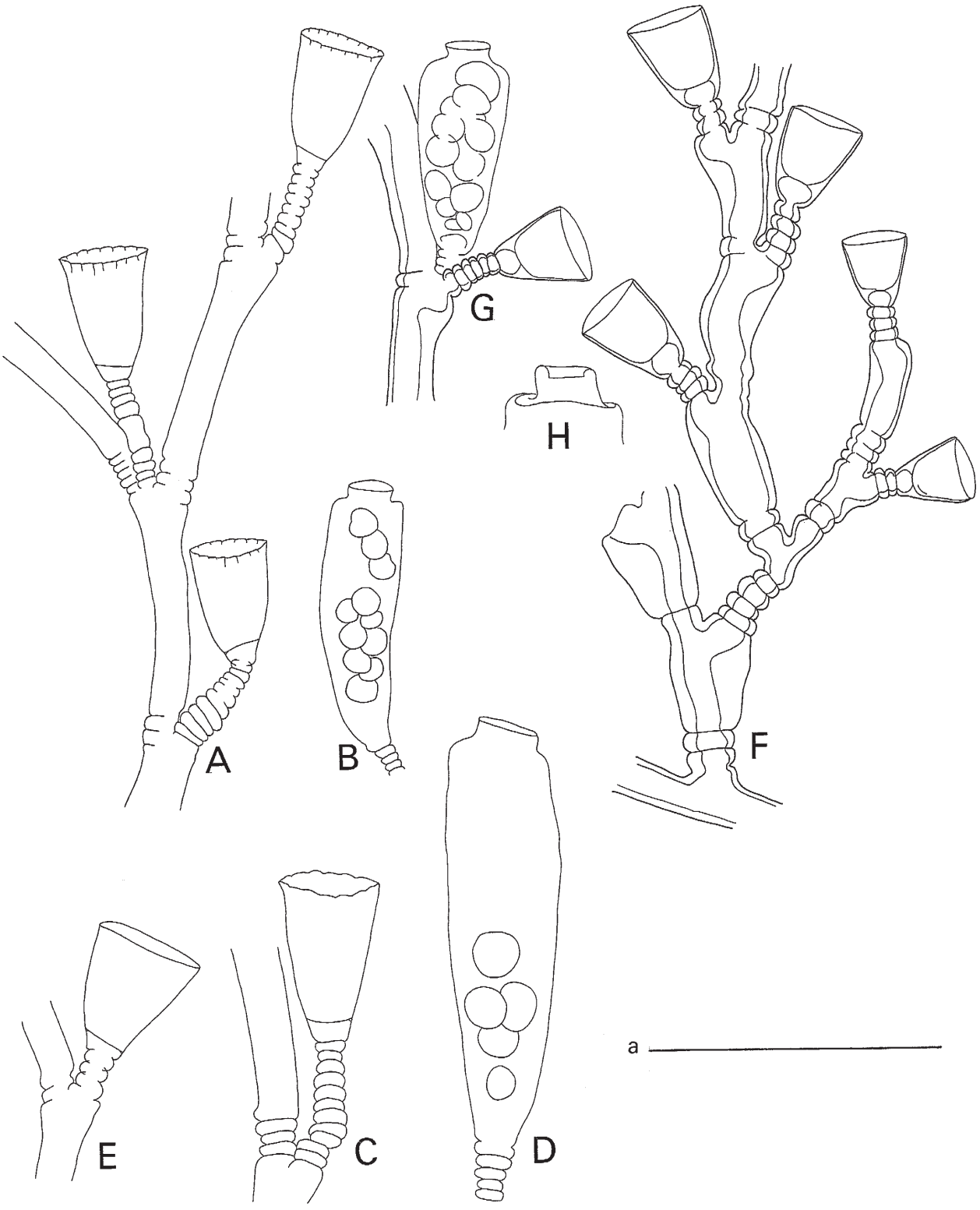

Fig. 104. A–E. ***Obelia dichotoma*** (Linnaeus, 1758). **A**, part of colony, frontal view. **B**, gonotheca, lateral view (NZOI Stn T808, slide 2932). **C**, hydrotheca. **D**, gonotheca; both in lateral view (NZOI Stn A695, slide 2708). **E**, hydrotheca, lateral view (Loc. 247, slide 3766). **F–H.** ***Obelia geniculata*** (Linnaeus, 1758). **F**, part of branched colony (Loc. 240, slide 3754). **G** , hydrotheca and gonotheca with its insertion, lateral view; H, distal part of gonotheca (Loc. 591, slide 3979). Scale: a, 2 mm (A–H). W.V.

MEASUREMENTS of *Obelia dichotoma* (in μm):

	NZOI Stn A695 slide 2708	NZOI Stn T808 slide 2932	Ralph's Loc. 247 slide 3766
Stem internode, length	1310 – 1885	1310 – 1395	1150 – 1230
Diameter	170 – 205	160 – 170	135 – 145
Internode of branch, length	1150 – 1310	1065 – 1150	575 – 740
Diameter	150 – 160	140 – 155	100 – 115
Hydrotheca, total length	530 – 690	450 – 495	370 – 410
Depth of basal chamber	56 – 84	45 – 56	34 – 45
Diameter at rim	325 – 385	280 – 310	270 – 310
Gonotheca, total length		1150 – 1395	870 – 900
Maximum diameter		295 – 310	270 – 290

Gonothecae on a pedicel of 5–8 rings, replacing an axillary hydrotheca; gonotheca about twice as long as hydrotheca, elongated conical; immature gonothecae with a rounded top, when mature with a flattened top with a broad, ring-shaped aperture on a low collar. Mature gonophores produce a multitude of medusae in various stages of development.

REMARKS: Basal portion of main stem occasionally slightly polysiphonic by apposition of a few secondary tubules (not observed in New Zealand material).

This species grows on fixed objects in the littoral zone and at intermediate depths under quite varied conditions of water movement. It also tolerates waters with a high load of suspended particles as a result of which the colonies are occasionally very dirty. They also provide a favoured substrate for diatom settlement and spat fall. The hydrothecal rim is very fragile and easily abraded; the polygonal structure and the fine, longitudinal ribs are only visible in perfect material and are best visible after staining or under phase contract illumination. After comparison of the New Zealand material of this species, including that in Ralph's collection identified as *Obelia australis* von Lendenfeld, 1885a, with an abundant Atlantic material of *Obelia dichotoma* (Linnaeus, 1758), we have reached the conclusion that the two species may well be inseparable and therefore, for the time being, we relegate *Obelia australis* to the synonymy of that species. The two species have long been considered separable on account of the hydrothecal diaphragm, said to be oblique in *O. australis* and straight in *O. dichotoma*. There are no other distinguishing characters in structure of colony, hydrothecae or gonothecae; the nematocysts of polyps and medusae still await detailed study.

As far as the diaphragm is concerned, in the New Zealand material transverse and oblique diaphragms are of approximately equal occurrence while in Atlantic material there is a slight dominance of hydrothecae with a straight diaphragm, though both types typically occur in a well developed colony. Also, a structurally oblique diaphragm may appear transverse under a certain angle of observation.

All New Zealand colonies studied so far have monosiphonic side branches. Colonies with long, polysiphonic side branches that give the colony a bushy to fan-shaped appearance have been described from Europe as *Obelia plicata* Hincks, 1868; this species is thought by Cornelius (1990a, 1995b) to be conspecific with *Obelia dichotoma* (Linnaeus, 1758).

Obelia nodosa was described by Bale (1924: 230, fig. 1) from Waitakere, Auckland [type in Canterbury Museum, slide no. 12 (Ralph, 1957), probably lost; three probable syntype slides in MOV, MV F58216 (Stranks, 1993)]. It was re-described by Ralph from Bale's type slide in Canterbury Museum. This brings the species into the synonymy of *Obelia dichotoma* (Linnaeus, 1758) as defined above. The species is only known from the type locality: Waitakere, Auckland (Bale, 1924; Ralph, 1957).

RECORDS FROM NEW ZEALAND: A mainly littoral species; the localities listed above consequently give a biased view of its distribution in New Zealand. It is likely to occur all around New Zealand on suitable substrata (large algae, lamellibranchs, large tunicates, all kinds of firm bottoms, etc.) down to a depth of at least 91 m. Gonothecae present in March, April, July, and November .

DISTRIBUTION: Cosmopolitan or near-cosmopolitan; depth distribution extending downwards to about 500 m.

Obelia geniculata (Linnaeus, 1758) (Fig. 104F–H)

Sertularia geniculata Linnaeus 1758: 812.

Laomedea geniculata: Coughtrey 1875: 290, pl. 20, fig. 42; 1876a: 299; 1876b: 24; Marktanner-Turneretscher 1890: 208, pl. 3, fig. 9; Hartlaub 1901b: 362.

Obelia geniculata: Hilgendorf 1898: 204–205, pl. 17, figs 2, 2a; Bartlett 1907: 42; Linko 1911: 227–231, fig. 43; Stechow 1913b: 8, 22, 69, figs 26–27; Stechow 1923b: 7; Uchida 1925:

90; Johnson & Snook 1935: 60, fig. 43; Briggs 1939: 14; Fraser 1939c: 159; Hiro (= Utinomi) 1939: 174, fig. 6; Fraser 1940b: 497; 1948: 214; Hodgson 1950: 3, figs 1–4; Kulka 1950: 80, fig. 1; Ralph 1956: 281–285, figs 1a, 2b; Hakushi *et al.* 1957: 217, pl. 108, fig. 3; Ralph 1957: 831, fig. 4i; Yamada 1958: 51, 54; Millard 1959: 250; Yamada 1959: 41; Naumov 1960: 261–263, figs 15B, 37, 147, 148; Kato *et al*. 1961: 195; Ralph 1961c: 104, 107; 1961d: 236; Itô & Inoue 1962: 449, pl. 8, fig. 67; Kawahara 1962: 33; Mammen 1965: 14, figs 39–40; Nishihira 1965: 77; Yamada 1965: 361; Millard 1966a: 483; 1966b: 491; Nishihira 1966: 187; Rho 1967: 342–343, fig. 1; Nishihira 1968a: 120; 1968b: 126; Ralph & Thomson 1968: 1–21, pls 1-3; Rho 1969: 164–165, figs 3–4; Day *et al.* 1970: 12; Shepherd & Watson 1970: 140; Nishihira 1971: 104; Roberts 1972: 300 *et seq.*; Rho & Chang 1972: 4; Morton & Miller 1973: 152; Millard & Bouillon 1974: 6; Rho & Chang 1974: 140; Cornelius 1975: 272–278, figs 1, 5; Millard 1975: 229, fig. 75A–B; Gordon & Ballantine 1977: 100; Rho 1977: 259, 417, text-fig. 9A, pl. 17, fig. 72; Honma & Kitami 1978: 10; Millard 1978: 195 *et seq*; Haderlie *et al.* 1980: 47; Cornelius 1982: 119–120; Hirohito 1983: 6, 17; Austin 1985: 53; Staples & Watson 1987: 218; Lin Sheng 1989: 341; Cornelius & Ryland 1990: 133, fig. 4.11; Park 1990: 79; Cairns *et al*. 1991: 23; Dawson 1992: 13; Watson 1992: 220; 1994a: 66; Bouillon *et al.* 1995: 84; Cornelius 1995b: 301–303, fig. 70; Hirohito 1995 (English text): 76–78, fig. 22a-b; Kalk 1995: 199, fig. 7.20; Medel & Vervoort 2000: 54-58 (*cum syn*.).

Obelia geniculata forma *subtropica* Ralph 1956: 285, fig. 1b.
Obelia geniculata forma *intermedia* Ralph 1956: 285, fig. 1c.
Obelia geniculata forma *subantarctica* Ralph 1956: 285, fig. 1d.
Campanularia geniculata: Kato 1949: 215.
Clytia geniculata: Bennitt 1922: 248.

Material Examined:

NMNZ: Kau Point, J. Moreland, 14.Oct.1954, 6 colonies, 8–12 mm high, some with gonothecae. NMNZ Co. 610; **Ranui Cove, Auckland Islands**, Jan.1963, J.C Yaldwyn, about15 stems up to 10 mm high from stolon creeping on algae; gonothecae present. NMNZ Co. 454; RMNH-Coel. slide 2973; **Petone Beach, Wellington**, R.K. Dell, 24.Aug.1970, numerous colonies with spent gonothecae on algae, height 8–12 mm. NMNZ Co. 468; 3 RMNH-Coel. slides 2981.

NMNZ Ralph Collection: Loc. 54, NMNZ Co. 914, several fragments of thallus of algae with some colonies attached to reptant stolon, with gonothecae. RMNH-Coel. slide 3612; **Loc. 86**, NMNZ Co. 942, tube contains debris of algae and 2 mm long stem fragment with 2 hydrothecae with hydranths; no gonothecae. RMNH-Coel. slide 3633; **Loc. 87**, NMNZ Co. 943, stem fragment about 8 mm long, without gonothecae. Made up as RMNH-Coel. slide 3634; **Loc. 88**, NMNZ Co. 944, many colonies arising from stolon reptant on thallus of alga, no gonothecae. RMNH-Coel. slide 3635; **Loc. 94**, NMNZ Co. 950, 3 stems 5–15 mm high without hydro- or gonothecae. No slide; **Loc. 155**, NMNZ Co. 1014, numerous detached stems, practically without hydrothecae and gonothecae, detached from substratum. RMNH-Coel. slide 3680; **Loc. 158**, NMNZ Co. 1016, numerous colonies up to 25 mm long, some branched; no gonothecae. RMNH-Coel. slide 3682; **Loc. 162**, NMNZ Co. 1020, numerous colonies on algae, with many (empty) gonothecae; some stems branched. Mixed with a species of *Orthopyxis*. RMNH-Coel. slide 3690. Also stained Canada Balsam slide in RSC as *Obelia geniculata* and data: Kapiti Is; L**oc. 166**, NMNZ Co. 1024, fragments of algae with many about 10 mm high colonies with gonothecae. RMNH-Coel. slide 3693; **Loc. 185**, NMNZ Co. 1040, numerous small, up to 8 mm high colonies from stolon reptant on fronds of algae. No gonothecae observed. RMNH-Coel. slide 3706; **Loc. 199**, NMNZ Co. 1048, 3 isolated colonies, branched and with gonothecae. RMNH-Coel. slide 3714; **Loc. 240**, NMNZ Co. 1084, many about 15 mm high colonies with gonothecae on algae; RMNH-Coel. slide 3754. With *Orthopyxis* cf. *caliculata* (Hincks, 1853) and *Salacia bicalycula* (Coughtrey, 1876a). N.B. Species mentioned in register not found; **Loc. 252**, NMNZ Co. 1097, mutilated colonies up to 8 mm high with stolonal tubes, detached from substratum but in poor condition. Empty gonothecae and hydrothecae without polyps; dead material. RMNH-Coel. slide 3772; **Loc. 253**, NMNZ Co. 1099, numerous up to 8 mm high colonies on stem of large brown alga, with gonothecae. RMNH-Coel. slides 3774; **Loc. 256**, NMNZ Co. 1104, stems up to 10 mm high on frond of brown algae, generally in poor condition; no gonothecae. Specimens in bad shape, covered by filamentous algae. RMNH-Coel. slide 3779; **Loc. 262**, NMNZ Co. 1110, several up to 10 mm high stems on fragments of brown alga, rising from creeping stolon, no gonothecae. 2 RMNH-Coel. slides 3786; **Loc. 266**, NMNZ Co. 1114, sample consists of fragments of algae with 15 mm high colonies of *Obelia geniculata* (Linnaeus, 1758); with *Plumularia setaceoides* Bale, 1882. RMNH-Coel. slide 3793; **Loc. 291**, NMNZ Co. 1136, colony about 12 mm high, with gonothecae. RMNH-Coel. slide 3817. With *Obelia longissima* (Pallas, 1766); **Loc. 329**, NMNZ Co. 1163, fair number of colonies about 12 mm high attached to fragment of alga. Hydrothecae and gonothecae in poor condition. RMNH-Coel. slide 3840; **Loc. 455**, NMNZ Co. 1222, tangled and fragmented colonies of *Obelia geniculata* (Linnaeus, 1758), without gonothecae. With *Plumularia setacea* (Linnaeus, 1758). RMNH-Coel. slide 3899; **Loc. 566**, NMNZ Co. 1274, several small colonies without gonothecae, mixed with *Salacia bicalycula* (Coughtrey, 1876a) and *Modeeria rotunda* (Quoy & Gaimard, 1827); **Loc. 591**(?), NMNZ Coll. 1301, fair number of colonies about 15 mm high, with gonothecae, on fragment of alga. RMNH-Coel. slide 3979.

PMBS: Aquarium Point, PMBS, on fronds of *Macrocystis,* common. Colour whitish; zigzag stalk. Identified by R. Kulka & P.M. Ralph. (Taken from card register).

Material Inspected: **Aquarium Point**, PMBS, 02.Oct.1952, E.J. Batham. Sample consists of fragment of thallus of algae with erect, about 8 mm high colonies. RMNH-Coel. 27269, slide 2686; **Aquarium Point,** PMBS, 02.April.1953. On fronds of *Macrocystis* sp., abundant, whitish (on card). Sample consist of large fragment of front of alga, covered by many about 8 mm high stems rising from stolonal filaments attached to alga. Not inspected in detail.

Otago Museum, Dunedin, N.Z.: **Iv. 750. A.52: 58**, no data on label, which also mentions *Tubiclava rubra*. Only recognisable species in sample is *O. geniculata*, 5–8 mm high, unbranched stems with gonothecae, arising from stolon creeping on algae?. *Tubuclava rubra* may have been present, but it has apparently disintegrated; **Iv. 751. A.98:145**, many 10–15 mm high colonies rising from a stolon creeping on algae. No gonothecae observed; **Iv. 753. A.99:38**, detached colonies up to 20 mm high, with slightly shorter branches and gonothecae. RMNH-Coel. 27248, slide 2665; **Iv. 755. A.33**, small, 3–5 mm high colonies with thick perisarc from stolon on algae; **Iv. 758. A.52: 52**, many colonies 8–10 mm high on algae. No gonothecae; **Iv. 760. A.24:122**, many colonies about 8–10 mm high from a stolon creeping on algae. Gonothecae present.

TYPE LOCALITY: Dover, Kent, U.K. (see Cornelius 1975a; Linnaeus's description is (probably) based only on Ellis's specimens and not on the dried specimens in Linnaeus's herbarium in London. Localtion of Ellis's specimens unknown but probably lost.

Syntypes of *Obelia geniculata* f. *intermedia* Ralph, 1956, in Ralph's collection in NMNZ as slide with the following labelling: "*Obelia geniculata intermedia* Ralph, 1956. Wharf Point, Port Chalmers, E.J. Batham, 30.11.1951, SYNTYPE, Co. 189 (PMR locality no. 266)". This is an unstained (or de-stained) glycerine-jelly slide, containing about 7 colonies with gonothecae.

Syntypes of *Obelia geniculata* f. *subantarctica* Ralph, 1956, in Ralph's collection in NMNZ as slide with the following labelling: "*Obelia geniculata subantarctica* Ralph, 1956. Ringdove Bay, Antipodes Island, SYNTYPE, Co. 190. R.K. Dell, Loc. 158, 7.11.1950". This slide contains about 10 stained colonies. Also a slide labelled: "*Obelia geniculata subantarctica* Ralph, 1956. Lachlan, Stn 69/50, off Kaikoura, 26.iii.1952; 43°25.2′ S, 172°56.7′ E, from beacon in water 8 weeks, NMNZ SYNTYPE, Co. 191". Stained Canada Balsam slide containing two colonies.

There are three more slides marked: SYNTYPE, Co. 192, from Loc. 458, off Cape Turakirae, 19.1.1956, fishing squad (unstained slide in unknown mounting medium); SYNTYPE, Co. 193 from A.N.A.R.E. (slide no. 1), Lusitania Bay, Macquarie Is, 29.8.1948 (single unstained colony in unknown mounting medium), and SYNTYPE Co. 194 from A.N.A.R.E. (slide no. 2), Kerguelen, Feb. 1950, two branched colonies in a partly dried out glycerine-jelly slide.

Syntypes of *Obelia geniculata* f. *subtropica* Ralph, 1956 in Ralph's collection in NMNZ as slides with the following labelling: "*Obelia geniculata subtropica* Ralph, 1956. Tidal rock pool, Paihia, Bay of Islands, SYNTYPE Co. 187. 29.11.1950, PMR 22, NMNZ Co. 187, *Obelia geniculata subtropica*". This is an unstained Canada Balsam slide. There is a second slide Co. 188 with almost identical labelling from PMR locality 23, also an un-stained (or de-stained) Canada Balsam slide. Both slides contain several colonies.

DESCRIPTION: Sympodial, erect, unbranched colonies, composed of internodes variable in length, separated by distinct nodes. Basal internode inserted directly on well developed, tubular, occasionally anastomosing stolon attaching colony firmly to substrate. Internodes straight or slightly curved, basally with a few rings or unringed, terminally with a hydrotheca on a short, ringed pedicel and an apophysis bearing the next internode; resulting stem moderately to strongly geniculate. Internode wall under insertion of hydrothecal pedicel with knee-shaped perisarcal thickening; walls of hydrotheca occasionally asymmetrically developed, the abcauline side being thicker.

Hydrotheca conical, robust, basally occasionally slightly rounded, with well formed proximal chamber separated from upper part by a ring-shaped thickening of perisarc and a distinct diaphragm. Rim of hydrotheca smooth, circular, non-everted.

Perisarc greatly varied in development, but typically well developed on internodes, pedicels and hydrotheca.

Gonothecae urn-shaped, narrowing basally into a ringed pedicel attaching gonotheca in axil between insertion of hydrothecal pedicel and apophysis; apical part rounded or flattened with a central, low collar surrounding a wide circular aperture. The gonophore produces numerous medusae of *Obelia* type.

MEASUREMENTS of *Obelia geniculata* (in μm):

Ralph's	Loc. 240 slide 3754	Loc. 591 slide 3979
Diameter of stolon	170 – 185	67 – 100
Stem internode, length	530 – 700	310 – 505
Diameter at node	275 – 295	155 – 195
Internode of side branch, length	390 – 400	
Diameter at node	190 – 195	
Hydrotheca, length including basal chamber	320 – 350	225 – 255
Diameter at rim	240 – 265	190 – 200
Gonotheca, total length, including terminal collar	1100 – 1165	705 – 790
Maximum diameter	440 – 450	310 – 325
Diameter of collar	160 – 170	125 – 130

REMARKS: The development of the perisarc may greatly influence the ultimate shape of colony. Branching may occur by development of secondary stems from the site of the hydrothecal pedicel; an axillary hydrotheca may develop between stem and secondary branch. Colony development may be quite irregular from regeneration after sustained damage. Colonies with strongly developed perisarc are typically short and stubby with a more or less distinct geniculation of the stem internodes. Others only have a minimal thickening of the layer of perisarc and may greatly resemble *Obelia dichotoma* (Linnaeus, 1758).

Colony shape and perisarc development in this species has been carefully studied by Ralph and related by her to latitudinal and temperature effects on the ultimate shape of the colony (see Ralph (1956)). She split the New Zealand material in three formae: forma *subtropica* Ralph, 1956; forma *intermedia* Ralph 1956, and forma *subantarctica* Ralph, 1956. 'Type' specimens of these formae were deposited in the collection of NMNZ and are briefly referred to above.

We have not followed Ralph in this respect for various reasons. The Code for Zoological Nomenclature does not recognise such formae and to give those proper nomenclatorial standing they would have to be raised to the level of subspecies. However, they are not geographically isolated but distinctly intergrade morphologically in transitional areas. *Obelia geniculata*, moreover, is a near-cosmopolitan species; in the recognition of subspecies the whole area of its distribution would have to be considered and subspecies should be based on distinctly isolated communities. This, at the present moment, is impossible: the formae recognised by Ralph in New Zealand material can equally well be distinguished in Atlantic material. Moreover, the complicated synonymy of this variable species would make the proper name for a subspecies a hazardous matter.

Records from New Zealand: Early records of *O. geniculata* are from Wellington Harbour; Cook Strait, south and east coast of South Island (Hilgendorf 1898); Rangitoto Island, Auckland (Hartlaub 1901); Island Bay, Wellington and New Brighton near Christchurch (Trebilcock 1928); Campbell Island (Jäderholm 1926) and Auckland Islands (Hickson & Gravely 1907). Avail-able records indicate that the species occurs all around the New Zealand coasts, including the Chatham Islands and Macquarie Island, on suitable habitats (typically large algae) in the littoral zone. Gonothecae occur all the year round. Data from experimental blocks and beacon poles suggest that development of the (settled) planula to a reproductive colony takes about eight weeks.

Distribution: Near-cosmopolitan but restricted largely to the littoral zone and there primarily on fronds of big algae but also on other solid substrata. On floating objects the species is carried around by sea currents and deposited on beaches, often in huge quantities.

Obelia longissima (Pallas, 1766) (Fig. 105A–C)

(Mainly Pacific records)

Sertularia longissima Pallas 1766: 119–121.

Obelia longissima: Linko 1911: 231-238, fig. 44; Kudelin 1914: 469; Stechow 1923b: 7; Johnson & Snook 1935: 61, fig. 44; Fraser 1937: 88-89, pl. 18, fig. 92; 1948: 215; Ricketts & Calvin 1950: 415; Ralph 1956: 283; 1957: 831–832, figs 4j, k, 5a-h; Yamada 1959: 42; Miller & Batt 1973: 41, 125, fig. 25; Morton & Miller 1973: 152, fig. 54, no. 5; Gordon & Ballantine 1977: 100; Rho & Park 1980: 21–22, pl. 3, figs 4–6; Kozloff 1983: 49; Austin 1985: 53; Cornelius 1990: 557–564, figs 5–6 (*cum syn.*); Cornelius & Ryland 1990: 134, fig. 4.11; Park 1990: 79; 1992: 288; Bouillon *et al.*1995: 85; Cornelius 1995b: 304–308, fig. 71; Park 1995: 12.

Material Examined:

NMNZ Ralph Collection: Loc. 252A, NMNZ Co. 1098, several monosiphonic stems up to 60 mm high, hydrocauli yellowish-brown. Few hydrothecae left but these with polyps. RMNH-Coel. slide 3773; **Loc. 291**, NMNZ Co. 1136, single colony about 12 mm high with gonothecae. RMNH-Coel. slide 3817. Also about 40 mm long colony with many gonothecae. RMNH-Coel. slide 3818; **Loc. 461**, NMNZ Co. 1223, about 10 young colonies 10–35 mm high, no gonothecae. RMNH-Coel. slide 3900. Partly dried out slide as: *Obelia longissima* (Pallas), no further data. Additional slide with data: V.U.W., Zoology Dept.

Otago Museum, Dunedin, N.Z.: I**v. 767. A.52: 59**, sample consists of monosiphonic, 25 mm long axis with pairs of branches, pairs found alternately on opposite sides of stem. Stem, pedicels, and hydrothecae heavily overgrown by algae; hydrothecae, as far as can be seen, with straight diaphragm. In addition there is a fragment with a few gonothecae.

Type Locality: Belgian coast (but most probably from the Dutch coast near The Hague; Pallas 1766). Type lost (cf. Cornelius 1990a: 550).

Description: Sympodial colonies with long, monosiphonic main stem and much shorter side branches, gradually shortening along stem. Main stem composed of a succession of almost straight, long, slender internodes with little geniculation. Each internode with a few basal rings, a thickened terminal part supporting the branches and an apophysis bearing the succeeding internode. Mode of branching variable; in the colony from Loc. 291 branching trichotomous with 2 main branches diverging and a less developed, third frontal branch. A terminal hydrotheca on a ringed pedicel with smooth intermediate section. Branching of side-branches much the same as main stem, through typically with dichotomous secondary branchlets.

In the colonies from Loc. 252A and 461, there are fewer branches: there is, in addition to the terminal hydrotheca and its pedicel, usually only 1 side branch to each internode.

Hydrotheca conical, with fairly broad base and almost straight walls, widening gradually towards the rim; aperture circular, rim hyaline, almost transparent, in present colonies almost smooth, although with indication of low, rounded cusps that give rim an undulated appearance. Basal chamber fairly narrow; diaphragm straight or slightly oblique. Hydranth with at least 24 tentacles.

Gonothecae replacing a terminal hydrotheca on internode, elongated conical with slightly convex walls; top flattened, with central collar with circular aperture. Gonophore developing into many small medusae completely filling gonotheca.

Perisarc moderately developed, almost black on internodes of stem; hyaline to yellowish-horny on internodes of principal branches.

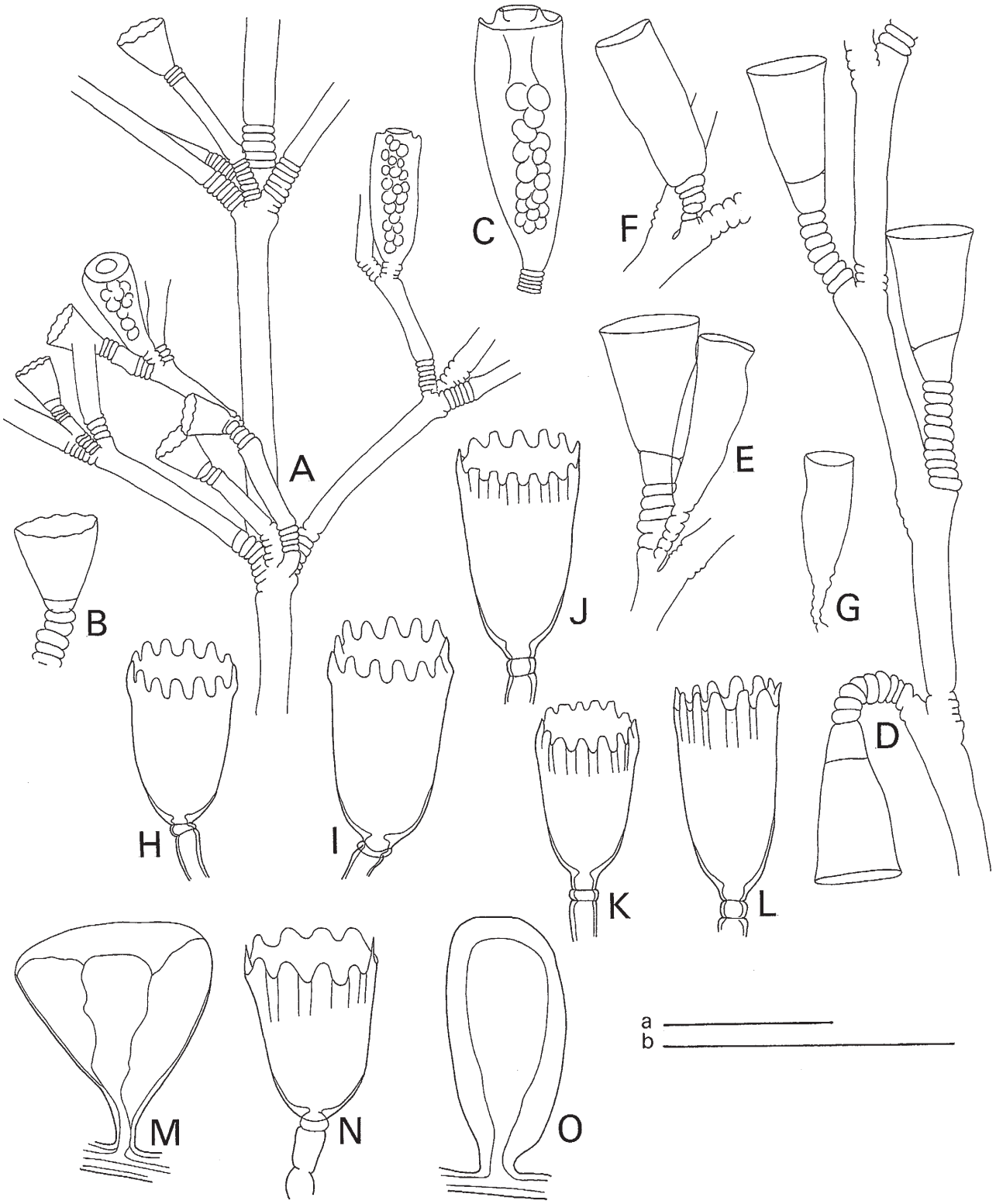

Fig. 105. A–C. ***Obelia longissima*** (Pallas, 1766). **A**, part of colony, frontal view. **B**, hydrotheca, oblique lateral view. **C**, gonotheca, lateral view (Loc. 291, slide 3818). **D–G.** ***Obelia*** sp. 1. **D**, part of stem, frontal view. **E**, gonotheca and its insertion on hydrothecal apophysis, lateral view. **F, G**, empty gonothecae (BS 457, slide 3003). **H–O.** ***Orthopyxis affabilis*** sp. nov. **H–L**, hydrothecae in lateral and slightly oblique lateral view. **M**, male gonotheca, frontal view (NZOI I75, holotype, slide 2095). **N**, hydrotheca, slightly oblique lateral view. **O**, female gonotheca, lateral view (NZOI Stn B482, slide 2777). Scales: a, 1 mm (A); B, 2 mm (B–O). W.V.

MEASUREMENTS of *Obelia longissima* (in μm):

Ralph's	Loc. 252A slide 3773	Loc. 291 slide 3818	Loc. 461 slide 3900
Stem internode, length	2540 – 3600	1885 – 2625	1310 – 2380
Maximum diameter	170 – 180	155 – 170	155 – 170
Internode, length	1310 – 1475	820 – 1640	490 – 900
Maximum diameter	145 – 170	130 – 140	135 – 145
Hydrotheca, length	310 – 350	280 – 340	310 – 325
Diameter at rim	225 – 280	235 – 255	225 – 250
Gonotheca, length		645 – 755	785 – 950
Maximum diameter		195 – 235	250 – 325
Diameter collar		110 – 125	130 – 135

REMARKS: Mainly different from *Obelia dichotoma* (Linnaeus, 1758) by colony structure, best visible in adult colonies; young colonies of both species inseparable. Although differences in structure of the hydrothecal cusps are found in descriptions (crenulate in *O. dichotoma* combined with polygonal cross section just under hydrothecal border; shallow castellate with blunt cusps in *O. longissima* and non-polygonal hydrotheca) these details are often invisible due to abrasion of the hydrothecal rim.

RECORDS FROM NEW ZEALAND: Rare in New Zealand waters. The material we have seen is all from Ralph's collections and from the localities given in her 1957 paper: off Kaikoura, 43°25.2′ S, 172°56.7′ E; Taylor's Mistake, Christchurch, and Little Papanui near Dunedin; depth data unknown but probably all from the littoral zone. The fertile colonies from Kaikoura were taken from a pole placed in the sea for a period of eight weeks, indicating that the development from settling planula to reproductive colony takes no more than that time. All localities are on the east coast of South Island.

DISTRIBUTION: Near cosmopolitan; widely distributed in Atlantic and Pacific Oceans and penetrating far to north and south (Cornelius 1995b).

Obelia nigrocaulis Hilgendorf, 1898

Obelia nigrocaulis Hilgendorf 1898: 203-204, pl. 17, figs 1, 1 a; Bale 1924: 230.
?*Obelia nigrocaulis*: Ralph 1957: 832.

TYPE LOCALITY: Dunedin Harbour, on stones, very plentiful at low-water mark (Hilgendorf, 1898; location of type unknown).

Remarks: Shortly and insufficiently characterised by Hilgendorf (1898); probably identical with either *Obelia dichotoma* (Linnaeus, 1758) or *O. longissima* (Pallas, 1766). No type material is available. Listed by Cornelius (1975a; 1982) amongst the synonyms of Obelia *dichotoma*, as is also *O. longissima* in those publications.

Obelia pygmaea Coughtrey, 1876b

?*Obelia pygmaea* Coughtrey 1876b: 25, pl. 3, fig. 3; Ralph 1957: 832.

TYPE LOCALITY: Dunedin (Coughtrey, 1876b; no type material was found).

REMARKS: Insufficiently described *Obelia* species; most likely based on young, sterile specimens of either *Obelia dichotoma* (Linnaeus, 1758) or *O. longissima* (Pallas, 1766).

RECORDS FROM NEW ZEALAND: Only recorded from the type locality (Dunedin; Coughtrey, 1876b).

Obelia sp. 1. (Fig. 105D–G)

MATERIAL EXAMINED:

NMNZ: BS 457, small colony, 30 mm high with empty gonothecae. NMNZ Co. 532, RMNH-Coel. slide 3003.

DESCRIPTION: Sympodial colony composed of stem about 20 mm high with 4 side branches, stem basally weakly polysiphonic and with a small bundle of stolonal filaments. Internodes of stem and branches slender, basally with about 5 indistinct rings, slightly geniculate.

Hydrothecae on completely annulated pedicels of about 10 distinct rings; hydrothecae elongated and slender, widening gradually from base onwards, slightly asymmetrical from a slight bulge in lower half of adcauline wall. Hydrothecal rim thin, smooth, slightly everted. Basal chamber big, diaphragm thin, suspended in a ring of thickened perisarc, oblique in most hydrothecae but straight in others, depending upon the angle of vision. Hydranths large, present in majority of hydrothecae, 12–14 long tentacles with transverse rings of nematocysts; proboscis conical.

MEASUREMENTS of *Obelia* sp. 1 (in μm):

	NMNZ BS 457 slide 3003
Stem, diameter at base	280
Internodes of stem, length	740 – 985
Diameter	95 – 125
Internodes of branches, length	740 – 1310
Diameter	100 – 115
Hydrotheca, total length (including basal chamber)	515 – 535
Depth basal chamber	110 – 130
Diameter at rim	270 – 310
Gonotheca, total length (excluding pedicel)	655 – 740
Maximum diameter	135 – 195

Empty gonothecae distributed over colony, elongated conical, narrowing basally into a short pedicel on internodal apophysis; pedicel with 5 or 6 rings that diminish in width towards place of attachment. Walls of gonothecae indistinctly undulated. Aperture circular, with ragged rim, no operculum visible.

REMARKS: The present colony differs from New Zealand representatives of the variable species *Obelia dichotoma* (Linnaeus, 1758) by the very slender and large hydrothecae with a spacious basal chamber and oblique diaphragm. All gonothecae are empty and show signs of wear, but it seems almost beyond doubt that they liberated medusae. The gonothecae are similar to those of *Obelia nodosa* Bale, 1924 (cf. Bale 1924; Ralph 1957), but in that species the hydrothecae are conical. One of the gonotheca is strongly contracted some distance under rim. So many species of *Obelia* have been described based on variable characters that this genus has been overburdened with suspect synonymies. In spite of the highly characteristic hydrothecae, we therefore refrain from describing this material as a new species of *Obelia*, pending the discovery of additional material.

RECORDS FROM NEW ZEALAND: Bay of Islands, 35°12.6′ S, 174°16.4′ E, 32–40 m, a single colony.

Obelia spp.

Obelia spp. Kramp, 1961: 162–164; Bouillon & Barnett 1999: 101, fig. 106.

DESCRIPTION (of the medusa phase): Umbrella flat, circular, diameter up to 6 mm, mesoglea thin. Velum rudimentary. Manubrium short, with squarish base; mouth with 4 short, simple lips, no peduncle. 4 radial canals, gonads ovoid to roundish, sac-like, from middle to end of radial canals. Tentacles numerous, short, solid and stiff, with stem core of single row of ectodermal cells; each tentacle with small basal bulb and short prolongation of endoderm into mesoglea of margin of umbrella. 8 adradial statocysts, each situated on underside of basal bulb of marginal tentacle; 1 concretion each (after Kramp 1961, and Bouillon & Barnett 1999).

REMARKS: *Obelia* medusae may be expected to occur in coastal plankton all around New Zealand; they are likely to be carried farther offshore by currents. A number of localities are specified by Bouillon and Barnett (1999), these are not detailed here.

Orthopyxis L. Agassiz, 1862

TYPE SPECIES: *Clytia (Orthopyxis) poterium* L. Agassiz, 1862; this species may be conspecific with *Orthopyxis integra* (Macgillivray, 1842). (cf. Cornelius 1982: 57–58).

Orthopyxis affabilis sp. nov. (Fig. 105H–O)

MATERIAL EXAMINED:

NZOI Stns: B482, colony densely covering *Symplectoscyphus subarticulatus* (Coughtrey, 1873); stolonal network with several hydrothecae (only a few perfect) and abundant female (?) gonothecae. 3 slides, of which 1 holotype H-788 and 1 paratype P-1244 in NIWA collection; 1 paratype RMNH-Coel. slide 2777; **I75**, plentiful on *Synthecium subventricosum* Bale, 1914, mixed with *Hebellopsis scandens* (Bale, 1888); 1 male (?) gonotheca. RMNH-Coel. slide 2095.

TYPE LOCALITY: South Tasman Sea, off Puysegur Point, 46°08.80′ S, 166°06.00′ E, 91 m.

DESCRIPTION (based on all material): Pedicels of hydrothecae and gonothecae rising from tubular, anastomosing stolonal network covering stem and hydrocladia of *Symplectoscyphus subarticulatus* (Coughtrey, 1875) and *Synthecium subventricosum* Bale, 1914. Hydrothecal pedicels about as long as hydrothecae or slightly longer, basally with a few indistinct undulations of perisarc and constrictions along length of otherwise smooth pedicel; a distinct internode occurs directly under hydrothecal base, forming a slightly flattened spherule. Hydrothecae with rounded base and distinct basal chamber, widening very gradually towards rim, set with 10–14 castellate cusps separated by rounded embayments of moderate depth; base of embayment slightly curved outwards, cross-section of hydrotheca at that level undulated; weak lines descend downwards from sides of these embayments. Top of marginal cusps oblique or indistinctly rounded. Perisarc of hydrotheca thin, basal part of hydrotheca with distinct perisarc ring at top of basal chamber; no diaphragm. Tissue remnants in some hydrothecae from NZOI Stn I75.

MEASUREMENTS of *Orthopyxis* (in μm):

	O. affabilis NZOI Stn B482 slide 2777	*O. affabilis* NZOI Stn I75 slide 2095	*C. hicksii* CANCAP Exped. Stn 5.044, slide 2550
Diameter of stolonal tube	85 – 115	80 – 150	115 – 130
Hydrotheca, total length	505 – 570	460 – 560	900 – 1080
Diameter at rim	310 – 355	290 – 365	540 – 625
Estimated length of pedicel	815 – 900	820 – 1800	2540
Female (?) gonotheca, total length	800 – 900		1195
Maximum diameter	310 – 330		665
Length of pedicel	55 – 85		
Male (?) gonotheca, total length		615	
Width at top		560	
Estimated diameter		85	
Estimated length of pedicel		55	

Female (?) gonothecae plentiful in material from Stn B482, elongate ovoid to club-shaped and slightly longer than hydrotheca, with rounded or almost truncate top, apex with circular aperture with ragged rim; attached to stolon by short, broad smooth pedicel. Majority of gonothecae filled with mass of unidentifiable tissue; spent gonothecae usually collapsed.

One presumably male gonotheca; roughly triangular, strongly bilaterally flattened, with rounded top opening along an elongated fissure. Perisarc generally thin and hyaline, thickened basally towards pedicel; pedicel short, unsegmented, attaching gonotheca to stolon. Gonotheca with undifferentiated strand of tissue, apparently a blastostyle after release of gonophore.

REMARKS: There are only a few perfect hydrothecae in the present material, the majority being damaged or crumpled. Female (?) gonothecae are plentiful but only a single presumed male gonotheca found in a slide of the material from NZOI Stn I75.

The hydrothecae bear a general resemblance to those of *Campanularia hincksii* Alder, 1856 (fig. 106A–C) of which no specimens have been found in the present collections. The hydrothecae in *Orthopyxis affabilis* are smaller and more cylindrical compared to those of *C. hincksii,* but the greatest difference is in the gonothecae, which in *C. hincksii* are elongate ovoid with undulated walls and with a wide circular aperture at the truncate top; male and female gonothecae externally differing only in size; the gonothecal pedicel is a single internode and the gonophore is styloid and sessile. The (presumed) female gonotheca of *Orthopyxis affabilis* is ovoid, slightly bilaterally flattened and has a short, ringed pedicel; the only male gonotheca is roughly triangular in outline, opens apically along a wide rupture and is strongly flattened after release of the sexual products. In these characters they greatly resemble the female and male gonothecae of *Orthopyxis mollis* (Stechow, 1919). Although there is as yet no absolute proof, the structure of the male and female gonophores in *O. affabilis* sp. nov. and *O. mollis* (Stechow, 1919) suggests the liberation of a much reduced medusoid gonophore, as also happens in *O. crenata* Hartlaub, 1901, and *O. integra* (Macgillivray, 1842). The number of marginal cusps of the hydrotheca varies between 10 and 14, the greatest number being found on the material from the subtropical locality on the Norfolk Ridge, NZOI Stn I75, that also has smaller hydrothecae than the holotype. In some of the hydrothecae from NZOI Stn I75, Norfolk Ridge, there is a much contracted, fairly well preserved hydranth with at least 20 long, thin tentacles.

We have also compared the new species with available descriptions of *Campanularia laevis* Hartlaub, 1905, a species mainly reported from South American and Subantarctic waters. The hydrothecae in *C. laevis* are much bigger (length 1.7–4.5 mm, diameter 0.97–2.5 mm) and are placed on a long pedicel (5.8–6.2 mm) (measurements taken from El Beshbeeshy 1991).

RECORDS FROM NEW ZEALAND: South Tasman Sea, off Stewart Island, 46°08.80′ S, 166°06.00′ E (type locality), 91 m and Norfolk Ridge, north of New Zealand, 28°45.00′ S, 167°55.20′ E, 70 m.

DISTRIBUTION: So far only known from southern New Zealand waters and from the southern part of the Norfolk Ridge.

ETYMOLOGY: The species name '*affabilis*' is from the Latin adjective *affabilis*, *affabile*, meaning friendly and refers to the hydrothecal shape greatly resembling that of the widely distributed *Campanularia hicksii* Alder, 1856.

Orthopyxis crenata (Hartlaub, 1901b)

(Fig. 106D–R)

Eucopella crenata Hartlaub 1901b: 364–366, pl. 22 figs 27–31, 33–35; Hutton, 1904: 319; Billard 1905b: 332; Stechow 1924d: 69; Kramp, 1961: 161; 1968: 75; Hirohito 1969: 7, fig. 7; Rho & Park, 1980: 18–19, pl. 2, figs 1–3; Park, 1992: 288; 1995: 11.

Orthopyxis crenata: Bale 1924: 232, fig. 3; Stechow 1925: 210; Trebilcock 1928: 3; Bale 1934: 273; Kulka 1950: 80, fig. 3a, b; Picard 1952b: 220; Vannucci 1954: 111; Batham 1956: 456; Ralph 1957: 839–839, fig. 6g-v; Picard 1958b: 191; Pennycuik 1959: 172; Ralph 1961c: 189; Rees & Thursfield 1965: 104; Miller & Batt 1973: 42; Morton & Miller 1973: 152, fig. 54 no. 2; Leloup 1974: 17, fig. 15; Marinopoulos 1979: 120; Cornelius 1982: 58–60, fig. 5; Isasi Urdangarin 1985: 56–57, fig. 10; Gili 1986: 177–178, fig. 4.18A; Isasi & Saiz 1986: 69; Gili *et al*. 1989: 23; Altuna & García Carrascosa 1990: 54 *et seq*., fig; Llobet *et al*. 1991: 283–291, fig. 1; Cornelius 1992a: 257; 1992b: 98; Boero & Bouillon 1993: 265; Altuna Prados 1995: 54, fig. 4E, F; Bouillon 1995: 236; Bouillon *et al*. 1995: 85; Medel & López-González, 1996: 207; Migotto, 1996: 123; Watson 1996: 78; Ramil & Ansin Agis 1998: 201.

Clytia crenata: Picard 1955: 186.

Orthopyxis crenata crenata: Dawson 1992: 13.

Orthopyxis crenata f. *crenata*: Ralph 1957: 838, fig. 65g-v.

Campanularia crenata: Picard 1951f: 261; Millard & Bouillon 1973: 47, fig. 6B–F; 1974: 5; Millard 1975: 204, fig. 68A–F; 1978: 189; Boero 1981: 182; García Corrales *et al*. 1978: 19, fig. 7; Hirohito 1995 (English text): 53–54, fig. 15e-k.

Campanularia ?crenata: Millard 1958: 170, fig. 2a-c, e.

Orthopyxis crenata f. *subtropica* Ralph, 1957: 839; Pennycuik 1959: 172; Ralph 1966: 158.

Orthopyxis crenata subtropica: Hicks *et al*. 1991: 7; Dawson 1992: 13.

Orthopyxis formosa Trebilcock 1928: 2, pl. 1, fig. 2.

Orthopyxis delicata Trebilcock 1928: 3, pl. 2, figs 1–1f; Ralph 1957: 840, fig. 7a-d; Pennycuik 1959: 172; Ralph 1961c: 109; 1961d: 236; Morton & Miller 1973: 152; Dawson 1992: 13; Stranks 1993: 4.

Campanularia delicata: Millard & Bouillon 1973; 48, fig. 6G–M; 1974: 5, 26; García Corrales *et al*. 1978: 22, fig. 8.

Campanularia ?delicata: Millard 1975: 206, fig. 68G–L.

MATERIAL EXAMINED:

NZOI Stn B223, colony on algae, with gonothecae. RMNH-Coel. slide 2742.

NMNZ Ralph Collection: Loc. 40, NMNZ Co. 909, separate hydrothecae from stolon on *Sertularella integra* Allman, 1876. With *Halecium delicatulum* Coughtrey, 1876 and *Hebellopsis scandens* (Bale, 1888). RMNH-Coel. slide 3604; **Loc. 41**, unstained, partly dried out slide as *Orthopyxis delicata*, no further data; **Loc. 148**, NMNZ Co. 999, in tube 2 fragments of algae, 1 with 5 pedicels with damaged hydrothecae. No gonothecae. May be this species. No slide; **Loc. 163**, NMNZ Co. 1021, a fair number of pedicels with hydrothecae on algae; no gonothecae observed. RMNH-Coel. slide 3691. Partly dried out slide as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.) and data: Wgt. Harbour. Unstained, poor slide as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.), with data: Wellington Harbour; **Loc. 165**, NMNZ Co. 1023, fragments of algae densely covered with reptant colonies with some gonothecae. RMNH-Coel. slide 3692; **Loc. 170**, partly dried out glycerine jelly slide as *Orthopyxis delicatula* Trebilcock, and data: Palliser Bay; **Loc. 175**, NMNZ Co. 1031, plentiful on fronds of algae, with some gonothecae. RMNH-Coel. slide 3697. (According to label *Silicularia bilabiata* and *Clytia johnstoni* must also have been present). Partly dried out slide and 2 stained Canada Balsam slides as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.) with data: Dunedin Harbour. Also unstained glycerine-jelly slide with same legends and 2 more slides as *Orthopyxis crenata* f. *crenata*; also 2 more stained slides in good condition; **Loc. 183**, poor slide as *Eucopella crenata* and data: Portobello; **Loc. 281**, isolated hydrothecae arising from stolon attached to algae; no gonothecae. With *Amphisbetia minima* (Thompson, 1879). RMNH-Coel. slide 3809. Partly dried out slide ias *Orthopyxis crenata* f. *typica* (*Eucopella* sp.) and data: Nelson. Additional unstained glycerine-jelly slide with same legends; **Loc. 311**, NMNZ Co. 1151, material consists of deteriorated fragments of algae with stolons and pedicels attached; no recognisable hydrothecae left. Identification accepted on authority of Ralph. Probably dead when collected. No slide; **Loc. 340**, NMNZ Co. 1165, numerous pedicels with hydrothecae arising from stolonal tubes reptant on fragments of brown algae; no gonothecae observed. RMNH-Coel. slide 3841; **Loc. 350**, poor slide as *Orthopyxis crenata*; no data; **Loc. 400**, NMNZ Co. 1190, a fair number of hydrothecae on about 5 mm long pedicels arising from stolonal tubes on algae. No gonothecae observed. RMNH-Coel. slide 3867; **Loc. 412**, partly dried out slide as: *Orthopyxis crenata* f. *typica* (*Eucopella* sp.), and data: Lyttleton Harbour. Additional unstained glycerine-jelly slide with same legends; **Loc. 434**, NMNZ Co. 1217, sample consists of fragment of algae with a species of *Orthopyxis* but in poor condition, sample has been dried out. RMNH-Coel. slide 3894; **Loc. 480**, NMNZ Co. 1229, sample consists of fragments of green algae with *Orthopyxis crenata* (Hartlaub, 1901) (RMNH-Coel. slide 3906, with gonothecae), *Obelia* sp. and *Sertularella robusta* (Coughtrey, 1876); **Loc. 499**, 2 unstained slides as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.), no further data.

PMBS: Aquarium Point, PMBS, on *Macrocystis* frond. Identified by P.M. Ralph, 1955. (Taken from card register).

MATERIAL INSPECTED: **Aquarium Point**, PMBS, at low tide, on *Macrocystis* frond, 2.April.1953, colour whitish (margin of cup varies from smooth to wavy or toothed).

TYPE LOCALITY: *Eucopella crenata*: French Pass, Cook Strait (Hartlaub 1901; location of type unknown). Of *Orthopyxis crenata* forma *subtropica* the syntype is in NMNZ labelled: "*Orthopyxis crenata subtropica* Ralph, 1957, SYNTYPE Co. 199. Thames. *Eucopella crenata subtropica*. 340. Gonangia". [Loc. 340: Coromandel Peninsula, 10 miles north of Thames, 17.Feb.1953]. This is an unstained (glycerine-jelly?) slide, containing two colony fragments, each with a gonotheca. Very little detail in this slide. There are two more slides with the labelling: "*Orthopyxis crenata subtropica* Ralph, 1957, SYNTYPE, Co. 200, 7 miles N of Gisborne, 15.2.1953, rock pool, P.M. Ralph's Loc. 371" (repeated on backslide of slide with also indication: *Eucopella crenata*). This second series of two slides are partly dried out glycerine-jelly slides; no gonothecae in these slides. There is a fourth carmin (?) stained Canada Balsam slide with the following labelling: "*Orthopyxis crenata subtropica* Ralph, 1957, SYNTYPE, Co. 201, PMR 434, *O. crenata* f. *subtropica*, syntype, gonangia, Blueskin Bay, Otago, 1.10.1952, D.E. Hurley, 18 m, 434 P.M. Ralph's Loc." This slide only contains stained gonothecae.

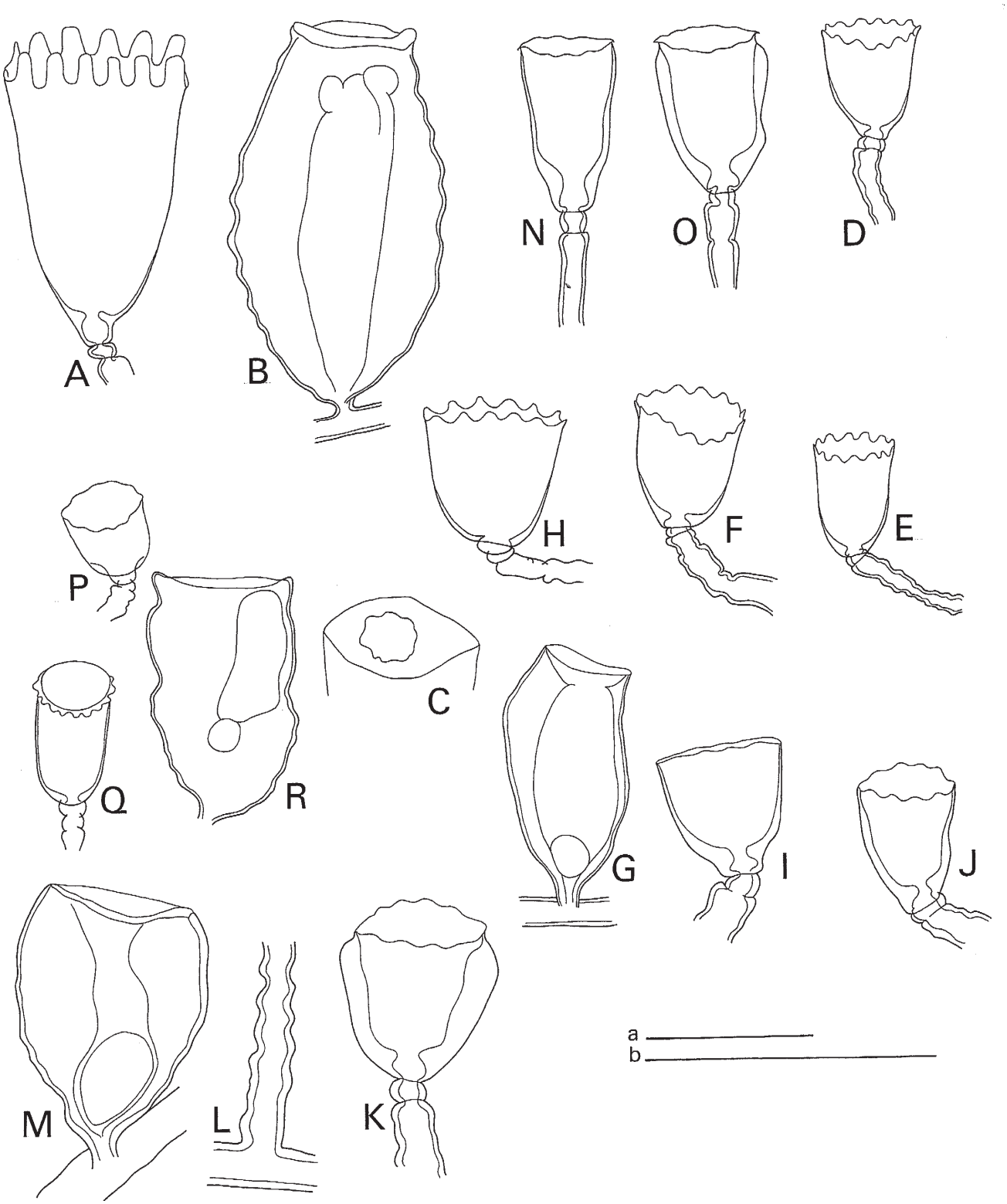

Fig. 106. A–C. ***Campanularia hincksii*** Alder, 1856. **A**, hydrotheca, slightly oblique lateral view. **B**, male(?) gonotheca. **C**, distal part of gonotheca, oblique view from above (CANCAP Stn 5.044, Azores, 36°46′ N 25°08′ W, 60–150 m, slide 2550). **D–R.** ***Orthopyxis crenata*** (Hartlaub, 1901). **D–F**, hydrothecae. **G**, gonotheca (NZOI Stn B223, slide 2742). **H**, hydrotheca of Ralph's '*Orthopyxis delicata*' (Loc. 41, slide 3604). **I**, hydrotheca (Loc. 163, slide 3691). **J, K**, hydrothecae. **L**, proximal part of pedicel. **M**, gonotheca (Loc. 165, slide 3692). **N, O**, hydrothecae (Loc. 400, slide 3867). **P, Q**, hydrothecae. **R**, gonothecae (Loc. 480, slide 3906). All hydrothecae in lateral or slightly oblique lateral view; gonothecae sex indeterminate, in lateral view. Scales: a, 1 mm (K–M, R); b, 2 mm (A–J, N–Q). W.V.

MEASUREMENTS of *Orthopyxis crenata* (in μm):

	NZOI Stn B223 slide 2742	Ralph's Loc. 163 slide 3691	Ralph's Loc. 165 slide 3692	Ralph's Loc. 400 slide 3867	Ralph's Loc. 41 slide 3604
Diameter of stolonal tube, including flange (if present)	28 – 110		310 – 315	195 – 335	
Pedicel, length, including globular internode	740 – 2130	1230 –1250	740 – 2625	985 – 2540	985
Diameter	45 – 95	110 – 120	155 – 170	140 – 160	67 – 84
Hydrotheca, total length	350 – 390	365 – 450	505 – 590	410 – 575	420 – 450
Diameter at rim	225 – 350	390 – 470	420 – 520	310 – 490	420 – 430
Female gonotheca, total length	870		1470	1390 – 1690	
Maximum diameter	325		1150	900 – 1060	
Diameter at rim	265		980 – 995	820 – 1035	
Length of pedicel	85		80	85	

There are four more slides marked as syntypes of which the labelling has not been copied: SYNTYPE Co. 201 from locality 434; SYNTYPE Co. 202 from Loc. 464 (two slides); SYNTYPE 203 from Loc. 465. These are all partly dried out, unstained, glycerine-jelly slides.*Orthopyxis formosa*: Entrance to Auckland Harbour, on floating seaweed (Trebilcock 1928; syntype, microslide, in MOV, MV F57887, Stranks 1993). *Orthopyxis delicata*: St Clair, Dunedin, growing over the surface of delicate algae and Polyzoa (Trebilcock 1928); syntype, microslide, in MOV, MV F57888. (Stranks 1993).

DESCRIPTION: Stolon tubiform, round or oval in section, occasionally with narrow flange for better attachment to substrate, with thick perisarc, sometimes reticulate. Pedicels arise directly from stolon, upright, variable in length, up to about 8 mm long, with irregularly wrink-led or indistinctly ringed, moderately thick perisarc, interrupted by smooth stretches. Globular internode (spherule) directly under hydrothecal base.

Hydrotheca much varied in shape, cup or bell shaped, occasionally more elongated and with rounded base, sometimes slightly bilaterally compressed; aperture circular, rim almost imperceptibly undulated to dentate 13 or 14 rounded cusps, separated by rounded incisions; embayments between cusps curved outwards to a varied degree, extreme forms sometimes found in same colony. Perisarc of hydrotheca quite thin to very thick, this influencing the ultimate shape of hydrotheca; typically extreme rim of hydrotheca thin. Basal chamber with a ring of thickened perisarc.

Hydranth with about 14 tentacles; hydranth attached to wall of hydrotheca by means of circular sheath of tissue some distance above diaphragm.

Gonotheca highly varable in shape, influenced by development of both perisarc and blastostyle; usually ovoid, bilaterally compressed, narrowing basally into a short pedicel attaching to stolon. Walls irregularly wrinkled to almost smooth; top truncate, occasionally with 2 rounded lateral projections, aperture with oval operculum. Blastostyle with 2 gonophores of which one in advanced stage of development above a much smaller gonophore.

REMARKS: The gonophores in this species may develop into short-lived medusae, as is also the case in *Orthopyxis integra* (Macgillivray, 1842), described by Hirohito (1969). The medusa of *O. crenata* has a subspherical umbrella, 0.5 mm high and 0.6 mm diameter, a distinct velum, four broad radial canals and eight statocysts but no tentacles or stomach. *Agastra mira* Hartlaub, 1897, the reduced medusa of *Orthopyxis integra* (Macgillivray, 1842), also differs by being proportionately taller.

We follow largely the synonymy given by Cornelius (1982), which implies that we concur in sinking *Orthopyxis delicata* Trebilcock, 1928, into the synonymy of *Orthopyxis crenata* (Hartlaub, 1901). We found the kind of hydrotheca described and figured by Trebilcock (1928) and Ralph (1957) for *Orthopyxis delicata* on a stolon also supporting hydrothecae that answer the characteristics of *Orthopyxis crenata*. The fairly substantial material shows a variability in its hydrothecae even wider than appears from Ralph's descriptions. The gonotheca, only found by Trebilcock (1928) and figured by Ralph (1957, fig. 7d) after Trebilcock's original material, is slightly smaller than that typically observed in *Orthopyxis everta* and has a rounded top. These differences, nevertheless, may largely be the result of changes in shape of the gonotheca during ripening. *Orthopyxis formosa* Trebilcock, 1928 had already been placed in the synonymy of *O. crenata* by Ralph (1957).

However, we differ from Cornelius concerning the interpretation of Hartlaub's text in describing *Eucopella crenata* (cf. Hartlaub, 1901: 364–366). According to Cornelius, *Eucopella crenata* "was based partly on material from French Pass, Bare Island, New Zealand

and partly on the original description of *Campanularia bilabiata* Coughtrey, 1875". Hartlaub suggested that his new species might possibly be identical with *Eucopella campanularia* von Lendenfeld, 1883 [= *Silicularia rosea* (Meyen, 1834)], recorded from New Zealand by Hilgendorf, 1898, and thought by that author to be identical with *Campanularia bilabiata* Coughtrey, 1875, type locality Timaru, New Zealand. In our opinion it is quite clear from Hartlaub's account of *Eucopella crenata*, that the specimens he described and consequently represented as the holotype, originated from French Pass, Cook Strait, New Zealand, where they were taken between December 1896 and January 1897. Additional leptolid material also described by Hartlaub (1901) originated from Bare Island, a small island between Vancouver Island and the Canadian mainland; no specimens of *Eucopella crenata* were described from that material.

Having regard to the wide variability in our material we do not recognise Ralph's two formae of *Orthopyxis crenata,* viz., *Orthopyxis crenata* forma *crenata* (Hartlaub, 1901) and *O. crenata* forma *subtropica* Ralph, 1957, that are placed in the synonymy of the nominotypical species

Records from New Zealand: Recorded from Glendowie, Auckland; north of Thames on the Firth of Thames; north of Gisborne; off Hastings, Lion Island, New Plymouth; Opunake Beach; Titahi Beach; Makara Beach; Wellington Harbour; Cook Strait; Port Nelson, Tasman Bay; French Passage; Lyttelton Harbour, Christchurch; Timaru Harbour, Portobello Marine Biological Station and Blueskin Bay, Otago, and Foveaux Strait. Some of these records, in particular that from the Tasman coast of North Island, originated from drifted material but in general it can be stated that the species occurs on large algae in suitable habitats all around the New Zealand coasts south of about 37° S.

Distribution: Tropical, subtropical and temperate parts of the Atlantic, Pacific and Indian Oceans.

Orthopyxis integra (Macgillivray, 1842)

(Fig. 107A–H)

Campanularia integra Macgillivray 1842: 465; Hincks 1868: 163–164, pl. 31, fig. 1; Coughtrey 1875: 291.

Orthopyxis integra: Cornelius 1982: 60–67, fig. 6 (*cum syn.*); 1995b: 235–238, fig. 54; Medel & Vervoort 2000: 59–62, fig. 13b-c.

Campanularia caliculata Hincks 1853: 178–179, pl. 5, fig. B; 1868: 164–167, pl. 31, fig. 2; Coughtrey 1876a: 299; von Lendenfeld 1885b: 910.

Campanulina caliculata: von Lendenfeld 1885b: 910.

Campanulina caliculata var. macrogona Farquhar 1896: 459.

Agastra mira Hartlaub, 1897: 452, 504–506, pl. 22, figs 5, 8–10; Russell, 1953: 303–306, text-figs 186–188, pl. 19, fig. 1.

Campanularia integra f. *calyculata*: Linko, 1911: 170–172.

Orthopyxis caliculata: Bale 1914: 74, pl. 11, fig. 1, pl. 12, fig. 1; Stechow 1919: 68, fig. Wa; 1923b: 7; Bale 1924: 232; 1934: 273–275; Johnson & Snook 1935: 57, fig. 38; Hodgson 1950: 7, figs 14–16; Ralph 1957: 838, fig. 6a-f; Yamada 1958: 51, 54; Pennycuik 1959: 172; Yamada 1959: 38; 1965: 361; Kawaguti 1966: 93-103, figs 1-16; Ralph 1966: 158; Shepherd & Watson 1970: 140; Watson 1975: 158; Cornelius 1981: 210; Watson 1994: 67.

Eucopella caliculata; Fraser 1937: 77–78, pl. 15, fig. 76; 1938d: 132, 136; Ricketts & Calvin 1964: 415; Hirohito 1969: 6, fig. 6.

Material Examined:

NMNZ Ralph Collection: Loc. 270, NMNZ Co. 1117: Sample consists of some fragments of algae with stolons from which arise some damaged hydrothecae. No slide made; **Loc. 274**, NMNZ Co. 1121: Numerous hydrothecae arising from stolonal filaments on fragment of *Codium* sp., gonothecae doubtfully present. RMNH-Coel. slide 3800; **Loc. 393**, NMNZ Co. 1184, numerous pedicels with hydrothecae arsing from stolonal matting on algae. No gonothecae observed. RMNH-Coel. slide 3859. 2 slides, the first bears an indication which might be 'good'; second 'good'; **Loc. 462**, good glycerine slide as *Orthopyxis caliculata* and data: V.U.W., Zoology Dept. Additional slide with same legends.

Type Locality: *Campanularia integra*: Mouth of River Don, Aberdeen, Scotland, on *Tubularia indivisa* Linnaeus, 1758 (Macgillivray 1842); location of type unknown. *Campanularia caliculata*: type locality restricted by Ralph (1957) to Pegwell Bay, Ramsgate, England; this material not located; syntype in NHM (1853.4.7.16) from near Old Head of Kinsale, Co. Cork, Eire. *Agastra mira*: plankton off Helgoland, German Bight, North Sea (Hartlaub 1896, type probably no longer extant).

Description: Stolonal colonies consisting of hydrothecae on pedicels up to 8 mm long arising from ramified, considerably sclerotised, thick stolonal tubes firmly attached to algal thalli. Pedicels irregularly wrinkled or indistinctly ringed, interrupted by short, smooth parts, a globular internode (spherule) with thick walls directly below hydrotheca. Shape of hydrotheca greatly influenced by development of perisarc of walls, cup- to bell-shaped, occasionally almost conical; aperture circular, rim smooth, typically not thickened. Perisarc of hydrothecal walls varying between comparatively thin to greatly thickened, hydrothecal rim always free, occasionally slightly everted and invariably with distinct globular basal chamber formed by thickening of basal perisarc.

Only 1 (female) gonotheca observed in present material; this gonotheca an ovoid, slightly compressed structure with wrinkled walls; cut off squarely at top; operculum circular; pedicel short, placed slightly eccentrically. Gonophore not well preserved, but containing a large developing medusa bud with a smaller one below. For a description of the medusae see Remarks.

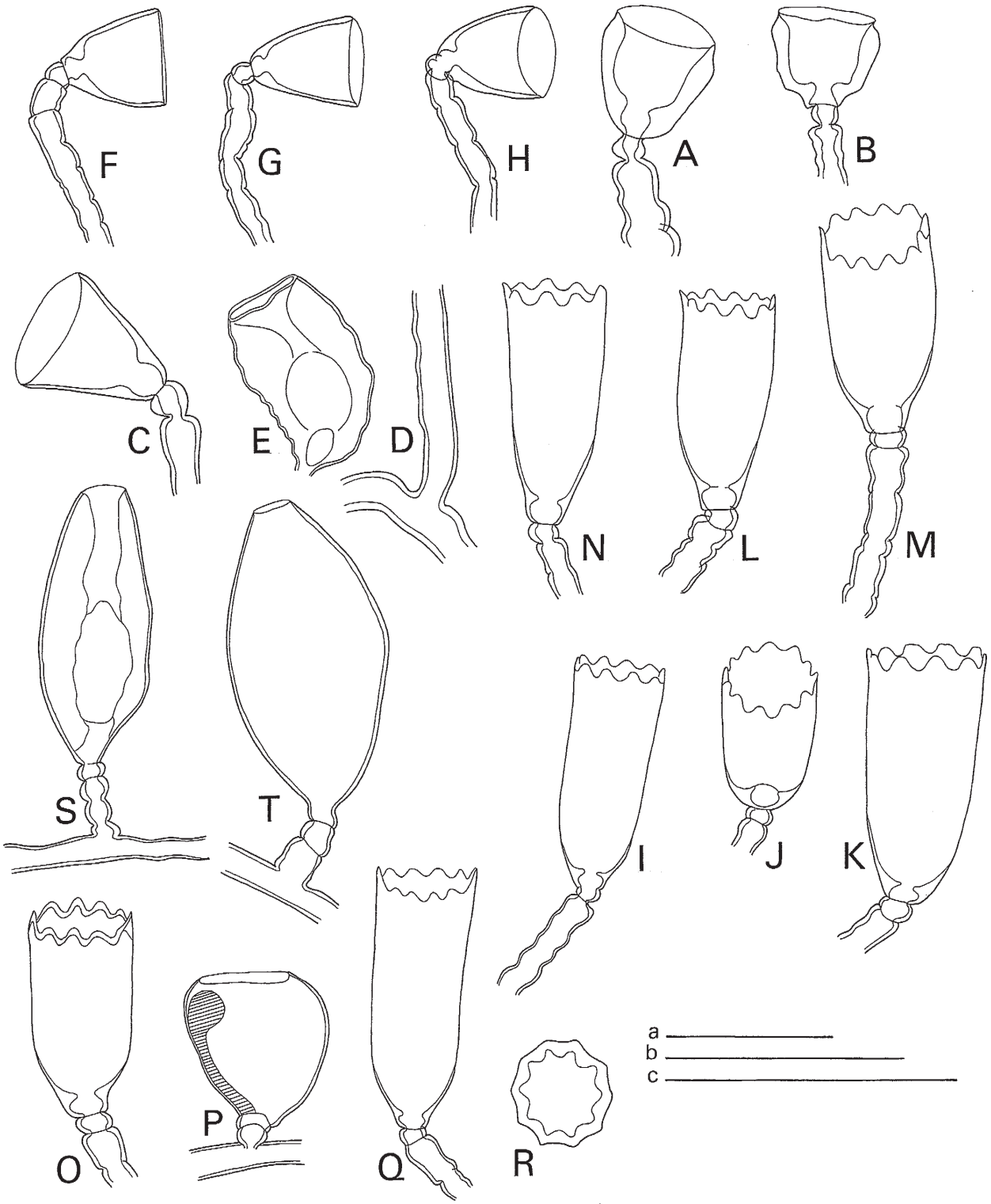

Fig. 107. A-H. ***Orthopyxis integra*** (Macgillivray, 1842). **A–C**, hydrothecae from same colony, lateral view. **D**, proximal part of pedicel. **E**, gonotheca, lateral view (Loc. 274, slide 3800). **F–H**, hydrothecae from same colony, lateral view (Loc. 393, slide 3859). **I–T.** ***Orthopyxis mollis*** (Stechow, 1919). **I, J**, hydrothecae from same colony, lateral and oblique lateral view (NZOI Stn B219, slide 2755). **K**, hydrotheca, lateral view (NZOI Stn D145, slide 2834). **L, M**, hydrothecae from same colony, lateral and oblique lateral view (BS 621, slide 2987). **N**, hydrotheca, lateral view (Loc. 244, slide 3762). **O**, hydrotheca, slightly oblique lateral view. **P**, male gonotheca, frontal view (Loc. 405, slide 3876). **Q**, hydrotheca, slightly oblique lateral view. **P**, hydrotheca, distal part seen from above. **S**, female gonotheca, lateral view. **T**, the same, frontal view (Loc. 480, slide 3914). Scales: a, 1 mm (E); b, 0.5 mm (I–T); c, 2 mm (A–D, F–H). W.V.

MEASUREMENTS of *Orthopyxis integra* (in μm):

Ralph's	Loc. 274 slide 3800	Loc. 393 slide 3859
Diameter of stolonal tube	100 – 115	115 – 170
Pedicel, length	1560 – 3280	740 – 2540
Diameter	85 – 125	73 – 90
Hydrotheca, total length	295 – 390	335 – 365
Diameter at rim	310 – 350	275 – 315
Female gonotheca, total length	1150	
Maximum diameter	615	
Diameter at rim	390	
Length of pedicel	55	

REMARKS: We have followed Cornelius (1982, 1995) in the synonymy of this species.

The gonophore develops into a much reduced, short lived medusa. It is described by Cornelius (182: 63) as follows: "The medusa, when released, is degenerate and ephemeral. It lacks organs of feeding and survives only a few days. Umbrella height about 1 mm, width about 0.65 mm; jelly thick, velum broad; stomach, manubrium and mouth absent; four narrow radial canals each with lobed gonad midway along; no tentacles or marginal cirri. Apparently only one medusa at a time is produced from each blastostyle. The medusae swim actively but are probably short-lived since they are presumed not to feed. They are sexually mature on release and do not develop further". It was described by Hartlaub (1897) as *Agastra mira* Hartlaub; it may be conspecific with the Mediterranean *Agastra rubra* Behner, 1914. Release of the medusa may be temperature-controlled; if retained free swimming planulae are released by the gonophore. The free medusa has not yet been recorded from New Zealand waters.

RECORDS FROM NEW ZEALAND: Recorded from Wellington Harbour by Coughtrey (1875) and Lyttelton Harbour by von Lendenfeld (1885b). Additional records are from Anawhata, Auckland; Dunedin; New Brighton, and Woodpecker Bay on the west coast of South Island (Ralph 1957). Drifted material originated from Paraparaumu Beach (Ralph 1957). We have been able to verify the records from Paraparaumu Beach and from Woodpecker Bay.

DISTRIBUTION: Near cosmopolitan, penetrating far to the north and south, but not recorded from brackish waters.

Orthopyxis mollis (Stechow, 1919) (Fig. 107I–T)

Campanularia tincta: Hartlaub 1905: 557–558, fig. D[1], E[1], F[1].
[Not *Campanularia tincta* Hincks 1861: 280, pl. 12].
Clytia mollis Stechow 1919: 44–45, fig. L; 1923d: 96.
Clytia noliformis f. *mollis*: Picard 1949: 189.
Campanularia mollis: Picard 1952a: 344-346, fig. 3: Dawson 1992: 13.
Orthopyxis mollis: Ralph 1957: 840, fig. 7e-k; 1961c: 108; 1961d: 236.
Campanularia ? mollis: Leloup 1974: 13, fig. 11.
[Not *Campanularia ? mollis* Millard 1966a: 476, fig, 13E-J (= *Campanularia pecten* Gow & Millard, 1975)].
Orthopyxis everta: Blanco 1967a: 258–261, pl. 2, figs 1–9, 14
Campanularia (*Orthopyxis*) *everta*: Vervoort 1972a: 87–89, fig. 26a-b (*sin syn.*); Blanco 1976: 36–38, pl. 3, fig. 4.
Orthopyxis hartlaubi El Beshbeeshy 1991: 100–102, fig. 23b-c.

MATERIAL EXAMINED:

NZOI Stns: B219, gear GLO, on about 25 mm long fragment of *Symplectoscyphus* cf. *j. johnstoni* (Gray, 1843), with gonotheca. RMNH-Coel. slide 2755; **B223**, gear GLO, separate hydrothecae from stolon on *Obelia* sp.; with *Symplectoscyphus procerus* (Trebilcock, 1928). RMNH-Coel. slide 2757; **D145**, on branches of *Nemertesia* sp. RMNH-Coel. slide 2834; **D874**, on colony of *Symplectoscyphus subarticulatus* (Coughtrey, 1875). No gonothecae; **E108**, numerous hydrothecae on algae. No gonothecae; Q85: *Orthopyxis mollis* (Stechow, 1919). [Slide 4201 JEW Colln, as *Clytia mollis*].

NMNZ: BS 621, many hydrothecae on stems of *Salacia bicalycula* (Coughtrey, 1876a). All in 2 RMNH-Coel. slides 2987.

NMNZ Ralph Collection: Loc. 244, NMNZ Co. 1088, on stem and hydrocladia of *Symplectoscyphus j. johnstoni* (Gray, 1843). RMNH-Coel. slide 3762; **Loc. 405**, NMNZ Co. 1195, numerous hydranths on pedicels arising from stolon creeping on *Symplectoscyphus subarticulatus* (Coughtrey, 1875), with female gonothecae. RMNH-Coel. slides 3876. Slide as *Orthopyxis mollis*, no further data. Also partly dried out slide as *Orthopyxis mollis* and as data: Foveaux Strait; **Loc. 489**, NMNZ Co. 1235, registered as no. 489; however, this is no. 699. Many hydrothecae with abundant male gono-thecae from stolon on *Sertularella g. gayi* (Lamouroux, 1821). RMNH-Coel. slide 3914.

Otago Museum, Dunedin, N.Z.: **Iv. 763. A.52: 49**, numerous hydrothecae from stolon completely covering certain colonies of *Symplectoscyphus subarticulatus* (Coughtrey, 1875), with *Hebellopsis scandens* (Bale, 1888). RMNH-Coel. 27239, slide 2656.

TYPE LOCALITY: Cette (= Sète), Mediterranean coast of France, on algae (Stechow 1919; type probably in ZSBS).

DESCRIPTION: Tubular, occasionally anastomosing stolon on other hydroids and algae from which arise slender hydrothecae on moderately long, unbranched pedicels below terminal spherule under hydrothecal basal chamber; pedicel indistinctly ringed or wrinkled with a few indistinct rings or constrictions basally.

MEASUREMENTS of *Orthopyxis mollis* (in μm):

	NZOI Stn B219 slide 275	NMNZ BS 621 slide 2987	Ralph's Loc. 405 slide 3876	Ralph's Loc. 489 slide 3914
Diameter of stolon	50 – 67	56 – 84		56 – 67
Hydrotheca, total length, including basal chamber	350 – 435	380 – 425	365 – 420	390 – 475
Diameter at rim	155 – 180	175 – 220	190 – 200	155 – 195
Length of pedicel	450 – 560	645 – 1680	950 – 1640	2460 – 2950
Male gonotheca, length				550 – 605
Maximum diameter				195 – 250
Diameter at top				70 – 75
Length of pedicel				110 – 130
Female gonotheca, length			310 – 315	
Maximum width			285 – 296	
Estimated thickness			73 – 84	
Length of pedicel			45 – 56	

Hydrothecae long and slender, cylindrical to near cylindrical, proximally rounded into distinct basal chamber, internally marked by circular ring of thickened perisarc. Hydrothecal aperture nearly circular, in frontal view weakly polygonal as embayments between cusps are slightly bent outwards. Rim of hydrotheca with 10–12 rounded cusps separated by rounded embayments, cross section just under rim undulated. Hydrothecae occasionally renovated.

Some colonies with abundant ovoid to elongated ovoid male gonothecae springing from stolonal tubes; walls smooth or slightly wrinkled on short pedicels of 2–4 rings. Gonotheca apically flattened, with circular aperture of moderate size; blastostyle with one developing gonophore.

Only a few female gonothecae present on separate colony, shape roughly triangular with rounded angles, strongly bilaterally compressed, on a small pedicel of 2 rings; aperture terminal, large, slit-like. Gonothecae spent, containing remnants of blastostyle along 1 wall.

REMARKS: Although the hydrotheca is slender and cylindrical there is variation in shape, some widening almost imperceptibly towards the rim; there is also some variability in the shape of the basal part of the hydrotheca: some have a distinct basal chamber, in others it is almost subsumed in the smoothly rounded basal part of the hydrotheca. In some hydrothecae the marginal cusps are squarish, possibly largely from wear.

We have recorded the New Zealand material as *Orthopyxis mollis* (Stechow, 1919) in spite of the fact that Cornelius (1982: 57) placed *Clytia mollis* Stechow, 1919 in the synonymy of *Campanularia volubilis* (Linnaeus, 1758) after the study of Stechow's type material, said to comprise immature colonies of the former. We believe this conclusion to be unjustified; Stechow also figured gonothecae, unlikely to be found in immature material, that exactly resemble the female gonothecae found in our New Zealand material. These female gonothecae lack the neck typically observed in the gonothecae of *C. volubilis*. Structure of female and male gonothecae and gonophores in the New Zealand colonies of *Orthopyxis mollis* justify its inclusion in the genus *Orthopyxis* L. Agassiz, 1862.

Mediterranean material of this species is fully described by Picard (1952a: 344–346, as *Campanularia mollis*); the description of the gonothecae generally matches our observations.

Orthopyxis hartlaubi El Beshbeeshy, 1991, and *Campanularia (Orthopyxis) everta* as described by Blanco (1967a, 1976) and Vervoort (1972a) are evidently conspecific with the present species.

RECORDS FROM NEW ZEALAND: Cook Strait; off Cape Campbell; Menzies Bay, Banks Peninsula; Gladstone Pier, Lyttelton Harbour, Christchurch; North Reef, Portobello Marine Biological Station; Foveaux Strait; Macquarie Gap, Southwest Pacific, and Chatham Islands. No North Island localities are known. Depth records from pools in the tidal zone to 366 m depth, with a preference for the deeper waters. Gonothecae occur in May and June.

DISTRIBUTION: Mediterranean (Stechow 1919, 1923d), southern West Atlantic, in particular the area bordering the coast of South Argentina (Blanco 1967, 1976; El Beshbeeshy 1991); Chilean waters of the eastern South Pacific (Leloup 1973).

Silicularia Meyen, 1834

TYPE SPECIES: *Silicularia rosea* Meyen, 1834.

Silicularia rosea Meyen, 1834 (Fig. 108A–D)

Silicularia rosea Meyen 1834: 204–206, pl. 35, figs i-xi; Ralph 1956: 293; Millard 1968: 259; 1971: 405.
Campanularia bilabiata Coughtrey 1875: 291–292, pl. 20, figs 46–49; 1876a: 25; 1876b: 299; Farquhar 1896: 460.
Hypanthea bilabiata: Hilgendorf 1898: 213, pl. 20, figs 5, 5a; Bale 1914: 89.
Silicularia bilabiata: Bale 1914: 84, pl. 13, figs 1–6, 1924: 233, fig. 4; Trebilcock 1928: 3; Batham 1956: 456; Ralph 1956: 285–294, fig. 2a, c; 1957: 842–843; Naumov & Stepan'yants 1958: 57, 58; Leloup 1960: 232; Ralph 1961: 104, 107; Naumov & Stepan'yants 1962: 73, fig. 2; Blanco 1967c: 221; Shepherd & Watson 1970: 140; Harris 1990: 227, fig. 11.3; Cornelius 1992b: 98.
Silicularia bilabiata bilabiata: Dawson 1992: 13.
Silicularia bilabiata var. *intermedia* Ralph 1956: 286, figs 2f, 3a-d; 1957: 843.
Silicularia bilabiata intermedia: Hicks *et al*. 1991: 7; Dawson 1992: 13.
Silicularia bilabiata f. *subantarctica* Ralph 1956: 287, fig. 3k; 1957: 843.
Silicularia bilabiata subantarctica: Dawson 1992: 13.
Silicularia bilabiata var. *subtropica* Ralph 1956: 286, figs 2d, 3e-j; 1957: 842; 1966d: 158.
Silicularia bilabiata subtropica: Hicks *et al*. 1991: 7: Dawson 1992: 13.
Hypanthea repens Allman 1876b: 115; Jäderholm 1903: 271.
Eucopella campanularia p.p. von Lendenfeld 1883c: 497, pl. 29, fig. 15D', D½.
Eucopella campanularia: Bale 1884: 60-61; 1888: 751, pl. 13, figs 9-15; Mulder & Trebilcock 1914: 9; Briggs 1918: 35; Trebilcock 1928: 4.
Silicularia campanularia: Bale 1924: 234; Hodgson 1950: 6, figs 12-13.
Hypanthea aggregata Allman 1888: 26, pl. 14, figs 1, 1a.
Hypanthea hemispherica Allman 1888: 27, pl. 14, figs 2, 2a.
Hypanthea georgiana Pfeffer 1889: 54.
Silicularia georgiana: Hartlaub 1905: 573, figs U_1, V_1, W_1; Broch 1929: 3-28.
Hypanthea atlantica Marktanner-Turneretscher 1890: 211, pl. 3, fig. 14.
Silicularia atlantica: Hartlaub 1905: 580, fig. C^2.
Hypanthea asymmetrica Hilgendorf 1898: 212, pl. 20, fig. 4; Hartlaub 1901b: 366, pl. 22, figs 24–26.
Eucopella reticulata Hartlaub 1905: 569, fig. R^1.
Silicularia reticulata: Nutting 1915: 91, pl. 25, figs 3–4.

MATERIAL EXAMINED:

NMNZ: Garden Cove, Macquarie Island, sublittoral algae, Dec. 1959. Many colonies reptant on algae, with female and male gonothecae on separate stolonal tubes. Colonies consist of hydrothecae and gonothecae rising in great number from creeping stolon, attached to algae; hydranths deteriorated, contents of gonothecae vaguely visible in slides. NMNZ Co. 707. RMNH-Coel. 27697, 4 slides 3397, 3 slides with male gonothecae, mostly spent, 1 slide with empty female gonotheca; **Buckles Bay, Macquarie Island**, on *Macrocystis*, Dec. 1959. Many colonies creeping on thalli and stems of algae, consisting of many hydrothecae and gonothecae arising from firmly attached stolons. Male and female gonothecae abundantly present, apparently rising from different stolonal tubes. Hydranths deteriorated, though cup-shaped and flattened hydrothecae are present. Contents of gonothecae vaguely visible in microslide preparation. NMNZ Co. 709. RMNH-Coel. 27699, 2 slides 3399 with developing male gonothecae with several buds.

NMNZ Ralph Collection: Loc. 29, NMNZ Co. 899, about 15 hydrothecae springing from a thick stolon on fragment of algae. No gonothecae. 2 RMNH-Coel. slides 3596. [No gonothecae in slide]; **Loc. 53**, NMNZ Co. 913, a fragment of thallus with several colonies from creeping stolon, with gonothecae. RMNH-Coel. slide 3611 with 1 gonotheca (male?); **Loc. 82**, NMNZ Co. 938:, 2 stained Canada Balsam slides as *Hypanthea bilabiata* Hilgendorf (?) material, a.98. Otago Museum; no locality record, only indication of male sex; **Loc. 84**, NMNZ Co. 940, red debris and fragments of algae with gonothecae, probably of *Silicularia rosea* (Meyen, 1834). No data, old museum specimen. No slide. 2 tubes with same number combined; **Loc. 140**, stained Canada Balsam slide as *Silicularia* spp. *campanularia*, no locality record; **Loc. 176**, NMNZ Co. 1032, many hydrothecae and gonothecae rising from stolon reptant on fronds of algae. Developing male gonothecae. Colony set with infusoria. RMNH-Coel. slide 3698. Stained Canada Balsam slide as *Silicularia bilabiata subtropica*, no locality record. In addition stained Canada Balsam slide marked 'hypotype'; no locality record but marked male and female; **Loc. 200**, NMNZ Co. 1049, a few hydrothecae on fragment of algae as well as some detached hydrothecae. No gonothecae, no slide; **Loc. 233**, NMNZ Co. 1078, colony with gonothecae arising from stolon on fragment of alga. Female gonophore 2 medusoids. RMNH-Coel. slide 3747. With *Plumularia setaceoides* Bale, 1882, and *Amphisbetia minima* (Thompson, 1879); **Loc. 240**, NMNZ Co. 108, *Silicularia rosea* (Meyen, 1834) without gonothecae on another fragment of algae. RMNH-Coel. slide 3755. With *Obelia geniculata* (Linnaeus, 1758) and *Salacia bicalycula* (Coughtrey, 1876). Species mentioned in register not found.; **Loc. 251A**, NMNZ Co. 1096, 2 lots of colonies attached to much decayed algae, consisting of stolonal tubes with hydrothecae and some gonothecae. Isolated some fragments and made up in RMNH-Coel. slide 3771. [Well preserved hydranths with 26–28 tentacles and developing female gonothecae, gonophore 1 medusoid and 1 bud]; **Loc. 254**, NMNZ Co. 1101, a large number of gonothecae and some hydrothecae covering frond of brown alga. RMNH-Coel. slide 3777 with male gonophore developing medusoids; **Loc. 317**, NMNZ Co. 1154, sample composed of decayed algae with stolonal fibres attached, with many empty gonothecae. No identifiable hydrothecae left. RMNH-Coel slide 3833 with fragments of stolon and some empty female gonothecae; **Loc. 32**6, NMNZ Co. 1159, stolonal tubes reptant on algae, with many (empty) gonothecae and some hydrothecae in bad shape. According to label *Silicularia bilabiata subtropica* Ralph, 1956. RMNH-Coel. slide 3836 with several female gonothecae with tissue rests; gonophores spent; **Loc. 421**, NMNZ Co. 1206, many hydrothecae on pedicels from stolon creeping on brown alga (*Cystoseira* sp.?), with gonothecae. 2 RMNH-Coel. slides 3889

with well preserved polyps, 2 almost empty female gonothecae, crumpled in slide. Unstained slide in RSC as *Silicularia campanularia*, no locality record.

PMBS: Aquarium Point. Little Papanui, on *Macrocystis* (Aquarium Point); on *Cystophora scalaris* (L. Papanui pods).Size of different specimens varies considerably; may be large and very dense on *Macrocystis*. Identified by P.M. Ralph, 1955. (Taken from card register).

Material Inspected: **Aquarium Point,** Portobello Marine Biological Station, 02.Oct.1952, on *Macrocystis*. Material consists of fronts of algae completely covered by stolonal fibres from which spring numerous hydrothecae and gonothecae. Gonothecae on short, hydrothecae on about 8 mm long pedicels; **Little Papanui**, reef near N-end, towards low tide, on *Cystophora scalaris* in pools, 14.May.1953, colour whitish: Numerous hydrothecae rising from stolon creeping on algae; **W. end of Quarantine Island**, Otago Harbour, spring low tide, on *Macrocystis pyrifera*, dense on a number of fronds of this one plant, 03.July.1962, collected noon, fixed 4 p.m. Colour whitish. Polyps not perfect; male gonothecae empty and with badly preserved rests of tissue. RMNH-Coel. 27272, slide 2689.

Otago Museum, Dunedin, N.Z.: **Iv. 748. A.24:120 & A.24:121**, sample consists of 4 fragments of thallus of large brown alga covered by dense network of stolonal threads from which spring hydrothecae and many gonothecae. Hydrothecae and hydranths poorly preserved; plane of aperture oblique, hydrothecal wall thickened. Gonothecae abundant, longer than hydrothecae, on short pedicel, basally oval in cross sections, but apically becoming flattened, strongly resembling condition found in certain Hebellids like *Halisiphonia*. Material very brittle; **Iv. 774. A.52:47**, sample consists of fragment of thallus (20 x 30 mm) of large brown alga covered by reticulum of stolonal fibres from which spring many hydrothecae on comparatively long pedicels. Hydrothecae with strongly oblique plane of aperture and greatly thickened basal portion, much too small for large, well preserved hydranth. No gonothecae observed; **Iv. 771. A.98:3?**, fragment (45 x 20 mm) of algal thallus covered by dense network of stolons from which rise stalked hydrothecae (pedicels about 5 mm) and shortly stalked gonothecae. [Labelled: *Silicularia bilabiata* or *Obelia*]; **Iv. 772**, club-shaped bladder of *Macrocystis* sp. entirely covered by stolons of this hydroid from which rise numerous 4–5 mm long pedicels and numerous gonothecae on shorter pedicels.

Type Locality: *Silicularia rosea*: Type designation somewhat confused, as Meyen (1834) records the species from the southern Ethiopean Sea and from the neighbourhood of 'Staaten-Land' (= Staaten Island, Isla de los Estados) and 'Kap Horn' (= Cape Hoorn, Cabo de Hornos), on *Fucus pyriferus* (= *Macrocystis pyrifera*). Both localities are widely separated; the type locality is here restricted to Staaten Island, off the southern tip of Argentina; the occurrence of *Fucus cystifera* in southern Ethiopean Seas being highly unlikely.

Campanularia bilabiata: Timaru, Pacific side of South Island on "Fuci, 2-5.5 m; delicate seaweeds; growing from roots of Laminarians" (Coughtrey 1875; type material probably lost).

Silicularia bilabiata var. *subantarctica*: No distinct type locality indicated and no type slides recovered. The first locality mentioned in Ralph's (1957) paper is Timaru, drift, E.W. Bennett, 12.6.1927; here designated the type locality of *Silicularia bilabiata* f. *subantarctica* Ralph, 1956.

Silicularia bilabiata var. *intermedia*: Island Bay, Wellington, N.Z. (Ralph 1956). The syntypes of *Silicularia bilabiata* var. *intermedia* are in NMNZ and are labelled: "*Silicularia bilabiata intermedia* Ralph, 1956, Island Bay, Wellington, drift, R. Zander (PMR Loc. 468)". There are three Canada Balsam slides, one of which is stained red (carmine?). This slide and a second have detached hydrothecae and gonothecae; the third slide has a leaf fragment with hydro- and gonothecae.

Silicularia bilabiata var. *subtropica*: Rockpools at Kuri Beach, creeping over seaweeds (*Hypanthea asymmetrica*) (Ralph, 1956). Of *Silicularia bilabiata* var. *subtropica* the Syntype is in NMNZ, a slide with the following labelling: "*Silicularia bilabiata subtropica* Ralph, 1956, Syntype, Co. 195, 29, Bay of I. (Long Beach, Russell, Bay of Islands, P.M. Ralph, 27.11.1950". Unstained (or destained) Canada Balsam slides containing several detached hydrothecae. Second Synetype slide Co. 196, from Bethell's Beach, Auckland, D. Kulka, 01.1.1951 (PMR loc. 466). This is a dirty Canada Balsam slide containing unstained colony fragments with gonothecae. Third and fourth Syntype slides, Co. 197, from intertidal rock pool, Wellington Harbour, Feb. 1944, P.M. Ralph (Loc. 467). Carmine stained colony fragments in Canada Balsam.

Hypanthea repens: Kerguelen (Allman 1876b; type probably in NHM).

Eucopella campanularia: Australia (von Lendenfeld 1883c; a slide in MOV, MV F59400, is considered a syntype by Stranks (1993) and originates from southern Australia, on laminarians below the low water mark).

Hypanthea aggregata: Kerguelen, 37–48 m, on laminarians (Allman 1888; type in NHM).

Hypanthea hemisphaerica: *Challenger* Stn 315, Port William, Falkland Islands, 51°40′ S, 57°50′ W, 9–22 m, on laminarians. (Allman 1888; type in NHM).

Hypanthea georgiana: South Georgia (Pfeffer 1889); localition of type unknown.

Hypanthea atlantica: 03° S, 38° W, on brown alga (Marktanner-Turneretscher 1890; type probably in NMW).

Hypanthea asymmetrica: Kuri Beach near Dunedin, creeping over seaweeds (Hilgendorf 1898; type presumably lost).

Eucopella reticulata: Port Williams, Falkland Islands. (Hartlaub 1905; location of type unknown, probably lost).

MEASUREMENTS of *Silicularia rosea* (in μm):

	Portobello slide 2689	Ralph's Loc. 254 slide 3777	Ralph's Loc. 251a slide 3771
Stolon, diameter	215 – 245	80 – 180	245 – 330
Hydrothecal pedicel, length	3280 – 9000	1965 – 2130	1900 – 2100
Hydrotheca, greatest length	605 – 900	460 – 655	525 – 575
Maximum diameter	510 – 820	395 – 525	460 – 555
Female gonotheca, length of pedicel			245 – 330
Total length (pedicel excluded)			1475 – 1720
Maximum diameter			870 – 1065
Male gonotheca, length of pedicel	575 – 655	410 – 540	
Total length (pedicel excluded)	1600 – 1700	575 – 1560	
Maximum diameter	400 – 410	410 – 440	

DESCRIPTION (based on all material inspected): Colony composed of hydrothecae and gonothecae arising on unbranched pedicels from a stolon firmly attached to large algae, usually *Macrocystis pyrifera*. Stolon thick, heavily sclerotised tubes, occasionally flattened and with a flange to further secure attachment, stolon often branched in a reticulate pattern. Hydrothecae on pedicels of varied length, up to 15 mm long, smooth or with 1 or 2 indistinct nodes, pedicel sharply contracted below spherule; spherule sharply separated from base of hydrotheca; perisarc of pedicel and spherule thick.

Hydrotheca asymmetrically conical with greatly thickened walls; rim uneven but smooth, considerably lowered on 1 side to fit pouch of body of hydranth. Hydranth large, body on 1 side with almost globular pouch accommodating voluminous expansion of stomach fitted into the depression in the hydrothecal wall. Proboscis large, an everted cone when expanded and a semi-globular dome when contracted. 26–28 tentacles arranged in a circle around the proboscis, not greatly contractile, with a concentration of nematocysts at the tip, imparting an almost capitate appearance. Hydranth much too big to fit the shallow cavity of the hydrotheca even when contracted.

Colonies dioecious; male and female gonothecae on separate but closely proximate colonies. Female gonotheca bell-shaped, narrowing basally into a short pedicel; widest apically, flattened or broadly rounded; gonophore typically 2 developing medusoids of which distal more advanced; proximal bud quite young. In well preserved gonophores radial canals with surrounding ovaries as well as a distinct exumbrella can be seen. Development of gonothecal perisarc varied, typically thicker on walls and much thinner at top. Male gonothecae usually on longer pedicel; when young elongate ovoid with flattened top and circular aperture. Gonophore inside developing into medusoid; during ripening the gonotheca and its gonophore become greatly elongated and cigar-shaped.

REMARKS: Water movement and temperature greatly influence the ultimate shape of the hydrotheca and to a lesser extent that of the gonothecae. This caused Ralph to split up her material in three subspecies, *S. bilabiata subtropica, S. bilabiata intermedia* and *S. bilabiata subantarctica*, the distribution of these 'subspecies' being governed by these factors. We have not followed Ralph, as the various subspecies are not sharply geographically delimited but are linked by intermediary forms over the considerable area of distribution in temperate and subantarctic waters of the southern hemisphere. Also it appears to us that there are no reliable characters that separate *Silicularia rosea* Meyen, 1834 from *Campanularia bilabiata* Coughtrey, 1875; consequently we have taken *Silicularia rosea* Meyen, 1834 as the oldest available name for this widely distributed southern species.

The fate of the gonophore is not exactly known. An almost fully developed but reduced male medusoid can be observed in many well preserved gonothecae, but it has apparently never been observed liberated. On the other hand, female gonothecae spawning planula larvae have been described and figured, e.g., by Ralph (1956, fig. 3j). The release of medusoids may very well be temperature dependent, release occurring under favourable temperature conditions and under adverse conditions fertilisation occurring inside the gonotheca.

RECORDS FROM NEW ZEALAND: Early New Zealand records are those by Coughtrey, 1876 (Timaru) and Hilgendorf, 1898 (Tomahawk Bay, Dunedin, on sea weeds, in rock pools). The species occurs on its preferred substrate, large brown kelps such as *Macrocystis pyrifera* and *Cystopteris* spp. in the intertidal and shallow subtidal zone. It occurs all around New Zealand, from Russell in the north to Macquarie Island in the south, with a slight preference for east and south coasts, probably because these are more exposed.

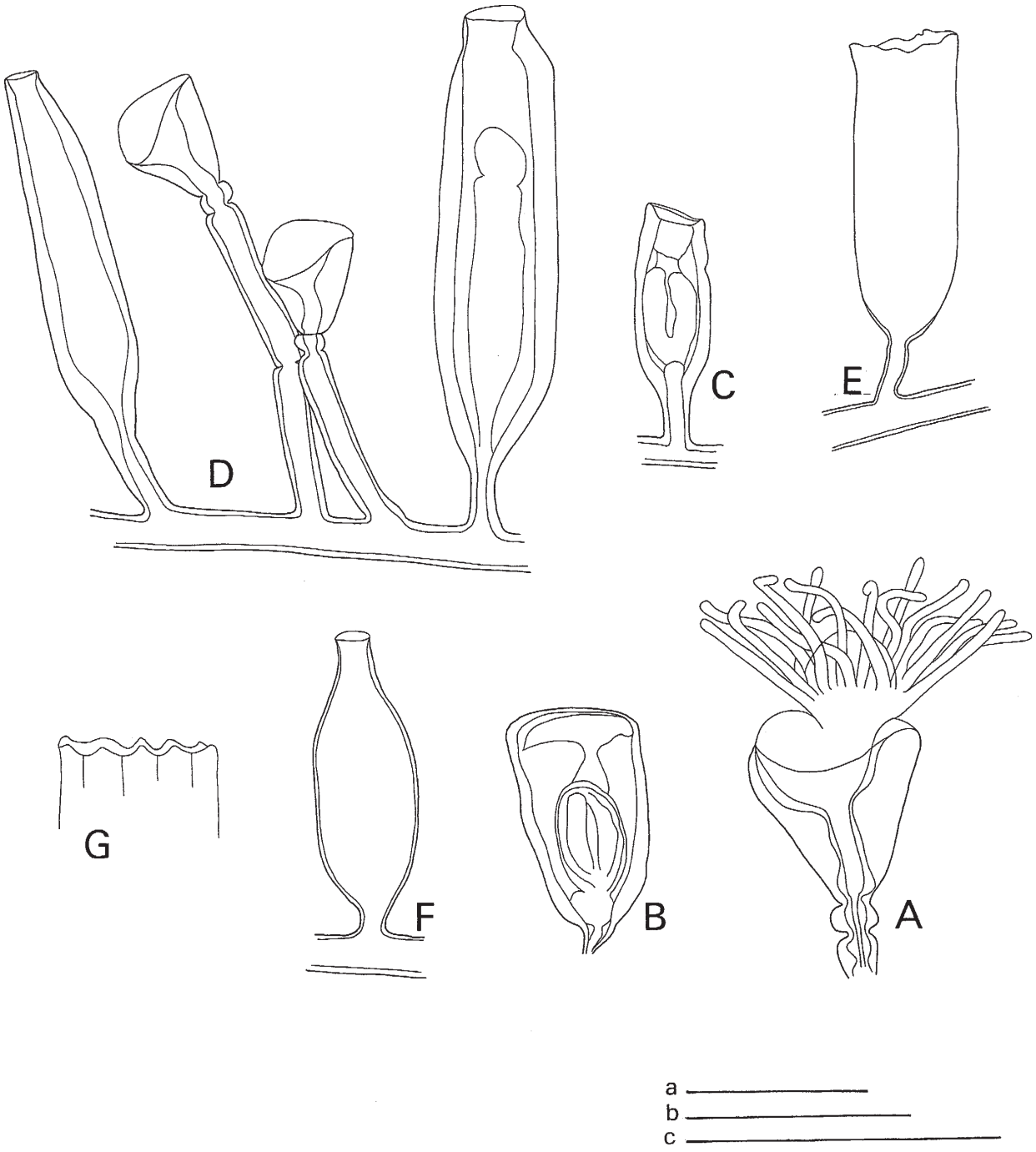

Fig. 108. A–D, ***Silicularia rosea*** Meyen, 1834. **A**, hydrotheca with extended hydranth. **B**, developing female gonotheca, both in lateral view (Loc. 251A, slide 3771). **C**, developing male gonotheca, lateral view (Loc. 254, slide 3777). **D**, part of colony composed of stolon, two empty hydrothecae and two empty male gonothecae (PMBS, west end of Quarantine Island, Otago Harbour, slide 2689). **E, F.** ***Tulpa diverticulata*** Totton, 1930. **E**, hydrotheca. **F**, empty gonotheca, both in lateral view (NZOI Stn D7, slide 4761). **G**, distal part undamaged hydrotheca, lateral view (NZOI Stn M763, slide 2898). Scales: a, 1 mm (C, D, G); b, 2 mm (E, F); c, 2 mm (A, B). W.V.

It is carried on its subtrate by currents and deposited on beaches all around New Zealand. Functional gonothecae occur from October to May.

DISTRIBUTION: Circumglobal in Antarctic and Subantarctic waters.

Silicularia sp.

MATERIAL EXAMINED:

NMNZ Ralph Collection: Loc. 323, NMNZ Co. 1158, tube contains completely disintegrated material and some fragments of algae. May well be a species of *Silicularia*. According to register *Silicularia bilabiata subtropica* Ralph, 1956; this cannot be checked.

REMARKS: Material unfit for specific identification.

Tulpa Stechow, 1921d

TYPE SPECIES: *Campanularia tulipifera* Allman, 1888.

In this genus the following species have been considered.

Tulpa costata Gravier-Bonnet, 1979;
Tulpa crenata Allman, 1876a [= *Campanularia speciosa* Clark, 1877];
Tulpa diverticulata Totton, 1930;
Tulpa magnifica Fraser, 1913, and
Tulpa tulipifera (Allman, 1888).

Tulpa diverticulata Totton, 1930 (Fig. 108E, F)

Tulpa diverticula Totton 1930: 145, figs 5a-c; Ralph 1957: 844, fig. 7l-n; Millard 1977: 20, fig. 5G–H; Gravier-Bonnet 1979: 33; Stepan'yants 1979: 35, pl. 6, fig. 2; Bouillon *et al.* 1995: 86.
Campanularia diverticulata: Naumov & Stepan'yants 1962: 72; Dawson 1992: 13.

MATERIAL EXAMINED:

NZOI Stns: A444B [samples that have been dried out, now in alcohol and in very poor condition, marked: A 444x1, A 444 x 2, etc. Probably from one large sample]: *Tulpa diverticulata* Totton, 1930 (J.E. Watson). [Slide 4198 JEW Colln]; **C672**, *Tulpa diverticulata* (Totton, 1930) (J.E. Watson); **D6**, colony in bad shape, about 35 mm high, probably dried out sample; **D7**, fragments of stolon with some hydrothecae and gonothecae, growing together with *Sertularella vervoorti* El Beshbeeshy, 1991. 2 RMNH-Coel. slides 4761; **D76**, many hydrothecae and gonothecae rising from a stolon creeping on stems of *Tubularia* sp.; **D145**, small bunch of hydrothecae with distinct polyp. No gonothecae; **D173**, many shortly stalked hydrothecae on bryozoans; **E832**, 4 hydrothecae on *Symplectoscyphus columnarius* (Trebilcock, 1928); **M763**, some isolated hydrothecae on *Synthecium elegans* Allman, 1872. RMNH-Coel. slide 2898.

NMNZ Ralph Collection: Loc. 33, NMNZ Co. 903, fragments of a larger, stolonal colony with only some of the (empty) hydrothecae left on about 8 mm long pedicels. RMNH- Coel. slide 3599. 3 slides in RSC as *Tulpa diverticulata* Totton; no further data; **Loc. 240**, in RSC slide with 2 labels, a: *Tulpa diverticulata* & *Aglaophenia plumosa*, and b: Diag. necessary *Synthecium* sp., *Hebella*, *E. mollis.*

TYPE LOCALITY: Off Three Kings Islands, New Zealand, 549 m; *Terra Nova* Stn 91 (Totton 1930; holotype in NHM).

DESCRIPTION: Stolonal colonies attached to firm substrata or loosely interwoven with other hydroids, stolon tubiform, from which arise hydrothecae and gonothecae on unbranched pedicels.

Hydrothecae large, pedicel typically short, about half length of hydrotheca; hydrotheca flask-shaped, with slightly swollen basal part, narrowing somewhat apically and widening again towards hydrothecal rim, hydrotheca distally internally fluted, resulting in a undulating rim produced into 10 rounded, internally curved cusps separated by rounded, outwardly bent embayments with weakly indicated vertical ribs; cross section of hydrotheca just under rim undulated. Perisarc of pedicel forming an indistinct ring at hydrothecal bottom serving attachment of a comparatively small hydranth with about 20 tentacles; perisarc rapidly thinning out along hydrothecal walls.

Gonothecae flask-shaped, with spacious, elongated ovoid body supported by a short pedicel and narrowing apically into a short neck with small, circular foramen. Perisarc of gonotheca firmer than that of hydrotheca, of uniform thickness. Exterior of gonotheca smooth, none with tissue remains; sex consequently indeterminate.

REMARKS: The perisarc of stolon and gonotheca is firm; that of hydrotheca very fragile and thin along its walls; as a result many collapsed and damaged hydrotheca. No evidence of regeneration after damage is visible in our material. The gonothecae in the present material differ from those figured by Ralph in general appearance and length of the 'neck'; also the fine transverse striation noticed by Ralph on the 'neck' are absent from our specimens and the rim of the aperture is not everted. In these respects our material is closer to the colonies described and figured by Millard (1977: 20–21, fig. 5G–H) from the Kerguelen and Crozet Archipelagoes. These differences may be sex-related; also the variability in shape of the gonothecae may be greater than noticed by Ralph.

MEASUREMENTS of *Tulpa diverticulata* (in μm):

	New Zealand (Ralph 1957)	*Terra Nova* Stn 91 (Totton 1930)	NZOI Stn D7 slide 4761
Hydrothecal pedicel, length	1000 – 9000	1500 – 1900	1600 – 1700
Diameter	170 – 230	200 – 230	230
Hydrotheca maximum diameter		1200	590 – 710
Total length, pedicel excluded	2000 – 4000		1965 – 2130
Diameter just below rim		1000	625 – 690
Diameter at rim	1000 – 1250	1200 – 1400	740 – 870
Gonotheca, length pedicel	310 – 500		165 – 245
Length of neck region	1250 – 1500		
Maximum diameter			870 – 935
Diameter at rim of aperture	250 – 400		280 – 295

Tulpa diverticulata Totton, 1930 has here been considered different from *Tulpa tulipifera* (Allman, 1888: 20, pl. 10, figs 1, 1a-b, as *Campanularia tulipifera*) on account of the absence of a distinct stem in the former, though Millard (1977), in her description of the Kerguelen and Crozet material, refers to the occasional presence of "several stolons (that) may run together or twine round each other simulating a fascicled stem".

RECORDS FROM NEW ZEALAND: Off Three Kings Islands (Totton 1930); Cook Strait; off Kaikoura; Bligh Sound; Milford Sound; waters off Stewart Island; Macquarie Gap; near Macquarie Island, and Menzies Bay, found in 'intertidal rock pool creeping over other hydroid stems' (see Ralph 1957). The depth distribution apparently reaches from the tidal zone to at least 415 m depth. Empty gonothecae found on material collected in April.

DISTRIBUTION: Isolated localities in deeper New Zealand waters and the waters of the Kerguelen and Crozet Islands. Probably more widely distributed in southern waters.

Family **PHIALUCIIDAE** Kramp, 1955
Phialucium Maas, 1905

TYPE SPECIES: *Mitrocoma mbenga* A. Agassiz & Mayer, 1899.

Phialucium mbenga (A. Agassiz & Mayer, 1899)

Mitrocoma mbenga A. Agassiz & Mayer 1899: 168, pl. 8, figs 24–25.
Oceania virens Bigelow, 1904: 252, pl. 1, figs 3–4.
Phialucium virens: Maas 1905: 32, pl. 6, figs 36–37.
Phialucium mbenga: Mayer 1910: 276; Vanhöffen 1911: 225, pl. 22, figs 12, 16; Kramp, 1953: 275, fig. 1; Vannucci 1957: 102; Kramp 1958; 345; Chow & Huang 1958: 190; Kramp 1961: 186; 1965: 70; 1968: 86, fig. 229; Xu & Zhang 1974: 17, 22, figs 4–5; Zhang 1977: 104; Xu & Zhang 1978: 31; Bouillon 1978: 125; Zhang 1979: 131, 133; Bouillon 1984: 2-6, figs 1–2; Bouillon *et al.* 1986: 141; 1988: 230; Lin Mao & Zhang Jimbiao 1991: 304; Bouillon *et al*. 1995: 59; Bouillon & Barnett 1999: 103, fig. 108.

TYPE LOCALITY: *Mitrocoma mbenga*: Fiji Islands, Pacific (A. Agassiz & Mayer 1899; location of type unknown. *Oceania virens*: Maldive Archipelago (Bigelow 1904; location of type unknown).

DESCRIPTION: Diameter of umbrella 9–12 mm, 4 or 5 mm high, a slightly flattened hemisphere. Mesoglea moderately thick, rigid. Manubrium urn-shaped, as long as broad, no peduncle; mouth with 4 fairly long, simple lips, lobed and folded. 4 radial canals and a circular canal. Gonads elongated, swollen and sinuous, on distal half of radial canals but not in contact with circular canal. Marginal tentacles hollow, number typically 16, increased to 18–20 in older specimens. Marginal bulbs well developed, conical. 4–9 triangular permanent rudimentary marginal bulbs between successive tentacles, total number 80–90. No excretory papillae or pores, 32 statocysts, typically 2 between each pair of tentacles, with 5–9 concretions each (Kramp 1961; Bouillon & Barnett 1999).

RECORDS FROM NEW ZEALAND: *Dana* Stn 3627, Southwest Pacific near Macauley Island, Kermadec Islands, 30°08′ S, 176°50′ W.

REMARKS: Known in New Zealand from the medusa stage only (Bouillon & Barnett 1999). The polyp has been reared by Bouillon (1984a), though not to the adult stage as it refused to take food.

The polyp is solitary and greatly elongated, rising from a thin, radiating stolon to a height of 1.5 mm. The pedicel (of the young polyp) has smooth perisarc, enlarging apically to forma cup-shaped hydrotheca into which the hydranth can completely withdraw; there is no diaphragm or annulus to separate pedicel and hydrotheca. The hydranth is small, with a single whorl of 10–14 long, filiform tentacles around a globular proboscis; on the tentacles the nematocysts are arranged in warts and a termimal globule. The polyps reached this stage of development in about four days.

DISTRIBUTION: Distributed over the tropical and subtropical Indo-Pacific, mainly on the eastern side (Indian Ocean, Malay Archipelago, China seas; Bismarck Archipelago).

Unidentifiable material occurred at the following stations and localities

NZOI Stns: A489, probably once dried out; **Stn A694,** dried out sample; **A697**, shells with hydroids; **A698; A704,** plumulariid, **A714; A724,** with bryozoans; **A731,** plumulariid; **A746; A747; A840; A841,** dried out; **A917; B175**, 2 RMNH-Coel. slides 2731; **B218; B222,** gear GLO; **B223,** *Obelia* sp.; **B226; B228; B580; B661,** *Clytia* sp.; **C118,** *Antennella* sp.; **C730; C732A,** dried out; **C762; C810; C814,** gear TAL; **C921,** plumulariid; **C925,** *Halopteris* sp. (slide 4219 J.E. Watson Colln); **D52,** fragment; **D127; D181; D208,** *Halecium/ Hydrodendron* sp.; **D375; D891; D899; D904,** dried out, *Hydrodendron* sp.; **E281,** with bryozoans; **E365; E385; E761; E822,** *Cryptolaria* sp.; **E832; E843; E864; E865; F95; F141,** *HaIecium/Hydrodendron* sp.; **F151,** *?Halecium* sp.; **F699; F899; F907; F922; G268; G273,** dried out; **G279A; G284A; G290A; G307A; G704; I24; I709; I739; J974,** RMNH-Coel. slide 2263; **N928; P970; Q11; Q25,** *?Stegolaria* sp.; **Q720,** *Clytia* sp.; **Q725,** *Clytia* sp.; **U608; V387,** dried out.
NMNZ: Lyall Bay, *Aglaophenia* sp. (NMNZ Co. 616); **T 16; BS 394; BS 761,** rooting mass *?Lytocarpia* sp.
NMNZ Ralph Collection, Loc. 26, NMNZ Co. 896; **Loc. 89,** NMNZ Co. 945; **Loc. 99,** NMNZ Co. 954; **Loc. 255,** NMNZ Co. 1103; **Loc. 322,** NMNZ Co. 1157; **Loc. 480,** NMNZ Co. 1229 (all *Obelia* sp.).

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APPENDIX 1

LIST OF STATIONS

NZOI/NIWA Collections, Wellington

The following abbreviations for equipment are used:

D = dredge
DBA = dredge, box, anchor
DC = dredge, cone
DCM = dredge, cone, mesh;
DCMB = dredge, cone mesh with bag
DD = dredge, Devonport
DIS = dredge, ironsand
DLB = dredge, letterbox
DM = dredge, mussel
DMA = dredge, Manihiki
DN = dredge, naturalists
DP = dredge, pipe
DR = dredge, rock
DSS = dredge, suction
GHO = grab, Hayward, orange-peel
GLO = grab, large, orange-peel
GO = grab, orange-peel
GP = grab, Peterson
GSM = grab, Smith-McIntyre
SC = shore collection
SE = sled, epibenthic
TAL = trawl, Agassiz, large
TAM = trawl, Agassiz, medium
TAMS = " with sediment sampler
TB = trawl, beam
TM = trawl, Menzies
TO = trawl, Otter
UWH = underwater hand sampler
WP = water with pump

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
A431	2.10.58	39°46.20′	173°43′00′E	77	DC	*Cryptolaria prima*, *Hydrodendron tottoni*, *Synthecium subventricosum*, *Symplectoscyphus johnstoni johnstoni*
A433	"	40°00.00′	173°40.00′E	110	DC	*Cryptolaria prima*, ?*Halecium beanii*, *Salacia bicalycula*, *Symplectoscyphus johnstoni johnstoni*
A439	4.10.58	40°59.60′	174°27.20′E	146	DC	*Sertularella integra*, *Symplectoscyphus subarticulatus*
A444B	5.10.58	41°14.30′	174°29.20′E	192	D	*Tulpa diverticulata* [Samples that have been dried out, now in alcohol and in very poor condition, marked: A444(1), A444(2), etc. Probably from one large sample.]
A444(1)	"	"	"			*Cryptolaria prima*, *Filellum serpens*, *Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus johnstoni johnstoni*, *Synthecium subventricosum*, *Nemertesia* cf. *cymodocea*
A444(2)	"	"	"			*Filellum serpens*, *Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *S. subarticulatus*
A444(6)	"	"	"			*Cryptolaria prima*
A444(7)						*Cryptolaria prima*, *Dictyocladium monilifer*, *Nemertesia elongata*
A444(8)	"	"	"			*Nemertesia cymodocea*
A489	13.10.59	41°27.00′	174°50.80′E,	107	DC	*Nemertesia cymodocea*, unidentifiable hydroid, probably once dried
A502	14.9.59	41°30.00′	174°32.80′E	457	DC	*Modeeria rotunda*, *Plumularia setacea*
A507	12.12.54	20°85′	174°53.23′E	44	WP	*Plumularia setacea*
A694	1.3.62	54°40.95′S,	158°54.80′E	95	DCMB	Dried out sample, later restored. Contains unrecognisable fragments of hydroids, mostly Athecatae.
A695	1.3.62	54°36.40′	158°57.00′E	91	DD	Sample consists largely of algae and has at one time been dried out. The following species have been isolated: *Lafoea dumosa*, *Sertularella fuegonensis*, *Symplectoscyphus confusus*, *Obelia dichotoma*
A696	"	54°37.70′	158°57.00′E	433	DD	Several bottles filled with shells and unrecognisable hydroid remains. Placed together in one jar. Isolated from this sample: *Lafoea dumosa*, *Symplectoscyphus johnstoni johnstoni*, *Symplectoscyphus* sp. 1.
A697	"	54°29.20′	158°58.90′E	40	DCM	Sample consists of shells with hydroids attached, algae and hydroid remains. Unidentifiable.

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
A698	1.3.62	54°29.30′	158°59.30′E	183	DCM	No recognisable hydroid observed.
A704	4.11.62	47°42.00′	179°27.00′E	154	DCM	Unidentifiable plumulariid.
A705	"	47°41.60′	179°05.70′E	48	DCM	*Symplectoscyphus johnstoni johnstoni*
A712	5.11.62	47°47.00′	178°42.00′E	326	DCM	*Nemertesia* sp.
A713	"	47°45.00′	178°52.50′E	201	DCM	*Symplectoscyphus columnarius*
A714	"	47°43.50′	179°04.00′E	165	DCM	No recognisable hydroids present.
A715	"	47°41.00′	179°03.00′E	121	DCM	Dried out sample: *Nemertesia* sp.
A720	6.11.62	49°42.67′	178°52.50′E	95	DCM	*Sertularella integra*
A721	"	49°39.50′	178°53.00′E	132	DCM	*Synthecium subventricosum*
A724	7.11.62	49°43.00′	178°50.00′E	201	DCM	Unidentifiable hydroid.
A731	8.11.62	49°43.50′	178°48.50′E	106	DCM	Unrecognisable plumulariid.
A732	"	49°44.00′	178°47.50′E	121	DCM	*Sertularella integra*
A733	"	49°43.30′	178°45.30′E	121	DCM	*Dictyocladium reticulatum, Sertularella integra, Synthecium subventricosum*
A734	"	49°42.00′	178°44.30′E	150	DCM	*Synthecium subventricosum*
A738	9.11.62	49°40.10′	178°47.30′E	62	DCM	*Filellum* sp. 1; *Salacia bicalycula*, *Symplectoscyphus johnstoni johnstoni*
A739	"	49°40.20′	178°49.30′E	113	DCM	*Plumularia* sp.
A740	"	49°41.00′	178°40.20′E	315	DCM	*Acryptolaria conferta conferta, Nemertesia* sp.
A742	"	49°37.90′	178°52.40′E	150	DCM	*Salacia bicalycula*
A744	"	49°36.70′	178°48.10′E	360	DCM	*Acryptolaria conferta conferta*
A746	15.11.62	47°30.00′	179°30.00′E	159	DCM	*Acryptolaria conferta conferta*, *Filellum serratum, Salacia bicalycula spiralis*, *Synthecium subventricosum* Unidentifiable hydroid remains.
A747	16.11.62	47°40.90′	179°03.10′E	113	DCM	Unrecognisable hydroid remains.
A749	"	47°42.30′	179°04.00′E	62	DCM	*Synthecium subventricosum*
A750	"	47°42.00′	179°07.90′E	135	DCM	*Symplectoscyphus johnstoni johnstoni*
A751	"	47°44.60′	179°07.40′E	155	TAM	*Synthecium elegans*
A830	25.8.63	46°42.50′	167°05.00′E	476	DCMB	*Lytocarpia spiralis*
A840	26.8.63	46°50.00′	167°20.00′E	155	GHO	Unrecognisable remains, probably not a hydroid.
A841	"	46°58.30′	167°19.80′E	168	DCMB	*Salacia bicalycula,* unrecognisable hydroid.
A898	8.9.63	43°22.00′	177°17.00′E	231	DCMB	*Plumularia setacea*
A910	13.9.63	43°04.00′	178°39.00′W	549	DM	*Acryptolaria angulata*, *Acryptolaria conferta conferta, Cryptolaria exserta*
A911	"	42°45.00′	178°15.00′W	497	DM	*Plicatotheca anitae, Parascyphus simplex*
A915	15.9.63	44°25.02′	178°11.52′W	909	DM	*Lytocarpia spiralis*
A917	"	43°56.00′	179°15.00′W	203	DM	*Salacia bicalycula*, *Sertularella* sp. 1; *Plumularia setacea.* unidentifiable hydroid remains.
B93	22.9.63	34°00.00′	172°30.00′E	55	DCMB	*Sertularella* cf. *robusta*, *Tasmanaria edentula, Lytocarpia chiltoni*, *Nemertesia elongata*
B175	8.10.59	50°26.50′	166°37.50′E	95	DC	*Dictyocladium reticulatum, Symplectoscyphus columnarius,* unidentifiable hydroid (athecate?).
B176	9.10.54	50°29.00′	166°30.50′E	84	TAS	*Filellum serratum*, *Halecium beanii* , *Amphisbetia bispinosa, Dictyocladium reticulatum*, *Sertularella integra, Symplectoscyphus johnstoni johnstoni, S. subarticulatus*
B196	18.10.59	46°20.60′	170°27.60′E	135	DN	*Filellum serratum*, *Halecium beanii*, *Salacia bicalycula, Symplectoscyphus johnstoni johnstoni*
B197	"	46°14.1′	170°32′E	110	DN	*Halecium beanii*, *Symplectoscyphus johnstoni johnstoni, S. subarticulatus*, *Synthecium elegans*
B215	20.5.60	46°50.00′	168°31.50′E	32	DD/GLO	*Amphisbetia trispinosa*, *Stereotheca elongata, Aglaophenia laxa*
B216	"	46°50.00′	168°23.00′E	22	DIS/GLO	*Amphisbetia fasciculata*
B218	21.5.60	46°50.00′	168°09.80′E	39	GLO	Unrecognisable hydroid remains.
B219	"	46°45.00′	168°09.80′E	39	GLO	*Amphisbetia fasciculata*, *Symplectoscyphus procerus, Orthopyxis mollis*
B219	"	46°45.00′	168°09.80′E	39	DIS	*Symplectoscyphus subarticulatus*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
B220	21.5.60	46°40.00′	168°09.80′E	37	DD/GLO	*Symplectoscyphus johnstoni johnstoni , S. subarticulatus, Plumularia setacea*
					DD	*Symplectoscyphus subarticulatus*
					DIS	*Symplectoscyphus subarticulatus*
B221	"	46°40.00′	168°16.80′E	31	DD/GLO	Dried out sample: *Amphisbetia fasciculata, Salacia farquhari, Sertularella integra, Symplectoscyphus procerus, S. subarticulatus*
B222	"	46°40.30′	168°24.20′E	27	DD/GLO	*Amphisbetia fasciculata, Symplectoscyphus procerus*
					DD	*Amphisbetia fasciculata, Symplectoscyphus subarticulatus*
					GLO	Unrecognisable hydroid remains.
B223	"	46°45.00′	168°24.20′E	26	DD/GLO	*Amphisbetia fasciculata, Sertularia unguiculata, Symplectoscyphus subarticulatus, Orthopyxis crenata*
					GLO	*Amphisbetia fasciculata, Symplectoscyphus subarticulatus, S. procerus, Monotheca hyalina, Obelia* sp.; *Orthopyxis mollis*
B224	"	46°45.00′	168°16.80′E	32	GOL	*Symplectoscyphus johnstoni johnstoni*
					DIS	*Symplectoscyphus johnstoni johnstoni*
B225	"	46°50.00′	168°18.00′E	31	GLO	*Sertularia tenuis*
					DIS	*Salacia farquhari*
B226	"	46°55.00′	168°16.80′E	49	GLO	*Amphisbetia fasciculata*
					DD	*Amphisbetia fasciculata*
					DIS	*Amphisbetia fasciculata, Plumularia setacea,* unidentifiable hydroids.
B228,	22.5.60	46°45.00′	168°02.50′E	38	GOL	*Amphisbetia fasciculata*
					DD	*Amphisbetia fasciculata*
					DIS	*Amphisbetia fasciculata, Nemertesia* sp. unidentifiable hydroid.
B229	"	46°40.00′	167°55.00′E	28	DD	*Amphisbetia fasciculata, Salacia farquhari*
B230	"	46°40.00′	168°02.50′E	26	DD	*Salacia farquhari, Symplectoscyphus johnstoni johnstoni Plumularia setacea, Clytia hemisphaerica*
B231	"	46°55.00′	168°11.50′E	21	DD	*Amphisbetia fasciculata*
B233	23.5.60	46°39.70′	167°48.00′E	37	DD	*Synthecium subventricosum*
B235	"	46°35.00′	167°55.00′E	49	DD	*Halecium delicatulum*
B236	"	46°35.00′	168°02.50′E	36	—	*Halecium delicatulum*
B237	"	46°35.00′	168°11.00′E	25	GLO	*Symplectoscyphus subarticulatus*
					DD	*Halecium delicatulum, Symplectoscyphus johnstoni johnstoni, S. subarticulatus*
					DIS	*Halecium delicatulum, Symplectoscyphus johnstoni johnstoni*
B238	"	46°35.20′	168°14.00′E	33	GLO	*Symplectoscyphus johnstoni johnstoni*
					DIS	*Hebellopsis scandens, Halecium delicatulum, Symplectoscyphus johnstoni johnstoni, S. subarticulatus*
B242	24.5.60	47°00.00′	168°24.20′E	83	DC/DD	*Amphisbetia fasciculata*
B246	26.5.60	46°30.00′	167°55.40′E	49	DD	*Symplectoscyphus johnstoni johnstoni*
B247	"	46°30.00′	168°02.50′E	36	DD	*Hebellopsis scandens, Salacia farquhari, Symplectoscyphus johnstoni johnstoni Synthecium elegans*
B248	"	46°25.00′	168°02.50′E	17	DIS	*Amphisbetia fasciculata, Sertularia unguiculata*
					GLO	*Amphisbetia fasciculata, Symplectoscyphus subarticulatus*
B251	"	46°25.00′	168°10.00′E	15	DD	*Symplectoscyphus johnstoni johnstoni*
B252	"	46°30.59′	168°11.60′E	18	DD	*Symplectoscyphus johnstoni johnstoni*
B253	27.5.60	46°40.00′	168°31.40′E	17	DD	*Amphisbetia fasciculata*
B254	"	46°37.00′	168°32.20′E	14	GLO	*Amphisbetia fasciculata*
B256	"	46°36.70′	168°45.30′E	21	DD	*Amphisbetia fasciculata*
B258	"	46°40.00′	168°38.30′E	19	DD	*Amphisbetia trispinosa, Plumularia setacea*
B260	"	46°45.40′	168°39.00′E	25	DD	*Plumularia setacea*
B264	"	46°39.50′	168°07.00′E	17	DO	*Salacia farquhari, Symplectoscyphus subarticulatus, Plumularia setacea*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
B264A	28.5.60	46°44.20′	168°22.20′E	28	GLO	*Amphisbetia trispinosa*, *Symplectoscyphus subarticulatus*
B265	"	46°55.50′	168°55.50′E	23	GLO	*Plumularia setacea*
					DD	*Symplectoscyphus subarticulatus*, *Plumularia setacea*
B268	29.5.60	46°45.00′	168°52.80′E	60	GLO	*Plumularia setacea*
B272	"	46°44.00′	168°31.40′E	21	GLO	*Aglaophenia laxa*
B314	25.10.60	39°22.00′	171°50.00′E	236	DD	*Nemertesia pinnatifida* sp. nov.
B480	5.6.61	45°16.80′	166°51.30′E	116	DC	*Modeeria rotunda*, *Stereotheca elongata*
B482	6.6.61	46°08.80′	166°06.00′E	91	DD	*Filellum serratum*, *Halecium sessile*, *Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *S. subarticulatus*, *Corhiza scotiae*, *Halopteris campanula*, *Orthopyxis affabilis* sp. nov.
B487	"	46°16.00′	166°03.00′E	196	DD	*Halecium delicatulum*, *Dictyocladium monilifer*, *Salacia bicalycula*, *Symplectoscyphus subarticulatus*
B488	7.6.61	46°28.70′	166°14.30′E	164	DD	*Modeeria rotunda*, *Stegolaria irregularis*, *Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus columnarius*
B556	6.10.62	44°00.00′	173°47.52′E	179	DCM	*Symplectoscyphus columnarius*, *Synthecium megathecum*
B561	7.10.62	45°18.20′	171°28.50′E	176	DCM	*Salacia bicalycula*
B567	8.10.62	46°00.00′	170°55.00′E	124	DCM	*Halecium beanii*
B568	"	46°00.00′	170°43.20′E	75	DCM	*Halecium beanii*, *Plumularia setacea*
B571	10.10.62	47°20.00′	167°02.00′E	174	DCM	*Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus columnarius*
B580	11.10.62	48°00.00′	168°20.00′E	140	DCM	*Plumularia setacea*, unrecognisable hydroid remains.
B581	"	48°00.00′	168°06.00′E	138	DCM	*Salacia bicalycula spiralis*, *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*; *Aglaophenia laxa*, *Nemertesia ciliata*, *Plumularia setacea*
B582	"	48°00.00′	167°38.00′E	143	DCM	*Plumularia setacea*
B583	"	48°00.00′	167°26.00′E	143	DCM	*Cryptolaria prima*, *Symplectoscyphus subarticulatus*
B589	13.10.62	48°44.00′	166°30.00′E	187	DCM	*Salacia bicalycula*
B591	"	48°46.00′	167°05.00′E	143	DCM	*Salacia bicalycula*, *Symplectoscyphus columnarius*
B592	"	48°46.00′	167°19.00′E	152	DCM	*Cryptolaria prima*, *Salacia bicalycula*, *Symplectoscyphus columnarius*
B595	14.10.62	46°40.00′	169°22.60′E	73	DCM	*Sertularia tumida*, *Symplectoscyphus johnstoni johnstoni*
B599	"	46°40.50′	167°12.00′E	260	DCM	*Salacia bicalycula*
B605	17.10.62	46°23.50′	167°22.00′E	73	TAL	*Symplectoscyphus johnstoni johnstoni*
B613	18.10.62	45°48.10′	166°28.00′E	99	DCMB	*Stereotheca elongata*
B616	"	45°20.00′	166°47.00′E	134	DCMB	*Stereotheca elongata*
B617	19.10.62	44°42.15′	167°33.80′E	57	DCMB	*Stereotheca elongata*
B619	"	44°42.00′	167°33.25′E	95	DCMB	*Stereotheca elongata*
B620	"	44°17.00′	168°00.00′E	42	DCMB	Dried out sample: *Plumularia* cf. *setacea*
B658	24.10.62	38°39.00′	173°25.00′E	143	TAL	*Cryptolaria prima*, *Dictyocladium monilifer*
B660	"	38°40.00′	174°12.00′E	71	TAL	*Synthecium* cf. *subventricosum*
B661	"	38°40.00′	174°36.00′E	22	DCMB	*Amphisbetia bispinosa*, *Clytia* sp.
B666	25.10.62	38°02.05′	173°55.80′E	170	TAL	*Hydrodendron tottoni*, *Lytocarpia spiralis*
B670	"	37°18.70′	174°03.80′E	170	TAL	*Nemertesia cymodocea*
B672	26.10.62	36°40.00′	174°03.30′E	75	TAL	*Nemertesia cymodocea*
B683	28.10.62	40°08.00′	171°15.00′E	693	TAL	*Lytocarpia subdichotoma*
B691	29.10.62	41°00.00′	173°20.50′E	42	TAL	*Symplectoscyphus subarticulatus*
C52	7.6.56	41°16.20′	174°20.60′E	238	GP	*Nemertesia elongata*
C58	"	41°21.80′	174°30.20′E	238	DN	*Nemertesia elongata*
C60	"	41°22.30′	174°25.50′E	143	DN	*Cryptolaria prima*, *Sertularella integra*, *Nemertesia elongata*
C86	8.6.56	41°26.00′	174°34.60′E	188	GP	*Synthecium* cf. *elegans*
C118	16.5.58	41°19.58′	174°28.50′E	172	DC	*Filellum serpens*, *Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus columnarius*, *S. subarticulatus* *S.* sp.; *Antennella* sp., *Nemertesia cymodocea*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
C125	18.5.58	41°17.26′	174°28.75′E	263	D	*Cryptolaria prima, Dictyocladium monilifer, Sertularella integra, Symplectoscyphus columnarius, S. johnstoni johnstoni, Nemertesia cymodocea*
C166	3.9.59	39°37.00′	171°58.20′E	271	TAS	*Aglaophenia* cf. *ctenata*
C168	"	39°40.00′	172°13.00′E	284	TAS	*Aglaophenia* cf. *ctenata*
C169	"	39°40.00′	172°25.00′E	234	TAS	*Symplectoscyphus* cf. *johnstoni subtropicus, Aglaophenia* cf. *ctenata*
C171	4.9.59	39°40.00′	172°52.50′E	163	TAS	*Aglaophenia* cf. *ctenata*
C177	5.9.59	39°40.00′	174°10.00′E	24	DC	*Amphisbetia fasciculata*
C178	"	39°40.00′	174°17.00′E	0	DC	*Amphisbetia bispinosa, Crateritheca insignis*
C180	"	39°49.00′	174°29.00′E	22	DC	*Amphisbetia fasciculata, Crateritheca insignis, Stereotheca elongata*
C259	20.10.59	41°66.45′	174°16.50′E	18	GP	*Dictyocladium monilifer, Plumularia setacea*
C266	22.10.59	38°20.00′	174°29.80′E	49	GP	*Nemertesia* cf. *elongata*
C344	26.10.59	37°58.60′	174°34.40′E	55	DD	*Stereotheca elongata, Parascyphus simplex, Halopteris campanula*
C370	28.10.59	38°54.00′	173°10.00′E	135	GP	Unidentifiable hydroid remains, probably species of *Eudendrium*
C380	"	38°50.00′	174°21.50′E	37	GP	*Nemertesia* sp.
C381A	5.2.60	41°18.10′	174°37.00′E	24	LCT	Dried out sample: *Symplectoscyphus johnstoni johnstoni*
C440	7.5.60	40°00.00′	174°02.00′E	51	GHO	*Lafoea dumosa*
C450	8.5.60	40°00.00′	174°57.00′E	27	GLO	*Nemertesia elongata*
C595	10.11.60	43°23.00′	175°17.00′E	37	GHO	*Sertularella integra*
C596	"	43°20.00′	175°12.00′E	124	GHO	*Symplectoscyphus columnarius*
C601	20.4.61	44°18.00′	176°16.00′E	144	DD	*Opercularella humilis, Modeeria rotunda, Filellum serratum, Halecium delicatulum, Symplectoscyphus columnarius, Synthecium elegans, Plumularia congregata* sp. nov.
C617	30.4.61	43°58.40′	175°22.90′W	302	DD	*Symplectoscyphus columnarius, Symplectoscyphus johnstoni johnstoni, Synthecium subventricosum, Gymnangium longirostre, Antennella secundaria, Corhiza scotiae*
C620	2.5.61	43°40.00′	174°47.00′W	752	DD	*Lytocarpia spiralis, L. subdichotoma*
C623	7.5.61	44°26.52′	175°16.02′W	398	DD	*Cryptolaria prima, Aglaophenia ctenata*
C627	26.5.61	39°13.00′	171°54.00′E	397	DD	*Aglaophenia ctenata*
C632	27.5.61	39°14.00′	172°01.00′E	406	DD	*Cryptolaria prima, Aglaophenia ctenata*
C633	27.5.61	39°16.00′	171°54.00′E	344	DD	*Filellum serpens*
C636	28.5.61	39°13.50′	171°53.00′E	681	DD	*Lytocarpia subdichotoma*
C645	"	39°18.00′	172°00.00′E	442	DR	*Cryptolaria prima*
C652	14.6.61	43°49.60′	173°27.20′E	54	GLO	*Symplectoscyphus johnstoni johnstoni*
C671	16.6.61	42°40.98′	173°30.00′E	28	GLO	*Aglaophenia acanthocarpa*
C672	"	42°43.62′	173°30.60′E	64	DR	Dried out sample: *Symplectoscyphus johnstoni johnstoni, Tulpa diverticulata*
C699	19.6.61	42°35.10′	173°44.08′E	274	DD	*Plumularia setacea*
C703	"	42°42.00′	173°37.80′E	184	DD	*Acryptolaria conferta conferta*
C730	24.11.61	54°55.00′	158°47.00′E	110	DD	Dried out sample: unidentifiable hydroid remains, probably species of *Eudendrium*.
C732A	25.11.61	54°29.50′	158°58.50′E	22	DD	Dried out sample: unidentifiable hydroid remains.
C734	"	53°55.00′	158°55.00′E	360	DD	*Acryptolaria conferta conferta*
C758	17.2.62	34°40.00′	172°14.50′E	203	GL/TAL	*Lytocarpia chiltoni*
C762	18.2.62	33°59.00′	171°37.00′E	256	GO	Unrecognisable hydroid.
C763	"	33°58.00′	172°17.60′E	73	GO/TAM	*Zygophylax polycarpa* sp. nov.; *Crateritheca insignis, C. novaezelandiae, Dictyocladium monilifer, Symplectoscyphus johnstoni johnstoni, Synthecium subventricosum, Gymnangium longirostre, Lytocarpia chiltoni, L. incisa*
C765	19.2.62	34°26.50′	172°49.00′E	22	GO/TAM	*Sertularia unguiculata, Aglaophenia acanthocarpa, Plumularia setacea*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
C770	20.2.62	34°39.90′	173°20.50′E	134	GO/TAM	*Plumularia tenuissima*
C785	22.2.62	37°00.20′	175°21.80′E	24	GLO/TAM	*Plumularia setacea*
C810	25.2.62	37°32.30′	177°11.60′E	104	DC	Unrecognisable hydroid
C812	"	37°39.50′	178°37.60′E	75	GLO	*Nemertesia elongata*
C814	"	37°40.00′	178°56.40′E	194	GLO	*Lytocarpia incisa*
					TAL	Unidentifiable hydroid remains and algae.
C844	1.3.62	41°38.30′	175°11.20′E	88	TAM	Dried out sample: *Cryptolaria prima*, *Salacia bicalycula*, *Symplectoscyphus subarticulatus*
C863	4.2.62	40°57.30′	174°00.20′E	75	GHO	*Cryptolaria prima*, *Plumularia setacea*
C921	10.2.63	41°04.90′	173°57.30′E	75	GHO	*Filellum serpens*, *Symplectoscyphus subarticulatus*, unidentifiable plumularian hydroid
C924	"	41°03.10′	173°56.40′E	63	GHO	Dried out sample: *Antennella* cf. *quadriaurita*, *Plumularia setacea*
C925	"	41°06.60′	173°55.10′E	39	GHO	Muddy sample: *Halopteris* sp.; *Plumularia setacea*
C926	"	41°00.00′	173°57.70′E	25	GHO	Muddy sample: *Antennella* cf. *secundaria*, *Clytia hemisphaerica*
C929	"	40°58.60′	173°56.20′E	28	GHO	Dried out sample: *Symplectoscyphus subarticulatus*, *Antennella secundaria*, *Plumularia setacea*
C957	7.3.63	43°09.00′	175°15.00′E	123	TAS	*Lytocarpia vulgaris* sp. nov., *Antennella kiwiana*
D1	12.4.63	44°18.00′	176°10.00′E	141	DCMB	*Halecium* sp., *Synthecium elegans*, *Plumularia congregata* sp. nov.
D6	20.4.63	55°29.00′	158°31.50′E	415	DCMB	*Acryptolaria patagonica*, *Symmetroscyphus australis* sp. nov., *Tulpa diverticulata*
D7	"	55°11.40′	158°43.00′E	241	DCMB	*Acryptolaria conferta conferta*, *Sertularella vervoorti*, *Tulpa diverticulata*
D9	"	54°52.00′	158°50.00′E	113	DCMB	*Symmetroscyphus australis* sp. nov.
D20	24.4.63	49°39.80′	164°02.20′E	126	DCMB	*Dictyocladium monilifer*, *Salacia bicalycula*, *Symplectoscyphus columnarius*, *Nemertesia ciliata*
D25	29.4.63	54°40.00′	158°49.00′E	55	DCMB	*Lafoea dumosa*, *Sertularella integra*
D39	7.5.63	50°58.00′	165°45.00′E	549	DCMB	*Zygophylax pseudafricanus* sp. nov.
D49	8.5.63	50°43.70′	166°12.90′E	75	TAM	*Symplectoscyphus johnstoni johnstoni*
D52	9.5.63	50°40.09′	166°13.40′E	68	TAM	Unidentifiable hydroid fragment.
D57	"	50°36.70′	166°15.70′E	44	DCMB	*Pycnotheca mirabilis*
D62	10.5.63	50°31.10′	166°17.30′E	22	TAM	*Amphisbetia trispinosa*, *Pycnotheca mirabilis*
D72	11.5.63	50°19.80′	166°24.00′E	163	DCMB	*Symplectoscyphus* sp.
D74	12.5.63	50°55.65′	165°54.80′E	168	DCMB	*Plumularia congregata* sp. nov.
D76	"	50°53.70′	165°54.00′E	168	DCMB	*Symplectoscyphus johnstoni johnstoni*, *Tulpa diverticulata*
D81	"	50°37.00′	165°53.00′E	159	TAM	*Amphisbetia trispinosa*
D90	17.5.63	43°50.00′	179°00.00′E	399	TAM	*Halecium* sp.; *Lytocarpia vulgaris* sp. nov.; *Corhiza scotiae*, *Kirchenpaueria bonnevieae*, *Nemertesia ciliata*, *Plumularia setacea*
D100	26.9.63	48°02.00′	166°36.00′E	161	DCMB	*Cryptolaria prima*, *Lytocarpia subdichotoma*
D114	7.10.63	44°12.00′	173°18.00′E	84	TM	*Cryptolaria prima*
D116	10.10.63	43°00.00′	178°40.02′E	377	DCMB	*Lytocarpia spiralis*
D117	"	43°15.00′	178°40.02′E	432	DCMB	*Lytocarpia spiralis*
D118	"	43°30.00′	178°40.02′E	380	DMA	*Lytocarpia spiralis*
D119	11.10.63	43°45.00′	178°40.02′E	492	DMA	*Aglaophenia subspiralis* sp. nov.
D127	7.1.64	46°42.00′	168°17.30′E	29	DCMB	*Amphisbetia bispinosa*, *A. fasciculata*, *Salacia bicalycula*, *Sertularella integra*, *Symplectoscyphus subarticulatus*
					TAM	*Cryptolaria prima*, *Sertularella integra*, *Sertularia tenuis*, *S. unguiculata*, *Symplectoscyphus johnstoni johnstoni*, *S. procerus*, *S. subarticulatus*, *Pycnotheca mirabilis*, *Plumularia setacea*, unidentifiable hydroid.
D131	11.1.64	48°02.00′	167°03.00′E	132	TAM	*Symplectoscyphus johnstoni johnstoni*
					DCMB	Dried out sample: *Halecium* sp.; *Symplectoscyphus johnstoni johnstoni*, *Plumularia* sp.

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
D132	12.1.64	48°06.00′	167°36.50′E	134	TAM	*Salacia bicalycula*,*Symplectoscyphus johnstoni johnstoni, S. subarticulatus*, *Aglaophenia* cf. *laxa*, *Nemertesia ciliata*
D133	"	48°11.50′	168°21.00′E	141	TAM	*Sertularella integra*, *Symplectoscyphus columnarius, S. johndstoni johnstoni*, *Aglaophenia laxa*, *Lytocarpia subdichotoma*
D138	13.1.64	48°32.00′	168°19.50′E	668	DCMB	*Dictyocladium monilifer, Symplectoscyphus columnarius, Aglaophenia laxa*, *Corhiza scotiae*
D139	"	48°20.50′	167°46.50′E	150	DCMB	*Dictyocladium monilifer, Symplectoscyphus columnarius, Synthecium elegans*, *Aglaophenia laxa*, *Plumularia* sp.
D144	14.1.64	48°31.00′	167°17.00′E	132	TAM	*Symplectoscyphus columnarius, Aglaophenia laxa*, *Corhiza scotiae*, *Plumularia* sp.
D145	"	48°42.00′	167°27.00′E	366	TAM	*Cryptolaria exserta*, *Halecium* sp.; *Sertularella gayi gayi, Antennella kiwiana, Nemertesia ciliata*, *Orthopyxis mollis, Tulpa diverticulata*
D148	"	49°48.00′	167°02.50′E	146	TAM	*Dictyocladium monilifer*, *Symplectoscyphus columnarius, S.johnstoni johnstoni*
D149	"	49°10.50′	166°51.00′E	454	DCMB	*Acryptolaria conferta conferta*, *Lytocarpia striata* sp. nov., *L. subdichotoma*
D154	16.1.64	48°09.00′	166°23.00′E	159	TAM	*Symplectoscyphus columnarius*
D155	"	48°02.00′	166°38.00′E	141	DCMB	*Symplectoscyphus columnarius*, *Lytocarpia subdichotoma*
D156	"	48°01.50′	166°35.00′E	81	DCMB	*Symplectoscyphus johnstoni johnstoni*
D159	17.1.64	49°01.00′	164°30.00′E	741	DCMB	*Gymnangium expansum*, *Lytocarpia striata* sp. nov.
D160	18.1.64	49°31.50′	166°15.50′E	722	DCMB	*Gigantotheca raukumarai* sp. nov.
D173	21.1.64	50°53.00′	166°32.00′E	141	DCMB	*Plumularia setacea*, *Tulpa diverticulata*
D175	"	50°36.50′	167°41.00′E	426	TAM	*Cryptolaria exserta*, *Aglaophenia laxa, Gymnangium japonicum*, *Lytocarpia striata* sp. nov.; *Nemertesia* cf. *ciliata*
D176	"	51°06.00′	167°48.50′E	216	TAM	*Acryptolaria corniformis*, *Plumularia setacea*
D181	22.1.64	50°50.00′	166°05.00′E	77	DCMB	Unidentifiable samples, probably largely Bryozoa and *Eudendrium.*
D196	23.1.64	50°55.00′	166°21.00′E	110	TAM	Dried out sample: *Symplectoscyphus johnstoni johnstoni*
D198	"	50°24.00′	166°14.00′E	141	TAM	*Symplectoscyphus columnarius*
D200	"	50 22.00′	167 28.00′E	112	TAM	Dried out sample: *Plumularia* sp.
D208	25–26.1.64	49°18.00′	171°46.50′E	150	DCMB	Bryozoa with remains of *Halecium* sp. or *Hydrodendron* sp.
D232	29.1.64	38°30.00′	169°09.00′E	505	TAM	*Nemertesia cymodocea*
D233	"	38°50.00′	169°20.00′E	530	TAM	*Lytocarpia subdichotoma*
D242	2.10.64	38°00.00′	169°03.00′E	337	DCMB	*Cryptolaria exserta*
D267	6.10.64	40°50.00′	173°43.00′E	60	TAM	*Nemertesia ciliata*
D273	"	40°45.00′	173°50.00′E	75	DM	Bottle 1: *Plumularia setacea,* mixed with ascidian *Periphonia hutchinsonia* Bottle 2, sample totally dried out: *Symplectoscyphus subarticulatus*
D375	20.11.64	41°15.50′	174°54.00′E	12	TAM	Dried out sample: no recognisable hydroids.
D868	24.3.69	43°54.00′	179°43.98′W	420	TAM	*Lytocarpia spiralis*
D871	"	43°19.98′	178°40.02′W	454	TAL	*Corhiza scotiae*
D873	25.3.69	43°34.50′	176°38.00′W	60	TAL/UWC	*Sertularia unguiculata, Synthecium elegans*
D874	"	43°30.00′	176°49.98′W	60	TAL	*Filellum serpens*, *F. serratum*, *Dictyocladium monilifer, Symplectoscyphus johnstoni johnstoni*, *S.subarticulatus*, *Orthopyxis mollis*
D876	"	43°19.98′	176°49.98′W	148	TAM	*Cryptolaria prima*, *Halecium delicatulum*, *Dictyocladium monilifer*, *Salacia bicalycula*, *Sertularella gayi gayi, Symplectoscyphus columnarius*, *Synthecium subventricosum*, *Plumularia congregata* sp. nov.
D877	"	43°19.98′	176°48.00′W	148	TAM	*Dictyocladium monilifer*, *Symplectoscyphus columnarius*
D878	"	43°25.02′	176°40.02′W	116	TAM	*Cryptolaria prima*
D882	26.3.69	43°41.52′	176°33.48′W	23	TAM	*Symplectoscyphus subdichotomus*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
D883	26.3.69	43°35.00′	176°40.00′W	58	TAM	*Symplectoscyphus subarticulatus*
D885	27.3.69	43°55.02′	176°40.02′W	59	TAL	*Cryptolaria prima*
D889	28.3.69	44°16.00′	176°30.30′W	95	DCMB	*Sertularella gayi gayi*
D891	"	44°13.98′	176°15.48′W	0	SC	Unrecognisable hydroids.
D896	29.3.69	44°19.98′	175°49.98′W	106	DCMB	*Acryptolaria minima*, *Dictyocladium monilifer*, *Salacia bicalycula*, *Symplectoscyphus johnstoni tropicus*, *Corhiza scotiae*, *Halopteris campanula*
D899	"	44°22.98′	176°49.02′W	370	TAL	*Acryptolaria conferta conferta*, *Cryptolaria pectinata*, *Corhiza scotiae*, unidentifiable hydroid remains.
D904	30.3.69	43°58.50′	178°40.02′W	459	TAL	Dried out sample: *Hydrodendron* sp.; *Lytocarpia subdichotoma*
E72	21.3.64	42°50.00′	176°22.00′E	748	TAM	*Aglaophenia ctenata*, *Nemertesia elongata*
E74	23.3.64	44°00.00′	176°44.02′E	299	TAM	*Lytocarpia spiralis*
E79	24.3.69	43°04.98′	178°00.00′E	371	TAM	*Aglaophenia ctenata*
E80	25.3.69	43°22.98′	179°31.98′W	459	TAM	*Lytocarpia subdichotoma*
E83	26.3.69	43°03.00′	179°30.00′E	534	TAM	Dried out sample: *Lytocarpia subdichotoma*
E96	23.10.64	42°55.62′	173°24.00′E	46	GO	*Salacia bicalycula*
E108	12.10.64	43°28.98′	177°00.00′W	95	DCMB	*Acryptolaria conferta conferta*, *Filellum serratum*, *Dictyocladium monilifer*, *Salacia bicalycula*, *Sertularella integra*, *Sertularia marginata*, *Symplectoscyphus subarticulatus*, *Synthecium subventricosum*, *Aglaophenia laxa*, *Lytocarpia incisa*, *L. vulgaris* sp. nov., *Orthopyxis mollis*
E109	"	43°15.00′	177°00.00′W	300	TAM	*Dictyocladium monilifer*, *Sertularella integra*
E111	"	43°00.00′	176°30.00′W	675	TAM	*Lytocarpia subdichotoma*
E120	14.10.64	42°58.98′	175°28.98′W	872	TAM	*Lytocarpia subdichotoma*
E136	16.10.64	44°04.98′	176°15.00′W	66	DCMB	*Lovenella* sp.; *Sertularella areyi*, *Sertularia unguiculata*
E140	17.10.64	44°30.00′	176°00.00′W	192	DCMB	Dried out sample: *Sertularella gayi gayi*
E146	"	44°30.00′	177°00.00′W	664	TM & DP	*Amphisbetia minima*, *Aglaophenia laxa*
E252	6.4.65	34°35.00′	172°32.50′E	62	DP/GO	*Plumularia setacea*
E255	"	34°39.00′	172°25.00′E	154	DC	Dried out sample: *Nemertesia ciliata*
E263	"	34°33.60′	172°25.00′E	115	DP	*Sertularella robusta*
E267	7.4.65	34°30.00′	172°37.50′E	37	DCMB/GO	*Dictyocladium reticulatum*
E278	"	34°25.00′	172°15.00′E	141	DCMB	*Dictyocladium monilifer*
E279	8.4.65	34°25.00′	172°20.00′E	106	GO/DP	*Nemertesia ciliata*
E281	"	34°26.40′	172°30.00′E	71	—	Unrecognisable hydroid.
E282	"	34°27.50′	172°35.00′E	37	DCMB	*Crateritheca insignis*
E283	"	34°25.00′	172°35.00′E	79	DCMB	*Hydrodendron mirabile*, *Synthecium gordoni* sp. nov., *Halopteris crassa*, *Halopteris pseudoconstricta*
E289	"	34°20.00′	172°06.00′E	190	DCMB	*Lytocarpia chiltoni*
E291	"	34°15.00′	172°50.00′E	410	DCMB	*Plumaria setacea*
E312	10.4.65	34°00.00′	171°47.50′E	119	DC	*Filellum serpens*, *F. serratum*, *Lafoea dumosa*, *Zygophylax polycarpa* sp. nov., *Crateritheca insignis*, *Gonaxia immersa* sp. nov., *Sertularella integra* , *Symplectoscyphus amoenus* sp. nov., *S. candelabrum* sp. nov., *S. johnstoni johnstoni*, *Tasmanaria edentula*, *Synthecium elegans*, *S. subventricosum*, *Lytocarpia incisa*, *Nemertesia pinnatifida* sp. nov.
E319	11.4.65	33°6.00′	172°17.00′E	104	DCMB	*Lytocarpia chiltoni*
E323	"	34°00.00′	172°15.00′E	165	DCMB	*Aglaophenia ctenata*
E325	"	34°00.00′	172°20.00′E	161	DCMB	*Lytocarpia chiltoni*, *Halopteris crassa*
E327	"	34°17.50′	172°25.00′E	119	DC	*Aglaophenia ctenata*
E336	12.4.65	34°00.00′	172°30.00′E	157	DP	*Nemertesia elongata*
E341	16.11.77	34°14.70′	172°50.80′E	89	TAM	*Aglaophenia laxa*
E365	14.5.65	34°33.00′	173°03.00′E	35	GO	Unidentifiable hydroid.
E385	16.5.65	34°22.50′	172°50.00′E	53	GO	Unidentifiable hydroid.
E388	"	34°13.50′	172°50.00′E	101	GO	*Crateritheca zelandica*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
E389	16.5.65	34°01.50′	172°43.50′E	155	DP	*Symplectoscyphus subdichotomus*
E400	7.10.65	46°00.00′S,	171°02.00′E	622	TAM	Dried out sample: *Symplectoscyphus columnarius, Plumularia* sp.
E402	9.10.65	47°20.00′	168°34.00′E	133	TAM	*Symplectoscyphus j. johnstoni*
E409	10.10.65	46°41.00′	170°21.00′E	743	TAM	*Halopteris infundibulum*
E413	11.10.65	45°12.00′	171°44.00′E	594	TAM	*Lytocarpia spiralis*, *Halopteris infundibulum*
E425	16.10.65	44°44.00′	172°44.00′E	721	TAM	*Lytocarpia spiralis*
E429	17.10.65	44°00.00′	173°59.00′E	523	TAM	*Lytocarpia spiralis*
E431	"	43°30.00′	174°00.00′E	417	DCMB	*Lytocarpia subdichotoma*
E433	18.10.65	43°43.02′	174°30.00′E	571	TAM	*Lytocarpia spiralis*, *L. subdichotoma*
E640	11.10.66	37°15.20′	176°51.20′E	130	DCMB	*Stegolaria irregularis*, *Acryptolaria* cf. *longitheca*, *Lafoea dumosa*, *Gymnangium prolifer*, *Lytocarpia phyteuma*
E713	22.3.67	39°20.80′	178°17.00′E	935–858	TAM	*Aglaophenia ctenata*
E719	23.3.67	38°46.00′	178°48.00′E	913–750	TAM	*Acryptolaria angulata*, *A. patagonica*, *Zygophylax sibogae*, *Sertularella* sp. 1; *Aglaophenia ctenata*, *Lytocarpia subdichotoma*
E725	24.3.67	37°20.50′	178°00.50′E	1004 -942	TAM	*Gymnangium tubulifer*
E731	25.3.67	37°23.50′	177°12.00′E	602 -503	TAM	Dried out sample: *Gigantotheca raukumarai* sp. nov., *Aglaophenia ctenata*
E735	26.3.67	37°28.00′	176°47.00′E	680–764	TAM	Dried out sample: *Lytocarpia subdichotoma*
E740	27.3.67	37°37.00′	179°07.50′E	757	TAM	*Lytocarpia subdichotoma*
E743	"	38°00.00′	178°53.40′E	503	TAM	*Aglaophenia ctenata*
E744	28.3.67	38°05.50′	178°58.60′E	772	TAM	*Lytocarpia spiralis*
E747	29.3.67	40°43.20′	176°48.20′E	554	TAM	*Aglaophenia ctenata*
E748	"	40°46.00′	176°55.00′E	739	TAM	*Aglaophenia ctenata*, *Lytocarpia spiralis*
E749	"	40°47.00′	176°57.00′E	913 -997	TAM	*Aglaophenia ctenata*
E751	30.3.67	41°39.70′	175°15.00′E	300 -399	TAM	*Cryptolaria pectinata*, *Synthecium megathecum*
E756	"	42°01.80′	174°26.52′E	885	TAM	*Aglaophenia ctenata*
E757	"	42°03.20′	174°27.20′E	1081 -1125	TAM	*Aglaophenia ctenata*, *Nemertesia* cf. *elongata*
E759	31.3.67	42°45.00′	173°40.00′E	195 -213	TAM	Dried out sample, later restored: *Filellum serpens*, *Synthecium megathecum*
E761	"	42°44.70′	173°45.30′E	852	TAM	Unidentifiable hydroid.
E803	21.10.67	45°57.00′	166°09.00′E	534	TAM	*Stegolaria irregularis*, *Zygophylax sibogae*, *Halopteris infundibulum*
E804	"	45°58.50′	166°18.50′E	183	TAM	*Cryptolaria pectinata*
E820	23.10.67	46°35.00′	165°58.00′E	220 -159	TAM	*Cryptolaria pectinata*, *C. prima*, *Hebellopsis scandens* , *Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus columnarius*, *S. subarticulatus*
E821	"	46°43.50′	165°46.50′E	220 -159	TAM	*Cryptolaria exserta*, *Lytocarpia striata* sp. nov., *Corhiza scotiae*
E822	"	46°50.60′	165°36.00′E	682	TAM	*Acryptolaria conferta conferta*, *Zygophylax sibogae*, *Gymnangium expansum*, *G. japonicum*, *Acryptolaria* sp.
E832	25.10.67	47°21.60′	167°21.00′E	251	TAM	*Salacia bicalycula*,*Sertularella integra*, *Symplectoscyphus columnarius*, *Tulpa diverticulata*, unidentifiable hydroid.
E838	16.3.68	34°49.00′	172°18.00′E	1288	TAM	*Lytocarpia incisa*
E840	"	33°52.00′	172°16.00′E	757	TAM	*Crateritheca bidens* sp. nov., *Lytocarpia subdichotoma*
E841	"	33°53.00′	172°17.00′E	262	TAM	*Symplectoscyphus epizooticus*, *Tasmanaria edentula*, *Lytocarpia incisa*, *Antennellopsis integerrima*
E843	"	33°55.00′	172°17.00′E	106	TAM	*Filellum serratum*, unidentifiable hydroid.
E848,	17.3.68	33°59.00′	171°40.00′E	250	DM	*Halopteris crassa*, *Nemertesia elongata*
E849	"	33°55.00′	171°32.00′E	216	DM	*Halecium plicatocarpum* sp. nov., *Symplectoscyphus epizooticus*, *Wanglaophenia rostrifrons* sp. nov., *Corhiza scotiae*, *Halopteris crassa*
E850	"	33°49.00′	171°19.00′E	509	TAM	*Gigantotheca raukumarai* sp. nov., *Nemertesia elongata*
E856	18.3.68	32°11.00′	168°18.00′E	1169	DM	*Lafoea dumosa*
E860	"	32°21.00′	167°41.00′E	1246	TAM	*Halecium plicatocarpum* sp. nov.

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
E861	18.3.68	32°25.00′	167°35.00′E	318	TAM	*Stegolaria irregularis*, *Corhiza scotiae*
E864	19.3.68	32°36.00′	167°36.00′E	130	TAM	*Cryptolaria minima*, *Dictyocladium monilifer*, *Salacia bicalycula spiralis*, *Corhiza scotiae, Billardia novae-zealandiae*, unidentifiable hydroid.
E865	"	32°41.00′	167°36.00′E	168	TAM	Dried out sample: *Zygophylax sibogae*, *Dictyocladium monilifer*, unidentifiable hydroid.
E866	"	33°01.00′	167°36.00′E	781	TAM	*Filellum serpens*, *Corhiza scotiae*
E876	21.3.68	34°39.00′	172°14.00′E	216	TAM	*Antennellopsis integerrima*, *Halopteris crassa*
E887	23.3.68	36°40.00′	173°53.00′E	379 -196	TAM	*Tripoma arboreum*
E893	24.3.68	37°19.00′	173°51.00′E	979	TAM	*Lytocarpia spiralis*
E907	28.3.68	38°39.00′	172°40.00′E	322	TAM	*Aglaophenia ctenata*
F10	30.10.64	38°43.00′	172°35.00′E	333	DCMB	*Aglaophenia ctenata*
F77	21.1.65	47°00.00′	169°30.00′E	117	TAM	*Salacia bicalycula*
F78	13.1.65	48°32.00′	167°09.00′E	139	TAM	*Aglaophenia laxa, Corhiza scotiae*
F80	14.1.65	49°00.00′	167°01.00′E	631	TAM	*Cryptolaria pectinata*, *Gymnangium japonicum*
F82	14.1.65	50°01.00′	166°54.00′E	137	TAM	*Symplectoscyphus subarticulatus*, *Antennella kiwiana*
F83	"	50°26.00′	166°54.00′E	117	TAM	*Dictyocladium monilifer*
F91	16.1.65	49°00.00′	167°30.00′E	687	TAM	*Lytocarpia subdichotoma*
F93	17.1.65	48°31.00′	167°30.00′E	141	TAM	*Corhiza scotiae*
F94	"	48°31.00′	168°01.00′E	604	TAM	*Symplectoscyphus subarticulatus*
F95	"	48°53.00′	168°39.00′E	646	TAM	Unidentifiable hydroid remains.
F99	18.1.65	48°32.00′	168°54.50′E	706	TAM	*Lytocarpia subdichotoma*
F101	"	48°08.00′	169°23.00′E	598	TAM	*Lytocarpia subdichotoma*
F107	20.1.65	48°45.00′	172°00.00′E	658	TAM	*Lytocarpia subdichotoma*
F109	21.1.65	49°11.00′	173°00.00′E	501	TAM	*Stegolaria irregularis*
F127	28.1.65	49°22.00′	176°16.00′E	1280	TAMS	*Lytocarpia alata* sp. nov., *Kirchenpaueria bonnevieae*
F141	31.1.65	52°38.00′	169°23.00′E	176	DCMB	Unidentifiable hydroid remains; probably *Halecium* sp. or *Hydrodendron* sp.
F142	"	52°52.00′	169°49.00′E	168	DCMB	*Phialella quadrata*
F143	1.2.65	53°05.50′	170°13.00′E	380	TAMS	*Filellum serpens*
F145	"	53°14.00′	171°48.00′E	435	TAMS	*Stegolaria irregularis*
F150	2.2.65	49°28.00′	174°28.00′E	501	TAMS	*Stegolaria irregularis*
F151	3.2.65	48°32.00′	174°50.00′E	814	TAMS	Unidentifiable colony, probably species of *Halecium*.
F188	21.3.65	40°50.20′	173°23.00′E	62	GO	*Symplectoscyphus* sp.
F227	26.3.65	40°39.10′	172°57.50′E	35	GO	*Lytocarpia subdichotoma*
F699	5.12.65	40°07.00′	176°53.60′E	24	GHO	Unidentifiable hydroid on algae.
F867	2.10.68	37°30.00′	179°00.00′E	307 -340	TAM	*Zygophylax tizardensis*
F868	"	37°28.50′	179°03.50′E	808 -924	TAM	*Zygophylax sibogae*, *Gigantotheca raukumarai* sp. nov.
F871	3.10.68	37°32.50′	178°11.00′E	547 -470	TAM	Dried out sample: *Aglaophenia ctenata*, *Lytocarpia subdichotoma*
F872	"	37°20.60′	178°11.20′E	878	TAM	*Aglaophenia ctenata*
F873	"	37°19.50′	178°11.00′E	1050	TAM	*Aglaophenia ctenata*
F876	"	37°32.50′	177°34.00′E	529	TAM	*Gymnangium tubulifer, Lytocarpia subdichotoma*
F895	6.10.68	36°39.50′	176°18.00′E	702	TAM	*Aglaophenia ctenata*
F899	8.10.68	36°13.00′	176°17.50′E	521	TAM	Dried out sample: Unrecognisable; questionable hydroid.
F900	9.10.68	36°13.00′	176°23.00′E	754	TAM	*Aglaophenia ctenata*, *Lytocarpia subdichotoma*
F905	10.10.68	35°25.00′	174°48.50′E	156	TAM	*Plumularia tenuissima*
F907	"	35°15.00′	175°02.00′E	510	TAM	Unrecognisable athecate hydroid.
F911	11.10.68	34°38.00′	174°36.00′E	1295	TAM	Probably not a hydroid.
F915	"	34°58.70′	174°18.00′E	251	TAM	*Kirchenpaueria bonnevieae*, *Plumularia tenuissima*
F916	12.10.68	34°38.50′	173°28.00′E	249	TAM	*Plumularia tenuissima*
F921	13.10.68	34°02.10′	172°31.00′E	344	DM	*Symplectoscyphus columnarius*
F922	"	33°59.00′	172°16.00′E	117	DM	*Zygophylax polycarpa* sp. nov., *Hydrodendron mirabile, Symplectoscyphus johnstoni johnstoni*, *Synthecium elegans*, *Lytocarpia chiltoni*, *L. incisa*, unrecognisable hydroid.

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
F924	13.10.68	34°07.50′	172°47.00′E	315	TAM	*Cryptolaria pectinata*, *Hydrodendron tottoni*, *Crateritheca zelandica*, ?*Staurotheca megalotheca* sp. nov., *Lytocarpia chiltoni*
F925	14.10.68	34°05.20′	172°48.00′E	503	TAM	*Aglaophenia ctenata*, *Lytocarpia spiralis*
F926	"	34°04.10′	172°50.50′E	964	TAM	*Aglaophenia ctenata*, *Lytocarpia spiralis*
F928	"	34°06.20′	172°06.80′E	388–406	DCMB	*Wanglaophenia rostrifrons* sp. nov.
F933	15.10.68	34°24.10′	173°10.30′E	252	TAM	*Crateritheca zelandica*, *Lytocarpia spiralis*, *Nemertesia ciliata*
F936	17.10.68	36°09.00′	174°45.00′E	53	TAM	*Nemertesia* cf. *ciliata*
G35	24.2.67	43°45.50′	178°00.00′E	433	DP	*Lytocarpia spiralis*
G67	28.2.67	43°24.00′	177°00.00′W	91	DP	*Lytocarpia vulgaris* sp. nov.
G172	17.1.68	43°39.00′	179°28.02′W	373	DP	*Lytocarpia subdichotoma*
G173	"	43°39.00′	179°28.02′W	373	DP	*Aglaophenia ctenata*
G185	18.1.68	44°07.98′	179°24.00′W	410	DP	*Sertularella leiocarpa*
G188	"	44°01.02′	179°34.98′W	344	DP	*Aglaophenia ctenata*
G189	"	44°00.00′	179°34.98′W	377	DP	*Lytocarpia spiralis*
G250	22.1.68	43°22.98′	179°28.98′E	395	TAM	*Plumularia setacea*
G268	23.1.68	43°22.02′	179°22.02′E	424	TAM	*Stegolaria irregularis*, unidentifiable hydroids.
G273	24.1.68	43°30.00′	179°15.00′E	410	TAM	Dried out sample: Unidentifiable hydroid remains.
G276A	"	43°35.00′	179°15.00′E	413	TAM	*Acryptolaria conferta conferta*, *Lytocarpia subdichotoma*
G279A	"	43°39.00′	179°07.00′E	426	TAM	Unidentifiable, probably hydroids.
G284A	"	43°26.00′	179°01.00′E	421	TAM	Unidentifiable hydroid remains.
G290A	25.1.68	43°40.00′	179°01.00′E	327	TAM	*Cryptolaria exserta*, unidentifiable hydroid remains.
G292	"	43°42.00′	179°48.00′E	454	TAM	*Halecium beanii*
G305	26.1.68	43°13.02′	179°19.98′W	455	TAM	*Halopteris infundibulum*
G307A	"	44°07.00′	179°13.00′W	402	TAM	*Acryptolaria conferta conferta*, *Cryptolaria exserta*, *Nemertesia* sp., *Plumularia setacea*, unidentifiable hydroids.
G364	3.2.68	43°38.00′	178°32.00′W	424	DP	*Lytocarpia subdichotoma*
G403	7.2.68	43°54.00′	179°43.98′W	391	TAM	*Aglaophenia ctenata*
G651	17.1.70	44°00.00′	174°31.00′E	572	TAM	*Lytocarpia spiralis*, *L. subdichotoma*
G652	"	44°00.00′	174°10.00′E	557	TAM	*Lytocarpia subdichotoma*
G656	"	44°00.00′	172°00.00′E	13	TAM	*Amphisbetia trispinosa*, *Symplectoscyphus subarticulatus*
G659	18.1.70	44°25.00′	171°18.00′E	18	TAM	*Amphisbetia operculata*, *Plumularia setaceoides*
G663	"	44°24.00′	173°30.00′E	612	TAM	*Aglaophenia ctenata*
G672	19.1.70	45º20.00′	170º57.00′E	29	TAM	*Symplectoscyphus johnstoni johnstoni*, *Pycnotheca mirabilis*
G674	"	45°27.00′	171°12.00′E	98	TAM	*Symplectoscyphus subarticulatus*
G680	20.1.70	45°43.00′	171°02.39′E	113	TAM	*Cryptolaria prima*
G683	"	45°42.90′	170°36.50′E	5	DP	*Amphisbetia trispinosa*
G685	"	45°53.00′	170°48.00′E	68	TAM	*Filellum serpens*, *Salacia bicalycula*, *Symplectoscyphus subarticulatus*
G686	"	45°53.00′	170°54.00′E	108	TAM	*Cryptolaria prima*, *Filellum serpens*, *Salacia bicalycula*, *Sertularella integra*,*Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*
G687	"	45°53.00′	171°00.00′E	245	TAM	*Salacia bicalycula*, *Sertularella integra*, *Symplectoscyphus subarticulatus*
G688	"	46°10.00′	171°00.20′E	731	TAM	*Lytocarpia subdichotoma*
G689	"	46°09.00′	170°48.00′E	133	TAM	*Salacia bicalycula*
G691	21.1.70	46°09.00′	170°24.00′E	63	TAM	*Symplectoscyphus johnstoni johnstoni*
G692	"	46°09.00′	170°11.40′E	23	TAM	*Amphisbetia fasciculata*, *Stereotheca elongata*, *Plumularia setacea*
G693	"	46°15.00′	170°03.00′E	38	TAM	*Plumularia setacea*
G694	"	46°20.00′	169°52.00′E	19	TAM	*Halecium sessile*, *Amphisbetia fasciculata*, *A. trispinosa*, *Symplectoscyphus johnstoni johnstoni*, *Stereotheca elongata*, *Plumularia* sp.
G695	"	46°19.70′	170°11.80′E	73	TAM	*Salacia bicalycula*, *Aglaophenia laxa*, *Halopteris campanula*
G696	"	46°18.50′	170°34.50′E	690	TAM	*Acryptolaria conferta conferta*, *Lytocarpia spiralis*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
G697	"	46°19.50′	170°42.00′E	528	TAM	*Sertularella* sp. 1; *Symplectoscyphus johnstoni johnstoni, S. paulensis, Lytocarpia subdichotoma, Halopteris infundibulum*
G701	22.1.70	46°20.00′	171°30.00′E	1400	TAM	*Lytocarpia* sp.
G704	23.1.70	46°17.00′	172°37.00′E	1600	TAM	Unidentifiable remains, probably an athecate hydroid.
G707	24.1.70	45°48.20′	170°56.20′E	91	TAM	*Cryptolaria prima, Synthecium elegans*
G708	"	45°47.50′	170°51.00′E	59	DP	*Halecium delicatulum, Symplectoscyphus johnstoni johnstoni, S. subarticulatus, Aglaophenia laxa, Plumularia* sp.
G834	21.2.71	38°47.80′	171°54.50′E	477	TAM	*Lytocarpia subdichotoma*
G835	23.2.71	40°47.60′	174°09.60′E	62	TAM	*Salacia bicalycula, Parascyphus simplex, Synthecium elegans, Clytia hemisphaerica*
G874	1.11.70	06°07.50′	103°36.00′E	62	TO	*Monoserius pennarius*
G875	17.11.70	34°56.50′	115°03.30′E	155	TO	*Zygophylax unilateralis, Gymnangium birostratum, Monoserius pennarius*
G886	27.11.70	48°14.00′	179°41.00′E	335	TO	*Aglaophenia ctenata*
G924	11.1.71	53°32.00′	169°41.00′E	500	TO	*Lytocarpia spiralis*
G927	12.1.71	53°32.80′	172°16.60′E	580	TO	*Zygophylax pseudafricanus* sp. nov.
G937	16.1.71	49°41.30′	167°16.50′E	520	TO	*Lytocarpia subdichotoma*
G938	17.1.71	49°33.90′	166°44.50′E	490	TO	*Aglaophenia ctenata*
G941	17.5.73	39°59.70′	178°08.00′E	665	TAM	*Aglaophenia ctenata*
G942	27.5.73	39°56.40′	178°40.50′E	3250	TAM	*Acryptolaria conferta conferta*
I1	2.5.75	35°48.10′	174°40.00′E	79	TB	*Clytia hemisphaerica*
I14	"	35°24.55′	174°28.00′E	50	DR	*Filellum* cf. *serpens, Lytocarpia chiltoni*
I15	4.5.75	35°24.55′	174°28.00′E	50	DR	*Acryptolaria minima, Lytocarpia chiltoni*
I19	5.5.75	35°25.20′	175°00.40′E	270	DR	*Lytocarpia chiltoni*
I24	"	35°22.30′	175°47.20′E	615	T	Unrecognisable hydroid remains.
I25	6.5.75	35°11.10′	175°06.10′E	675	T	*Lytocarpia subdichotoma*
I35	7.5.75	35°00.40′	175°00.20′E	596	TAM	*Aglaophenia hystrix* sp. nov.
I39	8.5.75	35°00.00′	174°12.00′E	175	TB	*Nemertesia* sp.
I69	14.5.75	36°11.20′	175°17.70′E	23	UWH	*Sertularia marginata*
I72	20.7.75	29°04.40′	168°01.10′E	55	DP/DR	*Hebellopsis scandens, Synthecium subventricosum*
I73	"	29°00.20′	168°00.80′E	51	DR	*Sertularia distans, Monostaechas quadridens*
I74	"	28°54.90′	167°55.50′E	44	DR	*Sertularia tumida*
I75	"	28°45.00′	167°55.20′E	70	TAM	*Hebellopsis scandens, Halecium delicatulum, Halecium* sp., *Parascyphus simplex, Synthecium subventricosum, Monostaechas quadridens, Orthopyxis affabilis* sp. nov.
I80	22.7.75	29°06.00,	167°56.70′E	34	DR	*Amphisbetia minima*
I84	"	29°07.80′	168°09.89′E	65	DR	*Symplectoscyphus johnstoni johnstoni*
I85	"	29°07.90′	168°15.00′E	290	TAM	*Synthecium protectum*
I87	23.7.75	29°25.00′	167°50.00′E	89	DR	Dried out sample: *Parascyphus simplex*
I89	"	29°25.30′	168°00.20′E	65	TAM	*Filellum antarcticum, Halecium tenellum, Dynamena quadridentata, Salacia desmoides, Symplectoscyphus candelabrum* sp. nov.; *S. odontiferus* sp. nov.; *Macrorhynchia philippina, Monotheca pulchella*
I91	"	29°24.80′	168°10.00′E	342	TAM	*Synthecium megathecum*
I340	16.11.77	34°14.70′	172°51.70′E	105	DR	*Crateritheca novaezelandiae, C. zelandica, Salacia bicalycula, Symplectoscyphus columnarius, Lytocarpia chiltoni, Corhiza scotiae*
I341	"	34°14.70′	172°50.80′E	89	TAM	*Crateritheca insignis, Symplectoscyphus subdichotomus, Aglaophenia laxa, Lytocarpia chiltoni, L. incisa, Corhiza scotiae*
I342	"	34°07.90′	172°47.10′E	102	TAM	*Lytocarpia spiralis, Symplectoscyphus johnstoni johnstoni*
I347	17.11.77	34°33.60′	173°35.20′E	330	DR	*Lytocarpia vulgaris* sp. nov.
I351	19.11.77	34°40.60′	173°50.50′E	0	TAL	*Aglaophenia difficilis* sp. nov., *Gymnangium tubulifer*
I352	"	36°39.00′	174°04.20′E	0	TAM	*Aglaophenia difficilis* sp. nov.
I353	"	34°45.40′	174°04.10′E	530	DN	*Lytocarpia subdichotoma*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
I366	20.11.77	34°42.30′	174°17.60′E	705	TAM	*Zygophylax cervicornis*, *Aglaophenia hystrix* sp. nov., *Gymnangium tubulifer*
I368	23.11.77	34°12.80′	173°01.30′E	452	TAM	*Aglaophenia ctenata*
I371	"	34°11.60′	172°49.50′E	118	TAM	Dried out sample: *Craterithecа zelandica*, *Sertularella integra*, *Sertularella* sp. 2; *Symplectoscyphus columnarius*, *Lytocarpia chiltoni*, *Corhiza scotiae*
I377	"	34°38.30′	173°46.50′E	567-478	TAM	*Lytocarpia chiltoni*
I378	"	34°38.30′	173°46.50′E	567-478	TAM	*Plumularia setacea*
I667	13.3.79	47°45.59′	179°17.00′W	648	TB	*Halecium sessile*
I705	21.3.79	47°30.00′	178°45.00′E	39	DR	*Symplectoscyphus confusus*
I707	22.3.79	47°20.00′	179°30.00′E	552	DR	*Acryptolaria patagonica*, *Halecium* sp., *Halopteris infundibulum*
I709	"	47°39.90′	179°59.80′E	340	DR	Unidentifiable hydroid remains.
I731	10.5.79	25°20.20′	159°39.00′E	68	TAM	*Lytocarpia howensis*
I737	11.5.79	24°03.80′	159°27.70′E	52	DR	*Gymnangium hians*
I739	"	23°57.90′	159°21.50′E	465	TAM	Unidentifiable hydroid remains, probably species of *Eudendrium*.
J15	20.3.70	45°47.00′	170°43.40′E	1	D	*Amphisbetia fasciculata*, *Symplectoscyphus johnstoni johnstoni*
J17	10.4.70	41°09.70′	173°06.30′E	14	TAM	*Sertularella robusta*, *Sertularia unguiculata*, *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*
J21	14.4.70	39°00.00′	169°39.00′E	560	TAM	*Gymnangium tubulifer*
J22	15.4.70	39°00.00′	169°26.00′E	545	TAM	*Lytocarpia subdichotoma*
J23	"	39°00.00′	169°13.00′E	525	TAM	*Gymnangium tubulifer*, *Lytocarpia subdichotoma*
J24	15.4.70	39°00.00′	169°00.00′E	516	TAM	*Lytocarpia subdichotoma*
J27	16.4.70	38°50.00′	169°26.00′E	508	TAM	*Gymnangium tubulifer*, *Lytocarpia subdichotoma*
J28	"	38°50.00′	169°39.00′E	548	TAM	*Nemertesia* cf. *ciliata*, *Plumularia setacea*
J29	"	38°40.00′	169°39.00′E	550	TAM	*Lytocarpia subdichotoma*
J30	"	38°40.00′	169°26.00′E	550	TAM	*Lytocarpia subdichotoma*
J31	"	38°39.00′	169°15.00′E	525	TAM	*Gymnangium tubulifer*, *Lytocarpia subdichotoma*
J32	"	38°40.00′	169°00.00′E	502	TAM	*Lytocarpia subdichotoma*
J33	17.4.70	38°25.200	169°02.00′E	502	TAM	*Lytocarpia subdichotoma*
J35	"	38°30.00′	169°26.00′E	546	TAM	*Gymnangium tubulifer*, *Lytocarpia subdichotoma*
J37	18.4.70	37°00.00′	170°26.00′E	2005	TAM	*Acryptolaria conferta conferta*
J42	19.4.70	37°50.00'	170°26.00′E	2008	TAM	*Acryptolaria conferta conferta*
J54	16.5.70	43°12.50′	175°26.00′E	102	DMA	*Pycnotheca mirabilis*
J657	4.9.74	37°28.20′	179°03.20′E	696	TAM:	*Aglaophenia ctenata*
J665	5.9.74	35°44.60′	178°28.60′E	289	DR	*Stegolaria irregularis*
J674	7.9.74	36°41.85′	175°55.20′E	3	UWH	*Aglaophenia acanthocarpa*
J676	8.9.74	37°22.50′	177°11.70′E	341	DR	*Lytocarpia subdichotoma*
J679	"	37°21.15′	177°11.75′E	316	DR	*Filellum serpens*, *Lytocarpia subdichotoma*
J680	"	37°25.80′	177°11.75′E	328	DR	*Filellum serratum*, *Sertularella acutidentata acutidentata*, *Gymnangium japonicum*, *G. prolifer*, *Lytocarpia chiltoni*
J701	10.9.74	37°33.13′	177°00.50′E	370	DR	*Aglaophenia ctenata*
J953	18.6.81	34°39.60′	172°13.10′E	270	DR	*Salacia bicalycula spiralis*, *Sertularella geodiae*, *Synthecium megathecum*, *Nemertesia pinnata* sp. nov., *Plumularia setacea*
J954	"	34°38.00′	172°13.50′E	204	DR	*Sertularella geodiae*, *Lytocarpia chiltoni*, *Halopteris crassa*
J958	19.6.81	34°22′	173°5.5′E	98–105	DR	*Synthecium megathecum*, *Nemertesia elongata*
J970	21.6.71	35°08.60′	174°21.10′E	86	DR	*Sertularella integra*, *S. robusta*, *S. simplex*, *Tasmanaria edentula*, *Synthecium* cf. *campylocarpum*, *Aglaophenia acanthocarpa*, *Gymnangium longirostre*, *Lytocarpia chiltoni*, *L. epizoica* sp. nov., *L. vulgaris* sp. nov.
J974	22.6.71	35°42.60′S,	175°19.20′E,	152	DR	*Nemertesia pinnatifida* sp. nov., unidentifiable hydroids.
J975	22.6.81	35°40.80′	175°23.60′E	205	DR	*Stegolaria irregularis*, *Filellum serratum*, *Zygophylax sibogae*, *Z. unilateralis*, *Dictyocladium watsonae*, *Salacia bicalycula spiralis*, *Corhiza scotiae*, *Plumularia setacea*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
K801	22.7.74	29°14.70′	177°51.70′W	18	UWH	*Salacia desmoides*, *Sertularella diaphana*
K819	24.7.74	29°13.24′	177°56.30′W	100	TAM	*Dictyocladium monilifer*
K820	"	29°13.30′	177°59.80′W	95	TAM	*Modeeria rotunda*, *Acryptolaria conferta conferta*
K825	25.7.74	28°47.80′	177°47.80′W	145 m	DR	*Stegolaria irregularis*, *Acryptolaria angulata*, *Sertularella sinensis*
K840	28.7.74	30°17.60′	178°25.30′W	398	TAM	*Acryptolaria conferta conferta*
K842	29.7.74	30°10.20′	178°35.90′W	325	DR	*Acryptolaria crassicaulis*
K844	"	30°11.20′	178°33.80′W	290	DR	*Cryptolaria pectinata*
K851	30.7.74	30°33.30′	178°31.80′W	106	DR	*Acryptolaria crassicaulis*, *Aglaophenia* cf. *laxa*
K855	"	30°33.20′	178°31.60′W	125	DR	*Acryptolaria angulata*, *A. conferta conferta*, *Symplectoscyphus columnarius*
M763	29.3.81	44°36.20′	167°49.73′E	27	UWH	*Hebellopsis scandens*, *Parascyphus simplex*, *Synthecium elegans*, *Tulpa diverticulata*
M778	31.3.81	44°29.00′	167°30.20′E	20	UWH	*Stereotheca elongata*
M793	7.4.81	44°36.02′	167°49.42′E	30	UWH	*Sertularella g. gayi*
N369	10.12.74	34°24.60′	172°26.30′E	101	TB	*Crateritheca insignis*, *Dictyocladium monilifer*, *Lytocarpia chiltoni*,*Corhiza scotiae*
N928	28.8.77	41°36.60′	175°16.80′E	550	DR	Unrecognisable hydroid remains.
O153	4.3.77	37°04.85′	174°41.20′E	4	DN	*Dictyocladium monilifer*
O159	6.3.77	37°02.30′	174°38.38′E	10	DN	*Amphisbetia fasciculata*
O164	8.3.77	37°00.70′	174°40.20′E	1	DN	*Amphisbetia fasciculata*
O170	"	37°00.53′	174°38.47′E	16	DN	*Halopteris campanula*
O184	9.3.77	37°03.25′	174°40.87′E	15	DN	*Filellum serpens*, *Dictyocladium monilifer*
O324	22.12.78	34°58.05′	173°14.50′E	2	DN	*Obelia bidentata*
O326	23.12.78	34°54.40′	173°18.00′E	0	UWH	*Plumularia setacea*
O329B	"	34°53.70′	173°17.60′E	7	DSS	*Dictyocladium monilifer*
P7	25.1.77	32°41.00′	167°28.60′E	150	DR	*Synthecium subventricosum*, *Gymnangium explorationis* sp. nov., *Lytocarpia* sp., *Corhiza scotiae*, *Halopteris crassa*
P16	26.1.77	29°36.30′	168°05.00′E	310	DR	*Lytocarpia spiralis*
P21	"	29°31.80′	167°59.20′E	52	DR	*Symplectoscyphus subdichotomus*
P34	28.1.77	28°57.80′	167°45.80′E	370	TAM	*Plicatotheca anitae*, *Modeeria rotunda*, *Cryptolaria pectinata*, *Filellum serratum*, *Dictyocladium watsonae*, *Sertularella areyi*, *Synthecium protectum*, *Billardia hyalina* sp. nov.
P39	29.1.77	29°10.40′	167°51.70′E	77	DR	*Symplectoscyphus subdichotomus*
P61	5.2.77	35°14.30′	172°42.30′E	216	TB	*Lytocarpia spiralis*
P64	7.2.77	34°52.50′	172°34.40′E	155	TB	*Lytocarpia spiralis*
P65	"	35°05.00′	172°26.60′E	302	TB	*Lytocarpia spiralis*
P82	28.5.77	31°49.80′	159°19.70′E	78	DR	*Cryptolaria pectinata*, *Symplectoscyphus howensis* sp.nov., *Aglaophenia sinuosa*
P84	"	31°41.40′	159°15.00′E	59	DR	*Zygophylax antipathes*, *Sertularia marginata*, *Hincksella sibogae*, *Aglaophenia laxa*, *A. sinuosa*, *Gymnangium ascidioides*, *G. humile*
P100	30.5.77	31°43.40′	159°12.30′E	–	DR	*Aglaophenia laxa*, *Gymnangium ascidioides*
P101	"	31°41.50′	159°02.80′E	32	DR	*Gymnangium ascidioides*
P103	"	31°37.60′	159°04.00′E	41	DR	*Aglaophenia laxa*
P114	31.5.77	31°23.90′	159°05.40′E	85	DR	*Zygophylax antipathes*, *Zygophylax tizardensis*, *Aglaophenia laxa*, *A. sinuosa*
P239	20.10.77	36°41.50′	156°11.50′E	140	DR	*Plumularia cf. insignis*
P441	20.6.78	34°24.00′	172°16.80′E	120	DP	*Aglaophenia ctenata*
P442	"	34°24.00′	172°24.90′E	103	DP	*Tasmanaria edentula*
P444	"	34°29.10′	172°35.80′E	30	DP	*Aglaophenia laxa*
P927	18.4.80	40°50.10′	168°14.80′E	1009	SE	*Gymnangium tubulifer*, *Lytocarpia subdichotoma*
P934	20.4.80	41°39.10′	165°13.60′E	4405	SE	*Acryptolaria conferta conferta*
P944	31.5.80	27°20.80′	179°20.90′W	673	DR	*Cryptolaria pectinata*
P946	1.6.80	25°59.10′	179°18.10′W	660	DR	*Acryptolaria conferta conferta*, *A. patagonica*, *Cryptolaria pectinata*, *Synthecium protectum*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
P967	11.6.80	29°14.70′	177°51.00′W	3	UWH	*Macrorhynchia phoenicea*
P970	17.6.80	39°30.00′	178°50.00′E	3391	SEB	Dried out sample: unidentifiable hydroid remains.
Q11	15.3.78	43°44.10′	179°31.62′W	300	DR	*Halecium ralphae*, unidentifiable hydroids.
Q25	22.3.78	44°26.22′	176°38.40′W	360	DR	*Stegolaria irregularis*, *Cryptolaria exserta*, *Corhiza scotiae* unrecognisable hydroid, possibly *Stegolaria* sp.
Q31	23.3.78	44°15.78′	176°54.78′W	340	DR	*Filellum serratum*, *Plumularia setacea*, *Obelia bidentata*
Q35	"	44°03.42′	176°49.92′W	100	DR	*Cryptolaria prima*, *Symplectoscyphus johnstoni johnstoni*, *Plumularia setacea*
Q72	3.6.78	24°52.90′S	159°37.30′E	65	TAM	*Modeeria rotunda*, *Lytocarpia brevirostris*, *L. howensis*
Q85	2.11.78	41°13.40′S	174°28.50′E	340	DR	*Modeeria rotunda*, *Cryptolaria prima*, *Hebellopsis scandens*, *Lafoea dumosa*, *Sertularella integra*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *S. subarticulatus* *Symplectoscyphus* sp.; *Clytia mollis.* All species totally intergrown.
Q104	9.11.78	45°01.60′	167°15.40′E	0	UWH	*Hebellopsis scandens*, *Synthecium elegans*
Q116	13.11.78	41°18.00′	173°52.20′E	28	DR	Dried out sample: *Halecium* cf. *sessile*, *Symplectoscyphus subarticulatus*, *Nemertesia elongata*
Q119	14.11.78	40°57.50′	174°01.50′E	40	DR	*Filellum serpens*, *Symplectoscyphus subarticulatus*
Q135	15.12.78	41°34.00′	174°45.30′E	160	DR	*Cryptolaria pectinata*, *Filellum serpens*, *Symplectoscyphus columnarius*, *Nemertesia elongata*
Q174	17.12.78	41°37.90′	175°12.80′E	44	DB	*Lafoea dumosa*, *Dictyocladium monilifer*, *Sertularia tumida*, *Synthecium elegans*, *S. subventricosum*, *Aglaophenia laxa*, *Pycnotheca mirabilis*
Q341	14.11.79	44°07.10′	176°19.20′E	264	DR	*Cryptolaria prima*, *Halecium beanii*
Q342	"	44°10.10′	175°49.30′E	365	DR	*Cryptolaria prima*
Q720	2.3.82	41°44.00′	169°50.10′E	960	DLB	*Lytocarpia subdichotoma*, *Clytia* sp.
Q725	4.3.82	42°25.50′	171°05.50′E	37	DLB	*Opercularella humilis*, *Amphisbetia bispinosa*, *Clytia* sp.
R437	16.4.90	39°35.10′	178°25.00′E	800–440	DR	*Stegolaria irregularis*
S13	11.9.78	42°36.30′	170°38.40′E	370	DR	*Modeeria rotunda*, *Stegolaria irregularis*, *Cryptolaria prima*, *Symplectoscyphus columnarius*, *Plumularia watsii*
S14	13.9.78	48°17.30,	168°42.10′E	607	DR	*Lytocarpia tenuissima*
S16	14.9.78	49°52.20′	170°15.80′E	593	TAM	*Lytocarpia subdichotoma*
S16	"	49°50.00′	170°14.00′E	578	TAM	*Lytocarpia spiralis*, *L. subdichotoma*
S22	17.9.78	50°39.00′	167°39.60′E	400	DR	*Gymnangium japonicum*, *Lytocarpia striata* sp. nov.
S50	22.9.78	52°59.50′	172°31.00′E	–	TAM	*Modeeria rotunda* on *Eudendrium* sp.
S155	28.10.79	44°05.28′	173°11.40′E	85	TAM	*Cryptolaria prima*
S159	"	44°19.32′	173°35.52′E	525	TAM	*Acryptolaria conferta conferta*, *Gonaxia australis* sp. nov., *Gymnangium tubulifer*, *Halopteris prominens* sp. nov.
S174	30.10.79	44°06.48′	173°54.12′E	518	TAM	*Gymnangium tubulifer*
S177	"	43°53.4′	173°54.2′E	400	TAM	*Lafoea dumosa*
S184	31.10.79	43°22.38′	173°21.90′E	75	DR	*Symplectoscyphus johnstoni johnstoni*
S192	"	43°15.00′	173°49.68′E	0	DR	*Symplectoscyphus columnarius*, *Aglaophenia ctenata* (N.B., depth or locality record cannot possibly be correct).
S197	1.11.79	43°10.40′	173°51.90′E	640	DR	*Lytocarpia subdichotoma*
S198	"	43°04.30′	174°01.60′E	970	DR	*Lytocarpia subdichotoma*
S206	3.11.79	43°27.00′	175°14.80′E	70	DR	*Cryptolaria prima*
S237	16.2.80	45°56.50′	166°39.00′E	42	UWH	*Symplectoscyphus johnstoni johnstoni*, *Aglaophenia laxa*
S364	27.1.83	43°02.20′	170°17.50′E	32	TAM	*Amphisbetia bispinosa*
S377	30.1.83	42°37.30′	169°26.70′E	975	TAM	*Lytocarpia subdichotoma*
S392	7.2.83	41°07.60′	172°04.30′E	29	TAM	*Amphisbetia bispinosa*
S397	9.2.83	40°55.60′	171°37.00′E	154	TAM	*Modeeria rotunda*, *Symplectoscyphus columnarius*
S895	20.7.91	42°31.00′	170°10.00′E	836	TAM	*Lytocarpia spiralis*
T22	11.3.81	48°00.10′	180°00.00′	268	DR	*Tasmanaria pacifica* sp. nov.
T46	14.3.81	49°41.50′	178°35.00′E	580	DR	*Symplectoscyphus johnstoni johnstoni*
T88	31.3.81	44°01.98′	174°46.62′E	500	TB	Dried out and rehabilitated: *Halecium beanii*, *Lytocarpia spiralis*, *L, subdichotoma*
T803	17.2.86	41°03.10′	174°11.90′E	9	UWH	*Obelia dichotoma*

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Gear	Species and Remarks
T808	1.7.87	41°03.10′	174°11.90′E	20	UWH	*Obelia dichotoma*
U227	18.10.82	39°33.90′	169°14.70′E	604	SE	*Lytocarpia subdichotoma, Nemertesia ciliata*
U547	29.1.88	40°15.30′	166°07.10′E	2250	DR	*Acryptolaria conferta conferta, Halecium beanii*
U561	1.2.88	38°26.10′	165°48.10′E	2330–2300	DR	Possibly not a hydroid; no tissue left.
U566	2.2.88	35°05.00′	169°09.70′E	979–974	DR	*Acryptolaria patagonica*, *Carpocladus fertilis* sp. nov.
U567	3.2.88	35°00.30′	169°09.70′E	1480–1050	DR	*Plicatotheca anitae*
U594	7.2.88	30°20.10′	172°59.60′E	406	DR	*Stegolaria irregularis*, *Cryptolaria conferta conferta*
U608	10.2.88	31°53.50′	172°31.90′E	1520–1600	DR	Probably not a hydroid; no tissue left.
V364	7.9.89	44°00.69′	179°00.95′W	–	DB	*Aglaophenia ctenata*
V366	8.9.89	43°29.87′	178°59.73′W	474	TAM	*Halecium* sp., with cirriped.
V367	"	43°14.31′	179°07.18′W	471	TAM	*Aglaophenia ctenata*, *Lytocarpia subdichotoma*
V369	11.9.89	43°05.07′	178°59.94′W	399	TAM	*Stegolaria irregularis*, *Aglaophenia ctenata, Lytocarpia subdichotoma*
V370	12.9.89	42°41.70′	179°03.42′W	1022	TAM	*Halecium* sp., *Lytocarpia spiralis*
V371	"	42°59.39′	179°03.30′W	533	TAM	*Lytocarpia subdichotoma*
V372	13.9.89	43°20.22′	178°58.88′E	415	TAM	*Lytocarpia spiralis*
V373	"	43°35.48′	178°59.50′E	385	TAM	*Halecium* sp.; *Aglaophenia ctenata, Lytocarpia spiralis*
V376	14.9.89	44°10.29′	179°00.04′E	1238	DBA	*Lytocarpia spiralis*
V383	15.9.89	42°49.32′	176°59.59′E	505	DBA	*Lytocarpia subdichotoma*
V387	16.9.89	43°49.62′	176°59.82′E	498	TAM	Fully dried out sample: unrecognisable hydroids.
V391	17.9.89	42°49.97′	176°59.91′E	476	TAM	*Lytocarpia subdichotoma*
V393	"	42°54.89′	176°12.53′E	538	TAM	*Lytocarpia subdichotoma*
W252	15.9.93	43°37.7′	178°59.8′E	400–428	TAM	*Lafoea dumosa*, *Halecium* sp., *Aglaophenia ctenata, Lytocarpia subdichotoma*
W257	18.9.93	43°22.5′	179°00.0′E	400–390	TAM	*Stegolaria irregularis*, *Halecium* sp.; *Lytocarpia* cf. *similis* sp. nov.; *Corhiza scotiae*
W258	19.9.93	42°57.9′	178°59.8′E	602–549	TAM	*Lytocarpia subdichotoma*
W259	"	42°54.1′	179°00.0′E	812–725	TAM	*Lytocarpia spiralis, L. subdichotoma*
W260	"	42°57.0′	179°00.0′E	665–625	TAM	*Lytocarpia spiralis*, *L. subdichotoma*
W261	"	42°47.2′	178°59.6′E	1212–1126	TAM	*Lytocarpia spiralis*
W262	"	42°44.0′	179°00.2′E	1410–1280	TAM	*Lytocarpia spiralis*
W263	"	42°41.0′	179°00.3′E	1660–1493	TAM	*Lytocarpia spiralis*
X484	4.7.94	42°45.94′	179°54.38′W	899–1060	TO	*Acryptolaria patagonica*
X486	"	42°46.67′	179°54.83′W	910–921	TO	*Acryptolaria patagonica, Symplectoscyphus confusus*
X488	5.7.94	44°01.54′	174°34.51′W	755–940	TO	*Acryptolaria patagonica*, *Filellum serratum*
X514	10.7.94	42°52.67′	175°49.52′W	940–944	TO	*Acryptolaria patagonica*, *Filellum serratum*, *Hebella striata*
X521	11.7.94	42°58.16′	175°27.91′W	862–865	TO	*Lytocarpia subdichotoma*
Z2363	1.1.71	37°21.00′	176°26.00′E	311	T	*Lytocarpia tenuissima*
Z2364	"	37°25.00′	176°26.00′E	277	T	*Cryptolaria pectinata, Lytocarpia spiralis*
Z2366	"	37°19.00′	176°26.50′E	366	T	*Lytocarpia spiralis*
Z2368	"	37°21.00′	176°24.00′E	183	T	Unrecognisable hydroid stem.

BS Cat. No.	Date	Latitude (° S)	Longitude	Depth (m)	Species and Remarks
163	30.8.51	40°52.6′	174°49.5′E	137	*Cryptolaria prima*, *Synthecium elegans*
166	"	40°49.6′	174°36.8′E	148	*Cryptolaria pectinata*, *Salacia bicalycula*, *Symplectoscyphus subarticulatus*
168	19.1.51	40°46.2′	174°27.0′E	137	*Nemertesia* cf. *cymodocea*
169	2.9.51	40°40.6′	174°03.2′E	201	*Synthecium elegans*
172	1.9.51	40°48.6′	174°06.6′E	60	*Clytia hemisphaerica*
180	21.3.54	41°28.5′	174°50′E	274	*Cryptolaria prima*,*Amphisbetia operculata*, *Symplectoscyphus columnarius*, *Nemertesia cymodocea*
195	3.1.57	40°50′	173°58′E	29	*Halecium beanii*
202	23.1.57	45°44′	171°2′E	139	*Salacia bicalycula*, *Sertularella gayi gayi*, *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*, *Synthecium elegans*
210	28.2.57	37°10′	176°23.5′E	732	*Aglaophenia ctenata*, *A. hystrix* sp. nov.; *Gymnangium tubulifer*, *Lytocarpia subdichotoma*, *Kirchenpaueria bonnevieae*
284	26.2.72	North Arm, Port Pegasus, Stewart Is.		46–49	*Filellum* sp. 1; *Sertularella gayi gayi*
352	7.2.74	37°34′	179°22′E	1518	*Lytocarpia spiralis*
361	13.2.74	36°05.5′	174°45′E	49-57	*Plumularia brachiata*
368	15.2.74	35°34′	174°39′E	102	*Halopteris campanula*, *Nemertesia* sp.
379	16.2.74	35°10′	174°11′E		*Acryptolaria conferta conferta*, *Filellum serpens*, *Symplectoscyphus johnstoni johnstoni*, *Halopteris campanula*
386	18.2.74	Middle South East Bay, Great King Is., Three King's Islands		42-46	*Crateritheca billardi*, *Salacia farquhari*
389	"	Between Palmer Rocks & Southeast Is., Three Kings Islands		82	*Filellum* sp. 2; *Halecium* sp.; *Crateritheca novaezelandiae* , *Dictyocladium monilifer*, *Symplectoscyphus johnstonni johnstoni*, *Synthecium elegans*, *Lytocarpia chiltoni*, *L.incisa*, *Halopteris campanula*
390	"	34°01′	172°07′E,	604	*Crateritheca zelandica*,*Symplectoscyphus spiraliformis* sp. nov., *Aglaophenia laxa*, *Lytocarpia chiltoni*, *Nemertesia* sp.
392	"	34°08.5′	172°11′E	102	*Crateritheca novaezelandiae*, *Tasmanaria edentula*, *Lytocarpia chiltoni*, *L. incisa*, *Halopteris campanula*
393	19.2.74	34°11′	172°10′E	91.5	*Zygophylax polycarpa* sp. nov., *Lytocarpia chiltoni*, *L. incisa*
394	"	34°11′	172°10′E	91.5	*Crateritheca zelandica*, *Symplectoscyphus johnstoni johnstoni*, *Tasmanaria edentula*, *Lytocarpia chiltoni*, unrecognisable hydroid.
396	"	34°13′	172°11.5′E	256	*Dictyocladium amplexum* sp. nov., *D. monilifer*, *Symplectoscyphus columnarius*, *Synthecium elegans*, *Lytocarpia chiltoni*, *Nemertesia cymodocea*, *Nemertesia* sp.
398	"	34°21′	172°37′E	90	*Crateritheca insignis*, *C. novaezelandiae*, *Dictyocladium thuja* sp. nov., *Sertularella integra*, *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*, *Aglaophenia laxa*, *Lytocarpia chiltoni*, *L. vulgaris* sp. nov.; *Corhiza scotiae*, *Halopteris crassa*, *Nemertesia cymodocea*,*Plumularia anonyma* sp. nov.
399	20.2.74	Off Spirits Bay		101–113	*Symplectoscyphus columnarius*, *Aglaophenia acanthocarpa*, *Lytocarpia chiltoni*, *Corhiza scotiae*
402	"	34°26′	173°14′E	146	*Lytocarpia chiltoni*
410	22.2.74	Main channel, Whangaroa Harbour entrance		20	*Hebellopsis scandens*,*Dictyocladium monilifer*, *Parascyphus simplex*
432	30.12.75	Between Titi Island & Alligator Head Marlborough Sounds		84–88	*Nemertesia cymodocea*
437	25.10.75	Bearing 338°T. 3.2 n. miles off Fleetwood Bluff, Raoul Island		54	*Modeeria robusta*, *Sertularella sinensis*, *Synthecium megathecum*
438	28.10.75	Bearing 110°T. 2.2 n miles off Nugent Island		165-146	*Stegolaria irregularis*, *Stegolaria operculata*
457	11.11.76	35°12.6′	174°16.4′E	32–40	*Stereotheca elongta*, *Plumularis setacea*, *Obelia* sp. 1

BS Cat. No.	Date	Latitude (° S)	Longitude	Depth (m)	Species and Remarks
479	21.1.76	16-20 miles off Waiau River		640–512	*Lytocarpia spiralis*, *L. subdichotoma*
480	29.11.76	41°26.5′	174°46.5′E	106–99	*Cryptolaria pectinata*,*Filellum antarcticum*,*Salacia bicalycula*, *Sertularella gayi gayi*, *S. integra*,*S. stolonifera* sp. nov.; *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*, *Aglaophenia laxa*, *Corhiza scotiae*, *Nemertesia cymodocea*, *Plumularia*/*Corhiza* sp.; *Campanularia hicksoni*, *Campanularia*/*Clytia* sp.
482	1.3.76	40°51′	174°58′E	64	*Dictyocladium* cf. *reticulatum*, *Salacia bicalycula spiralis*, *Sertularella* cf. *robusta*, *Symplectoscyphus columnarius*, *S. subarticulatus*, *Synthecium elegans*, *Corhiza scotiae*, *Nemertesia ciliata*, *Plumularia setacea*
486	"	40°11′	174°49′E	58–64	*Hebellopsis scandens*, *Dictyocladium monilifer*, *Sertularella gayi gayi*, *Plumularia setacea*
488	2.3.76	40°09.5′	174°36′E	82	*Sertularella gayi gayi*, *Synthecium megathecum*
496	"	40°33.5′	174°59.5′E	86–88	*Nemertesia ciliata*
500	3.3.76	40°57.5′	174°18′E	139–144	*Cryptolaria prima*
509	4.3.76	40°33′	174°07′E	132	*Symplectoscyphus subarticulatus*, *Nemertesia elongata*
510	"	40°38.5′	174°01′E	183–187	*Cryptolaria prima*, *Nemertesia ciliata*
511	5.3.76	40°46′	173°52.5′E	18	*Cryptolaria prima*
512	"	40°47′	173°48′E,	62	*Cryptolaria prima*, *Filellum serratum*, *Dictyocladium monilifer*, *Salacia bicalycula spiralis*, *Symplectoscyphus subarticulatus*, *Synthecium subventricosum*, *Halopteris campanula*, *Plumularia congregata* sp. nov.; *Billardia novaezealandiae*
514	"	40°57.5′	174°01.5′E	29	*Halopteris campanula*, *Plumularia setacea*
519	6.3.76	41°02′	174°33′E	256–186	*Modeeria rotunda*, *Cryptolaria prima*, *Filellum serratum*, *Hebellopsis scandens*, *Halecium beanii*, *Sertularella integra*, *Symplectoscyphus johnstoni johnstoni*, *Synthecium megathecum*, *Antennella secundaria*, *Nemertesia ciliata*, *Plumularia setacea*
522	8.3.76	40°49′	173°00.5′E	6-9	*Symplectoscyphus subarticulatus*
543	12.3.76	41°13.5′	174°30.5′E	315-293	*Nemertesia elongata*
559	27.9.76	43°14′	173°39′E	1006–512	*Aglaophenia ctenata*, *Lytocarpia spiralis*, *L. subdichotoma*, *Halopteris infundibulum*
561	29.9.76	41°24′ (51°24′on label),	174°33′E	256-274	*Cryptolaria prima*, *Filellum serpens*, *Dictyocladium monilifer*, *Sertularella gayi gayi*, *S. robusta*, *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*, *Halopteris campanula*, *Nemertesia cymodocea*
571	10.9.76	29°18.8′	177°54.2′W	274-21	*Stegolaria irregularis*, *Aglaophenia digitulus* sp. nov.; *Lytocarpia spiralis*
581	no date	29°13.96′	177°52.84′W	567-530	*Gymnangium hians*
621	no date	41°18.42′	174°21.33′E	120	*Modeeria rotunda*, *Cryptolaria prima*, *Hebellopsis scandens*, *Dictyocladium monilifer*, *Salacia bicalycula*, *Sertularella integra*, *Symplectoscyphus subarticulatus*, *Nemertesia elongata*, *Plumularia anonyma* sp. nov.; *Clytia hemisphaerica*, *Orthopyxis mollis*
630	13.4.78	42°36.1′–42°35.0′	170°40.0′–170°34.7′E	300	*Stegolaria irregularis*, *Acryptolaria patagonica*, *Cryptolaria exserta*, *Sertularella gayi gayi* ,*Corhiza scotiae*, *Nemertesia* cf. *elongata*, *Nemertesia* sp., *Plumularia*/*Corhiza* sp.
668	14.1.79	41°55.9′	174°43.2′E	454-424	*Lafoea dumosa*, *Symplectoscyphus columnarius*, *Aglaophenia ctenata*, *Gymnangium tubulifer*, *Nemertesia ciliata*
673	16.1.79	38°15.2′	178°38.6′E	139	*Corhiza* cf. *scotiae*, *Nemertesia* sp.
678	17.1.79	37°36.3′	178°53.1′E	74	*Salacia bicalycula*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *Aglaophenia laxa*, *Lytocarpia incisa*, *L. vulgaris* sp. nov., *Corhiza scotiae*, *Nemertesia elongata*
679	"	37°35.8′–37°35.6′	178°52.7-178°52.3′E	49	*Anthohebella parasitica*, *Crateritheca insignis*, *Dictyocladium monilifer*, *Salacia bicalycula spiralis*, *Sertularella* cf. *robusta*, *Sertularia tumida*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *Aglaophenia laxa*, *Corhiza scotiae*, *Lytocarpia incisa*, *Nemertesia elongata*

BS Cat. No.	Date	Latitude (° S)	Longitude	Depth (m)	Species and Remarks
682	"	37°35.0′	178°42.9′′E	129	*Filellum serratum*, *Zygophylax sibogae*, *Halecium delicatulum*, *Nemertesia pinnatifida* sp. nov.
697	19.1.79	37°25.2–37°25.0′	177°11.8′-177°11.3′E	318–288	*Cryptolaria exserta*, *Antennella quadriaurita*, *Plumularia filicula*
724	20.1.79	37°37.8′–37°40.5′	176°59.9′–177°00.8′E	129–139	*Synthecium megathecum*
742	22.1.79	37°22.0′–37°21.5′	176°28.5′–176°31.0′E	48–388	*Lytocarpia chiltoni*, *L. subdichotoma*, *Corhiza scotiae*, *Nemertesia ciliata*, *N. elongata*
756	23.1.79	37°00.8′–37°00.5′	176°12.3′–176°13.9′E	178–248	*Acryptolaria minima*, *Amphisbetia bispinosa*
761	24.1.79	37°22.0′–37°22.4′	176°40.0′–176°37.2′E	616–666	*Lytocarpia tenuissima*, rooting mass of a hydroid, probably a species of *Lytocarpia*, unidentifiable.
769	25.1.79	37°33.2′	178°50.3′E	76–71	*Hydrodendron mirabile*, *Crateritheca insignis*, *C. zelandica*, *Salacia bicalycula*, *Sertularella* cf. *robusta*, *Sertularia tumida*, *Symplectoscyphus subdichotomus*, *Parascyphus simplex*, *Lytocarpia incisa*, *L. vulgaris* sp. nov.; *Corhiza scotiae*, *Halopteris campanula*, *Pycnotheca mirabilis*, *Nemertesia elongata*
798	10.1.81	34°41.9′	172°33.5′E	103	*Nemertesia elongata*
805	11.1.81	34°48.0′	172°05.0′E	776-826	*Lytocarpia spiralis*
815	12.1.81	36°02.0′	173°35.0′E	168-180	*Cryptolaria prima*
819	"	37°06.5′	173°54.1′E	925	*Lytocarpia subdichotoma*
834	22.1.81	37°36.7′	178°51.6′E	56-63	*Filellum* sp. 2, *Crateritheca insignis*,*Salacia bicalycula spiralis*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *Parascyphus simplex*, *Synthecium subventricosum*, *Corhiza scotiae*, *Halopteris campanula*, *Monotheca togata*, *Nemertesia elongata*
835	"	37°36.4′	178°51.5′E	55-59	*Crateritheca insignis*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *Nemertesia cymodocea*
837	"	37°35.0′	178°52.8′E	31-47	*Dictyocladium monilifer*, *Symplectoscyphus j. johnstoni*
838	"	37°35.4′	178°52.9′E	34-54	*Filellum serpens*, *Crateritheca insignis*, *C. zelandica*, *Dictyocladium monilifer*, *Salacia bicalycula*, *Sertularia tumida*, *Stereotheca elongata*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *Aglaophenia laxa*, *Lytocarpia incisa*, *Antennella kiwiana*, *Halopteris campanula*, *Monotheca hyalina*, *Plumularia setacea*
840	"	37°38.4′	178°51,7′E	78–83	*Cryptolaria prima*, *Crateritheca insignis*, *C. novaezelandiae*, *C. zelandica*, *Salacia bicalycula spiralis*, *Sertularia tumida*, *Symplectoscyphus subarticulatus*, *Aglaophenia laxa*, *Lytocarpia incisa*, *Corhiza scotiae*, *Nemertesia ciliata*,*N. cymodocea*
841	"	37°35.8′	178°47.0′E	118–119	*Nemertesia* cf. *elongata*
854	25.1.81	35°56.8′–35°56.0′	176°21.4′–176°21.9′E	630–645	*Aglaophenia ctenata*, *Gymnangium tubulifer*, *Lytocarpia spiralis*
861	26.1.81	34°59.1′	174°25.2′E	327–317	*Lytocarpia spiralis*
862	"	35°00.35′	173°45.7′E	25	*Dictyocladium monilifer*, *Symplectoscyphus johnstoni johnstoni*
869	27.1.81	34°42.6′	173°14.4′E	63	*Cryptolaria prima*, *Lytocarpia phyteuma*, *L. vulgaris* sp. nov.
882	29.1.81	32°31.8′	167°29.5′E	113–118	*Sertularella robusta*, *Synthecium brucei* sp. nov., *S. megathecum*, *Lytocarpia*(?) *rigida* sp. nov., *Corhiza scotiae*
886	29.1.81	32°35.3′–32°34.0	167°41.8′E–167°39.0′E	437-422	*Tripoma arboreum*, *Cryptolaria exserta*, *C. pectinata*, *Filellum serratum*, *Zygophylax parapacificus* sp. nov., *Z. polycarpa* sp. nov., *Halecium delicatulum*, *Dictyocladium amplexum* sp. nov., *Gigantotheca maxima* sp. nov., *Gonaxia grandis* sp. nov., *Salacia macer* sp. nov., *Sertularella acutidentata acutidentata*, *S. areyi*, *Symplectoscyphus macroscyphus* sp. nov.; *Tasmanaria edentula*, *Parascyphus simplex*, *Synthecium megathecum*, *S. subventricosum*, *Lytocarpia*(?) *rigida* sp. nov., *L. spiralis*, *Wanglaophenia longicarpa* sp. nov.; *Halopteris crassa*, *Billardia novaezealandiae*
887	29.1.81	32°37.8′	167°42.4′E	572-487	*Zygophylax parapacificus* sp. nov.; *Gigantotheca maxima* sp. nov.
894	31.1.81	34°00.9′	171°44.7′E	201-216	*Cryptolaria pectinata*, *Synthecium elegans*, *Aglaophenia ctenata*, *Nemertesia* cf. *ciliata*

BS Cat. No.	Date	Latitude (° S)	Longitude	Depth (m)	Species and Remarks
899	"	33°59.8′	171°46.8′E	143-163	*Filellum serratum*; *Filellum* sp. 3, *Lafoea dumosa*, *Zygophylax polycarpa* sp. nov., *Dictyocladium monilifer*, *D. thuja* sp. nov., *Gonaxia intercalata* sp. nov., *Symplectoscyphus johnstoni johnstoni*, *S. subdichotomus*, *Tasmanaria edentula*, *Synthecium megathecum*, *S. protectum*, *S. subventricosum*, *Aglaophenia ctenata*, *Lytocarpia chiltoni*, *Billardia novaezealandiae*
902	1.2.81	34°10.5′	172°11.4′E	153	*Filellum serpens*, *Dictyocladium monilifer*, *Nemertesia* sp.
904	"	33°57.0′	172°19.0′E	128	*Hydrodendron mirabile*, *Crateritheca novaezelandiae*, *Salacia bicalycula spiralis*, *Symplectoscyphus columnarius*, *S. johnstoni johnstoni*, *Synthecium elegans*, *S. protectum*, *Lytocarpia spiralis*, *Plumularia setacea*
905	"	33°57.4′	172°19.4′E	128-123	*Zygophylax polycarpa* sp. nov.; *Hydrodendron mirabile*, *Crateritheca novaezelandiae*, *Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus columnarius*, *Tasmanaria edentula*, *Lytocarpia chiltoni*, *Corhiza splendens* sp. nov., *Halopteris crassa*, *Plumularia setacea*
907	2.2.81	34°16.8′	172°15.8′E	123-133	*Tasmanaria edentula*, *Aglaophenia ctenata*, *Gymnangium prolifer*, *Lytocarpia chiltoni*, *Nemertesia elongata*
908	"	34°16.6′	172°15.7′E	133	*Nemertesia ciliata*
911	"	34°20.2′	172°21.8′E	121	*Zygophylax binematophoratus* sp. nov., *Z. polycarpa* sp. nov., *Crateritheca insignis*, *Tasmanaria edentula*, *Lytocarpia chiltoni*, *L. vulgaris* sp. nov., *Nemertesia cymodocea*, *N. pinnatifida* sp. nov.
912	"	34°22.8′S,	172°24.6′E	121	*Dictyocladium monilifer*, *Tasmanaria edentula*, *Lytocarpia chiltoni*, *L. spiralis*
913	"	34°25.0′S,	172°27.8′E	78	*Hebellopsis scandens*, *Dictyocladium monilifer*, *Symplectoscyphus johnstoni johnstoni*, *Tasmanaria edentula*, *Lytocarpia chiltoni*, *Halopteris crassa*
916	3.2.81	34°25.0′S,	172°46.6′E	29	*Aglaophenia laxa*
918	"	34°29.4′S,	172°35.2′E	38-43	*Symplectoscyphus johnstoni johnstoni*

Other NMNZ collection material

Location	Date	Depth and/or Collector	Species and Remarks
Kermadec Islands			
Denham Bay Beach, Raoul I.	9.5.1908	W.R.B. Oliver	*Symplectoscyphus indivisus*
Denham Bay Beach, Raoul I.	14.10.1908	"	*Symplectoscyphus indivisus*
Denham Bay Beach, Raoul I.	"	"	*Amphisbetia minima* (det. J. Macken)
Norfolk Island			
Anson Bay	–.10.53	36.5 m	*Lytocarpia brevirostris*, *Plumularia caliculata*
Anson Bay	"	22–36.5 m	*Macrorhynchia philippina*
Cape Reinga & Three Kings Is	28.x.1962	90–101 m	Preserved in formalin and extremely brittle: *Filellum serpens*, *Symplectoscyphus subdichotomus*, *Synthecium gordoni* sp. nov., *Lytocarpia vulgaris* sp. nov., *Nemertesia cymodocea*, *N. elongata*
Poor Knights Islands	11.11.62	541–505 m	Marine Dept Hawl 23, Prawn Survey 1962: *Aglaophenia difficilis* sp. nov.
Northern Arch	20.11.70	46 m	*Aglaophenia laxa*
Hokianga Harbour, Opononi	21.2.63	R.K. Dell	*Aglaophenia laxa*
35°37.39′S, 173°06.07′E,	12.1.71	260 m	J01/62/71: *Lytocarpia spiralis*
Whangaruru Harbour	10.1.70	91 (A.N. Baker)	*Symplectoscyphus johnstoni johnstoni*
Cuvier Island	16.11.1908	73 (Oliver)	*Synthecium elegans*
37°30.16′S, 17638.06′E,	3.1.93	345-393	'Kaharoa', 9301/13: *Lytocarpia subdichotoma*
Between Motuhora & White Island, 37°40.2′S, 178°53.6′E,	2.5.90	117 m	non-vent area, 'Akademik Nesmeyanov': *Aglaophenia ctenata*, *Plumularia tenuissima*

Location	Date	Depth and/or Collector	Species and Remarks
Mahia, Opoutama Beach	6.9.70	A.N. Baker	*Amphisbetia operculata*,*A. trispinosa*, *Crateritheca zelandica*, *Symplectoscyphus fuscus*, *Aglaophenia laxa*
Gisborne, Tatapouri	–.12.65	L.D. Ritchie	*Symplectoscyphus fuscus*,*Aglaophenia laxa*
North of Kapiti Island	23.5.56	F. Abernethy	'Thomas Currell', *Synthecium elegans*
	5.9.56	55 m, F. Abernethy	*Cryptolaria prima*, *Nemertesia cymodocea*
Kapiti Island	15.2.71	V. Hoogard	*Lytocarpia incisa*
	13.2.72	33 m	*Cryptolaria prima*
Wellington area:			
Petone Beach	24.8.70	R.K. Dell	Washed ashore, attached to algae: *Sertularella crassiuscula*, *Obelia geniculata*
Days Bay	–.8.64	11 m, L.D. Ritchie	*Plumularia setacea*
Lyall Bay	31.8.54	J. Macken	Washed up on holdfast: *Aglaophenia* sp., *Monotheca hyalina*, *Amphisbetia episcopus*
Kau Point	14.10.54	J. Moreland	On *Macrocystis pyrifera*: *Obelia geniculata*
Turakirae Head, Palliser Bay	9.4.60	94 m, M. Buchler	Set line: *Nemertesia elongata*
Cook Strait			
VUW, Zool. Dept, T16			*Cryptolaria exserta*, *Gigantotheca raukumarai* sp. nov., *Lytocarpia chiltoni*, unrecognisable hydroid on *Antipatharia*.
40°44.28'S, 176°52.47'E,	23.1.95	462 m	'Kaharoa', 9/87: *Stegolaria irregularis*
Tory Channel, 'Ikatere'	15.8.63	171–183 m	*Dictyocladium monilifer*, *Sertularella gayi gayi*, *Sertularella integra*, *Symplectoscyphus columnarius*, *S. subarticulatus*, *Nemertesia ciliata*
French Pass	27.2.90	13-27 m, A. Stewart	*Amphisbetia bispinosa*
Queen Charlotte Sound			
Spencer Bay	10.11.61	3.6 m, J. Moreland	*Pycnotheca mirabilis*, *Plumularia setacea*
Kaikoura, Middle Bank	21.11.56	55 m, F. Abernethy	*Nemertesia cymodocea*
Otago:			
Off Green Island	30.1.55	A.J. Black	*Synthecium subventricosum*, *Plumularia setaceoides*
Otago Heads, Portobello Station Wharf	14.8.55	–	*Plumularia wattsii*
Zone 2, 4F, North Otago	–.10.62	1902 m, J. Graham	*Amphisbetia bispinosa*
Zone 2.25F, North Otago	–.10.63	1080 m, J. Graham	*Sertularella gayi gayi*, *Symplectoscyphus johnstoni johnstoni*, *Symplectoscyphus subarticulatus*
Otago Peninsula, RV 'Munida' Stn 8 45°41.85'S, 170°58.72'E,	10.5.90	97–100 m	*Cryptolaria prima*,*Filellum serpens*, *Salacia bicalycula* *Sertularella integra*, *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*
Foveaux Strait			
Oyster Beds	–.9.37	Masons Fish Shop	*Nemertesia ciliata*
Off Bench Islands	18.11.55	55 m	*Sertularella gayi gayi*, *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*, *Plumularia setacea*
J01/020/76, 48°38'S, 166°58'E,	? 1971	130 m, 'James Cook'	*Cryptolaria prima*
'Chiyo Maru 2', Stn 10, 48°39.7'S, 167°51.9'E,	18.10.88	635–642 m, R. Stewart & H. Kavale	*Cryptolaria prima*
Auckland Islands			
Between Dees Head & Tucker Point	–.1.63	26–27 m, J. Yaldwyn	*Plumularia setaceoides*
Ranui Cove	–.1.63	J.C. Yaldwyn	*Obelia geniculata*
Macquarie Island:			
Garden Cove	–.12.59	sub-littoral algae	*Silicularia rosea*
Buckles Bay	–.12.59	on *Macrocystis*	*Silicularia rosea*

Museum of New Zealand (NMNZ) Ralph Collection

A collection of tubed material and slides; only slides listed in the Ralph register have been studied.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
1	881	19.11.50	Napier water frond, drift, P.M. Ralph	*Stereotheca elongata* [as *Salacia bicalycula*].
3	882	"	Napier water frond, drift, P.M. Ralph	*Stereotheca elongata*
4	883	–		Not labelled, nothing left in bottle but some red dust and a label.
5	884	"	Napier foreshore, drift, P.M. Ralph	*Amphisbetia bispinosa*
7	885	"	Napier foreshore, drift, P.M. Ralph	*Amphisbetia minima*
8	886	"	Napier foreshore, drift, P.M. Ralph	*Amphisbetia minima*
9	887	20.11.50	Tolaga Bay, drift, P.M. Ralph,	*Amphisbetia bispinosa*. Reasonable slide in RSC as *Sertularia bispinosa* with data "vascular".
11	888	"	Matapouri Beach, drift, P.M. Ralph	*Lytocarpia incisa*
14	889	23.11.50	Opotiki Beach, drift, P.M. Ralph	*Monotheca hyalina*
15	890	27.11.50	Russell, landing ramp, drift, P.M. Ralph	*Sertularella crassiuscula*, *Plumularia setacea*
18		28.11.50	Rock pool, Moturoa Islands, Bay of Islands, P.M. Ralph	Good slide in RSC as *Sertularella crassiuscula*, no data.
19		"	Rock pool, Moturoa Islands, Bay of Islands, P.M. Ralph	Unstained Canada Balsam slide in RSC as *Clytia johnstoni*, with data: V.U.W., Zoology Dept.
21	891	29.11.50	Paihia, Bay of Islands, tidal rock pool, P.M. Ralph	*Clytia hemisphaerica*. Also unstained Canada Balsam slide in RSC as *Clytia johnstoni*, with data: V.U.W. Zoology Dept.
22	892	"	Paihia, Bay of Islands, tidal rock pool, P.M. Ralph	Red debris, no recognisable hydroid.
23	893	"	Paihia, Bay of Islands, drift, P.M. Ralph	Empty tube, no hydroid observed.
24	894	25.11.50	Te Mata, Coromandel Peninsula, in rock pool, P.M. Ralph	*Sertularella simplex*. Unstained slide in RSC as *Sertularella simplex*, no data. On label: smooth.
25	895	"	Te Mata, Coromandel Peninsula, in rock pool, P.M. Ralph,	*Phialella quadrata*
26	896	30.11.50	Tolaga Bay, on piles of wharf, P.M. Ralph	*Obelia* sp.
27	897	27.11.50	Russell, Long Beach, P.M. Ralph	*Sertularia marginata*. Three tolerable slides in RSC as *Sertularia marginata*, no data.
28	898	"	Russell, Long Beach, P.M. Ralph	*Plumularia setaceoides*. Reasonable slide in RSC as *Plumularia setaceoides*; no data.
29	899	"	Russell, Long Beach, P.M. Ralph	*Silicularia rosea*
30	900	7.5.50	Dusky Sound, 18,3 m, W.H. Dawbin	*Cryptolaria pectinata*
31	901	22.7.50	Island Bay Bank, 183 m, trawler of Fleming Gulf Survey	*Sertularella gayi gayi*
32	902	"	Island Bay Bank, 183 m, trawler of Fleming Gulf Survey	Red debris, no recognisable hydroid.
33	903	10.5.50	Bligh Sound, 55 m, W.H. Dawbin	*Tulpa diverticulata*. Three slides in RSC as *Tulpa diverticulata*; no further data.
34	904	25.10.50	Cape Reinga, drift, W.H. Dawbin	*Lytocarpia chiltoni*. Poor slide in RSC as *Thecocarpus chiltoni*; no data.
35	905	"	Cape Reinga, drift, W.H. Dawbin	Not a hydroid, probably Bryozoa or colonial Ascidia.
36	906	30.4.30	E. Papanui Inlet, dredged, D.H. Graham	*Symplectoscyphus subarticulatus*
37	907	"	NE Heads, Lyttelton Harbour, 42 m, D.H. Graham	*Amphisbetia trispinosa*. Partly dried out slide in RSC as *Sertularia bispinosa*, good. No data.
38	908	23.4.30	E. Papanui Inlet, 73 m, D.H. Graham	*Salacia bicalycula*
39	928	"	E. Papanui Inlet, 73 m, D.H. Graham	*Symplectoscyphus johnstoni johnstoni*
40	909	"	E. Papanui Inlet, 73 m, D.H. Graham	*Hebellopsis scandens*, *Halecium delicatulum*, *Sertularella integra*, *Orthopyxis crenata*
41		"	E. Papanui Inlet, 73 m, D.H. Graham	Unstained, partly dried out slide in RSC as *Orthopyxis delicata*, no further data.
50	910	12.6.27	Timaru Beach, drift, E.W. Batham	*Symplectoscyphus subarticulatus*
51	911	"	Timaru Beach, drift, E.W. Batham	*Symplectoscyphus johnstoni johnstoni*
52	912	14.2.51	Portobello Reef, intertidal, on algae, P.M. Ralph	*Amphisbetia minima*

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
53	913	14.2.51	Portobello Reef, intertidal, on algae, E.J. Batham	*Silicularia rosea*
54	914	15.2.51	Portobello Reef, intertidal, on algae, E.J. Batham	*Obelia geniculata*
55	915	"	Portobello Reef, intertidal, E.J. Batham	Fragments of algae with unrecognisable hydroid remains. Bad slide in RSC as *Aglaophenia plumosa*; no data.
57	916	11.2.51	Off Moeraki, 73 m, P.M. Ralph	*Corhiza scotiae*. Three good Canada Balsam slides in RSC as *Antennella ritchiei*; no data.
58	917	"	Off Moeraki, 73 m, P.M. Ralph	*Cryptolaria prima*. Unstained slide in RSC with label: *Cryptolaria prima*, nematophores.
59	918	11.6.51	Off Moeraki, 73 m, P.M. Ralph	*Symplectoscyphus subarticulatus*. Good slide in RSC as *Sertularella subarticulata* (fascicled at base); no data.
60	919	"	Off Moeraki, 73 m, P.M. Ralph	*Synthecium megathecum*
61	920	"	Off Moeraki, 73), P.M. Ralph	No hydroid found in tube. In register as *Symplectoscyphus johnstoni*.
62	921	"	Off Moeraki, 73 m, P.M. Ralph	*Sertularella integra*. Partly dried out slide in RSC as *Sertularella integra*, with data: Moeraki.
63	922	"	Off Moeraki, 73 m, P.M. Ralph	No hydroid found in tube. No name in register.
64	923	"	Off Moeraki, 73 m, P.M. Ralph	*Antennella kiwiana*
65	924	"	Off Moeraki, 73 m, P.M. Ralph	*Antennella kiwiana*
67	926	1950	Portobello Reef, intertidal, Hurndell	*Amphisbetia fasciculata*
68	927	30.1.51	Off Dunedin Heads (Waitaki), 73 m, E.J. Batham	*Nemertesia cymodocea*. Poor slide in RSC as *Nemertesia cymodocea* with data: very good.
69	929	14.2.51	Portobello, intertidal, E.J. Batham	*Sertularella robusta* . Reasonable slide in RSC as *Sertularella simplex intermedia*; no data.
70		"	Portobello, E.J. Batham	Reasonable slide in RSC as *Plumularia pulchella*, no data.
72	930	–	Stewart Island, Oyster shells, old museum specimen, no further data:	*Sertularella integra.* (On label: *Cryptolaria prima* (not found) and *Sertularia integra*). Partly dried out slide in RSC as *Cryptolaria prima* (peripheral fascicle). Additional unstained slide labelled: *Cryptolaria prima*, axial tube, no further data. Poor slide as *Sertularella integra*; no data.
73	931	–	No data, old museum specimen, 'Doto'.	*Symplectoscyphus subarticulatus*
77	933	–	Foveaux Strait, no further data:	*Salacia bicalycula*. Partly dried out slide in RSC as *Thuiaria buski* O.S.M.; no data.
78	934	–	Old museum specimens, A29 11A	Unrecognisable remains, probably of *Acryptolaria conferta conferta*, but too fragmentary to be certain. No slide.
78A, B,		–	Old museum specimens, A29 11A	Partly dried out slide in RSC as *Cryptolaria gracilis;* no data.
79	935	–	Bottom of S.S. 'Takapuna', no further data.	*Plumularia wattsii*
80	936	12.9.32	North Reef, Dunedin, 183 m, D.H. Graham	*Symplectoscyphus subarticulatus*. With *Symplectoscyphus* sp. Partly dried out slide in RSC as *S. subarticulatus*, with data: North Reef, 100 fms, D.H. Graham.
81	937	–	No data, old museum specimen, A.99.38	*Plumularia wattsii*. Bad slide in RSC as *Plumularia wattsii*, with data: A99.38.
82	938	–	No data, old museum specimen, A98.3	Red debris, no hydroids found. Also two stained Canada Balsam slides in RSC as *Hypanthea bilabiata*, material, A.98. Otago Museum; no locality record, only indication of male sex.
83	939	–	No data, old museum specimen, A24.120, 121	Red debris and remains of algae; no hydroid observed. Two tubes with same number combined.
84	940	–	No data, old museum specimen	Red debris and fragments of algae with gonothecae, probably of *Silicularia rosea*. No slide. Two tubes with same number combined.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
85(?)	941	–	No data, probably old museum specimen	Red debris, no hydroid observed.
86	942	–	Old Museum Colln A. 33	*Obelia geniculata*
87	943	–	Old Museum Colln A.99.3.S	*Obelia geniculata*
88	944	–	Old Museum Colln A24.122	*Obelia geniculata*
89	945	–	Old Museum Colln, no further data	Tube contains unrecognisable hydroid fragments, probably *Obelia* sp. Also partly dried out slide in RSC as *Obelia australis*; no further data.
90	946	–	Old Museum Colln, no further data	*Gymnangium longirostre*
91	947	–	Old Museum Colln (?), no data	*Symplectoscyphus johnstoni johnstoni*
92	948	–	Old Museum Colln, no further data	Tube contains some red debris.
93	949	–	Old Museum Colln, no further data	*Amphisbetia episcopus*
94	950	–	Old Museum Colln (?), no further data	*Obelia geniculata*
96	951	–.11.1880	Brighton, Old Museum Colln	*Plumularia* (?) sp. Might be *P. setaceoides*
97	952	"	Brighton, Old Museum Colln	Debris and remnants of hydroids, probably species of *Silicularia.* No slide.
98	953	"	Between Tomahawk and Sandfly, Old Museum Colln, no further data	*Plumularia caliculata*
99	954	"	Between Tomahawk and Sandfly, Old Museum Colln	*Obelia* sp.
100	955,	–	Old Museum Colln	No hydroid found in this tube; red fragments only.
101	956	–	Old Museum Colln, no further data	*Symplectoscyphus procerus*
102	957	–	Old Museum Colln, no further data	*Sertularella crassiuscula*
103	958	–	Old Museum Colln, no further data	*Stereotheca elongata*
104	959	–	Old Museum Colln, no further data	*Dictyocladium monilifer*
106	961	–	Old Museum Colln, no further data	*Amphisbetia bispinosa*
107	962	–	Old Museum Colln, no further data	*Symplectoscyphus johnstoni johnstoni*
108	963	–	Old Museum Colln, no further data	Unrecognisable hydroid remains attached to fragment of alga. No slide.
109	964	–	Old Museum Colln, no further details	*Nemertesia* sp.
110	965	–	Old Museum Colln, no further data	*Amphisbetia operculata*
111	966	–.2.51	Rock pool, Bay of Islands, M. Laird	Red debris only. According to label *Clytia johnstoni*. Also three slides in RSC, of which two partly dried out and one unstained Canada Balsam slide, as *Clytia johnstoni*; data: V.U.W., Zoology Dept.
112	967	"	Tide rock pool, Bay of Islands, M. Laird	*Sertularella crassiuscula*. Reasonable slide in RSC, as *Sertularella crassiuscula*, with data: Bay of Islands.
113	968	"	Rock pool, Bay of Islands, M. Laird	*Stereotheca elongata*. Good slide in RSC as *Stereotheca elongata*, no data.
114	969	–.12.51	Palliser Bay, Mrs. R.M. Lowry	No hydroid, algae.
115	970	"	Palliser Bay, Mrs R.M. Lowry	*Symplectoscyphus johnstoni johnstoni*. Good slide in RSC as *Sertularella delicatula*?, no data. On label: no teeth?
116	971	"	Palliser Bay, Mrs R.M. Lowry	*Dictyocladium monilifer*
117	972	"	Palliser Bay, Mrs R.M. Lowry	*Sertularella crassiuscula*. Good slide in RSC as *Sertularella crassiuscula*; no data.
118	1002	"	Palliser Bay, R.M. Lowry	*Aglaophenia acanthocarpa*
119	973	"	Palliser Bay, R.M. Lowry	Not a hydroid, algae?
120	974	–.3.42	Waimarama Beach, L.B. Moore,	Not a hydroid, Bryozoa?
121	975	19.11.50	Napier foreshore, drift, P.M. Ralph	Probably no hydroids; Bryozoa?
122	976 & 977	–.3.42	Waimarama Beach, L.B. Moore	*Amphisbetia bispinosa*, *A. trispinosa*. Good slide in RSC as *Sertularia bispinosa* (uni), no data.
124	978	–.3.42	Raukokore, Bay of Plenty, L.B. Moore	*Amphisbetia bispinosa*. Reasonable slide in RSC as *Sertularia bispinosa*; no further data, on label: (uni). Good slide in RSC as *Sertularia unguiculata*; no data.
125	979	"	Port Fitzroy, Great Barrier Island, L.B. Moore	Not a hydroid, Bryozoa.
126	980	14.5.42	Te Kaminaree Bay, L.B. Moore	*Salacia bicalycula*
127	981	–.1.42	Akitio, E. coast Waiene, L.B. Moore	*Sertularia unguiculata*

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
128	982	–.4.50	Pelorus Sound, drift (?), Judy Hay	*Cryptolaria prima*. Poor, unstained slide in RSC as *Cryptolaria prima*, axial tube main stem + also of hydrocladia; no further data. Also additional Canada Balsam slide, no data. Unstained slide with label: *Cryptolaria prima*, young coppinia, no gonangia, peripheral comm. to cover hydroth. apertures, no further data. Additional unstained slide with label: *Cryptolaria prima*, axial tube, no data.
130	984	30.9.23	Taylor's Mistake, G. Archey	No hydroid, algae.
131	985	17.2.22	Ripa Island, Lyttleton, G. Archey	No slides: *Phialella quadrata*; *Sertularella simplex*. Unstained slide in RSC as *Sertularella simplex*, no data.
132	986	–	Taylor's Mistake, E.W. Bennett	*Stereotheca elongata*. Unstained slide in RSC as *Stereotheca elongata*; no data.
133	1005	–.4.23	New Brighton, E.W. Bennett	*Aglaophenia laxa* . Fair slide in RSC as *Aglaophenia laxa*; no data.
134	987	25.1.24	Diamond Harbour, Rock Pool, E.W. Bennett	*Plumularia setacea*. Reasonable slide in RSC as *Plumularia setacea* var.?, no data.
135	988	30.9.23	Taylor's Mistake, G. Archey	*Stereotheca elongata*, *Symplectoscyphus johnstoni johnstoni,* and unrecognisable hydroid fragment. Reasonable slide in RSC as *Stereotheca elongata* & *Sert. johnstoni* ??, no data.
136	989	"	Taylor's Mistake, G. Archey	*Amphisbetia bispinosa*. N.B. Of this number a second tube, contains unrecognisable fragments. Reasonable slide in RSC; no data, on label (uni) small branch.
137	990		no data available	Unrecognisable fragments of axis, possibly of a species of *Plumularia* or *Halecium*. No slide.
138	991	–.9.1903	Taylor's Mistake, C. Chilton	No hydroid found in this tube.
140	992	22.3.51	Paraparaumu Beach, drift, P.M. Ralph	Unidentifiable hydroid remains and red debris. Also stained Canada Balsam slide in RSC, as *Silicularia* spp. *campanularia*; no locality record.
141	993	"	Paraparaumu Beach, drift, P.M. Ralph	*Sertularella crassiuscula*. Good slide in RSC as *Sertularella crassiuscula*; no data.
142	994	"	Paraparaumu Beach, drift, P.M. Ralph	Unidentifiable remains and red debris. May be a species of *Halecium*. No slide.
144	995	9.4.50	Palliser Bay, Putangarua pinnacles, B. Holloway,	*Stereotheca elongata*. Good slide in RSC as *Stereotheca elongata*, no data.
145	996	4.11.50	Chatham Rise, 'Discovery II' Stn 2733, 300 m, W.H. Dawbin	*Aglaophenia ctenata*. Poor slide in RSC as *Aglaophenia ctenata*; no data.
146	997	14.8.50	Pt Jerningham, rock tide pool, P.M. Ralph	Unidentifiable remains of hydroids and red debris.
147	998	"	Pt Jerningham, rock tide pool, P.M. Ralph	*Plumularia setacea*. Fair slide in RSC as *Plumularia setacea*; no data.
148	999	"	Pt Jerningham, rock tide pool, P.M. Ralph	*Orthopyxis crenata*
149	1000	"	Orogorongo, Cook Strait, 110-128 m, Geological Survey	No hydroid found in tube. Stained Canada Balsam slide in RSC as *Synthecium elegans* var. *elegans*; no data.
150	1010	"	Mid-Strait Bank, Cook Strait, edge of shallow, 128 m, Geological Survey	*Modeeria rotunda*, *Hebellopsis scandens*, *Symplectoscyphus johnstoni johnstoni* . Unstained slide in RSC as *Stegopoma fastigiatum* with *Sertularella* and *Hebella*; no data. Also partly dried out slide as *Hebella calcarata* var. *contorta* (?), with data: Cooks Bank.
151	1011	– 1950	Cook Strait, probably 128 m, Geological Survey	*Sertularella crassiuscula*. Poor slide in RSC as *Sertularella crassiuscula*, no data. On label: long internode.
153	1012	29.8.50	Cook Strait Bank, Geological Survey	*Synthecium subventricosum*, fragments of *Symplectoscyphus johnstoni johnstoni,* and *Salacia bicalycula*. (Not given separate NMNZ Colln nos.)
154	1013	– 1932	400 miles NW of Wellington, 1097 m, C.S.S. 'Recorder', W. Forster	*Stegolaria irregularis*. Two stained Canada Balsam slides in RSC as *Stegolaria irregularis*, no further data. Also partly dried out slide under same name, no data.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
155	1014	13.5.51	Paraparaumu Beach, drift, P.M. Ralph	*Obelia geniculata*
156	1007	"	Paraparaumu Beach, P.M. Ralph	Registered as *Aglaophenia laxa*. Tube contains nothing but reddish precipitate. Poor slide in RSC as *Aglaophenia laxa*; no data.
157	1015	10.5.51	Brother Islands, Cook Strait, 3.5-9 m, M. Davidson	*Halecium expansum*. Stained Canada Balsam slide in RSC as *Halecium sessile*, no data. Two more Canada Balsam slides, of which one indicated as male. One more Canada Balsam slide indicated as male gonangia.
158	1016	7.11.50	Ringdove Bay, Antipodes Islands, on floats of *Macrocystis*, R.K. Dell	*Obelia geniculata*
159	1017	"	Ringdove Bay, Antipodes Islands, deep low tide pools, R.K. Dell	*Tubularia* (?) sp. Tube contains much red debris and the stalk and tentacles (?) of what may have been a species of *Tubularia*. No slide.
160	1018	17.5.51	Te Awaite, E. coast, J.H. Sorenson	Partly dried out slide as *Stereotheca elongata*, no data.
161	1019	"	Te Awaite, E. coast, J.H. Sorenson	*Lytocarpia incisa* . Also poor slide in RSC, re-numbered 723 as *Thecocarpus incisus*, no data.
162	1020	24.5.51	Kapiti Island, Jnr Lect. (S.... Coll.)	*Obelia geniculata*. Mixed with a species of *Orthopyxis*. Also stained Canada Balsam slide in RSC as *Obelia geniculata* and data: Kapiti Is.
163	1021	7.6.51	Oriental Bay, Wellington, on *Sargassum sinclairii*, Hunter (student)	*Orthopyxis crenata* (Hartlaub, 1901). Partly dried out slide in RSC as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.) and data Wgtn Harbour. Unstained, poor slide as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.), with data Wellington Harbour.
164	1022	15.6.51	Lyall Bay, Drift, V. Dellow	Bryozoa only.
165	1023	16.6.51	Titahi Bay, tide rock pool, on algae, M. Davidson	*Orthopyxis crenata*
166	1024	"	Titahi Bay, tide rock pool, on algae, M. Davidson	*Obelia geniculata*
167	1025	13.7.51	Palliser Bay, 165 m, dredged, J.H. Sorenson	*Amphisbetia episcopus*. A fair and a poor slide in RSC *as Sertularia episcopus*; no data.
168	1026	"	Palliser Bay, 165 m, dredged, J.H. Sorenson	Bryozoa only.
169	1027	"	Palliser Bay, 165 m, dredged, J.H. Sorenson	*Stereotheca elongata*
170	1028	"	Palliser Bay, 165 m, dredged, J.H. Sorenson	Tube contains fragments of algae only. Partly dried out glycerine jelly slide in RSC as *Orthopyxis delicatula*, and data: Palliser Bay.
171	1029	"	Palliser Bay, 165 m), dredged, J.H. Sorenson	Algae only.
173	1030	– 1932	Cook Strait Cable, deep water. C.S. 'Recorder', 1932, Auckland Institute and Museum	*Cryptolaria exserta*. Two partly dried out slides in RSC as *Cryptolaria exserta*; no data.
174		–	Cook Strait Cable, deep water. C.S. 'Recorder', 1932, Auckland Institute and Museum:	Slide in RSC as *Filellum serratum*, no further data.
175	1031	26.3.51	Portobello Marine Biological Station, low spring tide, E.J. Batham	*Orthopyxis crenata*. (According to label *Silicularia bilabiata* and *Clytia johnstoni* must also have been present). Partly dried out slide in RSC as *Clytia johnstoni*, with data: V.U.W., Zoology dept. Also partly dried out slide and 2 stained Canada Balsam slides as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.) with data: Dunedin Harbour. Also unstained glycerine jelly slide with same legends and 2 more slides as *Orthopyxis crenata* f. *crenata*; also 2 more stained slides in good condition.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
176	1032	26.3.51	Reef, Portobello Marine Biological Station, E.J. Batham	*Silicularia rosea*. Stained Canada Balsam slide in RSC, as *Silicularia bilabiata subtropica*, no locality record. In addition stained Canada Balsam slide marked 'hypotype'; no locality record but marked male and female.
177	1033	"	Reef, Portobello Marine Biological Station, E.J. Batham	*Monotheca pulchella*
178	1034	"	Reef, Portobello Marine Biological Station, E.J. Batham	*Amphisbetia minima*
179	1035	"	Reef, Portobello Marine Biological Station, E.J. Batham	*Amphisbetia trispinosa*. Poor slide in RSC as *Sertularia trispinosa*, no data.
180	878	"	Reef, Portobello Marine Biological Station, E.J. Batham	*Aglaophenia plumosa*, *Plumularia setaceoides*
181	1036,	"	Reef, Portobello Marine Biological Station, E.J. Batham	*Sertularella integra, S. robusta*. Dried out slide in RSC as *Sertularella simplex intermedia* + *Amphisbetia minima*.
182	1037	"	Reef, Portobello Marine Biological Station, E.J. Batham	*Plumularia wattsii*
183	1038	"	Reef, Portobello Marine Biological Station, E.J. Batham	Tube contains red debris and unrecognisable tissue fragments. No slide. Poor slide in RSC as *Eucopella crenata* and data: Portobello.
184	1039	"	Reef, Portobello Marine Biological Station, E.J. Batham	*Amphisbetia trispinosa*
185	1040	"	Reef, Portobello marine biological Station, E.J. Batham	*Obelia geniculata*
186	1041	23.6.51	Island Bay, sub-littoral, V. Dellow	*Symplectoscyphus rentoni*. A poor and a good slide in RSC as *Symplectoscyphus rentoni* , *Sertularella* sp.?; no data.
187	1042	14.8.51	3 nm offshore Doubtless Bay cable, C.S. 'Matai', Z.O. Poole	Tube contains debris and unrecognisable fragments only. Two stained Canada Balsam slide in RSC as *Synthecium carinatum*; no data.
188	1043	"	3 nm offshore Doubtless Bay cable, C.S. 'Matai', Z.O. Poole	*Hebellopsis scandens*, *Synthecium elegans*, *Antennella kiwiana*, *A. secundaria*, *Pycnotheca mirabilis*. N.B. *Halopteris campanula* in the list. Reasonable slide in RSC as *Halopteris campanula,* no data.
190	1003	"	drift, Lyall Bay beach, Gran	*Aglaophenia laxa*
191	1044	4.2.46	North Port, Chalky Inlet, 15-18 m, 'Golden Hind' Exped., C.W.	Tube contains red debris and unrecognisable fragments; in list as *Halopteris campanula*. Poor slide in RSC as *Halopteris campanula*; no data.
192	1045	"	North Port, Chalky Inlet, 11–22 m, 'Golden Hind' Exped., C.W.	*Symplectoscyphus johnstoni johnstoni*
196		25.7.50	White Rock, Cook Strait, K.A. Wodzicki, nest material (king shag)	Partly dried out slide in RSC as *Cryptolaria prima*, no data.
197	1046	26.8.51	Menzies Bay, Christchurch, tide rock pool, S. Jonathon	*Plumularia opima*. Partly dried out slide in RSC as *Cryptolaria prima*; no data. Poor slide as *Plumularia setacea, Sertularella robusta* + smaller *Sertularia*; no data.
198	1047	"	Menzies Bay, Christchurch, tide rock pool, S. Jonathon	*Plumularia opima*
199	1048	"	Menzies Bay, Christchurch, tide rock pool, S. Jonathon	*Obelia geniculata*
200	1049	"	Menzies Bay, Christchurch, tide rock pool, S. Jonathon	*Silicularia rosea*
201	1050	"	Menzies Bay, Christchurch, tide rock pool, S. Jonathon	Nothing found in tube.
202	1051	"	Menzies Bay, Christchurch, tide rock pool, S. Jonathon	Unrecognisable debris only.
203	1052	"	Menzies Bay, Christchurch, tide rock pool, S. Jonathon	Algae only; no hydroid observed.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
204	1053	3.10.51	Foveaux Strait oyster beds, J.B. Yaldwyn	*Amphisbetia bispinosa*
205	1054	"	Foveaux Strait oyster beds, J.B. Yaldwyn	*Phialella quadrata, Hebellopsis scandens*,*Sertularella integra, Monotheca epibracteolosa*. Partly dried out slide in RSC as *Sertularella integra*; no data.
207	1056	"	Foveaux Strait oyster beds, J.B. Yaldwyn	*Symplectoscyphus subarticulatus*. Partly dried out slide in RSC as *Sertularella subarticulata*, with data: Oyster beds, Foveaux Strait.
209		14.8.51	Doubtless Bay, P. & T. Dept cable, 18 m	Poor slide in RSC as *Antennella africana*; no data.
210	1057	13.11.51	Clarence River to Kaikoura, drift, P.M. Ralph	*Plumularia setaceoides*
211	1058	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Salacia farquhari*. Partly dried out slide in RSC as *Salacia farquhari* ; no data.
212	1059	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Sertularella simplex*
213	1060,	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Amphisbetia minima*, *Symplectoscyphus macrogonus*. Poor slide in RSC as *Sertularella macrogona* and *Amphisbetia minima*; no data.
214	1061	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Amphisbetia trispinosa*
215	1062	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Plumularia setaceoides*
216	1055	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Symplectoscyphus subarticulatus*
217	1063	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Symplectoscyphus subarticulatus*
218	1064	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Stereotheca elongata* Partly dried out slide in RSC as *Stereotheca elongata*; no data.
219	1065	"	Clarence River to Kaikoura, drift, P.M. Ralph	*Symplectoscyphus johnstoni johnstoni*. Good slide in RSC as *Sertularella johnstoni*; no data.
220	1066	"	Clarence River-Kaikoura, drift, P.M. Ralph	*Symplectoscyphus subarticulatus*
221	1067	"	Clarence River-Kaikoura, drift, P.M. Ralph	*Symplectoscyphus macrogonus*
222	1068	–	Taylor's Mistake, Christchurch, G. Knox	*Plumularia setacea*
222A	1069	–	Taylor's Mistake, Christchurch, G. Knox	N.B. This number not in register, probably this locality. *Symplectoscyphus johnstoni johnstoni*
223	1070	–	Taylor's Mistake, Christchurch, G. Knox	*Symplectoscyphus macrogonus*. Poor slide in RSC as *Sertularella macrogona*; no data.
224		–	Taylor's Mistake, Christchurch, G. Knox	Dried out slide in RSC as *Sertularella simplex* + *Halecium lenticulare*, no data. On label: somewhat gibbous, granuled.
226	1071	–	Taylor's Mistake, Christchurch, G. Knox	*Obelia dichotoma*. Partly dried out slide in RSC as *Plumularia* sp. (*wattsii)*; no data.
227	1072	–	Taylor's Mistake, Christchurch, G. Knox	*Symplectoscyphus irregularis.* Poor slide in RSC as *Sertularella crassiuscula*; no data.
228	1073	–	Taylor's Mistake, Christchurch, G. Knox	*Amphisbetia bispinosa*
229 (also 733)		–	Taylor's Mistake, Christchurch, G. Knox	Poor slide in RSC as *Aglaophenia plumosa*; no data.
229A	1074	9.5.51	Menzies Bay, G. Knox	*Aglaophenia plumosa*, *Sertularia unguiculata*. Partly dried out slide in RSC as *Sertularia unguiculata* , with data: P.V.A.
230	1075	"	Menzies Bay, G. Knox	*Amphisbetia bispinosa*, *Plumularia setaceoides*. Three reasonable slides in RSC; no data, on label (uni). Reasonable slide as *Plumularia setaceoides*; no data ("many septa" on label).

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
231	1076	9.5.51	Menzies Bay, G. Knox	*Salacia bicalycula*, *Sertularella robusta*, *Plumularia anonyma* sp. nov., *Plumularia opima*
232	1077	13.9.50	Taylor's Mistake, Christchurch, G. Knox	*Monotheca hyalina*. Poor slide in RSC as *Plumularia hyalina, Tubiclava rubra*; no data.
233	1078	9.5.51	?Taylor's Mistake, Christchurch, G. Knox	*Amphisbetia minima*, *Plumularia setaceoides*, *Silicularia rosea*. Poor slide in RSC as *Plumularia setaceoides, Campanularia, S. minima* with data: short, broad stem internodes.
234	1079	7.1.51	Half Moon Bay, Stewart Island, W. side, under rocks, G. Knox	*Symplectoscyphus johnstoni johnstoni*, *Plumularia anonyma* sp. nov.
236	1081	2.4.49	Causeway (Heathcote?), G. Knox,	*Amphisbetia bispinosa*
237	1082	7.9.48	Taylor's Mistake, Christchurch, G. Knox	*Turritopsis nutricula*. Mixed with some stems of *Obelia dichotoma*
238	1083	"	Taylor's Mistake, Christchurch, G. Knox	Poor slide in RSC as *Plumularia setacea*, with data: female gonothecae.
240	1084	–.8.49	Menzies Bay, G., Knox	*Salacia farquhari*, *Obelia geniculata*, *Silicularia rosea*. N.B. Species mentioned in register not found. In RSC slide with 2 labels, a: *Tulpa diverticulata*, *Aglaophenia plumosa*, on b: Diag. necessary *Synthecium* sp., *Hebella*, *E. mollis.*
242	1086	7.4.47	Lake Ellesmere, near mouth of Selwyn, G. Knox	*Hartlaubella gelatinosa*. Also partly dried out P.V.A. slide in RSC as *Campanularia gelatinosa*, with data: V.U.W., Zoology Dept.
243	1087	–	10 miles NW of Cape Maria van Diemen, 91 m	Bale's material of *Thecocarpus rostratus*, *Dictyocladium thuja* sp. nov.; *Dictyocladium watsonae*, *Lytocarpia incisa, Halopteris crassa*
244	1088	30.8.51	Menzies Bay, The Point, on sea squirt (*Corella*)	*Sertularia unguiculata*, *Symplectoscyphus johnstoni johnstoni*, *Orthopyxis mollis*
247	1091	15.11.51	culvert, Heathcote Estuary, on mussel, P.M. Ralph	*Obelia dichotoma*
248	1092	"	culvert, Heathcote Estuary, on mussel, P.M. Ralph	*Sertularella simplex*. Two fair slides in RSC as *Sertularella simplex* var. *intermedia*; no data. Reasonable slides as *Sertularella simplex*, no data. On label: waved.
249	1093	"	culvert, Heathcote Estuary, on mussel, P.M. Ralph	*Clytia* sp.
250	1094	"	culvert, Heathcote Estuary, on mussel, P.M. Ralph	*Plumularia setacea*
251	1095	25.11.51	St Clair, Dunedin, tide rock pools, P.M. Ralph	*Sertularella simplex*
251A	1096	16.11.51	Taylor's Mistake, Christchurch, P.M. Ralph	*Silicularia rosea*
252	1097	25.11.51	St Clair, Dunedin, drift, P.M. Ralph	*Obelia geniculata*
252A	1098	16.11.51	Taylor's Mistake, Christchurch, P.M. Ralph	*Obelia longissima*
253	1099	25.11.51	St Clair, Dunedin, drift, P.M. Ralph	*Obelia geniculata*
253A	1100	16.11.51	Taylor's Mistake, Christchurch, P.M. Ralph	*Plumularia setacea*
254	1101	25.11.61	St Clair, Dunedin, drift, P.M. Ralph	*Silicularia rosea*
254A	1102	16.11.51	Taylor's Mistake, Christchurch, P.M. Ralph	*Amphisbetia bispinosa*
255	1103	25.11.51	St Clair, Dunedin, drift, P.M. Ralph	*Obelia* sp.
256	1104	26.11.51	Perry Wharf, Port Chalmers, P.M. Ralph	*Obelia geniculata*
257	1105	25.11.51	off Timaru, 73 m, Capt. J. Black	*Cryptolaria prima*
258	1106	30.11.51	channel between Quarantine Island and Portobello Island (biological station) P.M. Ralph	*Monotheca pulchella.* Unstained slide in RSC as *Plumularia pulchella*, with data: good, single hydrot.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
259	1107	30.11.51	Channel between Quarantine Island and Portobello Island (biological station), P.M. Ralph	*Amphisbetia minima*
260	1108	"	Channel between Quarantine Island and Portobello Island (biological station), P.M. Ralph	*Plumularia setacea*, *P. wattsii*
261	1109	"	Channel between Quarantine Island and Portobello Island (biological station), P.M. Ralph	*Amphisbetia minima*
262	1110	"	Portobello Marine Biological Station, reef, P.M. Ralph	*Obelia geniculata*
263	1111	"	Portobello Marine Biological Station, reef, P.M. Ralph	Partly decomposed algae with: *Amphisbetia minima* *Sertularella simplex*, *Plumularia setaceoides*
264	1112	"	Portobello Marine Biological Station, reef, P.M. Ralph	*Amphisbetia trispinosa*, *Plumularia setaceoides*
265	1113	"	Off Karitane, Otago, 8 m, 'Grace'	*Symplectoscyphus johnstoni johnstoni*, *Plumularia setacea.* Partly dried out slide in RSC as *Hebella calcarata*; no data. Good slide as *Sertularella johnstoni*; no data.
266	1114	"	Wharf Point, Port Chalmers, E.J. Batham, G. Knox	*Phialella quadrata*, *Plumularia setaceoides*, *Obelia geniculata*
267	1115	"	E.J. Batham	*Opercularella humilis* ?*Opercularella* sp., *Symplectoscyphus johnstoni johnstoni.* Poor slide in RSC as *Sertularella johnstoni* ?; no data.
268	1116	5.1.52	Paraparaumu Beach, drift, on *Sargassum* sp., P.M. Ralph	*Sertularella robusta*
269	1006	"	Paraparaumu Beach, drift, P.M. Ralph	*Amphisbetia minima*, *Aglaophenia laxa*
270	1117	"	Paraparaumu Beach, drift, P.M. Ralph	*Orthopyxis integra*
271	1118	"	Paraparaumu Beach, drift, P.M. Ralph	*Sertularella robusta*. Dried out slide in RSC as *Sertularella robusta*; no data.
272	1119	"	Paraparaumu Beach, drift, P.M. Ralph	*Amphisbetia minima*
273	1120	"	Paraparaumu Beach, drift, on algae. P.M. Ralph	*Amphisbetia minima*. Good, stained slide in RSC as *Sertularia minima* Thompson, large, no data.
274	1121	–	Paraparaumu Beach, drift, on *Codium* sp.	*Orthopyxis integra*
275	1122	15.1.52	Clifton Beach, Hastings, drift, Bailey Carrodus	*Amphisbetia bispinosa*
276	1123	9.2.21	Cape Maria van Diemen, beach, Bolton's Collection, Dunedin Museum	*Lytocarpia chiltoni*
277	1124	8.1.52	Stn 13, off Passage Point, Acheron Passage, Duskey Sound, 22-27 m, W.H. Dawbin	*Sertularella gayi gayi*
278	1125	7.1.52	Stn 11, between Bauza & Gaol Islands, Doubtful Sound, 91 m, W.H. Dawbin	S*ymplectoscyphus subarticulatus*
279	1126	18.2.46	Doubtful Sound, 55 m, 'Golden Hind'	*Lafoea dumosa*. Unstained, partly dried out slide in RSC as *Lafoea gracillima*; no further data.
280	1127	4.1.52	Wharf Piles, Nelson, G. Knox	*Halecium delicatulum*, *Symplectoscyphus simplex*, *Clytia hemisphaerica*
281	1128	5.1.52	Port Nelson, on algae, G. Knox	*Amphisbetia minima*, *Orthopyxis crenata*. Also partly dried out slide in RSC as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.) and data: Nelson. Additional unstained glycerine jelly slide with same legends.
282	1129	"	Port Nelson, G. Knox	*Halecium delicatulum*
282A		"	Port Nelson, G. Knox,	Stained Canada Balsam slide in RSC as *Halecium delicatulum*; no data.
282B		"	Port Nelson, G. Knox	Stained Canada Balsam slide in RSC as *Halecium delicatulum*; no data.
283	1130	7.1.51	Half Moon Bay, Stewart Island, G. Knox	Nothing found in tube.
284	1131	7.1.52	Half Moon Bay, Stewart Island, G. Knox	*Sertularella simplex*
285	1132	27.12.51	Provenance unknown	*Plumularia anonyma* sp. nov.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
287	1133	16.3.52	Off Mount Benmore, Middle Ground, Cape Campbell, J.A.F. Garrick	*Nemertesia cymodocea*
289	1134	31.3.52	Island Bay, Cook Strait, drift, on algae, Gran, 31.iii.1952.	*Monotheca epibracteolosa*. Bad slide in RSC as *Plumularia spinulosa*; no data.
290	1135	8.3.52	Plimmerton Beach, drift, Gran	*Stereotheca elongata*, *Symplectoscyphus johnstoni johnstoni*
291	1136	–	'Lachlan', Stn 69/50, off Kaikoura, 43°25.25'S, 172°56.7'E, from beacon pole in water 8 weeks	*Obelia geniculata*, *O. longissima*
293	1138	4.5.52	Breaker Bay, drift, V. Dellow	*Sertularella robusta*
294	1139	"	Breaker Bay, drift, V. Dellow	*Monotheca epibracteolosa, Plumularia setaceoides*
295	1140	–.2.51	Island Bay, drift, M. Aitken	*Stereotheca elongata*, *Symplectoscyphus rentoni*
296	1141	2.6.52	Makara Beach, V. Dellow	*Symplectoscyphus subdichotomus*
297		**–.5.52**	Cape Kidnappers, 69 m, N.H. Forrest (J. Garrick)	Poor slide in RSC as *Nemertesia* and polysiphonic *Plumularia ?brachiata*; data unreadable.
298		**–.11.51**	Kaikoura coast (first railway tunnel), drift, P.M. Ralph	Dried out slide in RSC as *Sertularella simplex* + *Halecium lenticulare*, no data.
299	1142	"	Kaikoura coast, first railway tunnel, drift. P.M. Ralph	*Amphisbetia episcopus*
300	1143	25.8.52	Makara Beach, drift, on holdfast, V. Dellow	*Stereotheca elongata*, *Lytocarpia incisa.* Also poor slide in RSC, re-numbered 710, as *Thecocarpus incisus*, with data: good for rhachis.
301	1144	"	Makara Beach, drift, on holdfast, V. Dellow	*Stereotheca elongata*
302		"	Makara Beach, drift, on holdfast , V. Dellow, 25.viii.1952:	Poor slide in RSC as *Plumularia setaceoides*; no data.
303	1145	"	Makara Beach, drift, V. Dellow	*Amphisbetia episcopus*. Three good slides in RSC as *Sertularia episcopus*; no data.
304	1146	"	Makara Beach, drift, on holdfast, V. Dellow	*Aglaophenia acanthocarpa*, *Monotheca* sp. Poor slide in RSC as *Plumularia spinulosa, Aglaophenia acanthocarpa* (?), no data.
305	1147	"	Makara Beach, drift, on holdfast, V. Dellow	*Sertularella simplex*
306	1148	"	Makara Beach, drift, on holdfast, V. Dellow	Sample contains a few fragments of algae; no recognisable hydroid observed.
308	1149,	– 1952	Foveaux Strait, oyster beds,27–37 m, G. Knox, 1952:	*Sertularia unguiculata*. Bad slide in RSC as *Sertularia unguiculata*; no data.
310	1150	–.2.53	Opunake Beach, drift, P.M. Ralph	*Sertularia unguiculata*. Good slide in RSC as *Sertularia unguiculata*; no data.
311	1151	"	Opunake Beach, drift, P.M. Ralph	*Orthopyxis crenata*
312	1152	"	Opunake Beach, drift, P.M. Ralph	*Plumularia setacea*
313	1008	"	Opunake Beach, drift, P.M. Ralph	*Aglaophenia* cf. *laxa*. No slide. Bad slide in RSC as *Aglaophenia laxa*; no data.
314	1153	"	Castlecliff Beach, drift, P.M. Ralph	*Stereotheca elongata*
317	1154	3.2.53	New Plymouth, beach alongside wharf, drift, P.M. Ralph	*Silicularia rosea*
319	1155	–.2.53	Muriwai Beach, N. Auckland, drift, P.M. Ralph	*Crateritheca zelandica*. Perfect, stained slide in RSC as *Crateritheca zelandica*, no data. Dried out slide as *Crateritheca zelandica*; no data.
320	1156	"	Muriwai Beach, N. Auckland, drift, P.M. Ralph	*Plumularia setaceoides*
321		"	Muriwai Beach, N. Auckland, drift, P.M. Ralph	Poor slide in RSC as *Plumularia setacea*, with data: Muriwai.
322	1157	"	Muriwai Beach, N. Auckland, drift, P.M. Ralph, ii.1953:	Tube contains three numbers, 321, 321a and 322, also fragments of *Obelia* sp. Poor slide in RSC as *Obelia*, with data: Muriwai.

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323	1158	–.2.53	Muriwai Beach, N. Auckland, drift, P.M. Ralph	Tube contains completely disintegrated material and some fragments of algae. *Silicularia* sp.
326	1159	12.2.53	Ohope Beach, Whakatane, drift, on algae, P.M. Ralph	*Silicularia rosea*
327	1160	"	Ohope Beach, Whakatane, drift, on algae, P.M. Ralph	*Sertularella crassiuscula*
328	1161	"	Ohope Beach, Whakatane, drift, on algae, P.M. Ralph	*Monotheca hyalina*
329	1163	13.2.53	Tauranga, The Hount, drift, P.M. Ralph	*Obelia geniculata*
329A		–	Tauranga, The Mount, drift, P.M. Ralph	Partly dried out slide in RSC, as *Obelia australis*; no further data.
331	1162	"	Tauranga, The Mount, drift. P.M. Ralph	*Plumularia setaceoides*
337	1164	14.2.53	Opotiki, 10 miles N. of East Cape Road, drift. P.M. Ralph	*Amphisbetia bispinosa*, *Sertularella simplex*
340	1165	17.2.53	Coromandel Peninsula, 10 miles N. of Thames, P.M. Ralph	*Orthopyxis crenata*
343	1168	–	Data unknown.	Contains some fragments of *Sargassum* sp. with *Halecium delicatulum*, *Sertularella simplex*. Poor, partly dried out slide in RSC as *Halecium delicatulum* (male) and *Sertularella*. No data.
344	1169		Data unknown.	*Halecium delicatulum*. Poor, partly dried out slide in RSC as *Halecium delicatulum* (male) and *Sertularella*. No data.
345	1170		Data unknown.	Sample consists of fragments of algae to which attached badly preserved colonies of *Bougainvillia* sp., *Halecium delicatulum*, and *Sertularella simplex*. Not attempted to separate and no slides.
346		11.2.53	Leigh, N. Auckland, drift, P.M. Ralph	Poor slide in RSC as *Sertularella crassiuscula*, with data: Leigh.
348	1171	"	Leigh, N. Auckland, drift, P.M. Ralph	*Plumularia setaceoides*
350		10.2.53	Cheltenham Beach, Auckland, drift, P.M. Ralph	Poor slide in RSC as *Orthopyxis crenata*; no data.
351		"	Cheltenham Beach, Auckland, drift, P.M. Ralph	Dried out slide in RSC as *Sertularella crassiuscula*, with data: Cheltenham.
352		"	Cheltenham Beach, Auckland, drift, P.M. Ralph	Dried out slide in RSC as *C. compressa*, with data: Cheltenham.
353	1172	"	Cheltenham Beach, Auckland, drift. P.M. Ralph	Unidentifiable skeleton of a hydroid, probably a species of *Obelia*. No slide.
364	1173	"	Hadfields Bay, Auckland, P.M. Ralph,	*Halecium delicatulum*. Stained Canada Balsam slide in RSC as *Halecium delicatulum*; no data.
365		9.2.53	Brown's Bay, Auckland, P.M. Ralph	Partly dried out slide in RSC as *Sertularella spiritualis (S. johnstoni ? delicatula)*; no data.
366	1174	"	Brown's Bay, Auckland, P.M. Ralph	*Amphisbetia minima*
367	1175	"	Brown's Bay, Auckland, P.M. Ralph	Tube contains debris only; no recognisable hydroid observed.
372		15.2.53	Otago Bay, P.M. Ralph	Partly dried out slide as *Crateritheca zelandica*; no data.
376		"	Otago Bay, P.M. Ralph	Fair slide in RSC as *Thecocarpus chiltoni*; no data.
377		"	Otago Bay, P.M. Ralph	Poor slide in RSC as *Plumularia hyalina*, with data: with one h per i. Additional poor slide as *Halopteris minuta*; no data.
382	1176	31.3.53	Wellington Floating Dock, breastwork, L. Ealy (or L. Eady)	*Phialella quadrata*
384	1178	–.5,53	Red Rocks, Wellington, drift, J.G. Gibbs	Not a hydroid, probably algae.
390	1181	3.1.52	Woodpecker Bay, West Coast, G. Knox	*Plumularia setacea*
391	1182	"	Woodpecker Bay, West Coast, G. Knox	*Amphisbetia bispinosa*, *A. trispinosa*, *Symplectoscyphus irregularis*

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392	1183	3.1.52	Woodpecker Bay, West Coast, G. Knox	*Halecium delicatulum*. Stained Canada Balsam slide in RSC as *Halecium delicatulum* (monosiphonic), with data: Woodpecker Bay.
393	1184	"	Woodpecker Bay, West Coast, G. Knox	*Orthopyxis integra*. Also two slides in RSC of which first bears indication which might be 'good'; second 'good'.
394	1185	"	Woodpecker Bay, West Coast, G. Knox	*Symplectoscyphus irregularis*, *Plumularia setacea*
395	1186	"	Woodpecker Bay, West Coast, G. Knox	*Sertularella simplex*, *Symplectoscyphus irregularis*
396	1187	"	Woodpecker Bay, West Coast, G. Knox	*Halecium beanii*. Stained Canada Balsam slide in RSC as *Halecium beanii*; no data. indicated: male.
397	1188	16.4.53	Aquarium Point, Portobello Marine Biological Station, end, beach, E.J. Batham	*Salacia farquhari*. Partly dried out slide in RSC, as *Thuiaria bicalycula*, no data; labelled: excellent.
399	1189	14.4.53	Little Papanui, Christchurch, on *Mytilus canaliculatus* [= *Perna canaliculus*], E.J. Batham	*Sertularella simplex*. *Symplectoscyphus pseudodivaricatus*
400	1190	–.5.52	Timaru Harbour, G. Knox	*Orthopyxis crenata*
401	1191	"	Timaru Harbour, G. Knox	*Salacia desmoides*,*S. farquhari*. Also *Clytia hemisphaerica* Four slides of *Salacia farquhari* in RSC as *Thuiaria bicalycula*, no data.
402	1192	4.1.53	Colac Bay, drift, G. Knox	*Aglaophenia acanthocarpa*
403	1193	–.5.53	Foveaux Strait oyster beds, W. Ruapuke Islands, 18 m, G. Knox	*Symplectoscyphus subarticulatus*
404	1194	"	Foveaux Strait oyster beds, W. Ruapuke Islands, 18 m, G. Knox	*Amphisbetia trispinosa*, *Salacia bicalycula*, *Symplectoscyphus procerus*
405	1195	"	Foveaux Strait oyster beds, W. Ruapuke Islands, 18 m, G. Knox	*Symplectoscyphus procerus*, *Symplectoscyphus subarticulatus*, *Orthopyxis mollis*. Also slide in RSC as *Orthopyxis mollis*, no further data. Partly dried out slide as *Orthopyxis mollis* and as data: Foveaux Strait. Good slide as *Sertularella subarticulata*, *Sertularella robusta*, with data: Foveaux Strait, Oyster beds.
406	1196	"	Foveaux Strait oyster beds, W. Ruapuke Islands, 22 m, G. Knox	*Sertularella gayi gayi*
407	1197	"	Foveaux Strait oyster beds, W. Ruapuke Islands, 22 m, G. Knox	*Amphisbetia trispinosa*
409	879	25.6.53	Gladstone Pier, Littleton Harbour, G. Knox	*Aglaophenia plumosa*
410	1198		Gladstone Pier, Lyttleton Harbour, G. Knox	*Sertularia unguiculata*. Partly dried out slide in RSC as *Sertularia unguiculata*; none.
411	1199	"	Gladstone Pier, Littleton Harbour, G. Knox	*Phialella quadrata*
412		"	Gladstone Pier, Littleton Harbour, G. Knox, 25.vi.1953:	Partly dried out slide in RSC as: *Orthopyxis crenata* f. *typica* (*Eucopella* sp.), and data: Lyttleton Harbour. Additional unstained glycerine jelly slide with same legends.
413	1200	20.5.53	Oreti Beach, Invercargill, G. Knox	*Amphisbetia fasciculata*
415	1201	–	10 miles NW Cape Maria van Diemen, 91 m. Bale's 1924 material, via G. Knox.	Sample contains: *Salacia bicalycula*, *Tasmanaria edentula.* Reasonable slide in RSC as *Sertularella edentula*; no data.
416		–	Provenance indistinct [10 miles NW Cape Maria van Diemen, 91 m. Bale's 1924 material, via G. Knox?]	Partly dried out slide in RSC, as *Ophiodissa caciniformis,* no locality record.
417	1202	–	10 miles NW Cape Maria van Diemen, 91 m, Bale's 1924 material, via G. Knox	*Halopteris crassa*. Also fragment of *Amphisbetia fasciculata*. Perfect slide in RSC as *Plumularia/ Halopteris heterogona*, with data 415/419.
418	1203	–	10 miles NW Cape Maria van Diemen, 91 m. Bale's 1924 material, via G. Knox:	*Lytocarpia incisa*. Also fair slide, re-numbered 713, in RSC as *Thecocarpus incisus*, with data: V.U.C. Zool. Dept.

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419	1204	–	10 miles NW Cape Maria van Diemen, 91 m. Bale's 1924 material, via G. Knox.	*Filellum serpens*, *Synthecium subventricosum*. Partly dried out slide in RSC as *Synthecium elegans* var. *subventricosum*; no data. Stained Canada Balsam slide as *Synthecium elegans* var. *subventricosum*; no data. Two partly dried out slides as *Synthecium elegans*; no data. One unstained, bad slide as *Lineolaria flexuosa*; no further data.
420	1205	14.5.53	Little Papanui, on *Cystophora* sp., E.J. Batham	*Monotheca hyalina*
421	1206	–	Aquarium Point, Portobello Marine biological Station, intertidal, on algae	*Silicularia rosea*. Unstained slide in RSC as *Silicularia campanularia*; no locality record.
422	1207	3.8.53	Little Papanui, on stalk of *Pyura pachydermatina*, E.J. Batham	*Amphisbetia trispinosa*
423	1208	"	Little Papanui, on *Mytilus canaliculus* [= *Perna canaliculus*], E.J. Batham	No recognisable hydroid in tube. Label completely disintegrated. Unstained slides in RSC as *Sertularella simplex*, no data. On label: 'waved', no spirit sp. left.
424	1209	"	Little Papanui, on seaweed, E.J. Batham	*Symplectoscyphus macrogonus*. Bad slide in RSC as *Sertularella macrogona*; no data.
425	1210	"	Little Papanui, on *Gigartina* sp. E.J. Batham	*Plumularia caliculata* Poor slide in RSC as *Plumularia setacea opima*; no data.
426	1211	"	Little Papanui, E.J. Batham	No recognisable hydroid found in tube; label fully disintegrated. No slide. Dried out slide in RSC as *Stereotheca elongata*; no data.
427	1212	"	Little Papanui, E.J. Batham	*Symplectoscyphus pseudodivaricatus*. Three perfect slides in RSC as *Sertularella divaricata*, Bales description; no data. Good slide as *Sertularella divaricata* Bale's description. No data.
429	1213	28.7.53	Aquarium Point, Portobello Marine Biological Laboratory, Cone Rock, on sponge, E.J. Batham	No recognisable hydroid in tube. Note on label: Rubber spoilt.
434	1217	1.10.52	Blueskin Bay, 18 m, D.E. Hurley	*Orthopyxis* cf. *crenata*
437		–.11.50	Wharf block, Wellington Harbour, P.M. Ralph, xi.1950:	Five stained Canada Balsam slides in RSC, as *Obelia australis* with data: Wharf Block.
438	1218	4.9.54	Island Bay, drift, J.C. Yaldwyn	*Stereotheca elongata*
439	1219	2.10.54	Island Bay, Cook Strait, on legs of *Paramithrax* (?) *peronii*, J.C. Yaldwyn	*Plumularia setacea*, *Pl. setaceoides*. Perfect slide in RSC as *Halopteris constricta, P. setacea*; no data (= new number 732).
444		22.5.53	Hawkes Bay, Stn M, 'Kotuka' Exp, J. Garrick	Poor slide in RSC as *Sertularella robusta*, with data: Hawke Bay.
446		25.12.53	'Alert' Exped., Stn 4A, NE. Stephens Islands, 33 m, W.H. Dawbin	Partly dried out slide in RSC, as *Billardia novae-zealandiae*, with data: V.U.W., Zool. Dept.
447		2.12.52	Goat Island, Otago Harbour, B. Brewin	Stained Canada Balsam slide in RSC as *Halecium tenellum;* no data.
449		20.9.44	Reef, Portobello Marine Biological Station, B. Brewin	Stained Canada Balsam slide in RSC as *Halecium expansum*; no data.
450	1220	17.12.54	Island Bay, Cook Strait, on *Pyura pachydermatina*, M. Aitken	*Filellum serratum*, *Symplectoscyphus johnstoni johnstoni*. Poor slide in RSC as *Sertularella j. delicatula*, no data. On label: 3 teeth.
451		"	Island Bay, on *Pyura pachydermatina*, M. Aitken	Unstained slide in RSC as *Salacia buski*, no further data.
452		–.12.53	Pleon of isopod *Neroula* (?) parasitic on groper, B. Pilgrim	Stained Canada Balsam slide in RSC as *Phialella quadrata*; no further data.
453	1221	9.1.54	Portobello Marine Biological Station, 'Alert', Stn 54-4, Otago Heads, on shells, 91 m, E.J. Batham	*Hebellopsis scandens*, *Synthecium elegans*. Stained Canada Balsam slide in RSC as *Synthecium elegans*, gonangia, no data. Partly dried out slide as *Hebella calcarata*; no data.

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454		13.6.55	Manakau Harbour, drift, D. Kulka	Stained Canada Balsam slide in RSC as *Synthecium elegans* var. *elegans*, male; no data.
455	1222	Nov.	Taylor's Mistake, Christchurch, G. Knox	*Plumularia setacea*, *Obelia geniculata*
460		–	Taylor's Mistake, B. Allison	Partly dried out slide in RSC as *Obelia longissima*, no further data. Additional slide with data: V.U.W., Zoology Dept.
461	1223	–	Little Papanui, E.J. Batham	*Obelia longissima*. Also partly dried out slide in RSC as: *Obelia longissima*; no further data. Additional slide with data: V.U.W., Zoology Dept.
462		5.1.51	Anawhata, D. Kulka	Good glycerine slide in RSC, as *Orthopyxis caliculata* and data: V.U.W., Zoology Dept. Additional slide with same legends.
470		–	Glendowie, D. Kulka	Partly dried out slide in RSC, as *Clytia johnstoni*, with data: V.U.W., Zoology Dept.
471		–	Cook Strait, V.U.C.Z. Stn, no further data	Unstained Canada Balsam slide in RSC as *Clytia johnstoni*, with data: V.U.W. Zoology Dept.
472		–	Wharf piles, Wellington Harbour, P.M. Ralph	Three stained Canada Balsam slides in RSC as *Phialella quadrata*; no further data.
475	1224	18.7.56	Kawau Island, Hauraki Gulf, 9-27 m, on seaweed, M. McKenzie	*Hebellopsis scandens*, *Synthecium elegans*
476	1225	"	Kawau Island, Hauraki Gulf, on seaweed, M. McKanzie	*Hebellopsis scandens*, *Synthecium elegans*. Good, unstained slide in RSC as *Hebella calcarata*, no data.
477	1226	"	Kawau Island, Hauraki Gulf, on seaweed, M. McKenzie	*Amphisbetia minima*
479	1228	1.6.56	Off Kapiti, c. 73 m, 'Admiral', Dickinson	*Hebellopsis scandens*, *Synthecium elegans*, *S. subventricosum*
480	1229	20.7.56	Cook Strait, J. Brodie	*Sertularella robusta*, *Obelia* sp.; *Orthopyxis crenata*
481	1230	"	Cook Strait, J. Brodie	*Aglaophenia laxa*, *Sertularella robusta*, *Clytia hemisphaerica*
482	1231	"	Cook Strait, J. Brodie	*Diphasia subcarinata*
483	1232	"	Cook Strait, J. Brodie	*Aglaophenia laxa*
484	1233	28.7.56	Cook Strait, J. Brodie	*Amphisbetia trispinosa*
486		26.5.50	Tamaki, Auckland, J. Kulka	Partly empty Canada Balsam slide in RSC as *Synthecium elegans*, with data: dredged, Tamaki, 30/5/1950(?).
488	1234,	19.8.56	Russell, intertidal, on algae, M. Aitken	*Sertularella crassiuscula*
489	1235	1.6.56	Off Cape Campbell, c. 73 m, J. Garrick, trawler 'Thomas Currell', (registered as 489; however, this is 699):	*Sertularella gayi gayi*, *Orthopyxis mollis*. Slide with unreadable indications in RSC.
490	1236	19.8.56	Russell, Bay of Islands, intertidal on algae. M. Aitken	*Sertularia marginata*.Three good slides in RSC as *Sertularia marginata*, no data.
491	1004	6.9.56	Palliser Bay, on crayfish appendages, R.W. Zander	*Aglaophenia laxa*
497		"	Palliser Bay, Cook Strait, on crayfish appendages, leg. R.W. Zander	Partly dried out slide in RSC as *Halecium lenticulare*
499		10.9.56	Stewart Island, Half Moon Bay, drift, Mrs A. Willa,	Two unstained slides in RSC as *Orthopyxis crenata* f. *typica* (*Eucopella* sp.), no further data.
500	1237	"	Half Moon Bay, Stewart Island, drift, Mrs A. Willa	*Sertularella crassiuscula*. Bad slide in RSC as *Sertularella crassiuscula*; no data. On slide: Large hydrothecae, longish internodes.
501	1238	"	Half Moon Bay, Stewart Island, drift, Mrs A. Willa	*Plumularia setaceoides*. Bad slide in RSC as *Plumularia wilsoni*; no data.
502	1239	"	Half Moon Bay, Stewart Island, drift, Mrs A. Willa	*Amphisbetia minima*
503	1240	19.8.56	Stn 8, Northern Prawn Investigation, V.U.C., off Mayor Island, Bay of Plenty, 146-219 m	*Acryptolaria conferta conferta*, *Zygophylax sibogae*. Partly dried out slide in RSC as *Zygophylax sibogae*; no data.

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506		29.8.56	Stn 9, Northern Prawn investigation, V.U.C.	Partly dried out slide in RSC as *Sertularella johnstoni delicatula*, no data.
507	1241	–.8.56	Stn 4, Northern Prawn Fisheries, Zool. Dept. V.U.C.	*Cryptolaria pectinata*. Partly dried out slide in RSC as *Cryptolaria pectinata*; no data.
508	1242	"	Stn 9, Northern Prawn Fisheries, Zool. Dept. V.U.C.	*Acryptolaria conferta conferta*. Partly dried out slide in RSC as *Acryptolaria conferta* var. *australis*; no further data.
509	1243	–.9.56	Stewart Island, on *Sargassum* sp., Mrs E. Willa	*Amphisbetia minima*
510	1244	9.10.56	Moa Point, Lyall Bay, on *Cystophora retroflexa*, A. Aitken	*Plumularia setaceoides*. Bad slide in RSC as *Plumularia setaceoides*; no data.
511	1245	2.3.54	'Alert' Stn 54-13, Canyon A, 549 m, E.J. Batham	This may be a species of *Halecium* or *Hydrodendron*, completely fragmented. No slide.
512	1246	16.1.54	Thec. 12, 'Alert' Stn 54-9, Canyon E, 366-549 m, E.J. Batham	*Nemertesia ciliata*
513	1247	4.7.54	'Alert' Stn 54-22, Canyon A, 549 m, E.J. Batham, 04.vii.1954:	*Amphisbetia fasciculata*. Fair slide in RSC as *Sertularia fasciculata*, with data: main stem and branches, excellent.
514	1248	16.8.55	'Alert' Stn 55-7, Canyon C, 658 m, E.J. Batham	Bryozoa
515	1249	18.10.56	Kahu Rocks, 36.5-55 m, between Wellington and Cape Terawhiti, on *Macrocystis* holdfast. F. Abernethy	*Plumularia setacea*. Poor slide in RSC as *Plumularia diploptera*; no data.
516	1250	"	Kahu Rocks, 36.5-55 m, between Wellington and Cape Terawhiti, on *Macrocystis* holdfast. F. Abernethy	*Sertularella robusta*. Poor slide in RSC as *Sertularella robusta*; no data on label: long internodes.
517	1251	–.8.52	Pohutukawa Flat, Little Barrier Island, on boulders at mid tide. M. Aitken	*Sertularella simplex*. Poor slide in RSC as *Sertularella simplex*; no data.
518		–	St Heliers, Auckland, on *Sargassum* sp., D. Kulka	Unstained slide in RSC as *Phialella quadrata* on *Sargassum*, with data: St Heliers.
519	1252	23.2.56	Cook Strait Stn 55, GUJ, 73-183 m, Zool. Dept. V.U.C., 23.ii.1956:	*Billardia novaezealandiae*. Unstained Canada Balsam slide in RSC as *Billardia novaezealandiae*, with data: V.U.W. Zool. Dept.
520	1253	"	Cook Strait Stn 55, GUJ, 73-183 m, Zool. Dept. V.U.C.	*Synthecium subventricosum*
521	1254	"	Cook Strait Stn 55, GUJ, 73-183 m, Zool. Dept. V.U.C.	*Hydrodendron tottoni* . Unstained, partly dried out slide in RSC as *Ophiodissa armata*; no further data.
522	1255	"	Cook Strait Stn 55, GUJ, 73-183 m, Zool. Dept. V.U.C.	*Hebellopsis scandens*, *Dictyocladium monilifer*, *Sertularella integra*, *Symplectoscyphus johnstoni johnstoni*. Two unstained, partly dried out slides in RSC as *Hebella calcarata*, no data.
523	1256	"	Cook Strait Stn 55, GUJ, 473-183 m, Zool. Dept. V.U.C., 23.ii.1956:	*Lafoea dumosa*. Unstained, partly dried out slide in RSC as *Lafoea gracillima*; no further data.
524	1001	"	Cook Strait, Stn GUJ (53), 73-183 m, Zool. Dept V.U.C.	*Acryptolaria minima*. Reasonable slide in RSC as *Acryptolaria minima*; no data.
525	1257	19.12.54	Cook Strait, Stn 9, J 11B, 90 m, Zool. Dept. V.U.C.	*Lafoea dumosa*. Unstained, partly dried out slide in RSC as *Lafoea gracillima*; no further data.
526	1258	22.2.56	Cook Strait, Stn 49, BOL, 128 m, Zool. Dept. V.U.C.	Sample consists of worm tubes and fragments of *Salacia bicalycula*, on which an unrecognizsable small species of *Halecium*.
527 (also 732)		8.11.56	Ringa Ringa, Stewart Island, drift, holdfast *Spatoglossum chapmanii*, Mrs E. Willa	Poor slide in RSC as *Aglaophenia plumosa*, no data.
528	880	8.11.56	Ringa Ringa, Stewart Island, on holdfast of *Asparagopsis armata*, Mrs E. Willa	*Aglaophenia plumosa*

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529			Cook Strait, Stn G.U.J. (55), 13-33 m, Zool. Dept. V.U.C.	Unstained slide in RSC as *Stegopoma fastigiatum*, no data.
530	1259	18.12.54	Cook Strait, Stn G 11B (6), 201 m, Zool. Dept. V.U.C	*Synthecium elegans*
531	1260	22.2.56	Cook Strait, Stn BOL (49), 128 m, Zool. Dept. V.U.C.	*Salacia bicalycula, Clytia* cf. *elongata*
532	1261	"	Cook Strait, Stn BOL (49), 128 m, Zool. Dept., V.U.C.	*Synthecium elegans*
534		26.12.51	'Alert' Stn 2, Pelorus Sound, 46-55 m, W.H.D.	Unstained, partly dried out slide in RSC as *Lineolaria flexuosa*; no further data.
535		19.12.54	Cook Strait, Stn 9, 90 m, N.E. Rangitoto Islands, J. Garrick	Partly dried out slide in RSC as *Lineolaria flexuosa*; no further data.
540		14.8.55	'Alert', Otago Canyon A, Stn 55.5 (or 35.5), 457 m, E.J. Batham	Slide in RSC with label *Lineolaria flexuosa*, no further data.
544	1262	16.1.54	'Alert' Stn 54-6, Canyon E, off Otago Peninsula, 194-179 m, E.J. Batham	*Synthecium elegans*
545	1263	26.5.50	'Ikatere', Tamaki Strait, depth c. 73 m, D. Kulka	*Hebellopsis scandens*, *Synthecium elegans*
546	1264	20.1.57	Reef, Portobello Marine Biological Laboratory, on brown alga, B. Dew, Cronulla	*Plumularia setaceoides*
547	1265	-.1.57	Manukau Harbour, shallow dredge, 0-3.5 m, J. Yaldwyn	*Plumularia setacea*
548	1266	–	Three Kings Islands, sub-littoral on algae, Capt. M. Johnson	*Lytocarpia incisa*
550	1339	24.1.54	Chatham Island Expedition, Stn 7, 51 m	*Halecium ralphae* sp. nov.; *Clytia gigantea*. Stained Canada Balsam slide in RSC as *Halecium beanii*; no data.
552	1340	11.2.54	Chatham Island Expedition, Stn 59, 530 m	*Halecium* sp.
554		26.5.50	Devonport, Auckland, ('Ikatere'), R. Kulka	Rather bad slide in RSC as *Halecium corrugatissimum*; no data.
556		12.5.50	Milford Reef, R. Kulka	Unstained slide in RSC as *Halecium delicatulum*, young female gonothecae, no data.
557		–	Motuihi Channel, Auckland, on *Synthecium elegans*	Unstained slide in RSC as *Halecium fragile*. No further data.
558	1267	–	Cook Strait, Zool. Dept. V.U.C.,	*Symplectoscyphus columnarius*. Bad slide in RSC as *Sertularella columnaria;* no data.
559	1268	–	Cook Strait, Stn 48, Zool. Dept. V.U.C.	*Salacia bicalycula*
560	1269	–	Cook Strait, Stn 75, Zool. Dept. V.U.C.	No recognisable hydroid in this sample.
561	1270	–	Cook Strait, Stn 44, Zool. Dept. V.U.C.	*Sertularella gayi gayi* . Good slide in RSC as *Sertularella intricata*; no data.
562	1271	–	Cook Strait, Stn 43, Zool. Dept. V.U.C.	?*Halecium* sp., *Salacia bicalycula*
563	1272	–	Cook Strait, Stn 48, Zool. Dept. V.U.C.	*Sertularella crassiuscula*. Partly dried out slide in RSC as *Sertularella grossiuscula*, no data. On label: long internodes.
565	1273	–	Cook Strait, Stn 49, Zool. Dept. V.U.C.	*Salacia bicalycula* Poor slide in RSC as *Salacia bicalycula*, with data: Cook Strait, Stn 49.
566	1274	–	Cook Strait, Stn 49, Zool. Dept. V.U.C.	*Modeeria rotunda*, *Salacia bicalycula*, *Obelia geniculata*
567	1275	–	Cook Strait, Stn 43, Zool. Dept. V.U.C.	*Salacia bicalycula*
568	1276	–	Cook Strait, Stn 15, Zool. Dept. V.U.C.	*Nemertesia cymodocea*. Bad slide in RSC as *Nemertesia cymodocea*; no data.
569	1277	–	Cook Strait, Stn 78, Zool. Dept. V.U.C.	*Aglaophenia ctenata*. Poor slide in RSC as *Aglaophenia ctenata*, no data.

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570	1278 & 1279 (second sample)	–	Cook Strait, Stn 77, Zool. Dept. V.U.C.	*Aglaophenia ctenata*, *Plumularia setacea*. Fair slide in RSC as *Plumularia diploptera*, with data (?) new sample.
571	1280	–	Cook Strait, Stn 4, Zool. Dept. V.U.C.	*Halopteris campanula*. Bad slide in RSC as *Halopteris campanula*; no data.
572/573	1282	–	Northern Prawn Investigations, Stn 20, Zool. Dept., V.U.C.	*Hebellopsis scandens*, *Synthecium elegans*. Partly dried out slide in RSC as *Synthecium elegans* var.; no data.
572/573	1281	–	Northern Prawn Investigations, Stn 20, Zool. Dept., V.U.C.	*Synthecium megathecum*. Partly dried out slide in RSC as *Synthecium elegans* var.; no data.
574	1283	–	Northern Prawn Investigations, Stn 9, Zool. Dept. V.U.C.	*Symplectoscyphus johnstoni johnstoni*
575	1284	–	Northern Prawn Investigations, Stn 20, Zool. Dept. V.U.C.	*Symplectoscyphus johnstoni johnstoni*. Partly dried out slide in RSC as *Sertularella johnstoni* ?; no data.
576	1285	–	Northern Prawn Investigations, Stn 20, Zool. Dept. V.U.C.	*Plumularia setacea* . Good slide in RSC as *Plumularia diploptera* (?), with data: 'interesting'.
577 (also no. 731)		–	Northern Prawn, Stn 13, Zool. Dept. V.U.C.	Poor slide in RSC as *Thecocarpus ctenatus*; no data.
578A	1286	23.2.56	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Symplectoscyphus johnstoni johnstoni*
578B	1287	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Symplectoscyphus johnstoni johnstoni*
579	1288	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Hebellopsis scandens*, *Sertularella integra*. Partly dried out slide in RSC as *Sertularella integra*, with data: Cook Strait. Poor slide as *Symplectoscyphus johnstoni delicatula*; no data. On label: no teeth.
580	1289	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Sertularella integra*. Two good slides in RSC as *Sertularella intricata* (*inconstans* crossed out); no data. Good slide as *Sertularella intricata*, with data: Cook Strait.
581	129	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Hebellopsis scandens*, *Sertularella integra*
582	1291	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Aglaophenia laxa*
583	1292	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Nemertesia cymodocea*
584	1293	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Synthecium elegans*. Partly dried out slide in RSC as *Synthecium elegans* var.; no data.
585 slide data.	1294	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Filellum serratum*, *Dictyocladium reticulatum.* Bad in RSC as *Dictyocladium moniliferum*, no
586	1295	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Salacia bicalycula*. Partly dried out slide in RSC as *Salacia buski*, no further data. Partly dried out slide as *Sertularella integra*;, no data.
587	1297	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Filellum serratum*, *Sertularella integra*
588	1298	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Sertularia tumida*
589	1299	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.,	*Cryptolaria prima*
590	1300	"	Cook Strait, Stn 55, Zool. Dept. V.U.C.	*Symplectoscyphus johnstoni johnstoni*. Partly dried out slide in RSC as *Sertularella johnstoni delicatula;* no data.
591(?)	1301	"	Cook Strait, Stn 48, Zool. Dep. V.U.C.	*Amphisbetia episcopus, Sertularella integra, Obelia geniculata*
592	1302	"	Cook Strait, Stn 48, Zool. Dept. V.U.C.	*Salacia bicalycula*. Three good slides in RSC as *Thuiaria bicalycula*, with data: Cook Strait. Labelled: large.
593	130	16.4.57	Off Cape Campbell, c. 73 m, on large concretion, A. Abernethy	*Hebellopsis scandens*, *Synthecium megathecum*
595	1304	14.8.55	Otago Harbour, edge of Canyon A, Stn 55.4. E.J. Batham	*Symplectoscyphus johnstoni johnstoni*, *Plumularia setacea*, *Orthopyxis mollis*. Good slide in RSC as *Symplectoscyphus irregularis*; no data.
596	1305	"	Otago Harbour, edge of Canyon A, 'Alert' Stn 55.4., E.J. Batham	*Symplectoscyphus johnstoni johnstoni*
597	1306	16.1.54	Otago Harbour, canyon E, 'Alert' Stn 54.6, E.J. Batham	*Sertularella integra*, *Symplectoscyphus johnstoni johnstoni*

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
598	1307	16.1.54	Otago Harbour, canyon E, 'Alert' Stn	*Salacia bicalycula,Sertularella integra,Symplectoscyphus johnstoni johnstoni* . Good slide in RSC as *Sertularella johnstoni*; no data.
599	1308	2.3.54	Otago Harbour, canyon A, 'Alert' Stn 54.13, E.J. Batham,	*Sertularella gayi gayi*
600	1309	14.8.55	Otago Harbour, canyon A, 'Alert' Stn 55-4, E.J. Batham	*Symplectoscyphus johnstoni johnstoni* . Good slide in RSC as *Sertularella johnstoni*; no data.
601	1310	"	Otago Harbour, Canyon A, 'Alert', Stn 55-5, E.J. Batham	*Symplectoscyphus johnstoni johnstoni* . Good slide in RSC as *Sertularella simplex*, no data. On label: 'waved'.
602	1311	16.8.55	Otago Harbour, Canyon C, 'Alert' Stn 55-8, E.J. Batham	*Symplectoscyphus johnstoni johnstoni*
603	1312	"	Otago Harbour, Canyon C, 'Alert' Stn 55-8, E.J. Batham	*Salacia bicalycula*, *Symplectoscyphus johnstoni johnstoni*, *S. subarticulatus*. Good slide in RSC as *Sertularella johnstoni*; no data.
604	1313	"	Otago Harbour, Canyon B-C, 'Alert' Stn 55-9, E.J. Batham	*Filellum serratum*, *Symplectoscyphus johnstoni*. Good slide in RSC as *Sertularella johnstoni*; no data.
605	1314	"	Otago Harbour, Canyon B-C, 'Alert' Stn 55-9, E.J. Batham	*Sertularella gayi gayi*
606	1315	16.1.54	Otago Harbour, Canyon E, 'Alert' Stn 54-6, E.J. Batham	*Salacia bicalycula*, *Symplectoscyphus subarticulatus*. Poor slide in RSC as *Thuiaria ? Sert. unguiculata* removed!, with data: Long Beach, Russell.
607	1316	"	Otago Harbour, Canyon E, 'Alert' Stn 54-7, E.J. Batham	*Salacia bicalycula*
608	1317	2.3.54	Otago Harbour, Canyon A, 'Alert' Stn 54-13, E.J. Batham	*Symplectoscyphus subarticulatus*. Good slide in RSC as *Sertularella subarticulata*; data not to be read.
609	1318	9.1.54	8 miles ESE of Cape Saunders, Stn 5	*Salacia bicalycula*. Three good slides as *Thuiaria bicalycula*, with data: Cook Strait. Labelled: retractor muscle on polyp.
610	1319	2.3.54	Otago Harbour, Canyon A, 'Alert' Stn 54-13, E.J. Batham	*Nemertesia ciliata*
611	1320	14.8.55	Otago Harbour, Canyon A, 'Alert' Stn 55-5, E.J. Batham	*Nemertesia ciliata*
612	1321	"	Otago Harbour, Canyon A, 'Alert' Stn 55-5, E.J. Batham	*Salacia bicalycula*
613	1322	16.8.55	Otago Harbour, Canyon B-C, 'Alert' Stn 55-9, 1280 m, E.J. Batham	*Halopteris campanula*
614	1323	12.1.52	'Alert' Stn 20, Paterson Inlet, Stewart Island, 33 m, W.H. Dawbin	*Sertularia unguiculata*
615	1324	"	'Alert' Stn 20, Paterson Inlet, Stewart Island, 33 m, W.H. Dawbin	*Sertularia unguiculata*, *Halopteris campanula*, *Plumularia setacea*
616	1325	"	'Alert' Stn 20, Paterson Inlet, Stewart Island, 33 m, W.H. Dawbin	*Symplectoscyphus johnstoni johnstoni*
617	1326	"	'Alert' Stn 20, Paterson Inlet, Stewart Island, 33 m, W.H. Dawbin	*Dictyocladium reticulatum*. Poor slide in RSC as *Dictyocladium moniliferum*; no data.
619	1327	–.5.57	Spencer Park Beach, north of Christ-church, M. Aitken	*Stereotheca elongata*
620	1328	13.9.56	[H1, Anchor under W. Research], off Port Waikato, west coast North Island, 55 m, trawled, H.J. Chapman	*Lytocarpia spiralis*
621	1329	7.8.56	[H3], west Coast North Island, between Port Waikato and Manukau Harbour, 73 m, H.J. Chapman	*Symplectoscyphus columnarius*. Poor slide in RSC as *Sertularella columnaria*; no data.
622	1330	"	[H5], Port Waikato, Auckland Harbour, 88 m, H.J. Chapman	*Crateritheca zelandica*. Dried out slide as *Crateritheca zelandica*; no data.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
623	1331,	–	[H2], Off Poor Knight Islands, Hauraki Gulf, 20 m, H.J. Chapman,	*Cryptolaria prima*. Unstained slide in RSC; no data.
624	1332	–	Off Cape Colville, Coromandel Peninsula, 73 m, H.J. Chapman	*Hydrodendron tottoni*. Also partly dried out slide in RSC as *Hydrodendron armata*; no locality record.
625		18.2.52	Cape Maria van Diemen (drift), R. Kulka	Two reasonable, unstained slides in RSC as *Crateritheca novazealandiae*, no further data. Good slide as *Crateritheca;* no data.
627		11.1.50	Anawhata, Auckland, C. Trevarthen	Partly dried out slide in RSC as *Stereotheca insignis*, with data: 11.1.50, rest unreadable (= *huttoni*).
628		"	Russell, Bay of Islands, C. Trevarthen	Poor slide in RSC as *Sertularia minima*, with data: Russell, 21.8.50, Sal.
629		16.12.50	Taylor's Mistake, C. Trevarthen	Poor slide in RSC as *Sertularia minima*, with data: Taylor's mist., 16.12.1950, Sa1.
630		–.11.50	Great Barrier Island, C. Trevarthen	Poor slide in RSC as *Sertularia minima* var., with data: Gr. Barrier, nov. 1950, Sa2.
631		"	East of Otago Heads, probably 13 m, E.J. Batham	Two good slides in RSC as *Diphasia subcarinata*, no data.
634		–	St. Heliers (R. Kulka)	Good slide in RSC as *Sertularia marginata*, with data: St. Heliers.
644	1333	1.8.57	Island Bay, drift, on *Ecklonia* sp., H. Clark	*Filellum* sp. 3; *Sertularella integra*. Two good slides in RSC as *Sertularella intricata*; no data.
645	1334	"	Island Bay, drift, on *Ecklonia* sp., H. Clark	*Lytocarpia incisa*
661		1950	M.B.S. Reef, Portobello, P.M. Ralph	Fair slide in RSC as *Sertularia fasciculata*, with data: Reef, MBSP.
662		22.10.50	Paraparaumu Beach	Fair slide as *Sertularia fasciculata*, with data: Paraparaumu Beach,22.10.50
664	1335	4.9.57	Brother Island, Cook Strait, intertidal, R.E. Barwich	*Synthecium elegans*, *Amphisbetia episcopus*. Unstained Canada Balsam slide in RSC, no data, as *Synthecium elegans* var. *elegans*
665	1336	"	Brother Island, Cook Strait, intertidal, R.E. Barwich	*Sertularella integra*. Reasonable slide in RSC as *Sertularella intricata*, no data.
667		–.12.50	Dunedin, R. Kulka	Partly dried out slide in RSC as *Sertularia trispinosa*, with data: Dunedin, 1950, Sa4.
668 (also 711)		28.8.57	Stn 96, Cook Strait, off Palliser Bay, Zool. Dept. V.U.	Fair slide in RSC as *Thecocarpus incisus*, with data: Cook Strait, Stn 96.
669		29.8.57	Stn 99, Cook Strait, off Palliser Bay, Zool. Dept. V.U.	Good slide in RSC as *Nemertesia cymodocea*, no data.
670		28.8.57	Stn 96, Cook Strait, off Palliser Bay, Zool. Dept. V.U,	Fair slide in RSC as *Nemertesia cymodocea*, no data.
672		29.8.57	Stn 191, Cook Strait, off Palliser Bay, Zool. Dept. V.U.	Good slide in RSC as *Thuiaria bicalycula*, with data: Cook Strait, Stn 101.
673		14.9.50	Cook Strait, Island Bank, 110-128 m, Geol. Survey	Good slide in RSC as *Sertularella crassiuscula*, no data.
675		1.1.50	Bethells, Auckland, R. Kulka	Poor slide in RSC as *Sertularella crassiuscula*, with data: Kulka, 1.1.1950.
676		–.11.50	Great Barrier Island, R. Kulka	Poor slide in RSC as *Sertularella crassiuscula*, with data: Gr. Barrier, 11.50, Se4, Kulka.
677		3.6.50	St Heliers, Auckland, R. Kulka	Poor slide in RSC as *Sertularella crassiuscula*, with data: St Heliers, Kulka, 3.6.1950, Se2, excellent.
681		–.8.56	Foveaux Strait oyster beds, R. Zancler	Partly dried out slide in RSC as *Salacia bicalycula*, with data: Foveaux Strait.
683		1950	Whatipu, Auckland, R. Kulka	Poor slide in RSC as *Sertularella robusta*, with data: Easter 1950, Kulka, Se3.
684		"	Whatipu, Auckland, R. Kulka	Poor slide in RSC as *Sertularella robusta*, with data: Easter 1950, Kulka, Se6, on *D. moniliferum*.
685		–	St Heliers, Auckland, R. Kulka	Good slide in RSC as *Sertularella simplex*, with data: St Heliers Bay, R. Kulka, 3.1.1950.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
689		–	S. 80°E, off Taiaroa Heads, approx. 73 m, E.J. Batham	Partly dried out slide in RSC as *Sertularella subarticulata*, with data: S. 80° E of Taiaroa Heads.
690		1.1.50	Whatipu, R. Kulka	Poor slide in RSC as *Sertularella intricata*, with data Whatipu.
693		18.2.52	Cape Maria van Diemen, R. Kulka	Syntype microslide of *Symplectoscyphus johnstoni subtropicus*, in RSC.
695		1950	Dunedin, R. Kulka	Good slide in RSC as *Sertularella johnstoni*, with data: Dunedin, 1950, Kulka, S.A. 7.
699		1.6.56	Off Cape Campbell, 73 m, J. Garrick	Two good slide in RSC as *Sertularella gayi*; no data.
701		14.8.55	Otago, Canyon A, Stn 55-4, 146-183 m, E.J. Batham	Two good slides in RSC as *Symplectoscyphus (?) vanhoeffeni*, no data.
703		3.8.53	Little Papanui (near north-east end of beach), *Durvillea* zone among *Mytilus caniculata* [= *Perna canaliculus*], E.J. Batham	A bad and a good slide as *Sertularella fusca*, with data: Little Papanui, D.
704		"	Little Papanui (near north-east end of beach), *Durvillea* zone among *Mytilus caniculata* [= *Perna canaliculus*)], E.J. Batham	Two fair slides as *Symplectoscyphus macrogonus*, no data.
706		14.8.55	Otago, Canyon A, Stn 55-4,146-183 m, E.J. Batham	Perfect slide in RSC as *Sertularella richardsoni*, with data: Otago Canyon.
710		16.1.54	Otago, Canyon E, 'Alert' Stn 54-7, 192-210 m, E.J. Batham	Poor slide in RSC, re-numbered from 300, as *Thecocarpus incisus*, with data: good for rachis.
711 (also 668)		28.3.57	Stn 96, Cook Strait, off Palliser Bay, Zool. Dept. V.U.	Fair slide in RSC as *Thecocarpus incisus*, with data: Cook Strait, Stn 96.
712		30.11.51	off Karitane, 1.8 m, (label partly unreadable):	Reasonable slide in RSC as *Plumularia setacea*, with data: Rangitoto, 6.6.50. Also reasonable slide, re-numbered 736, as *Thecocarpus incisus*, with data: v.1950, Kawhia Harbour.
713		9.5.51	Menzies Bay, Christchurch, G. Knox	Bad slide in RSC as *Plumularia setaceoides*, no data. Fair slide, re-numbered from 418, as *Thecocarpus incisus*, with data: V.U.C. Zool. Dept.
714		3.6.50	St Heliers Bay, reef, R. Kulka	Fair slide in RSC as *Plumularia hyalina* with data: St. Heliers Reef, 3.6.50, pl. 5.
715		22.8.50	Russell, Bay of Islands, R. Kulka	Reasonable slide in RSC as *Plumularia hyalina*, with data: Pennularian, Russell, (carpophyllum), 22.8.50.
716		18.5.50	Coromandel, R. Kulka	Reasonable slide in RSC as *Plumularia spinulosa* with data: Coromandel, 18.5.50, Pl. 7.
722		–.9.59	(with indication "none"), Island Bay, Cook Strait, on *Cystophora*, D.E. Griffin	Fair slide in RSC as *Thecocarpus incisus*, with data: Cook Strait, Stn 98, male corbula shows good theca at base.
723		–	Portobello Marine Biological Station, test block A.283, D. Hurley	Poor slide in RSC as *Plumularia wattsi*, with data PMBS, A283, wharf block. Also bad slide, re-numbered from 161(?) as *Thecocarpus incisus*, no data.
724		6.5.50	Narrow Neck, Auckland, C. Trevarthen	Reasonable slide in RSC as *Plumularia setaceoides*, with data: male & female, narrow neck, 6.5.1950.
725		21.8.49	Motuihe, Auckland, C. Trevarthen,	Reasonable slide in RSC as *Plumularia diploptera*, with data: dredged Motutapu, 21.8.49.
726		9.4.60	off Cape Turakirae, Cook Strait, c. 91 m, M. Buchler	Perfect slide in RSC as *Nemertesia elongata*, no data. Good slide as *Nemertesia elongata*, no data.
728		14.8.50	Point Jerningham, P.M. Ralph	Good slide in RSC as *Plumularia setacea* with data: Wharf Pile Oceanographic Institute.
729		21.8.50	Russell, Bay of Islands, intertidal, C. Trevarthen	Poor slide in RSC as *Halopteris minuta*; no data.
730		–.10.49	Glendowie (Auckland), C. Trevarthen	Four good slides in RSC as *Halopteris constricta*, with data: Russell.
731 (also 577)		2.10.54	Island Bay, on *Peronia paramithrax*, J.C. Yaldwyn	Poor slide in RSC as *Thecocarpus ctenatus*, no data.

Loc. No.	Colln No.	Date	Location and Collector	Species and Remarks
732 (new for 439)		2.10.54	Island Bay, on *Peronia paramithrax*, J.C. Yaldwyn	Perfect slide in RSC as *Halopteris constricta, P. setacea*, no data (= new number 732). Bad slide as *Aglaophenia plumosa*, no data (bears also number 527).
733 (also 229),		27.11.53	off Taiaroa, North Otago Heads, 33–36.5 m, E.J. Batham	Bad slide in RSC as *Aglaophenia plumosa*, no data.
734 with		–.5.50	(also "none"), Kawhia Harbour, C. Trevarthen	Good slide in RSC as *Dictyocladium moniliferum*, data: Russell.
735		–.3.50	(also "none"), Whatipu. C. Trevarthen	Poor slide in RSC as *Aglaophenia acanthocarpa*, with data: Whatipu, Easter 1950.
736		–.5.50	(also "none"), Kawhia Harbour, C. Trevarthen	Fair slide in RSC as *Aglaophenia acanthocarpa*, with data: May 1950. Also reasonable slide 712, re-numbered 736 as *Thecocarpus incisus*, with data: v.1950, Kawhia Harbour
No locality number			Wellington Harbour, collected between 1961 and 1963 (see Ralph & Thomson 1968). Large numbers of samples of *Obelia geniculata*, registered as NMNZ Colln 1355. Also *Sarsia eximia*.	

H4 slide Unstained slide in RSC, as *Halecium flexile* (monosiphonic), no data.
H4 slide Unstained slide in RSC, as *Halecium corrugatissimum* with data: TS Beach, 2/6/50.
none Slide in RSC as *Thecocarpus chiltoni*, with data: '49, P.M.R., Zool. dept.
none Poor slide in RSC as *Plumularia pulchella*, with data Aq. Pt.
none Poor slide in RSC as *Plumularia pulchella*, with data: PMBS, dec. 52, Reef + oddments, better shown elsewhere, P.V.A.
none Poor slide in RSC as *Plumularia setacea* var. *opima*, with data: Little Papanui.
none Poor slide in RSC as *Plumularia setacea*, with data: Aq. Pt.
none (possibly 57) Reasonable slide in RSC as *Thecocarpus incisus* (= *H. rostrata*), no data.
none Two good, stained Canada Balsam slides in RSC as *Antennella africana*, with data Cape Town, Millard's material.
none Four perfect slides in RSC as *Sertularella richardsoni*, with data: Otago Canyon.
none Perfect slide in RSC as [*Sertularella gayi*], with data: Otago Canyon.
none Good slide in RSC as *Symplectoscyphus subarticulatus* with data: Governer's Bay, Christchurch, Ralph Coll.
none Poor slide in RSC as *S. fusca*, with data: ANARE J 10.
none Fair slide in RSC as *Sertularia bispinosa*, with data: Zool. Dept. Museum specimen.
none Partly dried out slide in RSC as *Stereotheca elongata, Sertularia, S. bispinosa*, with data: Paraparaumu Beach, drift, Oct. 52, P.M. Ralph.
none Partly dried out slide in RSC, with data: *Sargassum* drift, Glendowie, Oct. 1949, K.
none Partly dried out slide in RSC as *Obelia geniculata subtropica*, with data: Kulka (1) check.
none Unstained slide in RSC as *Obelia geniculata*, and data: Rangitoto Isl., 26.6.50, Kulka.
none Slide without any indications, containing no hydroids.
none Stained Canada Balsam slide in RSC, as *Clytia gracilis*, and data: Auckland Harbour, ship hull, Ocean. Inst. 19.
none Two stained Canada Balsam slides in RSC, as *Clytia elongata*, and data: Auckland Harbour, ship hull, Ocean. Inst. 9.
none Partly dried out slide in RSC, as *Obelia geniculata*, and data: ANARE, Mi/49/Jl, 4/5/49.
none Stained, partly dried out slide in RSC with data: ANARE Exp., Mi/49/jl, 4/5/49.
none Unstained slide in RSC as *Orthopyxis* sp. and data: Ikatere drift, OPL 26.5.1950.
none Two unstained Canada Balsam slides in RSC as *Stegolaria irregularis* Totton, with data: 600 fms, 400 miles NW. of Wellington, Oct. 1950.
none Stained Canada Balsam slide in RSC as *Synthecium elegans*, with data: Manokau Harbour, 8/52, marked SYL.
none Rather bad slide in RSC as *Halecium corrugatissimum*, with data: Oct. 1949, *Sargassum* drift, Glendowie.
none Stained Canada Balsam slide in RSC as *Hebella calcarata* on *Dynamena crisioides*, with data: Cleveland, 10 April 1949.
none Reasonable, unstained slide in RSC as *Crateritheca zelandica* (one marked as male), with data: Manakau, 13.8.50.
none Fairly good slide in RSC as *Stereotheca elongata*, with data: Marine Summerton S.A., Feb. 1936, R.S.
none Good, stained slide in RSC as *T. buski* var. *tenuissima*, with data: Cape Maria van Diemen.
none Reasonable slide in RSC as *Thuiaria buski* var. *tenuissima*, with data: Cook Strait, Stn 96.
none Two good, stained slides in RSC as *Thuiaria buski* var. *tenuissima*, with data: Cape Maria van Diemen, O. Mus. material.
none Poor slide in RSC as *Sertularia fasciculata*, with data: Portobello Sa5, Dec. 1950, on label: (uni).
unreadable Partly dried out slide in RSC as *Crateritheca zelandica*, with data: North Island, WRR?
unknown Three perfect slides in RSC as *Halopteris heterogona*; no data (marked Bale).
unknown Four good slides in RSC as *Thecocarpus incisus* (= *H. rostrata*), no data.

unknown	Slide in RSC, no name, on *Cystophora*, Island Bay, 17.9.59, VUW Zool. Dept.
unknown	Slide in RSC: Calyptoblastic hydroid, no. 3, fair slide.
unknown	Fair slide in RSC as Calyptoblastea, *Clytia* spec., *Orthopyxis*, with data: 100% toothed.
unknown	Fair slide in RSC as *Dictyocladium dichotomum*, with data: Cape Palliser, Cook Strait, Stn ?55.

1954 Chatham Islands Expeditions, Ralph Collection

Stn No.	Date	Latitude (° S)	Longitude	Depth (m)	Location	Species and Remarks
3	23.1.54	43°10.1′	175°36.5′E	75	Mernoo Bank	*Hebellopsis scandens*
7	24.1.54	43°42′	179°55′E	512	Chatham Rise	*Lafoea dumosa*, *Clytia gigantea*
14	27.1.54	44°00′	176°21′W	27	Hanson Bay	*Sertularella robusta*
23	29.1.54	43°32.5′	176°47.5′W	60	N. of The Sisters	*Halopteris campanula*
25	"	littoral zone			Waitangi Wharf, on	*Glycimerus* sp., *Sertularella robusta* (with *Clytia johnstoni*, according to label, latter not found); *Symplectoscyphus* cf. *rentoni*
31	31.1.54	43°56.5′	176°37′W	40	Petre Bay	*Crateritheca insignis*. Partly dried out slide as *Crateritheca insignis*, with data: Chatham Strait, Stn 31, 31.1.54.
34	1.2.54	44°04′	175°23.5′E	238	E. of Forty Fours	*Acryptolaria conferta conferta*
37	2.2.54	44°21.5′	176°13′W	55	between South East & Pitt Islands	*Sertularia tumida*, *Halopteris campanula*
52	10.2.54	44°04′	178°04′W	476	Chatham Rise	*Lytocarpia subdichotoma*
59	11.2.54	43°38′	177°19′E	531	Chatham Rise	

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Mu Stn No.	Hyd. Ref.	Date	Depth (m)	Location	Species and Remarks
64-10	28	6.11.67	7	Molyneux Bay	Information on label: half of colony to P.M. Ralph: *Hydrodendron tottoni*, *Symplectoscyphus johnstoni johnstoni*
66-12	23 (on card)	8.11.66	15	Blueskin Bay Otter trawl	*Plumularia setacea*
66-24	fixed	20.9.66 24.9.66	59	ENE Taiaroa Heads beam trawl	*Aglaophenia laxa*
66-38	29	–	40	E of Taiaroa Heads	*Symplectoscyphus fuscus*
66-38	30	–	40	E of Taiaroa Heads	*Amphisbetia operculata*
66-38	32	–	40	E of Taiaroa Heads	*Sertularella integra*
66-38	196	–	40	E of Taiaroa Heads	Half identified by P.M. Ralph: *Stereotheca elongata*
66-38	34	–	58	no locality record	Other half P.M. Ralph: *Halopteris campanula*
66-62	24	8.11.66	15	Blueskin Bay Otter trawl	*Amphisbetia fasciculata*, *Plumularia setacea*
66-65	21	–	27	Offshore between Taiaroa Head and Cape Saunders	*Amphisbetia fasciculata*
67-10	19a	–	13	Molyneux Bay	Colour brown (other half identified by P.M. Ralph). *Stereotheca elongata*
67-40	11 (on card)	20.6.67	219–347	Saunders Canyon Agassiz trawl	Bright orange-yellow (other half identified by P.M. Ralph). *Halopteris campanula*
67-43	8	–	622–649	No locality record	*Lytocarpia subdichotoma*
67-43	10a	11.4.67	622–649	Saunders Canyon Agassiz trawl + b.s., 2 pm, fixed 3 pm	Colour whitish: *Lytocarpia spiralis*, *Lytocarpia subdichotoma*
66-48	35	–	59	No locality record	Other half identified by P.M. Ralph: *Plumularia setacea*

Mu Stn No.	Hyd. Ref.	Date	Depth (m)	Location	Species and Remarks
67-60		22.5.67	732	Canyon D Agassiz + b.s.	Slender yellow hydroid 'rods', colour yellow: *Lytocarpia spiralis*, *Lytocarpia subdichotoma*
67-61		"	686–631	Canyon D Agassiz + b.s.	All larger ones yellowish: *Lytocarpia spiralis*
67-13	27	7.2.67	10	Off Clutha mouth Agassiz trawl	Other half colony to P.M. Ralph: *Plumularia setacea*
67-63	14 fixed	22.5.67 23.5.67	457–438	Papanui Canyon Agassiz trawl	Other half identified by P.M. Ralph: *Symplectoscyphus subarticulatus*
67-41	2	20.6.67	512–319	Saunders Canyon	*Amphisbetia fasciculata*
67-41	16	"	512–319	Saunders Canyon	*Hydrodendron tottoni*
67-61		22/5/67	686–631	Papanui Canyon Agassiz trawl, sandy mud	*Aglaophenia ctenata*
67-79		–	66–68	Otago	*Sertularella gayi gayi*
67-80	15	–	219–165	Northern waters of New Zealand	*Sertularella gayi gayi*
67-81		–		Cape Maria van Diemen	*Hydrodendron tottoni*
67-98		–		no details	*Cryptolaria prima*

Other PMBS collections

Date	Location	Remarks	Species
29–31.6.51	E Otago continental shelf,	RV 'Taiaroa', commercial Otter trawl, 73–110 m	*Cryptolaria prima, Salacia bicalycula, Symplectoscyphus subarticulatus*
2.10.52	Aquarium Point, PMBS,	E.J. Batham	*Obelia geniculata, Silicularia rosea*
2.4.53	Aquarium Point, PMBS	On fronds of *Macrocystis* sp., abundant, whitish (on card)	*Obelia geniculata*, *Orthopyxis crenata*
2.10.52	Aquarium Point, PMBS	rocky shore, below low tide., colourless	*Amphisbetia fasciculata*
2.4.53	Aquarium Point, PMBS	low spring tide. On stalks of *Pyura pachydermatina*, abundant, pale straw yellow	*Amphisbetis trispinosa*
"	Aquarium Point, PMBS	low tide, common on *Cystophora*, also on *Macrocystis*	*Plumularia setaceoides*
4.4.53	Aquarium Point, PMBS	low tide, rocks just north of bridge	*Aglaophenia plumosa*
16.4.53	Aquarium Point, PMBS	little below extreme low spring tide, among *Macrocystis*, End Beach	*Salacia farquhari*
14.5.53	Little Papanui	reef near N end, towards low tide on *Cystophora scalaris* in pools. Colour whitish.	*Silicularia rosea*
"	Little Papanui	outer Otago Peninsula, *Durvillea* zone, on *Perna canalicula* [= *Perna canaliculus*] shells on continuously wave-exposed rocky shore, abundant, brown	*Amphisbetia bispinosa*
9.1.54	Taiaroa Heads, Otago	grey mud, 55 m. A. Black's trawl-dredge (brought back alive). Skeleton yellow-horny colour, hydranths unpigmented.	*Nemertesia cymodocea*
23.5.60	End Beach, Aquarium Point	low tide neap, on *Hormosira*	*Plumularia wattsii*
7.3.62	Port Chalmers, Otago Harbour	low spring tide	*Plumularia wattsii*
3.7.62	W end of Quarantine Head	spring low tide, on *Macrocystis pyrifera*	*Silicularia rosea*

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Identification	Location and Remarks	Species
Iv. 748, A.24:120 & A.24:121	Portobello, coll. W. Benham, 1924	*Silicularia rosea*
Iv. 750, A.52: 58	No data on label, which also mentions *Tubiclava rubra*	*Obelia geniculata*
Iv. 751, A.98:145	Port Chalmers, S.S. 'Ringarooma', coll. W. Benham/ E. Jennings, Nov. 1898	*Obelia geniculata*
Iv. 752, A.52:54	Wainui Beach, Gisborne, no date	*Amphisbetia trispinosa*
Iv. 753. A.99:38	Centre Island, Port Chalmers, Feb. 1899, coll. W. Benham	*Plumularia setacea, Obelia geniculata*
Iv. 755, A.33	Otago Harbour, seawall, coll. A. Hamilton, Sept. 1893:	*Obelia geniculata*
Iv. 757, A.52:57	From shells of *Ostrea angasi*, Stewart Island, August 1927:	*Sertularella integra*, *S. robusta*, *Symplectoscyphus subarticulatus*
Iv. 758, A.52:52	No data on label	*Obelia geniculata*
Iv. 760, A.24:122	Portobello, leg. W. Benham, 1924:	*Obelia geniculata*
Iv. 763, A.52:49	Collected from rock off North Reef, 183 m), 12.9.1932, leg. D.G. Graham	*Hebellopsis scandens*, *Symplectoscyphus subarticulatus*, *S. subdichotomus*, *Parascyphus simplex*, *Synthecium elegans*, *Orthopyxis mollis*
Iv. 764, A.29:11a	Tasman Sea, 38°55'S, 171°E, 570 m, Coll. Lt. Vickers, H.M.C.S. 'Iris', 1929	*Acryptolaria conferta conferta*
Iv. 765	No further data	*Symplectoscyphus johnstoni johnstoni*
Iv. 766, A.52:55	Foveaux Strait. No further data	*Salacia bicalycula*
Iv. 767, A.52:59	No data on label	*Obelia longissima*
Iv. 768, A.52:56	No data on label	*Stereotheca elongata*
Iv. 770	From unidentified hydrozoans collected by S.S. 'Doto'	*Cryptolaria prima*, *Symplectoscyphus subarticulatus*, *S. johnstoni johnstoni*
Iv. 771, A.98:3?	No further data	*Silicularia rosea*
Iv. 772,	Otago, 1890. On *Macrocystis* sp.	*Silicularia rosea*
Iv. 773, A.52:50,	Off bottom of S.S. 'Takapuna'	*Plumularia wattsii*
Iv. 774, A.52:47	No further data	*Silicularia rosea*

Additional material studied

9.4.94	Bauza Island, Doubtful Sound, 20 m, leg. J.E. Watson	*Symplectoscyphus johnstoni johnstoni*, *Synthecium tottoni* , *Obelia dichotoma* , *Orthopyxis mollis*
11.4.94	Doubtful Sound, 12 m, leg. J.E. Watson:	*Hebellopsis scandens*, *Hydrodendron mirabile*, *Salacia bicalycula*, *Sertularella gayi gayi*
	Spirits Bay, tip of North Island:	*Crateritheca novaezel*andiae, *Nemertesia elongata*

INDEX

This taxonomic index does not incorporate the specific names appearing in the Station Data in Appendix 1. Bold numerals indicate line drawings.