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DESCRIPTION OF A NEW SPECIES AND SUBSPECIES OF *FIELDINGIA*, ERECTION OF A NEW FAMILY FIELDINGIDAE AND A NEW ORDER FIELDINGIDA (PORIFERA; HEXACTINELLIDA; HEXASTEROPHORA)

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ABSTRACT

Re-investigation of *Fieldingia* collected in the Indonesian Archipelago and described by Schulze (1887) as *F. lagettoides* and discovery of new similar specimens from the South China Sea and South Central Pacific enable Schulze's specimen to be confidently accepted as *Fieldingia.* A new species, *F. valentini,* and a new subspecies, *F. valentini tizardi,* are described. The presence of complete spicule sets allow settlement of the problems with both dictyonal framework construction and loose spicule specification of the poorly known genus. These data provide the basis for erection of the Fieldingidae, a new family with a single recent genus. Based on the unique construction of the dictyonal choanosomal and dermal skeletons together with some other characters of loose spicules, a new order *Fieldingida* is established.

KEY WORDS

Porifera, Hexactinellida, Hexasterophora, *Fieldingia*, Fieldingidae n. fam., Fieldingida n. order.

ABBREVIATIONS

BMNH - Natural History Museum (London).
QM - Queensland Museum
MNHN - Museum National d'Histoire Naturelle (Paris)

INTRODUCTION

Two problems have been connected with the hexactinellid genus *Fieldingia* for a long time. The interpretation of the constructional morphology of the sponge itself and to which higher taxon this genus may be assigned. The poor knowledge of *Fieldingia* (absence of loose spicules in the type specimen, severely broken body and poor original description) resulted not only in many disagreements about the taxonomic position of this genus but also about the generic definition. The assumption that pentactines and small stauractines of the dermal skeleton, and Weltner bodies (spherical siliceous aggregations) of the choanosomal skeleton might belong to other hexactinellid sponges were made by TABACHNICK & REISWIG

(2000). The result of this conservative interpretation was the rejection of the Challenger specimen, incompletely described and identified as *F. lagettoides* by SCHULZE (1887), from the genus *Fieldingia* (TABACHNICK & REISWIG, 2000; REISWIG, 2002a).

The two allied genera, even suggested as probable synonyms (REID 1961, 1963), recent *Fieldingia* Kent, 1870 and fossil *Placotrema* Hind, 1883, have a long and mostly independent taxonomic history. The recent genus *Fieldingia* was erected for a single species *F. lagettoides* Kent, 1870 collected off Portugal and attributed to the suborder Corallispongiae. MARSHALL (1876) considered it to be a juvenile of *Aphrocallistes* and placed it within the Pleionacidae. SCHULZE (1886, 1887) attributed this genus to his Tretodictyidae and described a new specimen, which has got loose spicules, of *F. lagettoides* from off the Little Ki Island. Later SCHULZE (1904) suggested a new name for his Tretodictyidae - Tretocalycidae and left *Fieldingia* there (this was supported by SCHRAMMEN, 1912). IJIMA (1927) placed the genus within his family Aulocalycidae. REID in a series of publications (1961, 1963) returned it back to Tretodictyidae. TABACHNICK & REISWIG (2000) tentatively attributed *Fieldingia* to the Reticulosa and marked a possible relationship to the fossil Stromatidiidae of FINKS (1960). Recently, REISWIG (2002a) placed the genus within the Hexactinosa as i*ncertae sedis* (like the attribution in the cladistic reconstruction by MEHL, 1992).

The fossil genus *Placotrema* with its single species *P. cretacea* Hind, 1883 is known from Late Cretaceous formations of England. Initially it was placed within the Staurodermatidae and this was supported by other authors, who mentioned this genus in their reviews (DE LAUBENFELS, 1955; REZVOI *et al.,* 1962). But REID (1961, 1963), describing new specimens of *P. cretacea,* transferred it to Tretodictyidae (the large meshes were considered to be schizorhyses). Based on similarities of the skeletal construction ("superficial meshwork and the frequent occurrence of Weltner bodies") he postulated a close relationship between *Placotrema* and *Fieldingia.* Unfortunately, other palaeontologists (including SCHRAMMEN, 1902, 1903, 1912) dealing with the revision of Cretaceous Hexactinellida largely omitted this genus.

Recent discovery of two new specimens of *Fieldingia* in the South China Sea*,* very similar to the one described from the Banda Sea by Schulze (1887), and the observation of a probably dermal skeleton in both specimens like the one described for *Fieldingia lagettoides* with small stauractines, allow us to consider them as doubtless representatives of *Fieldingia* (the corresponding construction of dermal skeleton was described by TABACHNICK & REISWIG, 2000 for a *F. lagettoides* specimen taken from off Portugal). The complex of specific characters justify the rejection of all previous suggestions concerning higher taxon attribution of this genus and the erection a new family and order for it.

SYSTEMATIC DESCRIPTION

Fieldingida n. order

Synonymy. Part of Hexactinosa Schrammen, 1903; Ijima, 1927. Part of Hexactinodsida Schrammen, 1912; Reiswig, 2002a. Part of Reticulosa Tabachnick & Reiswig, 2000.

Definition. Hexasterophora with the rigid dictyonal framework composed of large hexactines (sometimes with short, partly reduced 1 - 2 rays) fused at points of mutual contact and reinforced by knots of fused smaller spicules and strong secondary silica deposition; the probably dermal skeleton is composed of several layers of fused laminae consisting mostly of small stauractines, usually fused by synapticulae. Diactines present among the loose (probably choanosomal) spicules.

Diagnosis. Likely basiphytous body of discoidal or irregularly undulating or convoluted plate. The probably dermal skeleton is composed of several layers of fused laminae, consisting of mostly fused small stauractines and some intermediate pentactines and hexactines. The choanosomal rigid dictyonal framework of the wall is formed by fusion at points of mutual contacts of large hexactines (sometimes with short, partly reduced 1 - 2 rays); dictyonalia do not construct dictyonal strands and have no channelization; it is regularly reinforced by knots of fused small hexactines, pentactines and stauractines. Loose spicules of the dermal skeleton are mostly small stauractines and rare intermediate hexactines and pentactines (with short rudimental sixth ray). Loose spicules of the choanosomal skeleton are uncinates, diactines and scopules. Microscleres are oxyhexactines, oxyhexasters, oxyhemihexasters, discohexasters and sometimes rare discohexactines and hemidiscohexasters.

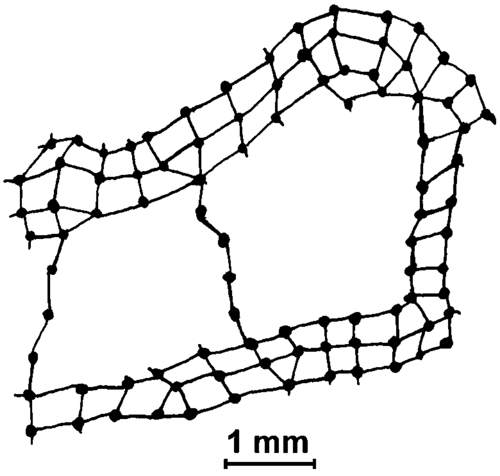

Fig. 1. *Placotrema cretacea* from the Late Cretaceous (Turonian) chalk rock of Hilchin, Herts (England), BMNH P.3168, drawing of the dictyonal skeleton from sectioned and polished specimen.

Remarks. This hexasterophoran order is closest to the order Hexactinosida (REISWIG, 2002b) by having dictyonal framework, scopules and uncinates. The principal differences are: 1) differentiation of choanosomal spicules into large (main dictyonal framework which is neither euretoid nor aulocalycoid) and smaller ones (which construct the knots); 2) formation of probably dermal skeleton of fused stauractines; 3) presence of diactines. Unlike Aulocalycoida (REISWIG, 2002c) the new order Fieldingida has got no dictyonal strands (at least they are not longer than the length of a ray). Skeletal channelization in Fieldingida is absent, the intradictyonal meshes are very large, the choanosomal skeleton resembles the secondarily euretoid one of the aulocalycoid type, but the large choanosomal spicules have 1 - 3 reduced (short) rays. The choanosomal skeleton shows no paraulocalycoid patterns, as it was suggested by REISWIG (2002a). The superficial skeleton of *Fieldingia* (Fig. A3), which we consider to be probably dermal, is similar to that lamellar structure in *Placotrema cretacea* , which was considered to be probably gastral (atrial) (REID, 1961) and later definitely gastral (REID, 1964). Unlike that of *Fieldingia*, the superficial skeleton of *P. cretacea* is described to contain pentactines (REID, 1961, 1964) but according to our re-examination of some of this fossil material, the superficial skeletons of the two genera show high similarity. Moreover, it is not clear how Reid considered hexactines with short distal rays, *i.e.* as hexactines or pentactines. The Jurassic *Porospongia*, type genus of the Porospongiidae Schrammen, 1912, was also considered to be a close ally of *Fieldingia* and *Placotrema* (REID, 1963). Its superficial skeleton was considered by REID (1963) to contain both pentactines and stauractines in the silica lamella, but according to the re-description by MEHL (1992), it consists of pentactines exclusively inserted into the silica lamella in a very similar way to the dermal spicules of *Fieldingia* (Fig. A8). Two other probably closely related taxa, according to MEHL (1992: Text-Fig. 14) belonging to the same clade as *Porospongia*, are the genera *Sphenaulax* and *Cribrospongia*. The dermal skeleton of *Cribrospongia* (Jurassic - Cretaceous) consists of fused stauractins and that of *Sphenaulax* (Late Jurassic) consists of pentactins fused to each others in a way very similar to *Fieldingia* (MEHL, 1992: Pl. 14, Figs 2, 5), but the modes of construction of the rigid skeletons of these fossil taxa are very different from that of *Fieldingia*, and this is true even for its supposedly closest ally, *Placotrema*. We have studied the following specimens of *Placotrema cretacea* from the Late Cretaceous chalk: BMNH S.8634, figured by REID (1964: Pl. 4; p. 116, Figs 58,61), BMNH P.3203 and P.3168, figured by HIND (1883: Pl. 2, Fig. 4 and Pl. 27,Fig. 4a). by light microscopy and BMNH 7037 by SEM. According to our observations on a sectioned specimen (BMNH P.3168), the rigid skeleton shows regular strands consisting of 2 - 3 layers of dictyonal hexactines interconnected by thin bridges of one dictyonal layer only (Fig. 1). We did not observe any knots (Weltner's bodies) in the skeleton of *P. cretacea*, which in SEM and light microscopy appears to be constructed of regular dictyonal hexactines with 6 complete rays (Figs A6-7), in contrast to the reduced dictyonal hexactines in *Fieldingia*. These differences in the dictyonal skeleton between *Fieldingia* and its suggested allies is notable, since all of the fossil genera (*Placotrema, Porospongia, Sphenaulax* and *Cribrospongia*) seem to have true hexactinosan dictyonal skeletons, but none of them shows the conspicuous knots, characteristic of *Fieldingia*. Thus, the fossil groups show affinity to recent *Fieldingia* in terms of their type of dermal skeleton, but the organization of their choanosomal skeletons is completely different from that of the recent genus. Because of the very characteristic dermal skeleton, we still consider the *Sphenaulax* - *Cribrospongia* - *Porospongia* clade (MEHL, 1992) to be the closest fossil ally of the recent *Fieldingia*-taxon. The presence of regularly situated knots = Weltner's bodies, which reinforce some nodules of the choanosomal skeleton, absence of dictyonal strands and construction of (probably) dermal skeleton by fused large pentactines or hexactines and rare small stauractines are unique features to the recent *Fieldingida*. All the other recent hexactinellid sponges possessing rigid skeleton have other manner of nodule reinforcement: lychniscs in Lychniscosida, strong silica deposition in others (*e.g.* Hexactinosida - *Iphiteon*). The specific character found in *F. valentini* is the presence of specific loose spicules - oxyoidal diactines, but it is unknown whether or not this character is also present in the recent *F. lagettoides*, the fossil *Placotrema cretacea*, or in any of the other fossil species, since these taxa were all described from specimens deprived of loose spicules. Diactines are not characteristical for recent Hexactinosida, and if present they all are different from the diactines of *Fieldingia*. The diactines in *Aphrocallistes vastus* are atrial spicules (REISWIG, 2002d) (in *Fieldingia* these spicules are connected with the choanosomal skeleton). *Laocoetis perion* (Tabachnick & Levi, 1997) and *Lonchiphora inversa* (Ijima, 1927) have lonchioles, which are similar to diactines but with quite different rays since they are descendants of the sarules. *Iphiteon panicea* has diactines obviously derived from hexactines, the origin of these spicules is not clear since all of them are described as loose (maybe dermal?) spicules (REISWIG, 2002d). The diactines of *Fieldingia* are most similar to diactines of Hyalonematidae. Affinities with other recent or fossil families are even less obvious and new separate family and order is the most appropriate solution for the *Fieldingia*-taxon.

Until better material is found, the external body shape of the family Fieldingidae and genus *Fieldingia* must be tentatively developed from the papers of REID (1961, 1963), since the fossil genus *Placotrema* is represented by numerous sometimes well-preserved specimens, whereas the recent *Fieldingia* is only known from a few broken fragments.

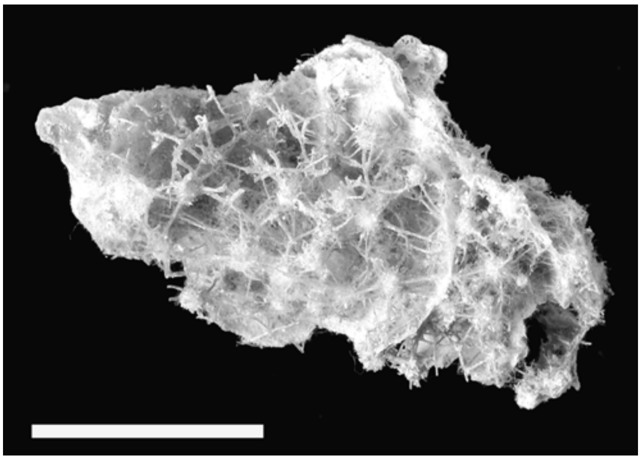

Fig. 2. *Fieldingia valentini valentini*, presumed internal view of the holotype (scale 10 mm).

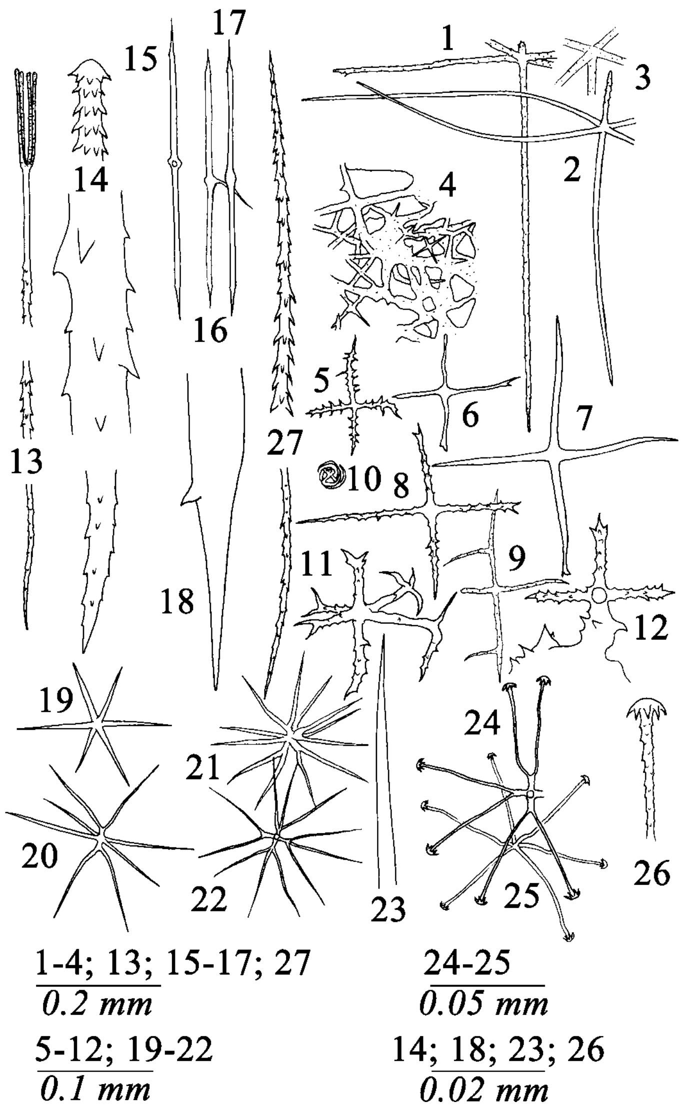

Fig. A. Spicules of *Fieldingia valentini valentini.* **1,** intermediate dermal pentacine with rudimental ray. **2,** intermediate dermal hexactine. **3,** intermediate dermal pentactine. **4,** dermal fused skeleton. **5-8,** dermal stauractines. **9-10,** abnormal derivatives of dermal stauractines. **11,** loose spiny hexactine. **12,** spiny hexactine attached to a knot. **13,** strongyloscopule. **14,** tine, shaft and termination of strongyloscopule. **15-17,** diactines. **18,** termination of diactine. **19-26,** microscleres. **19,** oxyhexactine. **20,** hemioxyhexaster. **21-22,** oxyhexasters. **23,** secondary ray of oxyoidal microscleres. **24,** discohexaster. **25,** discohexactine. **26,** secondary ray of discoidal microscleres. **27,** uncinate.

Fieldingidae n. fam.

Synonymy. Part of Corallispongiae Kent (1870). Part of Pleionacidae Marshall (1876). Part of Tretodictyidae Schulze (1886, 1887); Reid (1961, 1963). Part of Tretocalycidae Schulze (1904); Schrammen (1912). Part of Aulocalycidae Ijima (1927). Part of Stromatidiidae Tabachnick & Reiswig (2000).

Type genus. *Fieldingia* Kent, 1870.
Definition. Identical with that of the order.
Diagnosis. Identical with that of the order.

Fieldingia Kent, 1870

Synonymy. *Fieldingia* Kent, 1870: 222. ? *Placotrema* Hind, 1883: 127.
Type species. *Fieldingia lagettoides* Kent, 1870.
Scope. Two species, one is subdivided into two subspecies.
Definition. Identical with that of the order.
Diagnosis. Identical with that of the order.
Distribution. N-E Atlantic and W and S Pacific (type location off Portugal), 90 - 900 m depth.

Fieldingia valentini n. sp.

(Fig. 2, Figs A1-5, Tab. I)

Synonymy. Part of *Fieldingia lagettoides* Kent: Schulze, 1887: 335, Pl. XCVII.
Materials examined
Holotype: BMNH 1887.10.20.127 (identified as *F. lagettoides* by Schulze) - R.V. 'Challenger', stn. 192, off the Little Ki Island (the Indonesian Archipelago, Banda Sea), 5°49'1" S 132°14'15" E, 256 m.

Description

Body. The sponge is represented by two fragments 22 x 11 x 11 mm of the wall with dense layers of probably dermal remnants. These layers seem to be situated at some distance (about 0.5 - 1 mm) from each other and sometimes they are united into a single layer. It is very likely that both fragments belong to a single specimen.

Skeleton. The dictyonal framework of the choanosomal skeleton is constructed of large hexactines with one, rarely two or three rays reduced to short rudiments. The rudimental rays of these spicules are 0.01 - 0.09 / 0.003 - 0.020 mm, the length of the entire ray reaches several mm in length, usually they are covered with spines grouped in linear series. These spicules fuse to each other at points of mutual contact; it is very likely that they are irregularly distributed and do not form dictyonal strands. The meshes are irregular, but rectangular and triangular ones with spaces 0.02 - 2 mm. The knots (Weltner bodies) form nodules which seem to be regularly distributed at 0.20 - 2.50 mm from each other. The knots 0.050 - 0.140 mm in diameter seem to be formed by hexactines and some pentactines and stauractines, but extensive secondary silica deposition does not allow exact determination of the type of spicules which formed the knots. Some of the spicules on the surface of the knots have rays 0.020 - 0.076 / 0.003 - 0.011 mm curved and spiny similar to the dermal spicules. The meshes within the knots are spherical, 0.015 - 0.05 mm in diameter; the beams, 0.02 - 0.04 mm in diameter, are covered by spines. The dermal (superficial skeleton) or maybe (but unlikely) basidictyonal skeleton is about 0.1 mm thick, constructed of several layers of intermediate pentactines, or hexactines with short distal rays, and small stauractines (rarely small pentactines and hexactines). Most of these spicules are fused at points of mutual contact by dense silica deposition, but some of them are loose. The meshes in the dermal skeleton are usually triangular or rectangular 0.019 - 0.044 mm; the beams are 0.002 - 0.019 mm in diameter and slightly rough.

Spicules. The intermediate dermal hexactines and pentactines have spiny or rough rays with conically pointed or rounded terminations. The distal ray of these hexactines is 0.009 - 0.072 mm long, tangentials 0.204 - 0.340 mm, the proximal ray is 0.266 - 0.389 mm, their diameter is 0.006 - 0.007 mm. It is possible that they are incompletely developed large choanosoamal hexactines. The dermal stauractines have smooth, rough or spiny rays, straight or curved, usually with conically pointed terminations. Sometimes it is impossible to decide if these spicules have secondary spines or branches of their rays. The complete spicules have rays of 0.009 - 0.072 / 0.004 - 0.008 mm. Some minute fragments of these spicules, abnormal dermal stauractines or analogous choanosomal spicules with rays reduced in number and curved spiny rays were also found. They are 0.025 - 0.072 mm in diameter and might also be referred to as microscleres. The strongyloscopules are 0.638 - 0.927 / 0.004 mm, their 4 tines are 0.068 - 0.099 mm. The ornamentation of their spiny shafts begins some distance from the tines. The diactines 0.288 - 0.327 / 0.006 mm have a widening in the middle or four rudimental tubercles, some rare minute spines are situated in a short distance from the terminations with are spine-like themselves. The uncinates are about 1.4 / 0.012 mm.

Microscleres. Oxyhexasters are 0.072 - 0.115 mm in diameter with primary rosette 0.007 - 0.014 mm in diameter, they have 2 - 3 secondary rays. Hemioxyhexasters and oxyhexactines are 0.058 - 0.101 mm in diameter. Some hemioxyhexasters have very short primary rays being similar to asters. The rays of oxyoidal spicules are smooth. The discohexasters are 0.047 - 0.094 mm in diameter with primary rosette 0.005 - 0.011 mm, they have 2 secondary rays. Some rare hemidiscohexasters and discohexactines may be found, they are about 0.06 mm in diameter.

Remarks. Both subspecies of *F. valentini* differ from *F. lagetoides* in several characters. The knots in the latter species are less compact and obviously contain hexactines. Its dermal stauractines and small hexactines are not spiny (KENT, 1870; TABACHNICK & REISWIG, 2000; REISWIG, 2002a). The dictyonal beams (rays of the choanosomal skeleton) are entirely minutely spined (REISWIG, 2002a) and the dermal spicules are small stauractines and pentactines (TABACHNICK & REISWIG, 2000; REISWIG, 2002a). Because the loose spicules are unknown for *F. lagetoides*, it is impossible to state anything about their differences between the two species.

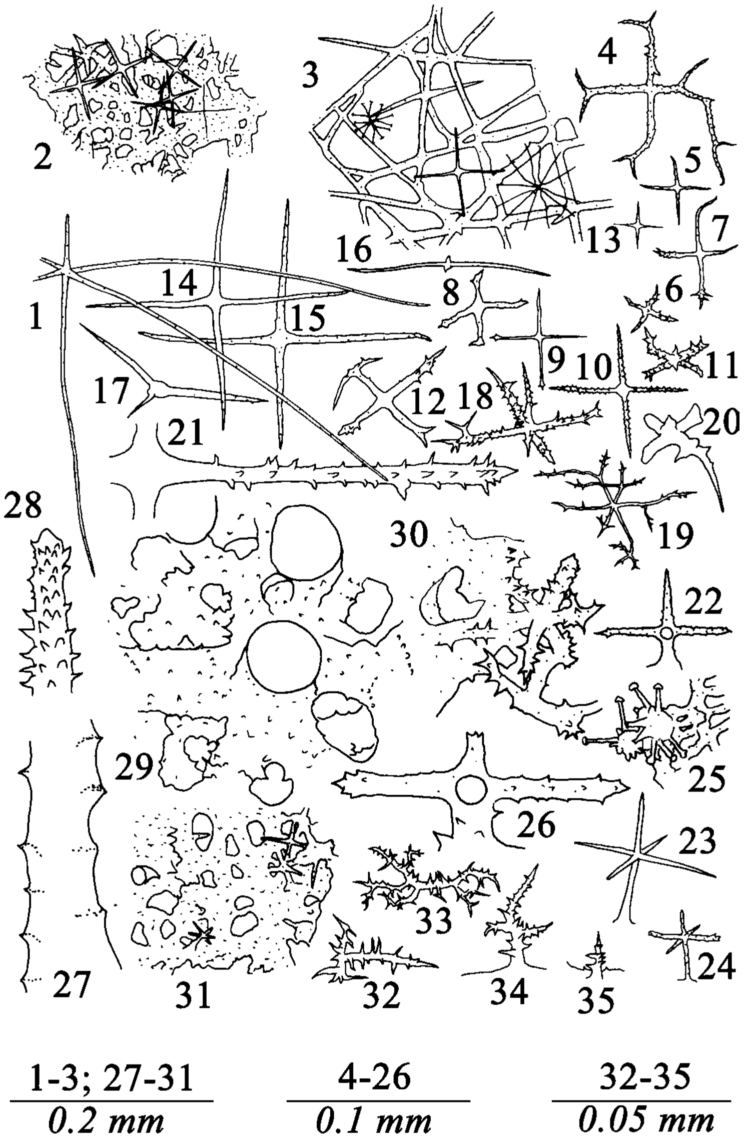

Fig. B. Spicules of *Fieldingia valentini tizardi*. **1,** intermediate dermal hexactine. **2-3,** dermal fused skeleton. **4-15** and **20-21,** dermal stauractines. **16-17,** abnormal spicules derived from dermal stauractines. **18-19,** spiny hexactines (dermal or choanosomal). **22-24** and **26,** spiny hexactine attached to a knot. **25,** discohexasters involved into secondary silica deposition. **27-28,** large choanosomal spicules (shaft and termination). **29-31,** structure of the knots. **32-33,** broken rays or abnormal derivatives of stauractines or hexactines. **34-35,** same as (32-33) involved in secondary silica deposition on the surface of a knot.

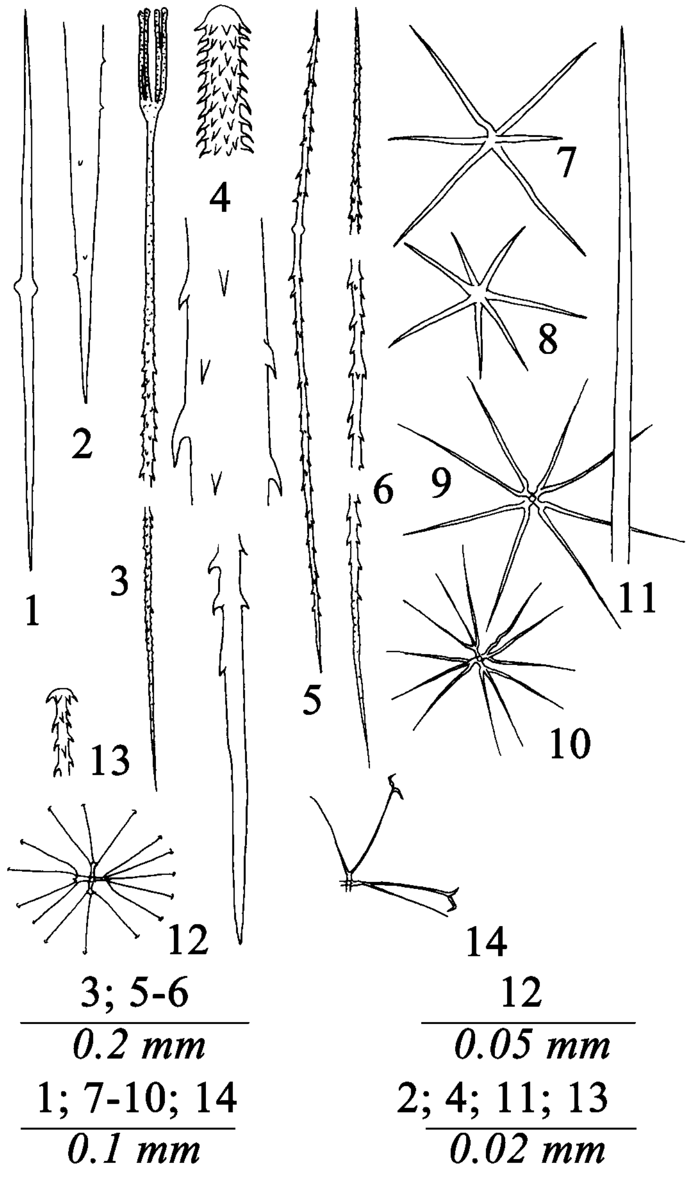

Fig. C. Spicules of *Fieldingia valentini tizardi.* **1,** diactine. **2,** termination of diactine. **3,** strongyloscopule. **4,** tine, shaft and termination of strongyloscopule. **5,** small uncinate. **6,** large uncinate. **7-14,** microscleres. **7,** oxyhexactine. **8,** hemioxyhexaster (or aster). **9-10,** oxyhexaster. **11,** secondary ray of oxyoidal microscleres. **12,** discohexaster. **13,** secondary ray of discoidal microscleres. **14,** a fragment of onychoidal microsclere.

Fieldingia valentini tizardi n. ssp.
(Figs A-B, Tab. I)

Materials examined

Holotype: BMNH 1889.09.18.010 (labelled *Hyalonema* sp. - anonymous erroneous identification) - Bassett Smith Coll., the Tizard Bank (off the Itu Aba Island, the South China Sea), 90 m.

Paratype: MNHN (P5042) - TAIWAN 2000, R.V. 'Fishery Research 1', DW 5, South China Sea, 23°40.50' N 119°56.10' E, 234 m.

Description

Body. The holotype is represented by a fragment 28 x 20 x 20 mm of the wall with dense layers of probably dermal skeletal remnants. The paratype is a similar fragment 14 x 6 x 6 mm in size, it contains no dermal remnants.

Skeleton. The rigid skeleton construction is similar to that of *F. valentini*.

Spicules. The intermediate dermal hexactines have rough rays with conically pointed or rounded terminations. The dermal stauractines have smooth or rough or spiny rays, straight or curved, usually with conically pointed terminations. Sometimes it is impossible to decide if these spicules have secondary spines or branchings of their rays. The completely developed spicules have rays 0.016 - 0.131 / 0.002 - 0.011 mm. Their abnormal derivatives (maybe broken rays) are 0.016 - 0.045 mm in diameter (they might also be referred to as microscleres). The strongyloscopules are 0.464 - 1.140 / 0.009 mm, their 2 - 4 tines are 0.061 - 0.129 mm. At some distance from the tines, their shafts become spiny. The diactines 0.175 - 0.481 / 0.006 mm have a widening in the middle; some rare short spines are situated in a short distance from the terminations which are conically pointed. The uncinates are 0.6 - 1.6 / 0.006 - 0.01 mm; the smaller ones have a widening in the middle.

Microscleres. Oxyhexasters are 0.072 - 0.130 mm in diameter with primary rosette 0.005 - 0.015 mm in diameter, they have 2 - 3 secondary rays. Hemioxyhexasters and oxyhexactines are 0.081 - 0.184 mm in diameter. Some hemioxyhexasters have very short primary rays being similar to asters. The rays of oxyoidal spicules are smooth. The discohexasters are 0.022 - 0.054 mm in diameter with primary rosette 0.004 - 0.011 mm; they have 4 - 6 (rarely 8) secondary rays.

Remarks. The two subspecies of *F. valentini* differ in discohexaster form and size: 2 - 3 secondary rays in *F. valentini valentini* and 4 - 6 (rarely in the paratype spicules with 2 secondary rays may be allochthonic) - in *F. valentini tizardi*; about two times larger in *F. valentini valentini* than in *F. valentini tizardi*. Hemidiscohexasters and discohexactines are absent in *F. valentini tizardi*. The strongyloscopules are more uniform in size and do not vary as much in *F. valentini valentini* as they do in *F. valentini tizardi*. The two specimens of *F. valentini tizardi* have some differences in spicule dimensions and form of outer ends of their diactines, which are not considered important enough to warrant their separation.

Fieldingia sp.

Location. QM G317944 - SALOMON , R.V. 'Alis', off the Solomon Islands, 900 m.

MNHN (P6014) - BORDAU 1, R.V. 'Alis', DW 1418, off Fidji, 16°28' S 178°56' E, 367 m.

Description. The 'QM' fragment is attached to a stone, itself it is 35 x 25 mm and about 5 mm high, the sponge contains dense layers and choanosomal skeleton with knots. Branching spines or branching, spiny rays similar to those of *Fieldingia valentini* are inserted into the dense silica aggregations. The 'QM' sponge, which is probably the biggest *Fieldingia* found so far, is deprived of loose spicules (Schlacher-Hoenlinger, pers. comm.) and appears to be a fragment as well. The 'MNHN' specimens is a fragment 30 x 25 x 17 mm with typical for the genus constriction of the choanosoamal skeleton, it contains no loose and dermal spicules. Exact identification is impossible, nevertheless it is likely that both of these sponges (similar knot construction and specific spines on the knots) belong to *F. valentini.*

REMARKS

Because the loose spicules are missing in the holotype of *F. lagetoides*, investigation of new speciemens is needed for final settlement of whether or not there are further differences between the two species, *F. lagetoides* and *F. valentini*, besides those of the dictyonal skeleton and the knots.

The natural position of the dense layers in *Fieldingia* is unclear. It is difficult to assume that it is a basidictyonal skeleton, since in all other hexactinellids possessing this type of skeleton it is constructed of hexactines (some Hexactinosida, Aulocalycoida, Lychniscosida and Lyssacinosida). It is unlikely that it belongs to the atrial skeleton because the absence of a specific atrial skeleton in Hexactinellida is well known (Leucopsacidae, some Euplectellidae, *Heterorete* - family Euretidae), whereas the presence of an atrial and absence of dermal skeleton is unknown. Moreover, it is difficult to imagine such dense constructions with very small pores as an atrial skeleton if the layers are not inverted. So the probable hypothesis is that these specific layers are remnants of the dermal skeleton attached to the rays of the choanosomal spicules in some (ray) distance from the knots. Moreover, several layers are sometimes observed. It is possible that a new dermal layer is forming at a distance from the former one, but again this would be a unique situation for Hexactinellida (the observed cases with several dermal layers show that their are no knots in the choanosomal skeleton between them). Finally this situation with so peculiar dermal layer is similar to some not hexactinellid sponges (*f.i.* Sphinctozoa - *Vaceletia*). A well-preserved specimen for further investigation is required to settle this question.

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Tab. I. Some measurements of the spicules of *Fieldingia valentini* (in mm; L- length; D- diameter, d- diameter of the primary rosette).

	F. valentini valentini					*F. valentini tizardi*					*F. valentini tizardi*				
	holotype					holotype					paratype				
	n	avg	min	max	std	n	avg	min	max	std	n	avg	min	max	std
L ray of dermal stauractine	25	.032	.009	.072	.014	25	.037	.016	.131	.023					
L dermal hexactine distal ray	3	.045	.019	.061	.023	1	.076	.076	.076						
L dermal hexactine tangential ray	3	.280	.204	.340	.070										
L dermal hexactine proximal ray	3	.311	.266	.389	.068										
L strongyloscopule	10	.758	.638	.927	.100	9	.817	.417	1.140	.245	19	.756	.464	1.140	.202
L tine of strongyloscopule	12	.084	.068	.099	.008	10	.074	.061	.099	.011	24	.101	.076	.129	.012
L diactine	25	.279	.228	.327	.027	25	.268	.175	.319	.036	25	.380	.178	.481	.070
L uncinate	1	1.444	1.444	1.444		8	1.172	.623	1.596	.307					
D oxyhexaster	20	.095	.072	.115	.012	25	.092	.072	.130	.012	3	.106	.104	.111	.004
d oxyhexaster	20	.010	.007	.014	.002	25	.008	.005	.011	.002	3	.010	.007	.015	.004
D oxyhemihexaster or oxyhexactine	14	.083	.058	.101	.011	10	.125	.097	.184	.024	25	.107	.081	.141	.016
D discohexaster	15	.060	.047	.094	.011	25	.032	.022	.054	.008	25	.044	.032	.054	.007
d discohexaster	15	.008	.005	.011	.001	25	.008	.005	.011	.001	25	.006	.004	.007	.002