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Family Leucopsacidae Ijima, 1903

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Leucopsacidae Ijima (Hexactinellida: Lyssacinosida) is revised to contain only three genera (*Leucopsacus*; *Chaunoplectella* and *Oopsacas*), distributed in the Atlantic, N and W Pacific, and Mediterranean.
Keywords: Porifera; Hexactinellida; Leucopsacidae; *Leucopsacus*; *Chaunoplectella; Oopsacas*.

DEFINITION, DIAGNOSIS, SCOPE

Synonymy

Leucopsacinae Ijima, 1898: 41. Leucopsacidae Ijima, 1903: 29. Leucopsacasidae Ijima, 1927: 320: 187. Placoplegmatidae de Laubenfels, 1936a. Leucopsacadidae (-inae) editor in footnote (Reid, 1958a: 45).

Definition

Lyssacinosida with poorly differentiated megascleres – dermal pentactines, choanosomal hexactines and rare diactines as well as atrial hexactines have rays similar in size and shape.

Diagnosis

Body is ovoid, basiphytose, sometimes attached with a short peduncle. Choanosomal spicules are mainly hexactines, diactines are rare. Dermalia are pentactines, rarely hexactines. Atrialia are hexactines. Microscleres are mostly with discoidal outer ends and sometimes sigmatocomes.

Scope & Distribution

Three genera distributed in the Atlantic, N and W Pacific, Mediterranean at depths of 25–1370 m.

History and biology

There are several nomenclatural and taxonomic problems with this family, beginning with its name and the name of the type species of the type genus. Ijima (1898) initially described this taxon as a subfamily with *Leucopsacus* as its type genus, subsequently elevating it to family level, Leucopsacidae (Ijima, 1903). Then, in attempting to improve the translation from Greek to Latin (although not required to do so under the ICZN), Ijima (1927) suggested to change the name of the type genus to *Leucopsacas* and family to Leucopsacasidae. Later authors used either name and a third name, 'Leucopsacadidae (-inae)', was proposed in a footnote by the editor of a monographic treatise (Reid, 1958a: 45). De Laubenfels (1936a) proposed a fourth name, Placoplegmatidae, because he reasoned that *Placoplegma* (obviously a spelling error for *Placopegma* Schulze, 1895) had been established earlier, whereas this action contravenes the ICZN, and in any case *Placopegma* has always been an uncertain representative of the family and is excluded from it here. The earliest available names, *Leucopsacus*, Leucopsacidae (-inae) are valid and consequently reaffirmed here.

Most taxonomic problems within Leucopsacidae concern the abnormally variable scope and artificial diagnosis of the taxon. Ijima (1898) initially assigned subfamily Leucopsacinae to the Rossellidae including the following genera: *Leucopsacus, Chaunoplectella, Caulocalyx, Placopegma, Aulocalyx* and *Euryplegma*. He based the diagnosis on three principal features: dermalia consist of large pentactines; hypodermalia are absent; microscleres are discohexasters. It appears that Ijima gathered into the new subfamily all the heterogeneous genera of Rossellidae that disturbed its uniformity, and in this conception it was clearly artificial. In elevating the taxon to family level Ijima (1903) also excluded the two most heterogeneous genera: *Aulocalyx* and *Euryplegma*, whereas the family diagnosis was not substantially changed. Among others *Leucopsacas* and *Chaunoplectella* appeared to form a natural taxon whereas two others, *Caulocalyx* and *Placopegma*, differed substantially from it and showing some greater similarities with Euplectellidae. Ijima (1903) suggested that these outstanding genera should be removed from the family. Later Schulze (1904) described *Chaunangium*, a peculiar genus partly similar to *Caulocalyx* and *Placopegma*, and assigned it to Leucopsacidae, supported later by Ijima (1927) in his list of Hexactinellida sponges. *Oopsacas* was described by Topsent (1927b, 1928c) and also included.

In his last publication (Ijima, 1927) the diagnosis of Leucopsacidae became so very broad that it has become unworkable, overlapping in part with Euplectellidae, Rossellidae and Caulophacidae. This diagnosis was perpetuated in Hartman's (1982) 'Synopsis'. Its artificial scope, inclusion of misplaced genera, and the addition of new genera without accompanying revision of its definition make it nearly *incertae sedis*. However, restricting its scope to three genera (*Leucopsacus*, *Chaunoplectella* and *Oopsacas*) returns to the original proposal of Ijima (1903), greatly improving the homogeneity of the family. All these genera are basiphytose, ovoid sponges, with a choanosomal skeleton composed chiefly of hexactines with rare diactines, dermalia are pentactines with rays similar in shape and size to atrial and choanosomal hexactines. As for the microscleres this revision does not substantially change the definition – only sponges with plumicomes are removed. Leucopsacidae (*sensu novo*, following Ijima, 1903) becomes more similar to the Aulocalycoida (*sensu stricto*, after Tabachnick & Reiswig, 2000). Choanosomal spicules of the both families are hexactines, and most microscleres have discoidal outer ends. Aulocalycoida differs significantly by its aulocalycoid

skeleton and presence of atrial pentactines, whereas in Leucopsacidae the skeleton is composed of loose spicules, atrialia are hexactines and sigmatocomes may be present among the microscleres.

As for the fate of the genera excluded here: *Placopegma, Chaunangium* and *Caulocalyx* are probably best assigned to Euplectellidae. Ijima (1903) showed that *Caulocalyx* is similar to *Hertwigia* and *Saccocalyx* (Corbitellinae *sensu lato*) in having plumicomes, with *Placopegma* similar to Euplectellinae in having anchorate basalia. Moreover, anchorate spicules of *Placopegma* are not pentactines but diactines or monactines with discoidal four-toothed outer ends similar to those of Euplectellinae (Ijima, 1903). Ijima did not place *Placopegma* in Euplectellidae, possibly due to his misconception that in Euplectellidae dermalia were only hexactines, despite his knowledge that dermal pentactines occur in some small (juvenile) specimens of true euplectellidans, *Regadrella okinoseana* (Ijima, 1901), and now confirmed by the inclusion of *Atlantisella* in Euplectellidae (see family Euplectellidae). Similar arguments support the transfer of *Chaunangium* Schulze (1904). Thus, these three genera clearly belong to Euplectellidae: *Placopegma* and *Chaunangium* assigned to Euplectellinae and *Caulocalyx* to Bolosominae.

Two genera of Leucopsacidae, *Leucopsacus* and *Chaunoplectella*, are very similar and differ only significantly in the presence or absence of discohexactines such that there may be grounds to recognize them only as subgenera of a single taxon *Chaunoplectella*. However, this action is not formally proposed here due to the lack of adequate material to fully support this contention.

Species of Leucopsacidae usually have a single osculum which is sometimes supplemented by additional lateral oscula. The lateral oscula appear as perforations of lobate diverticulae in several largest specimens of *Oopsacas minuta*. The fusion of the skeleton into basidictyonal structures takes place in the lower part of the body, which is connected to the basal attachment mainly by short-rayed hexactines which fuse at their points of contact.

Previous reviews

Ijima (1903), Schulze (1904).

KEY TO GENERA

(1) Microscleres are discohexasters only (with pileate discs) ..... ***Oopsacas***
Microscleres various (including sigmatocomes) 2
(2) With discohexactines ..... ***Leucopsacus***
Without discohexactines ..... ***Chaunoplectella***

LEUCOPSACUS IJIMA, 1898

Synonymy

Leucopsacus Ijima, 1898: 42; 1903: 34. *Leucopsacas* Ijima, 1927: 320; Topsent, 1928c: 337.

Type species

Leucopsacus orthodocus Ijima, 1898 (here designated; no type species designation was made by Ijima).

Definition

Leucopsacidae with microscleres in the form of discohexactines.

Diagnosis

Body is ovoid, basiphytose with a single osculum and basal part which can be in a form of short peduncle. Choanosomal spicules are mainly hexactines, diactines are rare. Dermalia are pentactines. Atrialia are hexactines. Microscleres are anchorate discohexactines, discohexasters, hemidiscohexasters and sigmatocomes which may be absent.

Description of type species

Leucopsacus orthodocus Ijima, 1898 (Fig. 1).

Synonymy. *Leucopsacus orthodocus* Ijima, 1898: 42; 1903: 34.

Material examined. Lectotype and paralectotype (here designated): ISM Tokyo – specimens 230 and 438 – not seen, off Japan, Sagami Bay, depth 214–429 m.

Description (from Ijima, 1898, 1903). Body ovoid, 11 mm total length, 6.5 mm diameter, with a short stalk about 4 mm long, 2 mm diameter and expanded at the lower end into a basal disc. Osculum 1.5–2 mm in diameter and walls about 1.5–2 mm thick. Spicules. Choanosomal skeleton mainly consists of hexactines with rays up to 0.5/0.010 mm. Additional spicules are rare diactines 1.5/0.008 mm. Spicules of the stalk are hexactines fused to each other by synapticules, up to 0.016 mm in diameter. Dermalia are pentactines with tangential rays about 0.200 mm and up to 0.270/0.015 mm long. Atrialia are hexactines with rays at least 0.280 mm long. Dermalia and particularly atrial spicules are very similar to choanosomal hexactines. Microscleres. Microscleres are anchorate discohexactines 0.110–0.168 mm in diameter and toothed discohexasters 0.050–0.088 mm in diameter with 4–8 secondary rays (occasionally 2). Hemidiscohexasters are not reported in the text but one is figured (Ijima, 1903: pl. 3, fig. 20).

Remarks. Four species are currently known. The sigmatocomes mentioned in the diagnosis were initially called tylfloricomes. They were found in *L. scoliodocus* (Ijima, 1903). In my opinion there is virtually no difference between these forms of microscleres for which the term sigmatocomes is most appropriate. A new species of *Leucopsacus* off New Caledonia (Tabachnick & Levi, 2000) has discohexasters with thin and numerous secondary rays. Such discohexasters were previously known only for *Aulosaccus* (Rossellidae).

Distribution

Atlantic and Pacific, depth 204–1370 m.

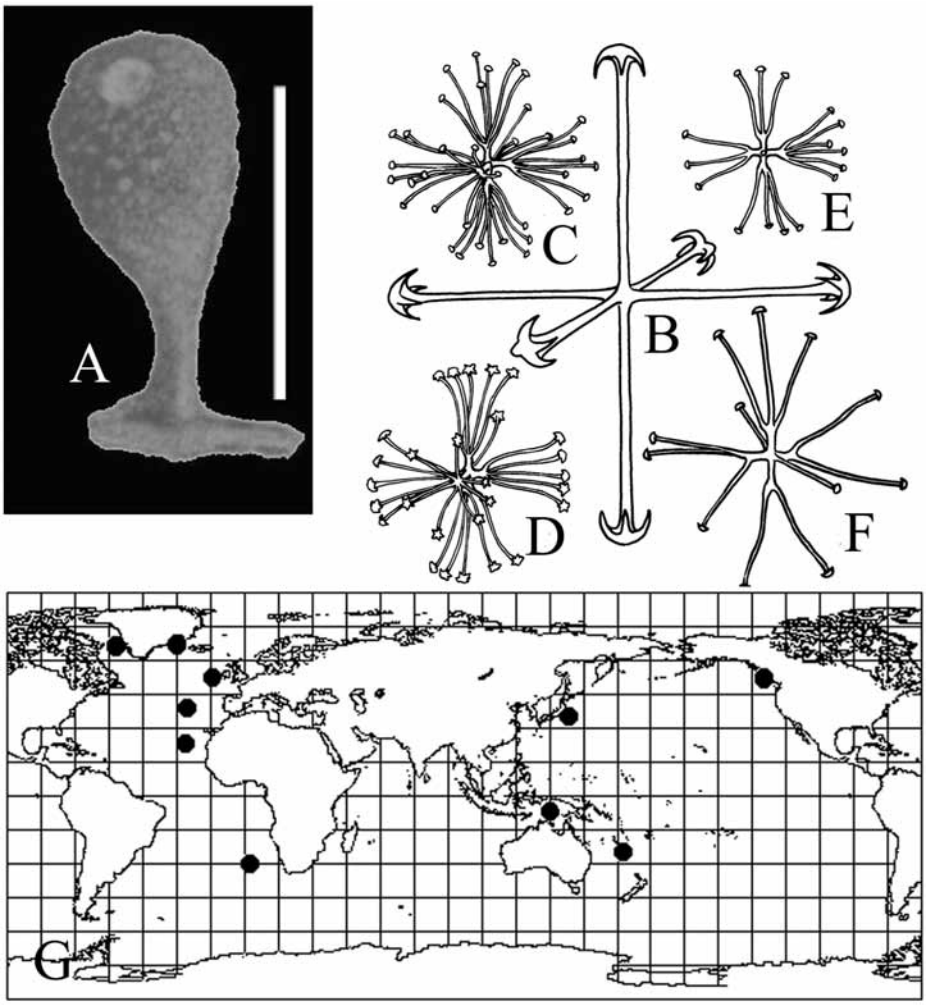

Fig. 1. *Leucopsacus orthodocus*. A, lectotype (scale 10 mm). B, anchorate discohexactine 500×. C–E, discohexasters 500×. F, hemidiscohexaster 500×. A–F, after Ijima (1903). G, distribution of *Leucopsacus*.

CHAUNOPLECTELLA IJIMA, 1896

Synonymy

Chaunoplectella Ijima, 1896: 250; 1898: 43; 1903: 53.

Type species

Chaunoplectella cavernosa Ijima, 1896 (by monotypy).

Definition

Leucopsacidae with several types of microscleres (various discohexasters (the largest anchorate), sigmatocomes, but never discohexactines).

Diagnosis

Body is ovoid, basiphytose with thick walls, single osculum, attached by a short peduncle. Choanosomal spicules are mainly hexactines, the derivatives up to diactines are more rare. Dermalia are pentactines sometimes together with hexactines. Atrialia are hexactines. Microscleres are various discohexasters (the largest anchorate), sigmatocomes and hexactines may be present.

Description of type species

Chaunoplectella cavernosa Ijima, 1896 (Fig. 2).

Synonymy. *Chaunoplectella cavernosa* Ijima, 1896: 250; 1898: 43; 1903: 53.

Material examined. Holotype: ISM Tokyo 443 (not seen) – Sagami Bay, Japan, depth 572 m. Paratype: BMNH 1898.12.19.007 – same locality; about 12 fragments and specimens were studied by Ijima and it is very likely that one of these fragments is specimen 1898.12.19.007, which is therefore probably the paratype). Other material. IORAS 5/2/2131 – 'Tihookeanskij', Khuril Islands, 44°58.9′N, 147°17.6′E, depth 500 m.

Description. Body ovoid or vase-like, 170–200 mm long, 130–160 mm in diameter with walls about 5.2–10 mm thick and base forming a short peduncle. Osculum about 80 mm in diameter. Spicules. Choanosomal skeleton consists mainly of hexactines and diactines, their derivatives with 3–5 rays were also found. Hexactines have rays about 7/0.070 mm. Diactines are up to 12/0.050 mm. Choanosomal spicules have rough conically pointed

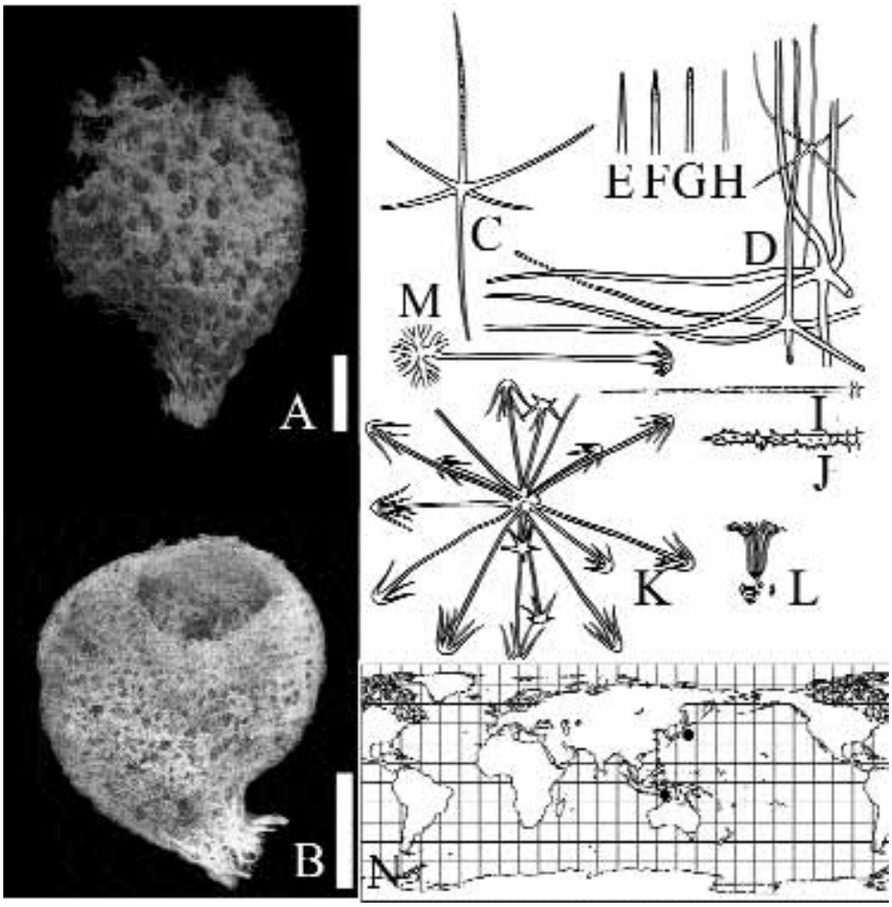

Fig. 2. *Chaunoplectella cavernosa*. A–B, external shape after Ijima (1903)(scale 50 mm). C, atrial hexactine 55×. D, choanosomal hexactines 30×. E–H, outer ends of choanosomal hexactines 55×. I, microhexactine 210×. J, microhexactine 210×. K, large anchorate discohexaster 210 ×. L, sigmatocome 420×. M, moderately large toothed discohexaster 420×. C, E–I, M, BMNH 1898.12.19.007. D, K–L, from Ijima (1903). J, IORAS 5/2/2131. N, distribution of *Chaunoplectella*.

or slightly swollen ends. Basalia are fused spicules corresponding to that of choanosomal skeleton covered with numerous spines. Dermalia of young specimens are mainly pentactines, rarely hexactines. In large individuals dermalia seem to be supplemented by choanosomal spicules underlying the dermal membrane. Atrialia are hexactines. No specific dermalia or atrialia were found in the specimen 5/2/2131 and only one in 1898.12.19.007 (possibly due to their preservation), with proximal ray 0.49 mm, tangential ray 0.30 mm, distal ray 0.44 mm long, all 0.02 mm in diameter. Proximal ray is smooth near the base while its upper part (3/4) is rough, the other rays are smooth and only the outer ends are rough. Microscleres. Microscleres are anchorate spherical discohexasters with 4–9 teeth, sigmatocomes and sometimes hexactines. Discohexasters are of three types 'small', 'moderately large' and 'large'. The combination of these discohexasters vary in different specimens. The holotype has the large and moderately large discohexasters. Specimen 5/2/2131 has rare small and common moderately large and large discohexasters, the latter found among dermalia while moderately large ones among atrialia. The paratype appears to lack small discohexasters whereas the other two types were found together mainly among dermalia. Small discohexasters are 0.050–0.120 mm in diameter, primary rosettes are about 0.011 mm. The moderately large discohexasters are 0.137–0.227 mm in diameter, primary rosettes are 0.011–0.023 mm. The large discohexasters are 0.167–0.400 mm in diameter, primary rosettes are 0.014–0.030 mm. Sigmatocomes are 0.032–0.068 mm, primary rosettes are 0.004–0.014 mm. Hexactines with rays covered by short dense spines were common in specimen 5/2/2131. The analogous hexactines in the paratype have rays longer than this specimen and with spines minute and sparse. The rays of these hexactines are 0.0 47–0.312/0.005–0.007 mm. Another rare microsclere was observed in specimen 5/2/2131 being a hexactine with large sparse spines.

Remarks. Two species are known. The diagnosis is slightly modified from Ijima (1903, 1927). The dermal pentactines of *C. spinifera* Ijima (1903) have spines on the tangential rays directed outwards. Atrialia of these sponges are always similar to the choanosomal hexactines. Sigmatocomes were observed in *C. cavernosa* only. *Chaunoplectella stelleta* Ijima (1927) is transferred here to the related genus *Oopsacas*.

Distribution

NW and W Pacific, depth 500–1140 m.

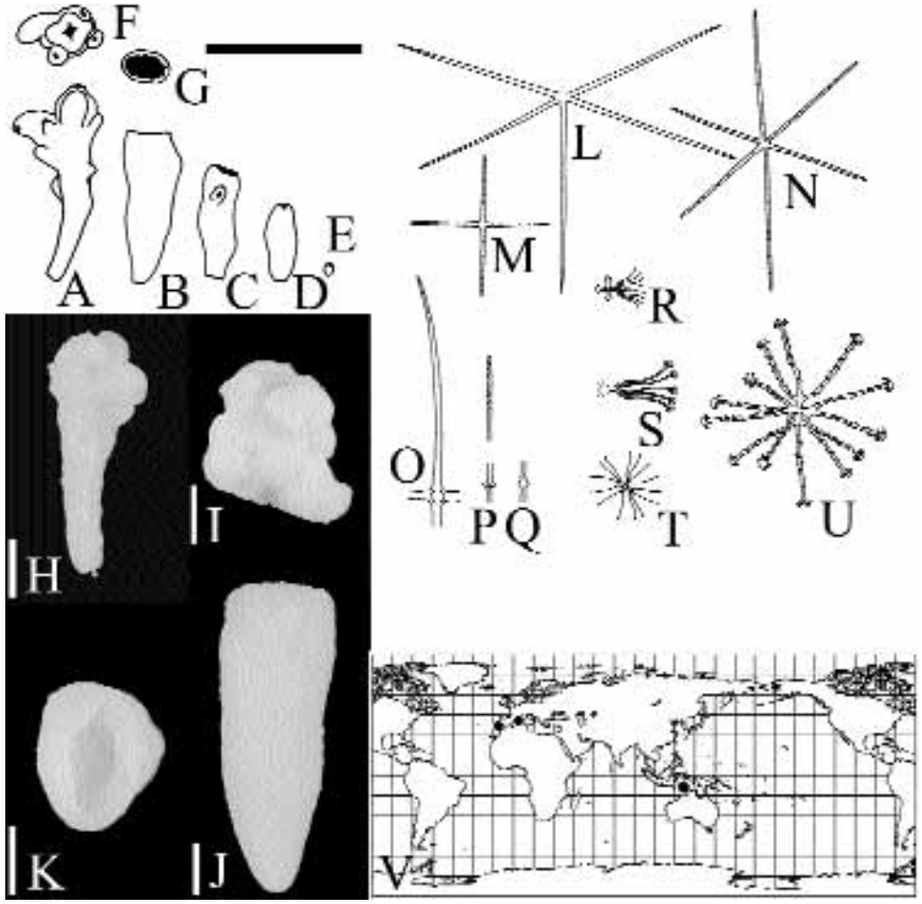

Fig. 3. *Oopsacas minuta*. A–E, side view and F–G, upper view of cave specimens off Marseille (scale 50 mm). H, lateral view (fr671) (scale 20 mm). I, upper view (fr671) (scale 10 mm). J, lateral view (fr672) (scale 10 mm). K, upper view (fr672) (scale 10 mm). L, dermal pentactine 60×. M, juvenile dermal stauractine 60×. N, atrial hexactine 60×. O, choanosomal hexactine 60×. P–Q, choanosomal diactines 120×. R–S, stellate discohexasters 440×. T–U, spherical discohexasters 440×. L–U, IO 040913(M110). V, distribution of *Oopsacas*.

OOPSACAS TOPSENT, 1927

Synonymy

Oopsacas Topsent, 1927b: 1; 1928c: 75.

Type species

Oopsacas minuta Topsent, 1927b (by monotypy).

Definition

Leucopsacidae with microscleres in the form of pileate discohexaster only.

Diagnosis

Body is ovoid, basiphytose with a single osculum in small and additional lateral oscula in large specimens. Choanosomal spicules are hexactines and some diactines. Dermalia are pentactines, and stauractines (latter are found in small specimens only). Atrialia are hexactines. Microscleres are pileate discohexasters.

Description of type species

Oopsacas minuta Topsent, 1927b (Fig. 3).

Synonymy. *Oopsacas minuta* Topsent, 1927b: 1; 1928c: 75.

Material examined. Lectotype: MOM 040913 (M110) – 'Princesse Alice', near Gibraltar, 35°59.3′N, 5°24.0′E, depth 924 m. Paralectotype: MOM 040913 (M109) – same locality. Other material. SME (several specimens) – Cave near Marseille, depth 25 m.

Description. Type specimens are small, ovoid about 5 mm long and 3–4 mm in diameter, with thin walls and small terminal osculum. New specimens are from 4–5 mm to 65 mm long. The largest with few additional lateral oscula on the lateral spherical lobes. Spicules. Choanosomal skeleton consists chiefly of hexactines with rays 0.074–0.400/0.016 mm which are slightly rough near the outer ends. Additional spicules are diactines with a widening or with four rudimental tubercles in the middle. These diactines are 0.38–1.79/0.004–0.005 mm, smooth with rough outer ends. Basidictyonal skeleton is observed only in the lower part of the body (Boury-Esnault & Vacelet, pers. comm.) as in most Lyssacinosida. Dermalia are smooth pentactines with rough outer ends. In small specimens (about 5 mm long) nearly half of dermal spicules are stauractines, rarely tauactines. The rays of the

stauractines are rough 0.104–0.200 mm in length. Tangential rays of dermal pentactines are 0.060–0.490 mm, proximal ray is 0.60–0.370 mm. Atrialia are hexactines with all the rays nearly equal to each other or to the rays of choanosomal hexactines. Distal ray of atrial hexactines directed inside the body is 0.078–0.220 mm, tangential rays are 0.090–0.250 mm, proximal one is 0.100–0.210 mm. Diameter of the rays of dermal and atrial spicules is 0.006–0.010 mm. Microscleres. Microscleres are pileate discohexasters of two types: spherical, with secondary rays covered with short spines and stellate with rays less spinous or smooth. The spherical discohexasters are found in all parts of the sponge, the stellate ones are located among atrialia only. Diameter of the stellate discohexaster is 0.014–0.031 mm, diameter of its primary rosette is 0.004–0.008 mm. The smallest stellate discohexasters could be similar to plumicomes since their discs are very minute. The discohexasters of the latter type were not found in the paralectotype.

Remarks. In largest specimens the ovoid body has some lateral spherical lobate formations usually with lateral oscula. Dermal pentactines and atrial hexactines are very similar to choanosomal hexactines. All discohexasters in *O. minuta* are of two types, spherical and stellate. Discohexasters of *O. stelleta* (Ijima, 1927) are spherical. The only notable difference between the genera *Oopsacas* and *Chaunoplectella*, aside from the weakly differentiated peduncle in the latter, is the presence of anchorate discohexasters in *Chaunoplectella*. The difference between former *C. stelletta* and *Oopsacas minuta* is only in the form of its discohexasters justifying why *C. stelletta* is transferred here to *Oopsacas*. It is possible that these two genera should be merged.

The difference in size of spicules is weakly correlated to the length of the body in *O. minuta*. The only notable juvenile feature is the presence of stauractines among dermal pentactines in specimens about 5 mm long. The larvae posses stauractines only (Boury-Esnault & Vacelet, 1994).

Distribution

Two species, Mediterranean and Indonesian Archipelago, depth 25–924 m.

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