*Systema Porifera: A Guide to the Classification of Sponges, Edited by John N.A. Hooper and Rob W.M. Van Soest*


# Family Hyalonematidae Gray, 1857

**Konstantin R. Tabachnick[1] & Larisa L. Menshenina[2]**

[1] Department of Bottom Fauna, Institute of Oceanology of Academy of Sciences of Russia, Nahimovsky 36, Moscow, Russia. (tabachnick@mail.ru)
[2] Department of Biophysics, Physical Faculty, Moscow State University, Vorobiovi (Leninskie) Gori, Moscow, Russia.

Hyalonematidae Gray (Hexactinellida, Amphidiscophora) contains five genera: *Hyalonema; Charalonema; Composocalyx; Lophophysema* and *Platella*. The genus *Hyalonema* is subdivided into 12 subgenera: *H.* (*Hyalonema*)*; H.* (*Corynonema*)*; H.* (*Coscinonema*)*; H.* (*Cyliconema*)*; H.* (*Paradisconema*)*; H.* (*Phialonemiella*)*; H.* (*Prionema*)*; H.* (*Pteronema*)*; H.* (*Thamnonemiella*)*; H.* (*Leptonema*)*; H.* (*Onconema*)*; H.* (*Oonema*). The validity of genera *Charalonema* and *Composocalyx* and some subgenera of *Hyalonema: Paradisconema, Prionema* and some others is questionable. Two new names *Phialonemiella* and *Thamnonemiella* are suggested to replace the former preoccupied names [*Phialonema*] and [*Thamnonema*]. The family is well distinguished among other Amphidiscophora by prevailing of diactines among choanosomal megascleres and presence of anchorate basalia with four and more teeth or discoidal basalia with serrated discs.
**Keywords:** Porifera; Hexactinellida; Amphidiscophora; Hyalonematidae; *Hyalonema*; *Charalonema*; *Composocalyx*; *Lophophysema*; *Platella*; *Hyalonema* (*Hyalonema*); *Hyalonema* (*Corynonema*); *Hyalonema* (*Coscinonema*); *Hyalonema* (*Cyliconema*); *Hyalonema* (*Paradisconema*); *Hyalonema* (*Phialonemiella*); *Hyalonema* (*Prionema*); *Hyalonema* (*Pteronema*); *Hyalonema* (*Thamnonemiella*); *Hyalonema* (*Leptonema*); *Hyalonema* (*Onconema*); *Hyalonema* (*Oonema*).

## DEFINITION, DIAGNOSIS, SCOPE

### Synonymy

Hyalonemadae Gray, 1857: 279; Bowerbank, 1864: 18. Hyalonematidae (part) Schulze, 1886: 57, 1887a: 178, 381; 1893: 543; 1904: 181. Carteiadae Gray, 1872b: 134. [Hyalonemidae] (*lapsus*) Schulze, 1887a: 181. Hyalonematinae (sensu subfamily) Schulze, 1886: 57, 1887a: 178, 381; 1893: 561.

### Definition

Amphidiscophora which have most choanosomal megascleres represented by diactines.

### Diagnosis

Body varies strongly: oval, cup-like or spindle-like (consists of two opposite cones), lophophytose, with or without atrial cavity. Basalia are located in a single tuft, contain spicules with more than two teeth (usually 4–8), other prostalia are represented by diactines, usually with pinular distal ray. Choanosomal skeleton consists predominately of diactines. Hexactines, ambuncinates and rarely uncinates are found in various combinations with diactines. Dermalia and atrialia are pinular pentactines, rarely hexactines. Hypodermal and hypoatrial skeleton consists of pentactines. Amphidiscs are various, usually they are represented by three kinds. Microhexactines and micropentactines usually prevail upon all their derivatives up to monactines.

### Scope & Distribution

Five genera, cosmopolitan in distribution, except Arctic ocean, found at depths 100–6235 m.

### History and biology

Hyalonemadae, the prototype of Hyalonematidae, and its type genus *Hyalonema* were intially considered to be corals (Gray, 1857). Subsequently there was a long debate in the literature on the 'coral-sponge' artificial nature of *Hyalonema*. Different parts of the body were named separately. For example, Gray (1867a) designated a new name [*Carteria*] for the cylindrical body. Only Bowerbank, in a series of publications between 1864–1867, made a correct interpretation of the body of *Hyalonema*.

Initially Hyalonematidae was the only family of Amphidiscophora, and this scheme persisted for a long time (Topsent, 1928c) notwithstanding the creation of Pheronematidae and Monorhaphididae for taxa previously included in this family. The first attempt to subdivide *Hyalonema* was made by Schulze (1886, 1887a) in an effort to better order the many species included. He proposed two subgenera: *Hyalonema* and *Stylocalyx*. Their distinction was based on the presence in *Hyalonema* (*Hyalonema*) or absence in *Hyalonema* (*Stylocalyx*) of oscular sieve-plates. Later Lendenfeld (1915) suggested to divide *Hyalonema* into seven subgenera: *Hyalonema, Leptonema, Prionema, Oonema, Phialonema, Skianema* and *Thallonema*. Ijima (1927) further developed the subgeneric definition of *Hyalonema*. He accepted the subgenera of *Leptonema, Prionema, Oonema* and *Phialonema* proposed by Lendenfeld and eight new subgenera: *Thamnonema, Paradisconema, Cyliconema, Pteronema, Coscinonema, Onconema, Corynonema* and *Euhyalonema* (the latter name is incorrect according to the ICZN). Lévi (1964a) proposed to elevate some of these subgenera to full generic status (*Euhyalonema, Ptreonema, Coscinonema, Cyliconema, Paradisconema, Corynonema, Leptonema, Prionema*, and *Oonema*), and he also suggested that the subgeneric status of *Phialonema, Onconema, Thamnonema, Skianema* and *Thallonema* were doubtful. He later retracted this action and did not mention the subgeneric definition of *Hyalonema* at all. The subgenus *Stylocalyx* in

which 6 species were described simultaneously was defined by Schulze (1886, 1887a) without a type species. Later both Schulze (1904) and Lendenfeld ignored this subgenus completely. Ijima (1927) referred the species of *Stylocalyx* to four subgenera (some of them with sieve-plates and some without). However, all species in four subgenera and some species in two subgenera have sieve-plates. Furthermore, the subgeneric schemes for *Hyalonema* proposed by Lendenfeld (1915) and Ijima (1927) were incomplete since omitted *Stylocalyx*, although its type species was never nominated and the name has not been used since the 19th century. Three other genera of Hyalonematidae (*Charalonema, Composocalyx* and *Platella*) are monospecific, and *Lophophysema* has three species (Tabachnick & Lévi, 1999).

Ijima (1927) pointed to some other features of Hyalonematidae that are noteworthy. (1) The absence of uncinates. Uncinates are rare among Hyalonematidae although 'uncinate rhabdodiactines' were reported in *Hyalonema* (*Onconema*) (Lendenfeld, 1915; Ijima, 1927). Uncinates were also found in *Hyalonema* (*Pteronema*) *repletum* (Reiswig, 2000a) and in *Platella* (Tabachnick, 1988). It is impossible to decide whether these Hyalonematidae uncinates differ principally from those of Pheronematidae, and consequently we assume that only the scarcity of these spicules is characteristic for the family Hyalonematidae. The suggestion of Ijima (1927) that uncinates of Pheronematidae are monactines and those of Hyalonematidae are diactines is questionable. (2) The absence of sceptres. (3) The presence of a single compact tuft of basalia. The presence of more than one basal tuft in *Hyalonema polycaulum* (Lendenfeld, 1915) and in *H. sieboldi* described below are considered to be accidental phenomena, following Ijima's (1927) suggestion. (4) The presence of acanthophores. These are certainly reported for many Hyalonematidae only, but their obligatory presence is questionable.

In this report we err on the side of 'splitting' to emphasise differences between taxa, as opposed to submerging these differences via potentially inaccurate synonymies. Consequently, the validity of some genera (*viz., Charalonema* and *Composocalyx*) is questionable due to their similarities to *Hyalonema* in many features. Furthermore, some subgenera of *Hyalonema* (*Paradisconema, Prionema*) may be synonimized with others in the future based on more detailed studies of their spicules in comparison to those of other subgenera.

The generic identification of Hyalonematidae is based on their habitus and prostal spicules, while the subgeneric identification of *Hyalonema* was based on dermal and amphidiscs spicules (Ijima, 1927). Hence, a fragment belonging to a hexactinellid other than *Hyalonema* could be potentially refered to a subgenus of *Hyalonema*. To avoid this both keys are united into a single key, emphasising spicule characteristics which may allow identification of even small fragments.

**KEY TO GENERA AND SUBGENERA**

(1) Macramphidiscs or large mesamphidiscs have serrated teeth edges ..... ***Hyalonema (Prionema)***
All macramphidiscs have smooth teeth edges ..... 2
(2) Dermal pinular ray is thickest at base, tapering towards the end ..... 3
Dermal pinular ray is spindle-like (rarely even) with outer end represented by an apical cone (rarely conical) ..... 13
(3) Macramphidiscs have umbels longer than broad ..... 4
Macramphidiscs have umbels broader than long or as broad as long ..... 6
(4) Dermal pinular ray with unusually long spines ..... ***Hyalonema (Thamnonemiella)***
Dermal pinular ray short-spiny or moderately long-spiny ..... 5
(5) Dermal pinular ray is even with rounded or conically pointed outer end; basalia are anchorate spicules with pileate, serrated discs ..... ***Platella***
Dermal pinular ray is usually whip-like; basalia are four-toothed anchors ..... ***Hyalonema (Leptonema)***
(6) Dermal pinular ray with unusually long spines ..... ***Hyalonema (Phialonemiella)***
Dermal pinular ray short-spiny or moderately long-spiny ..... 7
(7) With paradiscs among micramphidiscs ..... ***Hyalonema (Paradisconema)***
Without paradiscs among micramphidiscs ..... 8
(8) Ambuncinates absent ..... 9
Ambuncinates present ..... 10
(9) Sieve-plate absent ..... ***Hyalonema (Cyliconema)***
Sieve-plate present, basalia are situated in a broad, loose, untwisted tuft ..... ***Charalonema***
(10) Dermal pinular ray moderately long-spiny, conical or spindle-like in general shape (with or without sieve-plate) ..... ***Hyalonema (Pteronema)***
Dermal pinular ray short-spiny often whip-like in general shape ..... 11
(11) Prostalia lateralia are gathered in tufts on conical prominances of dermal surface; atrial surface is divided by septas into four parts ..... ***Composocalyx***
Dermal surface has no conical prominances and tufts of prostalia lateralia ..... 12
(12) The sieve-plate when present has open small meshes uniformly distributed ..... ***Hyalonema (Coscinonema)***
The sieve-plate has open meshes assembled in groups separated by imperforate tracts ..... ***Hyalonema (Hyalonema)***
(13) With uncinates ..... ***Hyalonema (Onconema)***
Without uncinates ..... 14
(14) Body composed of two opposite cones ..... ***Lophophysema***
Body is bell-like or oval ..... 15
(15) Most macramphidiscs are ovoid with umbels 1/3–1/2 long as the length of the whole spicule ..... ***Hyalonema (Oonema)***
Macramphidiscs have umbels narrower or broader than long, their umbels are about 1/4–1/3 long as the length of the whole spicule .....***Hyalonema (Corynonema)***

## *HYALONEMA* GRAY, 1832

### Synonymy

*Hyalonema* Gray, 1832: 59. *Hyalochaeta* (*H. posseti*) Brandt, 1859: 16. *Spongia* (part *S. spinicrux; S. octancyra*) Brandt, 1859: 21. *Serpula* (*S. parallela*) Coy, 1862: 85. [*Carteria*] Gray, 1867a: 540 (preocc. by *Carteria* Diesing, 1866, Protozoa) (*C. japonica* Gray, 1867: 350; *C. lusitanica* Gray, 1868a: 161). *Hyalothryx* (*H. lusitanica*) Gray, 1867c: 271. *Leiobolidium* Schmidt, 1880b: 65. *Stylocalyx* (subgenus of *Hyalonema*) Schulze, 1886: 59; 1887a: 211. *Asconema* – part *A. kentii* Schmidt, 1880b: 65.

### Type species

*Hyalonema sieboldi* Gray, 1835 (by monotypy).

### Definition

Hyalonematidae with mainly bell-like or ovoid body; the everted (when known) atrialia do not form notable rise; basalia are gathered in a compact twisted (in grown specimens) tuft, being represented by toothed anchors.

### Remarks

The genus contains 12 subgenera and approximately 107 described species and 4 new species currently in press. The present work is not a comprehensive revision of *Hyalonema* because it was not possible to track and reexamine many of the 'old' specimens whose descriptions are inadequate for modern purposes. Consequently we largely follow Schulze (1887a, 1904) in his interpretation of the genus and subgenera, with refinements of subsequent authors. *Leiobolidium* was considered to be a junior synonym of *Pheronema* but recent investigations by Reiswig (2000a) found that the holotype belongs to *Hyalonema* (*Prionema*).

It is not possibile to provide a comprehensive diagnosis for *Hyalonema* given the huge variability of species contained within it such that some genera of Hyalonematidae are very close to it and some subgenera of *Hyalonema* are sometimes considered to be good genera (see above). Thus, the pecularities of *Hyalonema* are evident from the definition of the genus.

### Distribution

Cosmopolitan, except the Arctic ocean; depth 100–6235 m.

## *HYALONEMA (HYALONEMA)* GRAY, 1832

### Synonymy

*Hyalonema* Gray, 1832: 59. *Hyalochaeta* (*H. posseti*) Brandt, 1859: 17. *Spongia* (part *S. spinicrux; S. octancyra*) Brandt, 1859: 21. *Serpula* (*S. parallela*) Coy, 1862: 85. *Carteria* (*C. japonica* Gray, 1867a: 350; *C. lusitanica* Gray, 1868a: 161). *Hyalonema* (*Euhyalonema*) Ijima, 1927: 50. *Euhyalonema* Lévi, 1964a: 85.

### Type species

*Hyalonema sieboldi* Gray, 1835 (by monotypy).

### Definition

*Hyalonema* with pinular ray of dermal spicules whip-like, short spiny, its rhachis is thickest at base; with ambuncinates; macramphidiscs have umbels broader than long, their umbels are 1/4–1/3 long as the length of the whole spicule; the sieve-plate has open meshes assembled in groups separated by imperforate tracts.

### Diagnosis

Body is oval, small atrial cavity divided by septas into several parts when small and inverted-conical with flat oscular sieve-plate has open meshes assembled in groups which are separated by imperforate tracts in large specimens. The apical cone was not found. Choanosomal spicules are diactines, ambuncinates and rarely hexactines. In one species the ambuncinates are absent but uncinates with the tubercules in the middle are present instead of them. Pleuralia lateralia are pinular diactines. Acanthophores are stauractines, tauactines, pentactines and diactines. Basalia are represented by anchors. Dermalia and atrialia are pinular pentactines. Their pinular ray is whip-like with short lateral spines, its rhachis is thickest at base. Hypodermalia and sometimes hypoatrialia are pentactines. Amphidiscs are represented by two or three kinds (mesamphidiscs may be absent). Macramphidiscs have umbels, usually about 1/4 – 1/3 (rarely 1/12) as long, and about 1/3 – 1/2 (rarely ) as broad, as the length of the whole spicule. Mesamphidiscs and micramphidiscs have common shape. Microhexactines are entirely absent in most species or they are rare.

### Description of type species

*Hyalonema* (*Hyalonema*) *sieboldi* Gray, 1835 (Fig. 1).

***Synonymy.*** *Hyalonema sieboldi* Gray, 1835: 59. *Hyalonema mirabilis* Gray, 1857: 279; Leidy, 1860: 85; Stimson, 1863: 458; Bowerbank, 1864: 196, 1867a: 18. *Hyalonema mirabile* Bowerbank 1867a: 32, 33. Not *Hyalonema mirabile* Wright, 1870: 73. Part of *Carteria – C. japonica*) Gray, 1867a: 350. *Hyalochaeta* (*H. posseti*) Brandt, 1859: 17.?*Hyalonema affine* Brandt, 1859: 16. *Spongia* (part *S. spinicrux; S. octancyra*) Brandt, 1859: 21. *Hyalonema* (*Euhyalonema*) *sieboldi* Ijima, 1927: 50.

***Material examined.*** Holotype?: BMNH (b738) – locality unknown (off Japan?). Other material. BMNH (b818) – (erroneously identified as *H. apertum*), off Japan, Boshin. BMNH 1887.10.20.087 (b324; b326) – (erroneously identified as *H. apertum*), locality unknown (off Japan?). BMNH (b739) – off Japan. BMNH 1885.12.30.016, 1895.04.09.002; (b717) – off Japan, Boshin. BMNH 1921.11.05.001 – off Japan, Misaki. BMNH 1868.06.20.001, 1883.08.29.011, 1885.12.31.014 – locality unknown (off Japan?). MNHN (p4708) – off Japan.

***Description.*** The body is inverted-conical, rounded below with flat oscular sieve-plate. Open meshes on the sieve-plate are assembled in groups which are separated by imperforate tracts. Open meshes 2–3 mm in diameter are often found on the dermal surface. The body is 75–150 mm in length and 55–150 mm in diameter. The length of basalia is over 400–650 mm. The apical cone is usually absent but in one specimen BMNH (b818) it is presented by two small rises. One specimen BMNH 1895.04.09.002 is represented by two fused specimens which have common oval sieve-plate and two basal tufts and lower body parts. Spicules. Choanosomal spicules are diactines, ambuncinates and rare hexactines. The

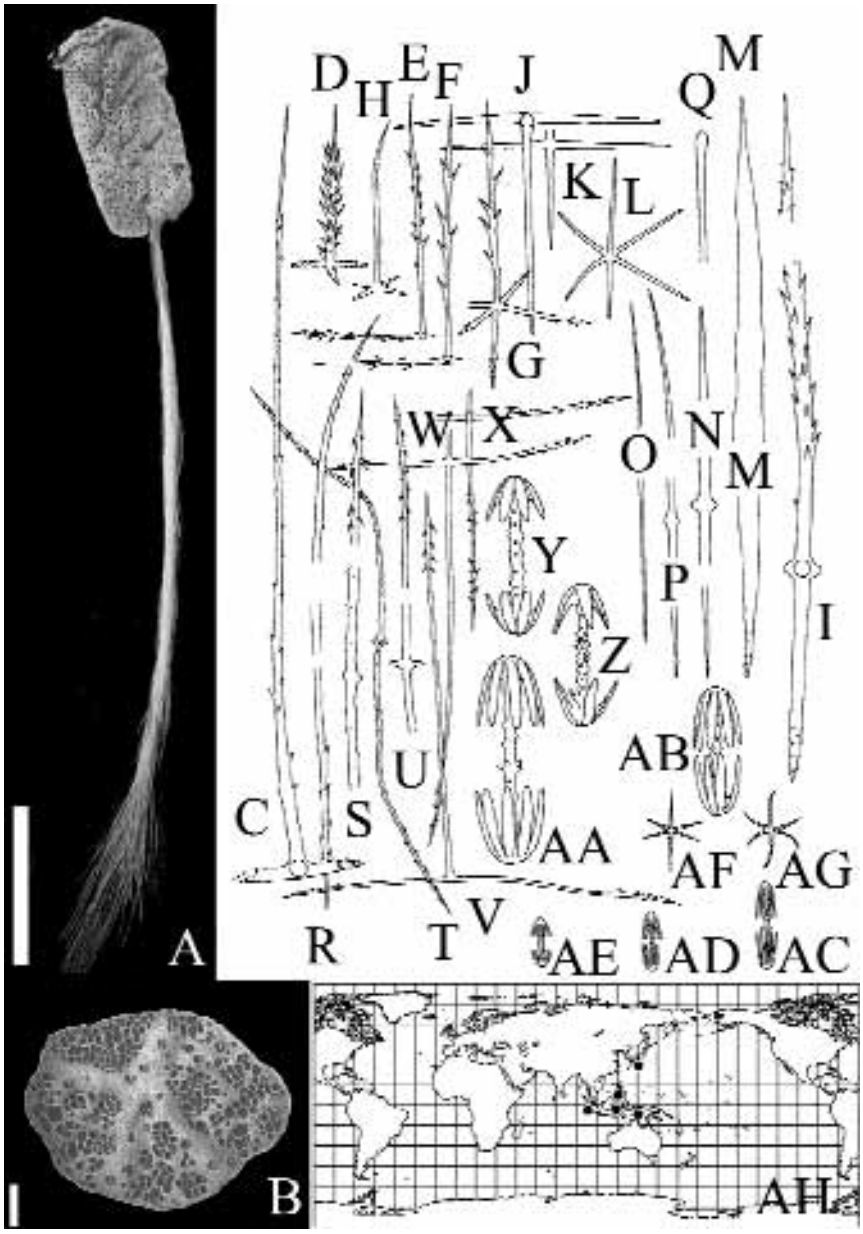


**Fig. 1.** *Hyalonema (Hyalonema) sieboldi*. A, view from lateral side after Schulze (1887a) (scale 120 mm). B, view from upper side after Schulze (1887a) (scale 10 mm). C–F, dermal pinular pentactines 250×. G, dermal pinular hexactine 250×. H, dermal pentactine 250×. I, pinular diactine 250×. J, hypodermal pentactine 75×. K, hypodermal stauractine 75×. L, choanosomal hexactine 75×. M–P, choanosomal diactines. M, 75×. N–O, 250×. P, 75×. Q, outer end of choanosomal diactine 250×. S–U, ambuncinates 250×. V, tauactine with ambuncinate's terminations 250×. W, stauractine with ambuncinate's terminations 250×. X, pentactine with ambuncinate's terminations 250×. Y–Z, macramphidiscs 75×. AA–AB, macramphidiscs 125×. AC–AD, mesamphidiscs 250×. AE, micramphidisc 500×. AF–AG, microhexactines 250×. C–D, M–S, AA–AG, BMNH (b738). E–F, BMNH 1887.10.20.087. G, BMNH (b739). H, J, T, BMNH 1895.04.09.002 (b736.2). I, BMNH 1895.04.09.002 (b736.1). K, L, BMNH (b717). U–X, BMNH 1885.12.30.016. Y–Z, BMNH 1921.11.05.001. AH, distribution of *Hyalonema (Hyalonema)*.

diactines are 0.5–2.7/0.004–0.061 mm. The smallest ones have a widening in the middle or two–four rudimentary tubercles, the largest diactines have even shafts. The diactines have conically pointed, rarely rounded or clavate terminations. Ambuncinates are numerously present in the choanosomal skeleton, they are 0.3–0.7/0.002–0.005 mm, usually with curved terminations. The ambuncinates have spines directed towards the spicule centre, at terminations some minute spines may be present close to the spicule centre. The ambuncinates have widenings, two–four tubercles or even shafts in the middle. Sometimes it is possible to find three–five rayed spicules with terminations as in the umbuncinates, such spicules were found in relatively large amount in BMNH 1885.12.30.016. The choanosomal hexactines are not numerous. They were found in one investigated specimen BMNH (b717). Their rays are 0.1–0.3/0.008–0.011 mm, their terminations are conically pointed. Prostalia lateralia are represented by pinular diactines with relatively short spines and conically pointed terminations which protrude beyond the last spines. Four rudimentary tubercles are situated in the middle. The proximal ray is smooth with minute spines near the outer end. The length of the pinular ray

is 0.40–0.46 mm long, proximal ray is 0.30–0.40 mm, their diameter is 0.008 mm. These pinular diactines were found in two investigated specimens. Basalia in the investigated specimens are broken. The shafts of basalia have interrupted spiral denticulate ridges in the middle parts and they are smooth proximally. It may be suggested that they are anchorate spicules. Acanthophores are stauractines, tauactines and diactines which are entirely covered by spines or spines are situated only at their terminations which are rounded or conically pointed. Dermalia and atrialia are pinular pentactines, rarely hexactines. The pinular ray of these spicules has short and usually rare spines. The outer end is whip-like and projects usually far beyond the last spines. Tangential rays are conically pointed, usually with spines at their terminations. The pinular ray of dermal pentactine is 0.076–0.608 mm in length, tangential rays are 0.015–0.068 mm. The pinular ray of atrial pentactine is 0.061–0.395 mm in length, tangential rays are 0.023–0.061 mm. Their diameter is 0.002–0.009 mm. Hypodermalia and hypoatrialia are pentactines and rarely stauractines. They have rays 0.14–0.85/0.005–0.030 mm. Microscleres. Amphidiscs are represented by two or three kinds. Macramphidiscs are not found in one specimen BMNH 1887.10.20.087. It is possible that they are absent in the investigated fragment only. The macramphidiscs have tuberculated shafts often with a whorl of tubercles in the middle. Sometimes it is possible to find abnormal macramphidiscs with reduced teeth. Total length of macramphidisc is 0.152–0.403 mm, the umbel length 0.068–0.144 mm, the umbel diameter 0.053–0.190 mm. In one specimen (BMNH (b738)) the macramphidiscs are about 2 times smaller than in the others, the smallest of these macramphidiscs have teeth which nearly overlap in the middle being similar to mesamphidiscs. The umbels of macramphidiscs are about 1/4 as long, and about 1/5 as broad, as the length of the whole spicule. Mesamphidiscs are numerous in one investigated specimen BMNH (b738). Mesamphidiscs are rare in BMNH 1885.12.30.016; BMNH (b818) and BMNH (b717) and they were not found in other investigated specimens. The shafts of mesamphidiscs are tuberculated, sometimes with a whorl of tubercles in the middle. Total length of mesamphidisc is 0.031–0.091 mm, the umbel length 0.013–0.046 mm, the umbel diameter 0.007–0.038 mm. Micramphidiscs have slightly tuberculated shafts. Total length of micramphidisc is 0.009–0.025 mm, the umbel length 0.003–0.008 mm, the umbel diameter 0.003–0.007 mm. It is not certain that microhexactines and micropentactines with straight or curved rough rays occur in this species. These spicules were described for *H. sieboldi* (Schulze, 1860; Schulze, 1887a) but they are rare in some of the reinvestigated specimens and it is possible to suggest that they are not fully developed dermal, atrial or canalar spicules.

***Remarks.*** The subgenus contains five species. The name *Hyalonema* (*Hyalonema*) used by Schulze (1886, 1887a) and Lendenfeld (1915) must be used in place of *H.* (*Euhyalonema*) of Ijima (1927) since it is the nominotypical taxon of the genus *Hyalonema* (Hooper & Wiedenmayer, 1994).

It is not certain that the holotype has been indicated correctly since its label states that it was presented by J. Reeve Esq. in 1835, while the first description of this genus was published in 1832. If this is correct and it becomes necessary to designate a lectotype, it is recommended a better specimen should be chosen than this alleged holotype.

Uncinates instead of ambuncinates were described in *H.* (*Euhyalonema*) *pellucidum* (Ijima, 1927: 6), as noted in the diagnosis. This species was considered to be a 'form' of *H. sieboldi* by Schulze (1904), whereas Lendenfeld (1915) referred it to *H.* (*Phialonema*) and Ijima (1927) placed it into his *H.* (*Euhyalonema*). Despite many data and publications on this species, its description (the best one from Schulze, 1887a) is still largely inadequate for modern purposes, to differentiate it from other related taxa, and it is not absolutely certain that *H. mirabilis* is a junior synonym of *H. sieboldii*. Gray (1857) notes "*Hyalonema mirabilis*, Gray, Syn. B.M. 1830, 180", but Schulze (1887a) specifically searched this publication and considered it to be erroneous. It is also uncertain whether *Hyalochaeta posseti* Brandt (1859), *Spongia spinicrux* and *Spongia octancyra* Brandt (1859) also belong to *H. sieboldi*, and thus the corresponding synonymyies are only suspected and after Schulze (1887a). Re-examination of a number of specimens stored in various museums identified as *H. sieboldi* revealed that they belong to *H. apertum* (see the corresponding description) and vice versa.

**Distribution**

Indo-West Pacific; depth 300–1235 m. The type species is distributed off Japan with one record also known off the Philippines (Cebu), at 300–1235 m depth.

### *HYALONEMA (CORYNONEMA)* IJIMA, 1927

**Synonymy**

*Hyalonema* (*Corynonema*) Ijima, 1927: 53. Part of *Hyalonema* (*Hyalonema*) – *H.* (*Hyalonema*) *grandancora* Lendenfeld, 1915: 235; *H.* (*Hyalonema*) *placuna* Lendenfeld, 1915: 207; *H.* (*Hyalonema*) *tenuifusum* Lendenfeld, 1915: 222; *H.* (*Hyalonema*) *tylostylum* Lendenfeld, 1915: 229. Part of *Hyalonema* (*Stylocalyx*) – *H.* (*Stylocalyx*) *depressus* Schulze, 1886: 60; *H.* (*Stylocalyx*) *depressum* Schulze, 1887a: 217. *Hyalonema depressum* Schulze, 1893: 580. *Corynonema* Lévi, 1964a: 92.

**Type species**

*Hyalonema* (*Corynonema*) *owstoni* Ijima, 1894 (by original designation).

**Definition**

*Hyalonema* with pinular ray of dermal spicules clavate or spindle-like in overall shape, with outer end terminating with an apical cone; without ambuncinates and uncinates; macramphidiscs have umbels narrower or broader than long, their umbels are about 1/4 – 1/3 as long as the length of the whole spicule.

**Diagnosis**

The body is from ovoid with or without atrial cavity to cup- or vase-like with atrial cavity and usually with apical cone. Choanosomal spicules are diactines and usually hexactines. Basalia are multi-toothed anchors. Acanthophores, when known, are mostly stauractines. Dermalia, atrialia and canalaria are pentactines. Dermal pinular ray is clavate or spindle-like in overall shape, with outer end terminating with an apical cone. Atrial pinular ray, when known, is even. Hypodermalia and hypoatrialia, when known, are pentactines. Amphidiscs are represented by three

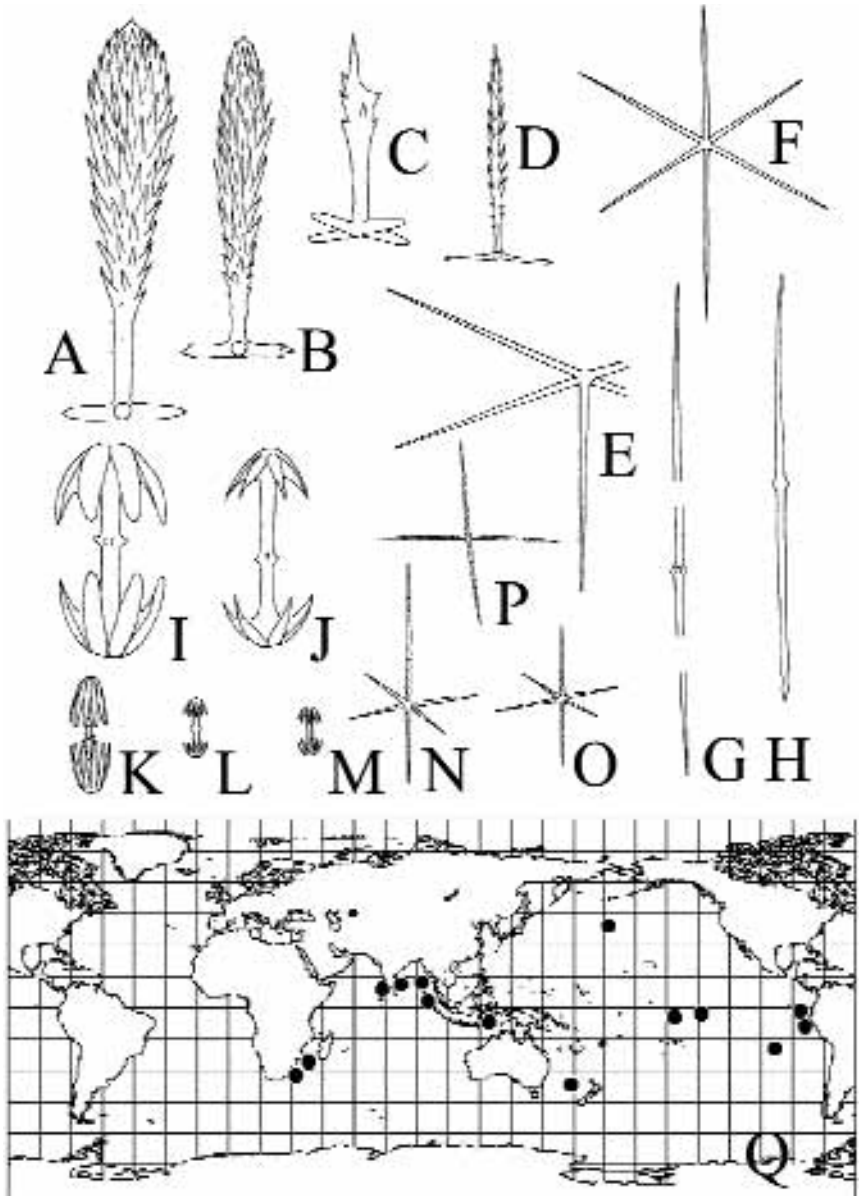


**Fig. 2.** *Hyalonema (Corynonema) owstoni*. A–D, pinular pentactines 200×. E, hypodermal or hypoatrial pentactine 100×. F, choanosomal hexactine 100×. G–H, choanosomal diactines 100×. I–J, macramphidiscs 200×. K, mesamphidisc 200×. L–M, micramphidiscs 400×. N–O, microhexactines 200×. P, microstauractine 200×. A–P, USNM 22128. Q, distribution of *Hyalonema (Corynonema).*

(rarely two) kinds. Macramphidiscs have umbels narrower or broader than long, usually about 1/4–1/3 as long, and about 1/3–1/2 as broad, as the length of the whole spicule. Other types of amphidiscs are represented by mesamphidiscs and micramphidiscs. Microhexactines predominate micropentactines and microstauractines.

## Description of type species

*Hyalonema* (*Corynonema*) *owstoni* Ijima, 1894 (Fig. 2).

***Synonymy.*** *Hyalonema owstoni* Ijima, 1894: 367. *Hyalonema* (*Corynonema*) *owstoni* Ijima, 1927: 53.

***Material examined.*** Holotype: unknown. Other material. USNM 22128 – 'Albatross', 33°22.50′N, 135°38.30′E, depth 995–997 m. *H.* (*Corynonema*) *clathratum* (described as *H.* (*Corynonema*) *owstoni* by Okada (1936): USNM 22129 – 'Albatross', 32°36.20′N, 132°24.30′E, depth 741 m.

***Description.*** Body is hemispherical with apical cone and atrial sieve-plate. The body length is 50–60 mm. The apical cone projects at 13–23 mm above the sieve-plate, the sieve-plate is 13–31 mm in diameter. Numerous small, irregularly distributed subatrial canals open beneath the sieve-plate. Basalia are a twisted tuft of spicules up to 400 mm in length. The specimen collected by the 'Albatross' expedition is a fragment. Spicules. Choanosomal spicules are diactines and hexactines. The diactines are 0.5–2.3/0.005–0.015 mm. They have conically pointed terminations and usually a widening or sometimes two or four rudimentary tubercles in the middle. The hexactines have rays 0.251–0.532/0.004–0.015 mm with conically pointed terminations. The pinular pentactines are numerous in the investigated fragment. They may

be refered to both dermal or atrial spicules. The pinular ray has clavate shape, it is covered with numerous relatively long spines, its outer end is rounded and does not protrude far beyond the last spines. The tangential rays have conically pointed or rounded terminations, they are smooth or have some short spines near the terminations. The pinular ray is 0.144–0.289 mm in length, its diameter close to the base is 0.006–0.011 mm, its maximal diameter is 0.023–0.053 mm. The tangential rays are 0.024–0.046/0.005–0.008 mm. Some spicules with thin and even pinular ray may be refered to canalaria or to undeveloped pentactines with clavate terminations. Hypodermalia are pentactines with rays 0.152–0.304/0.005–0.015 mm with conically pointed terminations. Microscleres. Amphidiscs are represented by three kinds. The macramphidiscs have smooth shafts with a whorl of tubercles in the middle, their teeth have rounded or sometimes conically pointed terminations. Macramphidiscs have umbels which are 1/3–1/2 as long, and 1/3–3/4 as broad, as the length of the whole spicule. Total length of macramphidisc is 0.090–0.180 mm, the umbel length 0.034–0.063 mm, the umbel diameter 0.031–0.095 mm. The mesamphidiscs have short spiny shafts with a whorl of spines in the middle. Total length of mesamphidisc is 0.027–0.085 mm, the umbel length 0.009–0.036 mm, the umbel diameter 0.009–0.041 mm. The micramphidiscs have smooth shafts, even or with a widening in the middle. Total length of micramphidisc is 0.013–0.022 mm, the umbel length 0.004–0.011 mm, the umbel diameter 0.004–0.013 mm. Microhexactines prevail over rarely found micropentactines and microstauractines. The microhexactines are represented by two forms in similar proportions: with equal rays and with one ray about 1.5 times longer than the others. These rays are 0.032–0.094/0.002 mm, short spiny.

***Remarks.*** The subgenus contains 15 species (one is divided into two subspecies). No type material was available to us, with the consequence that the description above is an amalgamation from several sources. Okada (1936) synonymized two species of Ijima (*H.* (*Corynonema*) *owstoni* and *H.* (*Corynonema*) *clathratum*) based on newly collected material from the 'Albatross' expedition. However, reinvestigation of this material led us to conclude that this action was unwarranted. One of these specimens clearly belongs to *H.* (*Corynonema*) *clathratum* while the other is (less certainly) *H.* (*Corynonema*) *owstoni*. Some differences in spicule measurements were noted between the primary description of *H.* (*Corynonema*) *owstoni* and the specimen collected by the 'Albatross' expedition. So Okada hesitated to refer it to *H.* (*Corynonema*) *owstoni*. We consider this specimen to correspond more closely to *H.* (*Corynonema*) *owstoni*. Since the description of Ijima is poor we use the later collected specimen in the spicule description above, although it may be referred to *H. owstoni* with some hesitation. Only a comprehensive reinvestigation of type material will solve this puzzle. The description of the body is based on Ijimas' data (1894).

*Hyalonema clavigera* of Schulze (1886, 1887a), previously referred to *H.* (*Corynonema*), is transferred here to *H.* (*Pteronema*) based on similarity of dermal pentactines and presence of ambuncinates. This means that all representatives of *H.* (*Corynonema*) lack ambuncinates as suggested by Ijima (1927). The postulation by Ijima (1927) that macramphidiscs of *H.* (*Corynonema*) have umbels broader than long is incorrect since a range of species demonstrate the opposite situation: *H. depressum* (Schulze, 1887a), *H. rotundum* (Ijima, 1927), *H. tenuifusum* (Lendenfeld, 1915), *H. tylostylum* (Lendenfeld, 1915) and *H. placuna* (Lendenfeld, 1915). Their amphidiscs are similar to that of *H.* (*Thamnonemiella*). This feature is similar to *H.* (*Leptonema*). The dermal pinular rays of *H.* (*Corynonema*) are spindle-like or clavate in overall shape (including its spines) but in some species the rhachis is clavate too. In the others the rachis is relatively even: *H. masoni* (Schulze, 1894), *H. weltneri* (Schulze, 1894), *H. populiferum* (Schulze, 1899). This feature justifies including these species in *H.* (*Corynonema*). In a reinvestigation of fragments of the type of *H. masoni* (BMNH 1907.08.01.003) it was noted that the dermal pinular ray is thickest at the base and distally tapering, barely corresponding to the illustrations of Schulze (1894, 1904), and consequently this species should be transferred to *H.* (*Cyliconema*). We are uncertain whether *H. weltneri* and *H. populiferum* are both true representatives of *H.* (*Corynonema*) but we have no material at our disposal to verify this. If, however, they do belong to *H.* (*Corynonema*) then their pinular ray construction emphasises their similarity with *H.* (*Cyliconema*) and *H.* (*Pteronema*).

Mesamphidiscs are absent in one species (*H.* (*Corynonema*) *rotundum* (Ijima, 1927)). We suppose there was a mistake in referring amphidiscs to corresponding kinds in the species description of *H.* (*Corynonema*) *owstoni* (Ijima, 1894): the mesamphidiscs must be considered as small macramphidiscs, the micramphidiscs are mesamphidiscs as in other related species of this subgenus and of other subgenera of *Hyalonema*, the micramphidiscs were not reported.

Besides the barrel-shaped mesamphidiscs (amphidiscs in which the teeth meet at the equator) characteristic of *H.* (*Corynonema*) *clathratum* there are some other features which distinguish the 'Albatross' specimen from *H.* (*Corynonema*) *owstoni*, leading us to the conclusion that it may belong to *H.* (*Corynonema*) *clathratum. Hyalonema* (*Corynonema*) *clathratum* has four kinds of amphidiscs, one of which is well distinguished between micramphidiscs and mesamphidiscs (belonging to large micramphidiscs). The shafts of macramphidiscs of *H.* (*Corynonema*) *clathratum* are covered by numerous tubercules, while that of *H.* (*Corynonema*) *owstoni* are much less tuberculated or have a whorl of tubercles in the middle. Many of the microhexactines in *H.* (*Corynonema*) *owstoni* have one ray about 1.5 times longer than the others. Other parameters such as spicules dimensions are also likely to differ between these species but this assertion requires corroboration from measurements of the type material. If all these assumptions are incorrect then the specimens collected by the 'Albatross' expedition should be described as new species.

### Distribution

Indian and Pacific oceans, depth 370–4504 m. The type species is distributed off Japan, depth 360–997 m.

## *HYALONEMA (COSCINONEMA)* IJIMA, 1927

### Synonymy

*Hyalonema* (*Coscinonema*) Ijima, 1927: 50. Part of *Hyalonema* (*Phialonema*) – *H.* (*Phialonema*) *pateriferum* Lendenfeld, 1915: 362. Part of *Hyalonema* (*Stylocalyx*) – *H.* (*Stylocalyx*) *elegans* Schulze, 1886: 61, 1887a: 223. *Hyalonema elegans* Schulze, 1893: 579. *Coscinonema* Lévi, 1964a: 86. Part of *Asconema – A. kentii* Schmidt, 1880b: 65.

### Type species

*Hyalonema* (*Coscinonema*) *kirkpatricki* Ijima, 1927 (by original designation).

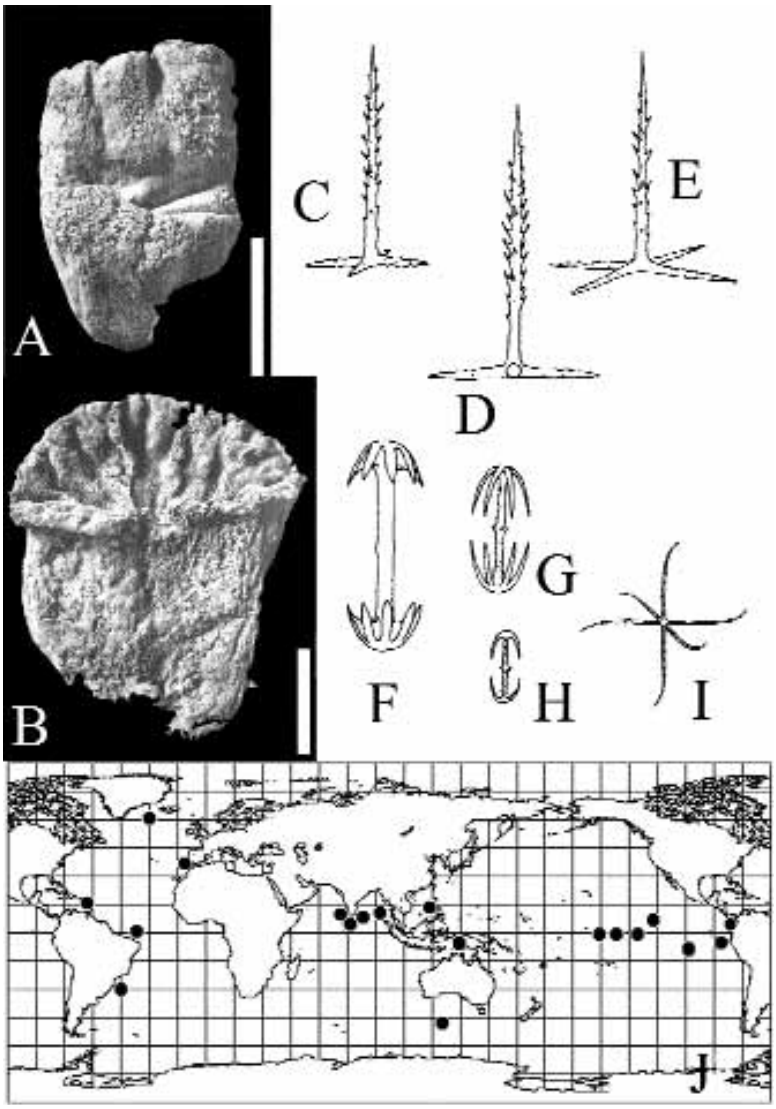


**Fig. 3.** *Hyalonema (Coscinonema) kirkpatricki kirkpatricki*. A, external shape after Ijima (1927) (scale 30 mm). B, external shape after Ijima (1927) (scale 30 mm). C, dermal pinular pentactine 300×. D, atrial pinular pentactine 300×. E, canalar pinular pentactine 300×. F, macramphidisc 80×. G, mesamphidisc 300×. H, micramphidisc (optical section?) 300×. I, microhexactine 300×. C–I, from Ijima (1927). J, distribution of *Hyalonema (Coscinonema)*.

## Definition

*Hyalonema* with a slender pinular ray of dermal spicules bearing short spines and with finely pointed outer end; macramphidiscs have umbels broader than long; the sieve-plate when present has open meshes small and uniformly distributed.

## Diagnosis

Body is oval, without atrial cavity and osculum when small and funnel-like, with atrial cavity and osculum in large specimens. One species has sieve-plate with small and uniformly distributed open meshes. The apical cone is found in some species, in one species the atrial cavity is divided by septas into four parts. Choanosomal spicules are diactines and in most species together with hexactines. Ambuncinates are known in a single species. Pleuralia oscularia, when present, are usually pinular diactines. Basalia, when known, have usually 4 teeth (in one species 2–6 teeth). Acanthophores, when known, are stauractines, tauactines and pentactines. Dermalia and atrialia are pentactines, rarely hexactines (usually similar to each other). The pinular ray is whip-like with short lateral spines (rarely with a little amount of long spines), its rhachis thickest at base. Hypodermalia and sometimes hypoatrialia are pentactines. Amphidiscs are usually of three kinds (sometimes some of them are absent). Macramphidiscs have umbels broader than long (usually about 1/2–1/8 as long, and about 1/2–1/3 as broad, as the length of the whole spicule). Mesamphidiscs and micramphidiscs have common shape. Microhexactines sometimes are rare, they have smooth or rough, straight or curved rays.

## Description of type species

*Hyalonema* (*Coscinonema*) *kirkpatricki* Ijima, 1927 (Fig. 3).

***Synonymy.*** *Hyalonema* (*Coscinonema*) *kirkpatricki* Ijima, 1927: 68.

***Material examined.*** ‘Syntypes’: 3 specimens, not seen. Ijima (1927) based most descriptions and dimensions on specimen ‘A’. The two known subspecies of this species have different

localities: *H.* (*Coscinonema*) *kirkpatricki kirkpatricki* – 'Siboga', 5°46.7′S, 134°00.0′E, depth 1788 m; *H.* (*Coscinonema*) *kirkpatricki globosum* – 'Albatross', 32°32.0′N, 132°23.0′E, depth 1320 m; 32°36.0′N, 132°23.0′E, depth 810 m.

***Description.*** The body is cap-like about 90 mm in length and in maximal diameter, with shallow 30–50 mm atrial cavity. Basalia are broken in all specimens. Spicules. Choanosomal spicules are diactines and rare hexactines. The diactines are 1–4/0.020–0.040 mm. They have a widening or four rudimentary tubercles in the middle. The hexactines have rays 0.300–0.660/0.009–0.030 mm. Ambuncinates are absent. Acanthophores are stauractines together with some tauactines and pentactines. Their rays are up to 0.250/0.020 mm, tuberculated. Dermalia and atrialia are pinular pentactines. Their pinular ray is short-spiny with conically pointed outer end (the pinular ray of atrialia is longer than that of dermalia). Their tangential rays are rough, conically pointed. The pinular ray of dermal pentactine is 0.095–0.165/0.005 mm, tangential rays are at about 0.045 mm in length. The pinular ray of atrial pentactine is 0.120–0.220/0.005 mm, tangential rays are about 0.045 mm in length. Canalaria are similar to dermal spicules, but their rays are slender, tangential rays are longer, spines on the pinular ray are less numerous. Hypodermalia are pentactines with tangential rays 0.250–0.800/0.016–0.040 mm. Microscleres. Amphidiscs are represented by 3 kinds. Macramphidiscs have umbel about 1/4–1/5 as long, and about 1/2–1/3 as broad, as the length of the whole spicule. Their shaft is smooth with indistinct tubercules in the middle. Total length of macramphidiscs is 0.275–0.450 mm, the umbel length 0.055–0.113 mm, the umbel diameter 0.110–0.175 mm. Mesamphidiscs and micramphidiscs have rough shafts with a widening in the middle. Total length of mesamphidiscs is 0.027–0.065 mm, the umbel length 0.009–0.022 mm, the umbel diameter 0.009–0.027 mm. Total length of micramphidiscs is 0.012–0.020 mm, the umbel length 0.004–0.007 mm, the umbel diameter 0.005– 0.008 mm. Microhexactines have slightly curved rough rays 0.057–0.118/0.002 mm.

***Remarks.*** The subgenus contains 15 species of which two are subdivided into two subspecies. *Hyalonema* (*Coscinonema*) *indicum* (Schulze 1894) has a sieve-plate and lacks an atrial cavity. The dermal surface of *H.* (*Coscinonema*) *polycoelum* is folded and has several additional lateral oscula (Lévi & Lévi, 1989). Ambuncinates are not reported except in *H.* (*Coscinonema*) *polycoelum* (Lévi & Lévi, 1989). Lendenfeld (1915) placed *H.* (*Coscinonema*) *pateriferum* into his subgenus *H.* (*Phialonema*) based on the presence of macramphidiscs with short and flattened umbels, but later it was transferred to *H.* (*Coscinonema*) by Ijima (1927). *Hyalonema* (*Coscinonema*) *heymonsi* is probably a young specimen of *H.* (*Coscinonema*) *indicum*, as was suggested by Schulze (1904) and Ijima (1927).

Two subspecies of *H.* (*Coscinonema*) *kirkpatricki* are described. The main differences between the typical form and *H.* (*Coscinonema*) *kirkpatricki globosum* Okada (1932) is macramphidisc form and length (tuberculated shaft, smaller size in the latter subspecies) and length of pinular ray of pentactines (it is longer in the latter subspecies). All the measurements of spicules and their descriptions are given for *H.* (*Coscinonema*) *kirkpatricki kirkpatricki*.

### Distribution

Cosmopolitan, except Antarctic and Arctic oceans; depth 327–4525 m.

## *HYALONEMA (CYLICONEMA)* IJIMA, 1927

### Synonymy

*Hyalonema* (*Cyliconema*) Ijima, 1927: 51. Part of *Hyalonema* (*Hyalonema*) – *H. polycaulum* Lendenfeld, 1915: 201. Part of *Hyalonema* (*Pteronema*) – *H. polycaulus* Ijima, 1927: 50. Part of *Hyalonema* (*Stylocalyx*) – *H.* (*Stylocalyx*) *apertus* Schulze, 1886: 59; *H.* (*Stylocalyx*) *apertum* Schulze, 1887a: 214; Gravier, 1899: 422; Arndt, 1928: 4; *H.* (*Stylocalyx*) *tener* Schulze, 1886: 62; *H.* (*Stylocalyx*) *tenerum* Schulze, 1887a: 224; *H.* (*Stylocalyx*) *thomsoni* Schulze, 1886: 59; 1887a: 211; Topsent, 1892a: 28. *Hyalonema aperum* Schulze, 1893: 581; *H. tenerum* Schulze, 1893: 577. Part of *Hyalonema* (*Corynonema*) – *H. masoni* Schulze, 1894: 31 (Ijima, 1927). *Cyliconema* Lévi, 1964a: 87.

### Type species

*Hyalonema* (*Cyliconema*) *apertum* Schulze, 1886 (by original designation)

### Definition

*Hyalonema* with whip-like (rarely spindle-like in overall shape), short spiny pinular ray of dermal spicules, its rhachis is thickest at base; without ambuncinates; macramphidiscs have umbels broader than long, their umbels are 1/2–1/7 as long as the length of the whole spicule.

### Diagnosis

The body varies from ovoid (in small specimens) to inverted-conical, funnel-like, cup-like or is combined from two cones fused to each other by their base. The atrial cavity, the apical cone and septes dividing the atrial cavity into several (often 4) parts may be present. Oscular sieve-plate is absent. The choanosomal spicules are diactines often together with hexactines. Ambuncinates are absent. Pleuralia lateralia are pinular diactines. Basalia are four-toothed anchors. Acanthophores vary from hexactines to diactines. Dermalia, atrialia and canalaria are pinular pentactines rarely hexactines. The pinular ray is whip-like (in one species spindle-like) with short spines, rhachis thickest at base. Hypodermalia and hypoatrialia are pentactines. Amphidiscs are represented by three, sometimes two kinds. Macramphidiscs have umbels, usually about 1/2–1/7 (rarely up to 1/13) as long, and about 1/1.5–1/6 as broad, as the length of the whole spicule. Microhexactines predominate their rare deviates: pentactines and stauractines.

### Description of type species

*Hyalonema* (*Cyliconema*) *apertum* Schulze, 1886 (Fig. 4).

***Synonymy.*** For *Hyalonema* (*Cyliconema*) *apertum apertum* Schulze, 1886: *H.* (*Stylocalyx*) *apertus* Schulze, 1886: 59. *H.* (*Stylocalyx*) *apertum* Schulze, 1887a: 214. *H. apertum* Schulze, 1893: 581; 1894: 39. ?*H. affine* Schulze, 1899: 112, 1902: 27. *H. affine japonicum* Schulze, 1899; 129. *H.* (*Cyliconema*) *apertum solidum* Okada, 1932: 21. For *Hyalonema* (*Cyliconema*) *apertum maehrentali* (Schulze), 1894: *H. maehrentali* Schulze, 1894: 41. *H. affine reticulatum* Schulze, 1899: 129; 1902: 27. *H. apertum* Schulze, 1904: 91.


**Fig. 4.** *Hyalonema (Cyliconema) apertum apertum*. A, longitudinal section after Schulze (1887a) (scale 50 mm). B, upper view after Schulze (1887a) (scale 50 mm). C–D, dermal pinular pentactines 200×. E–G, atrial pinular pentactines 200×. H, pinular diactine with short tangential rays 100×. I, pinular diactine with four tubercles instead of the tangential rays 120×. J, choanosomal hexactine 50×. K–L, hypodermal pentactines 50×. M, choanosomal stauractine 50×. N–O, large choanosomal diactines 50×. P–R, small choanosomal diactines 50×. S–X, the terminations of choanosomal diactines 100×. Y–AD, macramphidiscs 100×. AE–AF, mesamphidiscs 400×. AG–AJ, micramphidiscs 400×. AK, microhexactine 200×. AL, micropentactine 200×. AM, microhexactine 200×. C–F, BMNH 1887.10.20.084 (b323). G–H, J, X, (MNHN (p3847). I, from Schulze (1887a). K, P–Q, BMNH 1934.04.01.001 (b814). L, N–O, S–W, BMNH (b819). M, R, AC, AG, AJ, AL, BMNH 1934.04.01.001 (b813). Y, AD, BMNH 1900.09.07.001 (b821). Z, USNM 22132. AA–AB, BMNH 1887.10.20.084 (b322). AE–AF, AH, AK, AM, BMNH 1887.10.20.087. AN, distribution of *Hyalonema (Cyliconema)*.

***Material examined.*** Holotype: not seen. Other material. USNM (kt1437; kt1438; kt1439) – 'Albatross', 31°31.00′N, 129°25.30′E, depth 783 m. USNM 22127 – 'Albatross', 32°36.30′N, 132°23.20′E, depth 714–1057 m. Paratype of *Hyalonema* (*Cyliconema*) *apertum solidum*: USNM 22132 – 'Albatross', 30°34.00′N, 129°19.30′E, depth 805 m. USNM (kt1371) – (erroneously identified as *H. sieboldi*) off Japan, Enoshima. MNHN (p3847) – off Japan. MNHN (p3829; p3830; p3831.1; p3831.2; p3832) – (erroneously identified as *H. sieboldi*) off Japan. BMNH 1900.09.07.001; 1821.11.30.005; 1887.10.20.084; 1887.10.20.084; 1887.10.20.084; 1887.10.20.087 (b325); 1934.04.01.001; 1934.04.01.001; (b819); (b820) – off Japan. BMNH 1871.02.06.002; 1885.12.31.019 – (erroneously identified as *H. mirabile* = *H. sieboldi*) off Japan. BMNH 1868.06.20.001; 1876.07.22.001; 1877.05.21.010 (b815; b816); 1883.11.09.001 – (erroneously identified as *H. sieboldi*), locality unknown (off Japan?). BMNH 1868.10.02.001 – (erroneously identified as *H. sieboldi*) off Japan, Enoshima. IORAS 5/2/2354 – locality unknown. ZMA POR 2695 – (erroneously identified as *H. sieboldi*) off Japan.

***Description.*** The body differs between the subspecies. *Hyalonema apertum apertum* of Schulze (1886) is spindle-like,

deprived of atrial cavity when small and ovoid, with small osculum, with narrow atrial cavity and apical cone in it and with four septas separating the atial cavity when large. *Hyalonema apertum maehrentali* Schulze (1894) has body form as the described above when small and funnel-like, with shallow atrial cavity and without apical cone when large. *Hyalonema apertum solidum* Okada (1932) has cup-like body, with deeply concave atrial cavity. *Hyalonema apertum tuberosum* Ijima and Okada (1938) is vase-like, with shallow atrial cavity and apical cone. *Hyalonema apertum simplex* Koltun (1967) is known as a poor fragment. The length of the body *of H. apertum apertum* is up to 80 mm in length and 60 mm in diameter. Spicules. Choanosomal megascleres are diactines and rare hexactines. The diactines are 0.5–2.7/0.008–0.137 mm. They are even or with widenings in the middle, with conically pointed, rarely rounded or clavate smooth or rough terminations. Acanthophores are various derivatives of hexactines. Prostalia lateralia are pinular diactines with pinular ray similar to that of dermal and atrial pentactines and with four rudimentary tubercles in the middle. Prostalia basalia are four-toothed anchors spiny in the distal parts and with interrupted spiral denticulate ridge in proximal parts. Dermalia, atrialia and canalaria are pentactines, rarely hexactines. The pinular ray of these pentactines have short spines and whip-like termination which protrude far beyond the last spines. The tangential rays are covered with short spines, their terminations are conically pointed. The pinular ray of dermal pentactines is 0.053–0.296/0.003–0.005 mm, their tangential rays are 0.014–0.042/0.003–0.005 mm. The pinular ray of atrial pentactines is 0.046–0.258/0.002–0.007 mm, their tangential rays are 0.015–0.038/0.002–0.005 mm. Hypodemalia and hypoatrialia are pentactines and rare stauractines. Their rays are 0.2–0.9/0.011–0.061 mm, usually they are conically pointed with smooth, rarely rough terminations. Microscleres. Amphidiscs are represented by two or three kinds: macramphidiscs and micramphidiscs are found in all investigated specimens, mesamphidiscs are found in BMNH 1887.10.20.084; 1887.10.20.087 (b325); (b820) and USNM (kt1439) in relatively great amount, in USNM 22132 and BMNH 1887.10.20.084 they are rare. The macramphidiscs have tuberculated shafts sometimes with a whorl of tubercles in the middle. Some macramphidiscs are represented by abnormal forms: with umbels different in size (BMNH 1900.09.07.001); with curved teeth (USNM 22132); with reduced tooth (BMNH 1887.10.20.084); with rare tubercles represented mainly as a whorl in the middle of the shaft (BMNH 1887.10.20.084). Macramphidiscs have umbel about 1/3–1/5 as long, and about 1/1.5–1/3 as broad, as the length of the whole spicule. Total length of macramphidisc is 0.083–0.342 mm, the umbel length 0.022–0.091 mm, the umbel diameter 0.023–0.122 mm. Mesamphidiscs have tuberculated shafts or even with a widening in the middle. Total length of mesamphidisc is 0.025–0.101 mm, the umbel length 0.007–0.041 mm, the umbel diameter 0.007–0.053 mm. Micramphidiscs have smooth shafts with occasional tubercles or spines and with a widening in the middle. Total length of micramphidisc is 0.011–0.022 mm, the umbel length 0.003–0.009 mm, the umbel diameter 0.004–0.014 mm. Microhexactines and rare micropentactines have spiny usually distally curved rays 0.018–0.059/0.001–0.002 mm. The rare small microhexactines have some rays smooth.

***Remarks.*** The subgenus contains about 28 species. *Hyalonema masoni* (Schulze, 1894, 1904) is transferred to the subgenus *Cyliconema* from *H.* (*Corynonema*) where it was placed by Ijima (1927) after reinvestigation of the type material (see the corresponding remarks for the subgenus *Corynonema*). Staurodiscs corresponding to macramphidiscs are rarely present among microscleres.

*Hyalonema* (*Cyliconema*) *apertum* requires a more significant revision than is possible here, particularly because the descriptions of nearly all 5 subspecies are inadequate. The description of spicules provided above suggests that these specimens probably belong to *H.* (*Cyliconema*) *apertum apertum*. Re-examination of the paratype of *H.* (*Cyliconema*) *apertum solidum* Okada (1932) stored in the USNM demonstrated that it is synonymous with *H.* (*Cyliconema*) *apertum apertum* Schulze.

**Distribution**

Indo-west Pacific, E and N Pacific, East Central Atlantic, off S Africa, Australia, New Zealand and one record from Antarctic ocean; depth 100–6235 m. *Hyalonema* (*Cyliconema*) *apertum* Schulze, 1886 is distributed off Indonesia, Japan, Philippines, Andamans, Kamchatka, Australia ?, 403–6235 m depth. Its subspecies: *Hyalonema* (*Cyliconema*) *apertum apertum* Schulze, 1886 – off Japan, Andaman and Nicobar Islands, Sumatra, depth 403–6235 m. *Hyalonema* (*Cyliconema*) *apertum maehrentali* Schulze, 1894 – off Indonesia, Andamans, 204–1886 m depth. *Hyalonema* (*Cyliconema*) *apertum tuberosus* Ijima & Okada, 1938 – off Japan, 420–530 m depth. *Hyalonema* (*Cyliconema*) *apertum simplex* Koltun, 1967 – Behring Sea (off Kamchatka), 3920–3964 m depth.

## *HYALONEMA (LEPTONEMA)* LENDENFELD, 1915

**Synonymy**

*Hyalonema* (*Leptonema*) Lendenfeld, 1915: 245. *Carteria* (part – *C. lusitanica* Gray, 1868a) Gray, 1867d: 170. *Leptonema* Lévi, 1964a: 94.

**Type species**

*Hyalonema* (*Leptonema*) *campanula* Lendenfeld, 1915 (by monotypy).

**Definition**

Hyalonema with whip-like pinular ray of dermal spicules bearing short or moderate spines and with finely pointed outer end; macramphidiscs have umbels longer than broad or as long as broad.

**Diagnosis**

Body is from ovoid (when young) to inverted-conical, funnel- or cup-like. The atrial cavity is present or absent in different species. Some species have septas dividing the atrial cavity into several parts. The oscular sieve-plate and the apical cone is present in some species. Choanosomal spicules are diactines and sometimes hexactines. Without ambuncinates. Basalia, when known, are four-toothed anchors. Prostalia lateralia are pinular diactines known in most species. Dermalia and atrialia are pinular pentactines. The pinular ray is whip-like with short or moderate spines; its rhachis is thickest at base. Hypodermalia and hypoatrialia are pentactines. Amphidiscs are represented by three or rarely two sizes

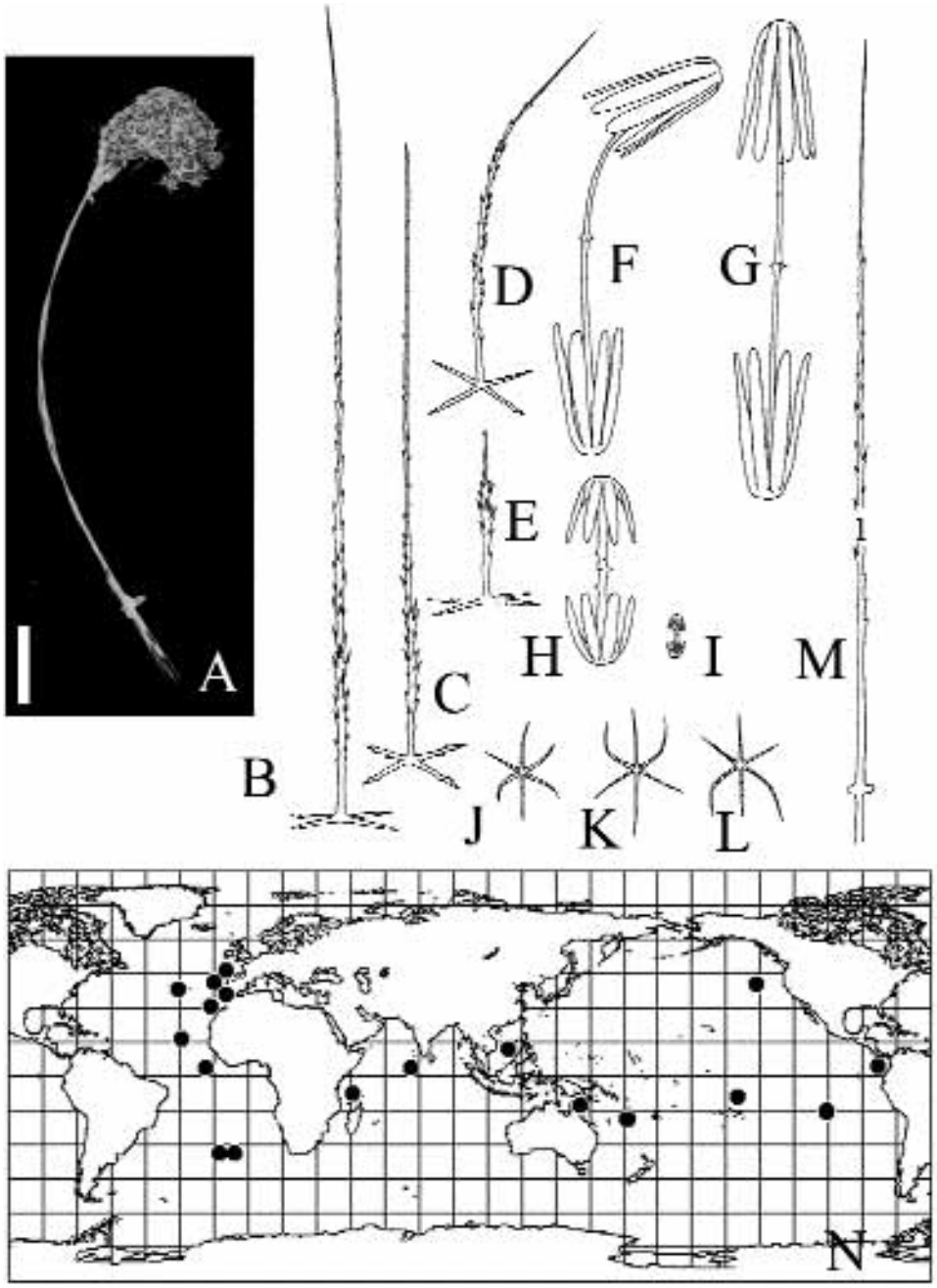


**Fig. 5.** *Hyalonema (Leptonema) campanula*. A, external shape after Lendenfeld (1915) (scale 10 mm). B–D, dermal pentactines 130×. E, dermal pentactine from the basal part of the sponge 130×. F–G, macramphidiscs 220×. H, mesamphidisc 220×. I, micramphidisc 220×. J–L, microhexactines 220×. M, pinular diactine 300×. B–M, redrawn from Lendenfeld (1915). N, distribution of *Hyalonema (Leptonema)*.

(mesamphidiscs may be absent). They are often similar in shape and hardly differ from each other due to presence of intermediate forms. Macramphidiscs have umbels, usually about 1/2–1/5 as long, and about 1/2–1/6 as broad, as the length of the whole spicule; the shafts are usually covered with spines. Microhexactines are rough, with straight or curved rays (in one species microhexactines are absent, in the other only microstauractines with tree rays short and one long are known).

### Description of type species

*Hyalonema* (*Leptonema*) *campanula* Lendenfeld, 1915 (Fig. 5).

***Synonymy.*** *Hyalonema* (*Leptonema*) *campanula* Lendenfeld, 1915: 245.

***Material examined.*** Holotype of *Hyalonema* (*Leptonema*) *campanula campanula*: not seen, 8°07.5′S, 104°10.5′W, 3811 m depth. Holotype of *Hyalonema* (*Leptonema*) *campanula longispicula* Tabachnick, 1990b: IORAS 5/2/547 – 'Akademic Kurchatov' 43, 33°33.0′–33.4′S, 12°39.6′–39.0′W, depth 3350–3470 m. Paratype: IORAS 5/2/478 – 'Akademic Kurchatov' 43, 31°34.2′–35.8′S, 7°58.5′–56.6′W, depth 3880–3930 m.

***Description.*** The single specimen of *H.* (*Leptonema*) *campanula campanula* is represented by a fragment 18 mm in diameter and a curved stalk 70 mm in length and 1 mm in diameter.

Spicules. Choanosomal spicules are diactines and hexactines. The diactines are 1–1.5/0.009–0.018 mm. The hexactines have rays 0.275–0.650/0.007–0.022 mm. Prostalia lateralia are pinular diactines. Their pinular ray is 0.73–1.2/0.006–0.009 mm being straight or curved, the proximal ray is 0.450–0.750 mm long, the other (tangential rays) are represented by short tubercles. The pinular ray in shape resembles that of dermal pinular pentactines. Prostalia basalia are broken at their distal ends, they are covered by short spines and reach up to 0.110 mm in diameter. Acanthophores are represented by pentactines and diactines with short rays densely covered by spines. Dermalia are represented by pinular pentactines. The pinular ray is covered by short spines, its whip-like finely pointed outer end protrudes far beyond the last spines. The tangential rays are smooth or with rare spines, with conically pointed terminations. The pinular ray is 0.230–0.810/0.005–0.008 mm, the tangential rays are 0.043–0.080 mm long. The pinular rays from the basal part of the sponge are smaller. The pinular ray is 0.100–0.165/0.005–0.006 mm, the tangential rays are 0.037–0.058 mm long. Hypodermalia are pentactines with proximal ray about 1/0.007–0.045 mm, tangential rays 0.230–1 mm long. The tangential rays are usually curved and slightly inclined towards the proximal ray. The terminations of these pentactines are conically pointed or rounded, rarely clavate. Microscleres. Amphidiscs are represented by three kinds. The macramphidiscs have smooth shafts with several rudimentary tubercles in the middle and with rare spines at other parts of the shaft. Total length of macramphidiscs is 0.150–0.290 mm, the umbel length 0.048–0.084 mm, the umbel diameter 0.025–0.053 mm. Mesamphidiscs have the shafts covered with numerous tubercles. Total length of mesamphidiscs is 0.077–0.118 mm, the umbel length 0.030–0.043 mm, the umbel diameter 0.040–0.047 mm. Total length of micramphidiscs is 0.018–0.026 mm, the umbel length 0.005–0.011 mm, the umbel diameter 0.006–0.010 mm. An abnormal macramphidisc with one umbel corresponding to mesamphidisc and the other one to micramphidisc was described. Microhexactines usually have some rays straight and some curved. Their rays are rough, 0.025–0.050/0.001–0.002 mm.

***Remarks.*** The subgenus contains 10 species, one of which is divided into two subspecies. Microhexactines are absent in *H. flabelliferum* (Ijima, 1927). Microstauractines are known in *H.* (*Leptonema*) *spatha* (Tabachnick & Lévi, 2000). *Hyalonema urna* (Schulze, 1904) and *H. ovuliferum* (Schulze, 1899) have some amphidiscs (which can be referred to the small type of macramphidiscs or to the mesamphidiscs) oval in shape.

Although Ijima (1927) considered that macramphidiscs of *H.* (*Leptonema*) are typically narrow but in most species the umbels are as broad as long and only in *H. campanula, H. lusitanicum* (Bocage, 1864) and *H. urna* (Schulze, 1904) they correspond to this strict definition. The subgenus *Leptonema* most closely resembles *Hyalonema* (*Cyliconema*) differing only in the form of their respective macramphidiscs. In the latter subgenus umbels are broader than long.

*Hyalonema (Leptonema) campanula* is close to *H.* (*Leptonema*) *divergens* (Schulze, 1887a), known also from the South Pacific. It is very likely that *H.* (*Leptonema*) *campanula campanula* and *H.* (*Leptonema*) *campanula longispicula* from the South Atlantic (Tabachnick, 1990b) are two subspecies of *H.* (*Leptonema*) *divergens* but this suggestion requires further comparison of the type materials. *Hyalonema* (*Leptonema*) *divergens* differs from *H.* (*Leptonema*) *campanula* by large macramphidiscs with shafts covered with spines (Lendenfeld, 1915).

**Distribution**

Cosmopolitan except for Arctic and Antarctic oceans, depth 489–5300 m.

## *HYALONEMA (ONCONEMA)* IJIMA, 1927

**Synonymy**

*Hyalonema* (*Onconema*) Ijima, 1927: 53. Part of *Hyalonema* (*Hyalonema*) – *H.* (*Hyalonema*) *agassizi* Lendenfeld, 1915: 172 and *H.* (*Hyalonema*) *obtusum* Lendenfeld, 1915: 153.

**Type species**

*Hyalonema* (*Onconema*) *obtusum* Lendenfeld, 1915 (here designated; Ijima (1927) did not designate a type species from two species available to him).

**Definition**

*Hyalonema* with pinular ray of dermal spicules clavate or spindle-like in overall shape, with outer end terminating in apical cone; with ambuncinates and uncinates; macramphidiscs have umbels narrower or broader than long, their umbels are about 2/3–1/5 long as the length of the whole spicule.

**Diagnosis**

The body is ovoid, with small osculum and atrial cavity situated between lateral walls and apical cone, sometimes septas divide the atrial cavity into several parts. Choanosomal spicules are diactines and usually hexactines. Uncinates and sometimes ambuncinates numerously present among the choanosomal spicules. Pleuralia lateralia are pinular diactines. Acanthophores, when known, are hexactines and their derivatives up to diactines and spheres. Dermalia and atrialia are pentactines (seldom hexactines) similar to each other. Dermal pinular ray is clavate or spindle-like in overall shape, with outer end terminating with an apical cone. Hypodermalia and hypoatrialia are pentactines. Amphidiscs are represented by two kinds: macramphidiscs and micramphidiscs which may be subdivided more. Macramphidiscs have umbels, about 1/1.5–1/5 as long, and about 1/2.5–1/5 as broad, as the length of the whole spicule. Microhexactines predominate its other derivatives up to diactines and monactines.

**Description of type species**

*Hyalonema* (*Onconema*) *obtusum* Lendenfeld, 1915 (Figs 6–7).

***Synonymy.*** *Hyalonema* (*Hyalonema*) *obtusum gracilis* Lendenfeld, 1915: 153. *Hyalonema* (*Hyalonema*) *obtusum robusta* Lendenfeld, 1915: 153.

***Material examined.*** Holotype: not seen. Other material. *H.* (*Onconema*) *obtusum* (var. *robusta*) – 'Albatross', 28°23′N, 126°57′W, depth 4330 m. *H.* (*Onconema*) *obtusum* (var. *gracilis*) – 'Albatross', 0°50′N, 137°54′W, depth 4504 m.

***Description.*** The body is ovoid, with small slit-like osculum and atrial cavity situated between lateral walls and apical cone. The body is 47–65 mm in length and 30–42 mm in diameter. Basalia are broken in both known specimens. Spicules.

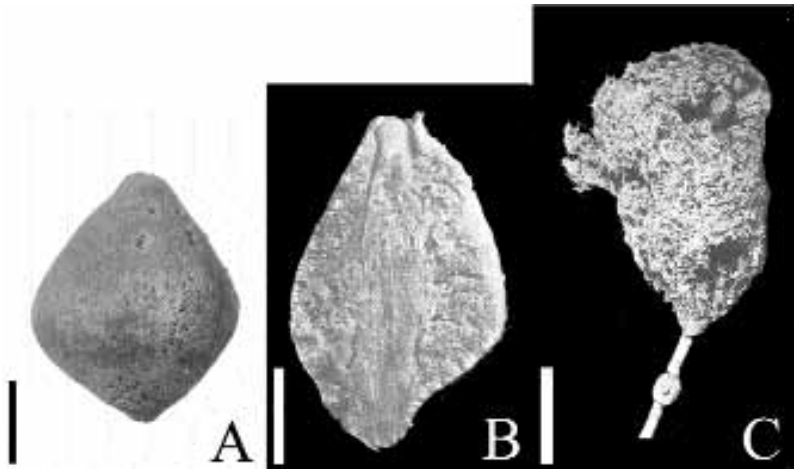


**Fig. 6.** *Hyalonema (Onconema) obtusum*. A, external shape after Lendenfeld (var. *gracilis*) (1915) (scale 20 mm). B, external shape after Lendenfeld (1915; var. *gracilis*) (scale 30 mm). C, external shape after Lendenfeld (1915, var. *robusta*) (scale 20 mm).

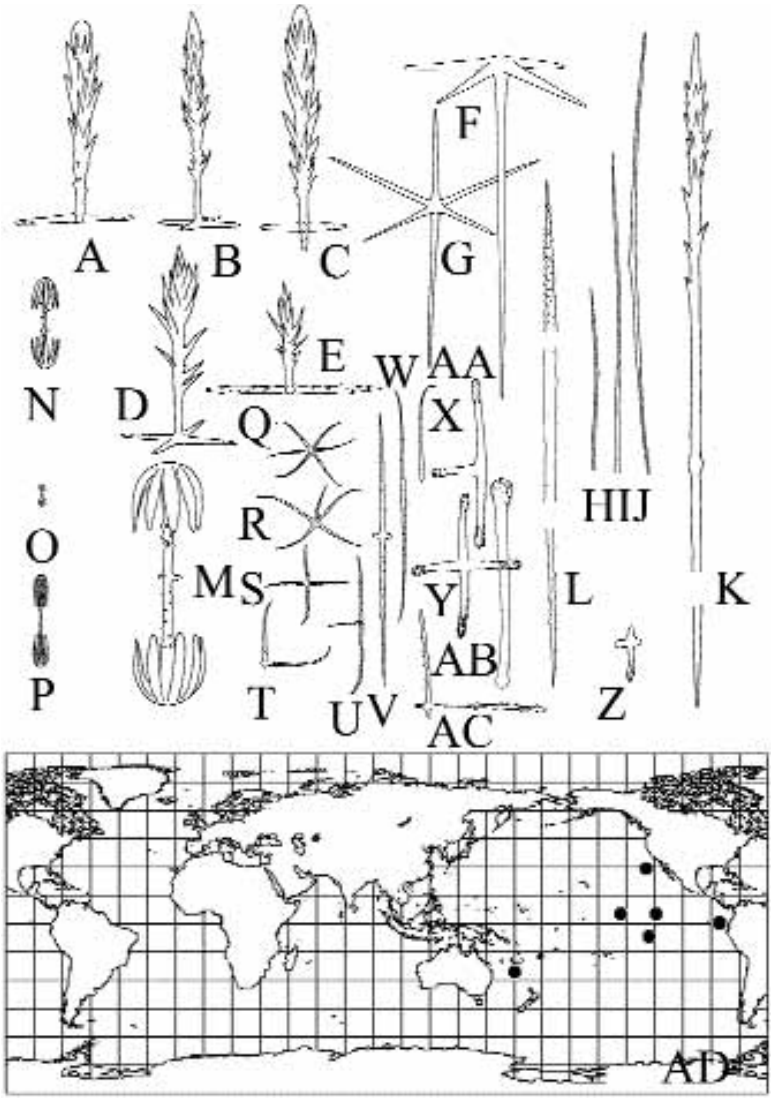


**Fig. 7.** *Hyalonema (Onconema) obtusum* A–B, dermal pentactines 210×. C, dermal hexactine 210×. D–E, atrial pentactines 210×. F, hypodermal pentactine 55×. G, choanosomal hexactine 55×. H–J, choanosomal diactines 55×. K, pinular diactine 210×. L, uncinate 210×. M, macramphidisc 105×. N, mesamphidisc 105×. O–P, micramphidiscs 210×. Q, microhexactine 210×. R, micropentactine 210×. S, microstauractine 210×. T, paratropal diactine 210×. U, paratetractine 210×. V–W, diactines 210×. X, micromonactine 210×. Y–AB, acanthophores 55×. AC, spicule transitional to acanthophores 105×. A–K, M–P, Y–AC, '*gracilis*' from Lendenfeld (1915). L, Q–X, '*robusta*' from Lendenfeld (1915). AD, distribution of *Hyalonema (Onconema)*.

Spicules. Choanosomal skeleton contains mainly diactines and hexactines. The diactines are 0.9–1.6 mm long and up to 0.030 mm in diameter, they have a widening in the middle and conically pointed or clavate terminations. The hexactines have rays 0.13–0.95/0.007–0.035 mm. The uncinates are covered with short spines they are approximately 0.58–1.1/0.005–0.020 mm. The pinular diactines which serve prostalia lateralia have even pinular rays with relatively short spines, the conically pointed terminations protrude far beyond the last spines. The pinular diactines have a widening in the middle. Their pinular rays are 0.304–0.450/0.005–0.010 mm, the proximal rays are 0.490–0.665 mm long. Acanthophores are represented by a row of spicules from pentactines to monactines. Some of the acanthophores have long and thin rays covered with relatively long spines. Dermalia and atrialia are represented by pinular pentactines or rarely hexactines. The pinular ray of dermal pentactines is clavate or spindle-like in overall shape. Its outer end which has shape of apical cone or clavate protrudes beyond the last spines. Tangential rays of dermal pentactines are smooth or rarely spiny with rounded or conically pointed terminations. The pinular ray of dermal pentactine is 0.137–0.172/0.004–0.008 mm, in maximal diameter it is up to 0.011 mm, tangential rays are 0.010–0.050/0.003–0.005 mm. The pinular ray of atrial pentactines is even with conically pointed outer end which protrudes beyond the last spines. Tangential rays of these spicules are smooth or spiny, usually with conically pointed terminations. The pinular ray of atrial pentactines is 0.073–0.145/0.005–0.007 mm, tangential rays are 0.035–0.090 mm long. Hypodermal and hypoatrial pentactines have the unpaired ray 0.24–1.86/0.010–0.075 mm, tangential rays are 0.14–0.75 mm long. Microscleres. Amphidiscs are represented by macramphidiscs and micramphidiscs. They both subdivide into small and large forms. Macramphidiscs have tuberculated shafts with a whorl of tubercles in the middle. The umbels are about 1/3 as long, and about 1/3.5–1/5 as broad, as the length of the whole spicule. Total length of large macramphidiscs is 0.235–0.335 mm, the umbel length 0.070–0.100 mm, the umbel diameter 0.070–0.110 mm. Total length of small macramphidisc is 0.086–0.212 mm, the umbel length 0.032–0.080 mm, the umbel diameter 0.016–0.069 mm. Micramphidiscs have spiny shafts, even or with a widening in the middle. Total length of large micramphidisc is 0.027–0.068 mm, the umbel length 0.011–0.025 mm, the umbel diameter 0.006–0.026 mm. Total length of small micramphidisc is 0.012–0.026 mm, the umbel length 0.004–0.009 mm, the umbel diameter 0.004–0.008 mm. Microhexactines predominate their derivatives with two opposite rays longer than four others and with reduced ray number up to monactines. They have curved spiny rays 0.020–0.043/0.002 mm.

***Remarks.*** This subgenus contains three species. Uncinates and ambuncinates are found in *H.* (*Onconema*) *uncinata* (Tabachnick & Lévi, 2000). Macrostaurodiscs were found in only one specimen of *H.* (*Onconema*) *agassizi*.

A type species was not designated prior to the present work because Ijima originally considered that the two described species were invalid, whereas it is now clear that they represent distinct taxa. The type species is not chosen between two varieties: '*gracilis*' and '*robusta*', and in fact one of these requires to be renamed as the nominotypical subspecies according to the rules of the ICZN. The differences between *H.* (*Onconema*) *obtusum* Lendenfeld (1915) and *H. agassizi* are not significant. They differ mainly by the form of their amphidiscs, microhexactines and acanthophores, their amphidiscs have similar size variation, and it is very probable that they may be united into a single species, as proposed by Ijima (1927).

**Distribution**

Central E Pacific and off New Caledonia, depth 2375–4504 m.

## *HYALONEMA (OONEMA)* LENDENFELD, 1915

**Synonymy**

*Hyalonema* (*Oonema*) Lendenfeld, 1915: 307. *Hyalonema* (*Skianema*) – *H.* (*Skianema*) *aequatoriale* Lendenfeld, 1915: 377; *H.* (*Skianema*) *umbraculum* Lendenfeld, 1915: 383. *Hyalonema* (*Thallonema*) *geminatum* Lendenfeld, 1915: 390. *Oonema* Lévi, 1964a: 95.

**Type species**

*Hyalonema* (*Oonema*) *bianchoratum* Wilson, 1904 (by subsequent designation; Ijima, 1927).

**Definition**

*Hyalonema* with spindle-like pinular ray of dermal spicules, heavy spined, with apical cone at the outer end; most of macramphidiscs are ovoid with umbels 1/3–1/2 as long as the length of the whole spicule.

**Diagnosis**

Body is ovoid, cap- or bell-like. The atrial cavity and the apical cone are present or absent in different species. The choanosomal spicules are diactines and hexactines. Acanthophores, when known, vary from hexactines to monactines. Dermalia and atrialia are pinular pentactines, seldom hexactines. The pinular ray is from whip-like to spindle-like in different species, with short lateral spines, its rhachis could be thickest at base or at upper parts of pinular ray. The dermal and atrial pinular rays usually are similar in size and shape. Canalaria, when present, are similar to dermal and atrial pentactines, but smaller, with pinular rhachis thickest at base. Hypodermalia and hypoatrialia are pentactines. Amphidiscs are of three or two kind (mesamphidiscs may be absent). Often each kind of amphidiscs can be subdivided into 2–3 types. Macramphidiscs have umbels 1/1.5–1/2 as long, and about 1/1–1/3 as broad, as the length of the whole spicule. Their shafts are smooth and without a whorl of tubercles in the middle. Mesamphidiscs and micramphidiscs usually have the shafts rough. Microhexactines are various, they are smooth or rough, with straight or curved rays.

**Description of type species**

*Hyalonema* (*Oonema*) *bianchoratum* Wilson, 1904 (Fig. 8).

***Synonymy.*** *Hyalonema bianchoratum* Wilson, 1904: 22. *Hyalonema* (*Oonema*) *bianchoratum pinulina* Lendenfeld, 1915: 307.

***Material examined.*** Holotype: USNM 8303 – 'Albatross', 14°46′N, 98°40′W, depth 3420 m.

***Description.*** The body forms differ between subspecies: In *H. bianchoratum bianchoratum* it is cap-shaped with deep atrial cavity; numerous subatrial canals are covered by the artial surface. The body is 50 mm in high, 75 mm in diameter, the atrial cavity is

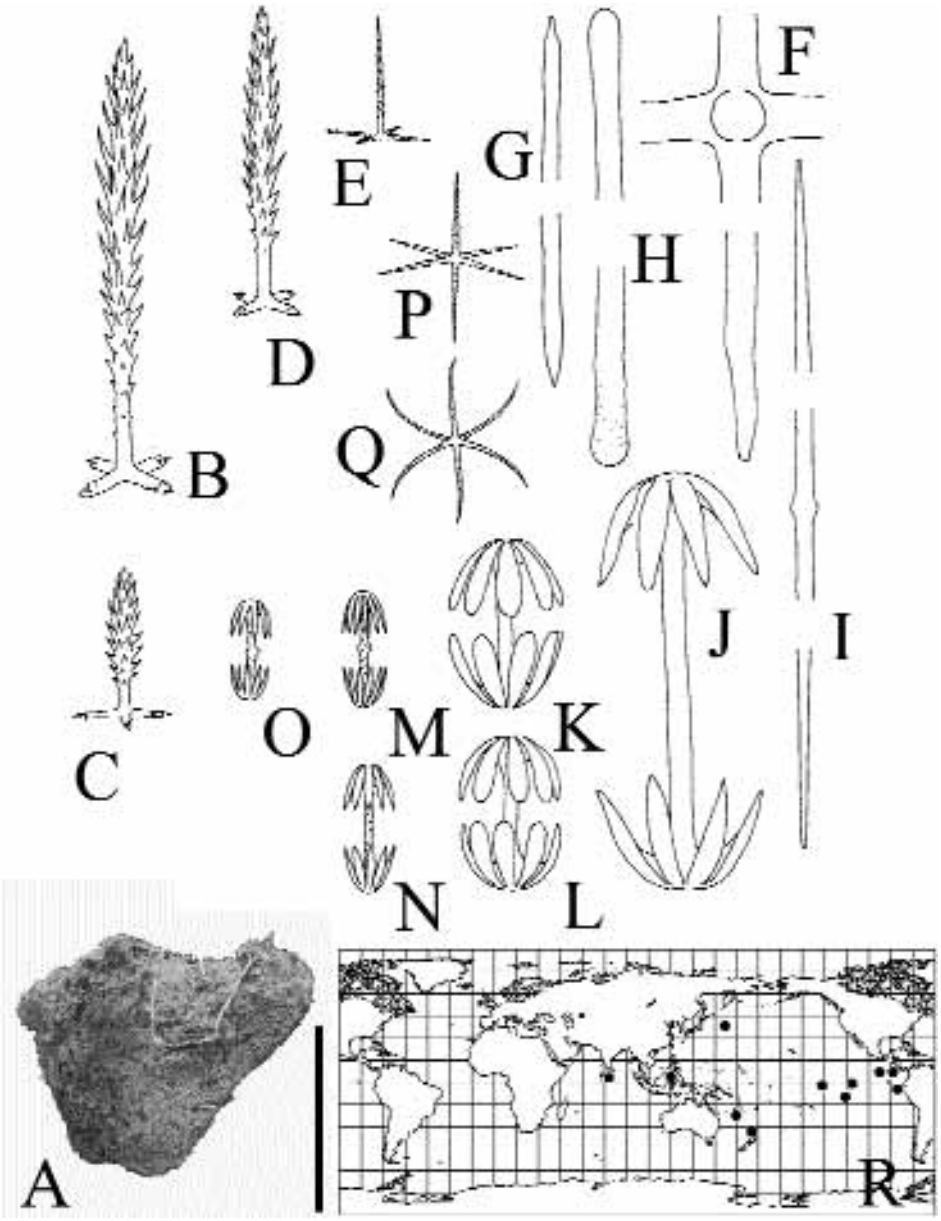


**Fig. 8.** *Hyalonema (Oonema) bianchoratum bianchoratum*. A, external shape after Wilson (1904) (scale 50 mm). B–D, dermal pinular pentactines 105×. E, canalar pentactine 105×. F, hypodermal or hypoatrial pentactine 105×. G–I, choanosomal diactines 105×. J, large macramphidisc 105×. K–L, small macramphidisc 105×. M, mesamphidisc 210×. N, mesamphidisc 210×. O, micramphidisc 420×. P–Q, microhexactines 210×. B–C, K–L, N, P–Q, from Wilson (1904). E–J, M, O, USNM 8303. R, distribution of *Hyalonema (Oonema)*.

30 mm deep, the walls are about 12 mm in width. In *H. bianchoratum pinulina* (Lendenfeld, 1915) the body is cylindrical, widened above to form of a shallow cap, with apical cone. The body is 111 mm in high and 49 mm in diameter in the specimen 'a'; and 141/66 mm correspondingly in the specimen 'b'. Spicules. Choanosomal spicules are diactines and hexactines. The diactines are 1–3/0.008–0.053 mm. They have conically pointed, sometimes rounded terminations, usually smooth and rarely rough. The diactines have even shafts or with a widening in the middle. Choanosomal hexactines have rays 0.2–3.5 mm in length with same to diactines terminations. Acanthophores and basalia are not described for *H. bianchoratum bianchoratum*. The pinular pentactines and rare pinular hexactines of dermalia, atrialia and, when known, canalaria have short spines. The pinular ray is even with conically pointed outer end which does not protrude far beyond the last spines. Atrialia and dermalia are similar in shape and size to each other. The pinular ray of dermal pentactines is 0.225–0.600 mm in length, tangential rays are 0.030–0.044 mm in length. The pinular ray of atrial pentactines is 0.250–0.530 mm in length, tangential rays are 0.030–0.044 mm in length. The pinular ray of these pentactines is 0.010–0.064 mm in diameter, tangential rays are 0.010–0.016 mm in diameter. Hypodermalia and hypoatrialia are represented by pentactines with rays 0.08–1.9/0.014–0.091 mm. Their terminations correspond to that of choanosomal spicules. Microscleres. Amphidiscs are represented by 4 kinds. Macramphidiscs have umbel about 1/2–1/3.5 as long, and about 1/1.5–1/3 as broad, as the length of the whole spicule. Their axial shafts are smooth. Macramphidiscs are easily distinguished into two

types: large 'I' and small 'II'. The umbel teeth are usually conically pointed in large ones and are rounded in small ones. Total length of large macramphidiscs is 0.320–0.475 mm, the umbel length 0.091–0.137 mm, the umbel diameter 0.130–0.220 mm. Total length of small macramphidiscs is 0.167–0.228 mm, the umbel length 0.068–0.114 mm, the umbel diameter 0.105–0.190 mm. The mesamphidiscs and micramphidiscs have the shafts covered with tubercles and usually with a widening in the middle. Total length of mesamphidiscs is 0.043–0.086 mm, the umbel length 0.018– 0.036 mm, the umbel diameter 0.018–0.049 mm. Total length of micramphidiscs is 0.023–0.040 mm, the umbel length 0.007–0.013 mm, the umbel diameter 0.007–0.013 mm. Microhexactines have straight or curved rays 0.035–0.058/ 0.003–0.004 mm rough or short spiny.

***Remarks.*** This subgenus contains 15 species with one species divided into two subspecies. The subgenus is characterised by the absence of spiny monaxones (uncinates and ambuncinates).

The synonymy and scope of *H.* (*Oonema*) follow Ijima (1927), as does the differential diagnosis provided above. One new sponge tentatively referred to *H.* (*Oonema*) *microstauractina* from off New Caledonia (Tabachnick & Lévi, 2000) has microstauractines which predominate over the other derivatives, including hexasters. Some specimens of this sponge have small macramphidiscs which vary to paradiscs, hemidiscs and spicules lacking serrated or toothed discs. Uncinates are absent.

*Hyalonema* (*Oonema*) *bianchoratum pinulina* was proposed by Lendenfeld (1915) as a new variety, under the name '*typica*' for *H.* (*Oonema*) *bianchoratum* (Wilson, 1904). The differences between these varieties are sufficient to distinguish the subspecies *bianchoratum* and *pinulina* (*Hyalonema* (*Oonema*) *bianchoratum pinulina* – 5°41.7′S 82°59.7′W depth 4063 m). The description and all spicule measurements are taken from *H.* (*Oonema*) *bianchoratum bianchoratum*.

### Distribution

Indo-Pacific, depth 2470–4970 m.

## *HYALONEMA (PARADISCONEMA)* IJIMA, 1927

### Synonymy

*Hyalonema* (*Paradisconema*) Ijima, 1927: 52. *Paradisconema* Lévi, 1964a: 91.

### Type species

*Hyalonema* (*Paradisconema*) *alcocki* Schulze, 1894 (by subsequent designation; Ijima, 1927).

### Definition

*Hyalonema* with pinular ray of dermal spicules thickest at base and tapering toward the outer end; macramphidiscs with umbels longer than broad; with paradiscs as a kind of micramphidiscs.

### Diagnosis

Body is cup-like with atrial cavity or oval with sieve-plate. Choanosomal spicules are diactines. Prostalia oscularia are pinular diactines or pinular pentactines. Acanthophores, when known, are spiny spicules with 2–6 rays (sometimes spheres). Dermalia and atrialia are pinular pentactines. The pinular ray is whip-like, with short spines; its outer end projects beyond the last spines. The outer end of atrial pentactines may be conical. Hypodermalia and sometimes hypoatrialia are pentactines. Amphidiscs are represented by 2–3 kinds. Macramphidiscs, if present, have umbels, usually about 1/5 as long, and about 1/3–1/2 as broad, as the length of the whole spicule. Micramphidiscs are represented mainly by paradiscs, they are asymmetrical spicules (Z-shaped), sometimes they are accompanied by some common-shaped micramphidiscs. Microhexactines are rare or, probably, entirely absent.

### Description of type species

*Hyalonema* (*Paradisconema*) *alcocki* Schulze, 1894 (Fig. 9).

***Synonymy.*** *Hyalonema alcocki* Schulze, 1894: 34.

***Material examined.*** Holotype: BMNH 1907.08.01.005 (fragment) – 'Investigator', off the Laccadives Islands, 10°07.50'N, 74°42.30′E, depth 2288 m.

***Description.*** The sponge is known from a single representative which body is oval with oscular sieve-plate, short prostalia marginalia and without atrial cavity. The body is 80 mm in length, 35 mm in diameter, the oscular sieve-plate is 15 mm in diameter. Basalia are broken being represented by a twisted tuft of spicules 120 mm in length and 4 mm in diameter. Spicules. Choanosomal spicules are diactines 0.8–2.0/0.006–0.020 mm. Their shafts are even or widened in the middle and conically pointed terminations with narrow axial canals. Prostalia marginalia are pinular diactines about 1 mm in length. Their pinular rays are equal in shape to that of dermal or atrial spicules. Dermalia and atrialia are similar to each other. In the reinvestigated fragment from the BMNH we have found a little amount of these spicules. The pinular ray is even, with short spines and finely tapering outer end which protrude not very far beyond the last spines. Tangential rays are covered with short spines in the distal half-parts of the ray. The pinular ray of these pentactines is 0.152–0.441/ 0.002–0.009 mm, tangential ones are 0.046–0.057/0.005–0.008 mm. Hypodermal pentactines have rays 0.2–2.3/0.015–0.076 mm (the ray directed inside the body is usually the longest). Their terminations are equal to that of choanosomal diactines. Microscleres. Amphidiscs are represented by three kinds. The macramphidiscs have smooth shafts sometimes with several rudimentary tubercles in the middle. Total length of macramphidiscs is 0.300–0.410 mm, the umbel length 0.076–0.099 mm, the umbel diameter 0.130–0.160 mm. Mesamphidiscs have the shafts covered with numerous short spines, usually with a whorl of tubercles or a widening in the middle. Total length of mesamphidiscs is 0.034–0.050 mm, the umbel length 0.010–0.020 mm, the umbel diameter 0.012–0.017 mm. Micram-phidiscs are represented by two forms: of common shape and paradiscs. The commonly-shaped micramphidiscs have smooth shafts with one or more widenings. Total length of micramphidiscs is 0.011–0.025 mm, the umbel length 0.003–0.012 mm, the umbel diameter 0.005–0.011 mm. The paradiscs have various numbers of teeth and smooth shafts with a widening in the middle. Their total length is 0.010–0.020 mm. Microhexactines are represented by rare spicules usually with curved rough rays 0.036–0.065/ 0.002–0.003 mm.

***Remarks.*** The subgenus contains 3 species. Two specimens seem to have cup-like growth forms with a relatively low atrial cavity and thick-walled body: *H.* (*Paradisconema*) *investigatoris*

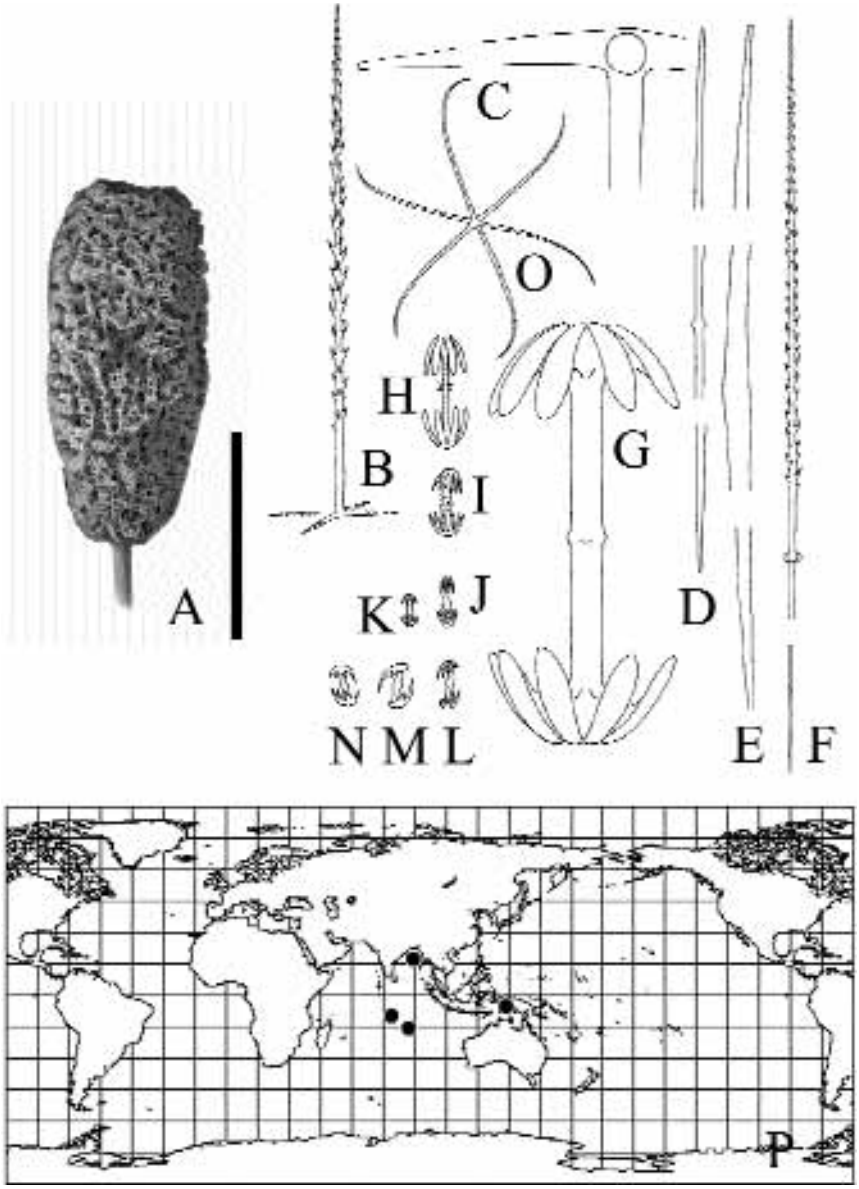


**Fig. 9.** *Hyalonema (Paradisconema) alcocki*. A, external shape after Schulze (1894) (scale 50 mm). B, dermal pinular pentactine 185×. C, hypodermal or hypoatrial pentactine 90×. D–E, choanosomal diactines 90×. F, prostalia marginalia 90×. G, macramphidisc 185×. H, mesamphidisc 370×. I, mesamphidisc 370×. J–K, micramphidiscs 370×. L, paradisc 370×. M–N, paradiscs 370×. O, microhexactine 370×. B, F–H, M, N, from Schulze (1894). C–E, F, I, J–L, O, BMNH 1907.08.01.005. P, distribution of *Hyalonema (Paradisconema)*.

(Schulze, 1894) and *H.* (*Paradisconema*) *vosmaeri* (Ijima, 1927). *Hyalonema* (*Paradisconema*) *alcocki* is oval with a sieve-plate and without an atrial cavity. Dermalia and atrialia are often similar to each other, or sometimes atrialia have longer pinular rays. Spiny monaxones (uncinates and ambuncinates) are absent. Macramphidiscs and mesamphidiscs are absent in *H.* (*Paradisconema*) *investigatoris* (Schulze, 1894). Mesamphidiscs are described as very rare spicules for *H.* (*Paradisconema*) *alcocki* and *H.* (*Paradisconema*) *vosmaeri* (Ijima, 1927). Common-shaped micramphidiscs besides paradiscs are known for *H.* (*Paradisconema*) *alcocki* (Schulze, 1894). The paradiscs usually have several teeth at each umbel, but some with only one tooth are known for *H.* (*Paradisconema*) *investigatoris* (Schulze, 1894). Paradiscs were recently also found in a new species off New Caledonia which is tentatively referred to *H.* (*Oonema*) (Tabachnick & Lévi, 2000). This new species possesses the spiculation and external shape corresponding to the subgenus *Oonema* but with paradiscs. Unlike *H.* (*Paradisconema*), in which paradiscs correspond to micramphidiscs, this tentative representative of *H.* (*Oonema*) has paradiscs which correspond to macramphidiscs. Thus, this feature becomes less valuable in defining subgenera than earlier schemes. As with most subgenera of *Hyalonema* *H.* (*Paradisconema*) must be defined emphasising the complexity of features or, alternatively, synonimized with *H.* (*Cyliconema*). Microhexactines, if present, are short spiny or smooth with straight or curved rays.

**Distribution**

NE Indian ocean, W central Pacific, depth 397–3300 m.

## *HYALONEMA (PHIALONEMIELLA)* SUBGEN. NOV.

### Synonymy

[*Phialonema*] Lendenfeld, 1915: 358. (The subgeneric name is preoccupied by *Phialonema* Stein, 1887, Protozoa.)

### Type species

*Hyalonema* (*Phialonemiella*) *brevancora* Lendenfeld, 1915 (by monotypy). *Hyalonema* (*Phialonemiella*) *paterofirum* was described simultaneously with *H.* (*Phialonemiella*) *brevancora* but is referred to *Coscinonema*, and *H. pellucidum* Ijima, 1894, referred to *Phialonema* by Lendenfeld (1915), is transferred to *Hyalonema* (*Euhyalonema*) = (*Hyalonema*) (Ijima, 1927)).

### Definition

*Hyalonema* in which pinular ray of dermal spicules has unusually prolonged spines; macramphidiscs with short umbels.

### Diagnosis

The body is ovoid, with small osculum and narrow atrial cavity between walls and apical cone. Choanosomal spicules are diactines and hexactines. Dermalia and atrialia are pentactines, seldom hexactines. The pinular ray has some lateral spines unusually prolonged, which sometimes carry secondary spines. Hypodermalia are pentactines. Amphidiscs are known of 2 kinds (macramphidiscs and micramphidiscs). Macramphidiscs have flattened and relatively very short umbels, about 1/10–1/15 as long, and about 1/5–1/8 as broad, as the length of the whole spicule. Microhexactines predominate micropentactines.

### Description of type species

*Hyalonema* (*Phialonemiella*) *brevancora* Lendenfeld, 1915 (Fig. 10).

***Synonymy.*** *Hyalonema* [*Phialonema*] *brevancora* Lendenfeld, 1915: 358.

***Material examined.*** Holotype: not seen, 'Albatross', 0°50′N, 137°54′E, 4504 m depth. Other material. IORAS 5/2/1110 – 'Dmitry Mendeleev', 16, 29°29.2′–28.5′S, 164°56.1′–55.1′E, depth 3400–3410 m.

***Description.*** The body of the type specimen is represented by fragments. The body of the specimen 5/2/1110 is ovoid (30 mm in length and 20 × 30 mm in diameter) with small osculum 4 × 6 mm. The atrial cavity is narrow, being situated between walls and central part with small apical cone. Basalia are broken. Spicules. Choanosomal spicules are represented by diactines and hexactines. The diactines are 0.4–4.5/0.004–0.020 mm. They have a widening in the middle and conically pointed or rounded terminations. Choanosomal hexactines have rays 0.20–0.045/0.007–0.016 mm. Dermal and atrial spicules are similar to each other in size and shape being represented by pinular pentactines, rarely hexactines. The pinular ray is thickest at base, slightly tapering towards the end. The spines of the pinular ray are very long, some of them bear secondary spines. The terminations of pinular rays are conically pointed or rounded, they can either protrude not far beyond the last spines or be equal to them. Tangential rays of these spicules are smooth, rough or sparsely spiny, they have rounded or conically pointed terminations. The pinular ray of dermal pentactines is 0.066–0.122/0.003–0.004 mm, tangential rays are 0.018–0.054 mm long. The pinular ray of atrial pentactines is 0.054–0.151 mm long, tangential rays are 0.022–0.065 mm long. Hypodermalia are pentactines. The proximal ray is 0.8–1.1/0.020–0.040 mm, tangential rays are 0.25–0.60 mm long. The tangential rays are usually slightly inclined towards the proximal one. The terminations of these spicules are similar to those of choanosomal ones. Microscleres. Amphidiscs are represented by two forms. Macramphidiscs have flattened, broad and very short umbels, about 1/10–1/15 as long, and about 1/5–1/8 as broad, as the length of the whole spicule. The shaft of macramphidiscs is smooth with a whorl of tubercles in the middle. Total length of macramphidiscs is 0.277–0.394 mm, the umbel length 0.014–0.041 mm, the umbel diameter 0.040–0.072 mm. Micramphidiscs have shafts rough or smooth. Total length of micramphidiscs is 0.018–0.043 mm, the umbel length 0.004–0.015 mm, the umbel diameter 0.007–0.011 mm. Microhexactines have straight, spiny rays 0.036–0.104/0.002–0.003 mm.

***Remarks.*** The subgenus currently contains only one species. The presence of secondary spines on the spines of the pinular ray of dermal and atrial spicules is not a remarkable feature for the type species because in a new species of *H.* (*Thamnonemiella*) this feature is much more prominent. Lendenfeld (1915) considered *H.* (*Pteronema*) *globus* Schulze 1886 to be closest to *H.* (*Phialonemiella*) *brevancora*. The main differences are sizes of micramphidiscs and the form of macramphidiscs' umbels.

### Distribution

Central-E Pacific, Indo-West Pacific; depth 3400–4500 m.

## *HYALONEMA (PRIONEMA)* LENDENFELD, 1915

### Synonymy

*Hyalonema* (*Prionema*) Lendenfeld, 1915: 251. *Prionema* Lévi, 1964a: 85. *Leiobolidium* Schmidt, 1880b: 65.

### Type species

*Hyalonema* (*Prionema*) *agujanum* Lendenfeld, 1915 (by subsequent designation (Ijima, 1927)).

### Definition

*Hyalonema* with pinular ray of dermal spicules from spindle-like to finely tapering; macramphidiscs with umbels longer than broad or as long as broad; the teeth of macramphidiscs or large mesamphidiscs have serrated edges (some microstauractins have thick rays with rounded ends (Fig. 12K, M)).

### Diagnosis

Body is plate-, cup-, vase-like or oval in shape, with or without atrial cavity and apical cone. Choanosomal spicules are diactines and hexactines. Ambuncinates are unknown. Acanthophores, when known, are mostly stauractines and diactines sometimes tauactines. Dermalia and atrialia are pentactines (seldom hexactines), often similar to each other. The pinular ray has rhachis from finely tapering and slender to a spindle-like in shape.

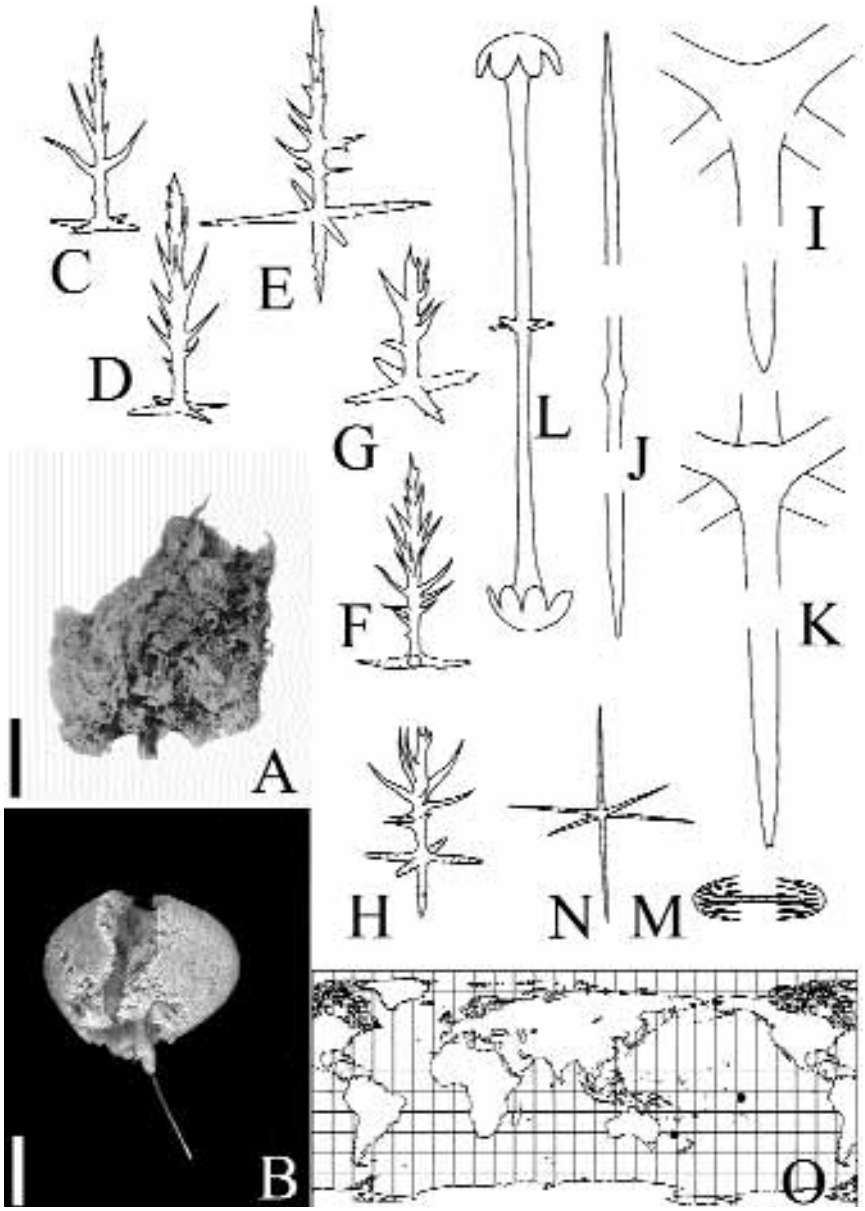


**Fig. 10.** *Hyalonema (Phialonemiella) brevancora*. A, external shape after Lendenfeld (1915) (scale 20 mm). B, external shape of the specimen IORAS 5/2/1110 (scale 20 mm). C–D, dermal pentactines 260×. E, dermal hexactine 260×. F–G, atrial pentactines 260×. H, atrial hexactine 260×. I, hypodermal pentactine 260×. J, choanosomal diactine 260×. K, choanosomal hexactine 260×. L, macramphidisc 260×. M, micramphidisc 520×. N, microhexactine 260×. C–N, IORAS 5/2/1110. O, distribution of *Hyalonema (Phialonemiella)*.

The lateral spines are from short to unusually prolonged. Hypodermalia and hypoatrialia are pentactines. Amphidiscs are usually represented by three kinds, but some of them sometimes are subdivided into two size classes. Common macramphidiscs have umbels, usually about 1/1.5–1/5 as long, and about 1/1.5–1/5 as broad, as the length of the whole spicule. The macramphidiscs or the largest mesamphidiscs have the umbel teeth with finally serrated lateral edges. Microhexactines predominate micropentactines.

## Description of type species

*Hyalonema* (*Prionema*) *agujanum* Lendenfeld, 1915 (Figs 11–12).

***Synonymy.*** *Hyalonema* (*Prionema*) *agujanum tenuis* Lendenfeld, 1915: 251. *Hyalonema* (*Prionema*) *agujanum lata* Lendenfeld, 1915: 251.

***Material examined.*** Holotype: not seen, 'Albatross', 6°54.6′S, 83°34.3′W, depth 4063 m.

***Description.*** This species is known from five specimens, and the description is taken from the literature. Their bodies are represented by inverted, lateraly flattened conuses. The best specimen has a broad and shallow atrial depression with an apical cone in the centre. The length of the body of these sponges is 19–29 mm, 23–30 mm broad, 8–16 mm thick. Their basalia are broken in the distal parts. Spicules. The choanosomal megascleres are diactines and hexactines. The diactines are 0.8–3.3/0.008–0.019 mm. The hexactines

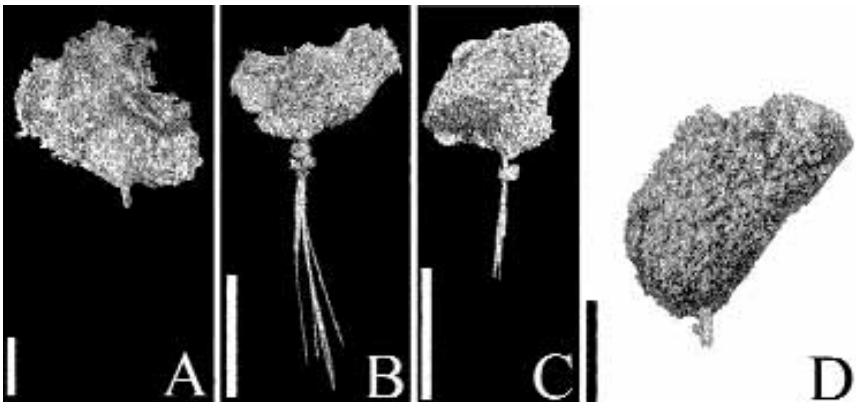


**Fig. 11.** *Hyalonema (Prionema) agujanum* (var. *tenuis*): A, external shape after Lendenfeld (1915) (scale 10 mm). B, external shape after Lendenfeld (1915) (scale 20 mm). C, external shape after Lendenfeld (1915) (scale 20 mm). D, external shape after Lendenfeld (1915) (scale 10 mm).

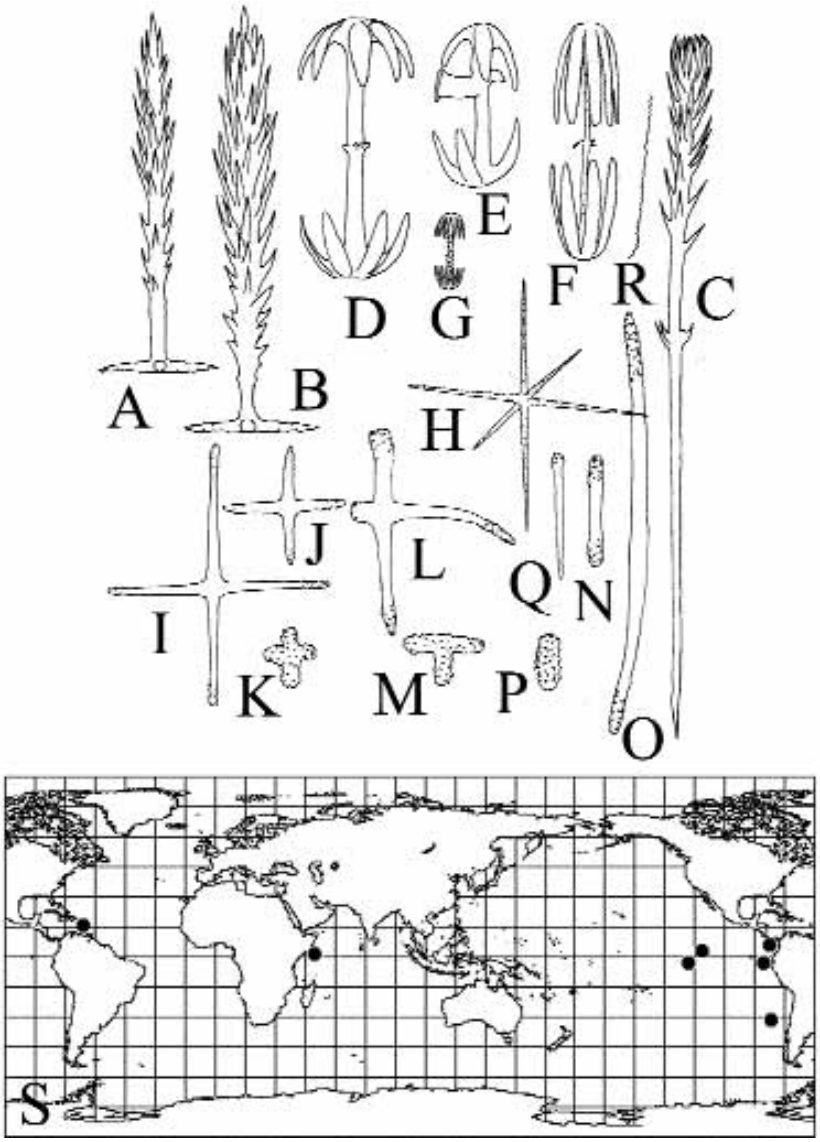


**Fig. 12.** *Hyalonema (Prionema) agujanum*. A–B, pinular pentactines 260×. C, pinular diactine 260×. D, macramphidisc 130×. E, abnormal macramphidisc 130×. F, serrated amphidisc 130×. G, micramphidisc 520×. H, microhexactine 260×. I–Q, acanthophores 260×; I–K, stauractines; L–M, tauactines; N–P, diactines; Q, monactine. R, serrated margin of an amphidisc umbel 1050×. A–B, F–Q, 'var. *tenuis*, form A' from Lendenfeld (1915). C, 'var. *lata*, form A' from Lendenfeld (1915). D–E, 'var. *tenuis*, form B' from Lendenfeld (1915). S, distribution of *Hyalonema (Prionema)*.

usually have two opposite rays longer the others. Their rays are 0.6–1.4/0.014–0.033 mm. Acanthophores are mostly stauractines, other spicules: tauactines, diactines and monactines are found in small proportion. Prostalia marginalia are pinular diactines. The pinular ray is clavate in shape, its outer end is conically pointed or rounded, it is covered from the lateral sides by numerous long spines. A widening with four rudimentary tubercles and usually with spines is situated in the centre of this spicule. The pinular ray is 0.167–0.290/0.005–0.010 mm, the proximal ray is 0.160–0.320 mm long. Basalia are represented by broken spicules which are 0.060–0.600 mm in diameter. Dermalia and atrialia are pinular pentactines similar to each other in size and shape. The pinular ray is covered with numerous spines, the conically pointed outer end does not protrude far beyond the last spines. The tangential rays are covered with rare small spines, their terminations are conically pointed. The pinular ray of dermal pentactines is 0.123–0.311/ 0.007–0.012 mm, tangential rays are 0.032–0.057 mm long. The pinular ray of atrial pentactines is 0.215–0.300/0.007–0.011 mm, tangential rays are 0.030–0.052 mm long. The pinular spicules with slender rays, transitional to microhexactines were considered to be canalar spicules. They are represented by pinular pentactines and hexactines. Their pinular ray is 0.100–0.170/0.004–0.007 mm, the tangential rays are 0.060–0.120 mm. Hypodermalia and hypoatrialia are pentactines. They have smooth, straight rays with terminations conically pointed or rounded. The proximal ray is 0.460– 0.900/0.017–0.034 mm, tangential rays are 0.220–0.500 mm long. Microscleres. Many classes of amphidiscs were distinguished by Lendenfeld, they are modified in this paper. 'Normal' macramphidiscs have smooth (not serrated) edges of their teeth. Their umbels are usually about 1/3–1/4 as long, and about 1/3 as broad, as the length of the whole spicule. Their shafts are smooth with a whorl of tubercles in the middle. Total length of these macramphidiscs is 0.200–0.440 mm, the umbel length 0.055–0.110 mm, the umbel diameter 0.112–0.172 mm. Some of macramphidiscs are represented by abnormal forms (var. *tenuis*, form A). Amphidiscs with serrated teeth's margins have elongate umbels, usually they are about 1/1.5–1/3 as long, and about 1/2–1/4 as broad, as the length of the whole spicule. Their shafts are rough with a whorl of tubercles in the middle. Total length of these amphidiscs is 0.090–0.415 mm, the umbel length 0.030–0.159 mm, the umbel diameter 0.020–0.154 mm. The mesamphidiscs (large micramphidiscs according to Lendenfeld, 1915) have spiny shafts with a widening with numerous spines in the middle. Total length of mesamphidiscs is 0.047–0.080 mm, the umbel length 0.013–0.039 mm, the umbel diameter 0.011–0.031 mm. Micramphidiscs have even, spiny shafts, rarely slightly thickened in the middle. Total length of micramphidiscs is 0.018–0.033 mm, the umbel length 0.004–0.010 mm, the umbel diameter 0.006–0.010 mm. Microhexa-ctines have straight, rarely curved rays covered with short spines. Their rays are 0.050–0.120/ 0.003–0.007 mm.

***Remarks.*** The subgenus contains 10 species. *Hyalonema poculum* (Schulze, 1886) included by Lendenfeld in *H.* (*Leptonema*) is considered to be a valid representative of *H.* (*Prionema*), as was postulated by Ijima (1927). *Hyalonema* (*Prionema*) *repletum* was recently redescribed by Reiswig (2000a) after *Leiobolidium* of Schmidt (1880b), this species is a single representative of the subgenus with uncinates.

No references to the distinguishing features of the holotype are found in five specimens, and consequently they were divided by Lendenfeld into two varieties, and one variety was further subdivided into two forms. Nevertheless, they are probably the same species and their recognition as subspecies is superfluous. According to the opinion of Lendenfeld (1915) this species is allied to *H.* (*Prionema*) *pinulifusum. Hyalonema* (*Prionema*) *agujanum* is distinguished by the shape of macramphidiscs and pinules.

### Distribution

East Central Pacific, off the Somali coast, West Central Atlantic, depth 1067–4243 m.

## *HYALONEMA (PTERONEMA)* IJIMA, 1927

### Synonymy

*Hyalonema* (*Pteronema*) Ijima, 1927: 50. Part of *Hyalonema* (*Stylocalyx*) – *H.* (*Stylocalyx*) *globus* Schulze, 1886: 61; 1887a: 21; *H. globus* Schulze, 1893: 572; *H.* (*Stylocalyx*) *claviger* Schulze, 1886: 60; *H.* (*Stylocalyx*) *clavigerum* Schulze, 1887a: 220. *Hyalonema globus* Schulze 1893: 572; *H. clavigerum* Schulze, 1893: 571. Part of *Hyalonema* (*Corynonema*) – *H.* (*Corynonema*) *clavigerum* Ijima, 1927: 53. *Pteronema sensu* Lévi, 1964a: 85.

### Type species

*Hyalonema* (*Pteronema*) *topsenti* Ijima, 1927 (by original designation).

### Definition

*Hyalonema* with pinular ray of dermal spicules conical or spindle-like in overall shape, long spiny, its rhachis is thickest at base; ambuncinates present; macramphidiscs have umbels broader than long, their umbels are about 1/3 long as the length of the whole spicule.

### Diagnosis

The body is from ovoid with or without atrial cavity to cup- or vase-like with oscular sieve-plate and subatrial canals beneath it or with atrial cavity. Choanosomal spicules are diactines, ambuncinates and rarely hexactines. Basalia are 4–8-toothed (in different species) anchors. Acanthophores, when known, are mostly stauractines. Dermalia, atrialia and canalaria are pentactines. The pinular ray of atrialia is longer than that of dermalia. Dermal pinular ray is plumose, with long lateral spines giving a conical or spindle-like shape to entire ray which is under 0.170 mm in length, the rhachis is thickest at base. Hypodermalia and hypoatrialia are pentactines. Amphidiscs are represented by two kinds. Macramphidiscs are always present, they have umbels, usually about 1/3 as long, and about 1/3 as broad, as the length of the whole spicule. Other type of amphidiscs is represented by mesamphidiscs or micramphidiscs. Microhexactines predominate micropentactines and microstauractines.

### Description of type species

*Hyalonema* (*Pteronema*) *topsenti* Ijima, 1927 (Fig. 13).

***Synonymy.*** *Hyalonema* (*Pteronema*) *topsenti* Ijima, 1927: 61.

***Material examined.*** Syntypes: two specimens, Ijima's (1927) description based on specimen 'A', 'Siboga', 0°54′S,

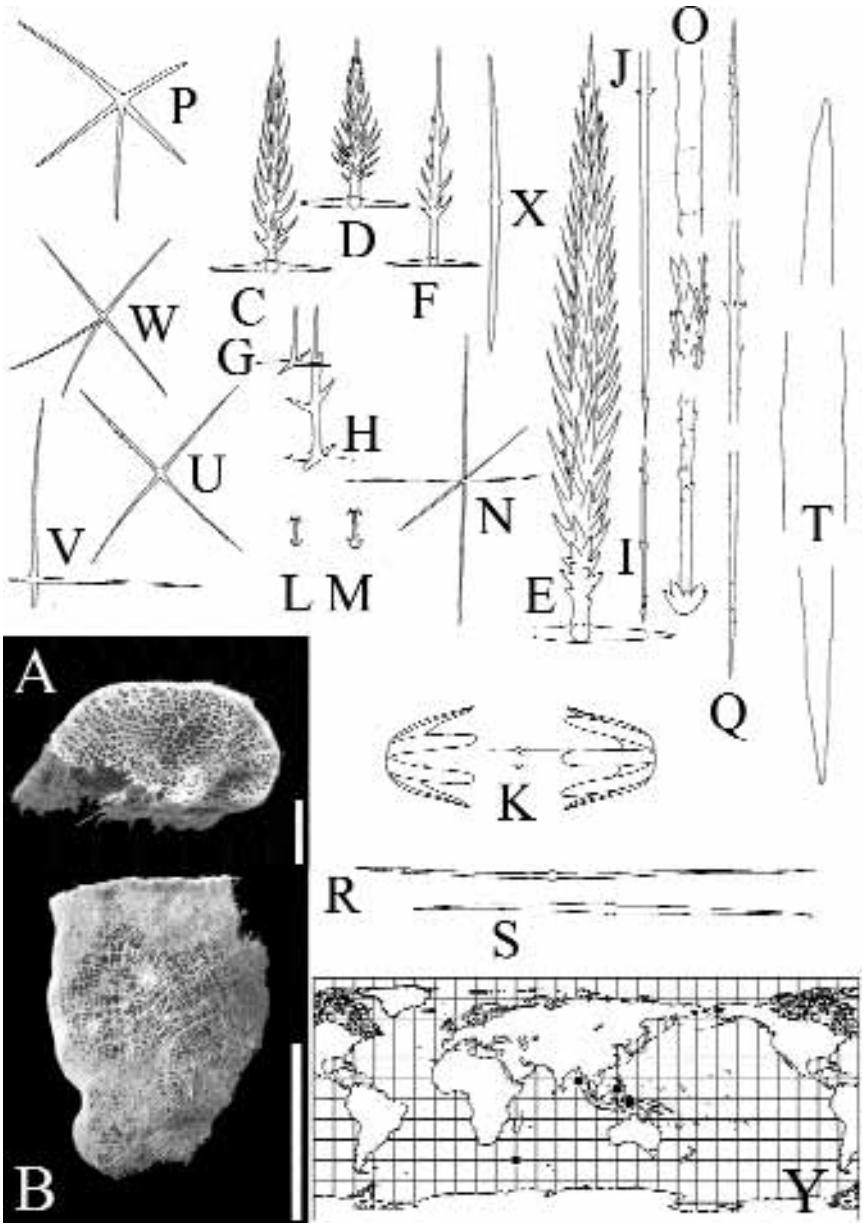


**Fig. 13.** *Hyalonema (Pteronema) topsenti*. A, upper view shape after Ijima (1927) (scale 10 mm). B, lateral view after Ijima (1927) (scale 50 mm). C–D, dermal pinular pentactines 200×. E, atrial pinular pentactine 200×. F–G, canalar pentactines 200×. H, canalar pentactine 200×. I, ambuncinate 50×. J, ambuncinate 200×. K, macramphidisc 100×. L–M, micramphidiscs (optical sections?) 200×. N, microhexactine 200×. O, anchor 30×. P, hypodermal pentactine 50×. Q–R, ambuncinates 100×. S, diactine with a widening in the middle 100×. T, large diactine 50×. U–V, microstauractines 200×. W, micropentactine 200×. X, diactine 100×. C–G, J, K, O, from Ijima (1927). I, L, M, N, X, Lévi & Lévi (1989). H, MNHN (p4689.5). P–W, MNHN HCL 425. Y, distribution of *Hyalonema (Pteronema)*.

128°39.9′E, depth 827 m. Other material. MNHN (p4676.2) – Musorstom 2, 13°2.80′–2.90′N, 122°37.10′–35.50′E, depth 1030–1190 m. MNHN (p4689.5) – Musorstom 2, 14°0.30′–0.40′N, 120°19.30′–17.60′E, depth 188–198 m. MNHN HCl 425 – CALSUB, 'Cyana', 20°53.0′S, 167°03.0′E, depth 602–690 m. MNHN HCl 426 – Bathus 4, 21°1′S, 164°27′E, depth 580–600 m. MNHN HCl 427 – off New Caledonia, 22°29.0′S, 166°23.0′E, depth 375–550 m. MNHN HCl 428 – Musorstom 6, 20°48.88′S, 167°06.13′E, depth 750 m. MNHN HCl 429 – Musorstom 6, 20°48.35′S, 167°05.80′E, depth 700 m.

***Description.*** The body is spherical, in the type specimen 'A' it is about 120 mm in length and diameter. A sieve-plate covers the oscular area. It is perforated by oval, rounded or roundly polygonal open meshes 1–2 mm in diameter. The beams between the meshes are about 1 mm in thickness. Large apertures of wide canals, 4 or 5 in number and separated by broad septas situated between the wall and columella are situated beneath the sieve-plate. The basalia are over 250 mm. The specimen 'B' is represented with a fragment of basalia and body around the columella. The specimen 'C' is tentatively referred to *H.* (*Pteronema*) *topsenti* since it may possibly belong to *Charalonema sibogae* (Ijima, 1927). The other specimens of this species (Lévi & Lévi, 1989; Tabachnick & Lévi, 2000) are represented with oval or conical specimens with or without apical cones; with flattened and reduced

atrial cavity or with slightly depressed one. They are 55–170 mm in length, 24–140 mm in diameter. Spicules. Choanosomal spicules are diactines and ambuncinates. The diactines are 0.5–9/ 0.004–0.200 mm. The small diactines have a widening or two rudimentary tubercles in the middle. The largest ones have no widenings. Ambuncinates are 0.5–2.0/0.010–0.035 mm. Their centre is marked with several spines all of which are bent in the same direction, their conically pointed terminations have several (3–4) spines directed to the spicular centre. Acanthophores are mostly spiny-tuberculated stauractines with rays up to 0.275/0.027 mm. Basalia are 7–8-toothed anchors. Their shaft in the upper parts have spiral series of conical spines. Dermalia and atrialia are pinular pentactines. Their pinular rays are conical-like or spindle-like in shape, with moderately long spines and rhachis thickest at base. Their conically pointed terminations protrude beyond the last spines. Tangential rays are smooth or rough with conically pointed terminations. The pinular ray of dermal pentactines is 0.090–0.198/0.008 mm, tangential rays are 0.023–0.084 mm in length. The pinular ray of atrial pentactines is 0.053–0.550/ 0.011–0.015 mm, tangential rays are 0.023–0.075 mm in length. Canalaria are also pentactines which pinular ray is less spiny or even smooth. The length of pinular ray of canalar pentactine is 0.150–0.275 mm, tangential ones are about 0.055 mm in length. Hypodermalia are pentactines with smooth tapering terminations. Their tangential rays are 0.1–1.0/0.005–0.100 mm. Hypoatrialia seem to be absent. Microscleres. Amphidiscs are represented by two types. Macramphidiscs have umbels which are usually about 1/4 as long, and about 1/3 as broad, as the length of the whole spicule. Their shafts are smooth with a whorl of tubercles in the middle. Total length of macramphidisc is 0.266–0.517 mm, the umbel length 0.053–0.145 mm, the umbel diameter 0.046–0.170 mm. Micramphidiscs have rough-spiny shafts (the type specimens have also some tubercles in the middle). Total length of micramphidisc is 0.013–0.029 mm, the umbel length 0.004–0.010 mm, the umbel diameter 0.004–0.010 mm. Microhexactines, micropentactines and microstauractines have straight rays, smooth or with rare spines. A row of their derivatives are similar to smooth canalaria. Microhexactines usually prevail over other related forms but the specimens from New Caledonia have more micropentactines and microstauractines instead of microhexactines. The rays of these spicules are 0.044–0.160/ 0.002–0.003 mm.

***Remarks.*** The subgenus contains 6 species. *Hyalonema* (*Corynonema*) *clavigera* was referred here by Ijima (1927) but it is a representative of *H.* (*Pteronema*) despite that its body form does not correspond to other representatives of this subgenus (being ovoid with an atrial cavity and septas). Ijima (1927) considered that *H. polycaulum* Lendenfeld, 1915 may also belong to *H.* (*Pteronema*) under the name *H. polycaulus*. Later it was transferred to *H.* (*Cyliconema*) (Lévi, 1964a). Specimens of *H.* (*Pteronema*) *aculeatum* (Schulze, 1894) are represented by small sponges which have prostalia lateralia represented by solitary spicules. Prostalia lateralia are very uncommon for Hyalonematidae being known for *Composocalyx* as tufts of diactines (Schulze, 1904). Acanthophores with 2–6 rays may occur. Mesamphidiscs are known in one species which otherwise lacks micramphidiscs.

**Distribution**

Indo-West Pacific, SE Indian ocean, depth 310–2920 m.

***HYALONEMA* (*THAMNONEMIELLA*) SUBGEN. NOV.**

**Synonymy**

[*Thamnonema*] Ijima, 1927: 52. (The subgeneric name is preocc. by *Thamnonema* Sollas, 1883, a fossil hexactinellid).

**Type species**

*Hyalonema* (*Thamnonemiella*) *thamnophorum* Ijima, 1927 (by original designation).

**Definition**

*Hyalonema* with a slender pinular ray of dermal spicules bearing long spines and with finely pointed outer end; macramphidiscs have umbels longer than broad.

**Diagnosis**

Body is clavate, without atrial cavity when small; funnel-like with wide atrial cavity or bell-like with sieve-plate and without atrial cavity in large specimens. Choanosomal spicules are diactines and hexactines (they could be found in equal amounts) and uncinates. Acanthophores are stauractines, sometimes tauactines. Dermalia and atrialia are pentactines, seldom hexactines. The pinular ray of dermal pentactines has a finely pointed outer ends, the slender rhachis has some lateral spines unusually prolonged (up to 0.04 mm or over). The lateral spines are smooth or bear additional small spines. The pinular ray of atrial pentactines has short spines and rhachis similar to dermal ones. Hypodermalia and hypoatrialia are pentactines. Amphidiscs are represented by 2–3 kinds. Macramphidiscs are narrow, with umbels longer than broad (usually about 1/3–1/4 as long, and about 1/4–1/5 as broad, as the length of the whole spicule). Mesamphidiscs when present and micramphidiscs are of common shape and size. Microhexactines predominate micropentactines, both are smooth or short spiny.

**Description of type species**

*Hyalonema* (*Thamnonemiella*) *thamnophorum* Ijima, 1927 (Fig. 14).

***Synonymy.*** *Hyalonema* [*Thamnonema*] *thamnophorum* Ijima, 1927: 99.

***Material examined.*** Syntypes: 2 specimens, not seen; Ijima's (1927) description is based on the smaller specimen; Banda sea, 6°24′S, 124°39′E, depth 2798 m.

***Description.*** This sponge is represented by two small specimens. Their body is clavate or spindle-like in shape without oscula and atrial cavity. The body of one specimen is 6 mm in length and 4 mm in diameter, its basalia are broken being represented with a tuft of spicules over 6 mm in length and about 1 mm in diameter. The other specimen is broken and represented by a fragment 10 mm in length and 4.5 mm in diameter. Spicules. Choanosomal spicules are diactines and hexactines in close to equal proportions. The diactines are up to 3/0.020 mm. The hexactines have rays up to 0.9/0.030 mm. Acanthophores are mostly stauractines and tauactines of various size, their rays are up to 0.020 mm in diameter. The dermal pinular pentactines are tree-like, with finely pointed outer ends and slender rhachis bearing twig-like lateral

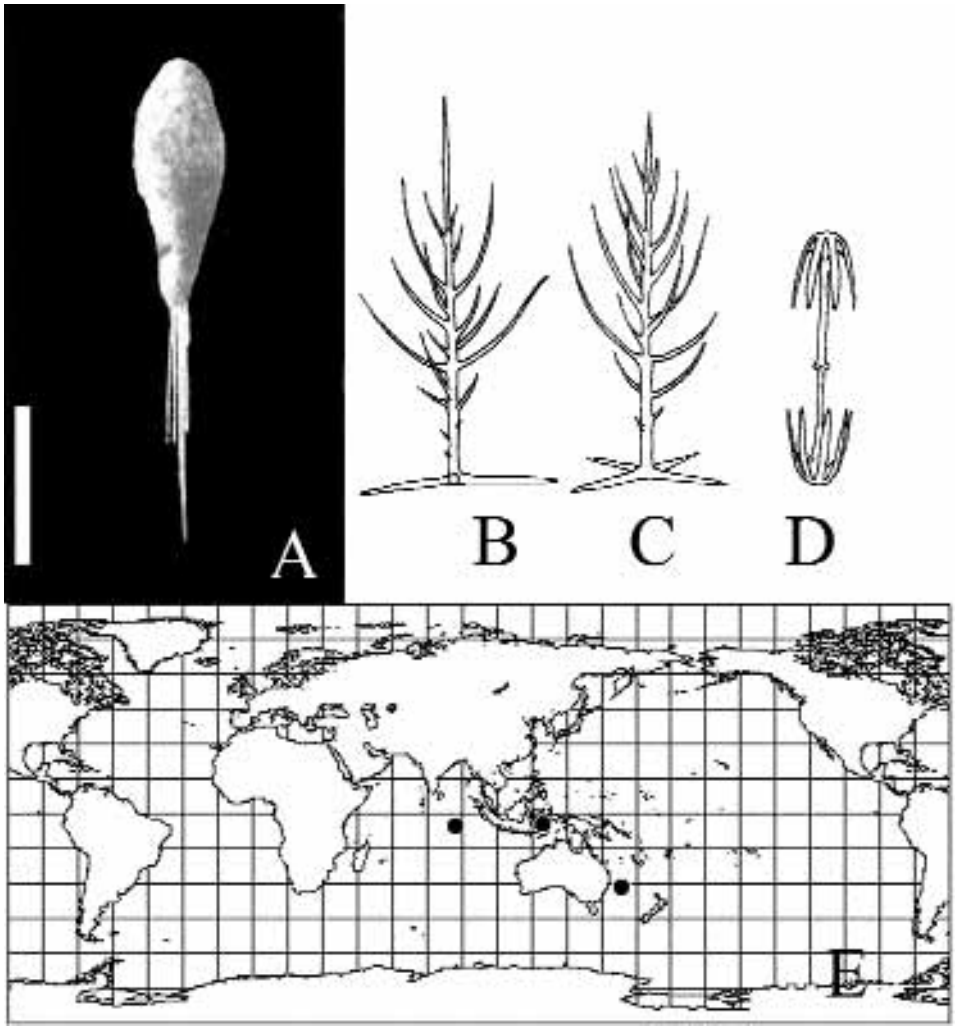


**Fig. 14.** *Hyalonema (Thamnonemiella) thamnophorum*. A, external shape after Ijima (1927) (scale 10 mm). B–C, dermal pinular pentactines 380×. D, macramphidisc 100×. B–D, from Ijima (1927). E, distribution of *Hyalonema (Thamnonemiella)*.

spines which attain the greatest length in the middle parts of the ray. Tangential rays are smooth with conically pointed terminations. The pinular ray is 0.125–0.145/0.004 mm, tangential rays are 0.038–0.048/0.003 mm. Atrialia are absent. Hypodermalia are pentactines. Their tangential rays are 0.24–0.70/0.010–0.025 mm. The proximal ray is much longer than tangentials. Microscleres. Amphidiscs are represented by two kinds. Macramphidiscs have deeply bell-like umbels (longer than broad, usually about 1/3 as long, and about 1/4 as broad, as the length of the whole spicule); the teeth are lanceolate; the axial shaft is smooth with a whorl of tubercles in the middle. Total length of macramphidiscs is 0.200–0.400 mm (avg. 0.318 mm, std. 0.074), the umbel length 0.070–0.120 mm (avg. 0.101 mm, std. 0.020, the umbel diameter 0.049–0.100 mm (avg. 0.081 mm, std. 0.018). Mesamphidiscs are absent. Micramphidiscs are of usual shape and size. Total length of micramphidiscs is 0.015–0.020 mm. Microhexactines are rough with straight rays (exceptionally one or two rays may be slightly bent). The rays of microhexactines are 0.080–0.190/0.003 mm.

***Remarks.*** The subgenus has one described species and two others currently in press. The genus lacks anchor-like terminations of basalia. Uncinates are very similar to those of other Amphidiscophora but with tubercles in the middle of the spicule, suggesting that these spicules originated from diactines. Such uncinates are known also from *H.* (*Euhialonema*) *pellucidum* from the Sagami Sea (Ijima, 1927). Ijima also noted similarities between *H.* (*Thamnonemiella*) *thamnophorum* and *H.* (*Phialonemiella*) *brevancora* Lendenfeld (1915) based on their dermal pentactines. However differences between their macramphidiscs prompted him to propose a new subgenus for the former species. Similarly, he noted resemblances in dermal pinular pentactines and macramphidiscs shape between *H.* (*Thamnonemiella*) *thamnophorum* and *H.* (*Prionema*) *fimbriatum* Lendenfeld (1915), differing only by the presence of serrated lateral edges of umbel teeth in the macramphidiscs of *H.* (*Prionema*).

Representatives of two subgenera have secondary spines on the spines of dermal pinular ray *H.* (*Phialonemiella*) and one undescribed species of *H.* (*Thamnonemiella*). The difference between these two subgenera is in the form of their macramphidiscs. The second type of macramphidiscs was found in one undescribed species of *H.* (*Thamnonemiella*), with umbels broad and short, but this spicule might belong to another species of *Hyalonema* living in the same locality.

**Distribution**

Indo-West Pacific, depth 2798–5200 m.

## *CHARALONEMA* IJIMA, 1927

**Synonymy**

*Chalaronema* Ijima, 1927: 43.

**Type species**

*Chalaronema sibogae* Ijima, 1927 (by monotypy).

**Definition**

Hyalonematidae which basalia are forming in a broad, loose, untwisted tuft, the sieve-plate present; pinular ray of dermal spicules is short spiny, its rhachis is thickest at base; without ambuncinates; macramphidiscs have umbels broader than long.

**Diagnosis**

The body is cylindrical, with thin sieve-plate at the truncate upper end, the rounded lower end forms a rise directed to a broad and rather loose basal tuft which is not twisted. Choanosomal spicules are diactines and ambuncinates. Basalia are 4-toothed anchors. Acanthophores are mostly stauractines. Dermal pinular pentactines have elongate conical pinular ray, its finely pointed outer end projects far beyond the last spines. Atrial pinular pentactines forming the sieve-plate are taller and more robust. Canalaria are small, not numerous, the unpaired ray is sparsely and weakly spiny. Hypodermalia and hypoatrialia are pentactines. Microscleres are amphidiscs of two kinds and microstauractines, rarely micropentactines, microhexactines and microtriactines.

**Description of type species**

*Chalaronema sibogae* Ijima, 1927 (Fig. 15).

***Synonymy.*** *Chalaronema sibogae* Ijima, 1927: 43.

***Material examined.*** ? Holotype: ZMA fragment (unknown whether fragment is from holotype or paratype from the same station), 'Siboga', 5°28.4′S, 132°00.2′E, depth 204 m.

***Description.*** The body of the holotype named specimen 'A' (Ijima, 1927) is approximately cylindrical, measuring about 60 mm in length and 30 × 35 mm in diameter. It is somewhat truncate above and rounded below. The texture of the sponge is soft. The basalia protrude at about 100 mm forming a broad tuft. The upper part of the body is occupied by an oscular sieve-plate, formed of atrialia, measuring about 25 mm in diameter. Small apical cone is found in the centre of the plate. A number of exhalant canals are found around the columella under the sieve-plate, they penetrate deep into the body. The paratype 'B' is about two times smaller. Spicules. Choanosomal spicules are diactines about 10/0.3 mm. Ambuncinates are about 2/0.2 mm with spicular centre marked with axial cross and 2–4 hook-like spines in a whorl, which are all short but still the longest of all the other spines of this spicule. Basalia are over 150 mm long up to 0.200 mm in diameter. The anchor is four-toothed, its shaft is spiny in the distal parts and with interrupted spiral denticulate ridges in proximal parts. Acanthophores are mostly stauractines with rays slender and tapering toward the end, they reach 0.250/0.012 mm. Dermalia are pinular pentactines. Pinular ray 0.110–0.150/0.007 mm is long, spiny, conical in general shape, with finely pointed outer end. Tangential rays are 0.040–0.068/0.006 mm, smooth, finely pointed. Atrialia are pinular pentactines similar to dermal ones. They have pinular ray up to 0.800/0.011–0.015 mm. Tangential rays of atrial pentactines are 0.075/0.012 mm, they are randomly spiny. Canalaria are pinular pentactines with rare spines. The unpaired (pinular) ray is 0.075–0.120/0.004 mm. Tangential rays of canalaria are smooth 0.040–0.072/0.005 mm. Some pinular diactines corresponding to prostalia oscularia (marginalia) of *Hyalonema* were found in *C. sibogae* too. They have shorter and less spiny pinular ray. Hypodermalia are pentactines with smooth rays about 1–1.5/0.1 mm. Hypoatrialia are absent. Microscleres. Amphidiscs are represented by two kinds: macramphidiscs and micramphidiscs. The macramphidiscs have smooth shafts with a whorl of tubercles in the middle. Total length of macramphidisc is 0.272–0.357 mm, the umbel length 0.030–0.114 mm, the umbel diameter 0.049–0.137 mm. The micramphidiscs have smooth shafts with a widening in the middle. Total length of macramphidisc is 0.013–0.024 mm, the umbel length 0.004–0.009 mm, the umbel diameter 0.004–0.007 mm. Microstauractines prevail over their analogous spicules (micropentactines, microhexactines, microtriactines). They have smooth rays 0.060–0.198/0.005–0.008 mm with rare spines near the terminations.

***Remarks.*** *Chalaronema* is presently monotypic. It is close to *Hyalonema* differing only by having a broad and rather loose, untwisted basal tuft. In spiculation it is similar to *Hyalonema* (*Pteronema*), and the features that differentiate these taxa may be insignificant such that they may be eventually synonymized. Hexactines are entirely absent from the choanosomal spicule complement. Furthermore, aside from the specific basal tuft *C. sibogae* is very similar to *Hyalonema* (*Pteronema*) *topsenti* such that it is nearly impossible to differentiate fragments of either of these species with accuracy.

**Distribution**

Indonesian Archipelago, depth 296 m.

## *COMPOSOCALYX* SCHULZE, 1904

**Synonymy**

*Composocalyx* Schulze, 1904: 99.

**Type species**

*Composocalyx gibberosa* Schulze, 1904 (by monotypy).

**Definition**

Hyalonematidae with prostalia lateralia which form tufts on conical prominences of dermal surface; atrial surface is low being divided by septas into four parts; pinular ray of dermal spicules bears short spines and has finely pointed outer end; macramphidiscs have umbels broader than long.

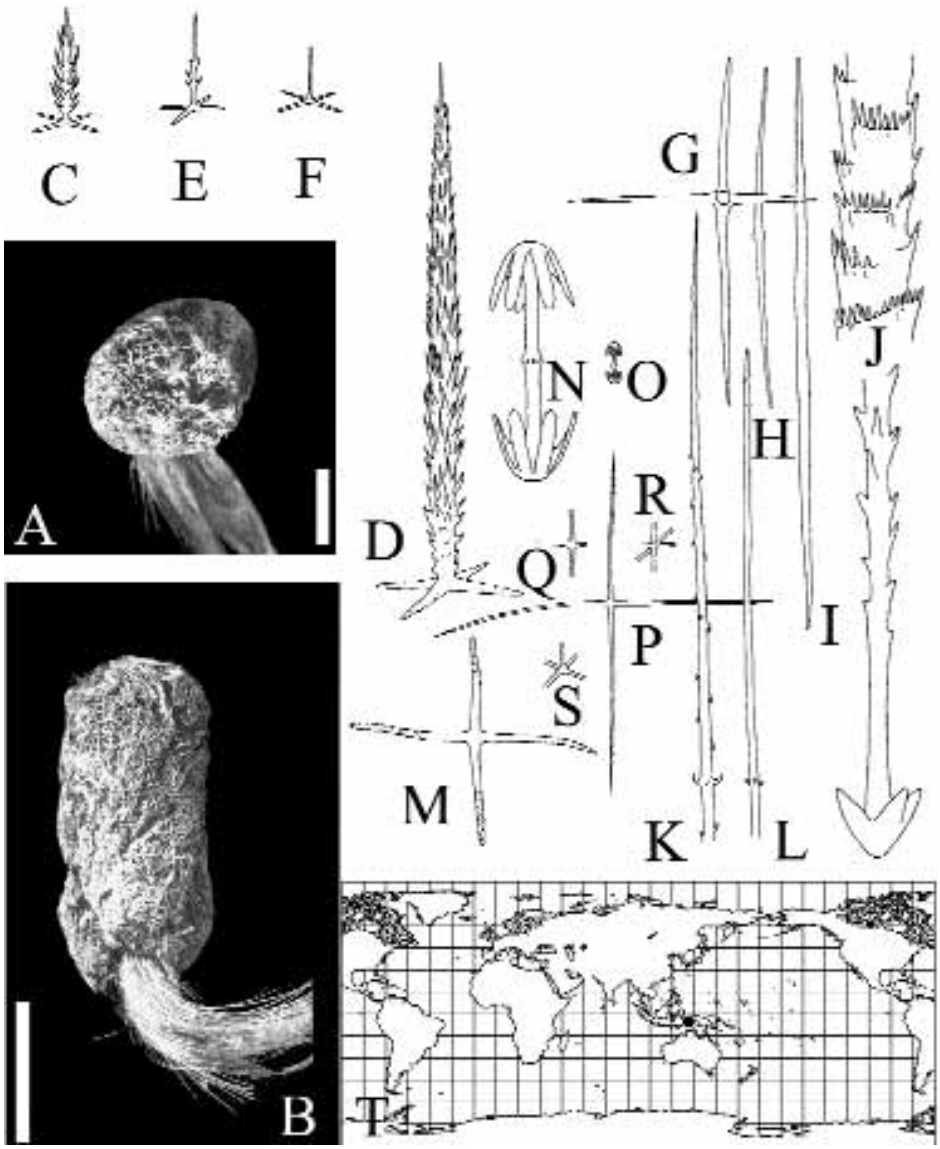


**Fig. 15.** *Chalaronema sibogae*. A, lateral view after Ijima (1927) (scale 30 mm). B, upper view after Ijima (1927) (scale 10 mm). C, dermal pinular pentactine 110×. D, atrial pinular pentactine 110×. E–F, pentactines of canalaria 110×. G, hypodermal pentactine 55×. H–I, choanosomal diactines 55×. J, anchorate basalia 55×. K, ambuncinate 220×. L, ambuncinate 220×. M, acanthophore (stauractine) 110×. N, macramphidisc 220×. O, micramphidisc 440×. P, microstauractine 220×. Q, microtriactine 220×. S, micropentactine 220×. C–D, H, I, L, P–S, from Ijima (1927). E–G, J, K, M–O, ZMA specimen. T, distribution of *Charalonema*. R, microtetractine.

**Diagnosis**

The body is barrel-like, the dermal surface is covered with numerous conical prominences with tufts of prostalia marginalia of diactines. The apical cone is in the centre of the osculum leading to the atrial cavity. The atrial cavity penetrates deep inside the body. It is divided by septas close to the osculum into four parts, situated around the apical cone. Choanosomal spicules are diactines together with ambuncinates. Dermalia, atrialia and canalaria are pinular pentactines, seldom hexactines. Hypodermalia and hypoatrialia are pentactines. Microscleres are amphidiscs (of two or three kinds) and microhexactines (rarely micropentactines).

**Description of type species**

*Composocalyx gibberosa* Schulze, 1904 (Fig. 16).

***Synonymy.*** *Composocalyx gibberosa* Schulze, 1904: 99.

***Material examined.*** Holotype: not seen, 'Valdivia', SW of Great Nicobar Island, 6°54,0′N, 93°28.8′E, depth 296 m.

***Description (from Schulze, 1904).*** The sponge is about 90 mm in length, 110 mm in diameter, the dermal conical prominences are about 10 mm, the wall thickness is from 15 to 20 mm. Basalia and the lower part are absent. Spicules. Choanosomal spicules are diactines and ambuncinates. The choanosomal diactines have a widening in the middle. They are 1–2/0.010–0.020 mm. Ambuncinates are 1–2/0.060 mm. Prostalia marginalia are diactines about several cm long and about 0.060 mm in diameter. The pinular ray of dermalia, atrialia and canalaria is thickest at base, its outer end is conically pointed and protrudes far beyond the last spines. The pinular ray is covered with relatively small spines, the tangential rays are covered with minute spines in their distal half. The pinular ray of dermal pentactine is 0.100–0.200 mm in

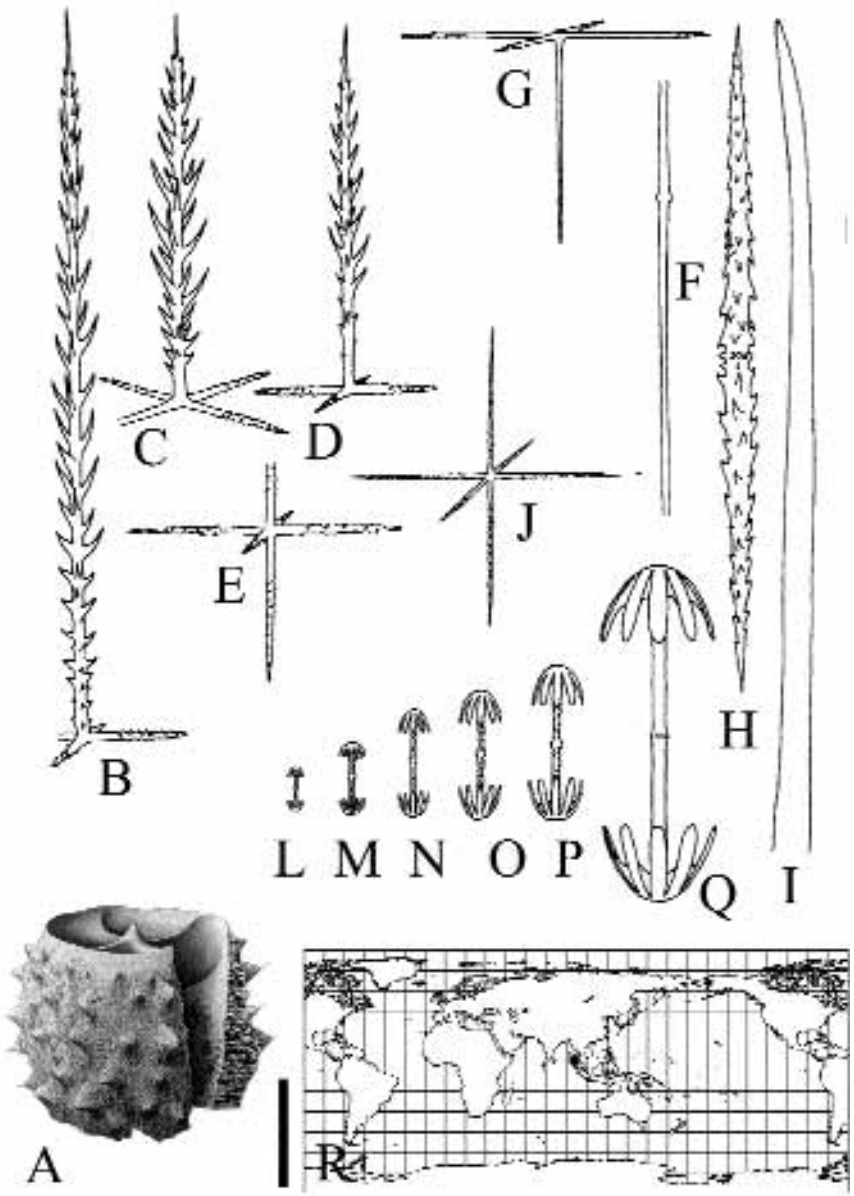


**Fig. 16.** *Composocalyx gibberosa*. A, after Schulze (1904) (scale 50 mm). B, atrial pentactine 360×. C, dermal pentactine 360×. D, canalar pentactine 360×. E, canalar hexactine 360×. F, choanosomal diactine 180×. G, hypodermal pentactine 180×. H, ambuncinate 55×. I, prostal diactine 55×. J, microhexactine 360×. L–M, micramphidiscs 360×. N–P, mesamphidiscs 360×. Q, macramphidisc 180×. B–Q, from Schulze (1904). R, distribution of *Composocalyx*.

length, tangential rays are about 0.030 mm in length. The pinular ray of atrial pentactine is 0.300 mm and over in length, tangential rays are 0.025–0.030 mm in length. The diameter of dermal and atrial pinular ray is 0.005–0.006 mm, the diameter of tangential rays of these spicules is 0.003 mm. Canalaria are pinular pentactines similar to dermal and atrial in shape. Its pinular ray is about 0.18 mm in length, tangential rays are about 0.04 mm in length. Hypodermalia are pentactines with tangential rays about 0.2 mm in length, proximal ray about 0.18 mm in length, their diameter is about 0.004 mm. The tangential rays have short spines on the distal ends. All rays of hypodermal pentactines are conically pointed. Microscleres. Microscleres are amphidiscs (of two or three kinds) and microhexactines (rarely micropentactines). Amphidiscs are represented by three kinds. The macramphidiscs have smooth shafts with a whorl of tubercles in the middle. Total length of macramphidisc is about 0.300 mm, the umbel length 0.080 mm, the umbel diameter 0.080 mm. Mesamphidiscs and micramphidisc have rough shafts with a thickening in the middle. Total length of mesamphidisc is 0.050–0.070 mm, the umbel length 0.011–0.017 mm, the umbel diameter 0.014–0.023 mm. Total length of micramphidisc is 0.012–0.016 mm, the umbel length 0.005–0.007 mm, the umbel diameter 0.007–0.012 mm. Microhexactines and micropentactines have spiny rays about 0.050/0.002–0.004 mm.

***Remarks.*** This genus is known only from a single incomplete specimen of the type species. The main diagnostic characters of the genus are the presence of wisps of prostalia marginalia on conical prominances on the dermal surface and the absence of oscular sieve-plate. But these features may not be significant given that *H.* (*Pteronema*) *aculeatum* (Schulze, 1894) also has some solitary spicules of prostalia lateralia. If these wisps of prostalia lateralia are deemed to be insignificant at the generic level (basalia are

unfortunately not present) *Composocalyx* might conceivably be better be placed in *Hyalonema*. Its spicule set is similar to *H.* (*Coscinonema*) and *H.* (*Hyalonema*) (formerly *H.* (*Euhyalonema*)). The main feature differentiating *Composocalyx* from these two subgenera of *Hyalonema* is the presence of oscular sieve-plates in the latter versus the presence of septa in *Composocalyx*. Schulze (1904) divided amphidiscs into three kinds but we suggest that mesamphidiscs and micramphidiscs are very similar and have no gap in their dimensions. But since we have no possibility to reinvestigate this sponge we reiterate the original description that includes various categories of amphidiscs.

**Distribution**

NE of the Indian Ocean, depth 269 m.

## *LOPHOPHYSEMA* SCHULZE, 1900

**Synonymy**

*Lophophysema* Schulze, 1900b: 19.

**Type species**

*Lophophysema inflatum* Schulze, 1900b (by monotypy).

**Definition**

Hyalonematidae with body composed of two opposite cones; pinular ray of dermal spicules is even or spindle-like in shape, with outer end terminating by an apical cone or conically pointed; without ambuncinates and uncinates; macramphidiscs have umbels as long as broad (sometimes ovoid in shape).

**Diagnosis**

Body is composed of two opposite cones. The outer surface of the upper cone corresponds to the everted atrial surface, forming the major part of the external body surface, while the same of the lower one is the dermal area, deeply sunk in the form of pits. Extensive inhalant system of wide and branching cavities and canals is vertically directed. The apical cone seems to protrude over the apex. The basalia are twisted in a tuft. Choanosomal skeleton consists of diactines, sometimes with hexactines. Prostalia marginalia (corresponding to oscularia) are pinular diactines. Dermalia, atrialia and canalaria are usually pinular pentactines, rarely hexactines. Hypodermalia are pentactines, hypoatrialia may be absent or are also pentactines. Microscleres are amphidiscs (macramphidisc and mesamphidiscs may be absent or rare, micramphidiscs are always present) and spiny microhexactines or rough monactines.

**Description of type species**

*Lophophysema inflatum* Schulze, 1900b (Fig. 17).

***Synonymy.*** *Lophophysema inflatum* Schulze, 1900b: 19.

***Material examined.*** Holotype: BMNH 1908.09.24.043 (fragment) – 'Investigator', Andaman Sea, 13°50′30′N, 93°26′E, depth 911 m. Other material. BMNH 1907.08.01.006 – same locality. MNHN HCl 151, MNHN HCl 152 – 'Karubar', N.O. 'Baruna Jaya 1', Indonesia, off Kai Island, 5°14′S, 133°00′E, depth 688–694 m. MNHN HCl 153 – same locality, 5°23′S, 132°29′E, depth 368–389 m. WAM 111–82, WAM 112–82, WAM 109–82 – 'Soela', W Australia, 20 miles W of Clarke Reef, 17°15′S, 119°01′E, depth 450–444 m. WAM 110–82, WAM (fr879), WAM 97–91 – 'Soela', 154 miles NW of Port Hedland, 18°45′S, 116°26.50′–22.50′E, depth 720–724 m. WAM 73–91 – 'Courageous', W Australia, N of Cape Preston, 18°34′S, 117°17′E, depth 475–477 m.

***Description.*** Body shape of all investigated specimens entirely corresponds to that in the generic diagnosis. Dermalia are organised into net-like structures, similar to the atrial sieves or sieve-plates common in other Hyalonematidae. The total length of the body (without stalk) is 35–240 mm, with the maximal diameter about 70–240 mm. Basalia are always broken, the longest are over 450 mm. The basalia are obviously twisted in a single tuft as in well-preserved specimens with rather long basalia. Both specimens stored in the BMNH are small fragments so the BMNH holotype must be considered to be the schizoholotype. According to the presence of some amount of acanthophores these fragments were taken from the basal part of the sponge body. The spicule contents of these fragments are very incomplete compared with the original description. Spicules. Choanosomal skeleton consists of smooth diactines which usually have a widening or four rudimentary tubercles in the middle, rarely there is no middle widening. They have smooth or tuberculated ends which are usually conically pointed or rounded. The diactines are several mm in length 0.015–0.023 mm in diameter. Monactines with different ends described above and triactines may be found occasionally. Choanosomal hexactines were found in two specimens WAM 110–82 and WAM 97–91. They are similar in shape and size to hypodermal or hypoatrial pentactines. The prostalia marginalia are diactines approximately 0.8/.012 mm with one pinular ray similar to a pinular ray of dermalia and atrialia. These pinular diactines were found in the holotype and in specimen WAM 110–82 only. The acanthophores are present in several specimens. They are stauractines, triactines and diactines with smooth or tuberculated ends or entirely covered with small spines. Basalia are very long (over 600 mm in the largest specimen). Distal ends of basalia are unknown. Dermalia, atrialia and canalaria are pinular pentactines, rarely hexactines. The base of the pinular ray is its thickest part. The pinular ray of dermalia is 0.097–0.547 mm long, the tangential rays are 0.019–0.076 mm long. The pinular ray of atrialia is 0.137–0.684 mm in length, the tangential rays are 0.018–0.061 mm long. The diameter of the pinular rays of dermal and atrial pentac-tines is 0.012–0.019 mm, same of tangential rays is 0.006–0.008 mm. Canalaria are hardly distinguished from dermalia and atrialia by their smaller size. Hypodermalia and hypoatrialia are pentactines, rarely stauractines. They have smooth rays but one specimen – WAM (fr879) contains some hypoatrial pentactines with a few spines on otherwise smooth tangential rays. The rays of hypodermal and hypoatrial spicules are 0.1–0.2/0.006–0.008 mm, the unpaired ray is usually about 1.5 times longer. Microscleres. The amphidiscs are of three types but macramphidiscs and mesamphidiscs may be absent. The mesamphidiscs are absent in the three specimens from the Indonesian Archipelago: MNHN HCl 151, MNHN HCl 152, MNHN HCl 153 and in WAM 97–91. The macramphidiscs are rare or absent in WAM 97–91, MNHN HCl 152. The shaft of the macramphidisc is tuberculated in the middle or everywhere, rarely smooth (WAM 109–82). Staurodiscs corresponding in length to macramphidiscs were found in WAM 112–82. The shaft of mesamphidiscs and of

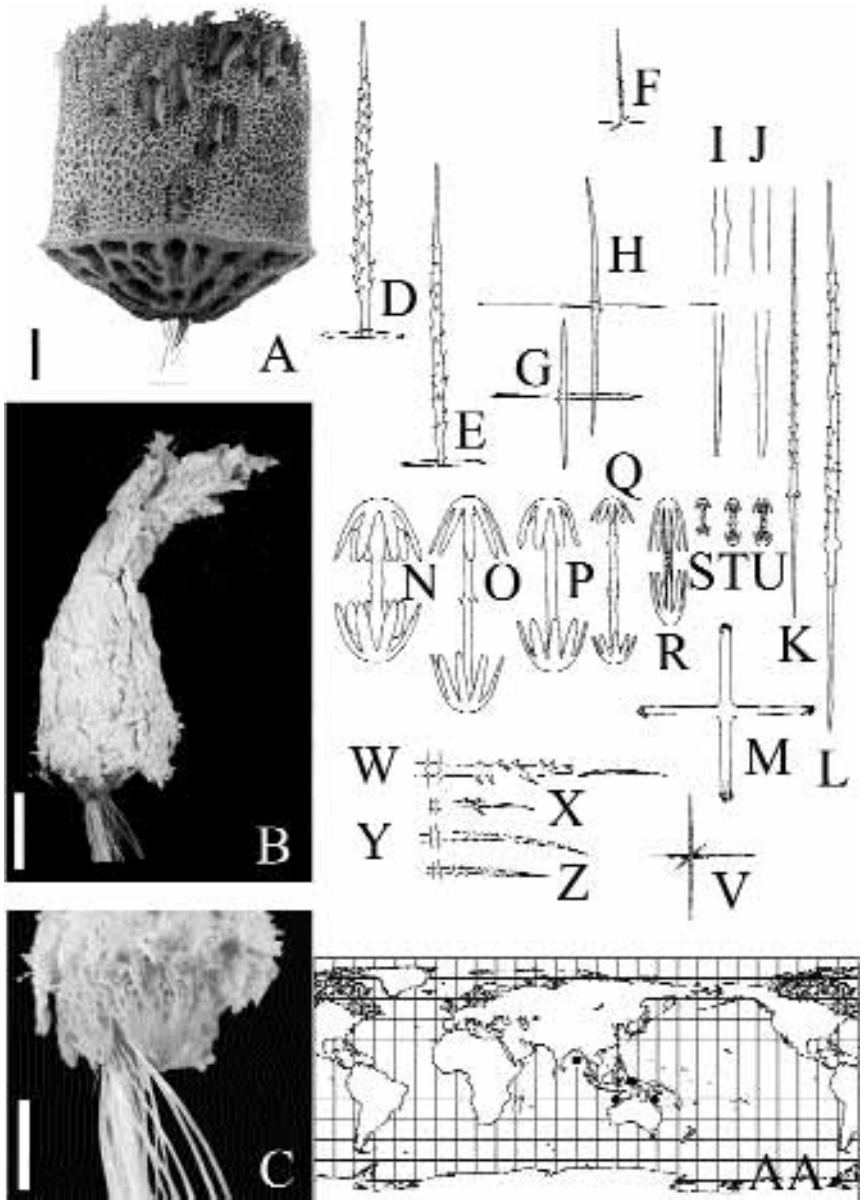


**Fig. 17.** *Lophophysema inflatum*. A, a lower fragment after Schulze (1900b) (scale 90 mm). B, complete specimen WAM (fr877) (scale 40 mm). C, a fragment of the lower part WAM (fr877) (scale 40 mm). D, dermal pentactine 110×. E, atrial pentactine 110×. F, pentactine canalaria 110×. G–H, hypoatrial pentactines 110×. I–J, choanosomal diactines 110×. K, pinular diactine 110×. L, pinular diactine 110×. M, stauractine acanthophore 110×. N, macramphidisc 110×. O–P, macramphidiscs 110×. Q, macramphidisc 110×. R, mesamphidisc 430×. S, 430×. T, micramphidisc 430×. U, micramphidisc 430×. V, microhexactine 110×. W–X, rays of microhexactines 430×. Y–Z, rays of microhexactines 430×. F, K, M, N, V, from Schulze (1900b). D, E, G–J, L, O–U, W–Z, from Tabachnick & Lévi (1999). D, MNHN HCl 152. E, L, WAM 110–82. G–H, Q, S, WAM (fr879). I–J, O–P, R, Y–Z, WAM 109–82. T, W–X, WAM 12–82. U, MNHN HCl 153. AA, distribution of *Lophophysema*.

micramphidiscs is covered with numerous small spines; in micramphidiscs it may have a small widening in the middle. Total length of macramphidisc is 0.083–0.547 mm, the umbel length 0.029–0.129, the umbel diameter 0.025–0.167 mm. Mesamphidiscs are 0.014–0.137 mm, the umbel length 0.004–0.061 mm, the umbel diameter 0.005–0.053 mm. The micramphidiscs are 0.006–0.033 mm, the umbel length 0.004–0.009 mm, the umbel diameter 0.004–0.010 mm. Microhexactines are usually covered with numerous small spines. In one specimen WAM (fr879) these spines are not numerous and rather long. The rays of microhexactines, 0.011–0.097/0.002–0.005 mm long, are usually straight, or with slightly curved ends.

***Remarks.*** The genus contains three species. The diagnosis is taken from Tabachnick & Lévi (1999) which was developed from that of Schulze (1900b; 1902) and Ijima (1927). The upper cone of the body is always larger than the lower one. Large inhalant cavities located beneath the dermal surface of the lower cone with wide initial openings are vertically directed and branch dichotomously. The exhalant canals are much smaller. In size canalaria are smaller, atrialia may be larger or smaller than dermalia between different specimens. The pinular ray has a rhachis thickest at its base, with short spines. Rare staurodiscs in *L. inflatum* correspond to macramphidiscs in shape-proportions and size. The shafts of macramphidiscs vary from one specimen to another. This

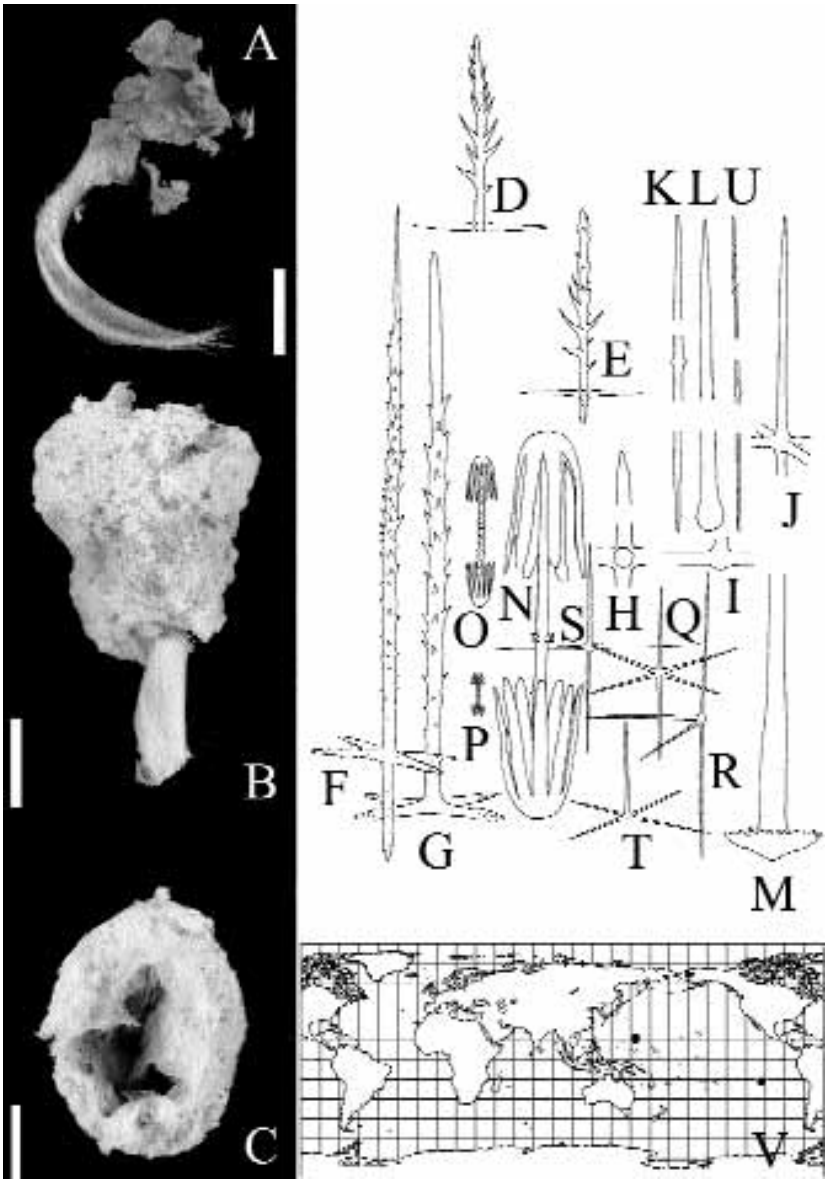


**Fig. 18.** *Platella polybasalia*. A, holotype (scale 50 mm). B, lateral view MNHN (p448) (scale 20 mm). C, upper view MNHN (p448) (scale 10 mm). D, dermal pentactine 220×. E, dermal hexactine 220×. F, atrial hexactine 220×. G, atrial pentactine 220×. H, hypodermal pentactine 110×. I, hypodermal triactine 110×. J, hypodermal hexactine 110×. K, choanosomal diactine 110×. L, choanosomal monactine 110×. M, basal anchorate clavule 55×. N, macramphidisc 220×. O, mesamphidisc 220×. P, micramphidisc 220×. Q, microhexactine 220×. R, microparatetractine 220×. S, microstauractine 220×. T, micropentactine 220×. U, uncinate 220×. D–U, holotype IORAS 5/2/118. V, distribution of *Platella*.

description of the type species is extracted from a recent revision of the genus *Lophophysema* (Tabachnick & Lévi, 1999).

**Distribution**

NE Indian Ocean, Indonesian archipelago, NW and NE Australia, off S Africa, depth 368–1385 m.

## *PLATELLA* TABACHNICK, 1988

**Synonymy**

*Platella* Tabachnick, 1988: 52.

**Type species**

*Platella polybasalia* Tabachnick, 1988 (by original designation).

**Definition**

Hyalonematidae in which basalia are anchorate spicules with pileate, serrated discs; pinular ray of dermal spicules is even with rounded or conically pointed outer end; macramphidiscs have umbels longer than broad.

**Diagnosis**

Body is ovoid with vast atrial cavity. Basal tuft is rather compact. Choanosomal spicules are diactines, seldom monactines, hexactines,

triactines and uncinates. Basalia are anchorate spicules with pileate, serrated discs. Dermalia and atrialia are pinular pentactines, rarely hexactines. Hypodermalia are pentactines. Microscleres are amphidiscs of three kinds and microhexactines which occur together with some micropentactines and microstauactines.

### Description of type species

*Platella polybasalia* Tabachnick, 1988 (Fig. 18).

***Synonymy.*** *Platella polybasalia* Tabachnick, 1988: 52.

***Material examined.*** Holotype: IORAS 5/2/118 – 'Akademic Mstyslav Keldysh', 9, 14°13′N, 155°57.5′–58.8′E, depth 1530 m. Paratype: BMNH (5/2/115) – 'Akademic Mstyslav Keldysh' 9, 14°08.94′–09.70′N, 156°31.95′–32.30′E, depth 1580 m. Other material. MNHN (p448) – 'Naudir', 18°45.26′S, 113°35.97′W, depth 2747 m.

***Description.*** The external shape of the body is known best of all for the specimen from the MNHN. The body of this specimen is ovoid 40 mm in length, about 32 mm in diameter. Osculum is 20 × 28 mm, the atrial cavity is 25 mm deep. The dermal surface is smooth, the atrial surface is longitudinally folded. The length of basalia is about 30 mm. The basal tuft is not twisted in this specimen but in the holotype and paratype it seems to be slightly twisted. The holotype and paratype are poor, incomplete fragments, the length of their basalia is 120 mm and 60 mm correspondingly. Spicules. Choanosomal spicules are diactines, rarely monactines, hexactines and triactines. The diactines 0.661–2.280/0.008–0.024 mm are smooth with or without widening in the middle, they have rounded terminations. The choanosomal hexactines have rays about 0.220/0.009 mm with rounded terminations. Uncinates were hardly corresponded to this kind of spicules because they have randomly distributed short spines at terminations and it was difficult to choose between uncinates and ambuncinates. The uncinates 0.547–0.851/0.006–0.007 mm are finely pointed with or without widening in the middle. Basalia are anchorate spicules with pileate serrated discs at terminations. The rhachis of basalia is smooth, 0.030–0.091 mm in diameter. The disc of basalia is 0.148–0.362 mm in diameter. Dermalia and atrialia are pinular pentactines and hexactines. The pinular ray of dermal spicules has usually an apical cone at the outer end while the whole ray has nearly constant thickness. The longest spines are situated in the lower part of the rhachis, the distal ones are short and the outer end freely projects beyond the last spines. The tangential rays are 0.094–0.187/0.0100–0.012 mm. The tangential rays are smooth while the proximal one is rough, they are conically pointed, 0.025–0.090/0.010–0.011 mm. The pinular ray of atrialia is longer than the dermal one, 0.112–0.436/0.019–0.022 mm. It is covered with short spines located in the lower part, the outer end is finely pointed or has an apical cone which freely projects far beyond the last spines. The tangential and distal rays of atrial spicules are rough or smooth with rough terminations, conically pointed, 0.022–0.108/0.015–0.019 mm. Hypodermalia are pentactines with smooth rays and rounded terminations. They have tangential rays 0.243–1.596/0.009–0.091 mm, the proximal ray is usually about 1.5 times longer. Corresponding hypoatrial spicules are absent. Microscleres. Amphidiscs are presented by three size-classes. Macramphidiscs have the smooth shafts, with a whorl of tubercles in the middle. Total length of macramphidisc is 0.223–0.432 mm, the umbel length 0.072–0.162 mm, the umbel diameter 0.054–0.108 mm. Mesamphidiscs and micramphidiscs have irregularly scattered tubercles on the shaft surface. Total length of mesamphidisc is 0.040–0.169 mm, the umbel length 0.011–0.054 mm, the umbel diameter 0.011–0.043 mm. Total length of micramphidisc is 0.010–0.058 mm, the umbel length 0.005–0.018 mm, the umbel diameter 0.006–0.014 mm. Microhexactines predominate pentactines and microtauactines. They have smooth rays 0.054–0.126/0.003 mm with finely pointed terminations.

***Remarks.*** The genus presently contains only one species. The most outstanding feature is presence of the clavule-like basalia with pileate serrated disc, while other genera of Hyalonematidae possess anchor-like basal spicules with four or more teeth. The other noteworthy feature of this genus is its primitive cup-like body form. The uncinates have randomly distributed short spines so it is very difficult to define them exactly as either uncinates or ambuncinates. The basal tuft is likely to be not twisted. Acanthophores were not found in the investigated specimens. Differences between the material examined in spicule dimensions is very minor. All these differences are morphometric, that is, with no other observable morphological differences between specimens that corroborate spicule morphometrics, and hence we conclude that they belong to a single species.

### Distribution

Central Pacific, depth 1530–2747 m.

## ACKNOWLEDGEMENTS

We appreciate contributions of our colleagues Dr. C. Lévi (MNHN), Dr. K. Rützler, Mrs. K. Smith (USNM), Mrs. C. Valentine (BMNH), Dr. R.W.M. Van Soest and Mr. J. Vermeulen (ZMA) for their help in accessing sponge collections and the editorial efforts of Dr. J.N.A. Hooper, particularly with language problems. This project was supported by grants of CNRS, Muséum National d'Histoire Naturelle (Paris), Royal Society of London and the Smithsonian Institution.