

SYSTEMA PORIFERA

*A Guide to the
Classification of Sponges*

VOLUME 2

下

John N. A. Hooper

and

Rob W. M. Van Soest

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A Guide to the Classification of Sponges

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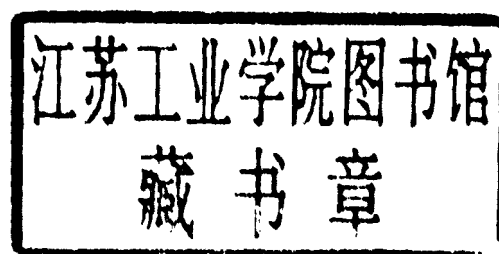
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Order Lyssacinosida Zittel, 1877

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Recent Lyssacinosida Zittel (Hexactinellida, Hexasterophora) contains three families and 53 valid placed genera, plus two genera presently unplaced and treated here as *incertae sedis*. The group is characterized by a choanosomal skeleton of spicules that remain separate (unfused) through life, or where fusion takes place, it does not involve hexactine megascleres – a typical dictyonal framework is not formed. These sponges are typically single oval, cup-form or tubular sponges with soft bodies and a single terminal osculum. They may be attached to hard substrate by basidictyonal plate (basiphytous) or rooted by anchors into sediments or onto irregular surfaces (lophophytous). Two patterns of surface structure are characteristic: (1) large pentactine or hexactine dermalia without specialized hypodermal supporting spicules and (2) small dermalia varying from hexactins to diactins supported on large hypodermal pentactins. The three constituent families are most easily differentiated by the form of the predominant choanosomal megascleres: hexactins or diactins or a mixture of stauractins, tauactins and diactins.

Keywords: Porifera; Hexactinellida; Lyssacinosida; Euplectellidae; Leucopsacidae; Rossellidae.

DEFINITION, DIAGNOSIS, SCOPE

Synonymy

Lyssakina Zittel, 1877 (emended). Euplectellaria Schrammen, 1903. Lyssacina Ijima, 1903. Lyssacinaria Schrammen, 1924a. Lyssacinosia Ijima, 1927.

Definition

Hexasterophora in which choanosomal megascleres remain as separate skeletal components, or, where fusion occurs it is by deposition of silica at contact points or as synapticula between slightly separated diactine, tauactine or stauractine megascleres. A dictyonal framework of fused hexactins is not formed.

Diagnosis

Body form is typically a single ovoid, cup or tube bearing a single terminal osculum and deep atrial cavity, with either basiphytous or lophophytous substrate attachment, either directly or by short peduncle or long stalk; basiphytous forms attach by a thin basidictyonal plate of fused hexactins; thin-walled forms may have a sieve plate over terminal osculum and a regular series of small parietal oscula; thicker-wall forms may occasionally bifurcate or grow one or more lateral diverticula, each with terminal osculum; branching in stalks of cap-shaped members is poorly documented as a growth form and may result from secondary settlement; choanosomal megascleres may be mainly hexactins, a combination of stauractins, tauactins and diactins, or mainly diactins; dermalia may be large pentactins or hexactins unsupported by hypodermalia or small hexactins (pinular or regular), pentactins, stauractins or diactins supported by large pentactin hypodermalia; atrialia may be either hexactins and/or pentactins and/or stauractins; lateral

prostalia may be absent or special diactins or extended hypodermal pentactins or simply the extended distal rays of choanosomal hexactins or pentactins; basalial of lophophytous forms may be monactine, diactine or pentactine anchors; microscleres include single types or combinations of stellate and spherical discohexasters of regular or hemi-form, discotasters, discohexactins, floricomeres, plumicomeres, strobiloplumocomeres, sigmatocomeres, oxyhexasters of regular and hemi-form, oxyhexactins and onychhexasters.

Scope

Three families: Euplectellidae Gray, 1867a, Leucopsacidae Ijima, 1903, Rossellidae Schulze, 1885.

Remarks

Zittel (1877), in his original concept of Lyssakina, as counterpoint to Dictyonina, included all hexactinellids in which the main megascleres remained separate, including both amphidiscophoran and hexasterophoran forms. Schulze (1899) first proposed the separation of Amphidiscophora from Hexasterophora but gave no group name to the now reformed lyssacine Hexasterophora. Ijima (1903), accepted Schulze's separation of the two lyssacine forms, and proposed (Ijima, 1903: 25 footnote) a corrected form, Lyssacina, of Zittel's original (1877) name, with concept emended to exclude Amphidiscophora and include only Hexasterophora with skeletons mainly of separate spicules, and where fusion occurs, does not involve fully developed hexactins. This remains the present concept of the order. Reid (1958a) proposed division of the order into the suborders Autodermalia and Hypodermalia, with characters and content clear from the names. The order traditionally contained four families, but with recent abolishment of the Caulophacidae by Tabachnick (1999), only three families remain.

KEY TO FAMILIES

- | | |
|---|----------------|
| (1) Choanosomal megascleres mainly diactins; with hypodermal pentactins | .. Rossellidae |
| Most choanosomal megascleres other than diactins; without hypodermalia | 2 |
| (2) Choanosomal megascleres mainly hexactins | Leucopsacidae |
| Choanosomal megascleres mainly stauractins, tauactins and diactins | Euplectellidae |

Family Euplectellidae Gray, 1867

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Euplectellidae Gray (Hexactinellida, Lyssacinosa) is revised to contain 27 genera in three subfamilies: Euplectellinae (with seven genera: *Euplectella*, *Acoelocalyx*, *Chaunangium*, *Docosaccus*, *Holascus*, *Malacosaccus* and *Placopegma*), Corbitellinae (12 genera: *Corbitella*, *Atlantisella* gen. nov., *Dictyaulus*, *Dictyocalyx*, *Hertwigia*, *Heterotella*, *Ijimaiella* gen. nov., *Pseudoplectella*, *Regadrella*, *Rhabdoplectella*, *Symplectella* and *Walteria*) and Bolosominae subfam. nov. (eight genera: *Bolosoma*, *Amphidiscella*, *Caledoniella*, *Caulocalyx*, *Hyalostylus*, *Saccocalyx*, *Trachycaulus* and *Vityaziella*). Several of these genera were transferred from other hexactinellid lyssacinosa families: *Symplectella* (previously in Rossellidae), *Placopegma*, *Chaunangium* and *Caulocalyx* (all previously in Leucopsacidae).

Keywords: Porifera; Hexactinellida; Euplectellidae; Euplectellinae; Corbitellinae; Bolosominae subfam. nov.; *Acoelocalyx*; *Amphidiscella*; *Atlantisella*; *Bolosoma*; *Caledoniella*; *Caulocalyx*; *Chaunangium*; *Corbitella*; *Dictyaulus*; *Dictyocalyx*; *Docosaccus*; *Euplectella*; *Hertwigia*; *Heterotella*; *Holascus*; *Hyalostylus*; *Ijimaiella* gen. nov.; *Malacosaccus*; *Placopegma*; *Pseudoplectella*; *Regadrella*; *Rhabdoplectella*; *Saccocalyx*; *Symplectella*; *Trachycaulus*; *Vityaziella*; *Walteria*.

DEFINITION, DIAGNOSIS & SCOPE

Synonymy

Euplectelladae Gray, 1867a: 527. Hertwigiidae Topsent, 1892a: 25. Alcyoncellidae de Laubenfels, 1936a: 188. Placoplegmatidae de Laubenfels, 1936a: 187 (part).

Definition

Lyssacinosa with choanosomal spicules of stauractines, tauactines and diactines; hexactines and pentactines, when present among the choanosomal spicules, are not numerous but are often the largest spicules constructing the base for the skeleton wall, their distal rays serve as prostalia lateralia (hypodermal pentactines are absent). Microscleres are various (graphiocomes, floricomes, drepanocomes characterize this family, but they are absent in some taxa).

Diagnosis

Tubular, cup-like, fungus-like growth forms; lophophytose or basiphytose, sometimes pedunculate. Prostalia basalia when present are anchorate spicules, rarely diactines. The main osculum may be covered by a sieve-plate. Choanosomal spicules of stauractines, tauactines and diactines; hexactines and pentactines, when present among choanosomal spicules, are not numerous but they are often the largest spicules constructing the base for the skeleton wall, their distal rays serve as prostalia lateralia. Dermalia are usually hexactines, in some genera pentactines or both. Atrialia are pentactines or hexactines or both. Microscleres are various with amazing variability of the outer ends.

Scope

27 genera, cosmopolitan in distribution, found at depths from 30–6328 m.

History and biology

The family was initially created by Gray (1867a) as Euplectelladae for three genera: *Euplectella*, *Corbitella* and *Heterotella*. It was characterized by a tubular body with oscula, sieve-plate and skeleton beams forming the regular skeleton network distributed in longitudinal, transverse and oblique directions. Schulze (1886; 1887a) corrected the family name to Euplectellidae and defined it by the dermal skeleton content only: "The dermal skeleton contains sword-shaped oxyhexacts with long proximal ray". He subdivided the family into three subfamilies: Euplectellinae (*Euplectella* and *Regadrella*); Holascinae (*Holascus* and *Malacosaccus*) and Taegerinae (*Taegeria* [later synonymized with *Corbitella*] and *Walteria*). Seven other genera were missing in the suggested subfamilies: *Habrodictyum* and *Eudictium* (synonymized with *Corbitella* and *Heterotella*); *Dictyocalyx*; *Rhabdodictyum* (later placed into Aulocalycidae (Ijima, 1927)); *Rhabdoplectella*; *Hertwigia* and *Hyalostylus*. The subfamily Euplectellinae was defined as tubular sponges with sieve-plates having numerous lateral oscula and with hypodermal hexactines bearing floricomes (microscleres) at their distal rays. The Holascinae were characterized mainly by negative features: without the sieve-plate, without lateral oscula, without superficially situated floricomes. The positive features of Holascinae were quite vague: tubular sponges with 'parenchymal oxyhexasters'. The subfamily Taegerinae was defined by a mixture of features of Euplectellinae and Holascinae: tubular or sack-like body with lateral oscula of irregular shape and distribution; the skeleton forms an irregular meshwork; 'hypodermal' hexactines are sword-shaped each bearing a floricome.

The family Hertwigiidae was created by Topsent (1892a) for two genera *Hertwigia* and *Trachycaulus*. The genus *Rhabdodictyum* was considered as a potential representative of this family. Two the former genera are doubtless representatives of Euplectellidae, the latter one was placed into Aulocalycidae by Ijima (1927). Hertwigiidae were characterized by choanosomal diactines fused to each other by numerous synapticulars, loose hexactines represented by two types and microscleres consisting

mainly of hexasters. Herwigidae has no reasonable valid basis since its diagnosis is indistinguishable from that of Euplectellidae.

The definition of this family to subfamilies followed in this paper is based on publications of Ijima (1901, 1902a, 1903, 1927) with division of Corbitellinae = Taegerinae to two subfamilies (a new subfamily is suggested). Description of new taxa of Euplectellidae in this paper led to revision of its diagnosis and tentative inclusion of some problematic genera of other lyssacinosa families (Rossellidae and Leucopsacidae) to Euplectellidae. This action resulted positively in Rossellidae and Leucopsacidae and somewhat disturbed Euplectellidae. The latter family requires further specifications.

Imperfection of the Schulze's system led to Ijima's revisions (1903, 1927), providing a new diagnosis for Euplectellidae: "Lyssacinosa of tubular, cup-like or massive body, sometimes stalked; either rooted by a tuft of monactine or anysodiactine anchorate basalialia or firmly attached by compact base; commonly with numerous open oscula. Ectosomal skeleton of relatively large hexactine dermalialia, the proximal ray of which is as a rule much longer than any other in the same spicule; without hypodermalialia. Choanosomal megascleres of hexactines with rays varying in number from six to two. Hexasters various." Ijima divided Euplectellidae into two subfamilies: Euplectellinae (simply defined as lophophytose Euplectellidae) and Corbitellinae (basiphytose Euplectellidae). However, this system is here partly rejected for the following reasons: (1) Postulated presence of dermal hexactines, because, as it was already known (Ijima, 1901), small (juvenile) specimens of some *Euplectella* and *Regadrella* species have dermal pentactines instead of hexactines characteristic for the family; and (2) the theoretical impossibility to further subdivide the family given that all known euplectellids are principally lophophytose or basiphytose.

These contradictions are avoided in this present revision given the following assumptions: some Euplectellidae principally have dermal pentactines instead of hexactines; reorganization of sister family Leucopsacidae and reallocation of some of its genera to Euplectellidae; division of Euplectellidae into three subfamilies: Euplectellinae, Corbitellinae (*sensu stricto*) and Bolosomininae subf. nov. In Euplectellidae the lateral oscula are common for most representatives, although these seem to have a different origin and develop in different ways in Euplectellinae and Corbitellinae on the one hand and Bolosomininae subf. nov. on the other hand. This new definition is based on three criteria: the mode of attachment to the substratum, differentiation of the choanosomal skeleton, and the corresponding skeletal organization.

Finks (1960) proposed two superfamilies, Euplectelloidea and Brachiospongioidea, primarily to assign fossil material.

KEY TO SUBFAMILIES

- | | |
|---|-----------------------------------|
| (1) Lophophytose method of fixation | Euplectellinae |
| Basiphytose method of fixation | 2 |
| (2) Pedunculate; atrialia are usually hexactines | Bolosomininae subfam. nov. |
| Tubular, attached directly by its basal part; atrialia when present are usually pentactines | Corbitellinae |

SUBFAMILY EUPLECTELLINAE

SCHULZE, 1886

Synonymy

Euplectellinae Schulze, 1886: 37; Ijima, 1903. Holascinae Schulze, 1886: 39; 1887a: 85; 1895: 44.

However, these groups are unsuitable for Recent taxa given that Euplectellidae contain many genera that overlap with the characteristics of both superfamilies. Finks (1960) defined Euplectelloidea as "Hexasterophora with main skeleton a continuous, non-cubic mesh of hexacts, joined by fusion at points of mutual contact and by synapticalia." On the basis of this diagnosis a large part of Euplectellidae would need to be removed, including all Bolosomininae and some species of other subfamilies (i.e., *Euplectella jovis*), which consist of mostly unfused spicules. Finks (1960) defines Brachiospongioidea as: "Vasiform sponges with large circular oscula, parietal gaps; specialized dermal layer of large spicules, usually pentacts, with characteristic processes on distal surface and in some species with extra tangential rays; a supradermal quadrate mesh of small pentacts or stauracts often present; interior spicules without uniform orientation." Some Recent representatives of Euplectellidae correspond to this diagnosis, especially the newly described *Atlantisella incognita*. Consequently, these superfamilies are rejected here for Recent Lyssacinosa.

The only practical significance of hexactinellids is known for *Euplectella aspergillum* and probably other related species, known for their close symbiosis with a pair of shrimps (family Stenopodidae) in Japan where it has been used traditionally in the marriage ceremony (Y. Masuda, personal communication).

Differences between similar families

The enlarged diagnosis of Euplectellidae is created due to the facts observed in genera and species of both its former representatives, newly described and genera transferred from other lyssacinosa families. This action shows the problem that differences between the three allied families of Lyssacinosa sometimes are hardly visible. Nevertheless they differ by complexes of features (mentioned in their definitions). The rows of transitional allied forms provide the possibilities to refer a 'difficult' taxon to the corresponding family in many cases.

Previous reviews

The previous reviews of this family were connected with the descriptions of hexactinellid sponges collected by several expeditions: 'Challenger' (Schulze, 1886; 1887a), 'Valdivia' (Schulze, 1904), 'Siboga' (Ijima, 1927) or accomplished during the investigation of regional hexactinellid fauna off Japan (Ijima, 1901).

Definition

Lophophytose Euplectellidae.

Diagnosis

Coexists with family diagnosis together with corresponding subfamily definition.

Scope

Seven genera, with cosmopolitan distribution excluding the Arctic ocean, with recorded depths of 36–6328 m.

Remarks

I have not provided an expanded diagnosis of the subfamily, nor has one been offered earlier (Ijima, 1903; 1927; Schulze, 1904), whereas it is more worthwhile to summarize here some of the features which can be used to differentiate all three subfamilies of Euplectellidae. In Euplectellinae the body is usually tubular. Lateral oscula are known in *Euplectella* and are likely developed through the mechanism of compensation of marginal growth which involves a fusion of small portions of oscula margins ("emission of tubular branches from the sides of axial funnels"; Reid, 1964). Hence, the difference between main osculum and lateral ones is significant. Basalia are always present and are usually anchorate monactines. As it was supposed by Ijima (1901) these spicules originated from diactines in which the spicule center (axial cross) is transferred to the distal part where a row of anchorate teeth are situated. The spicules with central cross in which all rays except two opposite ones are reduced were described for *Euplectella symplex* and in some representatives of *Holascus*. The anchorate spicules usually have numerous teeth (more than four in number) hence the speculations on their 'discoidal nature' (Ijima, 1901) but "pentactinic" forms are also known among the 'normal' basalia, i.e., in *Euplectella simplex* (Schulze, 1895) and *E. aspergillum* (Schulze, 1887a). Thus, the origination of basalia in Euplectellinae is very questionable and unclear. In *Acoelocalyx* basalia are organized in a peduncle in their upper part while in pedunculate *Malacosaccus* they are supplemented with tauactines in the peduncle. A sieve-plate is known in *Euplectella*, some species of *Hyalascus* and in *Placopegma*. This structure is organized from the spicules of the lateral wall which sometimes can be modified, whereas in some species the sieve-plate is formed by proximal rays of principal choanosomal spicules only.

Representatives of Euplectellinae are usually thin-walled sponges but often the walls are supported by large and thick choanosomal stauractines, pentactines or hexactines with short proximal ray. The distal ray of these pentactines and hexactines serves as prosthalia lateralia. The common choanosomal spicules are thin stauractines, tauactines, diactines, sometimes hexactines and pentactines. The choanosomal skeleton is known to become rigid by means of synapticular junctions and at points of mutual contacts between choanosomal spicules in large specimens of some *Euplectella* species, including the well-known *Euplectella aspergillum* but this feature is uncommon for most other representatives of this subfamily. Dermalia are hexactines. Atrialia are sparse pentactines or rarely hexactines. Microscleres are variable and make combinations specific for genera and species.

Following a simultaneous revision of the family Leucopsacidae in conjunction with this one I transfer here two former leucopsacid genera to Euplectellinae: *Chaunangium* and *Placopegma*. Both these genera have predominately pentactines among dermal spicules, which was probably the reason why Ijima (1903) and Schulze (1904) initially included them in Leucopsacidae given that the diagnosis of Euplectellidae at that

time contained species with dermal hexactines only, whereas all "strange" sponges with pentactines were placed in Leucopsacidae. This is surprising, however, because at that time it was known that dermal pentactines could be found in small (young) specimens of *Regadrella* and *Euplectella*. Moreover, they are the most abundant spicules in a true representative of Euplectellidae – *Atlantisella incognita* (gen.n., sp.n.). In any case the transfer of these genera, *Chaunangium* and *Placopegma*, to Euplectellinae is supported by their lophophytose method of fixation, and their other features do not contradict those of other representatives of Euplectellidae and Euplectellinae.

Placopegma has basalia of four-toothed anchors and monaxon spicules with rounded outer ends. Four-toothed anchors are found among other "multi-toothed" anchors in the former Euplectellinae (see above). Monaxones with rounded outer ends of *Placopegma* are quite peculiar. But peculiarity in basal spicules is known for evident Euplectellinae: *Malacosaccus* and *Acoelocalyx*. Their peduncle is supplemented by tauactines which notably differ from all the choanosomal spicules of the body. The other specific feature of *Placopegma* is that choanosomal and sieve-plate spicules are presented by diactines and some hexactines. However among former Euplectellinae, *Docosaccus* has the same choanosomal skeleton, and almost all representatives of subfamily Bolosomininae have the same type of choanosomal skeleton. The problem of the dermalia of *Placopegma* has already been discussed above. The last distinguishing feature of *Placopegma* is the presence of a single type of microscleres – discohexasters. This feature is really more characteristic of Leucopsacidae but among former Euplectellinae *Acoelocalyx* has the same single type of microscleres. Two other species of *Placopegma* which are known to me (but not yet described) have other types of microscleres, including floricones, plumicones and hexasters, which are characteristic of Euplectellidae. Nevertheless, even the possession of a single type of microsclere does not contradict the placement of *Placopegma* into Euplectellidae.

Conversely, placement of *Chaunangium* in the euplectellid Euplectellinae is more tenuous. The body of *Chaunangium* has an everted low atrial cavity (unlike the other three genera of Leucopsacidae which all are saccular). The sponge is lophophytose but all the basalia are monaxones (probably diactines) gathered in several tufts. Among Euplectellinae several tufts of basalia are known for the genus *Docosaccus* as well as in *Euplectella* (its basalia begins as separate tufts which are distally gathered into a common one). As for the entire absence of teeth on the basalia it is worth noting that *Placopegma* represents an intermediate variant – it has both types, toothed and untoothed basalia. Choanosomal spicules and dermalia of *Chaunangium* are similar to that of *Placopegma*. Atrialia are represented only by hexactines, these spicules are usual among atrial pentactines in some Euplectellinae (whereas atrialia of the sister subfamily Bolosomininae consists chiefly of hexactines). The microscleres of *Chaunangium* are discohexasters and plumicones. Discohexasters are usual for Euplectellinae (*Placopegma*, *Acoelocalyx*). Plumicones were previously absent among Euplectellinae but they occur in two other genera (*Hertwigia* and *Saccocalyx*) representatives of the other two subfamilies. Thus this action makes the plumicones to be specific microscleres of Euplectellidae. Consequently, there are reasonable and justified grounds for transferring these two genera from Leucopsacidae to the euplectellid Euplectellinae.

KEY TO GENERA OF EUPLECTELLINAE

- (1) Dermalia are mainly pentactines (in relatively large specimens) 2
 Dermalia are hexactines 3
- (2) Atrialia are mainly hexactines; basalia are represented by several tufts situated on the lower edge of the body; spicules of basalia have no teeth; atrial cavity is low; the body is flattened *Chaunangium*
 Atrialia are mainly pentactines; anchors have four teeth; atrial cavity present; the body is oval *Placopegma*
- (3) Anchorate basalia together with tauactines protrude from the peduncle formed in the lower part of the body 4
 Basalia protrude directly from the lower part of the body 5
 Basalia form a single tuft 6
- (4) Only discohexasters present among microscleres *Acoelocalyx*
 Microscleres various: hexasters, sometimes hemihexasters and hexactines; discohexasters, floricones and sometimes onychasters *Malacosaccus*
- (5) Basalia form several tufts; microscleres are hexactines, hemihexasters, hexasters, floricones and, probably, discohexasters *Docosaccus*
 Floricones present among microscleres; atrialia are pentactines; lateral oscula numerous *Euplectella*
 Floricones absent; dermal spicules have pinular rays; atrialia are usually hexactines *Holascus*

EUPLECTELLA OWEN, 1841**Synonymy**

Euplectella Owen, 1841: 3. *Conasterium* Ehrenberg, 1861: 452.

Type species

Euplectella aspergillum Owen, 1841 (by monotypy).

Definition

Euplectellinae deprived of peduncle, with a single tuft of basalia, numerous lateral oscula, dermalia of hexactines and oblique floricones among other microscleres.

Diagnosis

The body is tubular with numerous lateral oscula and with colander-like sieve-plate. The sponge lophophythose attached to the substratum with anchor-like basalia. The principal choanosomal spicules (large) are chiefly stauractines usually together with hexactines or pentactines. The distal rays of such hexactines and pentactines are rough, the proximal ones in hexactines are always rudimentary. Additional choanosomal spicules are diactines, tauactines and rarely stauractines together with more rarely found other derivatives. The choanosomal spicules form longitudinal and circular skeleton beams. The sieve-plate contains hexactine derivatives various in different species. Basalia are anchor-like spicules with 4 and more teeth. Dermalia are hexactines. Atrialia are pentactines. Microscleres are floricones and graphiocomes, sometimes hexasters and small sigmatocomes, rarely discohexasters, hemihexasters, hexactines and onychasters.

Description of type species

Euplectella aspergillum Owen, 1841 (Figs 1–2).

Synonymy. *Euplectella aspergillum* Owen, 1841: 3.

Material examined. Holotype: BMNH 1988.06.29.002 – off the Philippines. Other material. BMNH 1887.10.20.007–9, 12 – ‘Challenger’, off Cebu (Philippines), depth 95–100 m.

BMNH 1902.07.28.001 – probably, off the Philippines. BMNH 1921.11.30.004 – John Murray collection, probably off the Philippines. MNHN (p4275) – ‘Musorstom I’, 14°1.80’–1.20’N 120°17.20’–17.19’E, depth 182–194 m. MNHN (p1108, p1109, p1110, p1111, p1112) – ‘Musorstom II’, 13°15.30’–16.90’N 122°45.90’–46.60’E, depth 166–172 m. MNHN (p4274, p4278) – Musorstom II, 14°1.50’–0.10’N 120°18.90’–18.20’, depth 195–191 m. IORAS 5/2/1324 – ‘Vitiaz’, 50, 4°31.2’–30.8’N 112°55.7’–56.3’E, depth 88–85 m.

Description. The sponge is represented by thin-walled tube, covered with colander-like sieve-plate. In the lower part the body is narrowed with numerous prostalia basalia. The lateral wall is covered with numerous lateral oscula 1–2 mm in diameter. The oscula are organized into two intersecting systems of parallel right and left-handed spirals, ascending at angle of 45 degrees. In old specimens some of these spirals are marked with ridges 2–10 mm high, however these ridges may be irregularly situated. The sieve-plate may be absent in small specimens (Schulze, 1904). The body of *E. aspergillum* is 40–240 mm long, 14–50 mm in diameter, basalia protrude at 20–80 mm. The sponge which must be the holotype is 200 mm in length, 40 mm in diameter, with basalia about 20 mm long. Some specimens of *Euplectella aspergillum* (i.e., BMNH 1902.07.28.1) have abnormal, dichotomously branching body and each branched part has its separate sieve-plate. Spicules. This species is found in many museums but most of the specimens including the holotype are represented by fused choanosomal spicules only while the loose ones are macerated. The choanosomal spicules (together with basalia) form circular and longitudinal skeletal beams which are strongly fused by synapticulae in large specimens. The principal skeleton architecture is constructed by large stauractines which give the principal net with square meshes. They are surrounded by other choanosomal spicules and lateral oscula are situated among them. Two rays of these stauractines are directed longitudinally and two other rays horizontally. The latter rays are slightly bent forming the circular shape of walls in the horizontal plane, hence these spicules are slightly similar to paratractines. The large choanosomal spicules have smooth rays 8–19/0.046–0.152 mm with conically pointed outer ends. These spicules are absent in the sieve-plate, where large diactines (rarely triactines) are observed. Their rays are 3–6/0.061–0.076 mm. These diactines often have a widening in the middle and they are

usually curved. Unlike the large choanosomal stauractines their outer ends sometimes can be rough. Tauactines prevail among the choanosomal spicules, they have smooth rays 0.5–4.4 mm long (two opposite rays are usually longer than the “unpaired” one), they are 0.011–0.015 mm in diameter at base and about 0.033 mm in diameter in most parts of the shaft. The outer ends of choanosomal tauactines are needle-like, conical, rounded or clavate; smooth or rough. The other kind of choanosomal spicules is small and usually thick-rayed spicules, with 2–6 rays 0.061–0.578/0.004–0.049 mm, smooth conically pointed. These spicules are often similar and are hardly distinguished from choanosomal tauactines, dermal hexactines and atrial pentactines. Basalia are anchorate spicules: multi-toothed (about 6 teeth) anchors with partly spined shafts as in most Euplectellinae and four-toothed spicules with smooth shafts which are considered to be pentactines. The shafts of anchorate basalia are 0.015–0.061 mm in diameter, they penetrate deep into the upper parts of the sponge forming the longitudinal skeleton

beams together with large stauractines. Dermalia are hexactines with smooth rays and rounded or conically pointed outer ends. The distal ray of dermal hexactine is 0.068–0.274 mm long, the tangential rays are 0.076–0.532 mm long, the proximal ray is 0.160–1.178 mm long, their diameter is 0.005–0.034 mm. Atrialia are pentactines with rays similar to dermal spicules. Tangential rays of atrial pentactines are 0.068–0.342 mm long, distal one is 0.114–0.988 mm long, their diameter is 0.007–0.009 mm. Microscleres. Microscleres are floricoses, hexasters and graphiocomes. The floricoses are 0.054–0.090 mm in diameter, with primary rosette 0.007–0.016 mm in diameter. The hexasters have smooth rays. They are 0.043–0.079 mm in diameter, with primary rosette 0.005–0.014 mm in diameter. The graphiocomes were found only in some investigated specimens in relatively small amounts, their secondary rays were always broken, so the complete measures of these spicules were reconstructed. The graphiocomes are 0.173–0.191 mm in diameter with primary rays 0.010–0.014 mm in diameter.

Remarks. The genus currently contains 16 species (including one in press). Some deformed specimens (e.g., of *E. aspergillum*) have two sieve-plates and dichotomously branching tubular body.

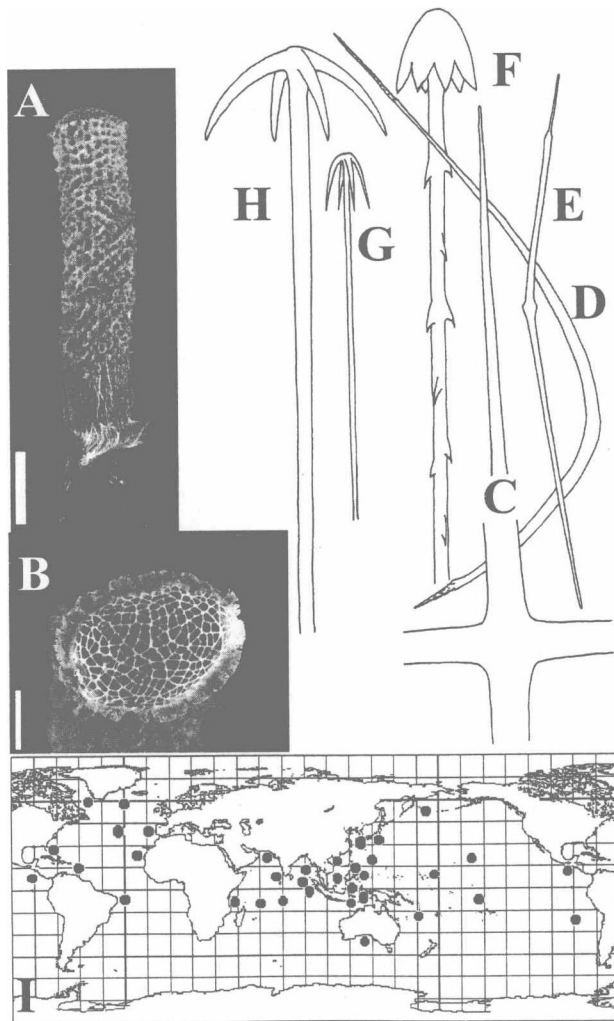


Fig. 1. *Euplectella aspergillum*. A, lateral view IORAS 5/2/1324 (scale 40 mm). B, upper view (scale 30 mm). C, large choanosomal stauractine 80 \times . D–E, large choanosomal diactines of the sieve-plate 80 \times . F–H, anchorate basalia. F, 160 \times . G–H, 40 \times . C–E, IORAS 5/2/1324. F–H, from Schulze (1886). I, distribution of *Euplectella*.

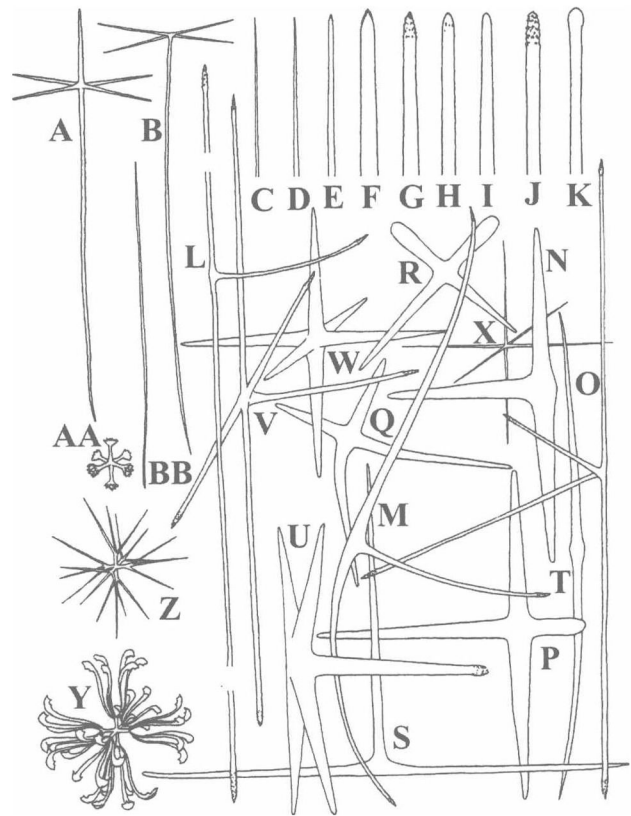


Fig. 2. *Euplectella aspergillum*. A, dermal hexactine 80 \times . B, atrial pentactine 80 \times . C–K, outer ends of choanosomal spicules 80 \times . L, common choanosomal tauactine with long rays 80 \times . M–N, S. choanosomal tauactines 80 \times . O, choanosomal paratetractine 80 \times . P–R, choanosomal stauractines 80 \times . T, choanosomal diactine 80 \times . U–V, choanosomal pentactines 80 \times . W–X, choanosomal hexactines 80 \times . Y, floricome 300 \times . Z, hexaster 300 \times . AA, primary rosette of graphiocomes 300 \times . BB, its secondary ray 300 \times . A–BB, from Schulze (1886).

The small specimens have no sieve-plate and lateral oscula (*E. aspergillum* without the sieve-plate (Schulze, 1904); *E. marshalli* without the sieve-plate and lateral oscula (Ijima, 1901)). The sieve-plate is considered to have originated within the lateral walls (Ijima, 1901).

The synapticular fusion of the choanosomal skeleton takes place in different species with differently expressed grade. An entirely rigid choanosomal skeleton is known in some *E. aspergillum* while no fusion was reported in *E. jovis* (Schulze, 1886), *E. marshalli* (Ijima, 1895; 1901), *E. oweni* (Herklots, Marshall, 1868; Ijima, 1901) or *E. curvistellata* (Ijima, 1901). The number of longitudinal beams increases toward the osculum. In the lower part of a sponge basalia are always gathered in a single tuft but in the upper parts they follow to all longitudinal beams by numerous tufts. The new basalia arise and project throughout growth such that the anchorate outer ends can be located among the spicules which construct the longitudinal beam of the lateral wall in small specimens. Later this part of the sponge becomes basal and most of the anchorate spicules are macerated. In *E. crassistellata* (Schulze, 1987) monaxon spicules with rounded outer ends are found together with anchors. In some species (*E. aspergillum*, *E. simplex* (Schulze, 1895), *E. aspera* (Schulze, 1895)) four-toothed anchors, which are considered to be genuine pentactines (Ijima, 1901), are found together with common multi-toothed anchors.

The most numerous additional choanosomal spicules are mostly stauractines seen in a still-undescribed species off New Caledonia, whereas in all other species of *Euplectella* these spicules are rare.

Some pentactines in addition to hexactines in dermalia were reported in *E. timorensis* (Ijima, 1927) but they seem to have choanosomal origin. The atrial pentactines of *E. oweni* (Ijima, 1901) have a rudiment of the sixth ray.

Hexasters are unknown in *E. simplex* and *E. jovis*. *Euplectella jovis* also has curved diactines which could probably have originated from hexasters through microhexactines (Ijima, 1901). Hemi-hexasters and hexactines are numerous in the *Euplectella* off New Caledonia. Sigmatomes are reported in *E. regalis*, *E. imperialis* and *E. marshalli*, a spicule derived from sigmatome is described in *E. aspera* under the name "young not fully developed floricome". Some specimens of *E. suberea* have discohexasters and onychasters (Schulze, 1886; Topsent, 1892a). One new (still-undescribed) species from the N Pacific, which seems to be close to *Euplectella*, has sigmatomes and spicules with onychoidal outer ends, its choanosomal skeleton contains chiefly diactines. The floricomes in *Euplectella* are usually located on the top of the distal ray of dermal hexactines.

In spite of the fact that *E. aspergillum* is one of the most famous Hexactinellid sponges (known under the name 'venus flower basket') its complete description exists only in Schulze's paper (1887a) while the accurate spicules measurements are not given in the descriptions. Unfortunately I have investigated and measured only the specimens of *E. aspergillum* off the Philippines. Since I have no specimens collected by 'Valdivia' in the W Indian Ocean and described by Schulze (1904). The contribution of Lendenfeld (1888) about the finding of *E. aspergillum* off Portugal and the same of Arndt (1941) off Cape St. Vincent are likely to be erroneous and these sponges are, probably, the common Atlantic *E. suberea*.

Distribution

Low and temperate latitudes (Fig. 1), depth 36–5050 m.

ACOLOCALYX TOPSENT, 1910

Synonymy

Acoelocalyx Topsent, 1910: 520.

Type species

Acoelocalyx brucei Topsent, 1910 (by monotypy).

Definition

Euplectellinae with a peduncle and single tuft of basalia, dermalia of hexactines, microscleres are represented by discohexasters only.

Diagnosis

Body is cylindrical, lophophytose with shallow atrial cavity, fixed with anchorate basalia organized in a peduncle-like tuft. Choanosomal spicules are chiefly hexactines, sometimes pentactines, rarely stauractines. The spicules of the peduncle are tauactines and anchor-like basalia. Dermalia and atrialia are hexactines, some pentactines were found in atrialia. Microscleres are discohexasters.

Description of type species

Acoelocalyx brucei Topsent, 1910 (Fig. 3).

Synonymy. *Acoelocalyx brucei* Topsent, 1910: 520.

Material examined. Holotype: NMS 1921.143.1384 – 'Scotia', 64°48' S 44°26' W, depth 4547 m.

Description. A single specimen has the body length about 150 mm, it is transversally flattened being: about 23–44 × 8–10 mm in diameter. The atrial cavity is shallow. The peduncle is thick about 6 mm in diameter and 220 mm in length. Spicules. The choanosomal spicules of the body contains chiefly hexactines, sometimes pentactines, rarely stauractines and never diactines. All these spicules are smooth with smooth conical or rounded outer ends. Their rays are 0.9–2.1/0.007–0.010 mm. The choanosomal spicules of the peduncle are tauactines and anchor-like basalia with shafts about 0.12 mm in diameter, covered by spines and carrying more than 4 teeth at the outer end. Dermalia and atrialia are hexactines with rays directed outside the wall, slightly widened toward the outer end. All the rays are covered with short spines in the distal half and the rays directed outside the walls are nearly entirely covered with short spines. Pentactines which have the proximal ray reduced to a small tubercle were found rarely among numerous atrial hexactines. The ray of dermal and atrial hexactines directed outside the wall is 0.167–0.350 mm long, tangential rays are 0.266–0.388 mm long, the ray directed inside the wall is 0.334–0.798 mm long, their diameter is 0.022–0.025 mm. Microscleres. Microscleres are discohexasters and possibly hexasters. Discohexasters have toothed discs with straight or sometimes curved secondary rays. Some rarely found discs of these discohexasters are deformed being rather floricoidal then discoidal. The discohexasters are about 0.133–0.148 mm in diameter with the primary rosette 0.016–0.022 mm in diameter. The hexasters which were rarely found among discohexasters are rather discohexasters with deprived discs then true oxyoidal spicules.

Remarks. The genus is monotypic and known so far only from the holotype. The presence of hexasters in *Acoelocalyx* is

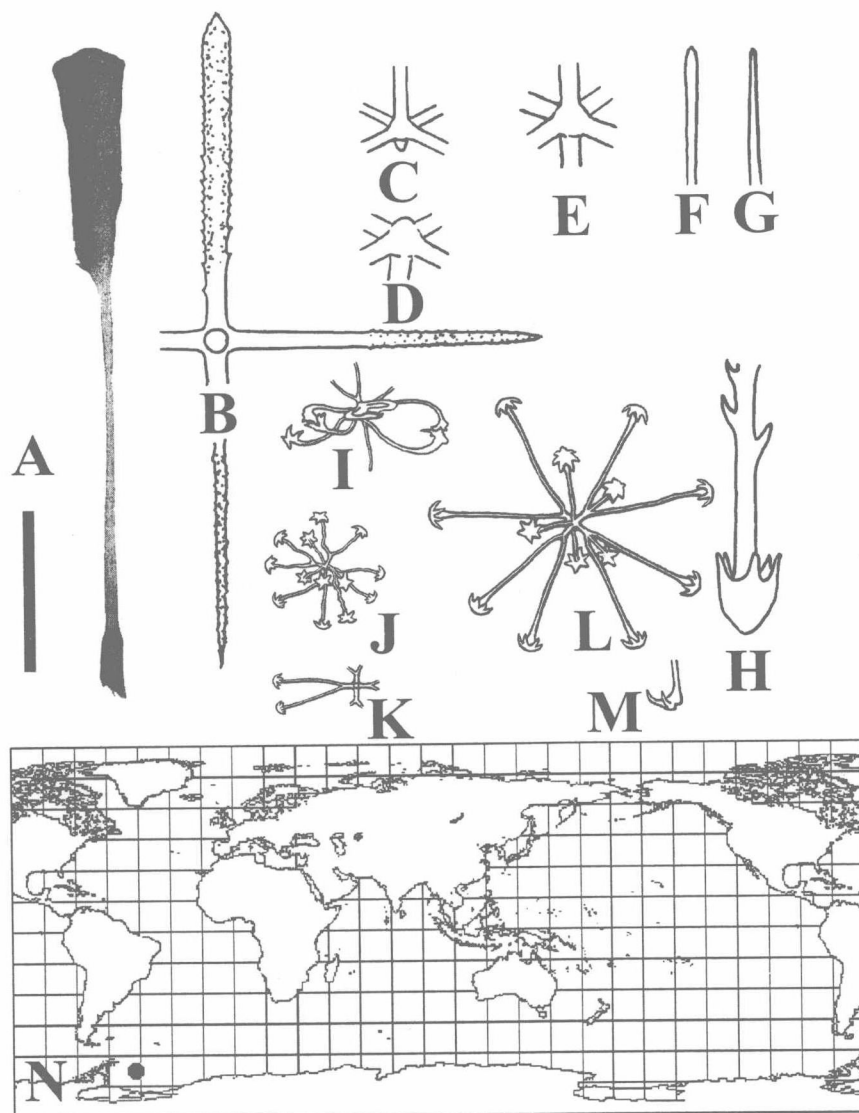


Fig. 3. *Acoelocalyx brucei*. A, external shape from Topsent (1913b) (scale 100 mm). B, dermal or atrial hexactine 120 \times . C–D, choanosomal pentactines 230 \times . E, choanosomal hexactine 230 \times . F–G, outer ends of the choanosomal spicules 230 \times . H, basal anchorate spicule 230 \times . I, deformed discohexaster with floricoidal outer ends 230 \times . J–L, discohexasters 230 \times . M, deformed onychoidal outer ends of the discohexaster 230 \times . B–M, from Topsent (1913b). N, distribution of *Acoelocalyx*.

questionable. These were reported by Topsent but I have not found undoubted hexasters in this same material. It is possible that his observations were made on irregular discohexasters, which sometimes have abnormal secondary rays, usually curved and irregular in shape, with their secondary rays more floricoidal than discoidal.

Distribution

Weddell Sea, Antarctic, depth 4547 m.

CHAUNANGIUM SCHULZE, 1904

Synonymy

Chaunangium Schulze, 1904: 31.

Type species

Chaunangium crater Schulze, 1904 (by monotypy).

Definition

Euplectellinae with flattened body with several tufts of basalia, dermalia of pentactines and plumicomes among microscleres.

Diagnosis

Body is flattened, lophophytose with low atrial cavity and several distinctly separated tufts of basalia (probably diactines) on the basal edge. Choanosomal spicules are diactines. Dermalia are pentactines, sometimes hexactines and stauractines. Atrialia are hexactines. Microscleres are discohexasters and plumicomes.

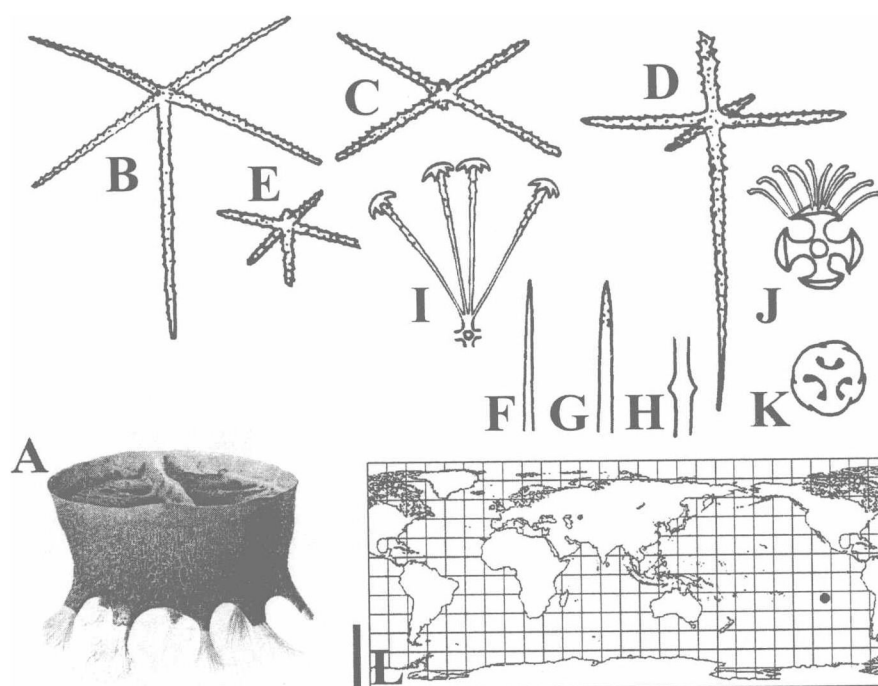


Fig. 4. *Chaunangium crater*. A, syntypes from Schulze (1904) (scale 50 mm). B–E, dermal spicules 190 \times . F–G, outer ends of choanosomal diactines 190 \times . H, central part of choanosomal diactine with a widening 190 \times . I, discohexaster 720 \times . J–K, plumicomes 720 \times . B–K, BMNH 1908.09.24.021. L, distribution of *Chaunangium*.

Description of type species

Chaunangium crater Schulze, 1904 (Fig. 4).

Synonymy. *Chaunangium crater* Schulze, 1904.

Material examined. One of 3 syntypes: BMNH 1908.09.24.021 – ‘Valdivia’, 6°56.3’N 93°32.7’E, depth 362 m; 7°48.8’S 93°07.6’E, depth 805 m; 6°53.1’S 93°33.5’E, depth 752 m.

Description. The holotype seems not to be distinguished among specimens of the type series collected on two stations. The best specimen is about 90 mm long and 180 mm in diameter with very low atrial cavity and narrow osculum. Lectotype status must be assigned to it, while the others must be considered paralectotypes. The basalia comprise diactines 20–30 mm long gathered in several tufts on the basal edge. The fragment stored in the Natural History Museum obviously belongs to the initial type series. Spicules. Choanosomal spicules are diactines 1.2–3.4/0.009–0.015 mm. They are smooth sometimes with rough conical outer ends, rarely with small thickenings. Basalia include spicules about 50 mm long which seem to be diactines. It is impossible to distinguish dermal and atrial surfaces of the fragment stored in the Natural History Museum. Pentactines, stauractines and hexactines from one surface were considered to be dermal and hexactines from the other surface – atrial. Dermalia are pentactines, hexactines, pentactines with a rudiment of the sixth ray, rarely stauractines. Atrialia are hexactines. Both dermalia and atrialia are covered with short dense spines. These spines are more dense on the outer parts of tangential rays of dermal pentactines. Tangential rays of dermal pentactines are 0.099–0.200 mm, proximal rays are 0.050–0.395 mm. Distal rays of atrial hexactines are 0.091–0.304 mm, tangential ones are 0.053–0.152 mm, proximal rays are 0.040–0.091 mm. All these dermal and atrial rays are about 0.009 mm in diameter. Microscleres. Microscleres are discohexasters and

plumicomes. Discohexasters are spherical, toothed with 5–7 teeth, 0.061–0.120 mm in diameter, with primary rosettes 0.005–0.015 mm in diameter. The plumicomes (according to Schulze (1904) – discoplumicomes) have discoidal outer ends. The primary rays rarely fuse to one another. Fusion is formed by their discoidal parts: the hexaradiate central part is enclosed inside the spherical spicule which is covered with sigmoidal secondary rays. The same type of spicules I have found in some specimens of *Saccocalyx*. Plumicomes are 0.032–0.043 mm in diameter with primary rosette 0.014–0.025 mm in diameter. According to Schulze (1904), plumicomes are 0.093 mm in diameter but I consider this data to be erroneous.

Remarks. This monotypic genus was previously included in the family Leucopsacidae. Reasons for its transfer are provided in the general remarks for Euplectellinae and Leucopsacidae. The most outstanding feature identifying it as a true member of Euplectellinae is presence of non-anchorate basalia, probably diactines.

Distribution

East-central region of the Indian ocean (Fig. 4), depth 362–805 m.

DOCOSACCUS TOPSENT, 1910

Synonymy

[*Doco acus*] Topsent, 1910: 520 [*lapsus*]. *Docosaccus* Topsent, 1913b (nomen emend.).

Type species

Docosaccus ancoratus Topsent 1910 (by monotypy).

Definition

Euplectellinae with sac-like body and several tufts of basalia, dermalia of hexactines, microscleres with oxyoidal, floricoidal and, probably, discoidal outer ends.

Diagnosis

Lophophytose body is supposed to be sac-like with thin walls fixed by the anchor-like basalia which are organized in several tufts. Choanosomal spicules are diactines, rarely hexactines and their derivatives. Largest choanosomal spicules are hexactines with long tangential rays. Dermalia and atrialia are hexactines. Microscleres are hexactines, hemihexasters, hexasters, floricomes and, probably, discohexasters.

Description of type species

Docosaccus ancoratus Topsent, 1910 (Fig. 5).

Synonymy. *Docosaccus ancoratus* Topsent, 1910: 520.

Material examined. Holotype: NMS 1921.143.1385 – 'Scotia', 64°48'S 44°26'W, depth 4547 m.

Description. A single specimen is known. It is represented by nearly square fragments up to 50 × 40 mm about 2 mm thick. Spicules. The large choanosomal hexactines have short distal and proximal rays about 1 mm long while tangential ones are about 9 mm long. All their rays are 0.06–0.12 mm in diameter. These large hexactines are smooth with rounded outer ends smooth or rough. Diactines prevail among other choanosomal spicules, which include rare hexactines, pentactines and paratractines. These spicules are smooth but sometimes have rare small spines. The outer ends are conically pointed. The diactines have a widened part or four rudimentary tubercles. The rays are 0.45–2.00/0.008–0.016 mm. Basalia are anchor-like spicules with shafts about 0.015 mm in diameter covered with spines. They have 4 and more teeth. Dermalia and atrialia are hexactines. Their rays directed outside the wall are covered with short spines or rough, the outer ends are conically or spherically pointed. These spicules are identical at both surfaces. The ray directed outside the wall is 0.084–0.334 mm long, the tangential ones are 0.152–0.388 mm long, the ray directed inside the wall is 0.416–0.813 mm long. The rays have the same diameter about 0.015 mm, the widened rays directed outside the wall are 0.025 mm in maximum diameter. Microscleres. Microscleres are microhexactines, hemihexasters, hexasters, floricomes and, probably, discohexasters. Microhexactines are 0.097–0.155 mm in diameter, hexasters have similar sizes being 0.086–0.133 mm in diameter, with primary rosette 0.011–0.018 mm in diameter. Floricomes are 0.058–0.101 mm in diameter with primary rosette 0.011–0.018 mm in diameter. Only one discohexaster was found in the holotype. It was 0.083 mm in diameter with primary rosette 0.013 mm in diameter. It seems that this discohexaster does not belong to *Acoelocalyx brucei* collected at the same station because its discs are rather serrated than toothed and it has more teeth than corresponding spicules in *Acoelocalyx*. The presence of discohexasters described by Topsent (1910, 1913b) is given in the genus diagnosis, in spite of the fact that their autochthonous origin is problematic. Hexactines and hemihexasters were found to be

relatively numerous in the type material. Sometimes hexasters and hemihexasters are deformed having rays curved.

Remarks. This monotypic genus resembles *Malacosaccus* in its microsclere composition. The most notable feature which differentiates *Docosaccus* from other Euplectellinae is its choanosomal spicules. Discohexasters are rare while hexactines, hemihexasters are relatively common.

Distribution

Weddell Sea, Antarctica (Fig. 5), depth 4547 m.

HOLASCUS SCHULZE, 1886**Synonymy**

Holascus Schulze, 1886: 39. *Holascella* (in part – *H. euonyx* Lendenfeld, 1915: 44); *H. taraxacum* (Lendenfeld, 1915: 29).

Type species

Holascus stellatus Schulze, 1886 (by original designation, since formally the type species was not indicated by Schulze when he was describing four species of *Holascus* simultaneously).

Definition

Euplectellinae with a single tuft of basalia, dermalia of pinular hexactines, atrialia usually of hexactines, deprived of floricomes.

Diagnosis

Body is tubular, lophophytose, with thin walls and a tuft of anchor-like basalia. Sieve-plate was observed in several species. Basalia are anchor-like spicules. Choanosomal spicules are hexactines, pentactines, stauractines and tauactines with different predomination in different species. Additional choanosomal spicules are short-rayed diactines and other short-rayed derivatives of hexactines. Dermalia and atrialia are usually pinular hexactines, rarely atrialia could be of pentactines. Microscleres are various combinations of hexasters, hemihexasters, hexactines, triactines and diactines, discohexasters, hemidiscohexasters, discohexactines, onychohexasters, hemionichohexasters, onychohexactines, graphiocomes, drepanocomes and tylohexasters.

Description of type species

Holascus stellatus Schulze, 1886 (Fig. 6).

Synonymy. *Holascus stellatus* Schulze, 1886: 40.

Material examined. Holotype: BMNH 1887.10.20.019 – 'Challenger', 36°44'S 46°16'W, depth 4850 m.

Description. Tubular sponge 80 mm long, 13 mm in diameter, the osculum is about 10 mm in diameter, basalia are at least 20 mm long. The irregular sieve-plate was figured by W. Thomson but it is not present in the holotype now. So the presence of the sieve-plate in *H. stellatus* is questionable. The walls are 1.5–2 mm thick. Spicules. The principal choanosomal spicules are hexactines and, probably, pentactines with rays 0.9–8/0.08 mm. In some choanosomal hexactines tangential rays seem to be the longest.

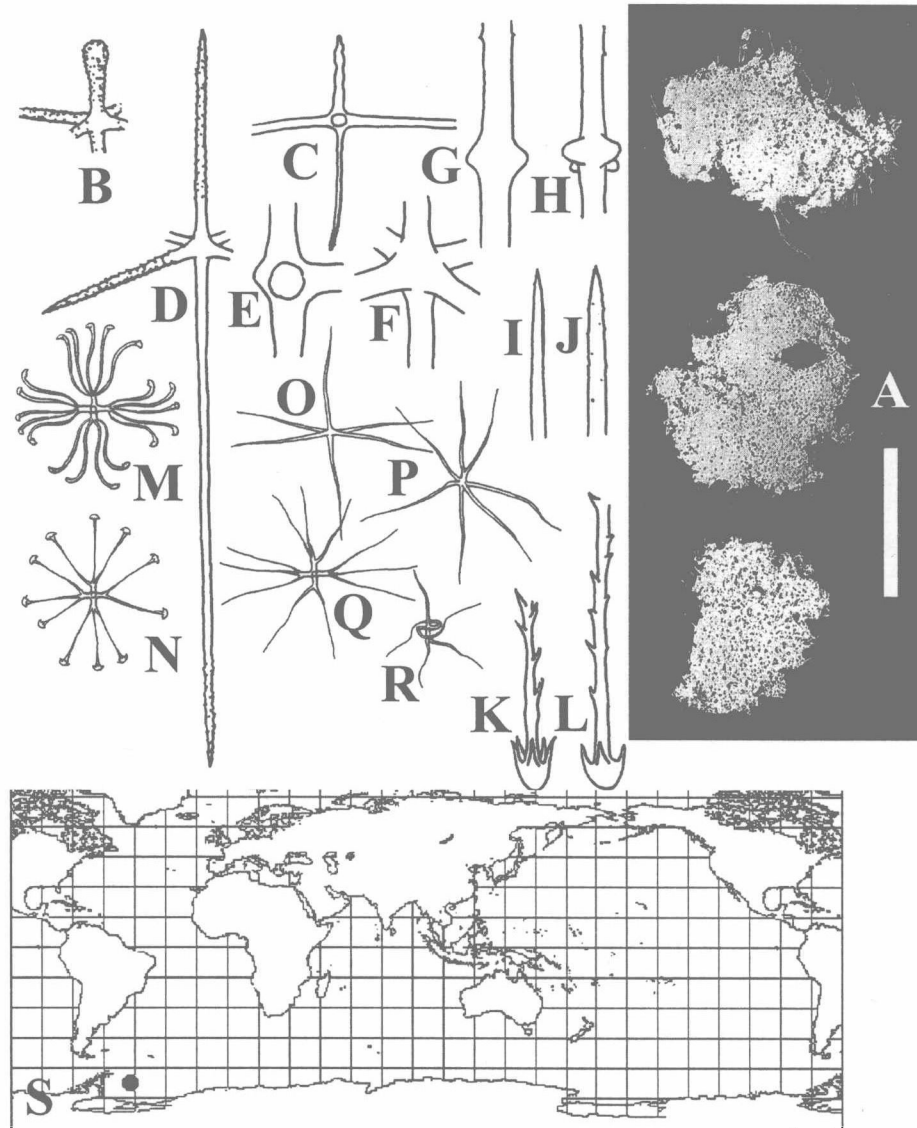


Fig. 5. *Docosaccus ancoratus*. A, holotype from Topsent (1913b) (scale 30 mm). B, D, dermal or atrial hexactines 140 \times . C, principal choanosomal hexactine 15 \times . E, choanosomal tauactine 260 \times . F, choanosomal hexactine 260 \times . G-H, choanosomal diactines 260 \times . I-J, outer ends of the choanosomal spicules 260 \times . K-L, basal anchorate spicules 140 \times . M, floricome 260 \times . N, discohexaster 260 \times . O, hexactine 260 \times . P, hemihexaster 260 \times . Q, hexaster 260 \times . R, hemihexaster with curved rays 260 \times . A-B; D-R, NMS 1921.143.1385. C, after Topsent (1913b). S, distribution of *Docosaccus*.

Additional spicules are numerous triactines, tauactines and rare diactines. These spicules have rays 0.4–3.3/0.008–0.023 mm. The vertically directed rays seem to be longer than the horizontally directed rays or rays directed inside the body. All the choanosomal spicules are smooth, they can have the outer ends covered with short spines or entire surface of the ray is covered with short sparse spines. Basalia are usually four-toothed (seldom more) anchor-like spicules. They are about 0.015 mm in diameter with upper part smooth and basal part spiny. Dermalia and atrialia are hexactines with the ray directed outside the wall covered with short spines, its outer end is conically pointed or rarely rounded. Atrialia are thinner than dermalia. The other rays (then directed outside the body) are smooth or covered with short sparse spines, their outer ends are conically pointed. Distal ray of dermal hexactine is 0.266–0.327 mm long, tangential rays are 0.236–0.494 mm, the

ray directed inside the wall is 0.646–1.520 mm. The proximal ray of atrial hexactine is 0.205–0.350 mm long, tangential rays are 0.236–0.350 mm, distal one is 0.532–1.102 mm. These hexactines are very similar in size and shape but atrial ones are thinner than dermal. The ray directed outside the body is 0.009–0.017 mm in diameter at base and up to 0.033 mm in maximal diameter if it is spindle-like in shape, the other rays are 0.009–0.015 mm in diameter. Microscleres. Microscleres are graphiocomes and numerous hexasters and their derivatives. The regular hexasters have two–four straight secondary rays, only sometimes their outer ends are curved. These hexasters are 0.065–0.122 mm in diameter, with primary rosette 0.009–0.022 mm in diameter. Spicules with curved rays are hexasters, hemihexasters, hexactines, stauractines, tauactines and diactines (the three latter types have central part spherical). Hexactines are 0.076–0.122 mm in diameter. The

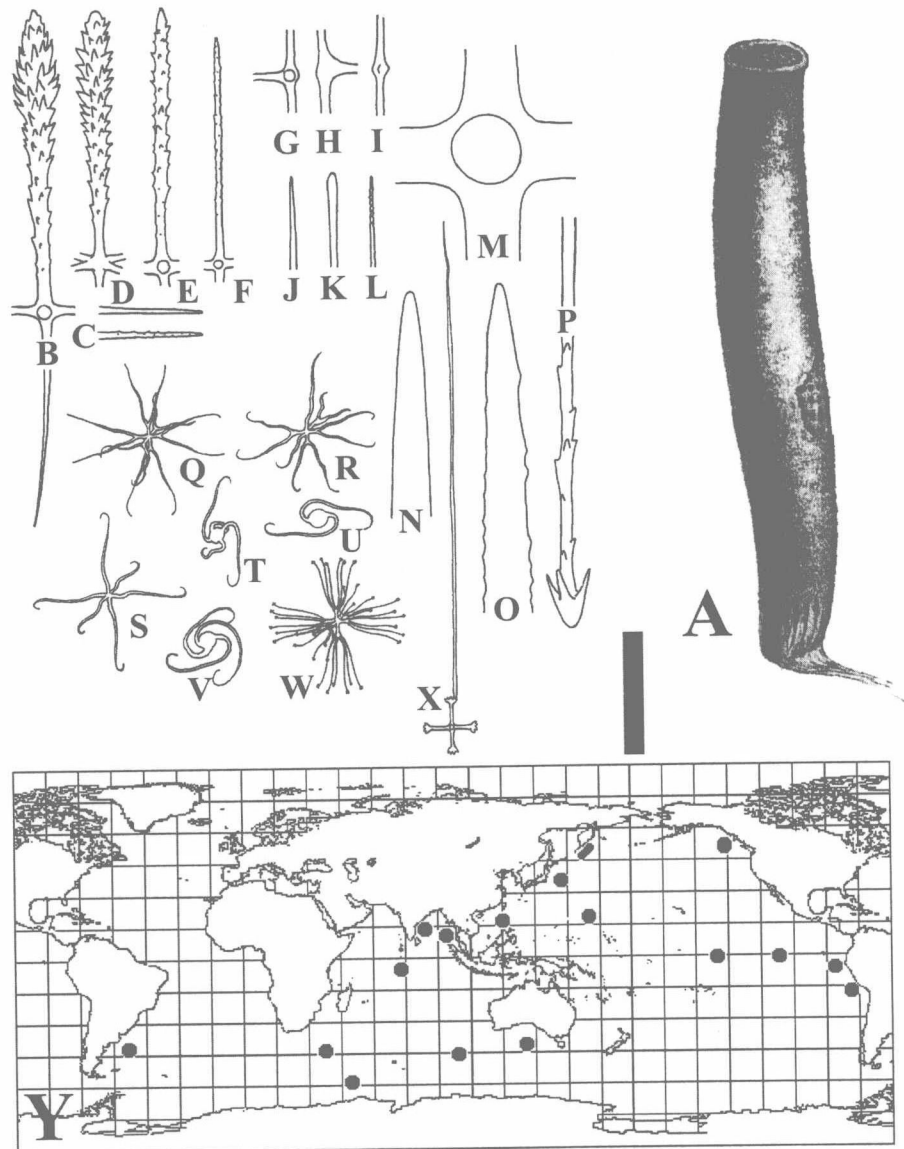


Fig. 6. *Holascus stellatus*. A, holotype from Schulze (1887a) (scale 20 mm). B–F, dermal and atrial hexactines and their outer ends 110 \times . G–L, choanosomal spicules and their outer ends 110 \times . M–O, large choanosomal hexactine and its outer ends 110 \times . P, anchorate basalia 110 \times . Q, hemihexaster 210 \times . R, hexaster 210 \times . S, hexactine 210 \times . T–V, hexactine's derivatives with curved rays 210 \times . W, discohexaster 210 \times . X, graphiome 210 \times . B–P, X, BMNH 1887.10.20.019. Q–W, from Schulze (1887a). Y, distribution of *Holascus*.

graphiomes are 0.526–1.125 mm in diameter with primary rosette 0.027–0.036 mm in diameter.

Remarks. *Holascus* presently contains 14 species, although the genus requires further revision. The genus *Holascella* (partly) is considered to be a junior synonym of *Holascus* due to a significant overlap of their diagnosis and absence of more precise criteria which could distinguish these genera correctly. Lendenfeld in characterizing the genus *Holascella* listed characters which differentiated it from *Holascus*: absence of discohexasters and floricores in *Holascus* and location of axial cross in the basalia. In *Holascella* this is situated in the distal part of anchor-like spicule together with its disc while in *Holascus* it lies outside the disc. However some species of *Holascus* (e.g., *H. undulatus* (Schulze, 1899), *H. tenuis* (Schulze, 1904) and perhaps also *H. stellatus*

(Schulze, 1887a)) have the 'calycocomes' which are themselves a kind of discohexasters. Besides *Holascella* floricores were reported in a single specimen of *Holascus* – *H. stellatus* (Schulze, 1887a: 86) or same specimen presented as *H. sp.* (Schulze, 1887a: pl. XV, fig. 18 and corresponding footnotes). So the validity of *Holascella* for its possible future reconstruction as a supraspecific taxon requires further investigations of the axial cross position and floricores presence in doubtless *Holascus* species. Moreover the position of the axial cross for most representatives of these genera is unknown and requires a special investigation. The sieve-plate is reported for *H. fibulatus* (Schulze, 1887a) and *H. polejaevi* (Schulze, 1887a). Pentactines as atrial spicules were observed in *H. fibulatus* and *H. polejaevi*. The microscleres are known to be present in different combinations in various species. A row from

calycocomes with discoidal outer ends as in *H. undulatus* (Schulze, 1899) to analogous spicules with finely pointed outer ends may be considered as hexasters in *H. polejaevi* (Schulze, 1887a) and to calycocomes with rounded outer ends – tylohexasters in *H. robustus* (Schulze, 1887a) is observed in this genus. An unusual type of microscleres, 'ring-shaped' diactines, was found in *H. edwardsii* (Lendenfeld, 1915). *Holascus* requires further revision. Variation of microscleres and other variable characters are extraordinary for the genus of Hexactinellida. Some specimens may turn to be young forms of other Euplectellinae genera. In the related subfamily Corbitellinae, young *Regadrella* are deprived of the sieve-plate and the lateral oscula and their spiculation also differs from the elder specimens.

Only a single specimen of the type species is known. Another specimen from the same station described by Schulze (1886, 1887a) as *H. stellatus* and figured as *H. sp.* (Schulze, 1887a) seems to be another (new) species. Schulze himself mentioned there were some differences in the spicule composition of these two specimens, whereas, unfortunately the spicules of both were described together. Thus, to reconstruct the holotype of *H. stellatus* the preserved material was compared with the published figures. The specimen number BMNH1887.10.20.019 was found to be the holotype of *H. stellatus*, whereas another specimen (1887.10.20.018) is referred to this other species, differing from *H. stellatus* in having the prevailing hexactines and pentactines located in the choanosomal skeleton, having discohexasters, but lacking stauractines, tauactines and diactines with curved rays.

Distribution

S Atlantic, Pacific, Indian and Antarctic oceans (Fig. 6), depth 494–6328 m.

MALACOSACCUS SCHULZE, 1886

Synonymy

Malacosaccus Schulze, 1886: 41. *Holascella* (in part – *H. ancorata* Lendenfeld, 1915: 37).

Type species

Malacosaccus vastus Schulze, 1886 (by original designation, since formally the type species was not indicated by Schulze when he was describing two species of *Malacosaccus* simultaneously).

Definition

Euplectellinae with a peduncle, dermalia of hexactines, atralia usually of hexactines, microscleres have oxyoidal, discoidal, floricoidal and sometimes onychoidal outer ends.

Diagnosis

Body is tubular or saccular, lophophytose, pedunculate with anchor-like basalia. Choanosomal spicules are chiefly hexactines, usually together with pentactines, stauractines and tauactines. The choanosomal spicules of the peduncle are tauactines together with

rare stauractines, paratetractines and anchors. Dermalia and atralia are usually pinular hexactines. Microscleres are hexasters, sometimes hemihexasters and hexactines; discohexasters, floricomes and sometimes onychasters.

Description of type species

Malacosaccus vastus Schulze, 1886 (Fig. 7).

Synonymy. *Malacosaccus vastus* Schulze, 1886: 41.

Material examined. Holotype: BMNH 1887.10.20.026 – between Kerguelen Island and Cape of Good Hope, 'Challenger', 46°46'S 45°31'E, depth 2510 m (this material is probably a fragment of the holotype, although not marked as such on the label).

Description. The external shape of the body is unknown. Sponge is described from a fragment of a wall about 300 × 300 mm and 4 mm thick. It was expected to be tubular about 400 mm in length and about 130 mm in diameter (Schulze, 1887a). Spicules. The choanosomal spicules of the body are smooth hexactines, rarely pentactines, stauractines and paratetractines. They have rays 1.3–2.3/0.007–0.013 mm with outer ends smooth, conical, rounded, spherical and clavate. The other type of choanosomal spicules are hexactines with rays about 0.5/0.016 mm covered with spines. The choanosomal spicules of the peduncle are chiefly tauactines, rarely paratetractines and stauractines. They are accomplished with anchor-like basalia. Dermalia are pinular hexactines. The ray directed outside the wall has spindle-like shape, covered with short spines. The other rays are smooth, conically pointed. Atralia according to the primary description are short spiny hexactines with all the rays equal in length. I have not found such hexactines. The atrial spicules are identical to dermalia, and spicules figured by Schulze (1887a) are more similar to spiny choanosomal hexactines. The ray of dermal and atrial spicules directed outside the body is 0.258–0.540 mm long, the tangential rays are 0.319–0.418 mm long, the ray directed inside the wall is 0.699–1.216 mm long, all these rays are about 0.007 mm in diameter at base while the spindle-like pinular ray is about 0.018 mm in maximal diameter. Microscleres. Microscleres are hexasters, discohexasters and floricomes. Discohexasters are very similar to floricomes in shape and in having the discs on their secondary rays asymmetrically located. Intermediates between discoidal and floricoidal forms of secondary rays can be found and often it is impossible to decide whether a spicule belongs to a discohexaster or a floricome. The discohexasters are common. Secondary rays of hexasters are curved. They are 0.122–0.223 mm in diameter with primary rosette 0.011–0.025 mm in diameter. Floricomes are 0.097–0.140 mm in diameter with primary rosette 0.018–0.043 mm in diameter. The discohexasters are very similar to floricome in size, they are 0.115–0.151 mm in diameter with primary rosette 0.022–0.040 mm in diameter.

Remarks. The genus presently contains 8 species. The external shape of some species of *Malacosaccus* is known from broken fragments only. But the body shape described in the diagnosis seems to be uniform for all described species. Synapticular fusion is absent in this genus. Choanosomal diactines seem to be entirely absent. Anchorate basalia have four or more teeth. Atralia in *M. heteropinularia* (Tabachnick, 1990a) and probably in *M. vastus* are short spiny hexactines with equal rays. It is doubtful that *Holascella ancorata* (Lendenfeld, 1915) belongs to *Malacosaccus*. It has no graphiocomes, besides it is the only sponge of the *Holascus* genus *sensu lato* with floricomes, and a significant number of tauactines are present in the choanosomal skeleton.

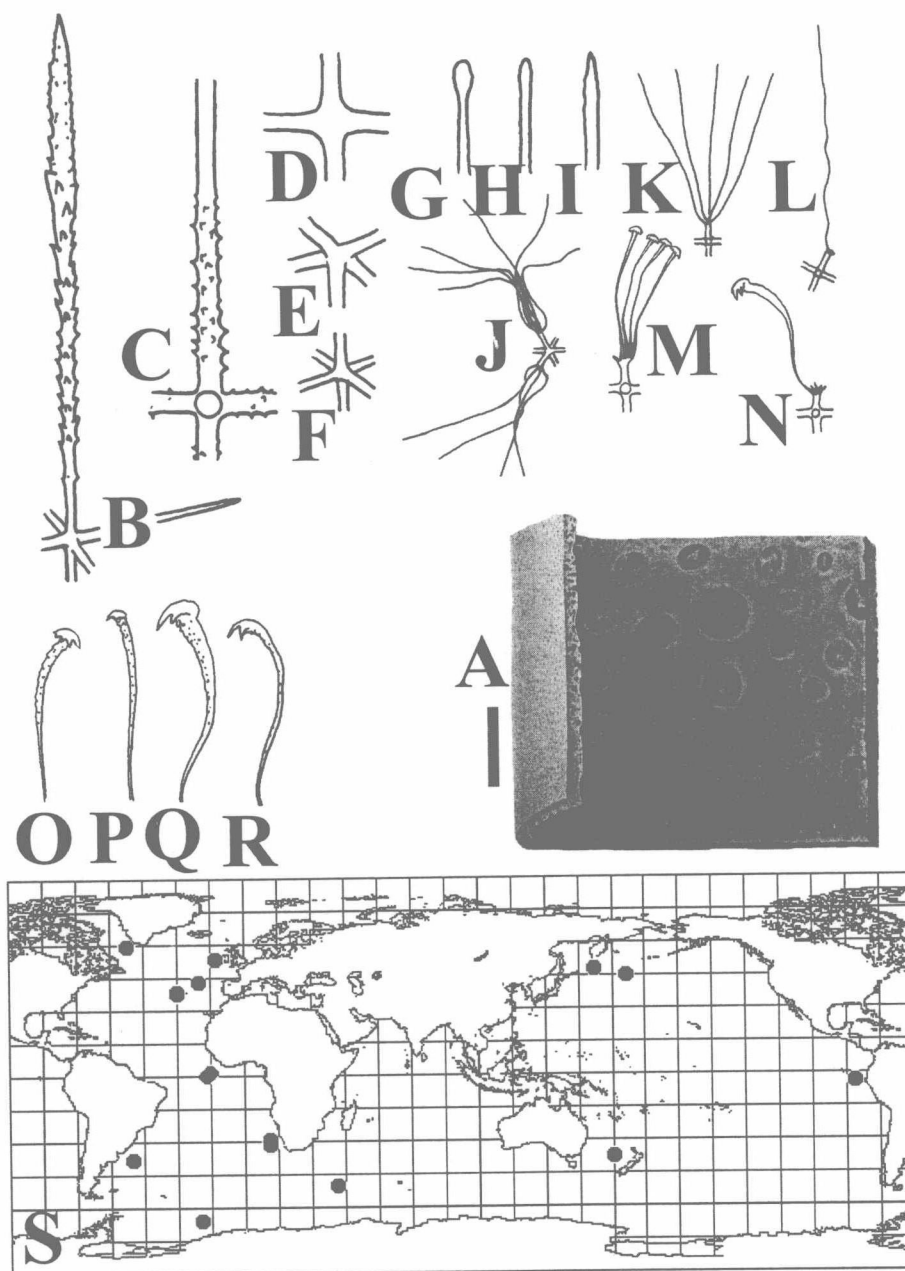


Fig. 7. *Malacosaccus vastus*. A, holotype from Schulze (1887a) (scale 20 mm). B, dermal or atrial hexactine 185X. C, choanosomal spiny hexactine 185X. D-F, choanosomal spicules 185X. G-I, outer ends of choanosomal spicules 185X. J-L, hexasters 360X. M, discohexaster 360X. N, floricome 360X. O, discoidal secondary ray 720X. P, intermediate secondary ray 720X. Q-R, floricoidal secondary rays 720X. B-R, BMNH 1887.10.20.026. S, distribution of *Malacosaccus*.

The microscleres in *H. ancorata* are more diverse than in other representatives of *Malacosaccus* and contain onychasters, hemionychasters, discohexactines, discohexasters, hemidiscohexasters and floricoles. Hexasters are absent but short spiny hexactines are present.

Distribution

Cosmopolitan, except the Arctic ocean (Fig. 7), depth 2510–6328 m.

PLACOPEGMA SCHULZE, 1895

Synonymy

Placopegma Schulze, 1895: 63. [*Placoplegma*] Burton, 1959a: 153; 179 (*lapsus*).

Type species

Placopegma solutum Schulze, 1895 (by monotypy).

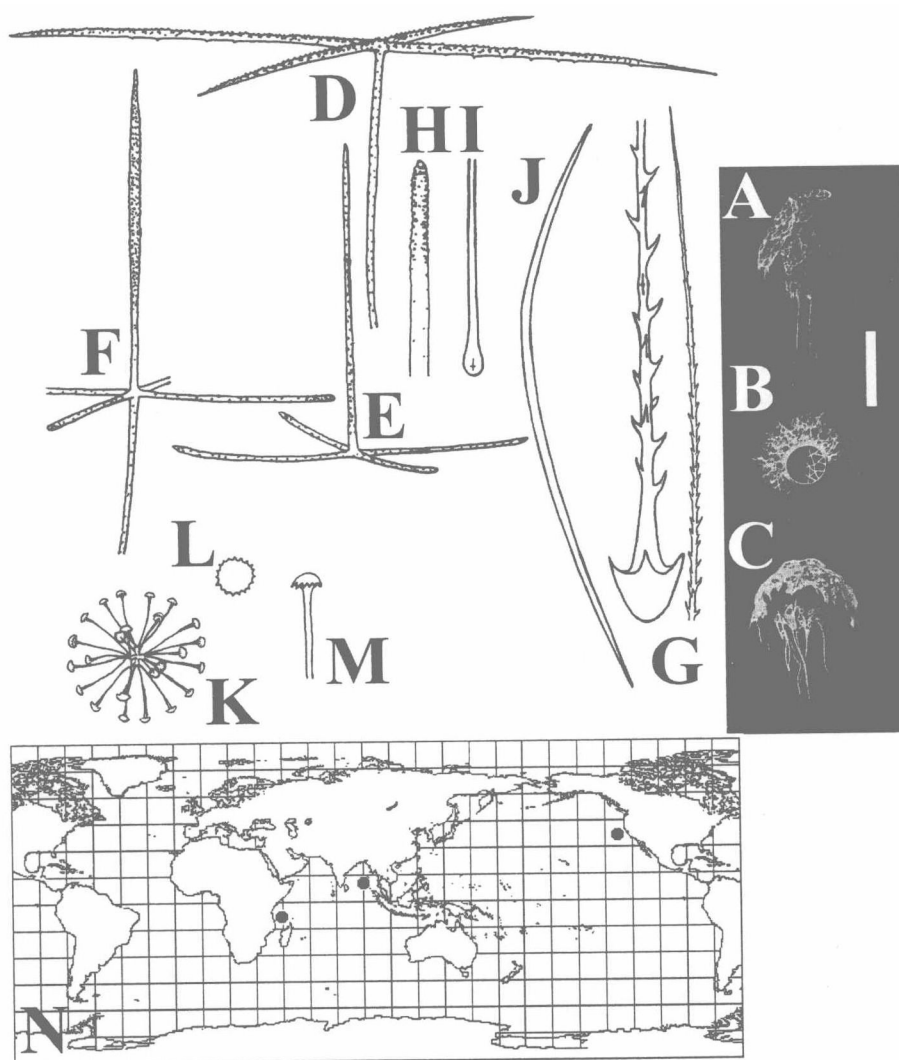


Fig. 8. *Placopegma solutum*. A–C, holotype after Schulze (1902, 1904) (scale 50 mm). A, lateral view. B, upper view. C, lateral view. D, dermal pentactine 170 \times . E, atrial pentactine 170 \times . F, hexactine of the sieve-plate 110 \times . G, anchorate basalia 110 \times . H, outer end of choanosomal spicule 280 \times . I, choanosomal monactine 110 \times . J, choanosomal diactine 110 \times . K, discohexaster 220 \times . L, disc of the discohexaster 560 \times . D–H, I–L, from Schulze (1904). H, M, BMNH 1907.08.01.011. N, distribution of *Placopegma*.

Definition

Euplectellinae deprived of peduncle, dermalia and atrialia of pentactines, microscleres have discoidal outer ends.

Diagnosis

Body is oval with a circular colander-like fold in the middle directed downwards, lophophytose with flat upper part where a single terminal osculum with sieve-plate or prostalia marginalia are located. Basalia are four-toothed anchors and, probably, monaxone spicules with rounded outer ends, which are gathered in a more or less compact tuft in the lower end. Choanosomal spicules and spicules of the sieve-plate are diactines, sometimes hexactines. Dermalia and atrialia are pentactines, rarely hexactines. Hexactines similar to dermal and atrial ones are found among the sieve-plate spicules. Microscleres are discohexasters, sometimes in

combination with plumicomes and hexasters and hexactines and discohexactines.

Description of type species

Placopegma solutum Schulze, 1895 (Fig. 8).

Synonymy. *Placopegma solutum* Schulze, 1895: 63. Not *Placopegma solutum*; Burton, 1959a: 153; 179 (misidentified specimens of *Hyaloplocoida echinum*, see *Hyaloplocoida* in this volume).

Material examined. Holotype (fragment): BMNH 1907.08.01.011 – Indian Ocean, depth 3008 m. ‘Investigator’, 12°50’N 90°52’E. Other material. BMNH 1908.09.24.020 – ‘Valdivia’, 6°12.9’S 41°17.3’E, depth 2959 m (erroneously labeled as the type whereas the holotype was collected by ‘Investigator’).

Description. The body is conical without upper narrowing part where a single terminal osculum covered with a sieve-plate is