*Systema Porifera: A Guide to the Classification of Sponges, Edited by John N.A. Hooper and Rob W.M. Van Soest*
© Kluwer Academic/Plenum Publishers, New York, 2002

# Family Rossellidae Schulze, 1885

**Konstantin R. Tabachnick**

Department of Bottom Fauna, Institute of Oceanology of Academy of Sciences of Russia, Nahimovsky 36, Moscow, Russia.
(tabachnick @mail.ru)

Rossellidae Schulze (Hexactinellida, Lyssacinosida) is revised to contain 22 genera in two subfamilies: Lanuginellinae with seven genera (*Lanuginella, Calycosoma, Doconesthes, Lanugonychia, Lophocalyx, Mellonympha* and *Sympagella*) and Rossellinae with 15 genera and 12 subgenera (*Rossella, Acanthascus: A. (Acanthascus), A. (Rhabdocalyptus), A. (Staurocalyptus), Anoxycalyx: A. (Anoxycalyx), A. (Scolymastra), Aphorme, Asconema, Aulosaccus, Bathydorus, Caulophacella, Caulophacus: C. (Caulophacus), C. (Caulodiscus), Crateromorpha: C. (Crateromorpha), C. (Aulochone), C. (Craterochone)* subgen. nov., *C. (Neopsacas)* subgen. nov., *C. (Caledochone)*, *Hyalascus, Schaudinnia, Scyphidium, Trichasterina, Vazella* and *Vitrollula*. Representatives of the former family Caulophacidae are transferred here to Rossellidae. The subfamily Acanthascinae is abolished and becomes a junior synonym of Rossellinae. Thus, Rossellinae comprises *Rhabdocalyptus* and *Staurocalyptus* which are regarded as subgenera of *Acanthascus*; *Scolymastra* becomes a subgenus of *Anoxycalyx*; *Caulodiscus* a subgenus of *Caulophacus*; and *Aulochone* a subgenus of *Crateromorpha*. Two new subgenera of *Crateromorpha* are described: *Craterochone* subgen. nov. and *Neopsacas* subgen. nov.
**Keywords:** Porifera; Hexactinellida; Lyssacinosida; Lanuginellinae; *Lanuginella*; *Calycosoma*; *Doconesthes*; *Lanugonychia*; *Lophocalyx*; *Mellonympha*; *Sympagella*; Rossellinae; *Rossella*; *Acanthascus*; *Acanthascus (Acanthascus)*; *Acanthascus (Rhabdocalyptus)*; *Acanthascus (Staurocalyptus)*; *Anoxycalyx*; *Anoxycalyx (Anoxycalyx)*; *Anoxycalyx (Scolymastra)*; *Aphorme*; *Asconema*; *Aulosaccus*; *Bathydorus*; *Caulophacella*; *Caulophacus*; *Caulophacus (Caulophacus)*; *Caulophacus (Caulodiscus)*; *Crateromorpha*; *Crateromorpha (Crateromorpha)*; *Crateromorpha (Aulochone)*; *Crateromorpha (Craterochone)* subgen.nov., *Crateromorpha (Neopsacas)* subgen. nov., *Crateromorpha (Caledochone)*; *Hyalascus*; *Schaudinnia*; *Scyphidium*; *Trichasterina*; *Vazella*; *Vitrollula*.

## DEFINITION, DIAGNOSIS & SCOPE

### Synonymy

Rossellidae Schulze, 1885: 447. Asconematidae Gray, 1872a: 458; Topsent, 1892a: 27; 1904b: 40. Crateromorphidae Gray, 1872b: 137. Caulophacidae Ijima, 1903: 78. Sympagellidae de Laubenfels, 1936a: 189. Lanuginellidae Schulze, 1897 (after de Laubenfels, 1936a: 189).

### Definition

Lyssacinosida which usually have hypodermal pentactines, from which develop prostalia (including basalia), when present; dermalia are small spicules; choanosomal skeleton is composed chiefly of diactines.

### Diagnosis

The body is usually cup-like basiphytose or lophophytose; in the pedunculate forms the body can be mushroom-like. Prostalia lateralia, when present, are formed with diactines or outwardly protruding hypodermal pentactines; prostalia basalia, when present, are outwardly protruding hypodermal pentactines which are usually specialised (anchorate). Choanosomal skeleton consists of diactines, sometimes together with less frequent hexactines. Hypodermal pentactines often present, usually they protrude from the dermal surface serving as prostalia. Hypoatrial pentactines are rarely found or absent in some taxa. Dermalia are combinations of various spicules usually pentactines; stauractines and diactines, rarely hexactines. Atrialia are usually hexactines but other holactinoidal spicules can be also found there. Microscleres are various: holactinoidal, asterous and asters, they usually have discoidal, oxyoidal terminations but sometimes floricoidal, onychoidal and sigmoidal ones.

### Scope

22 genera, cosmopolitan in distribution, found at depths from 8–6770 m, with one record supposedly from 7300 m.

### History and biology

The priority of Rossellidae Schulze (1885) over Crateromorphidae Gray (1872b) (never used since its creation) and Asconematidae Gray, (1872a) (not subsequently used since Schulze, 1897) is made in accordance with a submission to the International Commission on the Zoological Nomenclature and in accordance with Article 23.9 of the ICZN (Anon., 2000, ICZN Case 3112).

I have modified the diagnosis after previous authors (Ijima, 1904; 1927; Hartman, 1982) because of some changes in the family scope (see history and discussion).

Rare supplementary oscula may occur in addition to a main one. They develop as a result of growing processes when the main osculum is divided into two units with link of marginal walls (dichotomous branching). Usually these sponges have several (up to four) oscula of different diameter. The secondary fusion of the skeleton in Rossellidae takes place in the lower parts of the body. In tubular or saccular representatives of the family the fusion is represented by the formation of a basidictyonal skeleton, when short-rayed spicules (mainly hexactines) fuse to each other at the points of mutual contact. In the pedunculate forms the same skeleton develops in the basidictyonal plates while the spicules of the peduncle are diactines which fuse into the rigid skeleton by means of synapticular junctions.

Rossellidae was established by Schulze (1885, 1886) for a large number of genera, most of which have remained within this family group up until the present. The diagnosis of Rossellidae was very simple: “The dermalia are always without a distal ray”

Hoo-154.qxd 10/7/04 2:16 AM Page 1442



(Schulze, 1887a). At that time the scope of Rossellidae included 10–11 genera: *Lanuginella; Polylophus* (now *Lophocalyx*); *Rossella; Acanthascus; Bathydorus; Rhabdocalyptus; Crateromorpha; Aulochone; Caulocalyx* (now allocated to Euplectellidae); *Aulocalyx* and *Euryplegma* (both the latter are now allocated to Aulocalycidae). Asconematidae, of which most representatives are now allocated to Rossellidae, was defined by the following diagnosis: "The dermal and gastral skeletons contain pentact or hexact pinuli. The hypodermalia and hypogastralia are pentacts. With parenchymal discohexasters" (Schulze, 1897). The Asconematidae were divided into three subfamilies: Asconematinae (*Asconema; Aulascus* (synonym of *Sympagella*)); Sympagellinae (*Sympagella; Polyrhabdus; Balanites* (two of the latter are synonyms of *Caulophacus*)) and Caulophacinae (*Caulophacus*; *Trachycaulus* (later placed into Euplectellidae)). In 1897 Schulze changed the scope of these taxa. He referred to Asconematidae the following genera: *Asconema, Hyalascus, Caulophacus, Aulascus, Sympagella* and *Saccocalyx*. Rossellidae were divided into Rossellinae (*Bathydorus; Rossella; Crateromorpha; Aulosaccus; Placopegma* (now Euplectellidae); *Aulocalyx* and *Euryplegma*); Lanuginellinae (*Lophocalyx; Mellonympha; Lanuginella; Caulocalyx*) and Acanthascinae (*Acanthascus; Rhabdocalyptus*).

Leucopsacidae was initially defined as a subfamily of Rossellidae. It included *Leucopsacus, Chaunoplectella, Placopegma, Caulocalyx, Aulocalyx* and *Euryplegma* (Ijima, 1897). Creation of the new subfamily did not principally change the situation with Rossellidae but the rest of the subfamilies have become more reliable by removing unsuitable taxa. More significant results were achieved by differ-entiating Leucopsacinae into a separate family Leucopsacidae (*Leucopsacus; Chaunoplectella; Placopegma; Caulocalyx*) and organization of Caulophacidae (*Caulophacus; Sympagella*) instead of Asconematidae (Ijima, 1903). These actions clarified the diagnosis of Rossellidae. The publication of Ijima (1904) was the last principal revision of the definition and scope of Rossellidae until the present. Ijima's publication in 1927 contained a repetition of his earlier scheme: "Lyssacinosa of cup-like or sacciform body; sometimes stalked; generally firmly attached at base and exceptionally rooted by basal processes or by tufts of pentactine basalia. Besides the main terminal osculum, a few secondary formed oscular may occur. Ectosomal skeleton composed of small, rough dermalia with a variable number of rays (generally pentactine, stauractine or rhabdodiactine) and of hypodermalia which are either pentactins of rhabdodiactins, or both. The dermalia, when provided with distal ray as they occasionally are, have that ray much like the rest in appearance and not distinctly pinularly developed. Pentactine hypodermalia often show a tendency to protrude outwards in such a way that the paratangentials form a veil-like covering over dermal surface. Choanosomal megascleres of hexactins and rhabdodiactins, or of the latter only; hexasters various but generally oxyhexaster and discohexaster, but sometimes either of the two or in exclusion of the other. Oxyhexasters often hemihexasterose or quite hexactinoid. Discohexasters may be modified into discoctaster" (Ijima, 1927). Rossellidae were then divided into three subfamilies: Rossellinae (*Rossella; Aulorossella; Gymnorossella; Scyphidium; Vitrollula; Schaudinnia; Crateromorpha; Hyalascus; Anaulosoma; Aulochone; Aulosaccus; Asconema; Trichasterina; Aphorme; Bathydorus; Anoxycalyx; Scolymastra*); Acanthascinae (*Acanthascus; Rhabdocalyptus; Staurocalyptus*) and Lanuginellinae (*Lanuginella; Lanugonychia; Calycosoma; Mellonympha; Lophocalyx*). Only one new genus of Rossellidae – *Symplectella* was described since these revisions, which I consider to belong to the family Euplectellidae.

I agree principally with the scope and definition of the family made by Ijima in his later papers. The indication of close affinities between Rossellidae and Caulophacidae requires allocating all its genera into Rossellidae – an action which is implemented here given that the taxon Caulophacidae has no unique or specific features which distinguish it from Rossellidae (Tabachnick, 1999). Caulophacidae was established by Ijima (1903) by promoting its rank from subfamily Caulophacinae (Schulze, 1886), previously allocated to the family Asconematidae together with the subfamily Sympagellinae. The only feature which may be considered to be specific for Caulophacidae is a sort of stolonial branching of stalks in some representatives of *Caulophacus* and *Sympagella*. But as they have no common cavity system in their tubular stalks they are considered here to consist of fused but separate independent individuals rather than a single organism. Some of these fused sponges arose through settlement of new individuals on the rigid (or probably dead) stalks of other specimens (Tabachnick, 1999). Thus Caulophacidae is abandoned: *Sympagella* is placed into the subfamily Lanuginellinae; and *Caulophacus, Caulodiscus* and *Caulophacella* are placed into Rossellinae. Similarly, Sympagellidae de Laubenfels, 1936a is also synonymised with Rossellidae due to its former association with Caulophacidae and removal of its type species to Rossellidae (Lanuginellinae). The suggestion to change the name Rossellidae to Lanuginellidae (de Laubenfels, 1936a) has no reasonable grounds and is rejected here.

The two subfamilies of Rossellidae, Rossellinae and Lanuginellinae, essentially differ by the presence or absence of strobiloplumicomes, respectively, but this may be a weak division. For example, one species of Lanuginellinae, *Mellonympha mortenseni* (Burton, 1928b; 1954), has no strobiloplumicomes and its position within Lanuginellinae is established only by its otherwise close affinity with a more evident representative of Lanuginellinae – *Mellonympha velata*. Nevertheless, I support the recognition of Lanuginellinae because strobiloplumicomes seem to be distinct from the other microscleres of other Rossellidae.

The subfamily Acanthascinae was established based on a single feature: the presence of discoctasters (Schulze, 1897; 1904; Ijima, 1898; 1904). I consider that this subfamily should be abandoned. 'Discomultiasters', similar to discoctaster spicules, were found in *Caulophacus latus* (see below) and hence the taxonomic importance of this character is doubtful. The lophophytose branching of discoctasters can be seen in many discohexasters of *Caulophacus* (a genus which I consider to belong to the Rossellinae) and *Rossella* (which usually has calycoidal-type of branching that is likely to be close to the lophoidal one). Three previously known genera of Acanthascinae – *Acanthascus, Rhabdocalyptus* and *Staurocalyptus* – are considered here as subgenera of common genus *Acanthascus* (see the remarks on this genus below).

**Differences with similar families**

In most respects Rossellidae is well differentiated from the other Lyssacinosidan families by having hypodermal pentactines, relatively small dermal spicules and presumably diactines as the main choanosomal spicules. The difficult cases concern taxa lacking hypodermal pentactines, but these are resolved by comparing other characters in other closely related taxa. Another difficult case is the genus *Vitrollula* in which the choanosomal skeleton contains considerable hexactines, but this sponge has hypodermal pentactines and its position in the family Rossellidae is unequivocal.

### Previous reviews

These concern descriptions of hexactinellid sponges collected by several expeditions – 'Challenger' (Schulze, 1886; 1887a), 'Valdivia' (Schulze, 1904) – or comprehensive investigations of regional faunas, such as that of the hexactinellid fauna of Japan (Ijima, 1904). Two special publications emphasizing the revision of Rossellidae were published long ago (Schulze, 1897; Ijima, 1898) and many new data have been acquired since that time (e.g., Tabachnick, 1999).

## KEY TO SUBFAMILIES

(1) Strobiloplumicomes absent ..... **Rossellinae**
Strobiloplumicomes present ..... **Lanuginellinae**

## SUBFAMILY ROSSELLINAE SCHULZE, 1885

### Synonymy

Rossellinae Schulze 1885: 451; 1897: 13. Crateromorphidae Gray, 1872b: 173. Asconematidae Gray 1872a: 458; part Schulze, 1886: 44. Part of Caulophacinae Schulze, 1886: 46. Crateromorphinae Schulze 1885: 451. Aulochoninae Schulze 1885: 451 (nomen nudum). Part of Caulophacida Ijima, 1903: 78. Acanthascinae Schulze, 1897: 13. Asconematinae de Laubenfels, 1936a: 190.

### Definition

Rossellidae without strobiloplumicomes among microscleres.

### Diagnosis

See below.

### Scope

15 genera, 4 of which are divided into 11 subgenera, with cosmopolitan distribution, and recorded depths from 8–6770 m (possibly also 7300 m).

### Remarks

The earlier name Crateromorphidae (Gray, 1872b) is suppressed name in favour of Rossellinae (1885) in order to conserve the most common usage (Anon., 2000, ICZN Case 3112). Rossellinae is restricted to the definition above since all the other characters mentioned by Ijima (1904, 1927) exist in the family diagnoses of Rossellidae and Lanuguinellinae. The subfamily Acanthascinae is synonymised here with Rossellinae because the single difference between them, the presence of specific discoctasters, is not so distinct and not considered of primary importance. 'Discomultiaster' spicules were found in *Caulophacus latus* (see the corresponding description). Moreover, I change the status of *Rhabdocalyptus* and *Staurocalyptus* from genera to subgenera of *Acanthascus* (see the description of the genus *Acanthascus*). The genus *Acanthascus* seems to be the closest relative of *Rossella*. The suggestion of de Laubenfels (1936a) to change the name Rossellinae to Asconematinae Gray has no basis and is rejected.

Two genera previously assigned to Caulophacidae, *Caulophacella* and *Caulophacus*, and two subgenera of the latter, *Caulophacus* and *Caulodiscus*, are included in Rossellinae. These genera seem to be close to another pedunculate genus of Rossellinae, *Crateromorpha* with five subgenera. These pedunculate Rossellinae are also similar in the type of dermal and atrial spicules. In *Crateromorpha* dermalia and atrialia are chiefly pentactines; in *Caulophacus* and *Calycosylva* they are pentactines and hexactines with pinular unpaired ray directed outside the body. Atrialia in other Rossellinae are mainly hexactines. It is probable that the pedunculate Rossellinae might be incorporated into a separate subfamily in the future. *Aulochone* is considered here to be a subgenus of *Crateromorpha* as well as two newly described subgenera of *Crateromorpha*. The genus *Scolymastra* is considered to be a subgenus of *Anoxycalyx*.

## KEY TO GENERA AND SUBGENERA OF ROSSELLINAE

(1) Pedunculate (peduncle is long and thin – at least several times longer than body in any direction) ..... 2
Saccular, basiphytose, lophophytose, sometimes with rhizoidal processes (deprived of peduncle) ..... 9
(2) Dermalia and atrialia are chiefly pentactines with unpaired ray directed inside the body ..... ***Crateromorpha*** ..... 3
Dermalia and atrialia are pentactines and hexactines with pinular unpaired ray directed outside the body ..... 7
(3) All microscleres have oxyoidal terminations ..... ***Crateromorpha (Craterochone)***
Microscleres have other types of terminations, besides oxyoidal: discoidal and onychoidal ..... 4
(4) Microscleres with onychoidal terminations ..... 5
Microscleres with onychoidal terminations are absent; microscleres are represented by hexasters, sometimes hemihexasters and microdiscohexasters ..... 6
(5) Microscleres with discoidal terminations absent ..... ***Crateromorpha (Caledochone)***
Microscleres with discoidal terminations present ..... ***Crateromorpha (Neopsacas)***
(6) With hypodermal pentactines ..... ***Crateromorpha (Crateromorpha)***
Without hypodermal pentactines ..... ***Crateromorpha (Aulochone)***
(7) All microscleres have oxyoidal terminations ..... ***Caulophacella***
Microscleres are discoidal, onychoidal, rarely accompanied by spicules having oxyoidal terminations ..... ***Caulophacus*** ... 8
(8) Microscleres are represented by spicules with discoidal terminations ..... ***Caulophacus (Caulophacus)***
Microscleres are represented by spicules with discoidal, onychoidal and rarely oxyoidal terminations ... ***Caulophacus (Caulodiscus)***

(9) Dermalia are pentactines (sometimes hexactines) with the unpaired ray distally directed ..... ***Asconema***
Dermalia are various without distally directed ray (which if it is present is hexactine and not pentactine) ..... 10
(10) All microscleres have oxyoidal terminations (discoidal ones are absent) ..... 11
Microscleres have oxyoidal and discoidal terminations ..... 13
(11) Microscleres are represented by hexactines only (rarely their derivatives with reduced numbers of rays); tangential rays of hypodermal pentactines are spiny ..... ***Aphorme***
Microscleres are represented by combinations of hexasters, hemihexasters and sometimes hexactines; tangential rays of hypodermal pentactines are smooth or rough ..... 12
(12) Pappocomes are present among other oxyoidal microscleres which sometimes have spiny secondary rays ..... ***Trichasterina***
Pappocomes are absent; oxyoidal microscleres have smooth or rough secondary rays ..... ***Bathydorus***
(13) Discohexasters are represented only by microdiscohexasters ..... 14
Discohexasters are presented by two or more types; macrodiscohexasters are always present ..... 17
(14) Choanosomal skeleton composed of a large number of large hexactines; microscleres are hexasters and microdiscohexasters .....***Vitrollula***
Large hexactines are present in the choanosomal skeleton in small numbers or they are entirely absent ..... 15
(15) Dermalia are mainly diactines; hypodermal pentactines are partly with smooth and partly with spiny tangential rays … ***Schaudinnia***
Dermalia are various but mainly pentactines and stauractines ..... 16
(16) Hypodermal pentactines, if present, have tangential orthotropal (regular cross-like) rays ..... ***Hyalascus***
Hypodermal pentactines have paratropal tangential rays ..... ***Vazella***
(17) The largest discohexasters are stellate; the secondary rays are gathered in close tufts (lophoidal or calycoidal) ..... 18
The largest discohexasters are spherical ..... 21
(18) The largest discohexasters are discoctasters with discoidal-tyloidal-floricoidal terminations ..... ***Acanthascus***
The largest discohexasters are calycocomes with discoidal-tyloidal-clavate-rhopaloidal terminations ..... ***Rossella***
(19) Hypodermal pentactines absent ..... ***Acanthascus (Acanthascus)***
Hypodermal pentactines present ..... 20
(20) Tangential rays of at least some hypodermal pentactines have spines ..... ***Acanthascus (Rhabdocalyptus)***
Tangential rays of hypodermal pentactines never have spines, being smooth or rough ..... ***Acanthascus (Staurocalyptus)***
(21) The largest discohexasters have strobiloidal primary rays and secondary rays of different length; pappocomes are always present; other spicules with oxyoidal terminations may be present ..... ***Anoxycalyx*** ... 22
The largest discohexasters are spherical forms in which primary rays are not strobiloidal ..... 23
(22) Dermalia are stauractines and pentactines ..... ***Anoxycalyx (Anoxycalyx)***
Dermalia are mainly hexactines ..... ***Anoxycalyx (Scolymastra)***
(23) The largest spherical discohexasters or discasters have numerous secondary rays ..... ***Aulosaccus***
The largest spherical discohexasters have usual shape with restricted number of secondary rays ..... ***Scyphidium***

## *ROSSELLA* CARTER, 1872

### Synonymy

*Rossella* Carter, 1872a: 409. *Aulorossella* Kirkpatrick, 1907b: 14. *Anaulosoma* Kirkpatrick, 1907b: 20; Burton, 1929: 411. *Gymnorossella* Topsent, 1916: 164; 1917: 22; Burton, 1929: 413; 1932: 257. Part of *Acanthascus – A. dubius* Schulze, 1886: 49; 1887a: 147; *A. grossularia* Schulze, 1886: 49; 1887a: 145; 1897: 536.

### Type species

*Rossella antarctica* Carter, 1872a: 409 (by monotypy).

### Definition

Saccular Rossellinae with calycocomes among microscleres.

### Diagnosis

Body is saccular, thick-walled, basiphytose or lophophytose. Choanosomal skeleton is composed of diactines and rarely accompanied by hexactines. Hypodermal spicules are pentactines which can be differentiated into anchorate (which serve basalia) and commonly with paratropal and orthotropal tangential rays. Prostalia lateralia if present are monaxons and sometimes outward protruding hypodermal pentactines. Dermalia are usually pentactines or combinations of them with stauractines and hexactines. Atrialia are mainly hexactines, rarely together with pentactines or diactines. Microscleres have discoidal, tyloidal, rhopaloidal, oxyoidal rarely onychoidal terminations. Calycocomes always present, and are often accompanied by spherical 'mesodiscohexasters', discohexactines and microdiscohexasters. Oxyoidal spicules are combinations of hexasters, hemihexasters, hexactines and rarely other holactinoidal spicules.

### Desription of type species

*Rossella antarctica* Carter, 1872a (Figs 1–3).

***Synonymy.*** *Rossella antarctica* Carter, 1872a: 409. ? Part of *Acanthascus – A. dubius* Schulze, 1886: 49; 1887a: 147; *A. grossularia* Schulze 1886: 49; 1887a: 145; 1897: 536.

***Material examined.*** Lectotype: BMNH 1894.09.20.001a – Antarctica expedition, Ross Sea, 77°50′S, 175°W, depth 550 m. Paralectotype: BMNH 1894.09.20.001b – same locality.

***Description.*** The body is spherical or ovoid with its upper part of the largest diameter. The osculum is relatively large and deep. The dermal surface is sometimes covered with irregularly distributed conules. Prostalia oscularia of diactines (when present) are distributed at some distance from the oscular margin. Prostalia

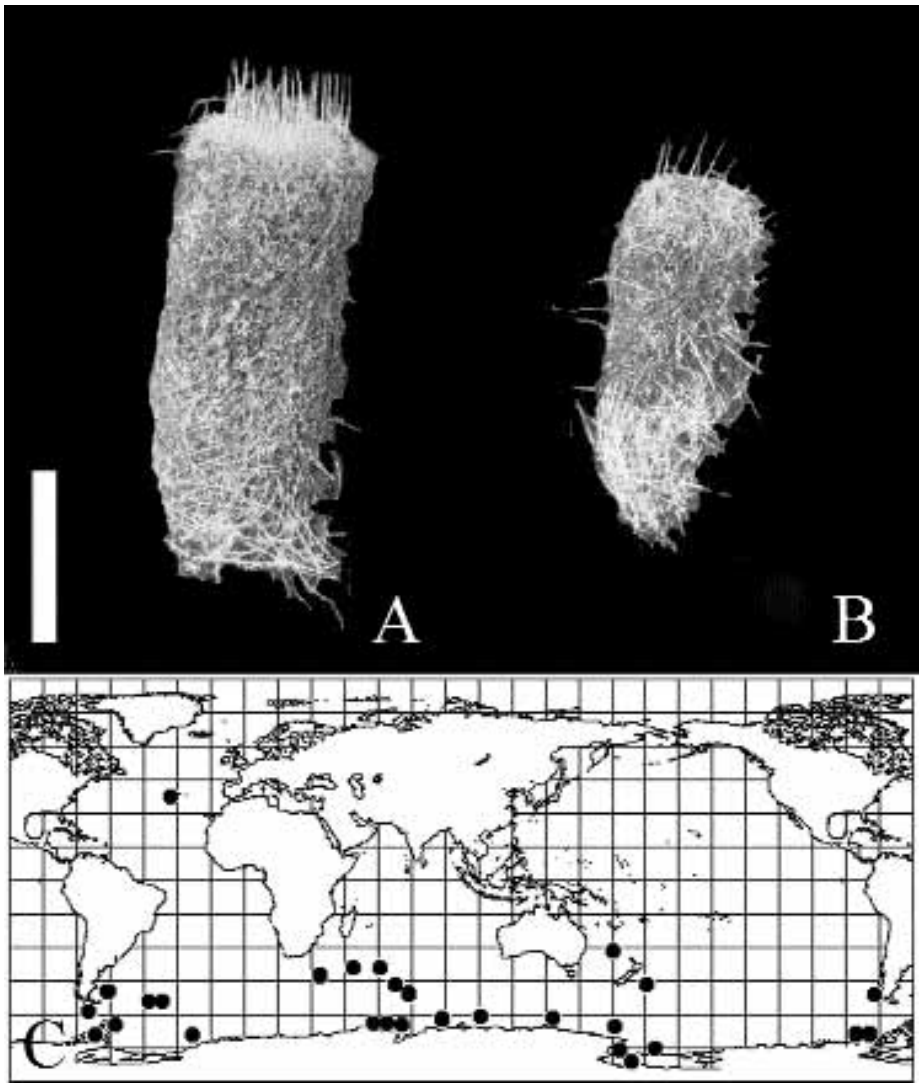


**Fig. 1.** *Rossella antarctica*. External shape. A, lectotype. B, paralectotype (scale 20 mm). A–B, after Schulze & Kirkpatrick (1911). C, distribution of *Rossella*.

lateralia (when present) are composed of combinations of outwardly protruding hypodermal pentactines and diactines. Prostalia oscularia and lateralia protrude at about 10–20 mm. This species is usually lophophytose – with a large tuft of basal anchorate hypodermal pentactines – or sometimes basiphytose with rare basalia. The largest known specimens reach 300 mm long and 150 mm in diameter (Barthel & Tendal, 1994). The lectotype is about 55 mm long and 13 mm in diameter, with osculum about 8 mm in diameter; prostalia oscularia protrude at about 8 mm, prostalia basalia protrude 10 mm. Paralectotype is 22 mm long, 6 mm in diameter, with osculum 4 mm in diameter; prostalia oscularia 5 mm long, prostalia basalia 15 mm long. Spicules. The choanosomal skeleton is composed of diactines from 0.75 mm long and 0.008–0.012 mm in diameter. These spicules have rounded or conically pointed, usually rough terminations and hardly distinguishable widening in the middle. Diactines of prostalia are 5–7/0.05–0.09 mm. They have conically pointed, smooth terminations and stout shafts. The other short diactines are reduced atrial spicules. Hypodermal pentactines of different types were found in the type specimens. They can have tangential rays paratropal smooth; paratropal rough; paratropal rough with spines; with orthotropal tangential rays and anchorate basalia. The anchorate basalia are modified hypodermal pentactines with short tangential rays curved in an anchor-like manner. They have proximal ray about 25 mm long and 0.055–0.060 mm in diameter, tangential rays are 0.2–0.5 mm long. The other types of hypodermal pentactines have tangential rays 0.7–5.0/0.008–0.065 mm, the proximal ray is 0.9–7.0/0.008–0.080 mm. Dermalia are pentactines, stauractines and rarely hexactines. Pentactines and stauractines often have a rudimentary rays. The dermal spicules have rays 0.046–0.129/ 0.010 mm, they are covered with numerous short spines and have rounded terminations. Atrialia are mostly hexactines with rays 0.084–0.355/0.011 mm. They are less spiny than the dermal spicules and most of the spines are situated in the distal part, their terminations are conically pointed. Sometimes it is possible to find spicules which are atrial diactines. They are 0.30–0.46/ 0.006–0.008 mm with conically pointed terminations and a widening in the middle or four rudimentary tubercles. These spicules are entirely covered with short spines or are rough. Length and shape these diactines are very similar to atrial hexactines. Microscleres. Microscleres are calycocomes (rarely calycocomes with five or four principal rays), microdiscohexasters, hemihexasters, hexactines,

Hoo-154.qxd 10/7/04 2:16 AM Page 1446



rarely hexasters, pentactines, stauractines and hemionychohexasters. Calycocomes are 0.054–0.104 mm in diameter with primary rays 0.018–0.036 mm in diameter. Rarely it is possible to find calycocomes with five or four principal rays, sometimes their principal rays have short curved processes (spines). The secondary rays of the calycocomes are smooth, the terminations are mostly tyloidal or clavate, rarely in the largest calycocomes they are discoidal – toothed. Only a single microdiscohexaster was found (measurements are mainly taken from the redescription of type specimens of Schulze & Kirkpatrick, 1911). The microdiscohexasters are 0.036–0.070 mm in diameter, the diameter of their primary rays is 0.015–0.018 mm. The hemionychasters (figured for *R. antarctica* (Schulze & Kirkpatrick, 1911)), have rays which are divided into several secondary rays which are calycoidal in shape. Spicules with oxyoidal terminations are mainly hemihexasters and hexactines, rarely hexasters, pentactines or stauractines. These spicules have rough secondary rays. The hexasters and hemihexasters are 0.086–0.144 mm in diameter, with primary rosette 0.007–0.018 mm in diameter. The hexactines are 0.086–0.166 mm in diameter.

***Remarks.*** The genus contains at least 8 species but this requires further revision. Although a revision of Antarctic species was recently completed, comprising most of the known representatives of *Rossella* (Barthel & Tendal, 1993), the scope and synonymy of most species are still unclear. For example, I do not agree with their proposed synonymy between *Rhabdocalyptus australis* (Topsent, 1901c,d) and *Rossella antarctica* because the former has discoctasters – spicules which are characteristic of *Acanthascus* (to which *Rhabdocalyptus* belongs as subgenus). The data on distribution of *R. antarctica* off South Africa (Uriz, 1988; Barthel & Tendal, 1993) is also doubtful. Their record probably refers to a species of *Rhabdocalyptus* – possibly *A. (Rhabdocalyptus) lophodigitatus* – as is obvious from their photograph (Uriz, 1988: pl. 28c) where a real discoctaster is shown. However, as for the scope of *Rossella* I agree with Barthel & Tendal (1993) on the synonymy between *Rossella, Aulorossella, Gymnorossella* and *Anaulosoma*. All nominal species in this genus require further revision through re-examination of all type material.

The external shapes of *Rossella* are highly variable, even within a single species. Lophophytose and basiphytose sponges may or may not have rhizophytose appendages in the lower part of the body. Prostalia lateralia may be absent or formed by diactines or outwardly protruding hypodermal pentactines, or by both types of spicules.

Calycocomes of *R. antarctica* are very similar to lophodiscohexasters. Some of these spicules are represented by forms in which only four primary rays are present so the primary rosette consists of stauractines or paratetractines. The terminations of most calycocomes of *R. antarctica* have tyloidal terminations. Calycocomes and 'hemicalycocomes' spicules (in which some primary rays have a single secondary ray) have been described for *R. gaussi* (Schulze & Kirkpatrick, 1911) (now incomprehensibly ascribed to a new taxon *R. vitiosa* Wiedenmayer in Hooper & Wiedenmayer, 1994).

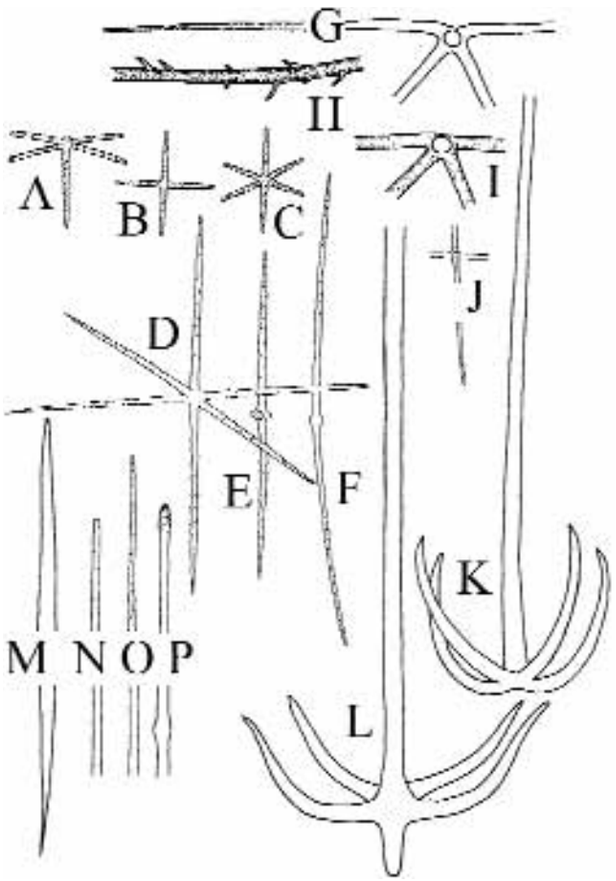


**Fig. 2.** *Rossella antarctica* spicules. A, dermal pentactine 185×. B, dermal stauractine 185×. C, dermal hexactine 185×. D, atrial hexactine 185×. E–F, atrial diactines 185×. G–J, hypodermal pentactines including forms which can serve as prostalia lateralia and its rays 90×. K–L, hypodermal pentactines which serve prostalia basalia 90×. M, prostalia lateralia 90×. N–P, choanosomal diactines 185×. A–C, K–L, from Schulze & Kirkpatrick (1911). D–J, M–P, BMNH 1894.09.20.001a.

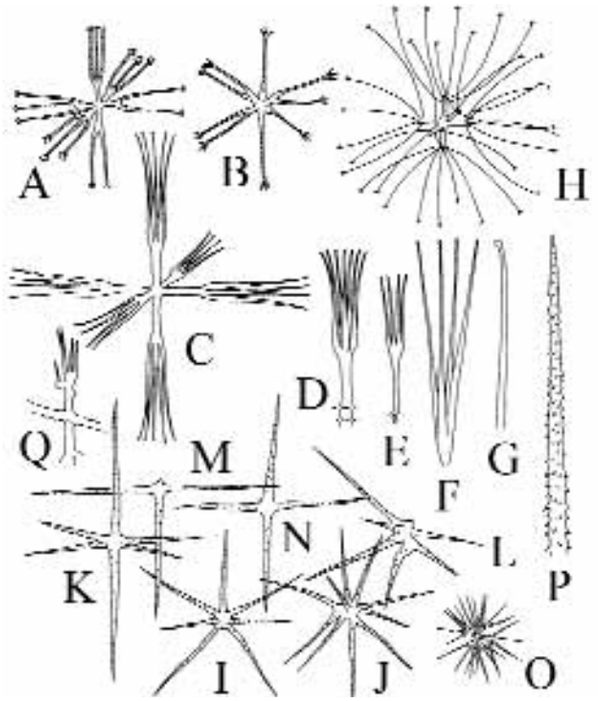


**Fig. 3.** *Rossella antarctica* spicules. A, large calycocome with toothed discs 330×. B, hemionychohexaster 330×. C–F, calycocome and their secondary rays 660×. G, secondary ray of calycocome 1300×. H, microdiscohexaster 660×. I–J, hemihexasters 330×. K, hexactine 330×. L, abnormal oxyoidal spicule 330×. M, tauactine 330×. N, stauractine 330×. O, hexaster 330×. P, secondary ray of oxyoidal spicules 1300×. Q, fragment of 'calycocome' with four principal rays and deformed secondary rays 660×. A–F, H, O, from Schulze & Kirkpatrick (1911). G, I–N, P–Q, BMNH 1894.09.20.001a.

Probable derivatives of calycocomes, simple discohexactines, are known in *R. gaussi* and *R. podagrosa*. Abnormal calycocomes were found in *R. ijimai* (Dendy, 1924). Hemionychaster were figured for *R. antarctica* (Schulze & Kirkpatrick, 1911), with rays divided into several secondary rays and having calycoidal shape. Other discohexasters are usually represented by two spherical forms: large mesodiscohexasters and small microdiscohexasters. The mesodiscohexasters have many derivatives up to discohexactines in *R. gaussi*. Discasters exist instead of mesodiscohexasters in *R. nodastrella* off the Azores (Topsent, 1915a; 1928c). *Rosella ijimai* is deprived of spherical discohexasters. Mesodiscohexasters are probably absent in some species. The microdiscohexasters are often in the form of anisodiscohexasters with secondary rays of different length and sometimes with discs of two different diameters situated at different levels on each principal. Sometimes microdiscohexasters may be divided into two forms with many secondary rays.

Combinations of hexasters and hemihexasters are usually dominant over other microscleres with oxyoidal terminations. Hexactines are found in some species. Other holactinoidal spicules, tetractines, triactines and diactines, have been described only for *R. fibulata* (Schulze & Kirkpatrick, 1911). Abnormal derivatives of oxyoidal spicules – irregular microscleres with curved rays – are known in *R. ijimai* (Dendy, 1924).

*Rossella antarctica* is restricted here to the description of the type specimens, while alleged spicule variation requires further investigations as does the status of the several nominal subspecies and varieties of sponges as partly listed above.

**Distribution**

Antarctica and subantarctic, off southern South America, off the Azores, depth range 8–2000 m.

## *ACANTHASCUS* SCHULZE, 1886

**Synonymy**

*Acanthascus* Schulze, 1886: 49. *Acanthosaccus* Schulze, 1899: 65; Mehl, 1992: 92. Part of *Bathydorus* – *B. dawsoni* Lambe, 1892: 73. Part of *Rossella* – *R. antarctica* Uriz, 1988: 26. *Rhabdocalyptus* Schulze, 1886: 51. *Staurocalyptus* Ijima, 1897: 53.

**Type species**

*Acanthascus cactus* Schulze, 1886 (by subsequent designation; Koltun, 1967).

**Definition**

Saccular Rossellinae with discoctasters and discasters.

**Diagnosis**

The body is saccular, basiphytose, sometimes dichotomously branching once or twice. Hypodermal spicules, when present, are orthotropal or paratropal pentactines which can serve as prostalia lateralia. Choanosomal skeleton is composed of diactines. Dermalia are combinations of stauractines, pentactines, hexactines and diactines. Atrialia are mainly hexactines but in some species pentactines are dominant. Microscleres are discoctasters often combined with microdiscohexasters (sometimes discasters) and various combinations of oxyoidal spicules usually hexasters, hemihexasters, hexactines and sometimes asters.

**Remarks**

37 species and 5 subspecies have been described for the genus. During the preparing of this revision it became obvious that all genera previously assigned to Acanthascinae (*Acanthascus, Rhabdocalyptus* and *Staurocalyptus*) belong to a single genus. All these nominal genera differ only in their hypodermal pentactines: their presence or absence, and the presence or absence of spines on their tangential rays. These features do not seem to be sufficient enough to differentiate taxa at the generic level. Moreover, some of the spicules of *Rhabdocalyptus* as well as all hypodermal pentactines of *Staurocalyptus* have no spines at all. As for presence and absence (in *Acanthascus*) of hypodermal pentactines, this feature was considered to be very important by Ijima (1904), with only three genera of Rossellidae characterised by this feature (*Aulochone; Aulosaccus* and *Acanthascus*). Irrespective, Ijima described in the same paper a species of *Hyalascus* (*H. mitsukuri*) which had no hypodermal pentactines contrary to other species in the genus, and subsequently hypodermal pentactines were described for three other species of *Aulosaccus* (*A. albatrossi* (Okada, 1932); *A. fisuratus* (Okada, 1932) and *A. schulzei* (Koltun, 1967)). Further, these spicules may be present or absent in individuals of *A. schulzei* (Koltun, 1967). Thus, the presence or absence of hypodermal pentactines in Rossellidae varies both intra- and interspecifically. These facts support uniting the genera *Crateromorpha* and *Aulochone*, and similarly with *Acanthascus, Rhabdocalyptus* and *Staurocalyptus*. Moreover, the latter three genera contain numerous species that display parallel variation throughout many other features (e.g., the number of rays in dermal spicules; presence and absence of microdiscohexasters; variation of oxyoidal spicules; etc.), and warrant their demotion to subgenera of *Acanthascus*. Choosing priority between the two genera *Acanthascus* and *Rhabdocalyptus* it is proposed to accept the former as synonym since the subfamily Acanthascinae, established before this publication, had the same type genus, and *Acanthascus* is also described several pages before *Rhabdocalyptus*.

Large hexactines were never found among the choanosomal spicules of this genus.

**Distribution**

N Pacific, off S Africa, Antarctic ocean (Fig. 4), depth 10–2440 m.

## *ACANTHASCUS (ACANTHASCUS)* SCHULZE, 1886

**Synonymy**

*Acanthascus* Schulze, 1886: 49.

**Type species**

*Acanthascus cactus* Schulze, 1886 (by subsequent designation; Koltun, 1967).

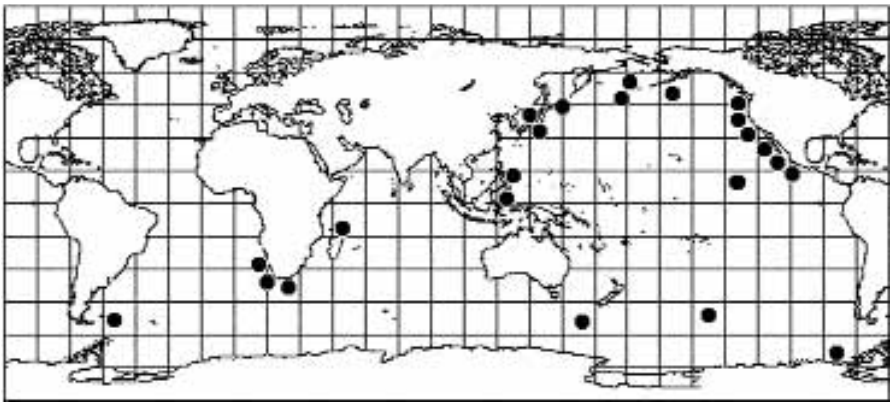

**Fig. 4.** Distribution of *Acanthascus*.

**Definition**

*Acanthascus* without any hypodermal pentactines.

**Diagnosis**

Refer to generic diagnosis and subgeneric definition.

**Description of type species**

*Acanthascus (Acanthascus) cactus* Schulze, 1886 (Fig. 5).

***Synonymy.*** *Acanthascus cactus* Schulze, 1886: 49.

***Material examined.*** Holotype: not seen, off Enoshima, Japan. Other material. BMNH (1894.07.06.007; 1896.06.27.004; 1898.12.19.026; 1921.11.05.004; (b660); (b662); (b664)) – off Japan. MNHN (p4674) – off Japan. USNM 22115, (kt 1470) – 'Albatross', stn. 5088, 35° 11.25′ N 139° 28.20′ E, depth 675–741 m. USNM (kt 789) – 'Albatross', stn. 3697, location unknown.

***Description.*** The body is vase-like with large osculum, basiphytose. Many specimens have one osculum but some are dichotomously branching with three to four oscula and a common atrial cavity. These sponges are from 30–44 mm to 432 mm long or even larger (Ijima, 1904), with walls about 10 mm thick. The prostalia lateralia are located in numerous conules usually situated in the lower part of the body they form tufts or are presented by solitary diactines. In the largest specimens these conules obtain 25 mm length while prostalia lateralia protrude about 20 mm or more. The holotype is 90 mm long, about 47 mm in maximum diameter, with osculum about 200 mm in diameter, the conules are about 3 mm long, prostalia lateralia protrude about 15 mm from the surface. Spicules. The choanosomal skeleton is composed of diactines. The principal diactines are 3–15/0.006–0.300 mm. Their terminations are rough and rounded or smooth and conically pointed. Two to four rudimentary tubercles are usually found in the middle of the choanosomal diactines. Prostalia are diactines which are longer than the choanosomal ones, they reach 25 mm or more. Dermalia are stauractines, sometimes pentactines. Their rays are rough with rounded terminations. The tangential rays of dermal stauractines and pentactines are 0.084–0.198/0.007–0.010 mm, the proximal ray of pentactines is 0.061–0.152 mm long. Atrialia are pentactines, but rarely stauractines, tauactines and diactines can be found. Their rays are also rough with rounded or slightly clavate terminations. The tangential rays of atrial pentactines are 0.053–0.160/0.008–0.010 mm, the distal ray is 0.046–0.144 mm long. Microscleres. Microscleres are discoctasters (rarely 'discomultiasters'), discasters, microdiscohexasters, hexasters, hemihexasters and rare hexactines and asters (some oxyoidal spicules can have some terminations onychoidal). Discoctasters are of two size-classes one of which is located in the vicinity of the dermal layer, the other is close to the atrial one. Although these discoctasters overlap in their dimensions their different modal distributions suggest there are two size classes. Diameter of dermal discoctaster is 0.076–0.137 mm, diameter of their primary rosette is 0.032–0.068 mm. Diameter of atrial discoctaster is 0.119–0.288 mm in diameter, diameter of their primary rosette is 0.043–0.112 mm. The discs of these spines are toothed, the surface of secondary rays is slightly spiny. In some specimens it is possible to find rare discostauraster which have central parts similar to common discoctasters. Microdiscohexasters are 0.013–0.018 (0.015–0.025) mm in diameter (according to Ijima, 1904), with primary rosette 0.006–0.009 mm in diameter. In some specimens they were absent or rare. These spicules are mostly located in the vicinity of dermal and sometimes of atrial surfaces. The hemihexasters, hexasters, hexactines and asters are 0.072–0.162 mm in diameter, with primary rosette 0.007–0.018 mm in diameter. These spicules have numerous short spines on their secondary rays. Sometimes hemihexasters and hexasters have some secondary rays with onychoidal terminations. Stauractines are rarely found.

***Remarks.*** The subgenus presently contains 6 species and 2 subspecies. Following reorganization of Acanthascinae the genus *Acanthascus* sensu Schulze & Ijima is transferred to *A. (Acanthascus).* The record of *A. nealus* de Laubenfels, 1942 from Greenland is doubtful given that typical discoctasters were absent with discohexasters described instead. Re-examination of the type material (USNM 23263, several specimens) found it to be a mixture of several specimens of Rossellidae (*Schaudinnia rosea* and *Anoxycalyx (Anoxycalyx) laceratus*). However, abolishing this species as an 'amalgam' of taxa, presents nomenclatural difficulties (see the corresponding genera), requiring the nominal taxon to be synonymised with two genera and species simultaneously, moreover one of them – *A. (Anoxycalyx) laceratus* – was described much later (Koltun, 1967).

Dermalia are pentactines in *A. (Acanthascus) alani* (Ijima, 1898; 1904; Koltun, 1967); *A. (Acanthascus) mitis* (Koltun, 1967); *A. (Acanthascus) platei* (Schulze, 1899) (probably together with hexactines) and *A. (Acanthascus) sacculus* (Hernandez, 1932b) (with some stauractines). Stauractines are common in *A. (Acanthascus) pachyderma* (Okada, 1932) and together with pentactines in *A. (Acanthascus) cactus*. Atrialia are stauractines and pentactines in *A. (Acanthascus) sacculus* and pentactines with

Hoo-154.qxd 10/7/04 2:16 AM Page 1449



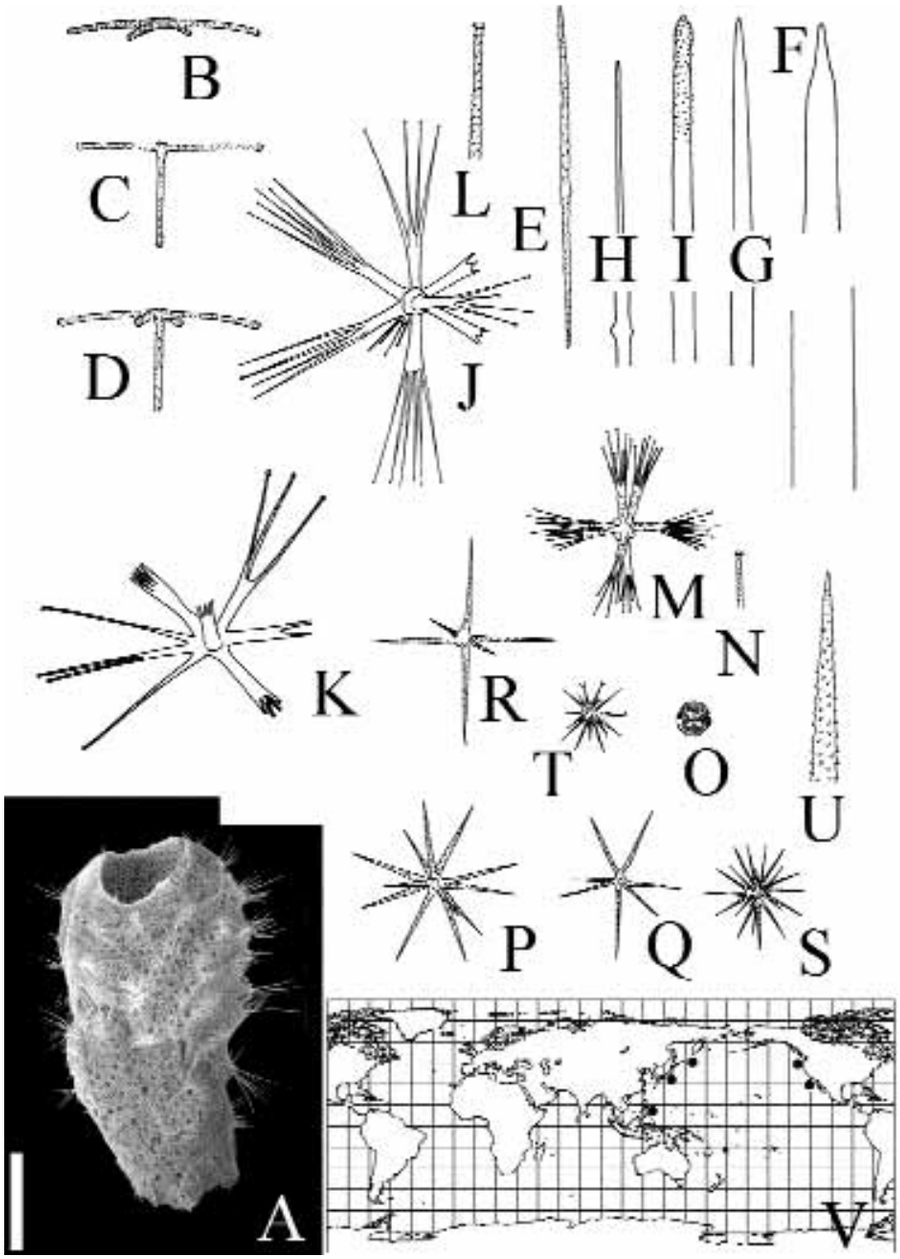


**Fig. 5.** *Acanthascus (Acanthascus) cactus*. A, external shape (after Schulze, 1887a) (scale 20mm). B, dermal stauractine 130×. C, dermal tauactine 130×. D, atrial pentactine 130×. E, atrial diactine 130×. F–G, prostal diactines 65×. H–I, choanosomal diactines 130×. J, atrial discoctaster 250×. K, discomultiaster 250×. L, its secondary ray 1000×. M, dermal discoctaster 250×. N, its secondary ray 1000×. O, microdiscohexaster 500×. P, hexaster 250×. Q, hemihexaster 250×. R, hexactine 250×. S, hexaster 250×. T, onychaster 250×. U, oxyoidal secondary ray 1000×. B, D, J, M, O–T, from Ijima (1904). C, F-I, USNM (kt 1470). E, K–L, N, U, BMNH 1921.11.05.004. V, distribution of *Acanthascus (Acanthascus)*.

and pentactines in *A. (Acanthascus) sacculus* and pentactines with some hexactines in *A. (Acanthascus) cactus*. Microdiscohexasters are common for most species of this subgenus except *A. (Acanthascus) alani profundum* (Koltun, 1967) where they were not described. Oxyoidal microscleres vary between different species. The most peculiar features of oxyoidal spicules are found in *A. (Acanthascus) alani profundum* – presence of spines; in *A. (Acanthascus) mitis* – hexactines derivatives – stauractines and other irregular spicules and in *A. (Acanthascus) cactus* some onychoidal terminations can be found in some mostly oxyoidal spicules.

**Distribution**

N Pacific, depth 117–2440 m. The type species is distributed off Japan, depth 220–675 m.

### *ACANTHASCUS (RHABDOCALYPTUS)* SCHULZE, 1886

**Synonymy**

*Rhabdocalyptus* Schulze, 1886: 51. Part of *Acanthosaccus* – *A. tenuis* Schulze, 1899: 65; Mehl, 1992: 92. Part of

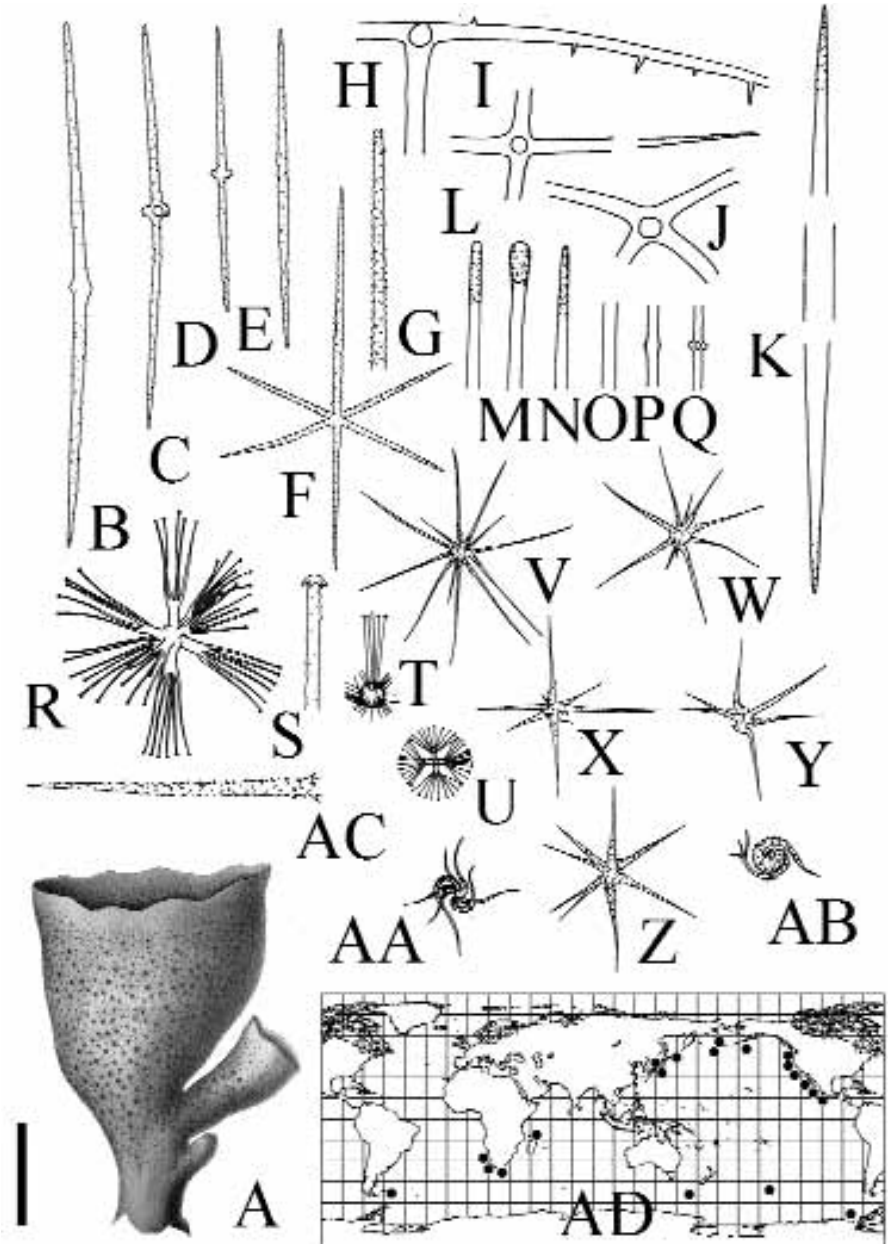


**Fig. 6.** *Acanthascus (Rhabdocalyptus) mollis*. A, external shape (after Schulze, 1887a) (scale 100 mm). B–E, dermal diactines 130×. F, atrial hexactine 130×. G, its distal ray 130×. H–J, hypodermal 65×. K, prostal diactine 65×. L–Q, terminations and central parts of choanosomal diactines 130×. R, discoctaster 250×. S, its secondary ray 1000×. T, discasters 250×. U, microdiscohexaster 500×. V–W, hemihexasters 250×. X–Z, hexactines 250×. AA–AB, curved hexactines 250×. AC, secondary ray of oxyoidal spicule 1000×. B–Q, S–U, AC, BMNH 1896.06.27.005. R, V–Z, from Ijima (1904). AA–AB, from Schulze (1887a). AD, distribution of *Acanthascus (Rhabdocalyptus)*.

*Bathydorus* – *B. dawsoni* Lambe, 1892: 73. Part of *Rossella* – *R. antarctica* Uriz, 1988: 26.

### Type species

*Rhabdocalyptus mollis* Schulze, 1886 (by subsequent designation; Koltun, 1967).

### Definition

*Acanthascus* with at least part of hypodermal pentactines having spines on their tangential rays.

### Diagnosis

Refer to generic diagnosis and subgeneric definition.

### Description of type species

*Acanthascus (Rhabdocalyptus) mollis* Schulze, 1886 (Fig. 6).

***Synonymy.*** *Rhabdocalyptus mollis* Schulze, 1886: 51.

***Material examined.*** Syntypes (2 specimens): unavailable, Sagami Bay, depth 500 m. Other material. BMNH 1896.06.27.005 – off Japan. MNHN (p3817) – same locality.

***Description.*** The body is vase-like, basiphytose. Many representatives including one from the type series are dichotomously branching and have 2–4 oscula and a common atrial cavity. The sponges are 130–350 mn long and 80–200 mm in diameter, with walls 6–10 mm thick. Schulze (1887a) described two type specimens, both of which are presently unknown. Spicules. The choanosomal skeleton is composed of thick and thin diactines. The former are up to 20/0.09 mm, with even shafts deprived of widening and with conically pointed slightly rough terminations. The smaller choanosomal diactines are thinner being 0.004–0.007 mm in diameter. The terminations of choanosomal diactines are rough, they vary in shape being rounded, conically pointed or clavate. They are even or rarely with a widening or four rudimentary tubercles in the middle. These spicules undergo the common synapticular fusion in the lower part of the body together with basidictyonal hexactines which usually form the basal skeleton in Rossellidae. The hypodermal pentactines usually have paratropal tangential rays but orthotropal ones are also common. Most tangential rays of hypodermal pentactines have spines but they may also have a rough surface or be entirely smooth. Tangential rays are up to 5 mm long, proximal ray is up to 10 mm, they are 0.009–0.013 mm in diameter. The terminations of the rays of hypodermal pentactines are conically pointed, slightly rough. Dermalia are mainly diactines but stauractines, pentactines, tauactines and monactines also occur. The diactines are entirely short-spiny, they have rounded or conically pointed terminations and shafts even or with a widening or two-four rudimentary tubercles in the middle. The dermal diactines have rays 0.122–0.380/0.009–0.015 mm. Atrialia are hexactines with spiny rays. The terminations of atrial spicules are usually conically pointed but sometimes proximally directed rays are nearly pinular with rounded terminations. The rays of atrial hexactines are 0.114–0.258/0.011–0.015 mm (the proximal ray is usually longer than the other ones). Microscleres. Microscleres are discoctasters, microdiscohexasters, hexasters, hemihexasters, hexactines and asters. Discoctasters are 0.094–0.175 mm in diameter, with primary rosette 0.022–0.047 mm in diameter. Their discs are toothed, the surface of secondary rays is slightly rough or spiny. Some discaster spicules resembling discoctasters were observed. Discasters have spherical central part from which several tufts of secondary rays begin (no organization into a common unit in their basal part of secondary rays was observed). These spicules differ strongly from the discoctasters in dimensions. The discasters are 0.076–0.083 mm in diameter with central spherical part 0.011 mm in diameter. Microdiscohexasters are 0.018–0.027 mm in diameter, with primary rosette 0.004–0.009 mm in diameter. They are rare and located mostly near the dermal surface. The hemihexasters, hexasters, hexactines and asters are 0.090–0.160 mm in diameter, with primary rosette 0.007–0.018 mm in diameter (when present). These spicules often have spines at the basal parts of secondary rays. Sometimes it is possible to find such spicules with abnormally curved rays, reduced in number.

***Remarks.*** The subgenus presently contains 16 species and 3 subspecies. *Rhabdocalyptus* is allocated as a subgenus of *Acanthascus* for reasons described for *Staurocalyptus*. Since the only difference between the three genera of Acanthascinae concern the state of hypodermal pentactines I do not propose to expanded diagnoses for this subgenus or the other subgenera.

The monotypic *Acanthosaccus* was synonymised with *Rhabdocalyptus* by Ijima (1904) with the single difference – presence of hexactines only among the oxyoidal microscleres in *A. tenuis* – considered not to be important at the generic-subgeneric level. In most species hypodermal spicules consist only of paratropal spiny pentactines, but closer investigation of some species found that hypodermal pentactines usually vary from paratropal to orthotropal tangential rays, and spicules characteristically with spines on the tangential rays may in fact be devoid of them. Dermalia consist of various combinations of diactines, stauractines, pentactines, and also hexactines and monactines.

Discoctasters are always present but in some species they are accompanied by abnormal forms in *A. (Rhabdocalyptus) mirabilis* (Schulze, 1899); discasters in *A. (Rhabdocalyptus) monstraster* (Tabachnick, 1994) and *A. (Rhabdocalyptus) mollis*. The discoctasters have discoidal or floricoidal secondary rays. The latter, called floricoctasters, are reported from *A. (Rhabdocalyptus) unguiculatus* (Ijima, 1904) and *A. (Rhabdocalyptus) bidentatus* (Okada, 1932) (these species were synonymised by Koltun, 1967)). Microdiscohexasters appear to be absent in the following species: *A. (Rhabdocalyptus) asper* (Schulze, 1899); *A. (Rhabdocalyptus) australis* (Topsent, 1901c,d); *A. (Rhabdocalyptus) lophodigitatus* = *plumodigitatus* (Kirkpatrick, 1901; 1902); *A. (Rhabdocalyptus) monstraster* (Tabachnick, 1994) and *A. (Rhabdocalyptus) tener* (Schulze, 1899). Oxyoidal spicules vary in most species of this subgenus, usually from hexasters to hexactines, but other combinations are also possible.

**Distribution**

N Pacific and Antarctic, off S Africa and off Madagascar, depth 10–2250 m.

### *ACANTHASCUS (STAUROCALYPTUS)* IJIMA, 1897

**Synonymy**

*Staurocalyptus* Ijima, 1897: 53. Part of *Rhabdocalyptus* – *R. dowlingii* Lambe, 1893: 37; 1900: 165; Schulze, 1897: 35 and *R. roeperi* Schulze, 1886: 51; 1887a: 158, 1897: 34.

**Type species**

*Acanthascus (Staurocalyptus) glaber* Ijima, 1897 (here designated). The type species is hereby replaced, in accordance to the principles of the ICZN, to designate *S. glaber*, Ijima, 1897 (Anon., 1999, ICZN Case 3104), and this sense of *Staurocalyptus* is adopted here. The previous type species, subsequently designated by Koltun (1967), *S. dowlingi* (Lambe, 1892), is a doubtful representative of *Staurocalyptus* and moreover its definition as type species contradicts some Articles of the Code (69b(8); 70b).

**Definition**

*Acanthascus* with hypodermal pentactines of which the tangential rays have no spines but are smooth or minutely, uniformly rough.

**Diagnosis**

Refer to generic diagnosis and subgeneric definition.

**Description of type species**

*Acanthascus (Staurocalyptus) glaber* Ijima, 1897 (Fig. 7).

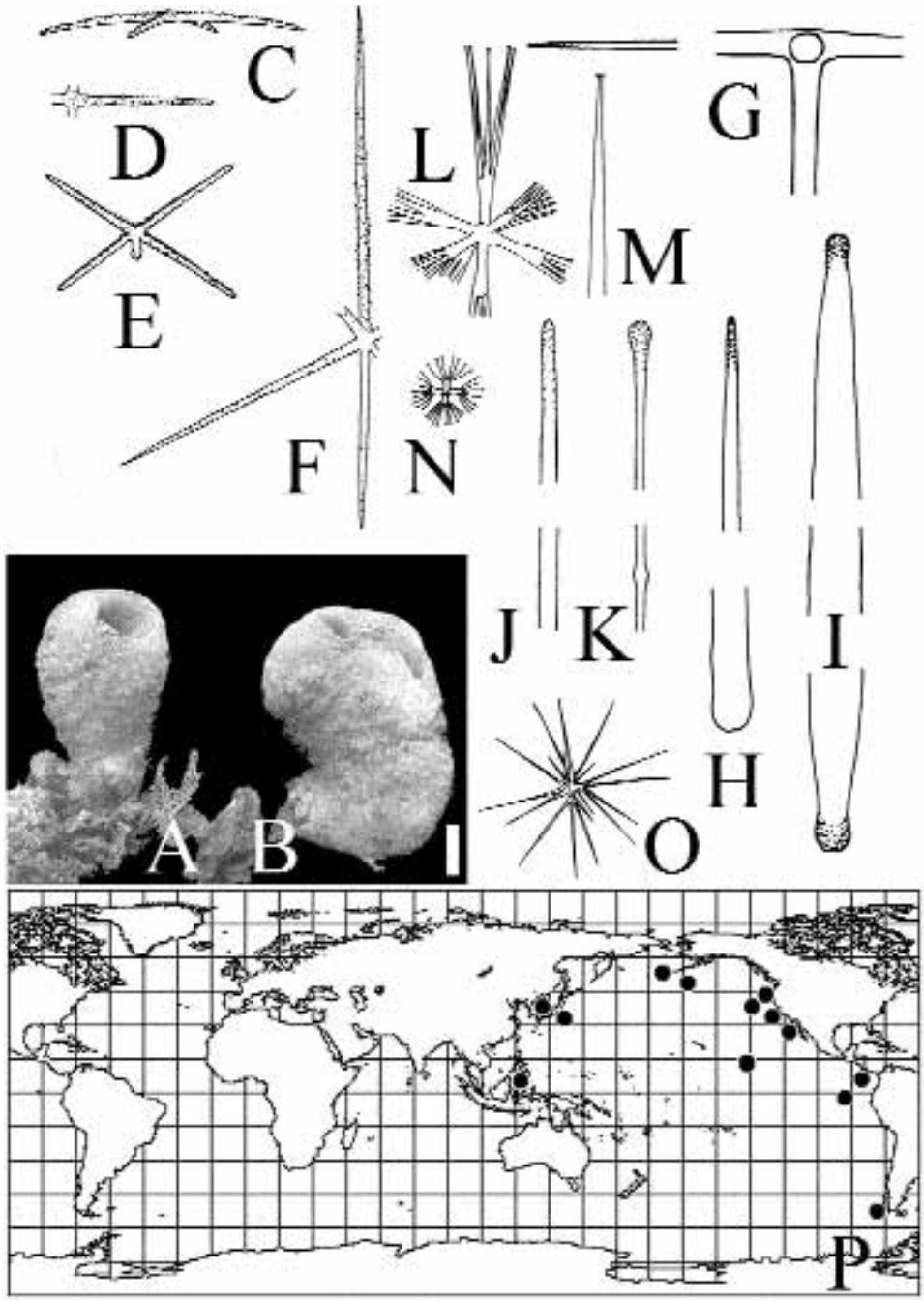


**Fig. 7.** *Acanthascus (Staurocalyptus) glaber*. A–B, external shape of two type specimens (after Ijima, 1904) (scale 20 mm). C–D, dermal stauractines 150×. E, dermal stauractine with rudimentary ray 150×. F, atrial hexactine 150×. G, hypodermal pentactine 80×. H, prostal monactine 80×. I, prostal diactine 80×. J–K, choanosomal diactines 150×. L, discoctaster 150×. M, its secondary ray 1200×. N, microdiscohexaster 600×. O, 300×. C–D, F, L, O, from Ijima (1904). E, G–K, M–N, BMNH 1912.11.09.002. P, distribution of *Acanthascus (Staurocalyptus)*.

***Synonymy.*** *Acanthascus (Staurocalyptus) glaber* Ijima, 1897: 57.

***Material examined.*** Holotype: unavailable – Sagami Bay, Japan, depth 480–572 m. Paratype: BMNH 1898.12.19.004 – Japan, Sagami Bay. Other material. BMNH 1912.11.09.002 – same locality. MNHN (p4707) – off Japan (a fragment of specimen stored in the MOM 04 1978; two small specimens identified and described by Topsent, 1928c).

***Description.*** The body is vase-like or ovoid, basiphytose, most specimens are attached to dead parts of Hexactinellida with rigid skeleton or to tufts of spicules of *Hyalonema* and rare specimens are attached to tough minerals. The holotype is likely not to be chosen from the type series. The largest specimen is 250 mm long, 66 × 95 mm in diameter, with walls about 17 mm thick. The smallest specimen is 6 mm long with osculum 2 mm in diameter, it has several diactines of prostalia lateralia. The larger specimens have prostalia of diactines which protrude at about 20 mm from the walls, some specimens seem to be deprived of prostalia at all. Spicules. The choanosomal skeleton is composed of diactines several mm long and 0.008–0.009 mm in diameter. The diactines have

Hoo-154.qxd 10/7/04 2:16 AM Page 1453



rounded or slightly clavate rough terminations, they are usually even or have widening in the middle. The diactines and rare monactines which serve prostalia lateralia are 1–25/0.09–0.20 mm. They have rounded or conically pointed, rough or smooth terminations and no widenings in the middle. The usual Rossellidae basidictyonal plate formed of hexactines is present in most species. The hypodermal pentactines have orthotropal tangential rays and only occasional hypodermal pentactines have paratropal rays. The tangential rays are 0.4–8/0.05–0.08 mm, the proximal ones are much longer. The terminations of hypodermal pentactines are conically pointed, rough. Dermalia are mainly stauractines, rarely pentactines or tauactines. These spicules have rays 0.068–0.167/0.006–0.010 mm, covered with numerous short spines and with rounded terminations. Atrialia are hexactines less spiny than dermal spicules with conically pointed terminations. The spines are more dense on the proximal ray and sometimes proximally directed on the surface of tangential rays. Some of the atrial hexactines have all the rays nearly equally long, the others have the proximal ray about 1.5 times longer, some spicules have tangential rays longer than distal and proximal ones. The length of proximal ray is 0.084–0.560 mm, tangential rays are 0.152–0.352 mm long, distal ray is 0.084–0.281 mm long, all these rays are about 0.010 mm in diameter. Microscleres. Microscleres are discoctasters, microdiscohexasters, hexasters and hemihexasters. Discoctasters are 0.240–0.660 mm in diameter, with primary rosette 0.137–0.228 mm in diameter. Their discs are pinheaded in shape. Most of the discoctasters are located in the deep parts of the wall. Microdiscohexasters are 0.014–0.022 mm in diameter, with primary rosette 0.005–0.008 mm in diameter. They are located mostly in the vicinity of dermal and atrial surfaces. The hemihexasters, sometimes hexasters and rare asters are 0.083–0.126 mm in diameter, with primary rosette 0.007–0.014 mm in diameter. They have rough secondary rays.

***Remarks.*** The subgenus contains 15 species. *Staurocalyptus* is allocated to a subgenus of *Acanthascus* for reasons discussed above for *Acanthascus*. In establishing the new genus Ijima (1897) did not designate a type species nor did he subsequently designate one. At that time *Staurocalyptus* contained the following species: *S. dowlingii* (Lambe, 1893), *S. roeperi* (Schulze, 1887a), *S. heteractinus* (Ijima, 1897), *S. glaber* (Ijima, 1897) and *S. pleorhaphides* (Ijima, 1897). The two former species were transferred from the related genus *Rhabdocalyptus*, and the three others were described as new. The species described as *Rhabdocalyptus dowlingi* Lambe, 1893 and transferred by further authors (from Ijima, 1897 to Koltun, 1967) to the genus *Staurocalyptus* requires type reinvestigation. Some specimens stored in different museums and identified as *Staurocalyptus dowlingi* are obvious representatives of *Rhabdocalyptus*. The diactines are common in dermal spicules *in A. (Staurocalyptus) pleorhaphides* (Ijima, 1904) and in *A. (Staurocalyptus) hamatus* (Lendenfeld, 1915). Stauractines are predominant among dermal spicules in the following species: *A. (Staurocalyptus) glaber* (Ijima, 1897; 1898; 1904); *A. (Staurocalyptus) heteractinus* (Ijima, 1897); *A. (Staurocalyptus) microhetus* (Ijima, 1898; 1904); *A. (Staurocalyptus) celebesianus* (Ijima, 1927) and in *A. (Staurocalyptus) fuca* (Tabachnick, 1989a). In the latter species two opposite rays of the stauractines are often shorter than the other pair of rays, and sometimes diactines carry two rudimentary tubercles in the middle. In all other known species of this subgenus the pentactines are predominant amongst dermal spicules. The calycocomes' secondary rays are usually smooth with spherical terminations. Microdiscohexasters were not found in *A. (Staurocalyptus) entacanthus* Ijima (1904). Hook-like terminations of oxyoidal spicules are known for *A. (Staurocalyptus) hamatus* (Lendenfeld, 1915). Hexactines are usually rare among microscleres but sometimes their derivatives – stauractines – could be found in *A. (Staurocalyptus) fuca* (Tabachnick, 1989a).

**Distribution**

Pacific Ocean, depth 30–1700 m.

### *ANOXYCALYX* KIRKPATRICK, 1907

**Synonymy**

*Anoxycalyx* Kirkpatrick, 1907b: 23. Part of *Acanthascus* (part of type series (paralectotype) of *A. nealus* de Laubenfels, 1942: 266; the other part (lectotype) belongs to the genus *Schaudinnia*). *Scolymastra* Topsent, 1916: 163. Part of *Trichasterina – T. sagittaria* Topsent (1913a) described by de Laubenfels, 1942: 266.

**Type species**

*Anoxycalyx ijimai* Kirkpatrick, 1907b (by monotypy).

**Definition**

Saccular Rossellinae with microscleres including strobiloidal discohexasters and pappocomes.

**Diagnosis**

Body is saccular, lophophytose or basiphytose. Choanosomal skeleton is composed of diactines. Hypodermal spicules are orthotropal pentactines which may serve as prostalia basalia being anchorate. Dermalia are combinations of stauractines, pentactines and hexactines. Atrialia are mainly hexactines. Microscleres are pappocomes and combinations of: macrodiscohexasters with strobiloidal primary rays and numerous secondary rays of different length, microdiscohexasters also with strobiloidal primary rays and not obligate mesodiscohexasters, hexasters, hemihexasters and asters.

**Remarks**

The genus presently contains three species. *Anoxycalyx* and *Scolymastra* are synonymised but their concepts are retained at the subgeneric level. It may eventually transpire to combine them completely (see remarks below).

**Distribution**

Circumpolar – Antarctic and Arctic oceans (Fig. 8), depth 20–603 m.

### *ANOXYCALYX (ANOXYCALYX)* KIRKPATRICK, 1907

**Synonymy**

*Anoxycalyx* Kirkpatrick, 1907b: 23. Part of *Acanthascus* (part of type series (paralectotype) of *A. nealus* de Laubenfels,

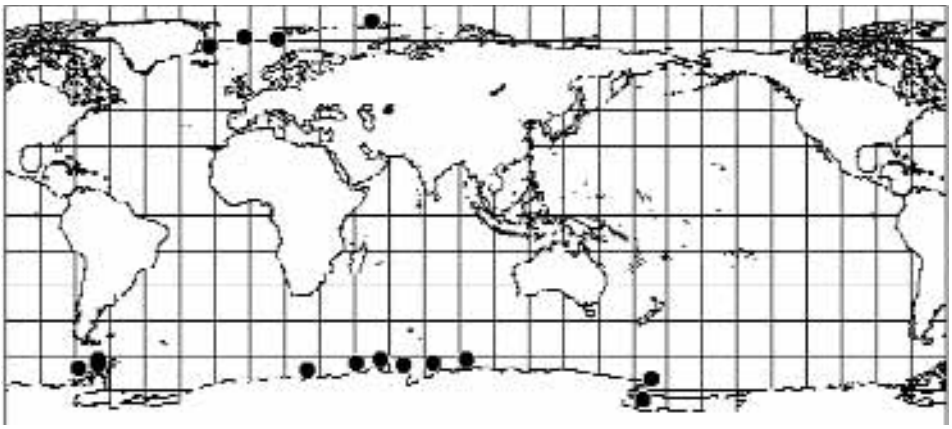

**Fig. 8.** Distribution of *Anoxycalyx*.

1942: 266; the other part (paralectotype) belongs to the genus *Schaudinnia*). Part of *Trichasterina – T. sagittaria* Topsent (1913a) described by de Laubenfels, 1942: 266.

### Type species

*Anoxycalyx ijimai* Kirkpatrick, 1907b (by monotypy).

### Definition

*Anoxycalyx* with dermalia consisting of stauractines and pentactines.

### Diagnosis

Body is saccular, lophophytose or basiphytose. Choanosomal skeleton is composed of diactines. Hypodermal spicules are regular pentactines which may serve as prostalia basalia. Dermalia are stauractines and pentactines. Atrialia are mainly hexactines. Microscleres are pappocomes, macrodiscohexasters and sometimes microdiscohexasters, hexasters, hemihexasters and asters.

### Description of type species

*Anoxycalyx (Anoxycalyx) ijimai* Kirkpatrick, 1907b (Fig. 9).

***Synonymy*** *Anoxycalyx ijimai* Kirkpatrick, 1907b: 23.

***Material examined.*** Lectotype (here designated): BMNH 1908.02.05.031 – 'Discovery', 77°S, 170°E, depth 329 m. Paralectotypes: BMNH 1908.02.05.031, BMNH 1887.10.20.020 – same locality. Other material. BMNH 1910.10.28.039, 1910.10.28.040 – 'Gauss station', 66°02.9′S, 89°38′E, depth 46–385 m. BMNH 1926.10.26.73 – 'Terra Nova', stn. 338, 77°13′S, 164°18′E, depth 379 m. USNM (kt757; w680; w683) – 'Eltanin' 6, stn. 436, 63°14–13′S, 58°45–49′W, depth 73 m. USNM (kt758; kt759; kt760; w681) – 'Eltanin' 27, stn. 1877, 72°18–19′S, 170°26–25′E, depth 143–146 m. USNM (kt754; kt755; kt756; w682) – 'Eltanin' 27, stn. 1897, 76°09–08′S, 168°10′E, depth 375–362 m. MNHN (p4219; p4220; p4221; p4222; p4223) – 'Pourquois-pas', 68°30′S, 67°30′W, depth 200 m.

***Description.*** The body is saccular with thin lateral walls and large atrial cavity, lophophytose. Sponges are small, the largest reaching 80 mm long, 30 mm in diameter, the osculum is 20 × 10 mm in diameter. The species is also characterised by intensive budding processes' presumably larvae settled on larger specimens. Prostalia are formed by diactines and outwardly protruding hypodermal pentactines up to 40 mm from the dermal walls. Spicules. The choanosomal skeleton is composed of diactines, rarely of tauactines. The diactines are from 0.5 mm to several mm long and 0.009–0.023 mm in diameter. These diactines are usually even or rarely they have a widening in the middle, their terminations are rough and conically pointed. Hypodermal anchorate pentactines have orthotropal but curved tangential rays. The tangential rays are 0.8–0.9/0.04–0.07 mm, smooth with conically pointed terminations. The proximal ray is up to 40–50 mm long and 0.05–0.08 mm in diameter, smooth in basal and rough in distal part. Dermalia are usually stauractines, sometimes pentactines and rarely tauactines and diactines. Their tangential rays are 0.084–0.372/0.006–0.015 mm, the proximal rays of pentactines are equal in shape and size to tangential rays. Rays of dermal spicules are covered with numerous short spines and have terminations usually rounded. Pentactines in specimens from the MNHN are predominant over stauractines and have the rays shorter than in all other specimens. Atrialia are hexactines. Their terminations are conically pointed and rays are more spiny than those of dermal spicules. Rays of atrial hexactines are 0.068–0.334/0.004–0.015 mm. MNHN specimens have hexactines usually smaller than in other material. Microscleres. Microscleres are discohexasters and pappocomes. The discohexasters may be divided into two types: macrodiscohexasters and microdiscohexasters. The former are larger and have numerous secondary rays of different lengths (anisodiscohexasters). Both micro- and macrodiscohexasters have clavate or strobiloidal primary rays. The macrodiscohexasters of MNHN specimens have spines on their shafts close to the center. The macrodiscohexasters are 0.130–0.266 mm in diameter, their primary rays are 0.018–0.054 mm in diameter. The microdiscohexasters are 0.068–0.115 mm in diameter, their primary rays are 0.013–0.023 mm in diameter. The pappocomes have usual shape, 0.065–0.187 mm in diameter with primary rosette 0.011–0.022 mm in diameter. The species is widely known from the Antarctic Ocean, 46–603 m depth.

***Remarks.*** The subgenus presently contains only two species. The genus was initially placed in the subfamily Lanuginellinae because its discohexasters with strobiloidal primary rays were considered to be strobiloplumicomes (Kirkpatrick, 1907b). Later Ijima (1927) correctly transferred this genus to Rossellinae. Pappocomes were originally called graphiocomes but I consider them to be pappocomes following descriptions of Topsent (1917) of *Scolymastra*. The discohexasters (both types,

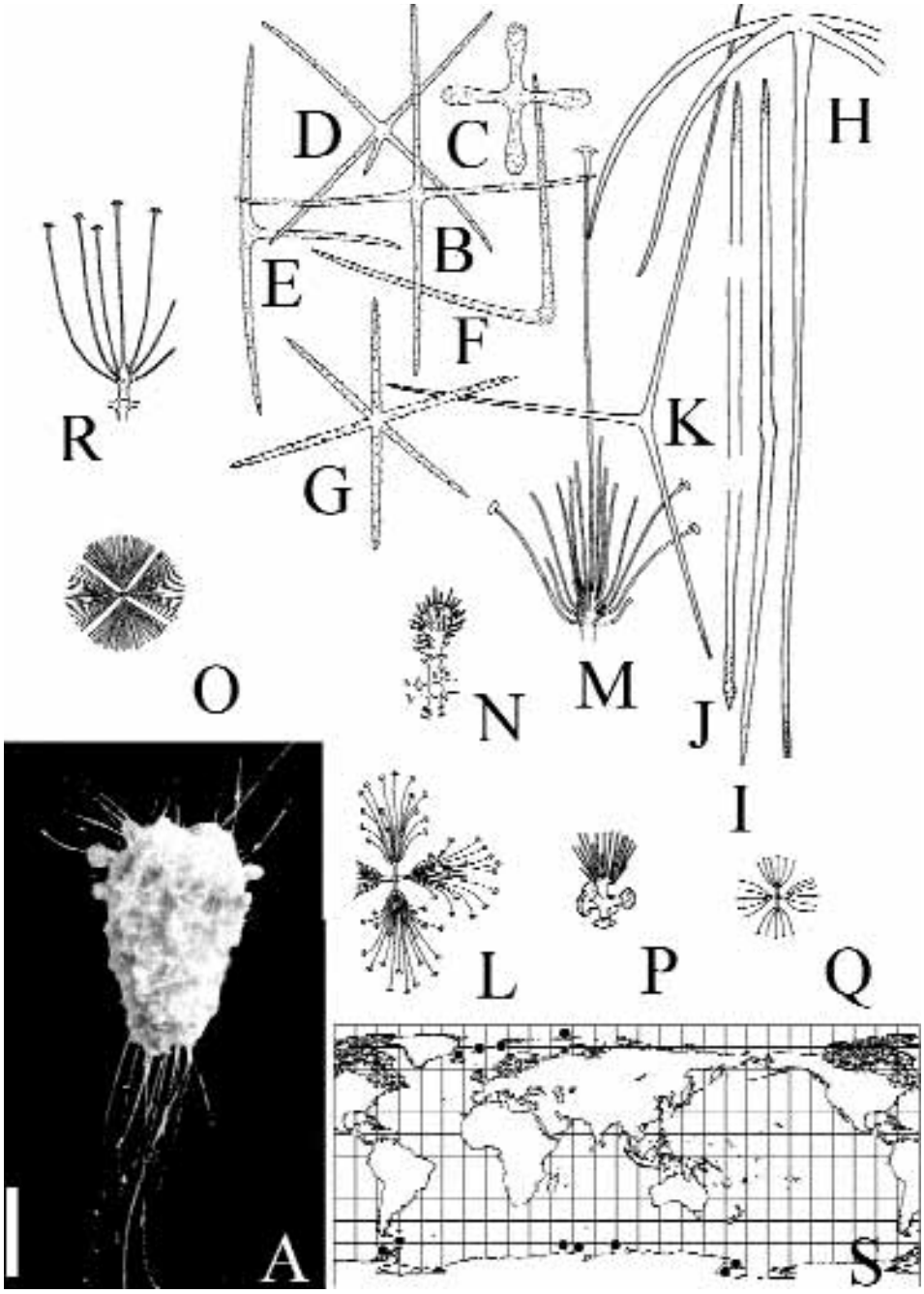


**Fig. 9.** *Anoxycalyx (Anoxycalyx) ijimai*. A, external shape (after Kirkpatrick, 1907b) (scale 10 mm). B–C, dermal stauractines 130×. D, dermal pentactine 130×. E, dermal tauactine 130×. F, dermal diactine 130×. G, choanosomal hexactine 130×. H, hypodermal pentactine 40×. I–J, choanosomal diactines 130×. K, choanosomal tauactine 40×. L, macrodiscohexaster 130×. M, its ray 500×. N, its primary ray 500×. O, pappocome 130×. P, its primary rosette 500×. Q, microdiscohexaster 130×. R, its ray 500×. A–H, K–M, O–R, from Kirkpatrick (1907b). I–J, lectotype (original). N, MNHN (p4221). S, distribution of *Anoxycalyx (Anoxycalyx)*.

if present) have strobiloidal primary rays. Hexasters, hemihexasters and asters (very rarely some spicules with onychoidal terminations) are described for the basiphytose *A. laceratus* (Koltun, 1967).

Numerous juveniles are present on prostalia lateralia in many specimens of *A. ijimai*. They have been previously interpreted as asexual buds but it is also likely that they originate from settled larvae.

The genus is very similar to *Scolymastra* (Topsent, 1916) in its combination of spicule types, with the only difference being the presence of dermal hexactines in *Scolymastra* and pentactines-stauractines in *Anoxycalyx*. Although this feature is usually important only at the species level within other Rossellinae, the next logical step of completely synonymizing these genera is not yet taken and *Scolymastra* is retained as subgenus of *Anoxycalyx*.

The priority of the type species name remains a problem. Part of the type series of *Acanthascus nealus* described by de Laubenfels (1942) is identical to *Anoxycalyx laceratus* of Koltun (1967), while the other part is identical to *Schaudinnia rosea*. The description of *A. nealus* (de Laubenfels, 1942) is very poor; it lacks illustrations; dermalia are described as hexactines (which are

absent in all the type specimens); and discoidal spicules mentioned in the description belong to *Anoxycalyx* while oxyoidal ones belong to *Schaudinnia*. By making a lectotype designation from the syntype series of *Acanthascus nealus* (USNM 23263) contradictions with the ICZN are avoided and support the correctly described *A. laceratus*. The lectotype is a series of fragments USNM 23263 (kt1471; kt1472; kt1473 and macerated fragments without additional numbers), becoming the junior synonym of *S. rosea*. Paralectotype is assigned to USNM 23263 (kt1474) which becomes to be the junior synonym of *Anoxycalyx laceratus.* Since the type material comprises two genera the species *A. nealus* becomes a junior synonym of two genera and species. *Trichasterina sagittaria* Topsent described by de Laubenfels (1942) USNM 23283 is also obviously a specimen of *A. laceratus.* Similarly, specimens stored in the MNHN collected from the Antarctic peninsula should be distinguished as a separate species or subspecies due to several significant morphological differences: dermalia are chiefly pentactines and primary rays of macrodiscohexasters are covered with spines. There are also some differences in spicule measurements, especially in dermalia and atrialia, and close dimensions of macro- and microdiscohexasters.

**Distribution**

Circumpolar – Antarctic and Arctic oceans, depth 46–603 m.

### *ANOXYCALYX (SCOLYMASTRA)* TOPSENT, 1916

**Synonymy**

*Scolymastra* Topsent, 1916: 163.

**Type species**

*Scolymastra joubini* Topsent, 1916 (by monotypy).

**Definition**

*Anoxycalyx* with dermalia consisting mainly of hexactines.

**Diagnosis**

Body is saccular, lophophytose. Choanosomal skeleton is composed of diactines and hexactines. Hypodermal spicules are regular pentactines. Paratropal pentactines and diactines serve as prostalia basalia. Dermalia and atrialia are mainly hexactines. Microscleres are discohexasters and pappocomes.

**Description of type species**

*Anoxycalyx (Scolymastra) joubini* Topsent, 1916 (Fig. 10).

***Synonymy.*** *Scolymastra joubini* Topsent, 1916: 163.

***Material examined.*** Lectotype (designated here): MNHN HT135 (described by Topsent as 764) – 'Pourquoi-pas', stn. 18, dredge, 62°00′S, 58°26′W, depth 75 m. Initially two specimens were described by Topsent (1916; 1917), and thus forming a syntype series. The specimen described by Topsent as 745 is presently missing but would form the paralectotype if it is subsequently rediscovered. Other material. BMNH 1926.10.26.069 – 'Terra Nova', stn. 314, 77°37′S, 166°20′E, depth 406–441 m.

***Description.*** The body is saccular with smooth lateral walls, lophophytose with large atrial cavity and relatively thick walls. Large subatrial cavities are located beneath the atrially lined surface. Maximal sizes were reported up to 150–2000 mm and 150–700 mm in diameter. The lectotype is 570 mm long, about 370 mm in diameter, the osculum is about 180 mm in diameter, the walls are 12–40 mm thick, basalia protrude outwards at about 30 mm. Spicules. The choanosomal skeleton is composed of diactines. They are 0.15–3.40/0.007–0.099 mm, even or with a widening or two rudimentary tubercles in the middle. Their terminations are conically pointed, often rough but sometimes smooth. The small diactines are rough or covered with short spines in the middle. Some diactines which probably supplement the anchorate basalia are about 6/0.17 mm. Rarely it is possible to find orthodiactines and monactines with one termination rounded and other conically pointed. Choanosomal hexactines are rare, their rays are similar to the regular hypodermal pentactines. Regular (orthotropal) hypodermal pentactines have rays 0.6–1.5/0.09–0.10 mm. The proximal ray is longer than the tangential ones. In some specimens these spicules may be absent (Barthel & Tendal, 1994). The terminations of orthotropal pentactine rays are rough, conically pointed. The hypodermal pentactines which serve as prostalia basalia are paratropal with tangential rays about 0.8–2.3/0.007 mm and proximal ray over 30 mm long. The tangential rays of these paratropal pentactines are rough while the proximal rays are smooth. Dermalia and atrialia are hexactines, rarely pentactines, stauractines and diactines. Their rays are covered with numerous short spines and have rounded terminations. Topsent (1917) notes that these spicules have very short 0.065–0.090 mm conically pointed rays and only occasional spicules have rays about 0.140 mm long. Re-examination of material showed that the short-rayed spicules are predominant in the lectotype but rare in BMNH specimen where long-rayed spicules are more numerous. The rays of dermal spicules are 0.030–0.215 mm long, the atrial ones are similar in length and shape, 0.022–0.281 mm long. All dermal and atrial spicules are 0.005–0.016 mm in diameter. Microscleres. Microscleres are discohexasters and pappocomes. The discohexasters are 0.126–0.378 mm in diameter with primary rosette 0.014–0.061 mm in diameter. The macrodiscohexasters are 0.198–0.378 mm in diameter with primary rosette 0.036–0.061 mm in diameter. The microdiscohexasters are 0.126–0.184 mm in diameter with primary rosette 0.014–0.025 mm in diameter. Discohexasters are barely differentiated into macro- and microdiscohexasters. They were divided by Topsent (1917) into two types: large 'strobilodiscohexasters' about 0.4 mm in diameter and small discohexasters about 0.14 mm in diameter. The difference in the external shape of primary rays – strobiloidal in the large and rounded in the small discohexasters – is unreliable since small discohexasters with a few secondary rays also have strobiloidal primary rays. The other differences are also indistinct being exceptions rather than rules: presence of toothed discs in small discohexasters and pileate with serrated margin in large ones; secondary rays of different length in large discohexasters (anisodiscohexasters). The pappocomes are 0.162–0.263 mm in diameter with primary rosette 0.018–0.036 mm in diameter. These spicules have rough secondary rays. The pappocomes of the type specimens are of usual form. The pappocomes in the specimen from the MNHN are similar to hexasters, they have fewer secondary rays which are about 0.005 mm thick while the same in the type specimens are about 0.002 mm in diameter.

***Remarks.*** The subgenus presently contains only a single species. The pappocomes are called graphiocomes by

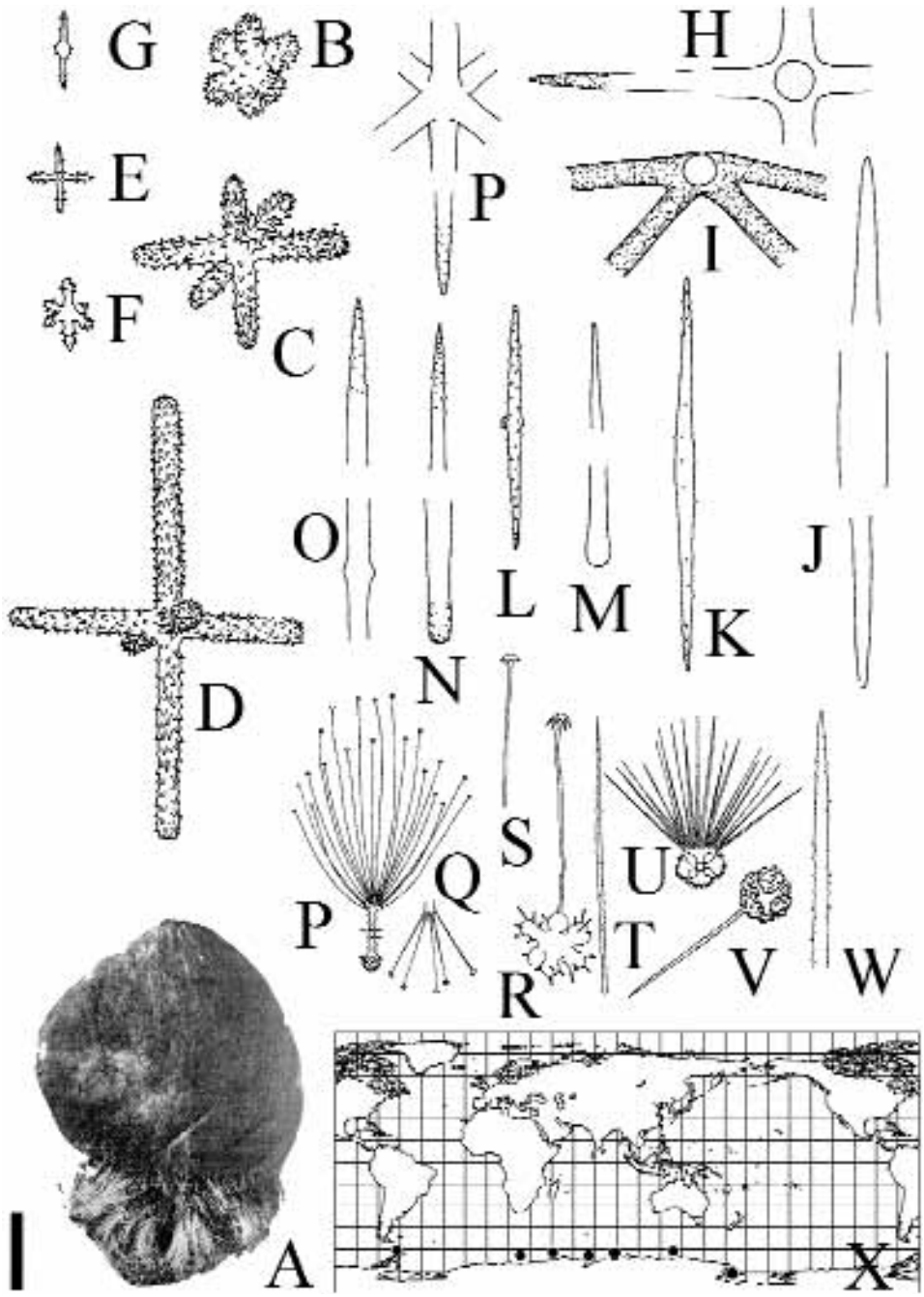


**Fig. 10.** *Anoxycalyx (Scolymastra) joubini*. A, external shape (after Topsent, 1917)(scale 50 mm). B–F, dermal hexactines 230×. G, dermal diactine 230×. H, regular hypodermal pentactine 60×. I, paratropal hypodermal pentactine – anchorate prostalia basalia 60×. J–L, O, choanosomal diactines 120×. M–N, choanosomal monactines 120×. P, large discohexaster 230×. Q, small discohexaster 230×. R, small discohexaster 460×. S, secondary ray of large discohexaster 460×. U, pappocome 230×. T, its secondary ray 460×. V, pappocome 230×. W, its secondary ray 460×. B, P–Q, U, MNHN HT135. C–P, R–T, from Topsent (1917). V–W, BMNH 1926.10.26.069. X, distribution of *Anoxycalyx (Scolymastra)*.

Barthel & Tendal (1994), but I consider them to be pappocomes following Topsent (1917) since they have secondary rays which are divergently distributed while in true graphiocomes the secondary rays are gathered into close tufts. Discohexasters are barely differentiated into macro- and microdiscohexasters.

This genus is very close to *Anoxycalyx*, with the most important difference being in the form of dermal spicules and insufficient to differentiate Rossellidae at the generic level. Dermalia of *Anoxycalyx ijimai* are mainly stauractines and hexactines, and hypodermalia have short curved tangential rays which serve anchorate prostalia basalia. The hypodermal pentactines of *Anoxycalyx laceratus* (Koltun, 1967) have typical shape and probably 'normal' hypodermal position for the genus. It is very likely that *Scolymastra* will be completely synonymised with *Anoxycalyx*, becoming its junior synonym because in most respects *Anoxycalyx ijimai* is closer to *Scolymastra* than to *Anoxycalyx laceratus*. Both types of microscleres in *Anoxycalyx (Scolymastra) joubini*, discohexasters and pappocomes, have strobiloidal primary rays.

Hoo-154.qxd 10/7/04 2:16 AM Page 1458



**Distribution**

Circum-antarctic, depth 20–440 m.

## *APHORME* SCHULZE, 1899

**Synonymy**

*Aphorme* Schulze, 1899: 40.

**Type species**

*Aphorme horrida* Schulze, 1899 (by monotypy).

**Definition**

Saccular Rossellidae in which the microscleres are hexactines and their derivatives with a reduction in the number of rays.

**Diagnosis**

Body is saccular, basiphytose. Choanosomal skeleton is composed of diactines. Hypodermal spicules are spiny paratropal and orthotropal pentactines which protrude outwards and serve as prostalia lateralia together with diactines. Dermalia are stauractines. Atrialia are hexactines. Microscleres are hexactines and rarely their derivatives with a reduction in the number of their rays.

**Description of type species**

*Aphorme horrida* Schulze, 1899 (Fig. 11).

***Synonymy.*** *Aphorme horrida* Schulze, 1899: 40.

***Material examined.*** Holotype: USNM 7504 – 'Albatross', stn. 2937, 33°04.30′N, 117° 42′W, depth 849 m. Other material. IORAS 5/2/1069 – 'Ichthyandr', stn. 6, 22°11.4′S, 81°24.6′W, depth 360–400 m.

***Description.*** The holotype is vase-like, 80 mm long and 45 mm in diameter, the osculum is 30 mm in diameter, the walls are thin about 5–6 mm in thickness. Prostalia lateralia are diactines and pentactines. The diactines protrude at 10–20 mm, they are located presumably in the upper part of the body. Pentactines protrude about 10 mm, being located on the dermal surface. The other specimen of this species consists only of a tiny fragment (Tabachnick, 1990). Spicules. The choanosomal skeleton is composed of diactines about 10/0.008–0.020 mm. These diactines have rounded or clavate rough terminations and sometimes they have a widening in the middle. Diactines of prostalia lateralia are about 20–60/0.200 mm. Hypodermal pentactines are described by Schulze as 'prostalia pentactines'. They have two types of tangential ray construction: paratropal and rarely orthotropal. The tangential rays are covered with claw-like (flattened) spines which are situated and slightly flattened in the tangential plane. The rays of hypodermal pentactines are 10–20/0.038–0.106 mm. Dermalia are stauractines (rarely triactines) with rays 0.182–0.631/0.008–0.030 mm. The rays are smooth with rough rounded terminations. The dermal stauractines notably vary in their dimensions (about 2 times) between the investigated specimens. Only few atrialia were found in the holotype. They are hexactines with rays covered by sparse tiny spines. Their terminations are conically pointed or rounded. The distal ray is 0.137–0.441 mm long, the tangential rays are 0.252–0.357 mm long, the proximal ray is 0.334–0.494 mm long, their diameter is about 0.008 mm. Some spicules similar to dermal and atrial spicules – pentactines and hexactines with one rudimentary ray – were found in small numbers, but unfortunately it is impossible to refer these spicules to dermal or atrial and this question requires further examination. Microscleres. Microscleres are hexactines and rare pentactines, stauractines and paratetractines. The hexactines are 0.050–0.101 mm in diameter, their rays are smooth and about 0.002 mm in diameter.

***Remarks.*** The genus is monospecific. The generic diagnosis is proposed here for the first time. I do not agree with Schulze's (1899) interpretation of dermal and hypodermal spicules. He considered large spiny pentactines to be a sort of prostalia marginalia spicules. Dermalia were assigned as small hexactines, which are entirely equal in his illustration (pl. 7, fig. 4) to microhexactines as well as to the atrial hexactines. Stauractines were considered to be hypodermal spicules. The diagnosis may be changed if a well preserved specimen is ever collected.

Although the two known specimens of *Aphorme* have different dermal stauractines which vary (about 2 times) in their dimensions, it is unwarranted to erect another species for the new fragment since it is incomplete and unreliable for careful spicule analysis.

**Distribution**

E Pacific, depth 360–849 m.

## *ASCONEMA* KENT, 1870

**Synonymy**

*Asconema* Kent, 1870b: 241. Part of *Trichasterina – T. bispiculigastra* Rezvoi 1923: 35; 1925: 193. Part of *Hyalonema – H. foliata* Fristedt 1887: 413. Part of *Hyalascus – H. foliatus* Hentschel 1929; Koltun 1964a: 145: 914. Not *Asconema kentii* Schmidt, 1880b: 65 (=*Hyalonema*). Not *A. setubalense* Burton 1928b: 8 (specimen ZMUC – Ingolf Expedition, =*Trichasterina borealis*).

**Type species**

*Asconema setubalense* Kent, 1870b (by monotypy).

**Definition**

Saccular, tubular or funnel-like Rossellinae with dermalia consisting of pentactines (and rare hexactines) in which the unpaired ray is distally directed.

**Diagnosis**

Body is funnel-like, saccular or tubular, basiphytose with thin walls and very large osculum. Choanosomal skeleton is composed of diactines and rare hexactines. Hypodermal and usually hypoatrial spicules are pentactines. Dermalia are mainly pentactines with a distally directed unpaired ray. Atrialia are hexactines together with pentactines or hexactines only. Microscleres are various in different species – combinations of spicules with discoidal

Hoo-154.qxd 10/7/04 2:16 AM Page 1459



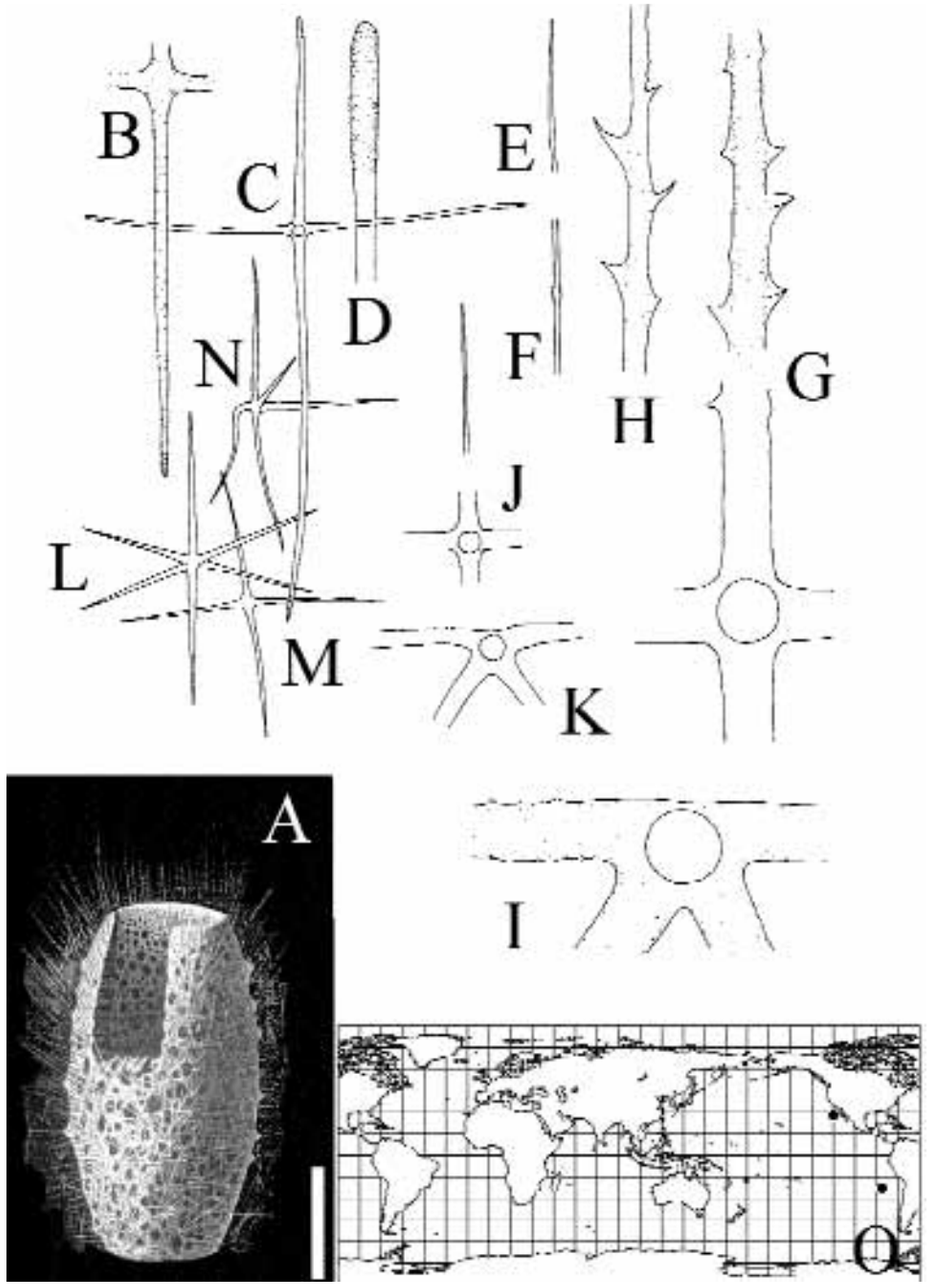


**Fig. 11.** *Aphorme horrida*. A, external shape (after Schulze, 1900a) (scale 30 mm). B, dermal stauractine 130×. C, atrial hexactine 130×. D–E, outer end of choanosomal diactines 65×. F, central part of choanosomal diactine 65×. G, hypodermal pentactine 65×. H, distal part of tangential hypodermal pentactine's ray 65×. I, paratropal hypodermal pentactine 65×. J, paratropal hypodermal pentactine 65×. K, paratropal hypodermal pentactine 65×. L, hexactine 250×. M, stauractine 250×. N, pentactine 250×. B–I, L–N, USNM 7504. J–K, IORAS 5/2/1069. O, distribution of *Aphorme*.

terminations: macrodiscohexasters, macrodiscasters, microdiscohexasters and oxyoidal terminations: asterous and holactinoid spicules.

**Description of type species**

*Asconema setubalense* Kent, 1870b (Fig. 12).

***Synonymy.*** *Asconema setubalense* Kent, 1870b: 246 and many other authors for material from the Central East Atlantic. Not *Asconema setubalense* and *A. setubalense pauperata* Schulze 1899: 25. Not *Asconema setubalense* Bronsted 1917: 478; 1933: 5; Burton 1928b: 8; Topsent 1892a: 27; Topsent 1904b 40; Topsent 1913a: 9; Topsent 1928c: 76; Arnesen 1932: 9; Hentschel 1929; 913; Koltun 1967: 81. Not *Trichasterina bispiculigastra* Rezvoi; *T. sagittaria* Topsent and *Hyalonema foliata* Fristedt or *Hyalascus foliatus* (Fristedt) as was suggested by Koltun (1967: 81).

***Material examined.*** Holotype (probable): BMNH 1940.12.10.001 (fragment) – off Portugal, possibly between Coimbra and Cape Espichel, Portugal. Other material. BMNH 1965.01.01.001 – Eastern Telegraph Company. BMNH

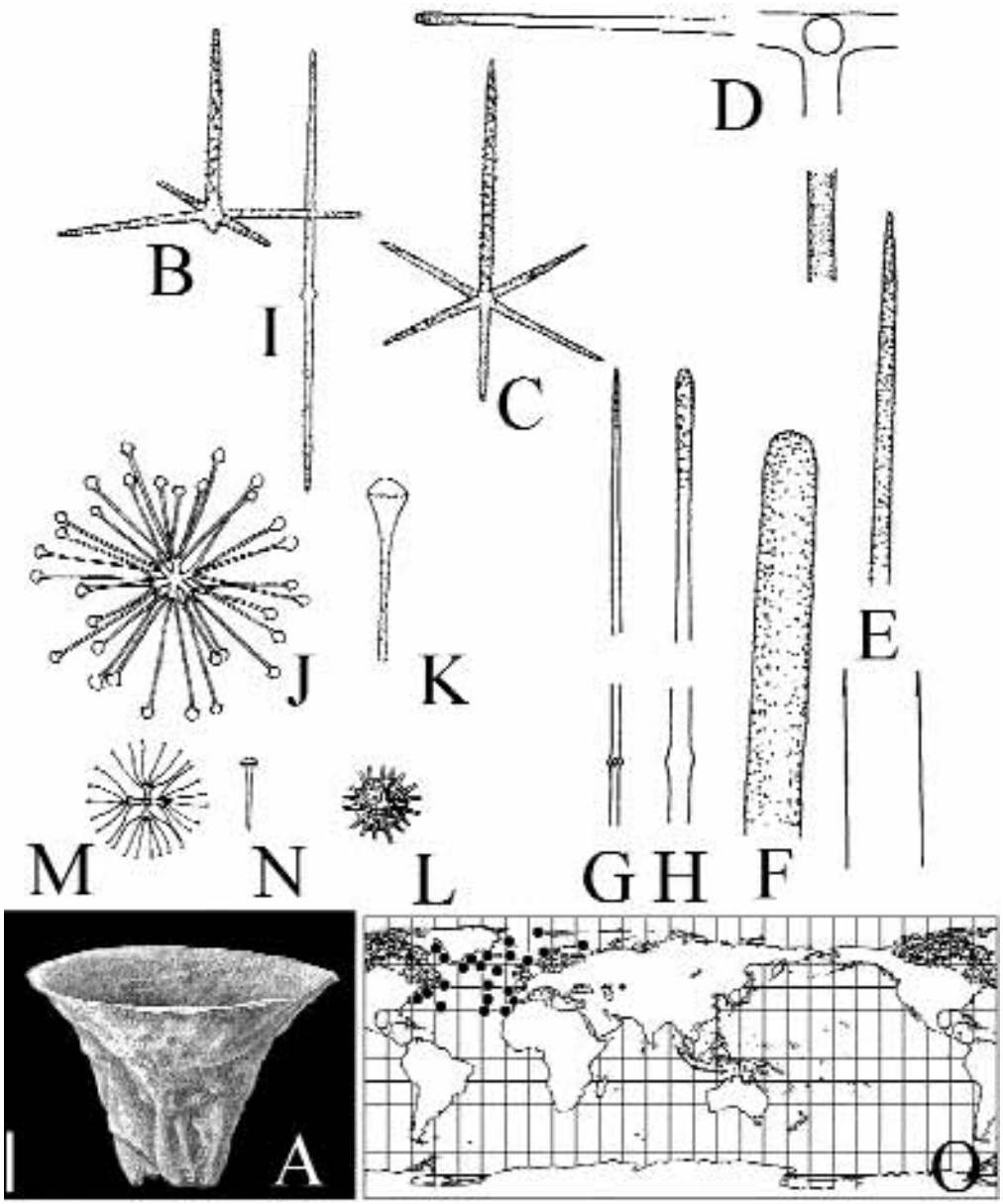


**Fig. 12.** *Asconema setubalense*. A, external shape (after Schulze, 1887a)(scale 100 mm). B, dermal pentactine 150×. C, atrial hexactine 150×. D, hypodermal pentactine 150×. E, large choanosomal diactine 150×. F, its outer end 150×. G–H, mediate choanosomal diactines 150×. I, small choanosomal diactine 150×. J, macrodiscohexaster 590×. K, its outer end 1180×. L, spherical primary rosette of macrodiscohexaster 590×. M, microdiscohexaster 590×. N, its outer end (BMNH 1889.01.08.001) 1180×. B–K, BMNH 1940.12.10.001. L–N, BMNH 1889.01.08.001. O, distribution of *Asconema*.

1889.01.08.001 – off Portugal, 673 m. BMNH 1902.10.31.001 – N Atlantic. BMNH 1898.07.30.001 – Conception Bank. IORAS (various specimens) – 'Academic Petrovsky', vicinity of Banc Josephine, 36°44–45′N, 14°15–21′W, 280–380 m. IORAS 5/2/1327 – 'Academic Mstyslav Keldysh', 36°34.75′N, 11°25.75′W, 396–420 m. IORAS 5/2/2353 – 'Moscow University', 505–150 m. IORAS (various specimens) – 'Akademik Oparin', 32°02.05′N, 12°56.06′W, 470 m. IORAS (various specimens) – 'Vitiaz 2', 36°43.01′N, 14°13.6′W, 280–300 m. MNHN (various specimens) – 'Le Noroit', Banc Goringe, 36°24.20–33.70′N, 11°28.8–43.20′W, 300–1040 m. 305–320 m. MNHN (various specimens) – 'Le Noroit', Banc Ampere, 35°04′N, 12°55′W, 225–280 m. MNHN (p3854) – 'Le Noroit', Banc Galice, 42°39.90′N, 11°35.80′W, 675–685 m. MNHN (various specimens) – 'Le Noroit', Banc Josephine, 36°45.80′N, 14°17.5–20.4′W, 315–380 m. MNHN (fr615) – 'Callypso', Banc Gorringe, 36°30′N, 11°30′W, 510 m. MNHN (fr616) – 'Callypso', Banc Spartel, 35°54′N, 6°W, 110 m. MNHN (fr614) – 'President Théodore Tissier', E of Gibraltar, 690 m. MNHN (p1387) – 'Thalassa', 44°10′N, 8°22.30′W, 410–640 m. MNHN (various specimens) – 'Travailleur', S Bay Gascogne, 43°01′N, 0°25′E, 420 m. MNHN (p3820) – 'Talisman', Gascogne Bay. MNHN (various specimens) – 'Talisman', off Sahara, 25°41′N, 13°35.46′W, 410 m.

***Description.*** Body is funnel-like, basiphytose with thin walls and very large osculum. The marginal parts are often everted and turned downwards. The sponge is often large. The holotype is about 600 mm long, the largest specimen is a tubular fragment of the upper part of the sponge 900 mm long. The maximum diameter is usually similar to the length while the diameter of the lower part is much smaller. Some short rhizophytose-like processes may be

present in the lower part of the body. Spicules. The choanosomal skeleton is composed of diactines which can be divided into three types. The largest ones are 16–22/0.038–0.076 mm, they have conically pointed or rounded rough terminations and even shafts. The intermediate choanosomal diactines are the most numerous choanosomal spicules. They are over 1.5 mm long and 0.004–0.009 mm in diameter. Their terminations are similar to the largest diactines while the shafts have a widening or four rudimentary tubercles in the middle. The small diactines are about 0.4 mm long and 0.004–0.009 mm in diameter, they have a widening in the middle and are entirely rough. In their dimensions the small diactines are similar to the dermal and atrial spicules but no other transitional forms between these spicule types exist hence they are referred to choanosomal spicules. Hypodermal pentactines have orthotropal tangential rays 0.4–1.8/0.009–0.023 mm, the proximal rays are several times longer than the tangential ones. The tangential rays are smooth with rounded rough terminations. The proximal ray is smooth or rough. Hypoatrial pentactines are rare, they are equal to the dermal ones. Dermalia are chiefly pentactines with the unpaired ray distally directed or sometimes hexactines, one specimen MNHN (p3854) has a considerable number of stauractines among dermal and atrial spicules. A short rudiment is situated in the pentactines instead of the proximal ray. The distal ray of dermal pentactines is 0.054–0.243 mm long, the tangential rays are 0.065–0.205 mm long. The rays of dermal pentactines are 0.009–0.015 mm in diameter and have rounded terminations. The distal ray is spinose (nearly pinular), the tangential ones are spiny or rough. Atrialia are mostly hexactines with proximal ray usually the longest 0.069–0.380 mm long, tangential rays are 0.084–0.236 mm long, distal one is 0.061–0.198 mm long. These rays are 0.009–0.017 mm in diameter. The shape of the proximal ray of atrial hexactines is similar to that of distal ray of dermal pentactines while all their other rays are similar to each other. Atrial pentactines are similar to dermal ones. Their proximal ray is 0.053–0.266 mm long, the tangential rays are 0.053–0.175 mm. Microscleres. Microscleres are macrodiscohexasters or macrodiscasters and microdiscohexasters. The macrodiscohexasters and macrodiscasters are 0.040–0.106 mm in diameter, their primary rosettes are 0.004–0.014 mm in diameter. The secondary rays have clavate terminations with a circular row of spines forming hardly distinguishable disc, their shafts are rough. The macrodiscohexasters are common spicules in most specimens examined while macrodiscasters with nearly spherical primary rosettes were found (together with the former type) only in some specimens (BMNH 1889.01.08.001; MNHN (p3820); IORAS 5/2/900.1), and they are predominant over 'normal' macrodiscohexasters in specimen MNHN (p3855). The microdiscohexasters are 0.018–0.036 mm in diameter with primary rosette 0.004–0.011 mm in diameter. The microdiscohexasters and macrodiscohexasters are barely distinguished from each other in specimen MNHN (p4081) because of the presence of transitional forms. Microdiscohexasters are located in the vicinity of atrial surface. In poor fragments which have no well-represented atrial area these spicules were not found (for instance in the schizoholotype). One specimen MNHN (p3854) contains a considerable number of hexasters 0.061–0.101 mm (av. 0.077 mm) in diameter with primary rosette 0.007–0.011 mm (av. 0.010) in diameter. It is supposed that these hexasters have allochthonic origin as well as dermal or atrial stauractines (see above).

***Remarks.*** The genus *Asconema* was previously considered to be monospecific but is revised to contain 5 species, including the previously known *A. setubalense* Kent, 1870b, with *A. foliata* (Fristedt, 1887) reinstated, and 3 new species (2 of which are subdivided into 3 and 4 subspecies) (Tabachnick, in press). These new species are characterised by combinations of microscleres, various hypodermal pentactines which have tangential rays smooth, rough and spiny.

The placement of *Hyalascus foliatus* in *Asconema* is equivocal but has more support than leaving it in *Hyalascus*. Ijima probably overlooked this species in his monographs (1904; 1927). *Hyalonema foliata* of Fristedt (1887) was transferred to *Hyalascus* by Hentschel (1929), and followed by Koltun (1964a). No material of this species has been examined to confirm or refute this action. Discohexasters described by Fristedt (1887) are relatively large, 0.16 mm in diameter, while true species of *Hyalascus* have microdiscohexasters less than 0.1 mm in diameter. Discohexasters of '*foliata*' are similar in shape (comparing illustrations) and size to large discohexasters of *Asconema*. Searching for the taxonomic position of '*foliata*' I tentatively include it in *Asconema* but no comment can be made concerning whether it should be synonymised with *A. setubalense* or retained as a separate species. To ascertain the correct generic allocation of '*foliata*' it is necessary to elucidate whether the unpaired ray of dermal pentactine is distal or proximal. If distal than it likely belongs to *Asconema* and microdiscohexasters should be searched for that could lead to its merging with *A. setubalense*. The sponge is basiphytose but some short rhizophytose-like processes can be found in the lower part of the body. One new species (Tabachnick, in press) has hypoatrial hexactines with spiny proximal ray in addition to hypoatrial pentactines. *Asconema setubalense* has been revised and its distribution is restricted to the coasts of Spain, Portugal and Morocco, depth 110–2075 m.

**Distribution**

N Atlantic, depth 93–4270 m.

## *AULOSACCUS* IJIMA, 1896

**Synonymy**

*Aulosaccus* Ijima, 1896: 252. *Calycosaccus* Schulze, 1899: 30.

**Type species**

*Aulosaccus schulzei* Ijima, 1896 (by monotypy).

**Definition**

Saccular Rossellinae with the largest spherical discohexasters or discasters having numerous secondary rays while their primary rays are not strobiloidal.

**Diagnosis**

Body is saccular, with thick walls, basiphytose. Choanosomal skeleton is composed of diactines. Hypodermal spicules if present are pentactines. Dermalia are various combinations of stauractines, pentactines, hexactines and diactines (hexactines' distal ray may be pinular). Atrialia are mainly hexactines (their proximal ray may be pinular). Microscleres are discohexasters, hexasters, hemihexasters

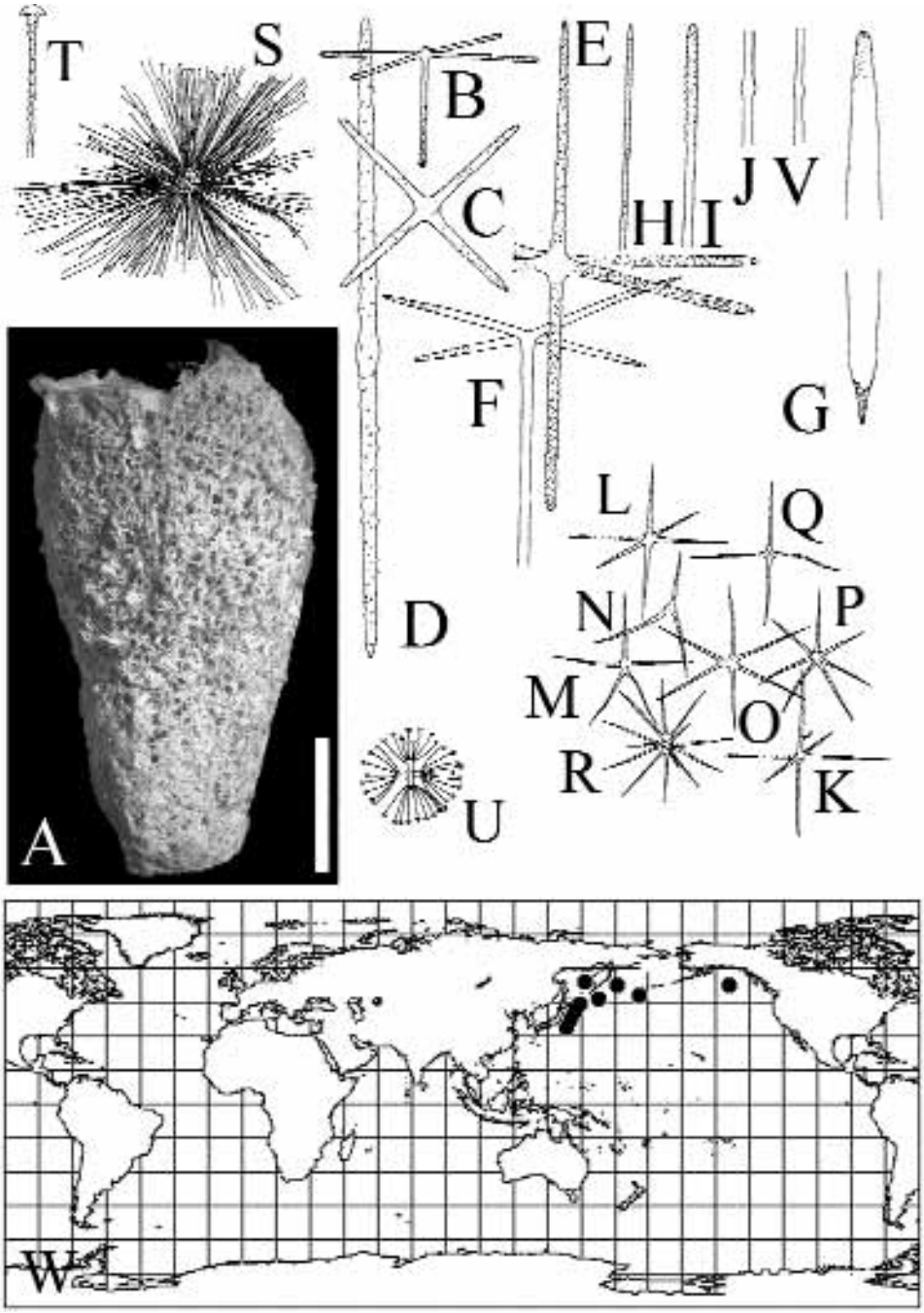


**Fig. 13.** *Aulosaccus schulzei*. A, external shape (holotype) (after Ijima, 1904) (scale 100 mm). B, dermal pentactine 120×. C, dermal stauractine 120×. D, dermal diactine 120×. E, atrial hexactine 120×. F, hypodermal pentactine 60×. G, large choanosomal diactine 60×. H–I, terminations of choanosomal diactines 120×. J, V, central parts of choanosomal diactines 120×. K, L, hexactines 230×. M–Q derivatives of hexactines 230×. R, hexaster 230×. S, discaster 60×. T, outer end of secondary ray of discaster 460×. U, microdiscohexaster 460×. B, K, M–Q, S, U, from Ijima (1904). C–G, R, from Koltun (1967). H–J, V, L, T, IORAS 5/2/2026. W, distribution of *Aulosaccus*.

and sometimes hexactines. Discohexasters are of two or rarely three types: large spherical discohexasters or discasters with numerous secondary rays, sometimes intermediate-sized discohexasters and microdiscohexasters.

### Description of type species

*Aulosaccus schulzei* Ijima, 1896 (Fig. 13).

***Synonymy.*** *Aulosaccus schulzei* Ijima, 1896: 252.

***Material examined.*** Holotype: unavailable, Sagami Bay, NW Pacific, depth 117–418 m. Other material. BMNH 1938.04.04.031, BMNH 1938.04.04.123, BMNH 1938.04.04.142 – Okhotsk Sea. USNM 22110 – 'Albatross', 46°42.0′N, 151°45.0′E, depth 419 m. IORAS 5/2/2022; 5/2/2026; 5/2/2025; 5/2/2024; 5/2/2023 – 'Academic Oparin', 55°22.5′N, 146°34.1′E, depth 163 m.

***Description.*** Holotype is vase-like, 450 mm long and 225 mm in diameter, osculum about 150 mm in diameter, walls about 25–50 mm thick. Subatrial cavities up to 30 mm in diameter.

Spicules. The choanosomal skeleton is composed of diactines 1–17/0.010–0.100 mm. The diactines have conically pointed terminations smooth or rough and barely distinct widening in the middle. Some large diactines are up to 30/0.18 mm, they have smooth or rough terminations, conically pointed or rounded. Hypodermal pentactines are sometimes absent, for example in the holotype (Ijima, 1904), but when present they have tangential rays 0.18–1.50 mm long, the ray directed inside the body is up to 3 mm long, with diameter up to 0.045 mm. The terminations of hypodermal pentactines are rough and conically pointed. Dermalia are rough stauractines, pentactines, diactines and sometimes hexactines. In the holotype pentactines predominate over stauractines (Ijima, 1904), while in other specimens the opposite situation occurs. Pentactines usually have the tubercle-like rudiment of the sixth ray. Stauractines, pentactines and hexactines have rays 0.046–0.250/0.007–0.012 mm (in material examined rays are shorter, 0.046–0.198 mm long). Dermal spicules have rounded terminations. Dermal diactines are 0.220–0.560/0.010–0.022 mm. They are rough with a widening in the middle and rounded terminations. Their rays are longer those of other dermal spicules. Atrialia are hexactines. Diactines, similar to dermalia, were described by Koltun (1967) but these were not found in the atrial-hypoatrial area and these spicules are probably dermal as well as rare atrial pentactines and stauractines described by Ijima (1904). Atrial hexactines have distal ray 0.046–0.280 mm long, tangential rays are 0.061–0.228 mm, proximal ray is 0.064–0.380 mm, with diameter 0.010–0.015 mm. Microscleres. Microscleres are discasters, discohexasters, hexactines, hemihexasters and sometimes hexasters. Discasters are large spherical with numerous secondary rays 0.400–1.00 mm in diameter, with primary rosette spherical in shape, 0.046–0.084 mm in diameter, typical for the genus. Their secondary rays are covered with numerous spines, the discs are pileate with serrated margin. The lengths of secondary rays vary from 0.095 to 0.475 mm, hence these spicules may be called anisodiscasters. Microdiscohexasters are 0.022–0.054 mm in diameter, diameter of primary rosette is 0.007–0.018 mm. Hemihexasters and hexactines are more abundant than hexasters in the holotype (Ijima, 1904) while in the other specimens hexasters are predominant. Hexactines are 0.058–0.162 mm in diameter. Hexasters and hemihexasters are 0.061–0.144 mm in diameter with primary rosette 0.007–0.014 mm in diameter. All these spicules have rough rays, sometimes with spines.

***Remarks.*** The genus contains 6 species. The generic diagnosis was developed from Ijima (1904) and Koltun (1967). Ijima (1904) mentioned the absence of hypodermal pentactines as the most important character of *Aulosaccus*, differentiating it from the closely allied genera *Rossella* and *Scyphidium*. Subsequently, however, hypodermal pentactines were described in new species: *A. albatrossi* (Okada, 1932); *A. fissuratus* (Okada, 1932), as well as in *A. schulzei* (Koltun, 1967). In contrast, Okada (1932) suggested the most important character was the type of macrodiscohexasters (termed here large spherical discohexasters or discasters with numerous secondary rays). According to his suggestion *A. mitsukurii* (Ijima, 1898; 1904), which has no large discoidal microscleres (and consequently seemed to Ijima to be a doubtful member of the genus *Aulosaccus*), should be transferred to *Hyalascus*. I do not support Koltun's suggestion (1967) to synonymise *A. schulzei* and *Hyalascus attenuatus* (Okada, 1932). Moreover I consider *Aulosaccus* and *Hyalascus* to be distinct genera.

Spiny dermal diactines were found among other more characteristic dermal spicules in *A. schulzei, A. albatrossi* (Okada, 1932) and *A. fissuratus* (Okada, 1932; Koltun, 1967). Large spherical discasters with numerous secondary rays are found in most representatives of the genus except *A. ijimai* (Schulze, 1899) which has instead discohexasters with the well-observed primary rosette carrying pileate secondary rays.

*Hyalascus attenuatus* Okada (1932) is not considered to be junior synonym of *A. schulzei* contrary to the suggestion of Koltun (1967) (see remarks for the genus).

**Distribution**

N Pacific, depth 117–1600 m.

## *BATHYDORUS* SCHULZE, 1886

**Synonymy**

*Bathydorus* Schulze, 1886: 49.

**Type species**

*Bathydorus fimbriatus* Schulze, 1886 (by subsequent designation; Koltun, 1967).

**Definition**

Saccular Rossellinae with holactinoidal and asterous microscleres bearing oxyoidal terminations; lacking pappocomes.

**Diagnosis**

Body is tubular or saccular, basiphytose, thin-walled. Choanosomal skeleton is composed of diactines sometimes with some hexactines. Hypodermal spicules are regular pentactines. Dermalia are combinations of various spicules, from hexactines to diactines. Atrialia are hexactines. Microscleres are combinations of hexasters, hemihexasters and hexactines.

**Description of type species**

*Bathydorus fimbriatus* Schulze, 1886 (Fig. 14).

***Synonymy.*** *Bathydorus fimbriatus* Schulze, 1886: 50.

***Material examined.*** Lectotype (here designated): BMNH 1887.10.20.059 – 'Challenger', 37°41′N, 177°04′W, depth 5300 m. ? Paralectotype: BMNH unregistered – possibly the second 'Challenger' specimen but labels missing. Not BMNH 1887.10.20.058 (several fragments) – another species of *Bathydorus*.

***Description.*** The sponge is thin-walled, tubular or saccular. Paralectotype (?) tubular upper part of the body at least 200 mm long, about 13 mm in diameter, osculum is 8 mm in diameter, the walls are 1–1.5 mm thick. Spicules. The choanosomal skeleton is composed of two types of diactines. The larger diactines are about 17 mm long and 0.06–0.12 mm in diameter. The smaller ones are 2.2 mm long and larger and 0.007–0.008 mm in diameter. The smaller diactines have rough terminations usually rounded or slightly clavate, rarely conically pointed. They usually have no widenings in the middle or rarely a hardly distinguishable swelling. Hypodermal pentactines have tangential rays 0.46–0.65/0.009–0.015 mm, the proximal rays are longer. The terminations of the

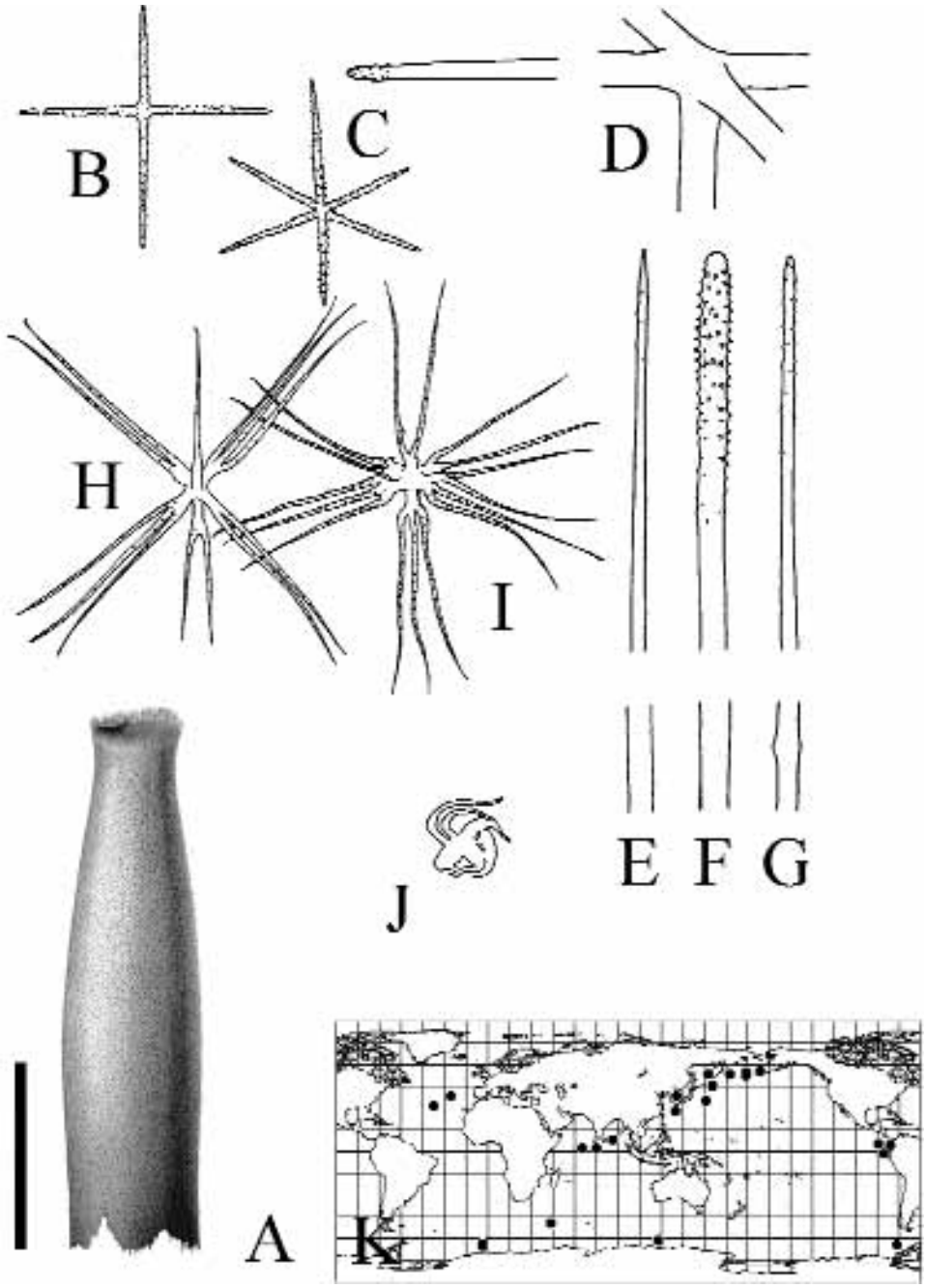


**Fig. 14.** *Bathydorus fimbriatus*. A, external shape (after Schulze, 1887a)(scale 70 mm). B, dermal stauractine 190×. C, atrial hexactine 190×. D, hypodermal pentactine 190×. E–G, choanosomal diactines 190×. H, hemihexaster 360×. I, hexaster 360×. J, abnormal microsclere 360×. B–J, BMNH 1887.10.20.059. K, distribution of *Bathydorus*.

rays are rough and rounded. Dermalia are stauractines (rarely triactines and pentactines) with rays 0.041–0.104/ 0.004–0.005 mm. The rays have rough or spiny rounded terminations. Atrialia are hexactines with all the rays of similar length. The atrial spicules are more spiny than the dermal ones, their rays are 0.044–0.093/ 0.004–0.005 mm with terminations conically pointed. Microscleres. Microscleres are hexasters and hemihexasters. They are 0.068–0.115 mm in diameter with primary rosette 0.011–0.022 mm in diameter. These spicules have 'calycoidal' shape – their primary rays are widened into a calyx while secondary rays are gathered in a parallel tuft. The secondary rays are rough or spiny often with slightly curved terminations. Some of these microscleres have spines. A few abnormal strongly curved microscleres can be found among the common types.

***Remarks.*** The scope of this genus is restricted here to contain 8 species (one still undescribed, from the N Pacific, 6800–7300 m depth, with dermalia consisting mainly of hexactines). The genus previously also included *B. baculifer* (Schulze, 1886; 1887a) and *B. stellatus* (Schulze, 1886; 1887a), both possessing microdiscohexasters, which are now referred to the genus *Hyalascus*. *Bathydorus pedunculatus* (Ijima, 1927) has a long peduncle and is transferred to the genus *Crateromorpha* and tentatively to the subgenus *Aulochone*. This revision allows us to restrict the diagnosis of the genus *Bathydorus* which previously overlapped with other genera

Hoo-154.qxd 10/7/04 2:16 AM Page 1465



of Rossellidae. Nevertheless, the genus requires further revision. I do not agree with suggestions of Koltun (1967) to unite *B. fimbriatus, B. levis* and *B. spinosus* into a single taxon, requiring a re-examination of all type material. The specimen identified by Schulze as *B. fimbriatus* (BMNH 1887.10.20.058) is a new species because its hexasters have spherical shape with secondary rays distributed in all directions.

**Distribution**

Cosmopolitan, except Arctic Ocean, depth 163–7300 m.

## *CAULOPHACELLA* LENDENFELD, 1915

**Synonymy**

*Caulophacella* Lendenfeld, 1915: 64.

**Type species**

*Caulophacella tenuis* Lendenfeld, 1915 (by monotypy).

**Definition**

Pedunculate Rossellinae with dermalia and atrialia pentactines, and hexactines in which the pinular ray is directed outside the body; all microscleres have oxyoidal terminations.

**Diagnosis**

Thin-walled, basiphytose sponge. Choanosomal spicules are diactines and hexactines. Dermalia and atrialia are pinular pentactines. Hypodermalia and hypoatrialia are pentactines. Microscleres are hexasters and hemihexasters.

**Description of type species**

*Caulophacella tenuis* Lendenfeld, 1915 (Fig. 15).

***Synonymy.*** *Caulophacella tenuis* Lendenfeld, 1915: 64.

***Material examined.*** Holotype: unknown (the description is summarised from the literature) – 'Albatross', 16°32.5′S, 119°54.0′W, depth 3679 m.

***Description.*** The only known specimen is a lamella-like fragment 15 × 18 mm and about 1 mm thick. Spicules. Choanosomal spicules are diactines and hexactines. The diactines are 3–17/0.010–0.050 mm, their terminations are sharply pointed. The hexactines have smooth rays 0.5–1/0.020–0.045 mm with tuberculated or rough tips. Dermalia and atrialia are pinular pentactines with a rudimentary tubercle, or rarely hexactines. The tangential rays are covered with short spines. Pinular pentactines of these two surfaces have different lengths. The large ones are dermal spicules and vice versa (Lendenfeld, 1915). The distal ray of 'dermal' spicules is 0.270–0.373 mm long, 0.006–0.013 mm in diameter at base and 0.014–0.022 mm in maximum diameter, tangential rays are 0.120–0.232/0.005–0.012 mm, the proximal one is 0.005–0.0016/0.006–0.013 mm. The distal ray of 'atrial' spicules is 0.150–0.180/0.005–0.007 mm at base and 0.005–0.015 mm in maximum diameter, tangential rays are 0.085–0.130/0.005–0.006 mm, the distal one is 0.005–0.010/0.005–0.007 mm. Hypodermalia and hypoatrialia have different sizes. Hypodermal pentactines have tangential rays 0.5–1.1/0.014–0.032 mm, with the corresponding rays of hypoatrial pentactines 0.110–0.330/0.007–0.014 mm. The position of these spicules is defined corresponding to dermal and atrial spicules. Microscleres. Microscleres are hexasters and hemihexasters with rays covered by short spines. Hexasters are more numerous than hemihexasters. They are 0.100–0.137 mm in diameter, with primary rosettes 0.016–0.022 mm.

***Remarks.*** This is a poorly known genus with 1 species. The external shape is unknown because the sponge was collected and described from a single fragment. It is close to *Caulophacus* and *Caulodiscus* differing by their microscleres. *Caulophacella* has oxyoidal spicules whereas *Caulophacus* and *Caulodiscus* have instead spicules with discoidal or onychoidal terminations. *Caulophacella* is also similar to *Sympagella-Calycosoma* in having asterous spicules but lacks strobiloplumicomes.

**Distribution**

Central S Pacific, depth 3679 m.

## *CAULOPHACUS* SCHULZE, 1886

**Synonymy**

*Caulophacus* Schulze, 1886: 46. Part of *Hyalonema – H. arcticum* Hansen, 1885; 19. *Polyrhabdus* Schulze, 1886: 45; 1887a: 121. *Pleorhabdus* (correction of *Polyrhabdus*) Schulze, 1887a: 541. *Balanites* Schulze, 1886: 45; 1887a: 122. *Balanella* (correction of *Balanites*) Schulze, 1887a: 541. *Caulodiscus* Ijima, 1927: 346.

**Type species**

*Caulophacus latus* Schulze, 1886 (by subsequent designation; Koltun, 1967).

**Definition**

Pedunculate Rossellinae with dermalia and atrialia pentactines and hexactines in which the pinular ray is directed outside the body, all microscleres have discoidal, onychoidal terminations (rarely accompanied by oxyoidal ones).

**Diagnosis**

Body is fungus-like or cup-like, basiphytose with long stalk. Choanosomal spicules are diactines and hexactines. Dermalia are pinular hexactines sometimes together with pentactines. Atrialia are pinular pentactines, sometimes hexactines or both. Hypodermalia and hypoatrialia are pentactines. Microscleres are represented chiefly by spicules with discoidal and onychoidal terminations (rarely with oxyoidal ones).

**Remarks**

*Caulodiscus* (Ijima, 1927) is returned here into synonymy with *Caulophacus*, as a subgenus, given that some new specimens off New Caledonia have microscleres transitional between *Caulophacus* and *Caulodiscus*. There are no data to synonymise these genera completely at this stage. Hence, the genus now contains about 18 species.

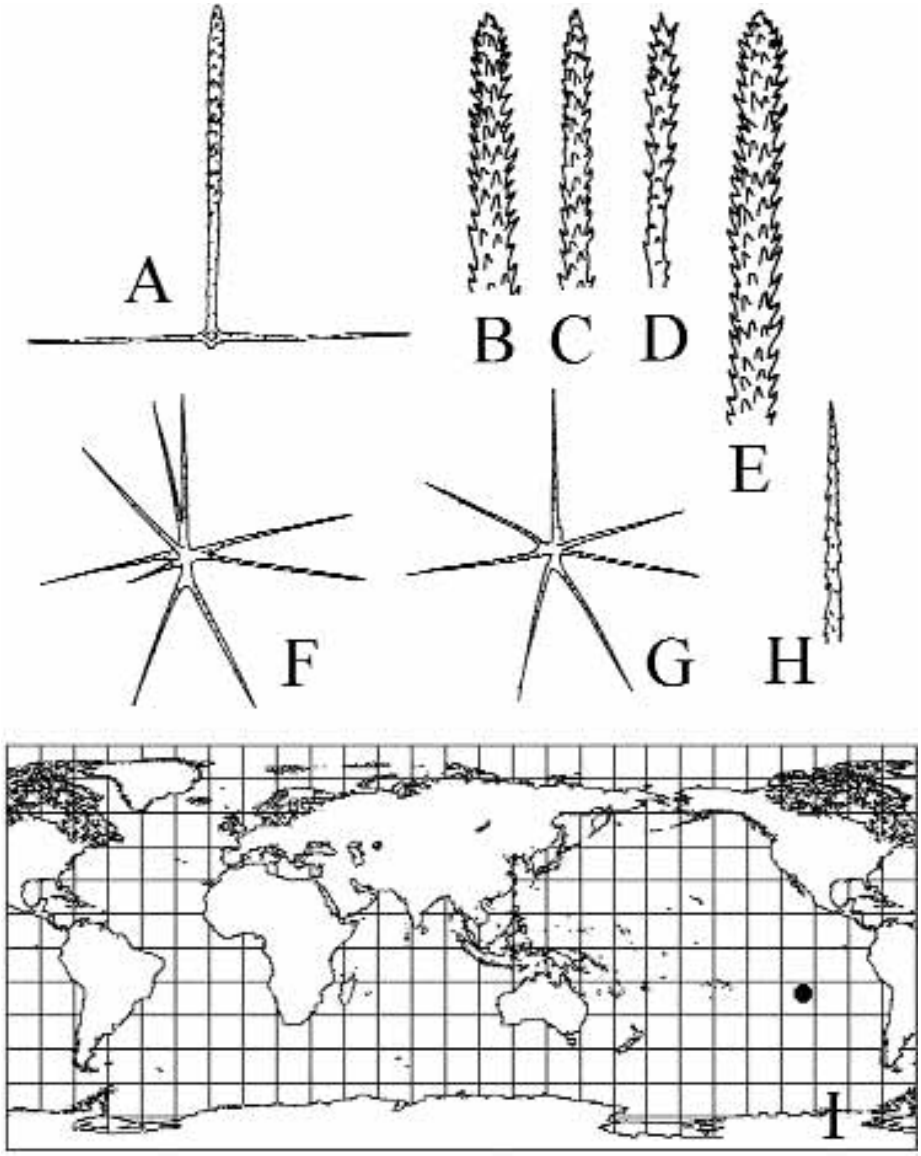


**Fig. 15.** *Caulophacella tenuis*. A, dermal pinular pentactine 130×. B–E, pinular rays 400×. F–G, hemihexasters 400×. H, ray of hemihexaster 1330×. A–H, from Lendenfeld (1915). I, distribution of *Caulophacella*.

The choanosomal hexactines have smooth rays or short-spiny at their base, but sometimes one ray is short-spiny and the others are smooth (*C. (Caulophacus) oviformis* (Schulze, 1886); *C. (Caulophacus)* sp. nov. and *C. (Caulodiscus)* sp. nov. (the latter two off New Caledonia; Tabachnick & Lévi, in press). Such hexactines are similar to the huge hexactines of some Euplectellidae.

**Distribution**

Cosmopolitan (Fig. 16), depth 133–6770 m.

***CAULOPHACUS (CAULOPHACUS)* SCHULZE, 1886**

**Synonymy**

*Caulophacus* Schulze, 1886: 46. Part of *Hyalonema – H. arcticum* Hansen, 1885; 19. [*Polyrhabdus*] Schulze, 1886: 45; 1887a: 121. *Pleorhabdus* (correction of preoccupied [*Polyrhabdus*]) Schulze, 1887a: 541. [*Balanites*] Schulze, 1886: 45; 1887a: 122. *Balanella* (correction of preoccupied [*Balanites*]) Schulze, 1887a: 541.

**Type species**

*Caulophacus latus* Schulze, 1886 (by subsequent designation; Koltun, 1967).

**Definition**

*Caulophacus* with microscleres mainly having discoidal terminations.

**Diagnosis**

Body is mushroom-shaped or cup-like, basiphytose with long stalk. Choanosomal spicules are diactines and hexactines.

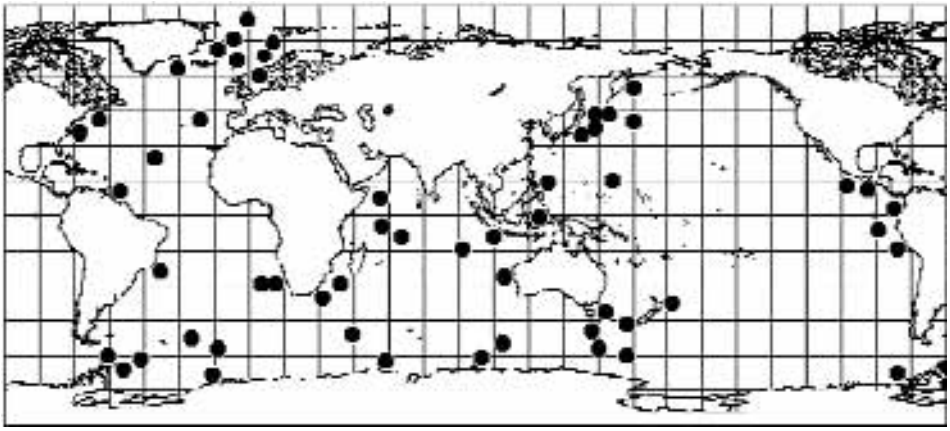

**Fig. 16.** Distribution of *Caulophacus.*

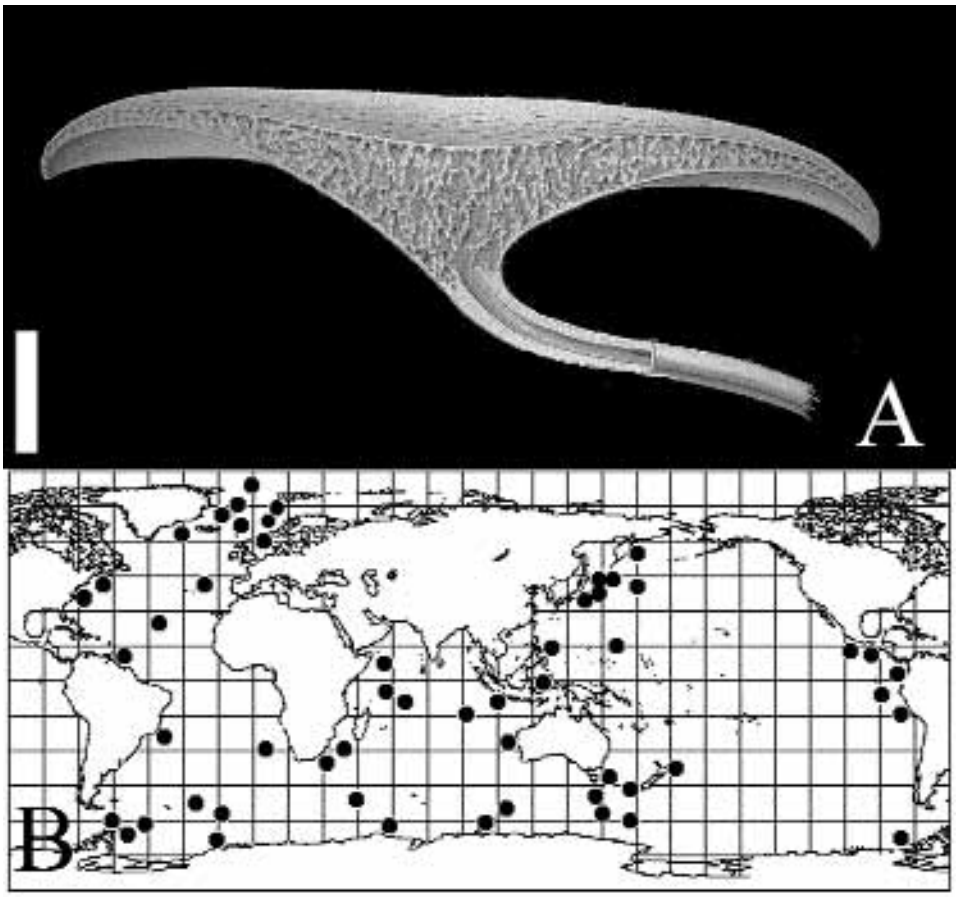


**Fig. 17.** *Caulophacus (Caulophacus) latus*. A, external shape (after Schulze, 1887a) (scale 20 mm). B, distribution of *Caulophacus* (*Caulophacus*).

Dermalia are pinular hexactines sometimes together with pentactines. Atrialia are pinular pentactines sometimes hexactines or both. Hypodermalia and hypoatrialia are pentactines. Microscleres are represented chiefly by spicules with discoidal terminations. Usually they can be divided into two categories. The first are spicules with thick rays covered with dense spines: usually discohexactines but also discohexasters, hemidiscohexasters and rarely discasters. The second are discohexasters with thin, smooth or rough secondary rays usually in the form of lophodiscohexaster but sometimes calycocomes and spherical discohexasters are present among them.

**Description of type species**

*Caulophacus (Caulophacus) latus* Schulze, 1886 (Figs 17–18).

***Synonymy.*** *Caulophacus latus* Schulze, 1886: 46.

***Material examined.*** Holotype: BMNH 1887.10.20.038 (fragment) – 'Challenger', 46°16′S, 48°27′E, depth 2880 m.

***Description.*** The species is known by a single mushroom-like specimen, with discoidal body about 155 mm in diameter and maximum thickness about 15 mm near the stalk. The rounded stalk is about 5 mm in diameter with central cavity about 2 mm in diameter. Spicules. Choanosomal spicules are diactines

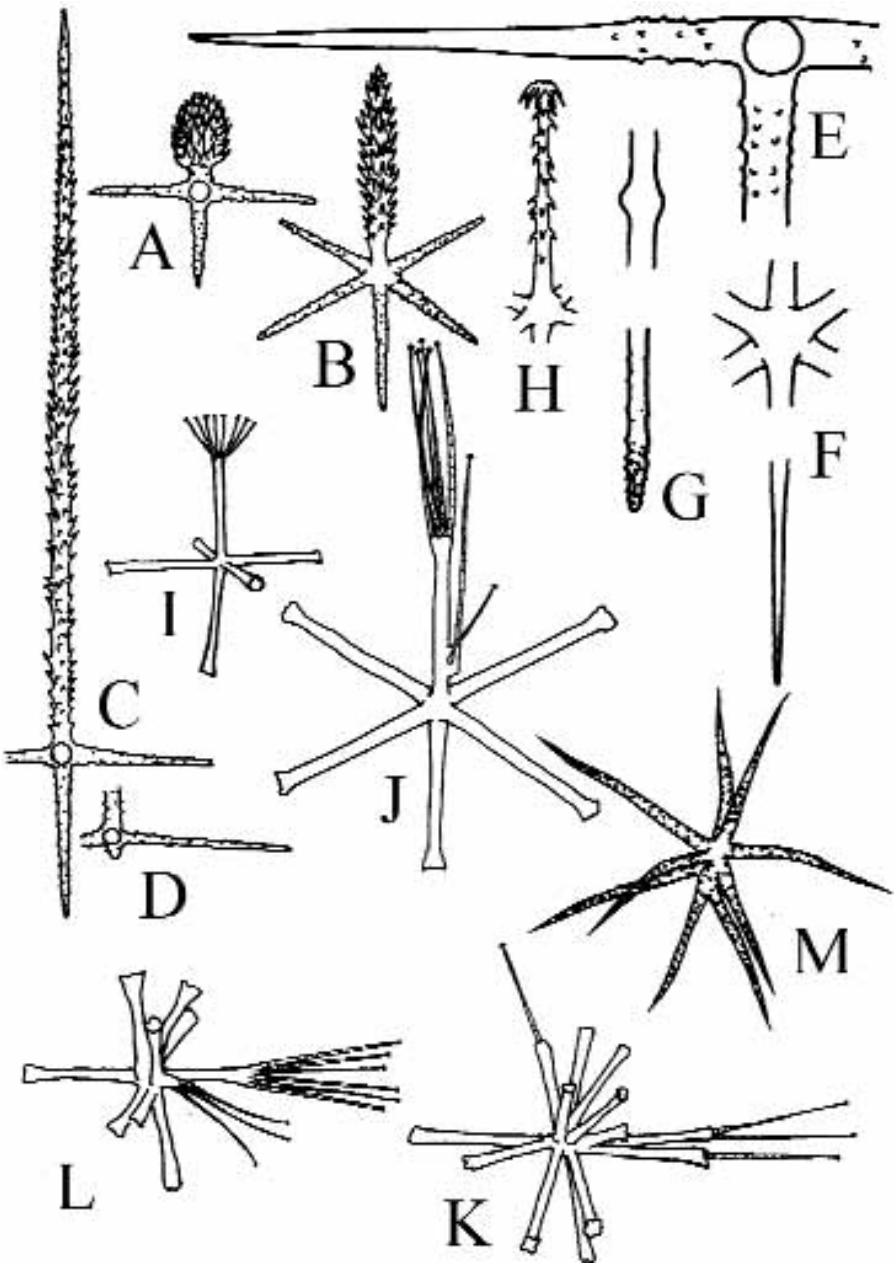


**Fig. 18.** *Caulophacus (Caulophacus) latus.* A–B, dermal hexactines 190×. C, atrial hexactine 190×. D, atrial pentactine 190×. E, hypodermal pentactine 190×. F, choanosomal hexactine 190×. G, choanosomal diactine 360×. H, discohexactine 360×. I, lophodiscohexaster 360×. J, calycocome 360×. K–L, 'discomultiasters' 360×. M, hemihexaster 360×. A–M, BMNH 1887.10.20.038.

1.5/0.006–0.011 mm (which sometimes have a widening in the central part and rounded rough terminations) and hexactines with rays up to 0.40–1.4/0.011–0.076 mm. The diactines of the stalk are fused by synapticular junctions. Dermalia are pinular hexactines, rarely pentactines. The pinular ray of dermal pentactines are of two kinds: spherical and spindle-like in shape (the former are shorter than the latter). The pinular ray of the dermal hexactines is 0.061–0.129 mm long, it is 0.009–0.023 mm in maximum diameter and 0.006–0.008 mm in diameter at base. The tangential rays are 0.086–0.144 mm long, the ray directed inside the body is 0.068–0.106 mm long if present. All the rays except pinular ones are covered with short spines, they are 0.006–0.008 mm in diameter. Atrialia are hexactines, sometimes pentactines with long gradually tapering pinular ray 0.129–0.775/0.008–0.016 mm. Tangential rays and the ray directed inside the body are 0.068–0.167/0.006–0.014 mm. The rays of atrial spicules are covered with short spines similar to the analogous rays found on dermal spicules. Hypodermalia and hypoatrialia are pentactines. Tangential rays of hypodermal pentactines are 0.36–0.57/0.015–0.038 mm, the proximal ray is about 0.80 mm. These spicules often have spines near the base while the outer parts are smooth with a conically pointed outer end. Microscleres. Most microscleres may be combined into two groups. The first encloses discohexactines with rays covered with numerous spines. They are 0.243–0.486/0.006 mm. Rarely these spicules have the form of hemihexasters. These discohexactines from the atrial and dermal surfaces are very similar in sizes. The other group of microscleres is represented by two forms of discohexasters: calycocomes and lophodiscohexasters (intermediate forms were also found). The discohexasters from dermal and atrial surfaces have different sizes. The dermal discohexasters are

0.083–0.216 mm in diameter with primary rosette 0.040–0.097 mm in diameter. The atrial discohexasters are larger 0.140–0.317 mm in diameter with primary rosette 0.101–0.180 mm in diameter. Some calycocomes demonstrate abnormal forms of discomultiaster with 8–12 primary rays of different length. They are similar to normal calycocomes in shape and size of their rays and hence it is possible that they have an autochthonous origin. Meantime, hemihexasters with slightly curved rays also seem to have an autochthonous origin (they were described by Schulze, 1887a and found again in the type specimen).

***Remarks.*** The BMNH holotype is not labelled as a 'type' as such, but since the original description (Schulze, 1887a) is based on a single specimen from 'Challenger' station 127 it is assumed that the fragment stored in the BMNH is part of the holotype (the location of the remainder of the holotype is unknown, if still extisting).

The subgenus now contains about 15 species. Hypodermal and hypoatrial pentactines often have spines near the base of the ray directed inside the body as well as of tangential rays. Hexactines and floricomes are usually absent in *C. (Caulophacus)* but *C. (Caulophacus) variens* (Tabachnick, 1988) contains discohexactines with floricoidal rays and rays with curved terminations in hexactines. Discohexactines are very rare or they have allochthonous origin in *C. oviformis,* (Schulze) 1886. This feature is so outstanding for *Caulophacus* that reconstruction of the genus *Pleorhabdus*, as a subgenus of *Caulophacus*, is highly likely.

In the reinvestigated specimen of *C. (Caulophacus) latus* some calycocomes are represented by abnormal forms with 8–12 primary rays. These spicules closely resemble discoctasters of abolished here Acanthascinae (Rossellidae) and should be called 'discomultiasters'. Another type of microscleres found in *C. (Caulophacus) latus* are hemihexasters which probably have allochthonous origin. Lophodiscohexasters and calycocomes often have some discoidal secondary rays which are fixed one by one on the primary rosette as for some discoctasters in *Acanthascus*.

It is possible to hypothesise that hemihexasters together with discomultiasters belong to a sponge of the *Acanthascus* complex (some species of *Acanthascus (Rhabdocalyptus)* are described from adjacent areas of S Africa and Antarctica). But *Rhabdocalyptus* was not recorded from the same 'Challenger' station when *C. (Caulophacus) latus* was collected, which had these amazing discoctasters. Discoctasters and discomultiasters may appear in various groups of Rossellidae. Koltun (1970) has included *Caulophacus lotifolium* of Ijima (1903) and *Caulophacus hadalis* of Lévi (1964a) into *Caulophacus latus* at the range of subspecies. As for *C. lotifolium* it is better to consider it as a representative of a separate subgenus *Caulodiscus* while *Caulophacus hadalis* requires further investigations.

### Distribution

Cosmopolitan, depth 133–6770 m.

## *CAULOPHACUS (CAULODISCUS)* IJIMA, 1927

### Synonymy

*Caulodiscus* Ijima, 1927: 346. Part of *Caulophacus – C. lotifolium* Ijima, 1903: 87; *Caulophacus valdivia* Schulze, 1904: 25; *Caulophacus latus lotifolium* Koltun, 1970: 173.

### Type species

*Caulophacus lotifolium* Ijima, 1903 (by original designation).

### Definition

*Caulophacus* with microscleres having various terminations: discoidal, onychoidal, oxyoidal.

### Diagnosis

Body is mushroom-shaped, basiphytose with long stalk. Choanosomal spicules are diactines and hexactines. Dermalia are pinular hexactines. Atrialia are pinular hexactines, rarely pentactines. Hypodermalia and hypoatrialia are pentactines. Microscleres are discohexasters, hemidiscohexasters, discohexactines, onychohexasters, hemionychohexasters, onychohexactines and rarely hexactines and hexasters.

### Description of type species

*Caulophacus (Caulodiscus) lotifolium* (Ijima, 1903) (Fig. 19).

***Synonymy.*** *Caulophacus lotifolium* Ijima, 1903: 87. *Caulophacus latus lotifolium* Koltun, 1970: 173.

***Material examined.*** Holotype: not seen, reportedly in Stuttgart (Ijima, 1903) – off Japan, Sagami bay, depth 572 m.

***Description (from the literature).*** Body. Holotype has mushroom-shaped body with total length 410 mm, and stalk about 75% of the total length. The diameter of the body is 132 mm. The tubular stalk is 8–10 mm in diameter, with central canal about 3 mm in diameter. Other known specimens have the body 10–50 mm in maximum diameter (Koltun, 1970). Spicules. Choanosomal spicules are diactines 2–3/0.011–0.022 mm which sometimes have a widening in the central part and hexactines with rays up to 0.44–1.6/0.022–0.028 mm. These spicules are smooth with rough terminations. The diactines of the stalk are thicker than the choanosomal ones – about 0.035 mm in diameter. Dermalia are pinular hexactines, pentactines are found in the lower part of the stalk. The pinular ray of hexactines is spindle-like in shape while in pentactines it is spherical. The pinular ray is 0.055–0.140, sometimes up to 0.18 mm. It is 0.027–0.060 mm in diameter in the middle, and about 0.011 mm – at base. The tangential and proximal rays are 0.088–0.120 mm long. Atrialia are hexactines with pinular ray gradually tapering towards the end 0.220–0.715 mm long about 0.012 mm in diameter at base and about 0.030 mm in maximal diameter. Tangential rays are 0.110– 0.132 mm long, proximal ray is 0.088–0.100 mm. All the rays are rough except pinular spicules. Hypodermalia and hypoatrialia are pentactines. Tangential rays of hypodermal pentactines are 0.33–0.60/ 0.023–0.030 mm, the proximal ray is 0.46–0.95 mm. Tangential rays of hypodermal pentactines from the lower part of the stalk are about 0.1 mm long with proximal ray 3–4 times longer. Hypoatrialia are similar to hypodermalia. Microscleres. Microscleres have discoidal and onychoidal terminations. The former are represented by following types: discohexasters, hemidiscohexasters, discohexactines. The latter are onychohexasters, hemionychohexasters and onychohexactines. Some of the specimens described by Koltun (1970) contain discohexasters in the form of calycocomes (they are called lophodiscohexasters) which are 0.055–0.330 mm in diameter. The discohexasters of the holotype are 0.060–0.092 mm in diameter, its discohexactines are 0.060–0.220 mm in diameter. Spicules with onychoidal terminations seem to be similar in size to the corresponding types of spicules with discoidal terminations.

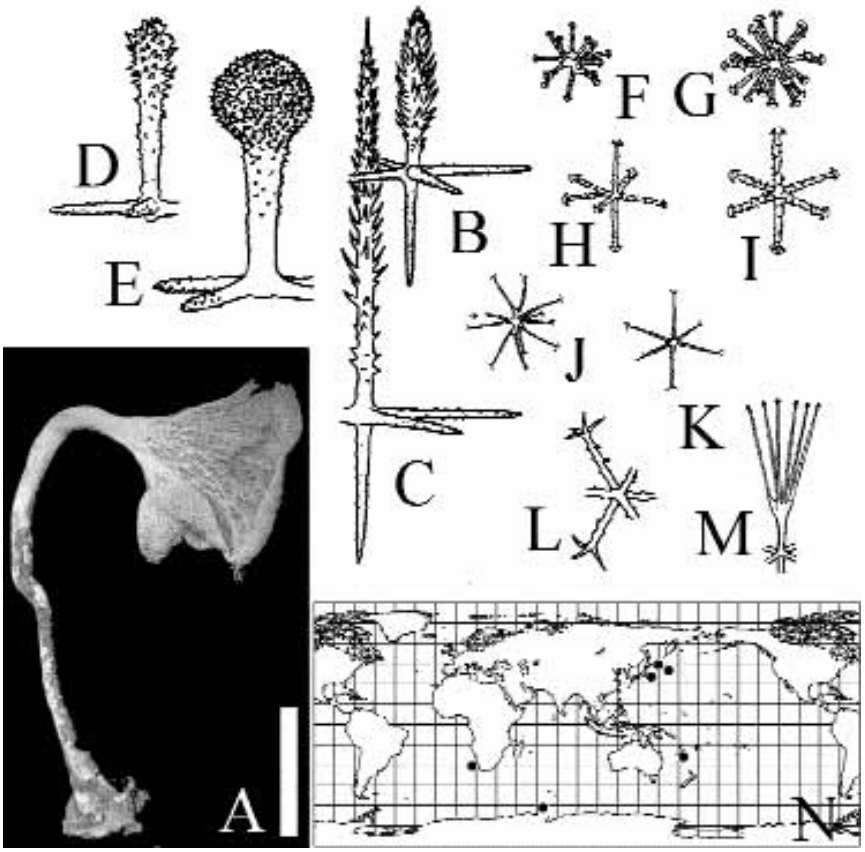


**Fig. 19.** *Caulophacus (Caulodiscus) lotifolium.* A, external shape (after Ijima, 1903)(scale 100 mm). B, dermal pinular hexactine 250×. C, atrial pinular hexactine 250×. D–E, dermal pinular pentactines from the lower part of the stalk 250×. F–G, discohexasters 250×. H, hemidiscohexaster 250×. I, discohexactine 250×. J, hemionychohexaster 250×. K–L, onychohexactine 250×. M, calycocome 250×. B–K, from Ijima (1903). L–M, from Koltun (1970). N, distribution of *Caulophacus (Caulodiscus).*

***Remarks.*** The subgenus contains four species (one new species currently in press). *Caulodiscus* is close to *Caulophacus (Caulophacus)* in shape and spicule composition, but *C. (Caulodiscus)* differs from *C. (Caulophacus)* by the presence of spicules with onychoidal terminations only. Discohexasters in the form of calycocomes are described in some specimens of *C. (Caulodiscus) lotifolium* (Koltun, 1970) (see also the remarks on the genus *Caulophacus*). Koltun (1970) suggested that the type species was a subspecies of *Caulophacus latus* as well as *Caulophacus hadalis* (Lévi, 1964a). This position is not acceptable because it leaves no place for *Caulodiscus.* Moreover, it is possible that *Caulophacus latus lotifolium* described by Koltun (1970) belongs to a new species of the subgenus *Caulodiscus*. Similarly, one new subspecies of *C. (Caulodiscus) lotifolium* is in press (Tabachnick & Lévi).

**Distribution**

NW and S Pacific, S Atlantic, Antarctic ocean, depth 572–6710 m.

## *CRATEROMORPHA* GRAY IN CARTER, 1872

**Synonymy**

*Crateromorpha* Gray in Carter, 1872b: 110 (the genus and species is atributed to Gray by Carter in this publication); Gray, 1872b: 136. Part of *Hyalonema – H. anomalum* Bowerbank, 1877: 461. *Aulochone* Schulze, 1886: 54. ? Part of *Bathydorus – B. pedunculatus* Ijima, 1927: 353.

**Type species**

*Crateromorpha meyeri* Gray, 1872b (by monotypy).

**Definition**

Pedunculate Rossellinae with dermalia and atrialia represented mainly by pentactines in which the unpaired ray is directed inside the body.

**Diagnosis**

Body is mushroom-shaped, funnel-like or cup-like, sometimes with folded surface, attached with peduncle, basiphytose. Choanosomal skeleton is composed of diactines, rarely hexactines. Hypodermal pentactines are found in some species. Dermalia are pentactines, stauractines, rarely hexactines, triactines and diactines. Atrialia are similar to dermalia. Microscleres consist of various combinations of asterous and holactinoid spicules (sometimes with reduction of primary rays number and irregular forms). These spicules have oxyoidal, discoidal and onychoidal terminations.

Hoo-154.qxd 10/7/04 2:16 AM Page 1471



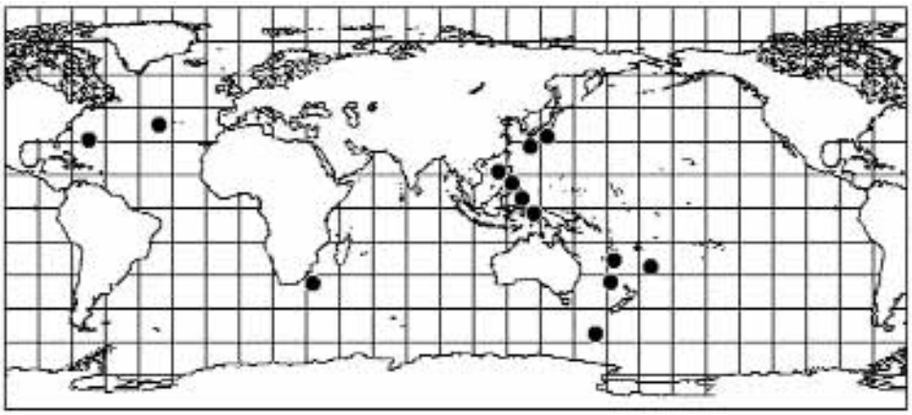

**Fig. 20.** Distribution of *Crateromorpha*.

**Remarks**

The genus contains 10 species with another 2 new species off New Caledonia currently in press (Tabachnick & Lévi, 2004).

The feature which principally distinguishes the genus *Crateromorpha* is the presence of atrial spicules similar to the dermal ones which are both mainly pentactines and stauractines (a very unusual feature for Rossellinae). The difference between two initially described species of *Aulochone, A. lilium* and *A. cylindrica* (Schulze, 1886) and representatives of the genus *Crateromorpha* is nearly invisible – the hypodermal pentactines are absent in the former but they may be rare in some representatives of the latter. So Schulze, who erected both genera again later synonymised them (Schulze, 1897). In contrast, Ijima (1904) recognised both genera because he considered that the absence or presence of hypodermalia was a feature of at least generic significance (for example in his Acanthascinae the distinction of *Acanthascus* from *Rhabdocalyptus* and *Staurocalyptus* is based on the same principle). As it is known now for the genera *Aulosaccus* and *Hyalascus* the presence or absence of hypodermal pentactines varies within genera. Consequently, I suggest to change the generic status of *Aulochone* to a subgenus within *Crateromorpha* since the reasons for their complete unification are not sufficient now and were erroneous earlier (Kirkpatrick, 1907b, footnote p. 21). As for *Crateromorpha (Caledochone)* (Tabachnick & Lévi, subgen. nov.) and the newly described subgenera *Crateromorpha (Craterochone)* and *Crateromorpha (Neopsacas)*, they are distinguished on a more sound base – their combinations of microscleres. The subgenera *C. (Crateromorpha)* and *C. (Aulochone)* are probably synonyms while *C. (Craterochone)* and *C. (Neopsacas)* are well-differentiated taxa such that they may need to be promoted to full genera. Another possible subgenus of *Crateromorpha* may be required for a species off the south of New Zealand that has only microdiscohexasters among the microscleres, but its description is not complete and creation of a new taxon for it would be premature at this time. *Bathydorus pedunculatus* Ijima (1927) is tentatively placed in the subgenus *Crateromorpha (Aulochone)*.

**Distribution**

E and S Pacific, W and Central Atlantic (Fig. 20), depth 134–3746 m.

***CRATEROMORPHA (CRATEROMORPHA)* GRAY IN CARTER, 1872**

**Synonymy**

*Crateromorpha* Gray in Carter, 1872b: 110; Gray, 1872b: 136. Part of *Hyalonema – H. anomalum* Bowerbank, 1877: 461. Part of *Aulochone – A. lankesteri* Kirkpatrick, 1902: 222; *Aulochone (Crateromorpha) lankesteri* Kirkpatrick, 1907b: 21 (in footnote).

**Type species**

*Crateromorpha meyeri* Gray, 1872b (by monotypy).

**Definition**

*Crateromorpha* with hypodermal pentactines and microscleres with onychoidal and discoidal terminations.

**Diagnosis**

Pedonculate sponge with mushroom-shaped, funnel like or cup-like, often folded, basiphytose. Choanosomal skeleton is composed of diactines, rarely hexactines. Hypodermal pentactines present. Dermalia are pentactines and stauractines, rarely triactines, hexactines and diactines. Atrialia are pentactines, rarely hexactines, stauractines and diactines. Microscleres are hexasters, sometimes hemihexasters and microdiscohexasters.

**Descripton of type species**

*Crateromorpha (Crateromorpha) meyeri* Gray, 1872b (Figs 21–23).

***Synonymy.*** *Crateromorpha meyeri* Gray in Carter, 1872b: 110; Gray, 1872b: 136. *Hyalonema anomalum* Bowerbank, 1877: 461. *Crateromorpha corrugata* Ijima, 1898: 49; 1904: 78.

***Material examined.*** Holotype and paratype of *Crateromorpha meyeri* (=*Crateromorpha meyeri meyeri*): BMNH 1887.10.20.065, BMNH 1887.10.20.064 – 'Challenger', off the Philippines (Cebu), 10°14′N, 123°54′E, depth 174 m. Other material. BMNH 1900.09.07.006 – off Japan. BMNH (b564), BMNH 1872.07.27.001 – off the Philippines (Cebu). MNHN (p4680.3) – 'Musorstom 2', 14°00.30–00.40′N, 120°19.30–17.60′E, depth 198–188 m. *Crateromorpha meyeri corrugata*: BMNH (b695),

198–188 m. *Crateromorpha meyeri corrugata*: BMNH (b695), BMNH (b691) – off Japan. MNHN (p3811) – off Japan. *Crateromorpha meyeri rugosa*: BMNH 1898.12.19.016 – off Japan, Sagami bay. USNM 22042 – 'Albatross', 30°54.40′N, 130°37.30′E, depth 188 m. *Crateromorpha meyeri* (S Pacific): IORAS 5/2/2350 – 'Akademic Oparin', 32°48.8′S, 167°36.3′E, depth 373 m. MNHN (p4136) – Biogeocal, 'Coriolis', 21°4.09′S, 167°0.40′E, depth 1760–1870 m. MNHN (p4681.5) – Biocal, 'Jean Charcot', 23°10.30′–10.08′S, 167°42.98′–43.54′E, depth 1000–950 m. MNHN (p4682.5), MNHN (p4683.5) – Biocal, 'Jean Charcot', 23°5.27′–5.43′S, 167°44.95′–45.356′E, depth 700–680 m.

***Description.*** The sponges are vase- or funnel-like, pedunculate. The body of the holotype is 90 mm long, its peduncle is about 90 mm long. The various subspecies have different external shape: cup-like with smooth surface in *C. meyeri meyeri*; the same with irregular prominence in *C. meyeri tuberosa* (Ijima, 1904); with irregular prominence and ridges in *C. meyeri rugosa* (Ijima, 1904; Okada, 1932); with depressions leading into intercommunicating intercanals in *C. meyeri corrugata* (Ijima, 1927; pro *C. corrugata* Ijima, 1898; 1904; Okada, 1932). Specimens collected off New Caledonia have two body forms. The first may have excavated atrial cavity and dermal depressions in the lower part. The second is probably funnel-like. These two representatives also have an unusually long (up to 105 mm long), thin (about 3 mm in diameter) peduncle of simple tubular structure. Formally these specimens may be distinguished as a new subspecies but I consider that it is better to refrain from this distinction (see remarks). Spicules. The choanosomal skeleton is composed of diactines 0.494–1.991/0.008–0.017 mm. These diactines have rounded or clavate rough terminations and often they have a widening usually in the middle. In the lower part of the peduncle these diactines fuse by synapticular junctions. Some specimens have choanosomal hexactines – *C. (Crateromorpha) meyrei tubulosa* (Ijima, 1904). Hypodermal pentactines are usually present in great numbers but in specimens off New Caledonia these spicules are rare or absent completely. The hypodermal pentactines have their terminations conically pointed often rough but sometimes smooth. Their rays are 0.5–1.4/0.023–0.114 mm. Dermalia are stauractines and pentactines, sometimes hexactines and rarely triactines and diactines. The stauractines predominate over the pentactines or vice versa. The dermal spicules usually have rough, but sometimes nearly smooth (BMNH (b695)) rays with rounded terminations. The pentactines and stauractines sometimes have rudimentary tubercles instead of the absent ray. Length of the distal ray of dermal hexactines is 0.023–0.144, the tangential rays of hexactines, stauractines and pentactines are 0.053–0.342 mm, the proximal ray of

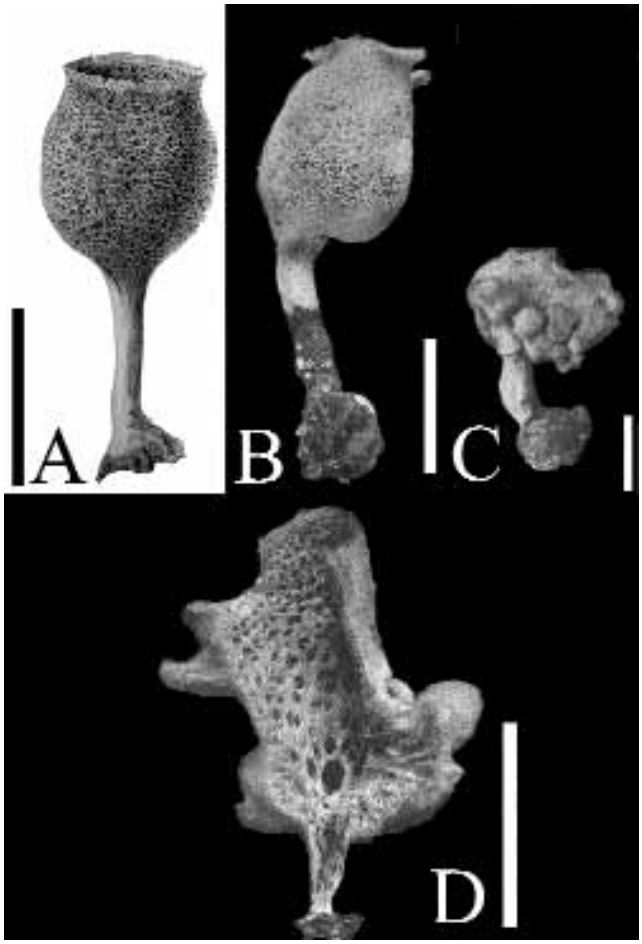


**Fig. 21.** *Crateromorpha (Crateromorpha) meyeri*. External shape. A, *C. (C.) meyeri meyeri* (after Schulze, 1887a) (scale 50 mm). B, *C. (C.) meyeri meyeri* (after Ijima, 1904) (scale 50 mm.) C, *C. (C.) meyeri tuberosa* (after Ijima, 1904) (scale 100 mm). D, *C. (C.) meyeri tuberosa* (after Ijima, 1904) (scale 100 mm).

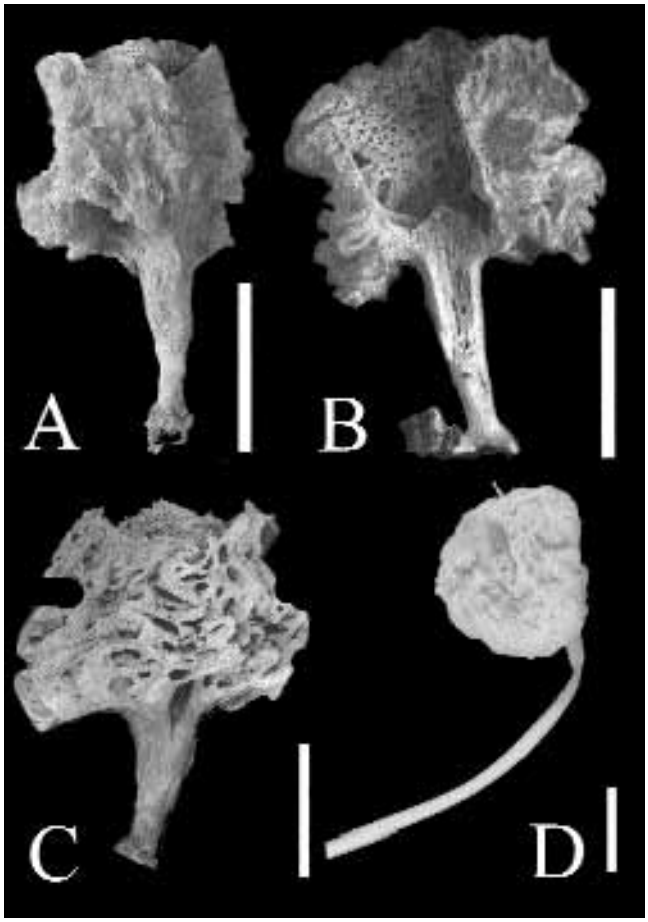


**Fig. 22.** *Crateromorpha (Crateromorpha) meyeri.* External shape. A, *C. (C.) meyeri rugosa* (after Ijima, 1904) (scale 100 mm). B, *C. (C.) meyeri rugosa* (after Ijima, 1904) (scale 100 mm). C, *C. (C.) meyeri corrugata* (after Ijima, 1904) (scale 100 mm). D, *C. (C.) meyeri.* (specimen from New Caledonia, MNHN (p4681.5)) (scale 20 mm).

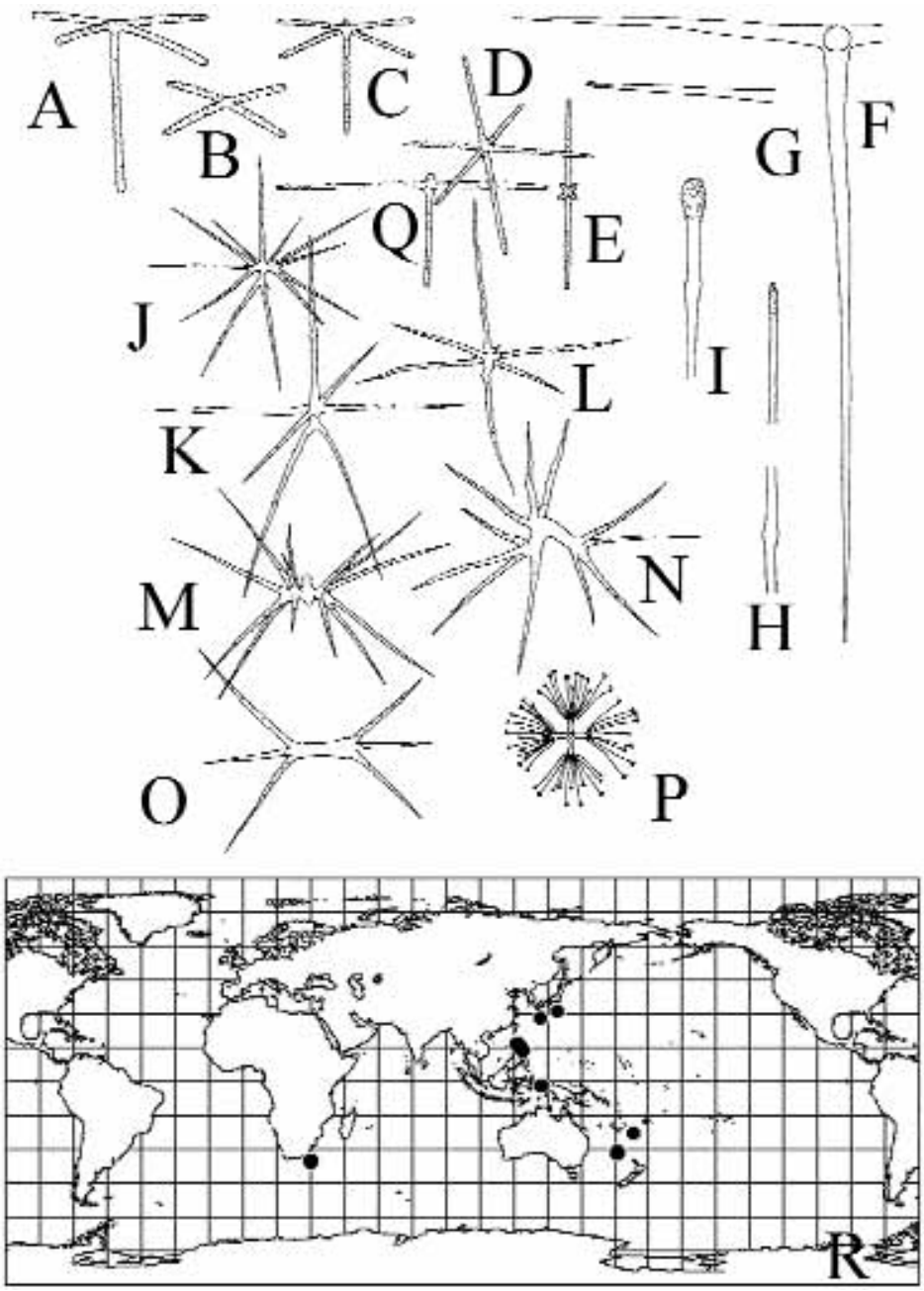


**Fig. 23.** *Crateromorpha (Crateromorpha) meyeri*. A, C, dermal pentactines 130×. B, dermal stauractine 130×. Q, dermal tauactine 130×. D, atrial hexactine 130×. E, atrial diactine 130×. F, hypodermal pentactine 65×. G, its ray 65×. H–I, choanosomal diactines 250×. J–K, hemihexaster 500×. L, hexactine 500×. M, stauraster 500×. N, hemidiaster 500×. O, diaster 500×. P, microdiscohexaster (BMNH 1887.10.20.064) 500×. A–C, F–K, P–Q, BMNH 1887.10.20.064. D, BMNH 1872.07.27.001. E, BMNH (b564). L, BMNH 1887.10.20.065. M–O, BMNH (b695). R, distribution of *Crateromorpha (Crateromorpha).*

hexactines and pentactines is 0.023–0.289 mm. Atrialia are same as dermal spicules. Length of the distal ray of atrial hexactines is 0.038–0.122, the tangential rays of hexactines, stauractines and pentactines are 0.053–0.289 mm, the proximal ray of hexactines and pentactines is 0.023–0.296 mm. The diameter of the rays of dermal and atrial spicules is 0.004–0.009 mm. Microscleres. Microscleres are hexasters, sometimes hemihexasters, rarely hexactines (in BMNH 1887.10.20.065), occasionally stauractines (in BMNH (b695) MNHN (p4136)), rarely diasters and other abnormal spicules (in BMNH (b691)); always microdiscohexasters. Hexasters and hemihexasters are 0.058–0.133 mm in diameter, with primary rosette 0.007–0.025 mm in diameter. They usually have spiny or rough secondary rays but in BMNH 1898.12.19.016 they are nearly smooth. Microdiscohexasters are 0.018–0.076 mm in diameter with primary rosette 0.006–0.014 mm in diameter. The length of their secondary rays is various (anisodiscohexasters). Some of microdiscohexasters were found with less than six primary rays but I consider that they have been lost due to a fragile construction and these spicules should not be related to 'discotriasters or discodiasters = diasters'.

***Remarks.*** The subgenus is revised here to contain 5 species, but it requires further careful revision since some species may turn out

Hoo-154.qxd 10/7/04 2:16 AM Page 1474



cle of most *Crateromorpha (Crateromorpha)* is unusual for other pedunculate Hexactinellida. In most Hexactinellida the peduncle is thin but even when thick it is tubular with a single common cavity, which may be considered to be atrial. Only specimens of *C. (Crateromorpha) meyeri* off New Caledonia have their peduncles connected as usual with the common atrial cavity. But other representatives of *Crateromorpha (Crateromorpha)* have a thick peduncle in which the inner cavity is separated longitudinally by septa so that it is likely that this structure originated from both subatrial cavities and atrial cavity rather than from only the latter. This process may be explained by the independent development of peduncles in different Hexactinellida.

Most of the microdiscohexasters in *C. (Crateromorpha) meyeri* and *C. (Crateromorpha) lankesteri* have rays of different length (anisodiscohexasters). Reinvestigation of specimens of *Crateromorpha lankesteri* Kirkpatrick (1902) gave grounds to return it from the genus *Aulochone* where it was placed by Ijima (1904; 1927). Two specimens were investigated: BMNH 1902.02.13.001, marked with holotype label, and BMNH 1902.02.13.002. Both specimens have hypodermal and hypoatrial spicules: pentactines, sometimes stauractines and rarely triactines, and what is most important microdiscohexasters in the form of anisodiscohexasters were rarely found in the holotype and only the primary rosette of this spicule was found in the other specimen (probably the paratype). Both hypodermalia and microdiscohexasters are absent in the description of Kirkpatrick (1902), resulting in an erroneous placement of *C. lankesteri* by Ijima in the genus *Aulochone*. Later, Kirkpatrick (1907b, footnote p. 21) found these microdiscohexasters in this material and also erroneously referred his species to *Aulochone* under the name '*A. (Crateromorpha) lankesteri*'.

After examination of a number of specimens of *C. (Crateromorpha) meyeri* I conclude that the existing subspecies created by Ijima (1898, 1904) should be repealed. All the described subspecies as well as some newly examined material off New Caledonia show a great similarity of spicule shape and their measurements (Tabachnick & Lévi, 2004). I have not investigated any specimens of *C. (Crateromorpha) tuberosa* but it can be assumed from the description of Ijima (1904) that its spicules are nearly equal to those *C. meyeri*. The only notable difference appears to be in the external shape of the body, which varies according to local conditions. Hence, this species is polymorphic in external shape which is not significant at the subspecies level.

**Distribution**

E, S Pacific, off South Africa, depth 134–1760 m.

## *CRATEROMORPHA (AULOCHONE)* SCHULZE, 1886

**Synonymy**

*Aulochone* Schulze, 1886: 54; 1887a: 168. Aulochonen Schulze, 1885: 451 (nomen nudum). ? Part of *Bathydorus* – *B. pedunculatus* Ijima, 1927: 353.

**Type species**

*Crateromorpha (Aulochone) cylindrica* Schulze, 1886 (by original designation).

**Definition**

*Crateromorpha* without hypodermal pentactines and with microscleres having onychoidal and discoidal terminations.

**Diagnosis**

Body is cylindrical or mushroom-shaped with excavated atrial cavity, dermal surface is folded in the lower part, attached with long and thin tubular peduncle, basiphytose. Choanosomal skeleton is composed of diactines. Hypodermal pentactines are absent. Dermalia are pentactines and stauractines, rarely triactines and paratetractines. Atrialia are similar to dermal spicules. Microscleres are hexasters and microdiscohexasters. Sometimes other oxyoidal microscleres are present: hemihexasters, hexactines and other possible derivatives of these spicules with tendency to form onychoidal secondary rays.

**Description of type species**

*Crateromorpha (Aulochone) cylindrica* Schulze, 1886 (Fig. 24).

***Synonymy.*** *Aulochone cylindrica* Schulze, 1886: 54.

***Material examined.*** Holotype: BMNH 1887.10.20.069 – 'Challenger', 28°33′S, 177°50′W, depth 1100 m.

***Description.*** The body is cylindrical, with partly everted atrial cavity so that atrialia line the upper and the lateral parts of the body. The atrial cavity is represented with a funnel-like depression in the upper central part of the body. The atrial cavity of the tubular peduncle (its central part) is connected directly with the upper atrial cavity inside the funnel according to Schulze (1986). The dermal surface lines the lower part of the body, large subdermal cavities are situated beneath the dermal layer. The body is about 30 mm long and 50 mm in diameter. The peduncle is thin and tubular, it is broken being over 25 mm long and about 4 mm in diameter. Spicules. The choanosomal skeleton is composed of diactines 0.7–1.8/0.006–0.011 mm. The diactines have clavate rough terminations and invisible widening in the middle. In the lower part of the peduncle the diactines are fused by synapticular junctions. Dermalia are pentactines, sometimes stauractines, rarely triactines and paratetractines. These spicules have rough rays with rounded or clavate terminations. The tangential rays of dermal spicules are 0.114–0.274 mm long, the proximal ray of dermal pentactines is 0.099–0.205 mm long. The diameter of these rays is 0.009–0.011 mm. Atrial spicules are similar to dermal ones. The tangential rays of atrial spicules are 0.106–0.228 mm long, the proximal ray of dermal pentactines is 0.099–0.182 mm long. Microscleres. Microscleres are hexasters, sometimes hemihexasters and microdiscohexasters. Most hexasters and hemihexasters have slightly rough secondary rays with rare spines. These spicules are 0.094–0.133 mm in diameter with primary rosette 0.011–0.029 mm in diameter. Some rare hexasters and hemihexasters have large spines on their secondary rays, these spines are comparable sometimes with the length of the primary rays, while some of the secondary rays have even onychoidal shape. The diameter of these spicules is about 1.5 times smaller than that of the common hexasters. Microdiscohexasters are quite rare, they have secondary rays of different length (anisodiscohexasters). Their diameter is 0.032–0.050 mm, the diameter of the primary rosette is 0.008–0.022 mm.

***Remarks.*** The BMNH specimen is not labeled as the holotype but according to Schulze (1886) this species is

Hoo-154.qxd 10/7/04 2:16 AM Page 1475



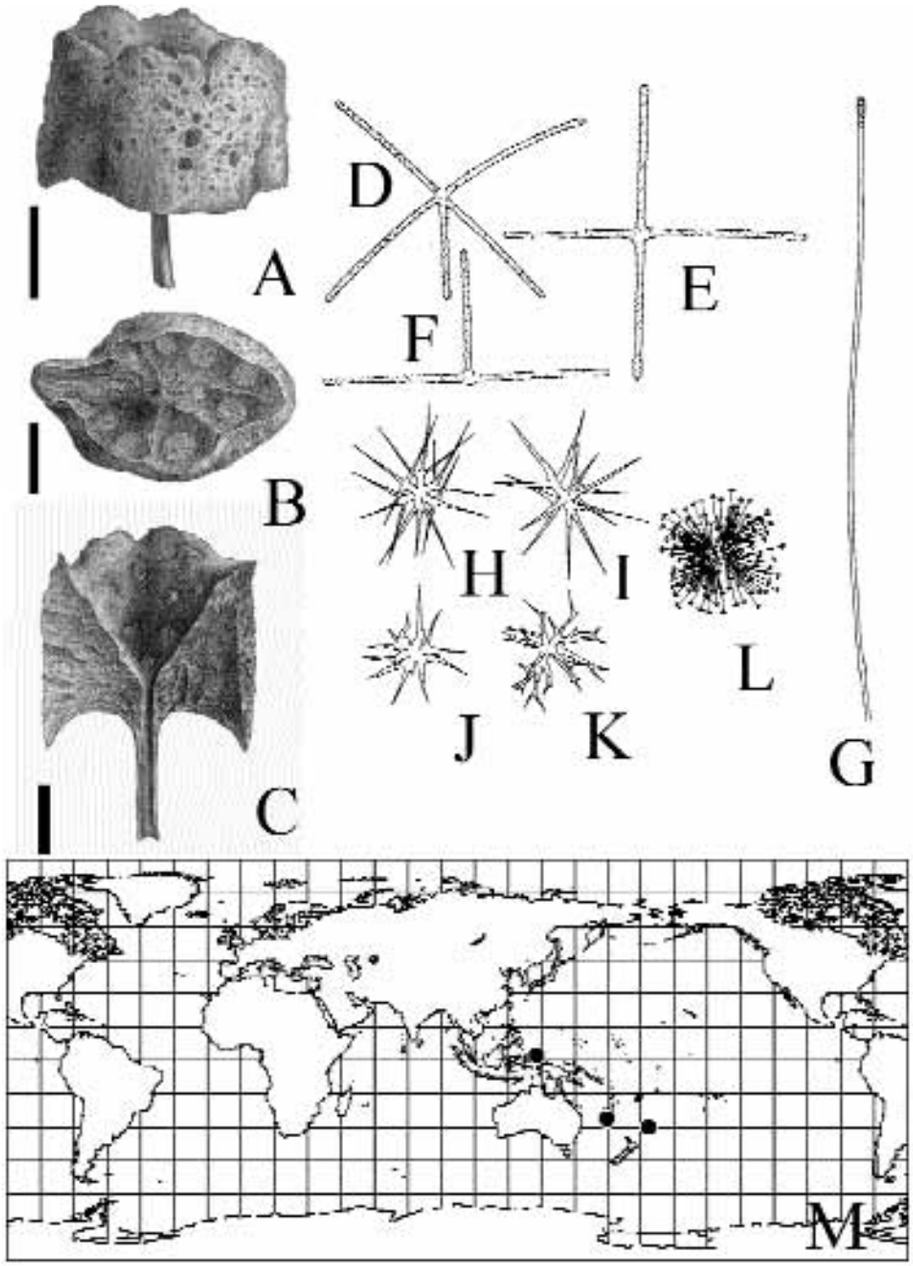


**Fig. 24.** *Crateromorpha (Aulochone) cylindrica*. A, lateral view (after Schulze, 1887a) (scale 30 mm). B, view from the lower side (after Schulze, 1887a) (scale 20 mm). C, longitudinal section (after Schulze, 1887a) (scale 20 mm). D, dermal pentactine 120×. E, dermal stauractine 120×. F, dermal triactine 120×. G, choanosomal diactine 120×. H, hexaster 230×. I, hemihexaster 230×. J–K, spiny, irregular hexasters 230×. L, microdiscohexaster 230×. D, G–H, J–L, from Schulze (1886). E, F I, original of the holotype. M, distribution of *Crateromorpha (Aulochone)*.

represented by only a single specimen, which is similar in dimensions to the specimen from the BMNH, hence the latter must be considered to be the holotype. The subgenus contains four species (one off New Caledonia (Tabachnick & Lévi, 2004)).

*Aulochone* was initially considered to be a genus (Schulze, 1886), then it was synonymised with *Crateromorpha* (Schulze, 1897). Ijima suggested it was a valid genus because it lacked hypodermal pentactines. In addition their respective body shape constructions differ significantly. Here I consider these genera (sensu Ijima, 1904)) to be valid subgenera of *Crateromorpha* (sensu Schulze, 1897). The body of *Crateromorpha (Aulochone)* is everted, the atrial cavity is represented by an upper hemisphere. The dermal surface situated on the lower part of the cylindrical body (similar to that of *Caulophacus*) is folded. The peduncle of *Crateromorpha (Aulochone)* is long, thin and tubular.

The two long-established species of *Crateromorpha (Aulochone), C. (Aulochone) cylindrica* and *C. (Aulochone) lilium* have different microdiscohexasters. The former has spherical microdiscohexasters with secondary rays of different length (as in some *Crateromorpha (Crateromorpha)*), the latter species has stellate microdiscohexasters which are unknown for other *Crateromorpha*. The third recently described specimen off New Caledonia (Tabachnick & Lévi, 2004) has a notable amount of hexactines, stauractines, diactines and asters.

Hoo-154.qxd 10/7/04 2:16 AM Page 1476



I transfer *Bathydorus pedunculatus* (Ijima, 1927) to this subgenus despite its lack of discohexasters. The presence of a long peduncle and dermal pentactines, as well as the absence of hypodermal pentactines, are similar to other representatives of this subgenus. The discohexasters may be absent in the fragment of *B. pedunculatus* because the specimen lacks atrialia (based on the reasonable assumption that discohexasters are located near the atrial surface). Since *C. (Aulochone) lilium* was collected close to *C. (Aulochone) pedunculatus* their true identities must be confirmed from their respective type specimens. If discohexasters are really absent then this species can be justifiably placed in *Crateromorpha (Craterochone). Aulochone clathroclada* (Lévi & Lévi, 1982) belongs to another new genus, *Clathrochone*, for which the family allocation remains uncertain (it is described together with the closely related genus *Hyaloplacoida* (Tabachnick, 1988) in Lyssacinosida, *incertae sedis*.

**Distribution**

S and probably central Pacific, depth 720–1264 m.

### *CRATEROMORPHA (CALEDOCHONE)* SUBGEN.NOV. (2002)

**Synonymy**

*Crateromorpha (Caledochone) caledoniensis* sp.nov. (2002).

**Type species**

*Crateromorpha (Caledochone) caledoniensis* sp.nov. (2002) (by original designation).

**Definition**

*Crateromorpha* with microscleres consisting of oxyoidal and onychoidal forms.

**Diagnosis**

Body is cup-like, attached with long thin tubular peduncle, basiphytose. Choanosomal skeleton is composed of diactines. Dermalia and atrialia are pentactines, sometimes stauractines, rarely tauactines, paratetractines, hexactines and diactines. Microscleres have oxyoidal and onychoidal terminations; they consist of regular hexasters with numerous secondary rays and hemihexasters with 1–3 secondary rays and row of their derivatives up to stauractines, staurasters and diactines.

**Description of type species**

*Crateromorpha (Caledochone) caledoniensis* sp.nov. (2002) (Fig. 25).

***Synonymy.*** *Crateromorpha (Caledochone) caledoniensis* sp.nov. (2002); Tabachnick & Lévi, 2004.

***Material examined.*** Holotype: MNHN HCL 529 – Halipro, 'Zoneco', 25°21.45′S, 168°16.94′E; 810–1172 m. Paratype: MNHN HCL 528 – Biogeocal, 'Coriolis', 20°36.91′S, 167°03.34′E; 920–760 m.

***Description.*** The body of the holotype is cup-like, 60 mm long and 40 mm in maximum diameter (around the osculum), the peduncle is over 130 mm long and about 2–3 mm in diameter. The paratype is a broken sponge with broken peduncle more than 400 mm long and 4–5 mm in diameter; the apical part of the body is a fragment, it is more than 30 mm long and 25 mm in diameter. Spicules. The choanosomal skeleton is composed of diactines 1.3–1.8/0.008–0.011 mm. The diactines have rounded, smooth or rough terminations and a widening in the middle. The spicules of the peduncle are diactines 0.005–0.038 mm in diameter fused to each other by numerous synapticulars. Dermalia and atrialia are pentactines, sometimes stauractines, rarely tauactines, paratetractines, hexactines and diactines with rough rays and terminations conical or rounded. The tangential rays of dermal spicules are 0.038–0.251 mm long and proximal ray is 0.038–0.570 mm. The rays are 0.007–0.015 mm in diameter. The tangential rays of atrial spicules are 0.038–0.167 mm long, the distal ray is 0.258–0.562 mm long, with diameter the same as dermal ones. Microscleres. Microscleres consist of holactinoidal and asterous forms with discoidal and onychoidal secondary rays. The holactinoidal microscleres are hexactines, stauractines and rarely diactines. These spicules may have both types of terminations: discoidal and oxyoidal, their rays are thick, usually straight or rarely curved, smooth or rough. They are 0.072–0.151 mm in diameter. The asterous spicules are hexasters, hemihexasters, staurasters and rarely diasters. They are 0.040–0.094 mm in diameter with primary rosette 0.007–0.029 mm in diameter. One type of regular hexaster has 3–4 thin, smooth or rough secondary rays. They are 0.050–0.144 mm in diameter with primary rosette 0.011–0.018 mm in diameter. Regular hexasters with numerous secondary rays and hemihexasters with 1–3 secondary rays. The reduction of 1–2 primary rays in these spicules may take place which leads to appearance of staurasters and stauractines. Their numerous secondary rays are slightly rough. Some spicules have rudimentary tubercle instead of the reduced primary ray. Rarely these microscleres have irregularly curved rays. The hexasters are 0.050–0.076 mm in diameter with primary rosette 0.016–0.029 mm in diameter. The hemihexasters are 0.086–0.144 mm in diameter with primary rosette 0.013–0.022 mm in diameter.

***Remarks.*** This subgenus contains a single species. The definition of this new subgenus is based on possession of a unique composition of microscleres which differs from *C. (Crateromorpha)* and *C. (Aulochone)*. In the meantime *C. (Craterochone)* obviously belongs to *Crateromorpha sensu lato* since the similarity of all the other spicules and most of all presence of atrial pentactines and stauractines instead of hexactines (as in the other representatives of Rossellidae). Hypodermalia are absent in the investigated specimens. The only difference between these two close subgenera *Crateromorpha (Caledochone)* and *C. (Craterochone)* is the presence of microscleres with onychoidal terminations in the former subgenus. This feature is not very significant in isolation but when compared with other subgenera of *Crateromorpha*, and even within genera of Rossellidae, it is sufficient to separate taxa at the subgenus level. There are some differences between the two investigated specimens but they clearly belong to the same species.

**Distribution**

S Pacific, depth 810–1172 m.

Hoo-154.qxd 10/7/04 2:16 AM Page 1477



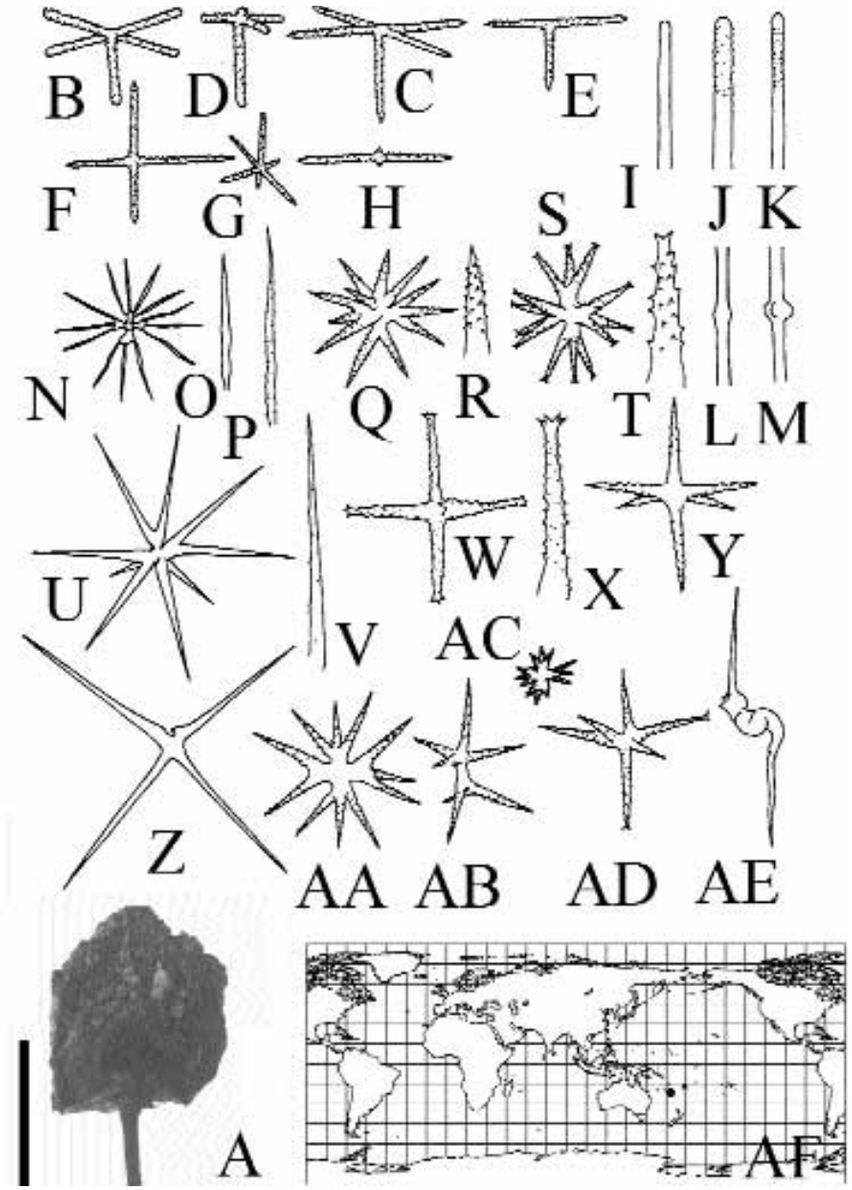


**Fig. 25.** *Crateromorpha (Caledochone) caledoniensis* subgen.nov., sp.nov. A, holotype (scale 50 mm). B–C, dermal pentactines 170×. D, dermal paratetractine 170×. E, dermal tauactine 170×. F, dermal stauractine 170×. G, dermal hexactine 170×. H, dermal diactine 170×. I–K, terminations of choanosomal diactines 170×. L–M, central parts of choanosomal diactines 170×. N, hexaster with thin secondary rays 330×. O–P, secondary rays of hexaster with thin secondary rays 660×. Q, hexaster with thick secondary rays 330×. R, secondary rays of hexaster with thick secondary rays 660×. S, onychohexaster 330×. T, secondary ray of onychohexaster 660×. U, hemihexaster with thick secondary rays 330×. V, secondary ray of hemihexaster 660×. W, onychostauractine 330×. X, ray of onychostauractine 660×. Y, hexactine 330×. Z, stauractine 330×. AA, stauraster 330×. AB, diaster 330×. AC, stauraster 330×. AD, irregular hexaster 330×. AE, diactine 330×. B–AE, spicules of the holotype. AF, distribution of *Crateromorpha (Caledochone)*.

## *CRATEROMORPHA (CRATEROCHONE)* SUBGEN. NOV.

### Type species

*Crateromorpha (Craterochone) bermudensis* sp. nov.

### Definition

*Crateromorpha* with microscleres consisting only of oxyoidal forms.

### Diagnosis

Body is cup-like, attached with long thin tubular peduncle, basiphytose. Choanosomal skeleton is composed of diactines. Dermalia are pentactines. Atrialia are pentactines, stauractines, sometimes diactines and rarely triactines. Microscleres are regular hexasters with numerous secondary rays and hemihexasters with 1–3 secondary rays and row of their derivatives up to stauractines, staurasters and diactines.

Hoo-154.qxd 10/7/04 2:16 AM Page 1478



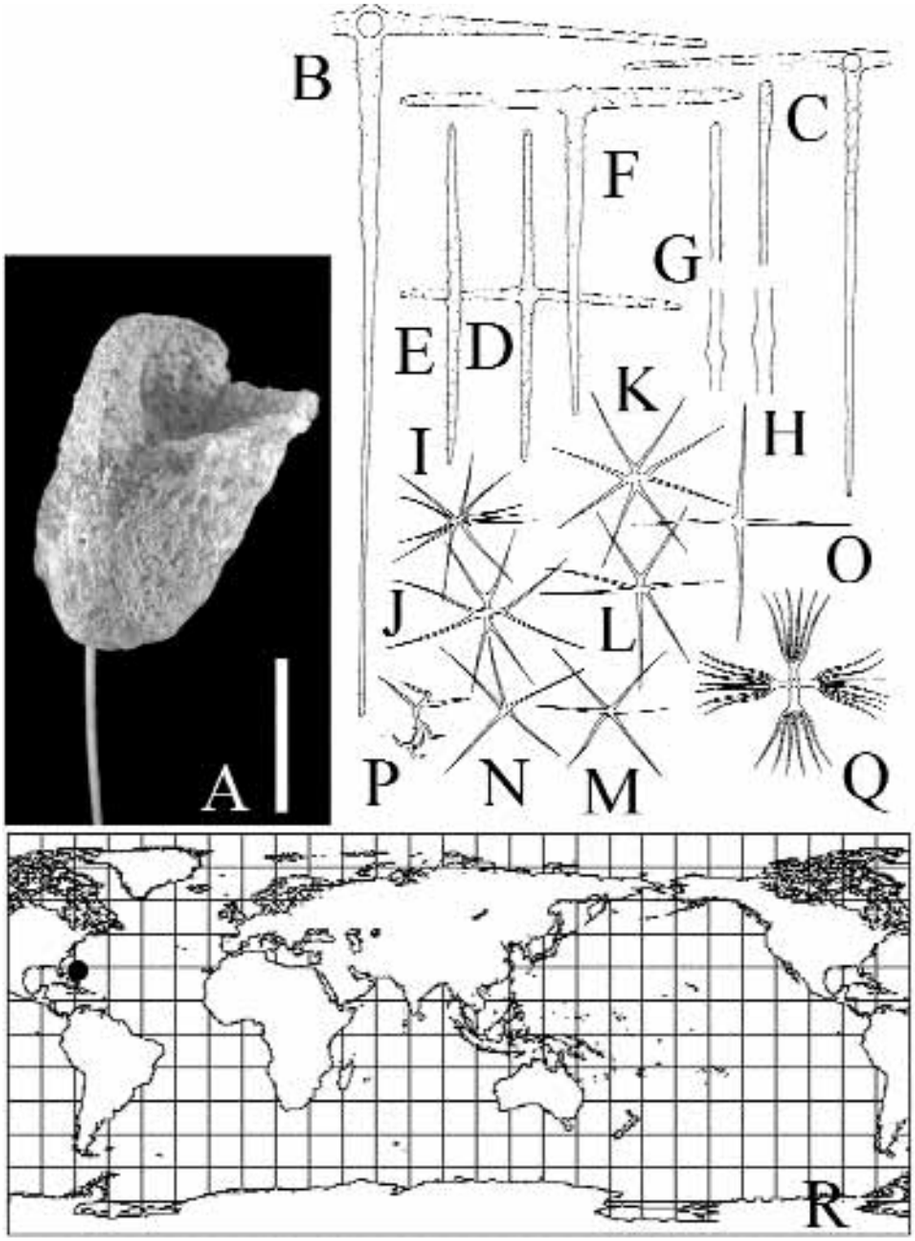


**Fig. 26.** *Crateromorpha (Craterochone) bermudensis* subgen. nov., sp. nov. A, external shape of the holotype (scale 50 mm). B, dermal pentactine 110×. C, atrial pentactine 110×. D, atrial stauractine 110×. E, atrial diactine 110×. F, atrial triactine 110×. G–H, choanosomal diactines 110×. I, hemihexaster 220×. J–K, stauraster 220×. L, abnormal oxyoidal spicule 220×. M, hexactine 220×. N, pentactine 220×. O, stauractine 220×. P, microsclere with curved rays 220×. Q, regular hexaster 440×. B–Q, spicules of the holotype. R, distribution of *Crateromorpha (Craterochone)* subgen. nov.

**Description of type species**

*Crateromorpha (Craterochone) bermudensis* sp. nov. (Fig. 26).

***Material examined.*** Holotype: IORAS 5/2/2103 – 'Akademic Mstislav Keldysh', 32°06.3–04.39′N, 65°14.5–14.38′W, depth 3746 m.

***Description.*** This species is represented by a single complete specimen. The body is cup-like, 105 mm long and 65 × 70 mm in diameter, the osculum is 60 mm in diameter, the walls are about 12 mm thick. The subdermal and subatrial cavities are situated beneath the corresponding spicule layers. The peduncle is 580 mm long and about 2.5 mm in diameter (5 mm near the basal plate), the basal plate is about 28 mm in diameter. Spicules. The choanosomal skeleton is composed of diactines 1.8–2.3/0.011–0.017 mm. The diactines have rounded or rarely clavate smooth or rough terminations. They have a widening in the middle. The spicules of the peduncle are long diactines about 0.017 mm in diameter fused to each other by numerous synapticulars. The spicules of the basal plate form the basidictyonal skeleton with irregular construction in which the individual spicules (except some diactines) are indistinguishable. Dermalia are pentactines with tangential rays 0.228–0.722 mm long and proximal ray 0.395–1.254 mm. The rays are 0.015–0.023 mm in diameter,

Hoo-154.qxd 10/7/04 2:16 AM Page 1479



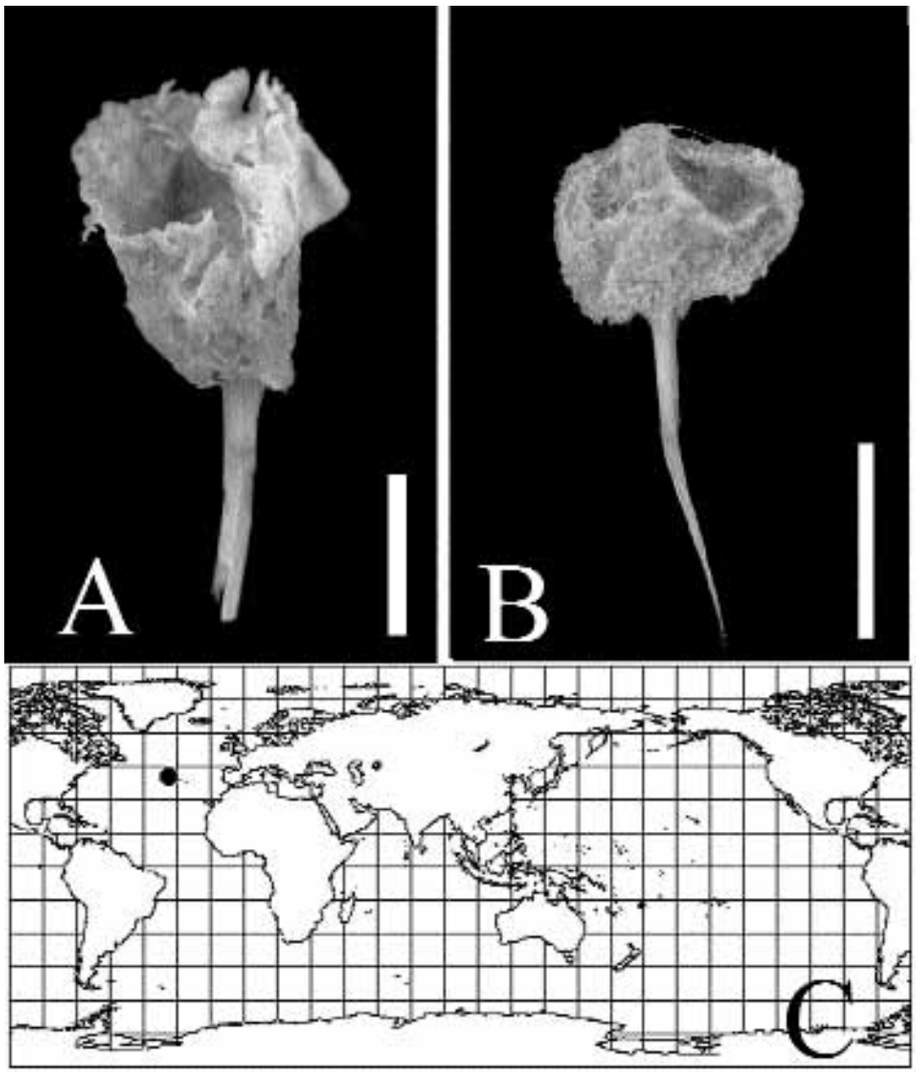


**Fig. 27.** *Crateromorpha (Neopsacas) variata* subgen. nov., sp. nov. A, external shape of the holotype (IORAS 5/2/404) (scale 10 mm). B, external shape of the paratype (IORAS 5/2/479) (scale 10 mm). C, distribution of *Crateromorpha (Neopsacas)* subgen. nov.

rough (the proximal ray may be rough near the base and at outer end and smooth between). Their terminations are rounded or clavate. A rounded tuberculate rudiment of the reduced distal ray is found in some of the pentactines. Atrialia are pentactines, stauractines, sometimes diactines and rarely triactines. The tangential rays of pentactines and stauractines are 0.084–0.388 mm long, the distal ray of pentactines is 0.084–0.707 mm long. The shape of these rays corresponds to dermal spicules, their diameter is 0.015–0.029 mm. Microscleres. Microscleres are regular hexasters with numerous secondary rays and hemihexasters with 1–3 secondary rays. The reduction of 1–2 primary rays in these spicules produces the superficial appearance of stauraster and stauractines. Their numerous secondary rays are slightly rough. Some spicules have a rudimentary tubercle instead of the reduced primary ray. Rarely these microscleres have irregularly curved rays. The hexasters are 0.050–0.076 mm in diameter with primary rosette 0.016–0.029 mm in diameter. The hemihexasters are 0.086–0.144 mm in diameter with primary rosette 0.013–0.022 mm in diameter.

***Remarks.*** This new subgenus of *Crateromorpha* contains only a single species, differentiated from other subgenera in its unique composition of microscleres. The taxon clearly belongs to *Crateromorpha sensu lato* based on similarities in all its other spicules and most of all on the presence of atrial pentactines and stauractines instead of hexactines (as found in other representatives of Rossellidae). Hypodermalia were absent in the specimens investigated.

**Distribution**

W Atlantic, depth 3746 m.

***CRATEROMORPHA (NEOPSACAS)* SUBGEN. NOV.**

**Type species**

*Crateromorpha (Neopsacas) variata* sp. nov.

**Definition**

*Crateromorpha* with microscleres consisting of oxyoidal, onychoidal and discoidal forms.

**Diagnosis**

Body is bell-like or ovoid, basiphytose with long peduncle, large atrial cavity and thin walls. The choanosomal skeleton is composed chiefly of diactines, rarely, tauactines and pentactines. The spicules of the peduncle are diactines fused to each other by synapticulars. Dermalia and atrialia are pentactines. Dermalia also contain some hexactines. Microscleres are various: hexactines, hexasters, discohexasters, discohexactines, onychohexactines, onychohemihexasters, derivatives of most of these spicules with a reduction in the number of rays, and forms irregular in appearance.

**Description of type species**

*Crateromorpha (Neopsacas) variata* sp. nov. (Figs 27–29).

***Material examined.*** Holotype: IORAS 5/2/404 – 'Akademik Kurchatov', 39°59.8′N, 29°35.5′W, depth 2780–2500 m. Paratypes: BMNH (5/2/403) – 'Akademik Kurchatov'. IORAS 5/2/479 – 'Akademik Kurchatov', 40°32.0′N, 29°34.5′W, depth unknown.

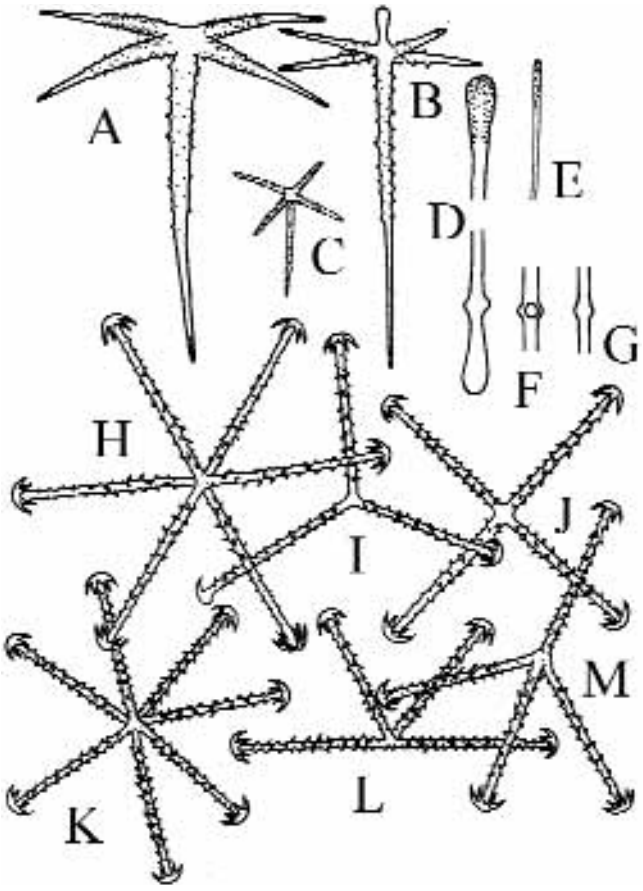


**Fig. 28.** *Crateromorpha (Neopsacas) variata* subgen. nov., sp. nov. A–C, dermal pentactines 90×. D–G, choanosomal diactines and their terminations 180×. H–M, large discohexactines and their derivatives 330×. A–M, IORAS 5/2/404.

***Description.*** Holotype has a bell-like body 60 mm long and about 45 mm in maximum diameter on the upper part. The walls are about 1.5–2 mm thick. The stalk is crushed and broken longitudinally, at least 35 mm long. Paratype (5/2/403) is an ovoid sponge with body 20 mm long and 22 × 4 mm in maximal diameter in the middle. The diameter of the osculum is 9 × 3 mm, the walls are about 1 mm thick. The tubular peduncle is broken, it is at least 43 mm long and about 1 mm in diameter. Paratype (5/2/479) is an ovoid sponge with the body 12 mm long and 15 × 5 mm in maximal diameter in the middle of the body. The osculum is about 6 × 4 mm in diameter. The walls are about 1 mm thick. The tubular peduncle is broken, at least 17 mm long and about 0.5–1 mm in diameter. Spicules. The choanosomal skeleton is composed chiefly of diactines, rarely triactines, tauactines and pentactines. The rays of the choanosomal spicules 0.61–1.22/0.007–0.015 mm are smooth with rough or smooth, widened or spherical terminations. The choanosomal diactines have a widening or four tubercles in the middle. The spicules of the peduncle are diactines 0.01–0.03 mm in diameter, they are fused by synapticulars. Dermalia and atrialia are relatively large pentactines, rare hexactines with short distal ray are found in dermalia. Some deformed forms with reduced rays were rarely found among dermal and atrial spicules. All the rays of these spicules are similar being spinose near the base and rough at outer parts. The diameter of the rays is 0.01–0.05 mm. The tangential rays of dermal pentactines are 0.213–0.441 mm, the proximal one is 0.152–0.973 mm. The tangential rays of atrial pentactines are 0.114–0.648 mm, the proximal one is 0.137–0.851 mm. Micro-scleres. Microscleres vary greatly. Groups with discoidal, onychoidal and oxyoidal terminations are distinguished. The discopentactines, discostauractines, discotauactines and such spicules with seven rays derived from large discohexactines. Their rays 0.058–0.115/0.004–0.005 mm carry discs which are similar in shape both to anchorate and pileate kinds with 3–8 teeth. The shafts of their rays are covered with spines. Small discohexasters are rare, hemidiscohexasters and discohexactines together with their derivatives with diminished ray number up to two (amphidiscs) are predominant over the former type. All these spicules have spines on the shafts. Their discs are pileate. Diameter of small hemidiscohexasters is 0.054–0.108 mm, diameter of its primary rosette is 0.009–0.022 mm. Rays of small discohexactines and their derivatives are 0.025–0.069/0.004 mm. Rare amphidiscs have pileate discs. Their shafts are smooth, spindle-like and covered with spines near the umbels. Hexactines and stauractines have rays 0.041–0.176/0.004 mm covered with numerous short spines. Regular hexasters 0.040–0.101 mm in diameter with primary rosette 0.011–0.061 mm are not numerous, they are smaller than other hexasters and have about 3–4 secondary rays on each primary ray. They do not vary in shape. Large hexasters, hemihexasters, hexactines and their derivatives up to diactines have smooth, rough or spinose rays, usually straight or slightly curved, rarely strongly deformed by their curvature. Diameter of large hemihexasters and rare onychasters are similar to the former is 0.065–0.130 mm, diameter of their primary rosette is 0.011–0.018 mm. Onychohemihexasters, onychohexactines and their derivatives which show a reduction in the number of their rays, up to two (onychodiactines), have rays similar to that of large hexasters and their derivatives. Rays of small hexactines, onychasters and their derivatives are 0.032–0.058/0.002 mm. All described spicules are similar. Small variations in spicule size are not correlated with the total size of the sponge. Atrial spicules seem to be entirely absent

Hoo-154.qxd 10/7/04 2:16 AM Page 1481



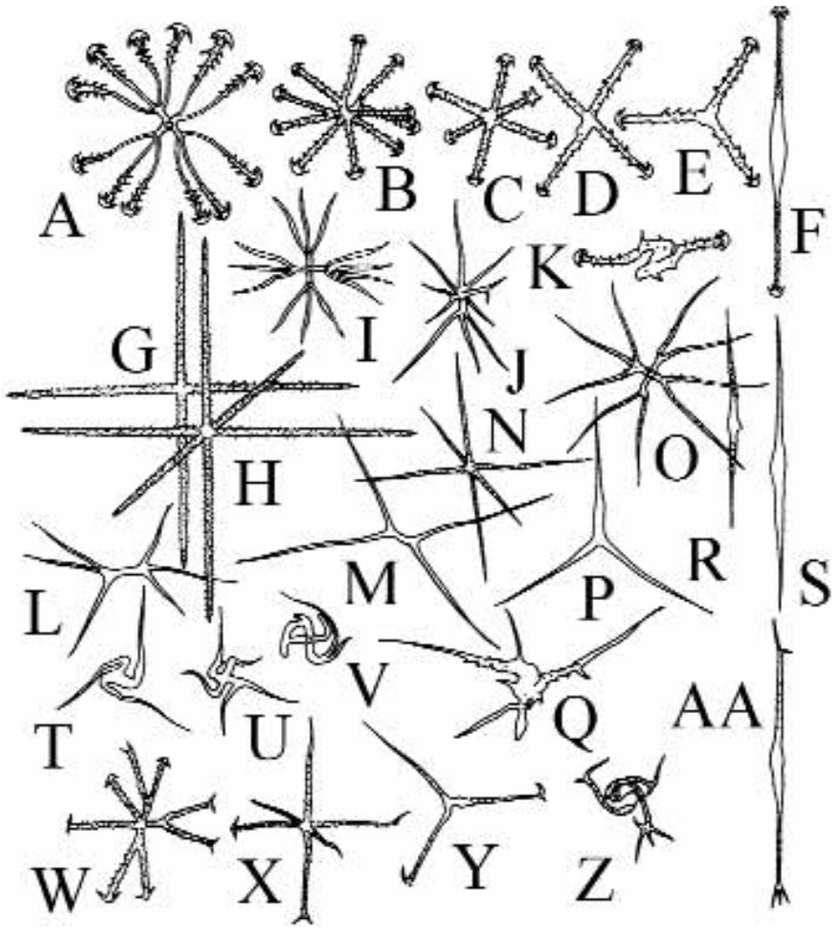


**Fig. 29.** *Crateromorpha (Neopsacas) variata* subgen. nov., sp. nov. A, discohexaster 330×. B–E, small hemidiscohexasters and their derivatives 330×. F, K, amphidiscs 330×. G, spinous large stauractine 330×. H, spinous large hexactine 330×. I, regular hexaster 330×. J, O, hemihexasters 330×. N, hexactine 330×. L–M, P–Q, T–V, derivatives from hexactine 330×. R–S, diactines 330×. W, hemionychohexaster 330×. X, onychohexactine 330×. Y–Z, derivatives from onychohexactine 330×. AA, onychodiactine 330×. A–AA, IORAS 5/2/404.

in the smallest specimen (5/2/479). Relatively large numbers of spinose stauractines were observed in specimen 5/2/403.

***Remarks.*** The position of this taxon, which contains only a single species (another species was collected from a closely adjacent location) is uncertain. The dermal and atrial pentactines are similar in shape and size to hypodermal spicules of other Rossellidae, but nevertheless I refer spicules of *C. (Neopsacas) variata* to the dermal-atrial category otherwise dermal and atrial spicules are entirely absent (unknown for Lyssacinosida). Some small pentactines were found in atrialia of one sponge, but they are rare and probably represent immature forms. Another species contains some small diactines in the atrial skeleton but the atrial net and dermal skeletons are composed of pentactines.

The most notable feature of *C. (Neopsacas)* consists of large variations in microscleres derived from several principal types. These variations are: large spinose hexactines and their derivatives – stauractines; large discohexactines and their derivatives with reduced numbers of rays; small discohexasters; hemidiscohexasters; discohexactines and their derivatives with reduced numbers of rays up to amphidiscs; small regular hexasters; intermediate hexasters; hemihexasters; hexactines and their derivatives up to diactines; onychohemihexasters; onychohexactines and their derivatives with ray number reduction. Amphidiscs are very rare, they differ morphologically from that of Amphidiscophora and *Amphidiscella* or *Vityaziella* but principally they also originate from discohexactines and other spicules with discoidal terminations. All the discs of discoidal spicules are pileate in shape. Other species in this subgenus differ principally in lacking large discoidal holactinoid spicules and the corresponding presence of large discohexasters.

**Distribution**

Central Atlantic – off the Azores, depth 2500–2800 m.

## *HYALASCUS* IJIMA, 1896

**Synonymy**

*Hyalascus* Ijima, 1896: 251. Part of *Aulosaccus – A. mitsukurii* Ijima, 1898: 52. Part of *Bathydorus – B. baculifer* and

Hoo-154.qxd 10/7/04 2:16 AM Page 1482



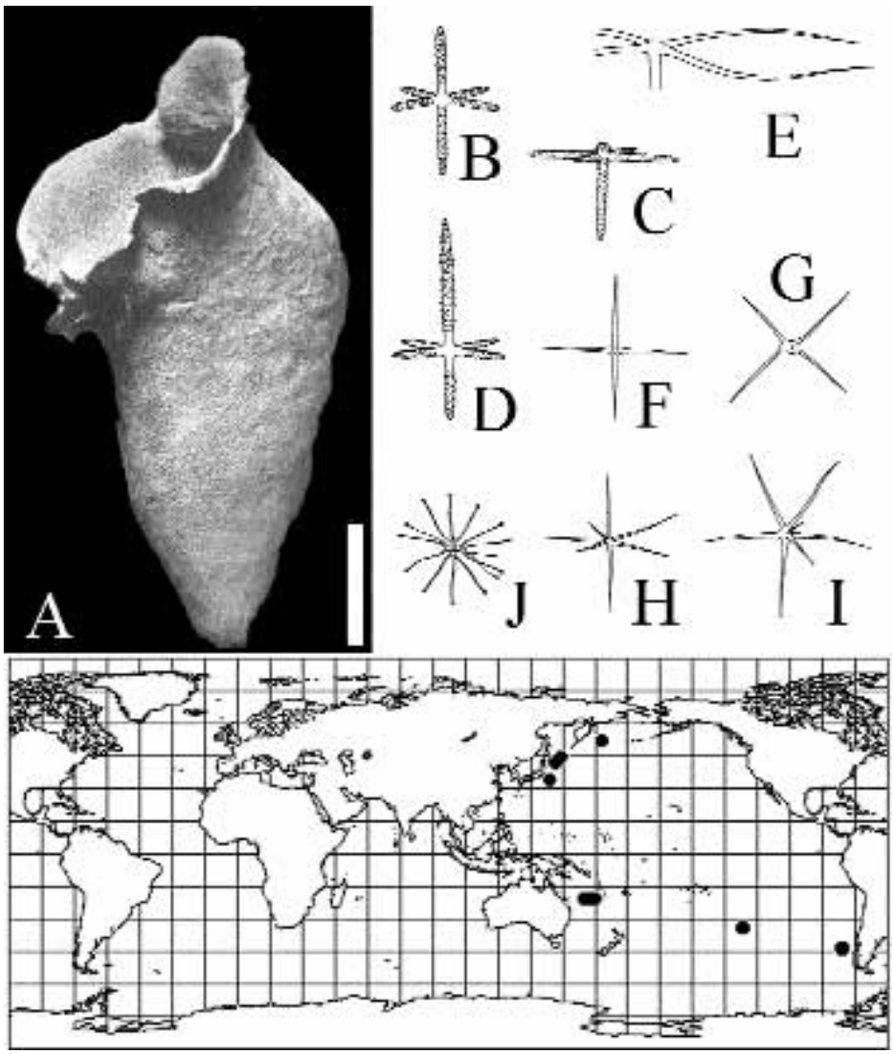


**Fig. 30.** *Hyalascus sagamiensis*. A, holotype, external shape (after Ijima, 1904) (scale 100 mm). B, dermal hexactine 110×. C, dermal pentactine 110×. D, atrial hexactine 110×. E, hypodermal pentactine 55×. F, hexactine 220×. G, stauractine 220×. H–I, hemihexaster 220×. J, discohexaster 220×. B–J, from Ijima (1904). K, distribution of *Hyalascus*.

*B. stellatus* Schulze, 1886: 50; 1887a: 152, 154; 1897: 15, 16; Ijima 1898: 46, 47.

**Type species**

*Hyalascus sagamiensis* Ijima, 1896 (by monotypy).

**Definition**

Saccular Rossellinae with discoidal microscleres consisting only of microdiscohexasters, dermalia are pentactines and stauractines, and hypodermal pentactines (if present) have orthotropal tangential rays.

**Diagnosis**

Body is saccular, basiphytose. Choanosomal skeleton is composed of diactines. Hypodermal spicules are pentactines, if present. Dermalia are various combinations of stauractines, pentactines, hexactines and diactines. Atrialia are mainly hexactines (its proximal ray may be pinular) and rarely pentactines. Microscleres are microdiscohexasters and combinations of hexasters, hemihexasters and hexactines.

**Description of type species**

*Hyalascus sagamiensis* Ijima, 1896 (Fig. 30).

***Synonymy.*** *Hyalascus sagamiensis* Ijima, 1896: 251.

***Material examined.*** Holotype: not seen, off Japan, Sagami Bay; probably stored in Amherst college, Massachusetts, USA (Ijima, 1904).

***Description (from Ijima, 1896; 1898; 1904; Schulze, 1897).*** Vase-like, about 500 mm long and 230 mm in diameter, the osculum is 160 × 140 mm in diameter, the walls are thin 10–12 mm thick. Spicules. The choanosomal skeleton is composed of diactines of variable diameter 0.020–0.120 mm. They reach 20 mm long. The diactines have conically pointed or rounded terminations, usually rough or tuberculated. Prostalia marginalia project

Hoo-154.qxd 10/7/04 2:16 AM Page 1483



about 0.5 mm from the body. Hypodermal pentactines have smooth finely tapering rays. The tangential rays are 0.9–1.2 mm long, the proximal ray is 2–3 mm long. Hypoatrialia were not registered. Dermalia are mostly pentactines, sometimes hexactines and rarely stauractines. Their rays are spiny, 0.080–0.110/0.008–0.011 mm with terminations conically pointed or rounded. Atrialia are hexactines. The tangential and distal rays are 0.090–0.110 mm long, proximal one is 0.185–0.275, their diameter is 0.010–0.014 mm. Microscleres. Microscleres are microdiscohexasters, rough hemihexasters and hexactines. Microdiscohexasters are 0.080–0.090 mm in diameter, diameter of its primary rosette is 0.006 mm. The number of secondary rays is few – with about 3 on each primary ray. Hemihexasters are more frequent than the hexactines. Hemihexasters are 0.100–0.145 mm in diameter. Hexactines are 0.120–0.145 mm in diameter, with rays about 0.003 mm in diameter. Some rare stauractines were found among microscleres.

***Remarks.*** This genus contains 10 species (including 2 new species off New Caledonia (Tabachnick & Lévi, 2004)). The generic diagnosis is developed from Ijima (1904).

I consider that *Hyalonema foliata* (Fristedt, 1887) is a doubtful member of *Hyalascus*; the species is discussed further within the genus *Asconema*. *Aulosaccus mitsukurii* (Ijima, 1898), previously assigned here, is transferred to *Hyalascus* since macrodiscohexasters characteristic of *Aulosaccus* are absent (see Remarks for *Aulosaccus*). *Hyalascus attenuatus* Okada (1932), which was synonymised with *Aulosaccus* by Koltun (1967), is also returned to *Hyalascus*. Two other species of *Bathydorus: B. baculifer* and *B. stellatus* (Schulze, 1887a; 1897; Ijima, 1898) are also returned here to *Hyalascus* based on their possession of microdiscohexasters. As for other spicules, these are similar in all these related genera.

The polyphyletic origin of *Hyalascus* is plausible, given the loss of large discohexasters in several genera of Rossellinae, but this genus is retained for the time being because there are currently no other options to investigate these putative origins.

Dermal diactines were found among the complement of dermal spicules in a new species off New Caledonia. Similarly, atrial pentactines were found together with hexactines in another new species from this region. A pinular ray on atrial hexactines was also reported for *H. sagamiensis*, and for the new species off New Caledonia. Hypodermal pentactines are absent in *H. mitsukurii* (Ijima, 1904). Microdiscohexasters of unusual form, with numerous secondary rays in a compact tuft (lophodiscohexasters), were found together with the usual spherical forms in *H. similis* (Ijima, 1904), and in one of the two new species off New Caledonia. Abnormal discohexasters with a reduced number and curved secondary rays were found together with normal ones in *H. hodgsoni* (Kirkpatrick, 1907b). These data indicate substantial variability in this putative genus, which requires corroboration through a substantial future revision.

**Distribution**

W, S Pacific and antarctic Oceans, depth 117–4270 m.

## *SCHAUDINNIA* SCHULZE, 1900

**Synonymy**

*Schaudinnia* Schulze, 1900a: 87. Part of *Bathydorus* – *B. arcticus* (Brondsted) Hentschel, 1929: 913; Koltun, 1964a: 145; and *B. roseus* (Fristedt) Hentschel, 1929: 913. Part of *Hyalonema* – *H. rosea* Fristedt, 1887: 411. Part of *Rhabdocalyptus* – *R. arcticus* Brøndsted, 1917: 477. Part of *Acanthascus* (part of type series (lectotype) of *A. nealus* (the paralectotype belongs to *Anoxycalyx (Anoxycalyx)* de Laubenfels, 1942: 266.

**Type species**

*Schaudinnia rosea* (Fristedt, 1887) (by monotypy).

**Definition**

Saccular Rossellinae with discoidal microscleres consisting only of microdiscohexasters; dermalia are diactines.

**Diagnosis**

Body is saccular, basiphytose sometimes rhizophytose. Choanosomal skeleton is composed of diactines and rare hexactines. Hypodermal spicules are pentactines with partly smooth and partly spined tangential rays. Prostalia oscularia are diactines. Prostalia lateralia, if present, are diactines and outward protruding hypodermal pentactines. Dermalia are mainly diactines. Atrialia are hexactines. Microscleres are microdiscohexasters and hexasters, hemihexasters, hexactines with straight and curved terminations.

**Description of type species**

*Schaudinnia rosea* (Fristedt, 1887) (Fig. 31).

***Synonymy.*** *Hyalonema rosea* Fristedt, 1887: 411. *Schaudinnia arctica* Schulze, 1900a: 87; Hentschel, 1929: 913; Mehl, 1992: 17; Mehl, Reitner & Reiswig, 1994: 301. *Bathydorus arcticus* (Brøndsted) Hentschel, 1929: 913; Koltun, 1964a: 145. *Bathydorus roseus* (Fristedt) Hentschel, 1929: 913. *Rhabdocalyptus arcticus* Brøndsted, 1917: 477. *Acanthascus nealus* (part of type series (lectotype) de Laubenfels, 1942: 266.

***Material examined.*** Holotype: unknown, E coast of Greenland, 'Vega', 70°N, 20°W, depth 230 m. Other material. ? Holotype of *S. arctica*: BMNH 1908.09.24.026 (fragment) – N of Spitzbergen. Specimens: BMNH 1926.04.21.001 – 'Danish Ingolf Expedition', Forsblad Fjord, 72°25′N, 26°W, depth 90–165 m. BMNH 1936.09.22.162, BMNH 1936.09.22.164 – received from ZINRAS. IORAS 5/2/2355 – 66°08′N, 30°56′W, depth 438 m. IORAS 5/2/2356 – 66°52′N, 29°58′W, depth 425 m. IORAS 5/2/2357 – 70°05′N, 15°13′W, depth 1075 m. IORAS 5/2/2359 – 67°39′N, 22°39′W, depth 650 m. USNM 23263 (kt 1471; kt 1472; kt 1473) – Norcross-Bartlett Expedition, E Coast of Greenland, 74°04′N, 17°58′W, depth 216 m.

***Description.*** Vase-like or saccular, basiphytose or often with tendency to produce rhizoidal diverticulae in the lower part. Some specimens are dichotomously branching retaining the common atrial cavity. The body is about 80–200 mm long, 25–150 mm in diameter, the walls are up to 10 mm thick. Prostalia marginalia are diactines similar to choanosomal ones. The surface is smooth or with prostalia lateralia composed of diactines sometimes together with hypodermal pentactines. Spicules. The choanosomal skeleton is composed of diactines. The common choanosomal diactines are 2–10/0.004–0.060 mm. They have a widening or four rudimentary tubercles in the middle and rough conically pointed terminations. Some rare choanosomal spicules are hexactines (Koltun, 1967), with the same rays as described above for diactines 0.1–0.3/0.010–0.030 mm. The large choanosomal diactines which serve as prostalia are 10–15 mm long. Some rare choanosomal

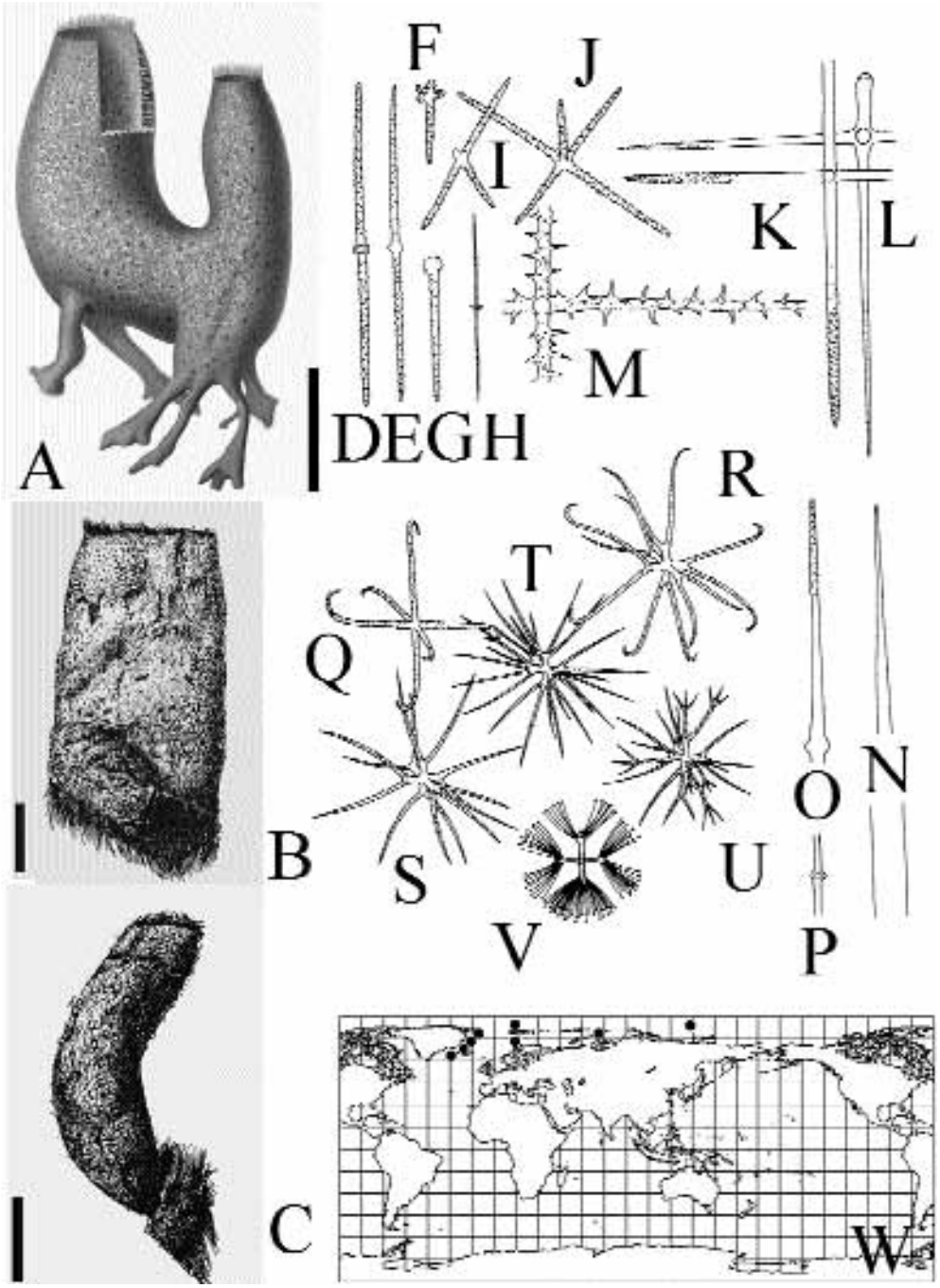


**Fig. 31.** *Schaudinnia rosea*. A, external shape (after Schulze, 1900a) (scale 50 mm). B, external shape (after Koltun, 1964a) (scale 20 mm). C, external shape (after Koltun, 1964a) (scale 20 mm). D–E, dermal diactines 110×. F, dermal monactine 110×. G, dermal monactine 110×. H, dermal diactine 110×. I, dermal triactine 110×. J, dermal pentactine 110×. K, atrial hexactine 110×. L, atrial hexactine with reduced ray 110×. M, hypodermal pentactine 55×. N, large choanosomal diactine 110×. O, choanosomal diactine 110×. P, central part of choanosomal diactine 110×. Q, hexactine with curved rays 220×. R, hexaster with curved rays 220×. S–T, hexasters 220×. U, hexaster with some secondary rays onychoidal 220×. V, microdiscohexaster 220×. D–E, K, M, Q–V, from Schulze (1900a). F, J, L, N–P, BMNH 1936.09.22.162. G, I, BMNH 1908.09.24.026. H, IORAS 5/2/2359. W, distribution of *Schaudinnia*.

monactines have one outer end rough and clavate while another is conically pointed and smooth, about 5 mm long. Hypodermal pentactines have tangential rays 1–3 mm long, the proximal rays are usually longer than the tangential ones, they reach 3 mm long, the diameter of these rays is about 0.050 mm. The tangential rays of hypodermal pentactines often have spines. Dermalia are diactines, rarely they are supplemented with stauractines, triactines, pentactines, hexactines and monactines. Dermal diactines are oriented tangentially, they have four rudimentary tubercles or a widening in the middle, their rays are rounded or conically pointed 0.076–0.243/0.006–0.020 mm. The other dermal spicules often have rudimentary tubercles instead of absent rays. Atrialia are hexactines. Their rays are smooth at the proximal half of the ray and rough at the distal part, the terminations are rounded

Hoo-154.qxd 10/7/04 2:16 AM Page 1485



or conically pointed. The distal ray of atrial hexactine is 0.068–0.388 mm long, the tangential rays are 0.068–0.426 mm long, the proximal one is 0.068–0.866 mm long, all these rays are 0.008–0.022 mm in diameter. Microscleres. Microscleres are microdiscohexasters and hexasters, hemihexasters and hexactines with straight and curved terminations. Microdiscohexasters are 0.032–0.045 mm in diameter, diameter of the primary rosette is 0.008–0.014 mm. Their secondary rays are numerous being gathered in a compact tuft at each primary ray. The microdiscohexasters are similar to lophodiscohexasters in shape. They are rare in the investigated specimens or sometimes they were not found at all, and they were not described in the type material (Fristedt, 1887). The oxyoidal microscleres have rough rays with straight and curved terminations. The curved-rayed spicules predominate over the straight-rayed ones. The hexasters and hemihexasters with curved rays are 0.043–0.126 mm in diameter with primary rosette 0.007–0.014 mm in diameter. The same spicules (the hexasters and hemihexasters) with straight rays are 0.058–0.119 mm in diameter with primary rosette 0.007–0.029 mm in diameter. Hexactines with straight rays are 0.064–0.122 mm in diameter, while the same with curved rays are 0.050–0.126 mm in diameter. The spicules with oxyoidal rays reach up to 0.165 mm in diameter (Koltun, 1967). Rare hexasters with straight rays were found with some onychoidal terminations (Schulze, 1900a, pl. 2, fig. 13).

***Remarks.*** The species name of this monospecific genus has been used in two variants up to now, and thus it is necessary to question the nomenclatural priority of the type species of *Schaudinnia*. Some authors consider the senior synonym to be *S. arctica* (by original designation of the type species), and others consider it to be *S. rosea* (by priority in the species description). The identity of these species is unequivocal, despite the fact that Fristedt (1887) had not described the rare microdiscohexasters, as all the other spicules are well recognizable in *S. arctica*. According to the ICZN priority must lie with '*rosea*', even if '*arctica*' was described as type species (Schulze, 1900a). Hence three specimens collected by the 'Vega' expedition are considered to be the types. Consequently, the holotype is not chosen from among the three specimens described by Fristedt (1887). For the comments on the alleged synonymy with *Acanthascus nealus* see the Remarks for *Anoxycalyx (Anoxycalyx).*

The diagnosis above was developed from Schulze (1900a) and Koltun (1967). I do not agree with Koltun's interpretation (1964a) of "stolonial asexual reproduction by means of rhizoids and dichotomous branching of some forms by budding". Some forms, which display dichotomous branching with two oscula and common atrial cavity, are known in *S. rosea* Schulze (1900a). Dermal stauractines, triactines, pentactines, hexactines and monactines are rarely found among the usual dermal spicules – diactines.

**Distribution**

Arctic Ocean, depth 90–3110 m.

## *SCYPHIDIUM* SCHULZE, 1900

**Synonymy**

*Scyphidium* Schulze, 1900a: 104. Part of *Aulosaccus – A. tuberculatus* Okada, 1932: 83. Part of *Rossella–R. longispina* Ijima, 1896: 263; Ijima, 1898: 51; Schulze, 1897: 19 and *R.* sp. (now *S. chilense* Ijima, 1927: 375); Schulze, 1899: 43. Part of *Vitrollula* (*V. namiyei* Ijima, 1898: 48).

**Type species**

*Scyphidium septentrionale* Schulze, 1900a (by monotypy).

**Definition**

Saccular Rossellinae with two types of discohexasters, the largest spherical with a restricted number of secondary rays.

**Diagnosis**

Body is saccular, basiphytose sometimes rhizophytose. Choanosomal skeleton is composed of diactines. Hypodermal spicules are pentactines. Prostalia, if present, are diactines and hypodermal pentactines. Dermalia are stauractines and pentactines in various combinations. Atrialia are mainly hexactines. Microscleres are discohexasters, microdiscohexasters and hexasters often with hemihexasters and hexactines.

**Description of type species**

*Scyphidium septentrionale* Schulze, 1900a (Fig. 32).

***Synonymy.*** *Scyphidium septentrionale* Schulze, 1900a: 104.

***Material examined.*** Lectotype (here designated): BMNH 1931.11.02.007 – off E Greenland, 81°20′N, 20°30′E, depth 1000 m. Other material. IORAS 5/2/2363 – 70°30′N, 9°29′W, depth 728 m.

***Description.*** The body is vase-like or saccular with tendency to produce rhizoidal diverticulae in the lower part. Some specimens are dichotomously branching retaining the common atrial cavity. The body is 25–200 mm long, 15–100 mm in diameter, the walls are 3–10 mm thick. Spicules. The choanosomal skeleton is composed of diactines which may be divided into two groups. The former contain spicules up to several mm long and 0.030–0.040 mm in diameter. They have smooth rounded terminations. The second is represented by more numerous diactines. They are 0.010–0.020 mm in diameter and have a widening in the middle and rough conically pointed terminations. Hypodermal pentactines have tangential rays up to 2 mm long and are 0.011–0.027 mm in diameter, the proximal rays are longer than the tangential ones. Dermalia are stauractines, rarely pentactines and sometimes diactines with rudimentary tubercles instead of absent rays. Some stauractines also have two rudimentary tubercles. The rays of these spicules are 0.061–0.167/0.005–0.007 mm, they are spiny with conically pointed terminations. Atrialia are hexactines, rarely pentactines and paratetractines with tuberculated rudiments of reduced rays. The rays of atrial hexactines are 0.060–0.213/0.005–0.007 mm, in shape they are equal to dermal spicules. Microscleres. Microscleres are spherical discohexasters, microdiscohexasters, hexasters, hemihexasters and hexactines. Discohexasters are 0.050–0.094 mm in diameter, diameter of the primary rosette is 0.005–0.014 mm. Microdiscohexasters are 0.029–0.050 mm in diameter, diameter of the primary rosette is 0.007–0.018 mm. The secondary rays of microdiscohexasters in the material examined have secondary rays of slightly different length (anisodiscohexasters). Hexasters and hemihexasters have rough rays, they are 0.061–0.108 mm in diameter with primary rosette 0.007–0.014 mm in diameter. Hexactines are 0.065–0.115 mm in diameter.

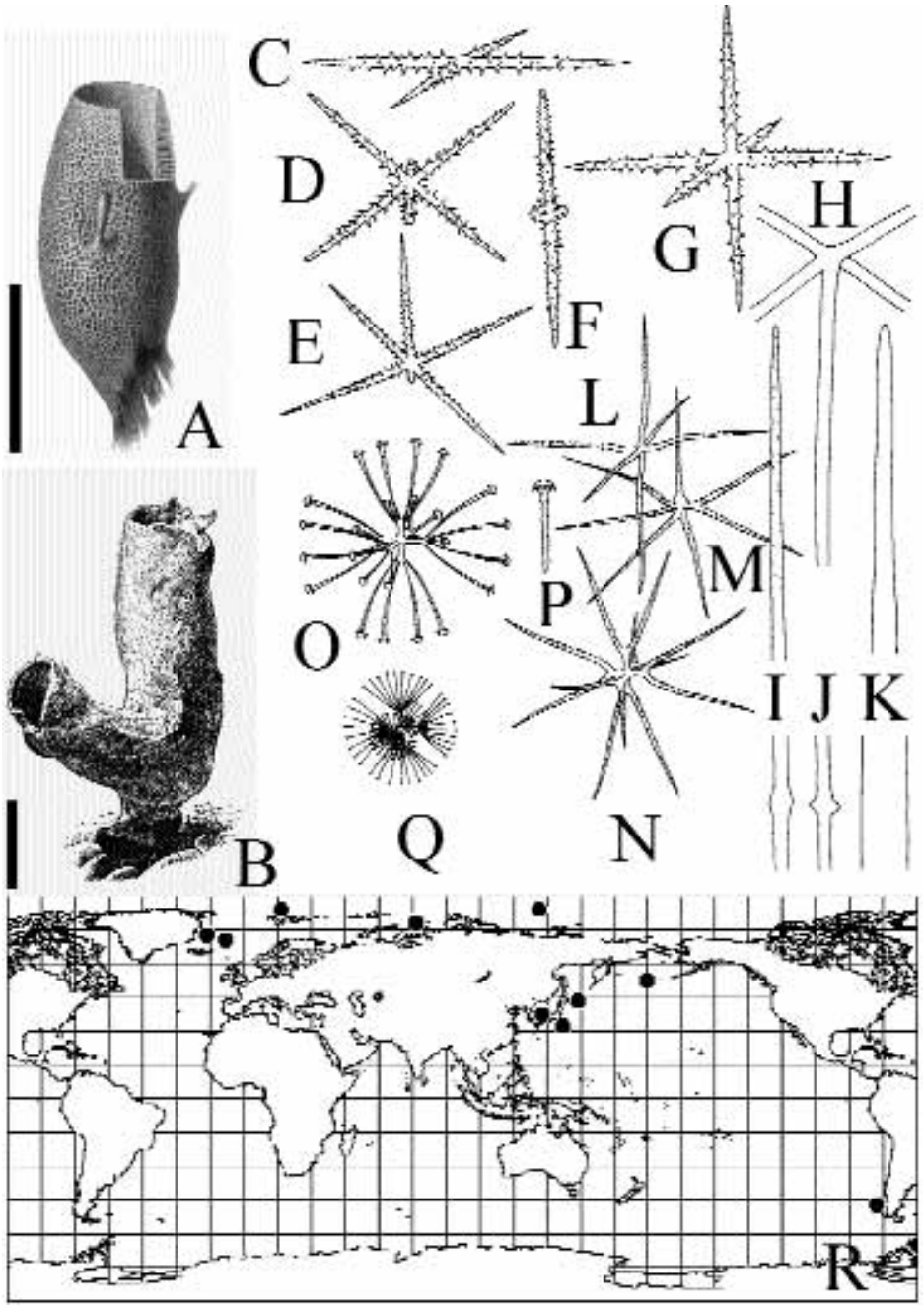


**Fig. 32.** *Scyphidium septentrionale.* A, external shape (after Schulze, 1900a) (scale 20 mm). B, external shape (after Koltun, 1964a) (scale 30 mm). C, dermal stauractine 250×. D, dermal stauractine with two rudimentary rays 250×. E, dermal pentactine with one rudimentary ray 250×. F, dermal diactine with two rudimentary rays 250×. G, atrial hexactine 250×. H, hypodermal pentactine 65×. K, large choanosomal diactine 65×. I, choanosomal diactine 65×. J, its central part 65×. L, hexactine 250×. M, hemihexaster 250×. N, hexaster 250×. O, discohexaster 250×. P, its secondary ray 500×. Q, microdiscohexaster 250×. C, G, L, N, O, Q, from Schulze (1900a). D–F, I–K, P, BMNH 1931.11.02.007. H, M, from Koltun (1967). R, distribution of *Scyphidium*.

***Remarks.*** The genus contains 6 species. The diagnosis is developed from Schulze (1900a), Ijima (1904) and Koltun (1967), although I do not agree with Ijima's interpretation (1904) of asexual reproduction with help of rhizoids and buds. Some forms which display dichotomous branching with two oscula and common atrial cavity are known in *S. septentrionale* (Koltun, 1967) and *S. namiyei* (Ijima, 1904). *Scyphidium septentrionale* is a rhizophytose form although basiphytose forms are also reported. *Scyphidium septentrionale, S. tuberculatum* (Okada, 1932) and *S. namiyei* are sponges with smooth surface. *Scyphidium longispinum* (Ijima, 1904), *S. chilense* (Ijima, 1927; 1904; Schulze, 1899) and *S. jamatai* (Tabachnick, 1991) have tufts of diactines of prostalia lateralia, and *S. longispinum* also has slightly extruded hypodermal pentactines. Hypodermal pentactines are unknown in *S. tuberculatum*. Hexasters predominate among oxyoidal microscleres, and rare hemihexasters in *S. namiyei* and *S. chilense* requires confirmation. Pentactines and other abnormal hexactines are found among oxyoidal microscleres in *S. jamatai*. Microdiscohexasters in

Hoo-154.qxd 10/7/04 2:16 AM Page 1487



*S. septentrionale* have secondary rays of slightly different length (anisodiscohexasters).

**Distribution**

Antarctic Ocean, N, NW and SE Pacific Ocean, depth 120–1000 m.

## *TRICHASTERINA* SCHULZE, 1900

**Synonymy**

*Trichasterina borealis* Schulze, 1900a: 100. Part of *Asconema setubalense* described by Burton 1928b: 8 (specimen ZMUC – 'Ingolf Expedition', 60°50′N, 26°50′W, 1518 m). Not *T. sagittaria* Topsent (1913a) described by de Laubenfels 1942: 256.

**Type species**

*Trichasterina borealis* Schulze, 1900a (by monotypy).

**Definition**

Saccular Rossellinae with microscleres consisting of actinoidal and asterous forms bearing oxyoidal terminations, pappocomes present.

**Diagnosis**

Body is saccular, basiphytose sometimes rhizophytose. Choanosomal skeleton is composed of diactines. Hypodermal spicules are pentactines. Prostalia oscularia are diactines. Dermalia are mainly stauractines, rarely pentactines and hexactines. Atrialia are hexactines. Microscleres are hexasters, hexactines, sometimes hemihexasters and the some abnormal spicules with rough and rarely spiny rays (trichasters) and pappocomes.

**Description of type species**

*Trichasterina borealis* Schulze, 1900a (Fig. 33).

***Synonymy.*** *Trichasterina borealis* Schulze, 1900a: 100. Part of *Asconema setubalense* described by Burton 1928b: 8. Probably, *T. sagittaria* Topsent, 1913a: 9.

***Material examined.*** Holotype: unknown, 81°20′N, 19°00′E; 81°20′N, 20°30′E, depth 1000 m. Other material. BMNH 1908.09.24.025, 1936.09.22.159; 1936.09.22.160 (received from ZINRAS), off Spitzbergen. IORAS 5/2/2358; 5/2/2362 – 66°16′N, 31°35′W, depth 345 m. ZMK (2368) as *Asconema setubalense* (identified by Burton and described in 1930) – 'Ingolf Expedition', 60°50′N, 26°50′W, depth 1518 m. IORAS 5/2/3094 – 'Akademic Mstislav Keldysh' – 'Mir 1', 64°37.91′N, 4°30.20′E, depth 1290 m. IORAS 5/2/3096; 5/2/3097 – 'Akademic Mstislav Keldysh' – 'Mir 2', 64°38.31′N, 4°48.58′E, depth 1303–1240 m.

***Description.*** Vase-like or saccular, basiphytose, often with a tendency to produce rhizoidal diverticulae in the lower part. One specimen described by Schulze (1900a) is dichotomously branching retaining the common atrial cavity. The body is about 150–180 mm long, 50–80 mm in diameter, the walls are 3–8 mm thick, the diameter of the osculum is about 40–50 mm. Prostalia marginalia are diactines common with choanosomal forms. The surface is smooth. Spicules. The choanosomal skeleton is composed of diactines. They are 2–5/0.010–0.040 mm with a widening in the middle and conically pointed or with rounded rough terminations. Hypodermal pentactines have tangential rays 0.6–1.4 mm long, the proximal rays are usually longer than the tangential ones, they reach 5 mm long, the diameter of these rays is about 0.018–0.030 mm. In one specimen (BMNH 1908.09.24.025) some of the tangential rays of hypodermal pentactines have spines, although it is possible that these are allochthonic in origin. Dermalia are stauractines with two rudimentary rays, or rarely pentactines with one rudimentary ray, or hexactines with two rays long and four short. The rays of these spicules are rough, with rounded terminations, they are 0.040–0.137/0.004 mm. Atrialia are hexactines with rough rays rounded or conically pointed terminations. The distal ray of atrial hexactines is 0.038–0.152 mm long, the tangential rays are 0.061–0.182 mm long, the proximal one is 0.061–0.266 mm long, they all are 0.004–0.006 mm in diameter. Microscleres. Microscleres are hexasters and hexactines, sometimes hemihexasters and similar abnormal spicules. These spicules have rough and rarely spiny rays and pappocomes. The hexasters are 0.040–0.083 mm in diameter with primary rosette 0.005–0.013 mm in diameter. Hexactines are 0.036–0.094 mm in diameter. These spicules (according to Schulze, 1900a and Koltun, 1967) are up to 0.180 mm in diameter, they have spiny or rough thin rays. The abnormal forms derived from hemihexasters and hexactines by a reduction in the number of rays were found in two specimens (IORAS 5/2/2358, BMNH 1936.09.22.160). Pappocomes (trichasters) are hexasters with numerous thin secondary rays form a widened tuft. They are 0.054–0.086 mm in diameter (according to Schulze, 1900a and Koltun, 1967, they are up to 0.170 mm in diameter) with primary rosette 0.009–0.020 mm in diameter.

***Remarks.*** The genus contains 1 certain and 1 doubtful species. The diagnosis was developed from Schulze (1900a) and Koltun (1967). The holotype does not seem to be designated from two specimens of the type series (Schulze, 1900a). Pappocomes were called trichasters by Schulze (1900a) and Koltun (1967). *Trichasterina sagittaria* (Topsent, 1913a; Burton 1930c) and *T. bispiculigastra* (Rezvoi, 1923; 1925) were transferred to *Asconema*, which at the time was considered to be monospecific (Koltun, 1967) whereas reinvestigation of the type specimen of the former (MOM 040805) showed that it belongs to *Trichasterina* while the second one is referred here to *Asconema foliata* (Fristedt) (Tabachnick, in press). *Trichasterina sagittaria* mentioned in the publication of de Laubenfels (1942) (specimen USNM 23283) is referred here to *Anoxycalyx laceratus* Koltun.

The principal differences pointed out by Topsent (1913a) for the definition of *T. sagittaria* (relatively large numbers of dermal stauractines which have no trace-tubercles or reduced rays; hexactines with relatively long rays; relatively large numbers of abnormal microscleres) do not seem to be sufficient. I refer new specimens described here close to *T. sagittaria* to another species (*T. borealis*). Unfortunately this evidence, together with similar features seen in specimens of *T. borealis*, does not solve the question of their identity since the single specimen of *T. sagittaria* is badly damaged. But it is very likely that they are synonymous.

**Distribution**

Arctic Ocean, depth 132–1447 m.

Hoo-154.qxd 10/7/04 2:16 AM Page 1488



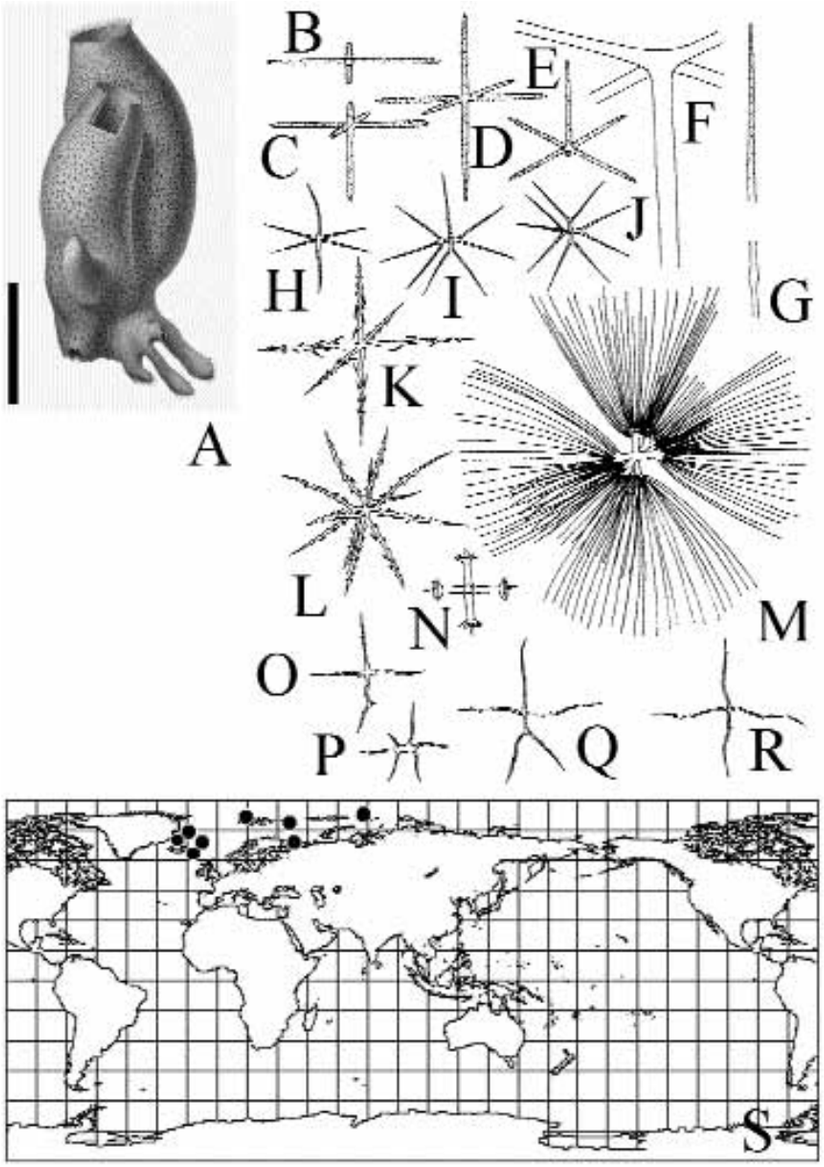


**Fig. 33.** *Trichasterina borealis.* A, external shape (after Schulze, 1900a) (scale 50 mm). B, dermal stauractine with 2 rudimentary rays 130×. C, dermal pentactine with 1 rudimentary ray 130×. D, atrial hexactine 130×. E, atrial pentactine 130×. F, hypodermal pentactine 65×. G, choanosomal diactine 65×. H, hexactine 250×. I, hemihexaster 250×. J, hexaster 250×. K, spiny hexactine 250×. L, spiny hexaster 250×. M, pappocome 250×. N, its primary rosette 500×. O, R, stauractines 250×. P, Q, abnormal microscleres 250×. B–D, K–M, from Schulze (1900a). E, G, H–J, BMNH 1936.09.22.160. F, N, from Koltun (1967). O–R, IORAS 5/2/3094. S, distribution of *Trichasterina*.

## *VAZELLA* GRAY, 1870

### Synonymy

*Vazella* Gray, 1870b: 311; Kent, 1870b: 252; Marshall, 1875: 146; Delage & Herouard, 1899: 244; de Laubenfels, 1936a: 192. *Holtenia* Schmidt, 1870: 14; 1880b: 65; Marshall, 1876: 126; Vosmaer, 1887: 278, Lendenfeld, 1888; 20; Burton, 1954: 217.

### Type species

*Holtenia pourtalesi* Schmidt, 1870 (by subsequent designation; de Laubenfels, 1936a: 192).

### Definition

Saccular Rossellinae with discoidal microscleres consisting only of microdiscohexasters; dermalia are pentactines and stauractines; hypodermal pentactines have paratropal tangential rays.

### Diagnosis

Body is saccular, basiphytose. Choanosomal skeleton is composed of diactines. Hypodermal spicules are paratropal pentactines. Prostalia basalia and marginalia are monaxones. Dermalia are stauractines and pentactines. Atrialia are mainly hexactines.

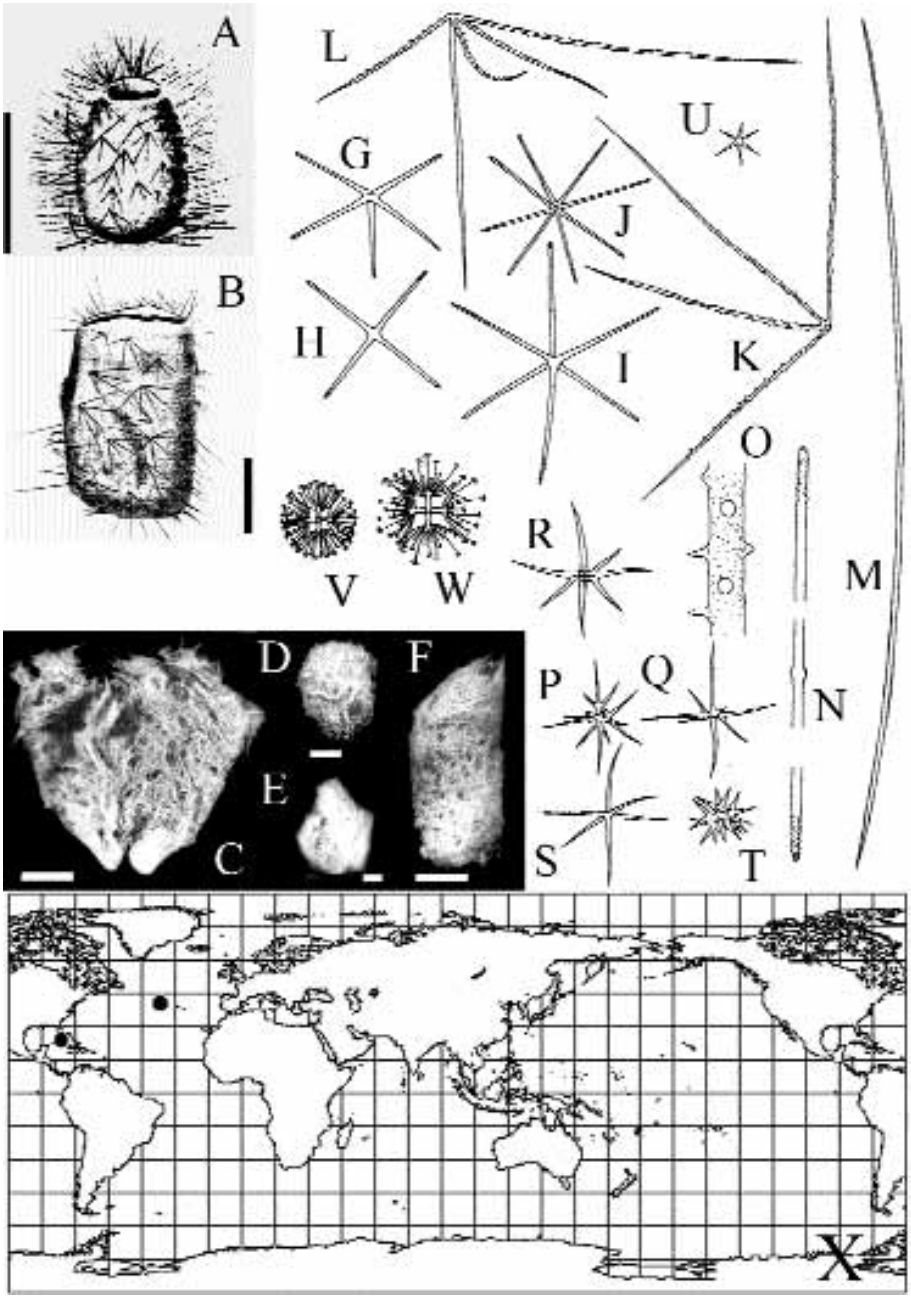


**Fig. 34.** *Vazella pourtalesi.* A, external shape (after Schmidt, 1870) (scale 10 mm). B, external shape (after Schmidt, 1870) (scale 10 mm). D–F, external shape (after Reiswig, 1992). C, lectotype MCZ 6290 (2/1995) (scale 20 mm). D, paralectotype MCZ 6862 (2/1995) (scale 50 mm). E, paralectotype MCZ 6860 (2/1995) (scale 50 mm). F, holotype of *Holtenia saccus* MCZ 6291 (1/1995) (scale 50 mm). G, dermal pentactine 65×. H, dermal stauractine 65×. I, atrial hexactine 65×. J, atrial spicule with 5 (of 6 primary rays) branching near central cross (tangential plane) 65×. K, hypodermal pentactine (tangential plane) 5×. L, hypodermal pentactine 5×. M, monaxone prostalia 25×. N, choanosomal diactine 130×. O, a fragment of tangential ray of hypodermal pentactine 65×. P, T, hexasters 250×. Q–R, hemihexasters 250×. S, U, hexactines 250×. V–W, discohexasters 500×. G–W, from Reiswig (1992). X, distribution of *Vazella*.

Microscleres are microdiscohexasters and combinations of hexactines, hexasters and hemihexasters.

### Description of type species

*Vazella pourtalesi* (Schmidt, 1870) (Fig. 34).

***Synonymy.*** *Holtenia pourtalesii* Schmidt, 1870: 14, 1880b: 65; Carter, 1873a: 282; 1873c: 361, 371; 1875a: 118; Marshall, 1875: 338; 1876: 126; Duncan, 1881: 179; Schulze, 1887a: 236, 424, 1899: 2, 3; 1904: 150; Vosmaer, 1887: 278; Agassiz, 1888: 175 (not p.174, fig. 531); Lendenfeld, 1888: 20; Dendy, 1889: 48; de Laubenfels, 1936a: 192; Desqueyroux-Faundez & Stone, 1992: 88. *Holtenia saccus* Schmidt, 1870: 15; Carter, 1873a: 282; Duncan, 1881: 179; Schulze, 1887a: 236, 424; 1899: 2,3; 1904: 150; Desqueyroux-Faundez & Stone, 1992: 88. *Vazella pourtalesii* Gray, 1870b: 311; Schulze, 1887a: 484; de Laubenfels, 1936a: 192. *Vazella saccus* Gray, 1870b: 311; Schulze, 1887a: 484. *Pheronema pourtalesii* Schulze, 1893: 548;

Hoo-154.qxd 10/7/04 2:16 AM Page 1490



Reiswig, 1992: 30. *Pheronema saccus* Schulze, 1893: 548; Reiswig, 1992: 30.

***Material examined.*** Lectotype: MCZ 6290 – US Coast Survey, off Sombrero, Florida, 24°14′20′N, 80°57″W, depth 479 m. Paralectotypes: MCZ 6862, 6860 – US Coast Survey, off Sand Key, Florida, 24°15′N, 80°41″10′W, depth 282 m. Other material. Holotype of *Holtenia saccus*: MCZ 6291 – Florida. Specimens: MOM 04 2114 – 'Princesse-Alice', Azores, 38°31′00–30.30′N, 26°49.15–50.15′W, depth 845 m.

***Description.*** Lectotype has a flattened saccular body 92 mm long and 100 mm in diameter with large atrial cavity and walls about 1 mm thick. Other specimens are about 15.5–25 mm long and 11.5–20 mm in diameter. Prostalia are monaxones and hypodermal pentactines extruded over the dermal surface. Spicules. The choanosomal skeleton is composed of diactines 0.47–7.5/0.005–0.034 mm. The smaller ones usually have a widening in the middle which is absent in the larger ones. Their terminations are rough, rounded or spherical. Prostalia are monaxones (probably diactines too) 5.2–54/0.058–0.139 mm with finely pointed smooth terminations. Hypodermal pentactines have paratropal tangential rays often rough with spines rarely smooth without spines as well as the proximal ray. The tangential rays of hypodermal pentactines are 4.2–14.2/0.061–0.118 mm, the proximal ray is 7.2–12.3/0.077–0.120 mm. Dermalia are stauractines and pentactines. The latter notably predominant in the lectotype. Pentactines and stauractines are equal on proportion in the paralectotype. Stauractines are notably predominant in the smallest paralectotypes and in the specimen from the Azores. Dermal stauractines and pentactines have rays 0.112–0.342/0.007–0.014 mm. Tangential rays are usually equal long when the proximal ray can be slightly smaller or larger. Atrialia are hexactines, rarely pentactines, stauractines, triactines and spicules with more than 6 rays. One ray of atrial hexactines can be slightly longer than the others. The rays of atrial hexactines are 0.162–0.249/0.007–0.012 mm. Both dermal and atrial spicules have smooth rays with rough rounded terminations. Microscleres. Microscleres are microdiscohexasters and combinations of hexactines, hexasters and hemihexasters. Microdiscohexasters have numerous secondary rays which can have different length (anisodiscohexasters) bearing toothed discs. Microdiscohexasters are 0.021–0.036 mm in diameter, diameter of the primary rosette is 0.004–0.015 mm. Hemihexasters are more abundant than hexasters and hexactines in the specimens from Florida. Only hexactines were present in the specimen from the Azores while hemihexasters and hexasters were not found. These spicules are 0.037–0.122 mm in diameter.

***Remarks.*** This genus was recently redescribed by Reiswig (1992), hence the description above is based chiefly on this publication whereas one specimen from the Azores was also discovered among specimens of putative *Pheronema*. The genus contains only one species.

Although *Vazella* has existed for a long time it has had an uncertain taxonomic position due to its poor description, until Reiswig redescribed it (1996). I consider this genus to be basiphytose more so than lophophytose. Its attachment by thick diactines projecting only 1–2 mm from basal surface, without organization into a root tuft (according to Reiswig, 1996), may be considered to be an additional type of basiphytose attachment. Some microdiscohexasters are found in the form of microanisodiscohexasters.

**Distribution**

W and Central Atlantic, depth 282–845 m.

## *VITROLLULA* IJIMA, 1898

*Vitrollula* Ijima, 1898: 47.

**Type species**

*Vitrollula fertile* Ijima, 1898 (by monotypy). The other species described originally by Ijima (1898), *V. namiyei*, belongs to the genus *Scyphidium* (Ijima, 1904).

**Definition**

Saccular Rossellinae in which the choanosomal skeleton contains a considerable number of hexactines; microscleres have oxyoidal and discoidal terminations, the latter represented only by microdiscohexasters.

**Diagnosis**

Body is saccular, basiphytose. Choanosomal skeleton is composed of diactines and hexactines. Hypodermal spicules are pentactines. Dermalia are stauractines and pentactines. Atrialia are hexactines and pentactines. Microscleres are hexasters and microdiscohexasters.

**Description of type species**

*Vitrollula fertile* Ijima, 1898 (Fig. 35).

***Synonymy.*** *Vitrollula fertile* Ijima, 1898: 47. *Vitrollula fertilis* Ijima, 1904: 38; 1927: 375; Mehl, 1992: 22.

***Material examined.*** Holotype: not examined, off Japan, Sagami Bay, depth 330–414 m.

***Description (from Ijima, 1898, 1904).*** The body is oval or spindle-like with large atrial cavity and smooth surface. The sponge is 12–15 mm long and 6–8.5 mm in diameter, the osculum is 1.75–3 mm in diameter, the walls are 1.3–2 mm thick. Spicules. The choanosomal skeleton is composed of diactines and a considerable number of hexactines. The diactines are about 0.012 mm in diameter with a widening or four rudimentary tubercles in the middle, smooth with rough conically pointed terminations. The hexactines have rays about 0.8/0.030 mm, smooth with rough conically pointed terminations. Typical basidictyonal skeleton was found in the basal part of these sponges. Hypodermal pentactines have tangential rays about 0.5/0.027 mm, the proximal ray is about two times longer. The smallest hypodermalia have tangential rays which coincide in shape and size with dermal stauractines, and consequently probably belong to the latter type of spicule. Dermalia are stauractines and pentactines. Stauractines are slightly convex in the tangential plane, with rays 0.132–0.340/0.007–0.012 mm, with surface rough or tuberculated with conically pointed terminations. Atrialia are hexactines and pentactines. They have rays 0.165–0.176 mm long. In shape the rays resemble dermal spicules. Microscleres. Microscleres are hexasters and microdiscohexasters. The hexasters have 4–7 rough secondary rays at each principal. These spicules are 0.114–0.140 mm in diameter. The microdiscohexasters are 0.026–0.030 mm in diameter.

***Remarks.*** The holotype has never been designated from the two type specimens. Only two other specimens are known, discovered later by Ijima (1904). *Vitrollula* is presently monotypic and very close to *Hyalascus*, for which the diagnosis has been broadened since Ijima's revisions (1898; 1904). Features which Ijima suggested

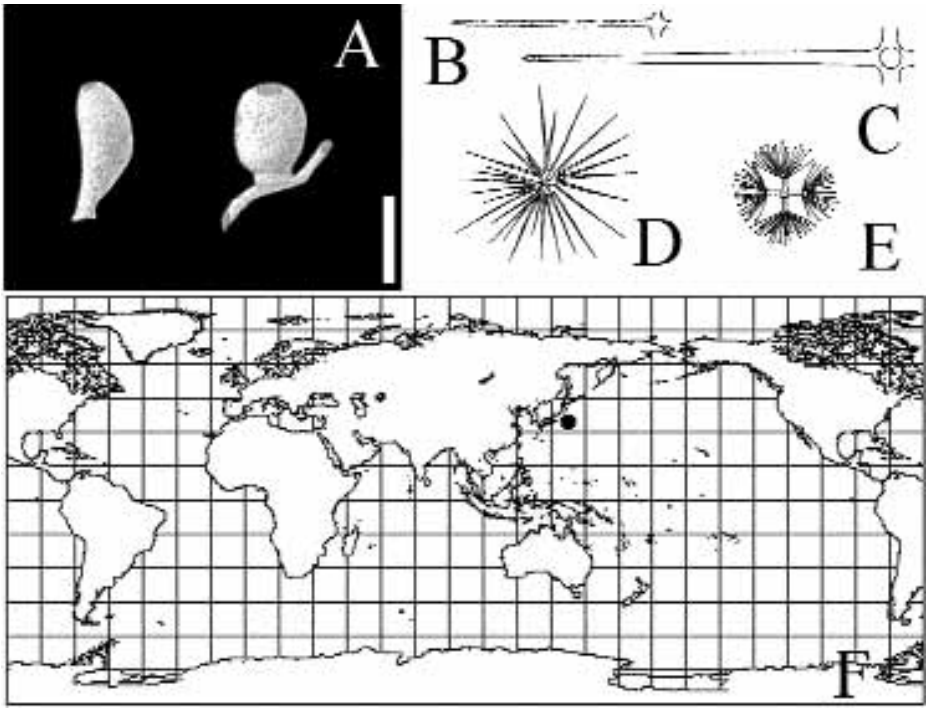


**Fig. 35.** *Vitrollula fertile*. A, external shape (after Ijima, 1904). Two specimens (scale 10 mm). B, dermal stauractine 130×. C, hypodermal pentactine 130×. D, hexaster 250×. E, microdiscohexaster 500×. B–E, from Ijima (1904). F, distribution of *Vitrollula*.

distinguished *Vitrollula* from *Hyalascus* – the smaller size of the body and hexactinic parenchymalia and normally developed oxyhexasters – are no longer satisfactory criteria at the generic level following revision of *Hyalascus*. The presence of choanosomal hexactines is the single specific diagnostic feature of *Vitrollula*, differentiating it from *Hyalascus*. This feature, however, does not appear to be important given that some other genera of Rossellidae possess it, and it is possible that *Vitrollula* should be merged with *Hyalascus*, although not yet formally proposed here – requiring further revision from re-examination of respective type material.

I also consider the 'small hypodermal pentactines', which coincide in length and shape with dermal stauractines according to Ijima (1904), to be dermal spicules. This fact indicates 'the low degree of differentiation of the species (*V. fertile*) from the Leucopsacidae' Ijima (1904), as well as presence of choanosomal hexactines. Larvae were found and have been described in this species. They are spindle-like with typical Hexactinellid larvae spicules – stauractines.

**Distribution**

Off Japan (Sagami bay), depth 330–414 m.

## SUBFAMILY LANUGINELLINAE SCHULZE, 1897

**Synonymy**

Lanuginellidae Schulze, 1897: 26.

**Definition**

Rossellidae with strobiloplumicomes as microscleres.

**Diagnosis**

See below.

**Scope**

Seven genera are included in the subfamily.

**Remarks**

I do not support the expanded diagnosis of Ijima (1904, 1927) because it nearly completely overlaps with that of Rossellinae. Consequently, I return to the diagnosis of Schulze (1897) "… Rossellidengattungen … Bezitz von Plumicomen oder den nahe verwandten Aspidoplumicomen …", which is the differential diagnosis.

One species of Lanuginellinae, *Mellonympha mortenseni* (Burton, 1928b; 1954) has no strobiloplumicomes and its position within Lanuginellinae is ascertained only after its close affinity with *M. velata* which has spicules characteristic of the subfamily. Another feature characteristic for Lanuginellinae (aside from the poorly known *Doconestes*) is the presence of hexactines among choanosomal diactines. Rossellinae (except *Vitrollula*) rarely have hexactines.

In defining the scope of this subfamily I follow Ijima (1927), excluding *Caulocalyx tenera* (initially included by Schulze, 1897), and transferring *Sympagella* (from Caulophacidae) and *Doconesthes* (following Topsent, 1928c), with the subfamily now containing all species with strobiloplumicomes. The definition of strobiloplumicomes requires clarification. *Caulocalyx* and *Saccocalyx* (representatives of another family) have strobiloplumicome-like spicules called plumicomes (or aspidoplumicomes). Both strobiloplumicomes and plumicomes have numerous

Hoo-154.qxd 10/7/04 2:16 AM Page 1492



sigma- or hook-like secondary rays situated in several concentric circles on the primary ray (these sigma-like secondary rays are situated in a single circle in sigmatocomes of some Euplectellidae). Strobiloplumicomes and plumicomes differ by the form of the primary ray. They are discoidal in plumicomes and clavate, or clavate with terminal spine, in strobiloplumicomes. The secondary rays in the latter are subequal in length and differ strongly in the former. Secondary rays of strobiloplumicomes, situated on the side of the primary ray, are notably (several times) shorter than that on the inner side.

The key to genera is substantially modified from that of Ijima (1904), and consequently (unfortunately) complicated, but it has the capacity to identify broken fragments of sponges (common to most deep-sea collections). Similarly, in this key I ignore the presence or absence of a peduncle because many hexactinellid sponges are known only from broken fragments. Nevertheless, the presence of a peduncle is a characteristic of three basiphytose genera: *Calycosoma, Sympagella* and *Lanugonychia*. *Lanuginella* is also basiphytose but it has a tendency as well to form a veil of outwardly protruding hypodermal pentactines in some specimens, and thus it verges on the lophophytose condition. All lophophytose sponges in this subfamily are attached to the substratum by outwardly protruding anchorate hypodermal pentactines, often gathered together in a basal tuft.

It is presently not possible to speculate whether Lanuginellinae are monophyletic, but they are nevertheless apparently close genera and not clearly differentiated from other Rossellidae.

**Distribution**

Cosmopolitan, depth 27–5045 m.

**KEY TO GENERA OF LANUGINELLINAE**

(1) Hypodermal pentactines of one type and common to Rossellidae; anchorate pentactines absent (mainly basiphytose – firmly attached by its base to a solid substratum, or lophophytose – rooted by diactine spicules) ..... 2
Hypodermal pentactines of two types: common and short-toothed anchorate spicules, outwardly protruded from the body (mainly lophophytose – anchored to the bottom by anchorate pentactines, or basiphytose – attached to solid rough substratum) ..... 6

(2) Dermalia are chiefly pinular hexactines and pentactines (in the latter the unpaired ray is distally directed) ..... 3
Dermalia are chiefly stauractines and diactines ..... 4

(3) With oxyoidal microscleres besides strobiloplumicomes; with prostalia lateralia or basalia of tufts of diactines ..... ***Calycosoma***
With discoidal, oxyoidal and onychoidal microscleres besides strobiloplumicomes (prostalia lateralia are absent) ..... ***Sympagella***

(4) Discohexasters are present among microscleres ..... 5
Hemihexasters and hexasters are present besides strobiloplumicomes ..... ***Doconesthes***

(5) Dermalia are chiefly stauractines; microscleres are discohexasters besides strobiloplumicomes ..... ***Lanuginella***
Dermalia are chiefly diactines, microscleres are discohexasters and onychohexasters besides strobiloplumicomes ... ***Lanugonychia***

(6) Discohexasters are absent or rarely microdiscohexasters are present; common hypodermal pentactines (other than anchorate ones) have orthotropal tangential rays (displaying a regular cross-figure) ..... ***Lophocalyx***
Discohexasters have the usual form of macrodiscohexasters, other than asterous discoidal spicules can be found; the common hypodermal pentactines (other than anchorate ones) have paratropal tangential rays ..... ***Mellonympha***

## *LANUGINELLA* SCHMIDT, 1870

**Synonymy**

*Lanuginella* Schmidt, 1870: 13. *Lanuginella*, *Laguniella* (lapsus) Mehl, 1992: 92.

**Type species**

*Lanuginella pupa* Schmidt, 1870 (by monotypy).

**Definition**

Basiphytose Lanuginellinae with dermalia of stauractines; microscleres discohexasters and strobiloplumicomes.

**Diagnosis**

Body is ovoid or spherical, basiphytose. Choanosomal skeleton is composed of diactines and hexactines. Hypodermal spicules are pentactines which sometimes protrude outwards forming prostalia lateralia. Dermalia are chiefly stauractines. Atrialia are hexactines. Microscleres are strobiloplumicomes and discohexasters.

**Description of type species**

*Lanuginella pupa* Schmidt, 1870 (Figs 36–37).

***Synonymy.*** *Lanuginella pupa* Schmidt, 1870: 70.

***Material examined.*** Holotype: not seen, off Cape Verde Islands, off St. Jago. Other material. ZMA 7412 – CANCAP 7, Cape Verde Islands, W of Sal, off Palmeira, 16°42′N, 23°02′W, depth 125–164 m. USNM 22133 – 'Albatross', off Japan, Kagoshima bay, 30°58.30′N, 130°32.00′E, depth 188–278 m. (?) BMNH 1887.10.20.044 – 'Challenger', 5°49.15′S, 132°14.15′E, depth 236–256 m (*incertae sedis*).

***Description.*** The sponges are ovoid or spherical, 2–60 mm long, maximum diameter 2–40 mm. The smallest specimens (2–3 mm) have no oscules (Schulze, 1887a) while specimens 6–7 mm long do (Ijima, 1904). The dermal surface is smooth, in some specimens prostalia lateralia are formed by outwardly protruding hypodermal pentactines, at 0.5–1 mm, having the shape of a veil. These sponges are basiphytose although Schulze suggested that some

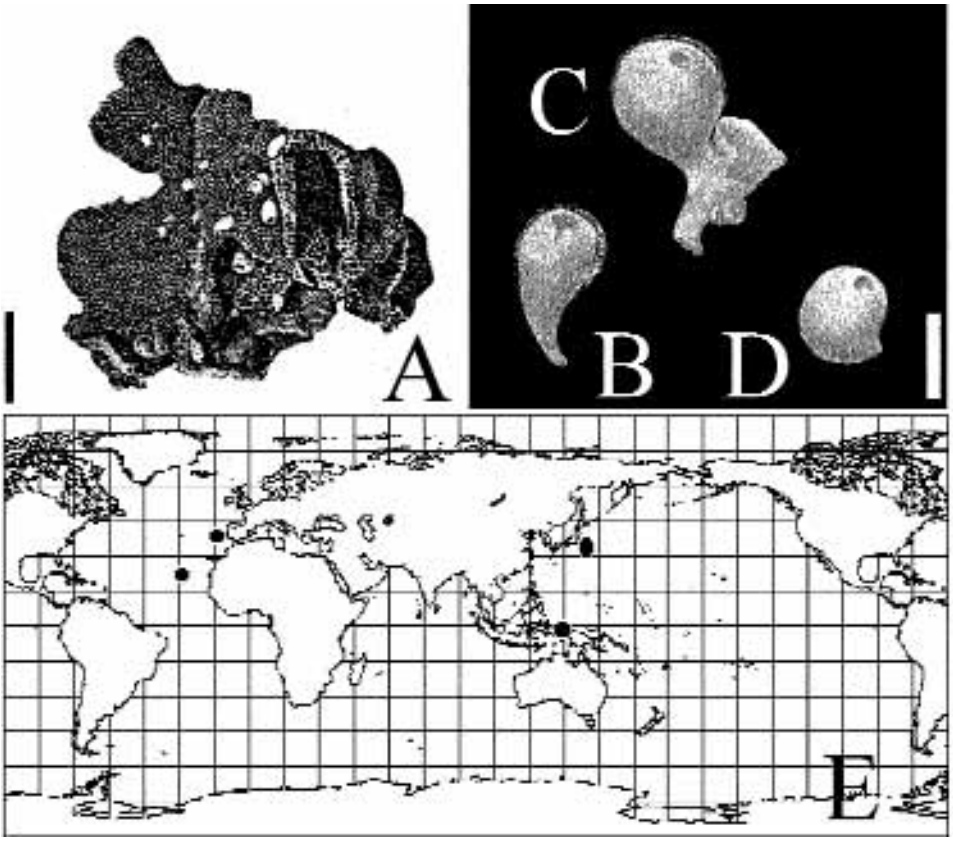


**Fig. 36.** *Lanuginella pupa*. A, numerous specimens attached to *Aphrocallistes* sp. (after Schmidt, 1870)(scale 10 mm). B–D, three specimens (after Ijima, 1904) (scale 10 mm). E, distribution of *Lanuginella*.

lophophytose forms also occur. Schulze may be correct given that prostalia lateralia can vary whereas Ijima described *Lophocalyx* from the same jar as *Lanuginella* with the possibility that lophophytose forms also occur. The type specimens (attached to an *Aphrocallistes*) are small, probably up to 3 mm in diameter, the largest of which have open oscules (Schmidt, 1870). Spicules. The choanosomal skeleton is composed of diactines 0.8–5.0/0.005–0.100 mm. They often have widening in the middle or rarely four rudimentary tubercles. The terminations of these diactines are conically pointed or rounded, smooth or sometimes rough. Choanosomal hexactines are typical of the family. They have rays often of different lengths, 0.1–1.1/0.007–0.038 mm, with conically pointed smooth or rough terminations. The spicules which Ijima (1904) described as basidictyonalia (hexactines, pentactines and stauractines) are very similar to dermal spicules, with rays about 0.050 mm long, and the smallest spicules of the true dermalia (specimen ZMA 2603) are close in their dimensions (see below). Hypodermal pentactines have tangential rays up to 0.5/0.034 mm, with the proximal ray about 3 times longer. They have terminations similar to those of choanosomal hexactines. The hypodermal pentactines forming the prostalia lateralia can have a rough surface. Dermalia are mostly stauractines, however pentactines, tauactines and hexactines can be also found. They have rays 0.057–0.189/0.007 mm, slightly rough with conically pointed or rounded terminations. Atrialia are hexactines with rays 0.068–0.243/0.007 mm. They are less rough than dermal spicules, their distal, tangential and proximal rays do not vary strongly in length. Microscleres. Microscleres are discohexasters and strobiloplumicomes. Discohexasters are 0.029–0.090 mm in diameter, with the diameter of primary rosettes 0.007–0.016 mm. 2–5, but usually 3, rough secondary rays are fastened to each principal. Strobiloplumicomes are 0.025–0.076 mm in diameter, with primary rosette 0.004–0.018 mm in diameter.

***Remarks.*** The genus is currently monotypic. Schulze (1887a) mentioned that *L. pupa* sometimes could be lophophytose, with long anchors, whereas Ijima considered these lophophytose specimens to be small representatives of *Lophocalyx philippinensis*, stored in the same jar with *L. pupa*.

It is not obvious that the Atlantic and Pacific specimens should be synonymised into a single species from their published descriptions. Unfortunately, the type material has not been examined and descriptions of *L. pupa* from the Atlantic are not sufficiently detailed to resolve this issue. Ijima compared only his material from the Pacific with that collected by the 'Challenger' expedition, also from the Pacific and described by Schulze (1887a). Only the ZMA specimen from the Atlantic Ocean appears to be conspecific to Pacific material. The discohexasters of Atlantic and Pacific *L. pupa* are dissimilar, but the question of whether they are conspecific requires further investigations, in particular the type material from the Atlantic needs to be redescribed. Illustrations presented here are based on spicules of the Atlantic specimen whereas Pacific spicules are well documented in the papers of Ijima (1903; 1904).

I am not sure that the specimen BMNH 1887.10.20.044 really belongs to this genus with the possibility that it is a mixture of *Lophocalyx philippinensis* and *L. pupa*, as described by Schulze (1887a); characteristic strobiloplumicomes were not rediscovered from re-examination of this material although they were described by Schulze.

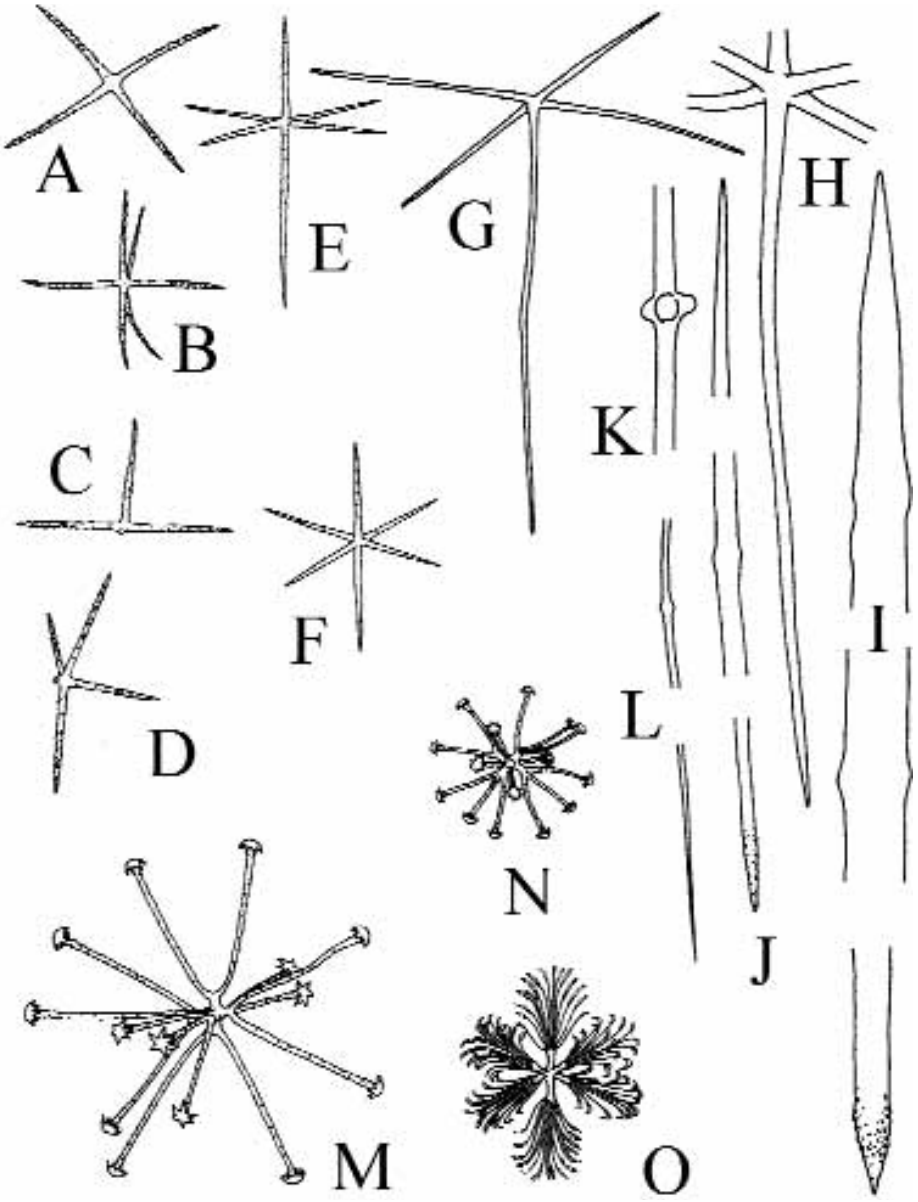


**Fig. 37.** *Lanuginella pupa*. Spicules. A, dermal stauractine 190×. B, dermal hexactine 190×. C, dermal tauactine 190×. D, dermal paratetractine 190×. E–F, atrial hexactines 190×. G, hypodermal pentactine 90×. H, choanosomal hexactine 90×. I–L, choanosomal diactines 190×. M–N, discohexasters 710×. O, strobiloplumicome 710×. A–O, ZMA 7412.

**Distribution**

E Central Atlantic and W Pacific, depth 125–572 m.

## *CALYCOSOMA* SCHULZE, 1899

**Synonymy**

*Calycosoma* Schulze, 1899: 27. Not *C. gracile* Schulze, 1903: 14 and not *C. validum* off Antarctica; Topsent, 1910: 17; 1913b: 606; Barthel & Tendal, 1994: 111.

**Type species**

*Calycosoma validum* Schulze, 1899 (by monotypy).

**Definition**

Basiphytose, often pedunculate Lanuginellinae with dermalia consisting of pinular pentactines and rare hexactines; with oxyoidal microscleres besides strobiloplumicomes, and with prostalia lateralia consisting of diactines which can serve as basalia.

**Diagnosis**

Body is funnel-like, basiphytose or lophophytose with prostalia of diactines gathered in tufts which sometimes serve as basalia. Choanosomal spicules are diactines and hexactines. Dermalia and atrialia are pentactines, sometimes hexactines and stauractines. Hypodermalia and rare hypoatrialia are pentactines. Microscleres are strobiloplumicomes, hemihexasters, hexasters and rarely hexactines.

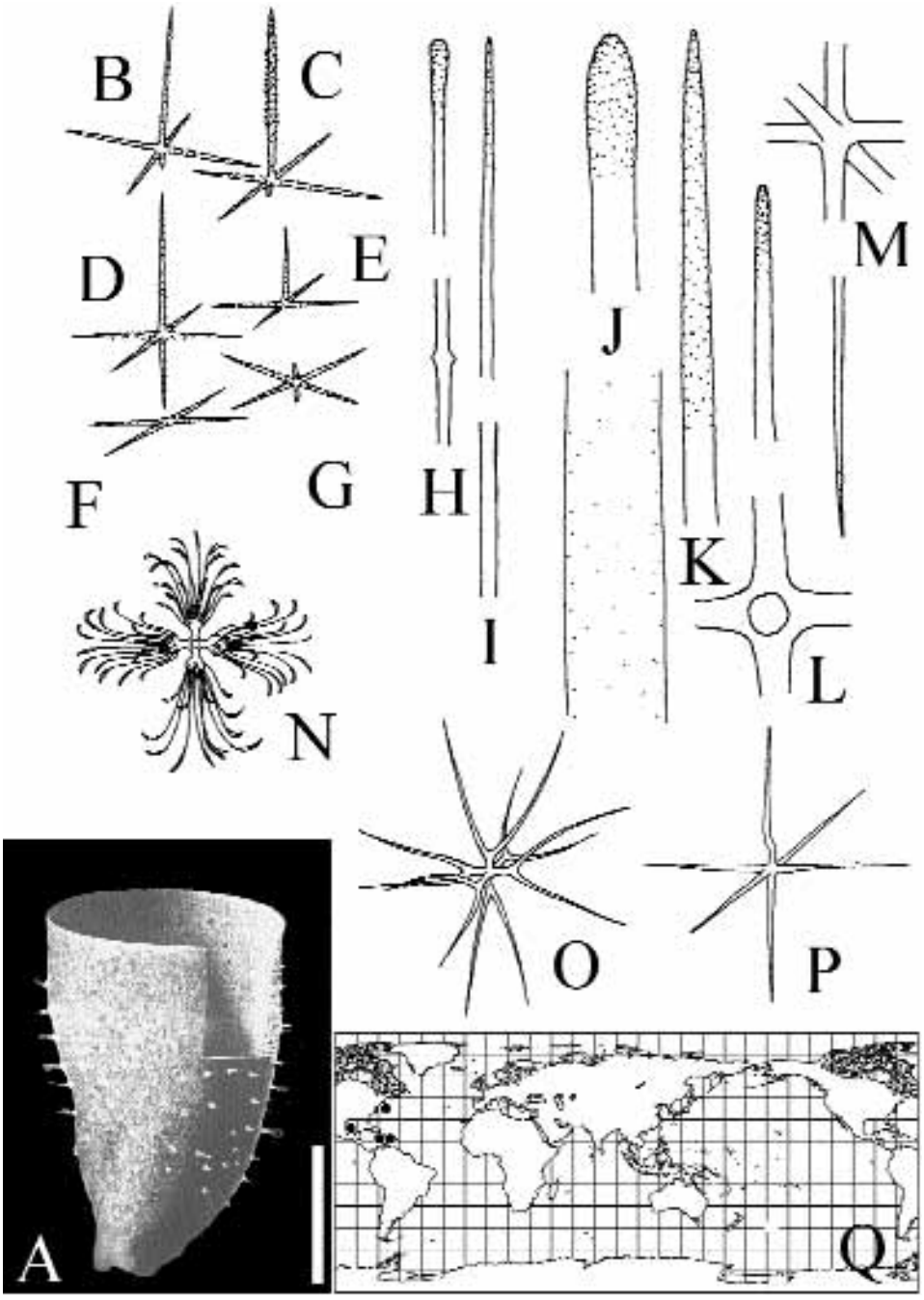


**Fig. 38.** *Calycosoma validum*. A, external shape (after Schulze, 1899) (scale 50 mm). B, dermal pentactine 160×. C, dermal pentactine 160×. D, dermal hexactine 160×. E, dermal pentactine 160×. F–G, dermal stauractines 160×. H–I, choanosomal diactines 160×. J–K, prostalia diactines 160×. L, hypodermal pentactine 160×. M, choanosomal hexactine 160×. N, strobiloplumicome 620×. O, hexaster 310×. P, hexactine 310×. B, D–M, USNM 4761. C, N, USNM (kt1460). O–P, from Schulze (1899). Q, distribution of *Calycosoma*.

**Description of type species**

*Calycosoma validum* Schulze, 1899 (Fig. 38).

***Synonymy.*** *Calycosoma validum* Schulze, 1899: 27. Not *Calycosoma validum* off Antarctica Topsent, 1910: 17; 1913b: 606; Barthel & Tendal, 1994: 111.

***Material examined.*** Holotype: USNM 4761 (fragment BMNH 1908.09.24.029) – 'Albatross', 40°34.18′N, 66°09.00′W, depth 3186 m. Other material. USNM (numerous specimens) – 'Albatross', 15°24.40′N, 63°31.30′W, depth 1250 m. USNM (numerous specimens) – 'Bartlett' 1301–82, 13°48.30′N, 67°49.12′W, depth 5008 m. USNM (kt1306) – 'Bartlett' 1301–82, 13°27.4′N, 64°43.9′W, depth 3422–3464 m. USNM (kt1458; kt1460) – 'Alaminos', Gulf of Mexico, depth 3840 m. USNM (328) – 'Oregon' stn. 2199.

***Description.*** The sponge has funnel-like basiphytose body carrying conules with prostalia lateralia composed of diactines gathered in tufts. The holotype is about 140 mm long and 80 mm in diameter, the walls are up to 10 mm thick. The conules are about 4 mm high and 1–2 mm in diameter. Prostalia lateralia protrude at 5–15 mm long. The numerous other specimens are represented only

Hoo-154.qxd 10/7/04 2:16 AM Page 1496



by fragments. Spicules. Choanosomal spicules are diactines and hexactines. Diactines are of two types. The large diactines serving as prostalia lateralia and as basalia in some specimens are about 5–60 mm long and 0.05–0.45 mm in diameter, they are smooth or rough with rounded or conical rough terminations. Basalia of allochthonic origin from Euplectellidae and Hyalonematidae were observed in some specimens. The common choanosomal diactines are shorter, several mm long and 0.005–0.017 mm in diameter, they are smooth with or without a widening in the middle. They have conical, rounded or clavate terminations. The choanosomal hexactines have smooth rays 0.49–0.68/0.015–0.019 mm often with conical and slightly rough terminations. The notable fusion of the choanosomal spicules by synapticular junctions was observed only in the holotype. Dermalia are chiefly pentactines with a short rudiment instead of the absent ray. Hexactines and stauractines (the latter with or without rudimentary rays) are also common among dermalia. The distal ray is 0.030–0.198 mm long, tangential rays are 0.038–0.129 mm long, they are about 0.006 mm in diameter. The rays are short spiny with conically pointed terminations. The distal ray is similar in shape to tangential ones seen in the holotype (unlike spicules figured by Schulze, 1899, pl. IV, figs 5–6), but in most other specimens the spines on the distal ray are longer and the ray is nearly pinular. Atrialia are similar to dermalia in shape and size. The proximal ray is 0.053–0.243 mm long, tangential rays are 0.046–0.137 mm long. Hypodermalia and sometimes hypoatrialia are pentactines. These spicules have smooth rays 0.4–0.9/0.015–0.053 mm with conically pointed slightly rough terminations. Microscleres. Microscleres are strobiloplumicomes and combinations of hemihexasters, hexasters and rare hexactines. The strobiloplumicomes (plumicomes according to Schulze) are 0.027–0.076 mm in diameter, with primary rosette 0.011–0.022 mm in diameter. Hemihexasters and hexasters (the latter absent in some specimens) are 0.065–0.140 mm in diameter with primary rosette 0.005–0.022 mm in diameter. Some of these spicules rarely have strongly curved secondary rays. Hexactines are rare or seem to be entirely absent in some specimens, they are 0.083–0.122 mm in diameter.

***Remarks.*** The genus is monotypic. Differences between *C. validum* from the Atlantic ocean (described by Schulze) and from Antarctica (described by Topsent) do not allow their combination into a single species, or even into a common genus. I agree with Topsent (1913b) and Barthel & Tendal (1994) that differences in microsclere dimensions are not of crucial importance whereas their hypodermal pentactines are quite different. The specimen from Antarctica differs from the Atlantic one in having anchor-like pentactines as well as usual ones with straight tangential rays. It is similar to specimens collected from Antarctica USNM (w650; w657) – 'Eltanin' – 16, 53°46.0–45.0′S, 159°12.0′E, depth 750–996 m; USNM (w664; kt706; kt707) – 'Eltanin' – 6, 61°17.0–11.0′S, 58°41.0′–59°02.0′W, depth 3380–4231 m). Unfortunately the external shape of this material is unknown (all fragmented), but it is possible to hypothesise from this material that anchor-like pentactines may serve as anchorate spicules, like those of *Lophocalyx* or *Mellonympha*. Hence, this sponge is more lophophytose than basiphytose in its mode of attachment by mean of anchorate type of hypodermal pentactine. In addition, Antarctic material differs substantially by the presence of large hexactines with pinular distal ray in the inner layer. These spicules differ from the choanosomal hexactines known from the Atlantic material of *C. validum*, and from some *Lophocalyx*, by the possession of a spiny distal ray. Similarly, Atlantic *C. validum* has chiefly pentactines with a rudimentary sixth ray as dermal and atrial spicules, and most of these are dissimilar to those figured by Schulze (1899). They have even rays directed outside the body, usually more spiny than the other rays, or sometimes pinular but with fine conically pointed terminations. The same spicules in the Antarctic specimens have mostly hexactines which are entirely similar Schulze's illustrations. Topsent may have referred his Antarctic material to this species based on comparison with these illustrations despite that they are not characteristic of this sponge. The Antarctic *C. validum* is re-examined to be a new species of *Lophocalyx*. *Calycosoma* is very close to *Lophocalyx*, differing mainly by the absence of anchorate hypodermal pentactines where large diactines serve as basalia if lophophythose fixation occurs in *Calycosoma*. These features may be insignificant at the generic level since some specimens of *Lophocalyx* have few anchorate pentactines, with the consequence that *Calycosoma* may be relegated to a subgenus or synonymised completely with *Lophocalyx*.

**Distribution**

NW and W Central Atlantic Ocean, depth 1250–5008 m.

## *DOCONESTES* TOPSENT, 1928

**Synonymy**

*Doconesthes* Topsent, 1928c: 80.

**Type species**

*Doconesthes sessilis* Topsent, 1928c (by monotypy).

**Definition**

Basiphytose Lanuginellinae with dermalia of diactines; and microscleres consisting of hemihexasters, hexasters and strobiloplumicomes.

**Diagnosis**

Body is basiphytose. Choanosomal spicules are diactines. Hypodermalia are pentactines. Dermalia are diactines, rarely stauractines and tauactines. Microscleres are strobiloplumicomes, hemihexasters and hexasters.

**Description of type species**

*Doconesthes sessilis* Topsent, 1928c (Fig. 39).

***Synonymy.*** *Doconesthes sessilis* Topsent, 1928c: 80.

***Material examined.*** Holotype: MOM (not seen) – off the Azores, 42°53.0′–54.0′N, 28°30.45′–30.45′W, depth 2460 m.

***Description (from the literature).*** The sponge is represented by a single basal part of a broken specimen. It is a lamella-like 9 × 6 × 3 mm, 3–5 mm thick. Spicules. Choanosomal spicules are diactines 0.32–0.39/0.006–0.010 mm. They have rough terminations and a widening in the middle. Hypodermalia are pentactines with very short proximal ray. The tangential rays are 0.525–0.800/0.030 mm, while the proximal one is 0.126–0.245 mm. The rays of hypodermal pentactines have rough rounded ends. Dermalia are chiefly diactines 0.320–0.390/0.006–0.010 mm. Sometimes sparse tauactines and stauractines are present. These spicules have rough rays and rounded terminations. The diactines

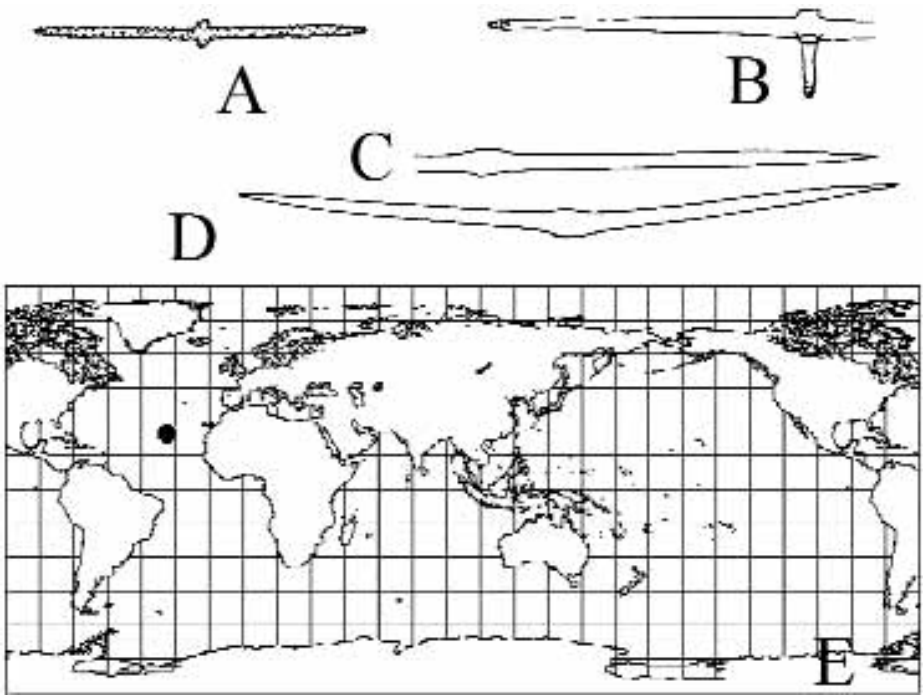


**Fig. 39.** *Doconesthes sessilis*. A, dermal diactine 190×. B, hypodermal pentactine 90×. C–D, choanosomal diactines 90×. A–D, from Topsent (1928c). E, distribution of *Doconesthes*.

have the rudiments of two rays represented only by tubercles in the middle. Microscleres. Microscleres are strobiloplumicomes, hemihexasters and some hexasters. The strobiloplumicomes are about 0.040 mm in diameter, with secondary rays 0.015–0.018 mm long. The hemihexasters and hexasters are 0.100–0.110 mm in diameter.

***Remarks.*** This is a poorly known monotypic genus represented only by a fragment. Atrialia are not described for the genus or species.

**Distribution**

Off the Azores, depth 2460 m.

## *LANUGONYCHIA* LENDENFELD, 1915

**Synonymy**

*Lanugonychia* Lendenfeld, 1915: 103.

**Type species**

*Lanugonychia flabellum* Lendenfeld, 1915 (by monotypy).

**Definition**

Basiphytose Lanuginellinae with dermalia of diactines; and microscleres consisting of discohexasters, onychohexasters and strobiloplumicomes.

**Diagnosis**

Body is funnel-like, basiphytose, attached by a long stalk. Choanosomal spicules are diactines and hexactines. Dermalia are chiefly diactines, hence all the other hexactine derivatives are also found. Atrialia are mostly hexactines. Hypodermalia and hypoatrialia are pentactines. Microscleres are strobiloplumicomes, onychohexasters and discohexasters.

**Description of type species**

*Lanugonychia flabellum* Lendenfeld, 1915 (Fig. 40).

***Synonymy.*** *Lanugonychia flabellum* Lendenfeld, 1915: 103.

***Material examined.*** Holotype: ? ZMB (not seen) – 'Albatross', NE of Easter Island, 25°22.4′S, 107°45′W, depth 3694 m.

***Description (from the literature).*** Pedunculate sponge with funnel-like body and thin walls, represented only by a single damaged specimen. The lamellar-like fragment is about 60 × 40 mm and 1 mm thick, attached to a peduncle over 90 mm long and 2–3 mm in diameter. Spicules. Choanosomal spicules are diactines and hexactines. Diactines 4–20/0.005–0.140 mm are smooth with finely pointed rough terminations, they have a widening or rudimentary tubercles in the middle. Choanosomal hexactines have rays about 0.165/0.024–0.030 mm, they are spiny and clavate (club-shaped). The spicules of the stalk are diactines 0.020–0.090 mm in diameter fused to each other by synapticular junctions. Dermalia are chiefly diactines (monaxones) but all the other spicules (hexactines, pentactines, stauractines, tauactines and monactines) can also be found. The dermal diactines often have two or four rudimentary tubercles in the middle, as well as other hexactine derivatives often with rudimentary tubercles instead of the absent ray. Atrialia are chiefly hexactines but all the derivatives described above for the dermal spicules can be found too. The dermal and atrial spicules have rough rays with conically pointed terminations. The fully developed rays are 0.083–0.180/0.005–0.014 mm. The rudimentary tubercles are rounded 0.006–0.025 mm long. Hypodermalia and hypoatrialia are pentactines. Their tangential rays are 0.4–0.8 mm long, the unpaired ray is 0.6–1.0 mm long.

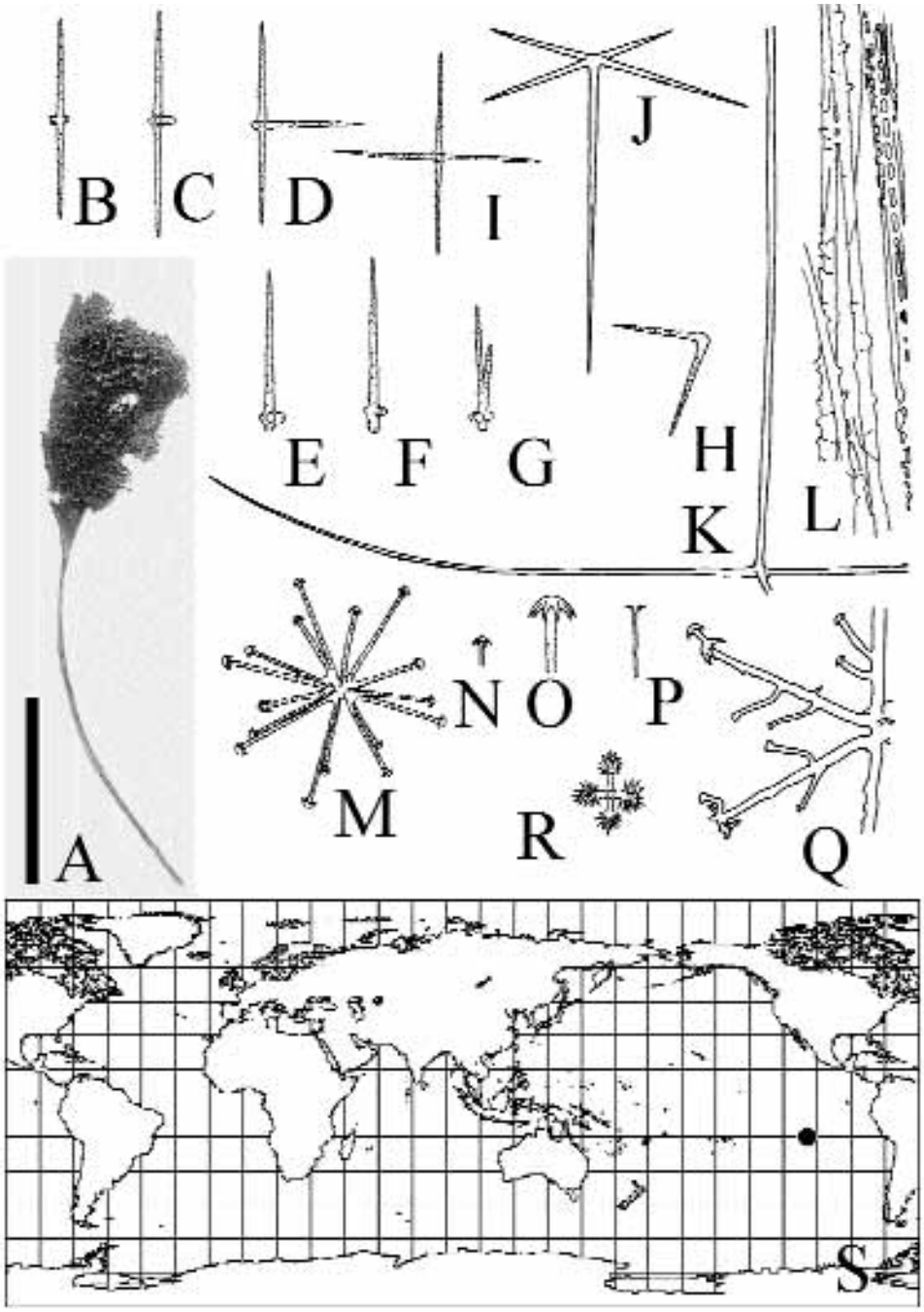


**Fig. 40.** *Lanugonychia flabellum*. A, external shape (after Lendenfeld, 1915) (scale 50 mm). B–C, dermal diactines-monaxones 140×. D, dermal triactine 140×. E–F, dermal monactines 140×. G–H, dermal orthodiactines (diactines-diaxones) 140×. I, atrial ? hexactine 140×. J–K, hypodermal or hypoatrial pentactines 70×. L, choanosomal diactines of the stalk 40×. M, discohexaster 260×. N–O, its terminations 520×. P, onychoidal outer end 520×. Q, abnormal discohexactine 520×. R, primary rosette of strobiloplumicome 520×. B–R, from Lendenfeld (1915). S, distribution of *Lanugonychia*.

The rays have conically pointed rough terminations, at their base they are 0.020–0.040 mm in diameter. Microscleres. Microscleres are strobiloplumicomes, onychohexasters, discohexasters and hemidiscohexasters. The strobiloplumicomes ('plumicomes' according to Lendenfeld) are 0.080–0.108 mm in diameter, with primary rosette 0.020–0.028 mm in diameter. The onychohexasters are 0.085–0.135 mm in diameter, with primary rosette 0.010–0.016 mm in diameter. Discohexasters can be divided into two categories by sizes. The large discohexasters are 0.165–0.220 mm in diameter, with primary rosette 0.016–0.020 mm in diameter. The small discohexasters are 0.082–0.140 mm in diameter, with primary rosette 0.010–0.016 mm in diameter. Abnormal (irregular) discohexasters with spines and additional discs are very rare. They are 0.120–0.140 mm in diameter, with primary rosette 0.010–0.022 mm in diameter. The spicules, described as amphiasters (equivalent to onychodiasters according to newly suggested terminology) are rare and probably allochthonous in origin.

***Remarks.*** When describing this monotypic genus Lendenfeld (1915) compared it to other representatives of Lanuginellinae: *Mellonympha* and *Lanuginella*. Ignoring the dermal spicules,

Hoo-154.qxd 10/7/04 2:39 AM Page 1499



which are quite specific in *L. flabellum* (although their variation overlaps that of *Sympagella*), *Lanugonychia* closely resembles *Sympagella* in body shape, combination of microscleres, and in having both hypodermal and hypoatrial pentactines. These similarities become more obvious if Caulophacidae is abolished and *Sympagella* is transferred to Rossellidae, subfamily Lanuginellinae (as proposed by Tabachncik, 1999). *Lanugonychia* is probably a junior synonym of *Sympagella*.

**Distribution**

SE Pacific Ocean, depth 3694 m.

## *LOPHOCALYX* SCHULZE, 1887

**Synonymy**

*Lophocalyx* Schulze, 1887a: 514. Part of *Rossella – R. philippinensis* Gray, 1872b: 137; 1873a: 234; 1873b: 361; Carter, 1875a: 118; Marshall & Meyer, 1877: 261. [*Polylophus*] Schulze, 1885 (preocc., *nomen nudum*): 451; 1886: 47: 1887a: 132. *Calycosoma* (part) – *C. validum* Topsent, 1910: 17; 1913b: 606; Barthel & Tendal, 1994: 111.

**Type species**

*Rossella philippinensis* Gray, 1872b (by monotypy).

**Definition**

Lophophytose or basiphytose Lanuginellinae with hypodermal pentactines of two types: common ones with orthotropal tangential rays and also short-toothed anchorate spicules; among the microscleres with discoidal terminations only rare microdiscohexasters can be found.

**Diagnosis**

Body is spherical or ovoid, lophophytose or basiphytose, with prostalia consisting of diactines and anchorate pentactines. Choanosomal spicules are diactines and hexactines. Hypodermalia are pentactines represented by two types: ones usual for the family and anchorate ones (serving as prostalia); hypoatrialia when known are orthotropal pentactines sometimes together with diactines. Dermalia are combinations of stauractines, pentactines and hexactines. Atrialia are combinations of hexactines and pentactines. Microscleres are strobiloplumicomes and combinations of hexasters, hemihexasters, hexactines and rarely stauractines, triactines, diactines and, possibly, microdiscohexasters.

**Description of type species**

*Lophocalyx philippinensis* (Gray, 1872b) (Fig. 41).

***Synonymy.*** *Lophocalyx philippinensis* Schulze, 1887a: 514. *Rossella philippinensis* Gray, 1872b: 137; 1873a: 234; 1873b: 361; Carter, 1875a: 118; Marshall & Meyer, 1877: 261. [*Polylophus*] *philippinensis* Schulze, 1886: 47; 1887a: 132.

***Material examined.*** Holotype: BMNH (not seen). Other material. BMNH 1875.06.25.001, BMNH 1875.06.25.002 (2 specimens), BMNH 1877.05.21.011, BMNH 1887.10.20.047 (4 specimens, 'Challenger') – off Cebu, Philippines. BMNH 1887.10.20.045 (6 specimens) – 'Challenger', depth 180 m. BMNH 1887.10.20.046 (6 specimens) – 'Challenger', 10°14′N, 123°54′E, depth 155 m. BMNH 1890.04.10.026 (4 specimens) – 'Challenger', 54°9.15′S, 132°14.15′E, depth 236 m.

***Description.*** The body is spherical or ovoid, lophophytose with thick walls, relatively small osculum and vast atrial cavity. The body is 8–50 mm long, 4–50 mm in diameter, with osculum 1–22 mm in diameter. Prostalia are gathered in tufts often situated on small conules on the body surface. The largest prostalia are located in the basal part of the body, 15–150 mm long. In the distal part prostalia basalia and some of the longest lateralia are often gathered into a common tuft. The holotype is 30 mm long, 20 mm in diameter, the osculum is about 7 mm in diameter, basalia are about 7 mm long. On large specimens (on their prostalia lateralia) smaller specimens of the same species may be present. According to the literature these small specimens were considered to be asexual buds, but it is equally possible that they originated from larvae settled on the prostalia lateralia spicules of larger specimens. Spicules. Choanosomal spicules are diactines and hexactines. Diactines may be divided into two types. The thick ones seem to be longer 1.5–4.6/0.015–0.080 mm, they have smooth conically pointed terminations and an even shaft (without any widening). The other diactines are more numerous. They have rough, conically pointed terminations and often a widening or four rudimentary tubercles in the middle. They are about 0.007–0.019 mm in diameter. The choanosomal hexactines have rays similar to those of regular hypodermal spicules. Their rays are 0.7–2.0/0.038–0.053 mm. Hypodermalia are pentactines of two types. Pentactines typical of Rossellidae are also present, having orthotropal long tangential rays 0.2–2.0/0.01–0.05 mm. They are smooth with conically pointed terminations. Anchorate hypodermal pentactines have short tooth-like tangential rays. They serve as prostalia basalia and are often outwardly protruded from the body. Their tangential rays are 0.1–0.2/0.05–0.08 mm, proximal ray is 15–150 mm long. Dermalia are chiefly stauractines, but pentactines and tauactines are also found. The tangential rays of these spicules are curved, being bent in the proximal direction. The unpaired rays of pentactines are often distally directed. The dermal spicules have rays 0.053–0.144/0.006–0.007 mm, they are rough with rounded terminations. Atrialia are hexactines with rays equal long but one ray is often about 1.5 times longer. The rays of atrial hexactines are 0.046–0.182/ 0.007 mm, they are less rough than the dermal ones and their terminations are often conically pointed or sometimes rounded. Microscleres. Microscleres are strobiloplumicomes, hemihexasters, hexasters and sometimes hexactines and discohexasters. The strobiloplumicomes are 0.032–0.065 mm in diameter, with primary rosette 0.009–0.016 mm in diameter. The hexasters are 0.054–0.112 mm in diameter, with primary rosette 0.032–0.054 mm in diameter. Hexactines may be rare but in about half of all the material examined they are quite numerous. The hexactines are 0.047–0.126 mm in diameter. Hexasters have the secondary rays rough, while the primary ones are smooth. The rays of hexactines are entirely rough or they can be rougher in the distal parts of the ray. Discohexasters may be referred to microdiscohexasters (in comparison with other representatives of Rossellidae). They were sparse in about a half of the material examined (and absent from the holotype description). Discohexasters are 0.036–0.054 mm in diameter, with primary rosette 0.006–0.011 mm in diameter.

***Remarks.*** The genus presently contains 4 species, with another species (*L.* sp.) not yet formally named but described

Hoo-154.qxd 10/7/04 2:39 AM Page 1500



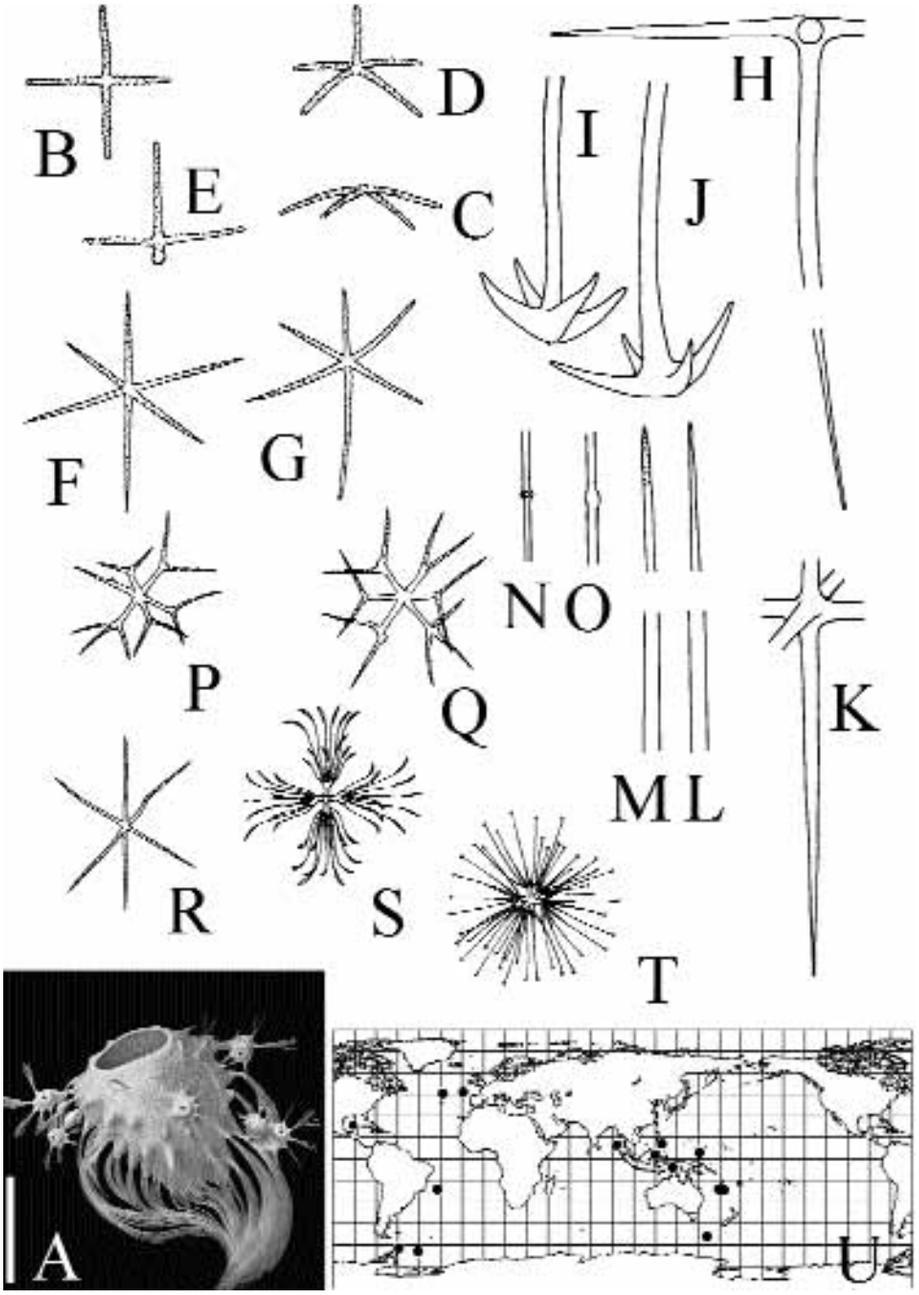


**Fig. 41.** *Lophocalyx philippinensis*. A, large specimen with many small ones on its prostalia lateralia (after Schulze, 1887a) (scale 50 mm). B–C, dermal stauractines 140×. D, dermal pentactine 140×. E, dermal tauactine 140×. F–G, atrial hexactines 140×. H, common hypodermal pentactine 70×. I–J, anchorate hypodermal pentactines 70×. K, choanosomal hexactine 70×. L, large choanosomal diactine 70×. M, choanosomal diactine 140×. N–O, middle parts of choanosomal diactines 140×. P, hemihexaster 260×. Q, hexaster 260×. R, hexactine 260×. S, strobiloplumicome 520×. T, discohexaster 520×. B–C, F–Q, BMNH 1875.06.25.002. D–E, T, BMNH 1890.04.10.026. R–S, BMNH 1877.05.21.011. U, distribution of *Lophocalyx*.

previously as a specimen of *Calycosoma validum* from Antarctica. There are also 4 other new species from the Atlantic Ocean currently in press (Menshenina & Tabachnick, in press). Reasons for transfering the Antarctic specimens of *Calycosoma validum* to the genus *Lophocalyx* are discussed in the remarks on the genus *Calycosoma*.

Prostalia lateralia are gathered into tufts situated on conules in *L. philippinensis*, while in other species these spicules are dispersed over the surface. The basiphytose fixation is found in *L. moscalevia* (Tabachnick, 1988), which is fixed to a dead part of a large specimen of Farreidae by anchorate pentactines. However, this mode of fixation may be also considered as lophophytose. As for *L. spinosa* and *L.* sp. (pro *C. validum* from the Antarctic) their modes of fixation are unknown but hypothesised to be lophophytose due to the presence of the anchorate prostal pentactines.

Choanosomal hexactines are reported from *L.* sp. from Antarctica. The choanosomal hexactines have the distal ray spiny, a common feature in many representatives of Euplectellidae but not

characteristic of the Rossellidae. Spicules similar to these hexactines were also found in a new species from the Atlantic but they all are hypoatrial spicules. Dermal stauractines are known from *L. philippinensis* and *L. suluana* (Ijima, 1927; Lévi, 1964a) (the name '*suluana*' was corrected from '*suluanus*' by Reiswig (1990)). The stauractines are supplemented by pentactines with distally directed unpaired ray in *L. spinosa* (Schulze, 1900a; 1902). Hexactines and rare pentactines are found in *L. moscalevia* (Tabachnick, 1988) and in a new species from the Atlantic (Menshenina & Tabachnick, in press) and in *L.* sp. from Antarctica. The ray of dermal spicules (when present) is directed outside the body, and in atrial spicules it is more spiny or even pinular.

Hexasters are found in *L. suluana, L. spinosa, L. philippinensis* and *L.* sp. from Antarctica. Hemihexasters are known from *L. spinosa, L. moscalevia* and *L.* sp. from the same region. Hexactines and their derivatives with a reduced number of rays are known from *L. moscalevia*. Asterous microscleres were found in one new species from the Atlantic (Menshenina & Tabachnick, in press). Some microdiscohexasters were reported by Ijima (1927) for one of three specimens of *L. suluana*. I have also found discohexasters in some specimens of *L. philippinensis*. It is uncertain whether the specimen BMNH 1877.05.21.012 collected from New Guinea belongs to the same species, and similarly the record for *L. philippinensis* is problematic too.

### Distribution

E Indian Ocean, SW Pacific Ocean, Antarctica and Atlantic Ocean (pl. 63), depth 155–4231 m. The type species occurs off the Philippines and possibly also off New Guinea, depth 155–236 m.

## *MELLONYMPHA* SCHULZE, 1897

### Synonymy

*Mellonympha* Schulze, 1897: 28. Part of *Rossella – R. velata* Thomson, 1873: 418; Carter, 1873c: 361; 1875a: 120; Marshall, 1875: 150; 1876: 127; Schulze, 1887a: 143; *R. mortenseni* Burton, 1928b: 9; 1954: 218).

### Type species

*Mellonympha velata* (Thomson, 1873) (by monotypy).

### Definition

Lophophytose Lanuginellinae with two types of hypodermal pentactines: common (with paratropal tendency in their tangential rays arrangement) and short-toothed, anchorate; the spicules with discoidal terminations are represented by macrodiscohexasters only.

### Diagnosis

Body is saccular, thick-walled, lophophytose. Choanosomal skeleton is composed of diactines and rare hexactines. Hypodermal spicules are pentactines which outwardly protrude to form prostalia lateralia and anchorate hypodermal pentactines which form prostalia basalia together with some spicules of the former type. Dermalia are chiefly pentactines and stauractines. Atrialia are mainly hexactines. Microscleres are macrodiscohexasters and hexasters, while strobiloplumicomes, discohexactines, hemidiscohexasters and hemihexasters with curved rays may be present.

### Description of type species

*Mellonympha velata* (Thomson, 1873) (Fig. 42).

***Synonymy.*** *Rossella velata* Thomson, 1873: 418; Carter, 1873c: 361; 1875a: 120; Marshall, 1875: 150; 1876: 127; Schulze, 1887a: 143; *Rossella mortenseni* – part Burton, 1954: 218 (not Burton, 1928b: 9).

***Material examined.*** Holotype: BMNH 1882.07.28.119 – Strait of Gibraltar, depth 1172 m. Other material. BMNH 1938.06.30.028 – 'Rosaura' expedition, 28°25′N, 13°34′W, depth 1300 m. BMNH 1882.07.28.133 – 'Porcupine', Strait of Gibraltar. ZMA unnumbered – CANCAP 7, Cape Verde Islands, SE of Sao Nicolau, 16°32′N, 24°14′W, depth 175 m. ZMA 15798 – CANCAP 7, Cape Verde Islands, SE of Sao Nicolau, 16°32′N, 24°16′W, depth 590–602 m.

***Description.*** The sponge is ovoid, 20–150 mm in diameter, with large atrial cavity and thick walls up to 10 mm. The holotype is 60 mm long, 50 mm in diameter, with osculum 18 mm in diameter. Prostalia are formed by hypodermal pentactines and large diactines which are gathered in numerous tufts on conical processes on the dermal surface. Prostalia lateralia protrude at 20 mm, prostalia basalia are longer than 50 mm. In large specimens the atrial cavity is subdivided into spherical cavities with wide openings into the common atrial cavity. Spicules. The choanosomal skeleton is composed of diactines from 0.9 to several mm long and 0.011–0.084 mm in diameter. The diactines often have a faint widening at their centre or four rudimentary tubercles, their terminations are rough and rounded. The other choanosomal spicules are hexactines which are sparse in the material examined. They have rays comparable in shape and length to that of paratropal hypodermal pentactines. Hypodermal pentactines are found in two forms: those typical in many Rossellidae consisting of paratropal pentactines with long tangential rays, and anchorate ones. The former have smooth or rough, rarely spiny tangential rays, which are from 0.8 to several mm long and 0.011–0.084 mm in diameter, the proximal ray is smooth and usually much longer. The spicules serve as prostalia lateralia. The other type of hypodermal pentactines are anchorate spicules with four short tooth-like tangential rays about 0.2 mm long, these spicules are located mostly in the basal part of the sponge forming prostalia basalia together with paratropal pentactines. Dermalia are mostly pentactines, often stauractines; all derivatives of hexactines may be present. The pentactines and stauractines often have tubercles instead of absent rays. They have rough or short-spiny rays with rounded terminations. The tangential rays of pentactines and stauractines are 0.061–0.220 mm long, proximal ray of pentactines is 0.061–0.152 mm. Atrialia are hexactines and all their derivatives up to monactines are present in trace quantities. They have the same shaped ray as dermal spicules. Their proximal ray is 0.076–0.182 mm long, tangential rays are 0.076–0.220 mm long, distal one is 0.076–0.524 mm long. The distal ray is usually the longest but sometimes all the rays are as equally long. The diameter of rays of dermal and atrial spicules is 0.010–0.014 mm. Microscleres. Microscleres are discohexasters, strobiloplumicomes hexasters and in some specimens asterous-oxyoidal spicules. Discohexasters are spherical 0.061–0.122 mm in diameter, diameter of its primary rosette is 0.007–0.018 mm. They have rough secondary rays, usually 2 at each principal. Some rare

Hoo-154.qxd 10/7/04 2:39 AM Page 1502



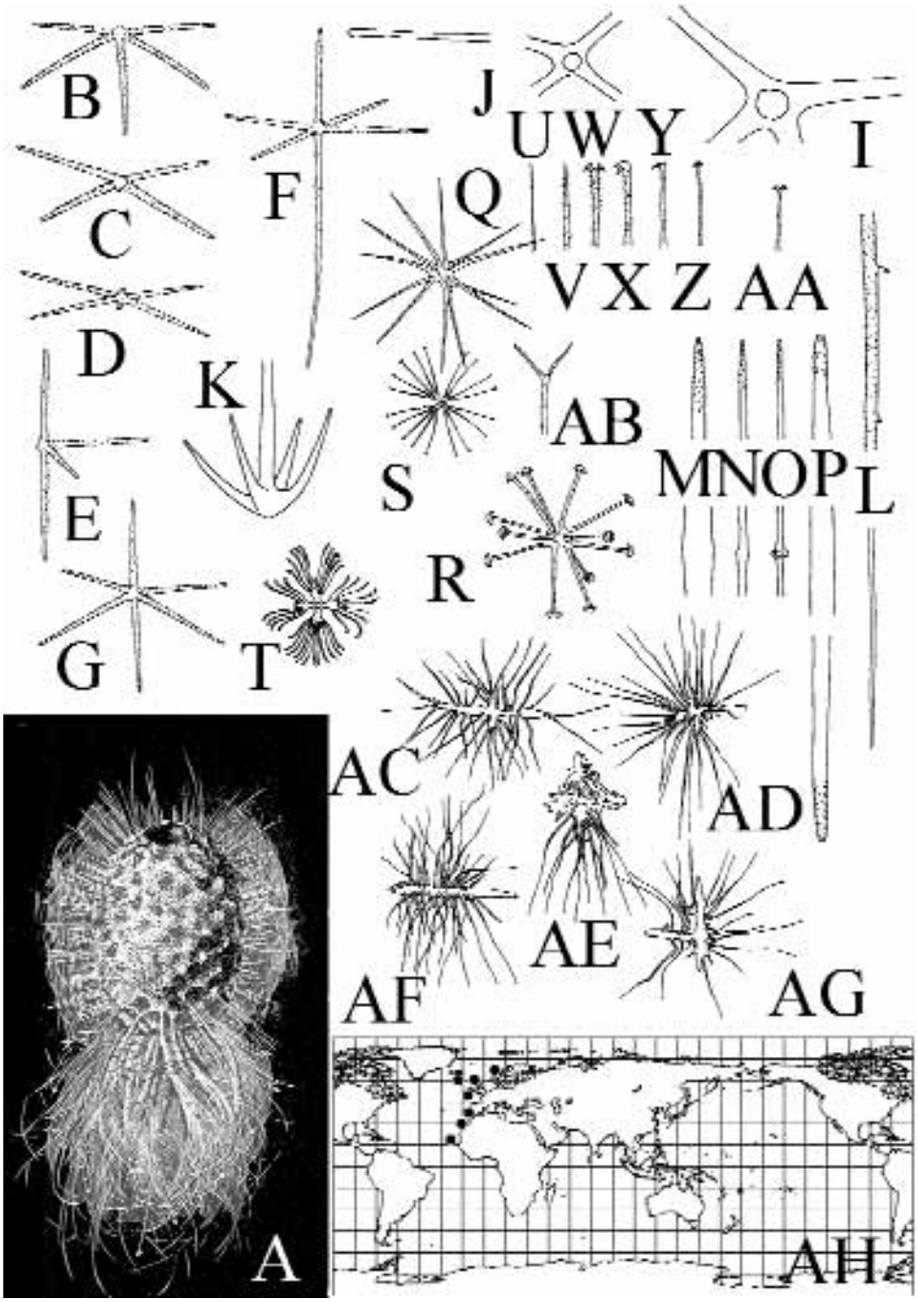


**Fig. 42.** *Mellonympha velata*. A, external shape (after Schulze, 1887a). B, dermal pentactine 1103. C–D, dermal stauractines 110×. E, dermal paratetractine 110×. F–G, atrial hexactines 110×. I–J, hypodermal pentactines 55×. L, its ray 55×. K, anchorate hypodermal pentactine 55×. M–O, choanosomal diactines 110×. P, choanosomal diactine 55×. Q, hexaster 220×. R, common discohexaster 220×. S, discohexaster with numerous secondary rays 220×. T, strobiloplumicome 440×. U–AB, secondary rays of microscleres 440×. AC–AG, asterous-oxyoidal microscleres 220×. B–AB, BMNH 1882.07.28.119. AC–AG, ZMA unnumbered. AH, distribution of *Mellonympha*.

spherical discohexasters have several thin secondary rays. Some terminations are onychoidal. Strobiloplumicomes are 0.040–0.086 mm in diameter, with primary rosette 0.011–0.027 mm in diameter. Hexasters are 0.061–0.133 mm in diameter, with primary rosette 0.007–0.030 mm in diameter. They have rough secondary rays, usually 2 at each principal. Microscleres of ZMA specimens contain spicules with pointed thin secondary rays which are irregularly settled on the irregular principals. These principals are barely recognizable stauractines, triactines and diactines, some of their rays carry very short rudimentary secondary rays. These spicules are 0.104–0.169 mm in diameter, the diameter of their primary rosette is approximately 0.011–0.068 mm.

***Remarks.*** The genus contains two species. The diagnosis is developed from Koltun (1967), although I do not agree with his interpretation on the scope of the genus. Koltun (1967) synonymised *Rossella mortenseni* of Burton (1928b; 1954) with *Mellonympha velata*, despite obvious differences between them. I have re-examined only *R. mortenseni* collected by the 'Rosaura'

expedition and described by Burton (1954). This specimen contains relatively abundant strobiloplumicomes, and the rays of hexasters are straight such that it obviously belongs to *M. velata*. Other specimens very similar to *Rossella mortenseni* Burton (1928b) were found under the name *Rossella velata* (identified by an unknown person) in the BMNH (1931.10.28.014 – two large and many small specimens), received from the Trondheim Museum, Norway, depth 300 m). These sponges have no strobiloplumicomes, hexasters and discohexasters are rare while hemihexasters and hemidiscohexasters are quite common. The oxyoidal microscleres have curved rays. Sparse discohexactines were also present. It is necessary to investigate the type material of *M. mortenseni* to evaluate the potential synonymy of these two species correctly. Nevertheless, the suggestion of Koltun (1967) seems to be doubtful and *Mellonympha* probably has two species. Conversely, I agree with Koltun that the species '*mortenseni*' must be moved to the genus *Mellonympha*, despite the fact that it has no strobiloplumicomes. The similarity of these two species is notable and *M. mortenseni* is clearly a representative of *Mellonympha. Mellonympha velata* inhabits E Central Atlantic up to Ireland, and probably also off the Faroe islands, and *M. mortenseni* is known off Iceland and in the Norwegian sea. In this genus some terminations of discoidal microscleres are onychoidal.

**Distribution**

N and E Central Atlantic, depth 175–1460 m.

## *SYMPAGELLA* SCHMIDT, 1870

**Synonymy**

*Sympagella* Schmidt, 1870: 15. *Aulascus* Schulze, 1886: 45; 1887a: 118; 1897: 8. Part of *Calycosoma – C. gracile* Schulze, 1903: 14. *Calycosilva* Lendenfeld, 1915: 67.

**Type species**

*Sympagella nux* Schmidt, 1870 (by monotypy).

**Definition**

Basiphytose, often pedunculate Lanuginellinae, without prostalia lateralia; dermalia consist of pinular hexactines and pentactines; microscleres are various.

**Diagnosis**

Body is saccular, funnel-like, tubular or mushroom-like, basiphytose, with long or short stalk. Choanosomal spicules are diactines and hexactines. Dermalia are pinular hexactines and pentactines. Atrialia are pinular hexactines. Hypodermalia and sometimes hypoatrialia, if present, are pentactines. Microscleres are strobiloplumicomes and various combinations of discohexasters, onychasters, hexasters, hemihexasters, hemionychasters and tylohexasters.

**Description of type species**

*Sympagella nux* Schmidt, 1870 (Fig. 43).

***Synonymy.*** *Sympagella nux* Schmidt, 1870: 15.

***Material examined.*** Holotype: unknown, off Florida, depth 180–225 m. Other material. MOM 04 0408 – 'Princesse Alice', 38°27′N, 28°03.25′W, depth 523 m. BMNH 1887.10.20.035 (2 specimens) – 'Challenger', off St. Iago, Cape Verde, depth 180–230 m. BMNH 1939.02.10.035 – off Bora Grande. USNM (various specimens) – 'Albatross', off Martha's Vineyard. USNM (kt 2291) – 'Alaminos', Gulf of Mexico, 29°28′N, 86°46′W, depth 396 m. MNHN (p1581) – 'Talisman', 14°35′N, 25°07′W, depth 347–507 m.

***Description (from Schmidt, 1870; Schulze 1887a; 1899; 1906; Uriz, 1988; Boury-Esnault et al., 1994).*** Pedunculate sponge with ovoid body, thin walls and small osculum. The sponge is usually several mm long but sometimes it reaches several cm in length. The peduncle is relatively long and tubular. Spicules. Choanosomal spicules are diactines and hexactines. Diactines 0.335–2.128/0.004–0.012 mm are smooth with finely pointed rough terminations, they usually have a widening or rudimentary tubercles in the middle. Choanosomal hexactines have smooth rays 0.1–0.6/0.008–0.016 mm with smooth or rough terminations. Dermalia are pinular pentactines often with (or rarely without) a rudimentary tubercle on the sixth ray directed inside the wall, or rarely hexactines. The pinular ray is 0.050–0.137 mm long, it is usually widened toward the outer end from 0.006 to 0.012 mm in diameter. The longest spines are situated close to the outer end which has an apical cone. Some pinular rays of these spicules are thickest at the base, they have spines shorter than the former, and the conically pointed outer end protrudes far beyond the last spines. The tangential rays of dermal pentactines are rough, 0.023–0.122 mm long. Atrialia are pinular hexactines. Pinular rays gradually taper toward the outer end or are spindle-like in shape. The outer end of these spicules protrudes beyond the last spines. The pinular ray is 0.076–0.836/0.004–0.011 mm, tangential rays are 0.041–0.5 mm long, the distal one is 0.038–0.304 mm. Hypodermalia and hypoatrialia are smooth pentactines, rarely stauractines with tangential rays 0.18–0.85 mm long, the ray directed inside the body is 0.270–0.912 mm. The ray diameter of hypodermal or hypoatrial pentactines is similar to choanosomal hexactines and these rays have corresponding terminations. Microscleres. Description of microscleres composition varies according to different publications. Typical strobiloplumicomes were not mentioned for *S. nux* (from W of Gibraltar; Boury-Esnault *et al*., 1994), and were rare in specimens off Namibia (Uriz, 1988). Discohexasters were described from all specimens. Tylohexasters were described from specimens in the Mediterranean and off the E coast of USA (their secondary rays were rough or covered with minute spines; Schulze, 1899, 1906). Minute hexactines with curved rays were described in *S. nux* from the Mediterranean (Schulze, 1906). Microdiasters were described under the name 'roller stars' from *S. nux* off Cape Verde Islands (Schulze, 1886). Hexasters were described in specimen from the W Atlantic (Schulze, 1899). I have analyzed specimens of *S. nux* from these different localities, emphasizing their microsclere composition. Discohexasters and strobiloplumicomes are typical. Discohexasters are spherical with toothed discs 0.032–0.100 mm in diameter, the primary rosette is 0.005–0.011 mm in diameter. Strobiloplumicomes have their primary rays widened with, or rarely without, terminal spine, they are 0.018–0.058 mm in diameter, with primary rosette 0.007–0.022 mm. Supplementary spicules are mainly tylohexasters or tylohexactines with some irregularly situated spines. These tylohexasters are notably smaller than the discohexasters, being 0.029–0.032 mm in diameter, with primary rosette 0.007–0.011 mm. A spicule with

Hoo-154.qxd 10/7/04 2:39 AM Page 1504



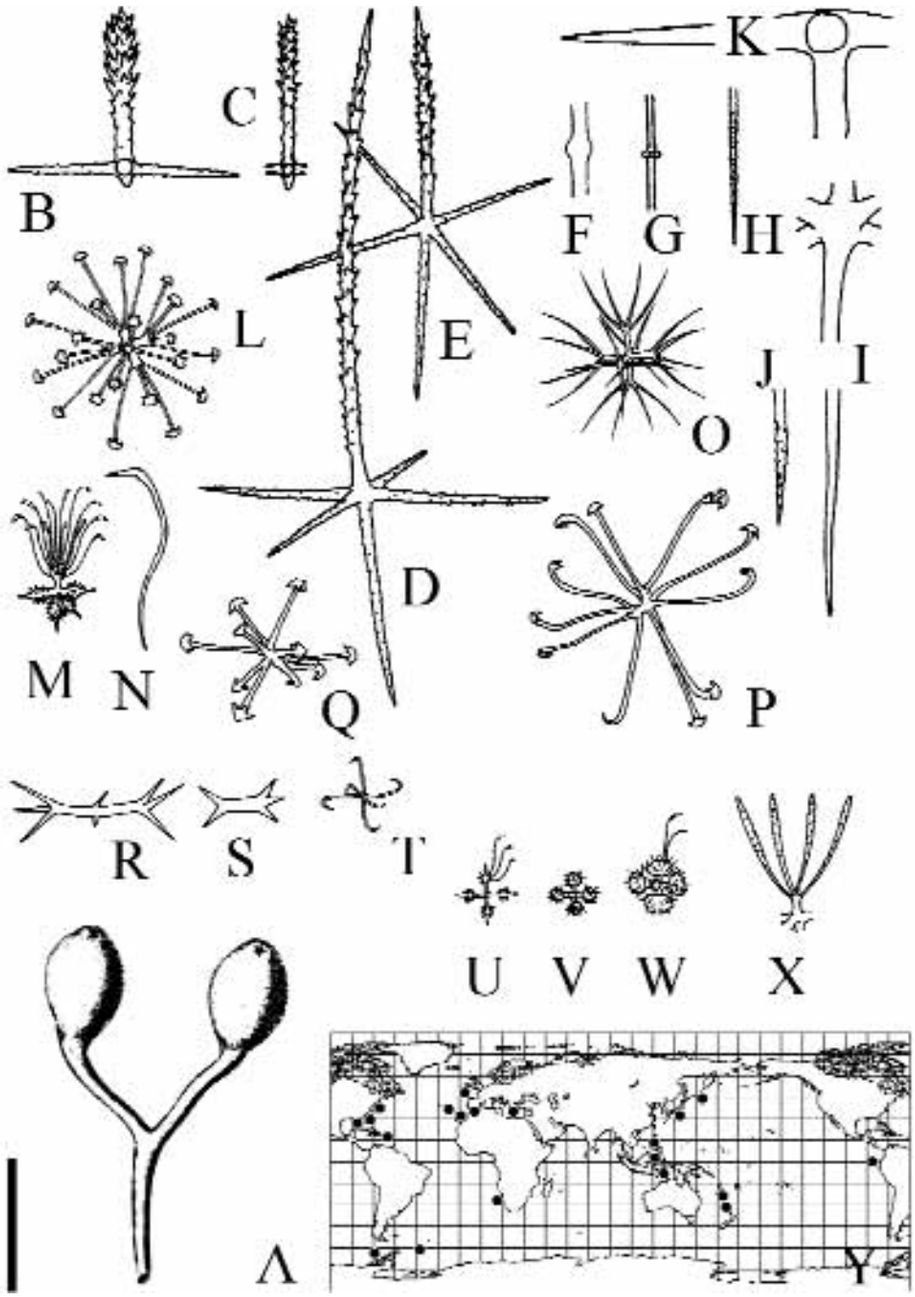


**Fig. 43.** *Sympagella nux*. A, external shape (after Schmidt, 1870) (scale 10 mm). B–C, dermal pinular pentactines 250×. D–E, atrial pinular hexactines 250×. F–H, choanosomal diactine central parts and outer end 250×. I–J, choanosomal hexactine and outer end 250×. K, hypodermal pentactine 250×. L, discohexaster 500×. M, strobiloplumicome 500×. N, secondary ray of strobiloplumicome 1000×. O, microhexaster 600×. P, asterous spicules with different secondary rays 600×. Q, irregular discohexaster 600×. R–S, microdiasters 600×. T, hexactine 600×. U–W, strobiloplumicomes 600×. X, tylohexasters 600×. B–N, USNM (kt3043). O, from Schulze (1899). P, USNM (p1581). Q, USNM (kt2311). R–S, from Schulze (1887a). T, X, from Schulze (1906). U, USNM (1887.10.20.035). V, IO (04 0408). W, USNM (kt 2291). Y, distribution of *Sympagella*.

different secondary rays, mainly discoidal but also with floricoidal, onychoidal and hook-like secondary rays, was found once in specimen MNHN (p1581).

***Remarks.*** The genus contains 6 species, one of which is recently described (Tabachnick & Lévi, 2004). The body form varies between species: *S. gracilis* is funnel-like, *S. cantharellus* mushroom-like, *S. johnsoni* is tubular, *S. anomala* and *S. nux* are saccular or funnel-like. Choanosomal spicules of *S. cantharellus* may have spines. Choanosomal spicules of peduncles are fused with synapticular junctions. Prostalia lateralia and pentactines with curved tangential rays are known in *C. validum* (Schulze, 1903; Topsent, 1910). Microsclere composition also varies notably among species. Strobiloplumicomes are found in all species. Onychasters and hexasters are found *S. gracile*, and in *S. cantharellus* they may be supplemented by curved forms. Onychasters, discohexasters and sometimes hexasters are known for *S. anomala*. Discohexasters are

Hoo-154.qxd 10/7/04 2:39 AM Page 1505



reported for *S. johnsoni* and *S. nux. Calycosoma gracile* Schulze (1903) was synonymised with *Sympagella* by Ijima (1927). Most spicule dimensions are similar for all described specimens of these species, irrespective of their disjunct distributions, although there is some variability in the size (up to 3 times) of atrial pinular hexactines in some specimens.

Some specimens of *S. nux* are fixed to the stalks of other specimens, resembling colonies with numerous individual units. The tubular stalks of different specimens never have united cavities and therefore it is most likely that larvae have settled on these stalks. It is vague whether the rare microhexactines and microdiasters described by Schulze have autochthonous origin.

**Distributions**

Low latitudes in the Atlantic and Pacific Oceans, and possibly Antarctica, depth 27–5045 m. The type species inhabits the Atlantic Ocean, depth 27–1476 m.

**ACKNOWLEDGMENTS**

I very much appreciate the assistance of Dr. P. Tubbs (BMNH; the International Commission of the Zoological Nomenclature) for helping with nomenclature problems encountered within the Rossellidae. I am also very grateful to my colleagues Drs. J. Vacelet, N. Boury-Esnault (SME), C. Lévi (MNHN), K. Rützler, Ms. K. Smith (USNM), Ms. C. Valentine (BMNH), Dr. R.W.M. van Soest and Mr. J. Vermeulen (ZMA), Dr. C. Carpine (MOM), Drs. H.M. Reiswig (Redpath Museum), P. Willenz (Institute Royal des Sciences Naturelle de Belgique, Bruxelles) for their help in investigation of their sponge collections and in the preparation of this publication. I am very much grateful to Drs. J.N.A. Hooper and R.W.M. van Soest for their great editorial efforts in preparation of this publication. This project was supported by grants from the Volkswagen Foundation 1/73 638, CNRS, Muséum National d'Histoire Naturelle (Paris), Royal Society of the UK and the Smithsonian Institution.