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A SYSTEMATIC REVISION OF THE NORTH-EASTERN ATLANTIC SHALLOW-WATER HAPLOSCLERIDA (PORIFERA, DEMOSPONGIAE), PART II: CHALINIDAE

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ABSTRACT

In the present paper the north-eastern Atlantic Chalinidae (Porifera, Demospongiae) are systematically revised and redescribed; where necessary lectotype designations are made. Three genera are recognized, viz. *Haliclona*, *Acervochalina* and *Dendroxea*. The latter genus is not represented in the study area. Seventy-two nominal species have been described in *Haliclona* in the wide sense here employed (including species assigned to other genera here considered junior synonyms of *Haliclona*: *Reniera*, *Gellius*, *Adocia*, *Toxadocia*, *Orina*). Among these 72 nominal species 12 valid species are recognized. One species new to science is described, viz. *Haliclona xena* spec. nov.; 4 nominal species of *Acervochalina* are reduced to 2 valid ones.

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INTRODUCTION

The Chalinidae Gray, 1867 (pro Haliclonidae de Laubenfels, 1932), which have a worldwide distribution, are by far the largest and taxonomically most complicated family of the order Haplosclerida (Porifera, Demospongiae) (cf. van Soest, 1980; Bergquist & Warne, 1980; de Weerdt, 1985). There was and still is much disagreement among authors about the characters to be used to define the family, and whether the Renieridae Schmidt, 1870 (nomen correctum Ridley, 1884), the Gelliidae Gray, 1872 (nomen correctum Ridley & Dendy, 1887), and the Adociidae de Laubenfels, 1936a should be kept as separate families or not. The same applies to the genera of the Chalinidae, about which a worldwide consensus is far from reached yet.

The present author has undertaken a systematic revision of the shallow-water Haplosclerida of the north-eastern Atlantic region (de Weerdt, 1985, and in prep.), part of which consisted of a taxonomic revision of species belonging to the Calinidae. Although the present publication merely consists of redescriptions and taxonomical treatments of the species occurring in the study area, some decisions have already been taken on higher taxonomic (genus) level. Justification of this will be given in a separate paper (de Weerdt, in prep.). For a key to the chalinids of the British Isles one is referred to de Weerdt, in press.

Following van Soest (1980) the Renieridae, Gellidae and Adociidae are included in the Chalinidae. Van Soest (l.c.) and others (Griessinger, 1971; Lévi, 1973; Wiedenmayer, 1977; Berquist & Warne, 1980; de Weerdt, 1985) used the family name Haliclonidae in the sense as presently understood, but the name Chalinidae is to be preferred, since it is the oldest available senior synonym. The Chalinidae have been established for *Chalina* Grant, 1861, which is a junior synonym of *Haliclona* Grant, 1835. However, there is still no reason to suppress the name Chalinidae (International Code of Zoological Nomenclature, Article 40a and 79c).

Within the Chalinidae three valid genera are recognized, viz. *Haliclona* Grant, 1835 (type-species *Spongia oculata* Pallas, 1766), represented by 13 species in the study area, *Acervochalina* Ridley, 1884 (type-species *Spongia limbata* Montagu, 1818), represented by 2 species, and *Dendroxea* Griessinger, 1971 (type-species *Reniera lenis* Topsent, 1892b) which is not represented in the study area.

MATERIAL AND METHODS

The material studied for the present paper consists of type material and other original specimens incorporated in the collections of the British Museum (Natural History), London (BMNH), the Muséum National d'Histoire Naturelle, Paris (MNHN), and the Zoologisk Museum, København (ZMK), and of material in the collection of the Zoölogisch Museum, Amsterdam (ZMA). Fresh material was collected by the author and others by shore wading, SCUBA-diving, and dredging in Sherkin Island (Ireland), Lundy (Great Britain), Roscoff (France), Bergen (Norway), Banyuls (France), and Zeeland (the Netherlands). A large collection of specimens, belonging to the private collection of Mr. G. Ackers (Marine Conservation Society (MSC), Great Britain) was placed at my disposal. In addition several specimens were kindly donated or placed at my disposal by Prof. P. Bergquist (New Zealand), Dr. B. Picton (Ireland), Mr. D. Moss (Great Britain), Dr. O. Tendal (Denmark), and Dr. J. Vacelet (France).

The material has been studied in the same way as described in de Weerdt (1985).

The following abbreviations are used: BC = Bowerbank collection (BMNH), NC = Norman collection (BMNH), JC = Johnston collection (BMNH), GA = private collection G. Ackers (MCS), DM = private collection D. Moss (MCS), D.T. = identified by Topsent (MNHN).

SYSTEMATIC DESCRIPTIONS

Family Chalinidae Gray, 1867.

Definition: Haplosclerida with a delicate, reticulated skeleton of uni-paucispicular primary lines which are regularly connected by uni- or paucispicular secondary lines. Ectosomal skeleton, if present, a unispicular, tangential reticulation.
Remarks: The primary lines may become multispicular, but they reach never the thickness as, for instance, in *Amphimedon* (Niphatidae). The skeleton may be reinforced by spongin fibres or spicule tracts.

Genus **Haliclona** Grant, 1835

Definition: Chalinidae with unispicular secondary lines.

Species of the **oculata**-*group*

GROUND-PLAN: the choanosomal skeleton consisting of unispicular primary and secondary lines. Basically the skeleton is regularly ladder-like. Oxea typically cigar-shaped, short, fat and straight. Spongin abundant.

Remarks: the primary lines may become paucispicular, which happens quite frequently within one and the same individual; for instance in *Haliclona oculata* where the lines are unispicular at the periphery and at the top of the branches, but become pauci- or even multispicular towards the base. On the other hand the skeleton may verge towards an isotropic reticulation in which there are no clearly distinguishable primary and secondary lines. This happens for instance in *Haliclona cinerea.* Spongin may be so abundant as to form the main part of the skeleton; oxea are frequently of reduced size in this case.

Species: *Haliclona oculata* (Pallas), *Haliclona urceolus* (Rathke & Vahl), *Haliclona simulans* (Johnston) and *Haliclona cinerea* (Grant).

Haliclona oculata (Pallas, 1766)

(fig. 1, pl. I fig. 4, pl. II fig. 3, pl. V fig. 1)

Spongia oculata Pallas, 1766: 390; Linnaeus, 1767: 1298; Houttuyn, 1772: 454, pl. CXXXV fig. 4; Ellis & Solander, 1786: 184; Esper, 1794: 180; Montagu, 1818: 78, pl. vi fig. 2; Templeton, 1836: 470.

Halichondria oculata; Johnston, 1842: 94, pl. III, figs. 1 & 2.

Chalina oculata; Bowerbank, 1864: 208, pl. XIII, fig. 262; 1866: 361; 1874: 169, pl. LXVI figs. 1-3; 1882: 185; Higgin, 1886: 76; Hanitsch, 1889: 161; Topsent, 1890: 201; 1891b: 527; 1894a: 7; 1928: 328; 1933: 3; Lambe, 1896: 184, pl. I fig. 2; 1900b: 155; Lundbeck, 1902: 10, pl. VIII, fig. 7; Stephens, 1912: 26; 1916: 233; Hentschel, 1929: 987; Brøndsted, 1932: 24.

Chalinula oculata; Schmidt, 1870: 77; 1875: 115.

Euchalinopsis oculata; Lendenfeld, 1887: 744.

Haliclona oculata; Grant, 1841: 5; Arndt, 1935: 100, fig. 214; Alander, 1942: 23; Hartman, 1958: 52, 85, pls. 7-10; 1964: 3, 6; Könnecker, 1973: 459; van Soest et al., 1981 [1983]: 45; Hiscock et al., 1983 [1984]: 27; Jones, 1984: 242; Ackers et al., 1985: 177, photo's 36-38.

Haliclona oculata tavaresi Arndt, 1941: 25.

Halichondria cervicornis; Johnston, 1842: 96, pl. VI figs. 1 & 2, pl. V figs 1 & 2.

Chalina cervicornis; Bowerbank, 1866: 364; 1874: 171, pl. LXVII figs. 1-3; 1882: 185.

[Non: *Spongia cervicornis* Pallas, 1766: 388 = ?*Axinella* spec.].

Spongia dichotoma Linnaeus, 1767: 1299; Ellis & Solander, 1786: 187; Esper, 1794: 188; Montagu, 1818: 82, pl. vi fig. 1; Templeton, 1836: 470.

[Non: *Isodictya dichotoma* Bowerbank, 1866; nec: *Chalinula dichotoma*; Schmidt, 1870 = *Haliclona cinerea* (Grant), cf. de Weerdt & Stone, in prep.].

Isodictya pygmaea Bowerbank, 1866: 313; 1874: 141, pl. LVI figs. 6-10; 1882: 118.

Diplodemia vesicula Bowerbank, 1864, pl. XIV fig. 273, pl. XXIII fig. 324, pl. XXXVI fig. 377; 1866: 357; 1874: 178, pl. LXX figs. 12-14; 1882: 183.

Chalina grantii Bowerbank, 1866: 375; 1874: 173, pl. LXVIII figs. 6 & 7; 1882: 186.

Pachychalina grantii; Ferrer-Hernandez, 1922: 18.

Isodictya varians Bowerbank, 1874: 307, pl. LXXXVIII, figs. 1-6.

[Non: *Isodictya varians* Bowerbank, 1866: 281; nec: Bowerbank, 1874: 124, pl. XLVIII figs. 14-16 = *Haliclona cinerea*, (Grant), cf. de Weerdt & Stone, in prep.].

Chalina flemingii (pars) Bowerbank, 1874: 357.

[Non: *Chalina flemingii* Bowerbank, 1866: 370; nec: Bowerbank, 1874, pl. LXVIII figs. 1 & 2 = *Haliclona cinerea* (Grant), cf. de Weerdt & Stone, in prep.].

Veluspa polymorpha var. *gracilis* Miklucho-Maclay, 1870: 5, pl. 1 figs. 1 & 2, pl. II fig. 22, 3.

Reniera gracilis; Dybowsky, 1880: 47, pl. III fig. 3, pl. IV fig. 16.

Haliclona gracilis; Koltun, 1959: 216, fig. 175.

Veluspa polymorpha var. *digitata* Miklucho-Maclay, 1870: 5, pl. 1 figs. 3 & 4.

Veluspa polymorpha var. *arctica* Miklucho-Maclay, 1870: 5, pl. I fig. 11, pl. II fig. 22, 2.

Chalina arbuscula Verrill, 1873: 742 [cf. Hartman, 1958: 52]; Fristedt, 1885: 50; 1887: 416; Hentschel, 1929: 987.

?*Pachychalina caulifera* Vosmaer, 1882: 33, pl. I fig. 14, pl. III figs. 64-66; Levinsen, 1886: 350, pl. XXIX fig. 4, pl. XXX fig. 1; Lundbeck, 1902: 7, pl. II figs. 1 & 2, pl. VIII figs. 4-6; Hentschel, 1916: 14; 1929: 988; Brønsted, 1932: 25.

Material examined (here also lectotype designation; for the taxonomic status of specimens of *Haliclona oculata*, see table I).

NORTH AMERICA: ZMK, *Spongia dichotoma*, Newport, Rhode Island (probably Linnaeus' original specimen).

BRITISH ISLES and IRELAND: BMNH 1841.1.13.46, *Spongia oculata*, two dried specimens, connected by a small rope, and with

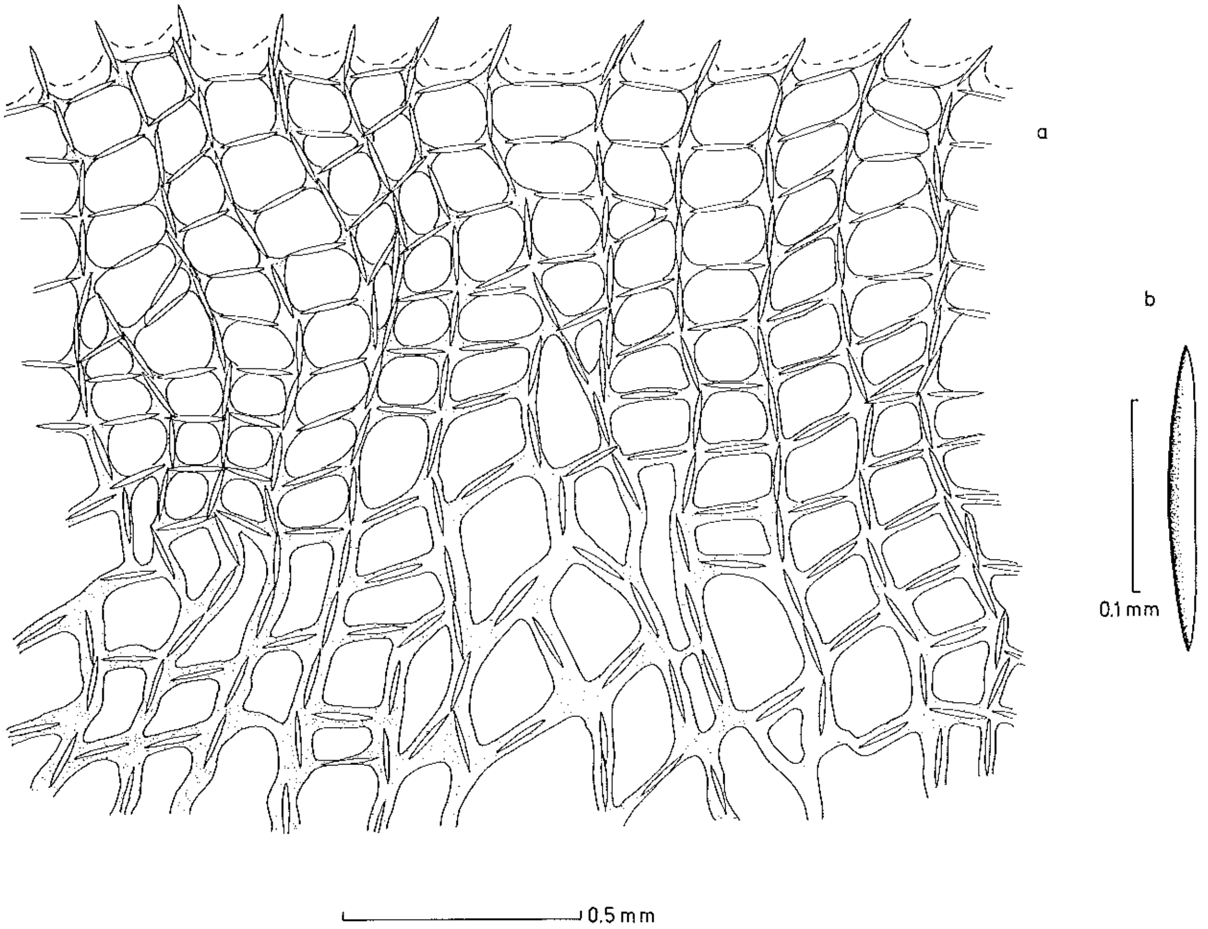

Fig. 1. *Haliclona oculata*, a. choanosomal skeleton, b. oxea.

a small label on which is written: "*Spongia oculata*, 106, 4/3.45", an added label with: *Chalina oculata* (Pallas), TYPE?; BMNH 1877.5.21.2079, *Chalina flemingii* Bowerbank, BC, Peterhead, C.W. Peach, described by Bowerbank, 1874: 357; BMNH 25.11.1.775a, microscopical slide of *Chalina arbuscula* Verrill, Dendy collection, Wood's Hole Museum; BMNH 1877.5.21.2080, *Chalina cervicornis*, BC, Torquay, figured specimen of Bowerbank, 1874, pl. LXVII fig. 1; BMNH 1847.9.7.2, *Chalina oculata*, JC, Firth of Fourth; BMNH 1847.9.7.144, *Halichondria cervivornis*, JC, figured specimen of Johnston, 1842, pl. V fig. 2; BMNH 1847.9.7.145, *Halichondria cervicornis*, JC, figured specimen of Johnston, 1842, pl. V fig. 1; BMNH 1932.1.5.10, *Isodictya pygmaea* Bowerbank, BC, Scarborough, figured specimens of Bowerbank, 1874, pl. LVI figs. 6-8; the specimen of fig. 6 is here designated as the lectotype; BMNH 1910.1.1.325, *Isodictya pygmaea* Bowerbank, NC, Scarborough; BMNH 1910.1.1.326, *Isodictya pygmaea* Bowerbank, NC, Seaham Harbour, tidemarks; BMNH 1877.5.21.2081, *Isodictya pygmaea* Bowerbank, BC, Scarborough; BMNH 1932.1.5.12, holotype *Chalina grantii* Bowerbank, BC, Brighton, figured specimen of Bowerbank, 1874, pl. LXVIII fig. 6, designated as the type on p. 173 of the same volume; BMNH 1920.4.1873, *Isodictya varians* Bowerbank, seven specimens in one box, with different labels: 32.12.69.22, River Mersey; 32.12.69.24, Irish Sea; 32.12.69.27, Irish Sea; 32.12.69.31, River Mersey; 32.12.69.35, River Mersey; 32.12.69.37, River Mersey;

32.12.69.43, Irish Sea, coll. Mr. Moore; BMNH 1910.1.1.349, *Isodictya varians* Bowerbank, NC, Mouth of Mersey; BMNH 1877.5.21.2083, *Isodictya varians*, BC, Mersey, by Mr. T. Higgin. ZMA POR. 5671, Crab Rock, Sherkin Island, Ireland, 20 m, 16-IV-1983, coll. M. Reichert.

SHETLANDS: BMNH 1910.4.59, *Isodictya varians* Bowerbank, BC, Shetland, Mr. Barlee. BMNH 1877.5.21.2082, holotype *Diplodemia vesicula* Bowerbank, BC, Shetlands, figured specimen of Bowerbank, 1874, pl. LXX fig. 12, designated as the type by Bowerbank on p. 178 of the same volume.

DENMARK: ZMK, labeled: *Euchalinopsis oculata*, Limfjorden, 1874, coll. Lytken; ZMK, Faenø Sund, off Hindsgavl, ca. 27 m, 23-V-1916; ZMK, Harbour of Frederikshavn, 1 m, 4-VIII-1969, coll. O. Tendal.

FAROE: ZMK, *Pachychalina caulifera* Vosmaer, Vestmanhavnsfjord, Faroerne, ca. 70 fms, 30-V-1899, coll. Th. Mortensen, det. Lundbeck; ZMK, *Pachychalina caulifera*, Island eller Farø, 1900, coll. Müller, det. Lundbeck.

KARA SEA: ZMK, *Pachychalina caulifera* Vosmaer, Karahavet, 11 m, 1882, Dymphna, det. Lundbeck.

FRANCE: numerous specimens in the ZMA collection, among which: ZMA POR. 14, Audresselles, Pas-de-Calais, 29-V-1962, coll. G. Kleeton; POR. 4510, Audresselles, Pas-de-Calais, LLWS, in cave, 12-VI-1980, coll. R. W. M. van Soest; POR. 4648, Audresselles, Pas-de-Calais, LLWS, in caves, 5-VI-1981, coll. students Prof. Stock; POR. 4718, Cap Gris Nez, Pas-de-Calais, littoral, 1-VI-1981, coll. J. H. Stock and R. W. M. van Soest; POR. 5775, Petit Blanc Nez, Pas-de-Calais, 18-X-1984, coll. J. H. Stock; POR. 2688, Pointe de la Crèche, Boulogne, *Laminaria*-zone, in little cave, 21-IX-1967, coll. J. H. Stock; POR. 106, La Tortue, Baie de Morlaix, Finistère, 15-30 m, XI-1963, coll. A. Descatoire; POR. 252, La Tortue, Baie de Morlaix, Finistère, 20-25 m, 17-VIII-1964, coll. G. Kleeton; POR. 5557, La Tortue, Baie de Morlaix, Finistère, 12-15 m, 7-VIII-1981, coll. W. H. de Weerdt; POR. 5558, La Tortue, Baie de Morlaix, Finistère, 16 m, 9-VI-1982, coll. W. H. de Weerdt; POR. 5602, Château du Taureau, Baie de Morlaix, Finistère, 20 m, 11-VIII-1981, coll. W. H. de Weerdt.

THE NETHERLANDS: numerous specimens in the ZMA collection, among which: ZMA POR. 22, Wemeldinge, Oosterschelde, 22-VII-1962, coll. G. Kleeton; POR. 3467, Wemeldinge, Oosterschelde, 20-VIII-1975, coll. R. W. M. van Soest; POR. 6001, Wemeldinge, Oosterschelde, LLWS, 1 m, 10-X-1985, coll. A. Oosterbaan; POR. 4166, Zierikzee, Oosterschelde, 3-VIII-1976, coll. R. W. M. van Soest and J. Vermeulen; POR. 4188, Schelphoek, Schouwen-Duiveland, 7-IV-1977, coll. D. A. G. Buizer and J. Vermeulen; POR. 6031, kanaal van Zuid-Beveland, Grevelingen, 4 m, 17-XI-1977, coll. J. Vermeulen; POR. 4168, Den Helder, 12-V-1976, coll. R. W. M. van Soest and J. Vermeulen.

Description of material

BMNH 1841.1.13.46 consists of two very similar specimens which are connected with a small rope. Their height is 16 cm; both consist of 2-3 main branches which branch off dichotomously towards the top. The oscules are cir-

Table I. Taxonomic status of specimens which belong to *Haliclona oculata*.

specimen	original name	locality	taxonomic status
BMNH 1932.1.5.10	*Isodictya pygmaea*	Scarborough	lectotype (design. this paper)
BMNH 1932.1.5.12	*Chalina grantii*	Brighton	holotype (design. Bow., 1874: 173)
BMNH 1877.5.21.2082	*Diplodemia vesicula*	Shetlands	holotype (design. Bow., 1874: 178)

cular, 1-2 mm, flush with the surface, irregularly scattered on all sides of the branches. The skeleton is strongly fibrous and consists of spongin fibres of 15-30 µm thick; the primary fibres contain 1-3 spicules, the secondary fibres are unispicular. The oxea are cigar-shaped and measure 114 × 5.1 µm (see also table I in which spicule sizes of a selection of specimens are given).

The lectotype of *Isodictya pygmaea* consists of irregularly fused branches originating from a stalk of ca. 3 cm. The oscules are rather few in number, 1 mm, and irregularly scattered. The skeleton consists of uni-paucispicular primary lines and unispicular secondaries. The specimen has a high number of styles and strongyles intermixed, and rather scarce spongin. The oxea are 118 × 8 µm.

The holotype of *Chalina grantii* is a somewhat aberrant form, consisting of laterally spreading, fused branches; the greatest breadth is ca. 8 cm. There is no stalk. The specimen might be easily confused with *Haliclona cinerea* (Grant), but the skeleton is typically *oculata*-like, consisting of spongin fibres with the characteristic, cigar-shaped oxea of 114 × 8 µm.

The ZMK specimens identified as *Pachychalina caulifera* are of a rather sturdy growth form; they consist of a few coarse and broad branches, which are strongly compressed. The oscules are rather large, viz. 2-3 mm and slightly elevated; they are evenly dispersed on all sides of the branches. The amount of spongin is moderate; the oxea of the specimen from the Kara Sea are 125 × 12 µm.

ZMA POR. 6031 (pl. II fig. 3 of the present paper) is a dense bush of slender, partly fused branches; they originate from eight basal branches growing from a short stalk of 2.5 cm long and 0.5 cm thick. The branches are for the greater length 3-5 mm thick, slightly compressed; towards the top they become more laterally compressed and broader. The oscules are few in number, not elevated, circular or slightly oval, 0.5-1.5 mm, mainly on the margins of the branches. The height of the sponge is 12 cm, the width is ca. 10 cm. A similar growth form is exhibited by the sponge of pl. I fig. 4.

ZMA POR. 5671 is somewhat fan-shaped; it consists of a broad, laterally compressed blade, 6.5 cm high, 3.5 cm broad and 3 mm thick at the base and ca. 1.5 cm thick in the middle; towards the top the thickness decreases to ca. 1 cm. The specimen consists obviously of branches which have fused to a maximum degree. On both sides of the blade there is a little lobe branching off from the main body. On one side the little branch remains isolated along its 2.5 cm long length; the lobe on the other side has left the blade for ca. 1.5 cm and has then fused again with the main body. The margins of the blade are undulating; this is caused by the oscules which are situated along the margins and which are each placed at the top of a little summit. In addition there are several small, round and slightly elevated oscules of 0.5-1.5 mm on both sides of the flap. The stalk is 3 cm long, slightly compressed and 3 mm broad throughout. The sponge is very velvety and smooth to the touch.

Diagnosis

Shape and size: basically the sponge consist of solid branches growing from a short stalk which is attached to the substratum with a pedicel. There is a considerable variation in the number and the degree of fusing of the branches. The branches may remain isolated along their entire length, like the specimen of pl. 1 fig. 4, or fuse to such a degree that the sponge becomes flabelliform. Commonly the diameter of the branches decreases towards the blind ends, but there is also variation in this feature. There is a strong tendency of the branches to be laterally compressed. The oscules are always small, 1-3 mm, and mainly arranged on the narrower sides of the compressed branches. They are not or only slightly elevated. When the sponge is flabelliform, the oscules are mainly situated on the margins of the blade; it happens quite frequently that the oscules are then situated at the summit of small mammiform elevations, making the margins of the blades undulating.

Gemmules of ca. 500-1000 µm in diameter, dark orange, are normally present in dense clusters at the base of the stalk. The gemmules are probably not functional, because the sponges survive during the winter; however, it happens sometimes that a new sponge is growing out of these gemmules (this was observed in a number of unregistered specimens in the BMNH collection, collected by F. Rowe at Portsmouth, Great Britain).

The sponge may reach a considerable size, commonly it is between ca. 10 cm and 30 cm in height.

Consistency: rather soft but elastic, not fragile; towards the base the sponge becomes firmer; the stalk is very firm and incompressible.
Surface: very smooth and velvety to the touch, slightly hispid.
Colour: light brown, dark-yellow, often with a greenish tinge, sometimes reddish.
Ectosome: mostly absent, but occasionally some dermal spicules are arranged into a vague tangential isodictyal network.
Choanosome: very regular, with uni- to paucispicular primary and unispicular secondary lines.

Table II. Spicule sizes (in µm) of *Haliclona oculata*.

specimen	locality	spicule sizes
BMNH 1841.1.13.46 *Spongia oculata*	unknown	98.4-*114.4*(7.5)-127.2 × 4.3-*5.1*(0.5)-6.2
ZMK *Spongia dichotoma*	Rhode Island	98.4-*110.7*(6.9)-122.4 × 6.0-*7.3*(0.9)-8.9
BMNH 1877.5.21.2080 *Chalina cervicornis*	Torquay	115.2-*131.9*(8.8)-154.8 × 5.0-*7.4*(0.9)-9.4
BMNH 1932.1.5.10 *Isodictya pygmaea*, lectotype	Scarborough	108.0-*118.3*(6.5)-136.8 × 7.2-*8.0*(0.5)-8.4
BMNH 1932.1.5.12 *Chalina grantii*, holotype	Brighton	105.6-*114.2*(7.2)-132.0 × 5.0-*8.1*(1.5)-10.1
BMNH 1910.1.1.349 *Isodictya varians*	Mersey	88.8-*95.2*(4.7)-103.2 × 6.2-*9.9*(1.8)-12.0
BMNH 1877.5.21.2079 *Chalina flemingii* (descr. Bow., 1874: 357)	Peterhead	100.8-*120.2*(7.4)-132.0 × 6.0-*7.0*(0.6)-7.7
BMNH 1877.5.21.2082 *Diplodemia vesicula*, holotype	Shetlands	100.8-*111.4*(6.1)-117.7 4.3-*4.8*(0.4)-5.3
ZMK *Pachychalina caulifera* (descr. Lundbeck, 1902: 9)	Faroe	108.0-*119.8*(7.9)-134.4 × 7.4-*8.6*(0.7)-9.4
ZMK *Pachychalina caulifera* (descr. Lundbeck, 1902: 9)	Kara Sea	115.2-*125.4*(8.0)-139.2 × 9.6-*11.9*(0.9)-13.2
ZMK	Frederikshavn, Denmark	108.0-*123.0*(11.7)-144.0 × 6.0-*7.7*(1.2)-9.8
ZMA POR. 5557	Roscoff	91.0-*114.0*(7.6)-132.0 × 6.0-*8.5*(1.7)-11.0
ZMA POR. 5671	Sherkin Island	129.6-*137.8*(7.7)-151.2 × 7.0-*7.4*(0.4)-8.4
ZMA POR. 6031	Netherlands	110.4-*125.3*(8.1)-136.8 × 9.4-*10.4*(0.8)-11.8

Spongin: commonly abundant, clearly visible; towards the base it forms the main part of the skeleton.
Spicules: short, fat cigar-shaped oxea with short and sharp points; stylote and strongylote modifications are very common; oxea range from ca. 80-145 by 4.5-12 μm (see also table II).

Ecology: in the infralittoral, to ca. 100 m, on rocky and sandy bottom, attached to stones, *Mytilus* etc. It can tolerate low salinity and turbid water with suspended silt.

Distribution (fig. 2): Atlantic coast of Canada and North America, from the Gulf of St. Lawrence to North Carolina, west coast Portugal, France, the Netherlands, British Isles, Shetland, Faroe, Denmark, west coast Sweden, north coast Norway, Spitsbergen, Bear Island, White Sea, Kara Sea. Probably occurring in the entire arctic and subarctic area (Koltun, 1959, and others).

Discussion

Haliclona oculata is morphologically well characterized by its compressed, solid branches and the linear arrangement of the small oscules on the narrower sides of the branches. The skeletal architecture is rather variable, due to the high variation in the amount of spongin, but still characteristic; the form of the oxea is highly consistent. The species differs from the other sympatric, stalked chalinid, *Haliclona urceolus* (see below) by its solid branches, the abundant spongin and smaller spicules.

The high number of synonyms of *H. oculata* is not surprising because of its variable growth form and common occurrence in the study area. The number of species descriptions is an example of the tendency of earlier taxonomists to describe every growth form as a separate species.

The conspecifity of *Halichondria cervicornis*, *Spongia dichotoma*, *Isodictya pygmaea*, *Diplodemia*

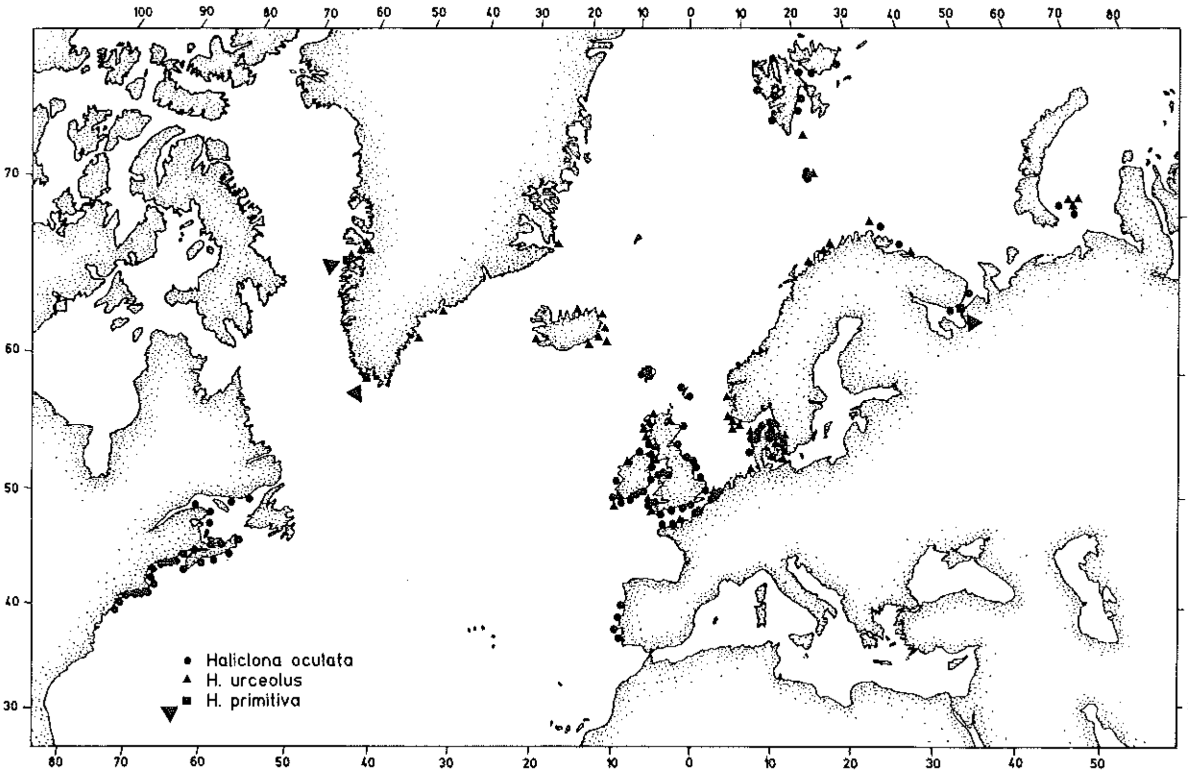

Fig. 2. Distribution of *Haliclona oculata*, *H. urceolus* and *H. primitiva*.

vesicula, *Chalina grantii*, *Isocictya varians* (pars), and *Chalina flemingii* with *H. oculata* is for the greater part established on basis of study of the original specimens. I did not make a microscopical slide of Johnston's material of *H. cervicornis* because of the fragility of the preserved specimens. They agree completely with Johnston's figure and leave no doubt about their identity. Pallas' description of *Spongia cervicornis*, however, does not conform to *H. oculata*. Most probably it is an axinellid. Pallas' description of *S. cervicornis* reads literally (Pallas, 1766: 388): "Fruticuli pumili, palmares, dichotomi, ramosissimi. Rami calamo crassiores, teretes, and axillas compressi, subadtenuati. Substantia rigidiuscula, tenax, ex fibris subadscendentibus dense contexta, extus hispidula, grysea. Odor combustae animalis. Locus: Mare Mediterraneum." Most conspicuous differences between *S. cervicornis* and *H. oculata* are the apparently strongly hispid surface in *S. cervicornis*, the rounded branches which are only slightly compressed at the base, and the greyish colour. Study of the original material is needed to assess the taxonomic status of this species, but it is quite certain that it is not *H. oculata*.

The specimen of *Spongia dichotoma* in the ZMK collection may very well be Linnaeus' original specimen. The label is probably in Linnaeus' handwriting, but it is partly unreadable. It reads: "*Spongia dichotoma*," nova(?) species", ... varietet, ... Newport Rhode Island in ....." The label was once fixed with a green rope to the sponge, but it has now broken off. The sponge (dried) is completely wrinkled into a roundish bush of numerous branches; the degree of fusing of these branches is rather small. The skeleton consists mainly of spongin fibres which are 30-40 μm thick and which contain single spicules at regular distances. The oxea are typically cigar-shaped and measure 110 × 7.5 μm.

The holotype of *Diplodemia vesicula* consists only of gemmulae on the inside of a shell, with a few spongin fibres holding them together. The gemmulae are 800-1000 μm, densely filled with oxea of ca. 110 × 4.8 μm. The spongin fibres are 25-45 μm thick, enclosing a few oxea of ca. 95-125 × 4 μm. The conspecifity of *Diplodemia vesicula* with *H. oculata* is evident and was already mentioned by Topsent (1894a: 16).

All the specimens of *Isodictya varians*, except for the holotype, conform to *H. oculata*; they are all very delicately branched. BMNH 1910.1.1.349 is most similar to the figured sponge of Bowerbank, 1874, pl. LXXXVIII fig. 1, although it is somewhat larger and even more branched than the figured sponge. The oxea are short and very fat: 95 × 10 μm; the amount of spongin is moderate. The specimen designated as the holotype by Bowerbank (Bowerbank, 1874: 124) conforms to *Haliclona cinerea*. This specimen belongs to Johnston's collection of *Halichondria cinerea*, but it has, together with the three other specimens of this collection, been re-identified by Bowerbank. The complex history of these specimens and its bearing on later confusions concerning *H. cinerea* s.l. will be explained to full extent in a forthcoming paper (de Weerdt & Stone, in prep.).

The holotype of *Chalina flemingii* (designated as the type by Bowerbank, 1874: 173) conforms also to *H. cinerea*. The only other specimen of *C. flemingii* (BMNH 1877.5.21.2079) is *H. oculata*. It is branched and stalked, and has irregularly scattered, very small oscules. The skeleton is strongly fibrous and consists of spongin fibres of 8-16 μm, partly containing oxea of reduced size, partly containing oxea of the usual form and size (120 × 7 μm). This specimen is described by Bowerbank (1874: 357). In his description Bowerbank mentioned the similarity to *Chalina oculata*, but because of the irregularly dispersed oscules, which have a lateral linear arrangement in *C. oculata* he assigned the specimen to *C. flemingii*.

The identity of *Veluspa polymorpha* var. *gracilis*, var. *digitata* and var. *arctica* is established on the basis of descriptions and figures. They are, therefore, only tentatively considered synonymous with *H. oculata*.

V. polymorpha var. *gracilis* Miklucho-Maclay (1870: 5) is described as thin branches which fuse into bundles; oscules in rows, sometimes on papillae; the skeleton a regular network of spicula (oxea and strongyles) which are at the nodes connected by spongin. No size of the spicules is given. The description and figures of the sponges and the skeleton evidently point to *H. oculata*. The same holds true for *V.* var. *digitata* and var. *arctica*. Miklucho-Maclay distinguished these forms from the foregoing one by their larger size and higher development of spongin. The three species are described from the Pacific coast of Russia (Sea of Okhotsk); *V. polymorpha* var. *digitata* also from Bear Island.

The identity of *Pachychalina caulifera* (type material not found in ZMA) is also tentatively established on Vosmaer's description and figures and on the ZMK specimens identified by Lundbeck. Vosmaer described the species, from the Barents Sea, as having an elongated, compressed, semi-ramose body, with oscules on one side. His figures of the skeleton and spicula (Vosmaer, 1882, pl. III figs. 64-66) conform to *H. oculata*. The fourth ZMK specimen identified by Lundbeck as *P. caulifera* (from Vestmansund, Greenland) is very similar in habit to the other specimens, but it conforms to *Pachychalina* (= *Isodictya*) *excelsa* Schmidt (1870). This species is extremely similar in habit to sturdy forms of *H. oculata*, but differs from it by the thick, coarse spicule tracts and by the possession of chelae.

Haliclona urceolus (Rathke & Vahl, 1806) (fig. 3, pl. II figs. 1, 2, pl. V figs. 2, 3)

Spongia urceolus Rathke & Vahl [in] Müller, 1806: 42, pl. 157 fig. 3.
Reniera urceolus; Lundbeck, 1902: 35, pl. I fig. 6, pl. XI fig. 1; Brøndsted, 1914: 477; 1932: 24; Hentschel, 1929: 898.
Adocia urceolus; Arndt, 1935: 95, fig. 207.
Haliclona urceolus; Alander, 1942: 25, pl. 4 fig. 2; Burton, 1959: 18; Koltun, 1959: 220, fig. 180; Könnecker, 1973: 459.
?*Spongia laevigata* Montagu, 1818: 95, pl. XVI fig. 4.
Isodictya clava Bowerbank, 1866: 316; 1874: 135, pl. LIII figs. 7-11; 1882: 130.
Chalina pulcherrima Fristedt, 1885: 49, pl. IV figs. 3a, b.
Siphonochalina pulcherrima; Lundbeck, 1902: 13, pl. I figs. 3 & 4, pl. VIII figs. 10 & 11; Brøndsted, 1914: 473.
Haliclona pulcherrima; Alander, 1942: 24, pl. 4 fig. 1; Burton, 1959: 19.
[Non: *Adocia pulcherrima*; Brøndsted, 1924: 451; nec: Bergquist & Warne, 1980: 21 = *Haliclona* spec.].
Reniera clavata Levinsen, 1886: 35, pl. XXIX fig. 5, pl. XXX fig. 3; Lundbeck, 1902: 43, pl. XI fig. 9; 1909: 431; Brøndsted, 1914: 478; 1933a: 18, 1933b: 9.
Haliclona clavata; Burton, 1959: 19.
Chalinula robustior Schmidt, 1870: 38.
Siphonochalina mollicula Lundbeck, 1902: 15, pl. VIII figs. 12-14; Hentschel, 1929: 902.
Reniera simplex Hansen, 1885: 3, pl. I fig. 9, pl. VI fig. 1; Arnesen, 1903: 5.
[Non: *Isodictya simplex* Bowerbank, 1866 = *Haliclona rosea* (Bowerbank), cf. de Weerdt & Stone, in prep.].
?*Chalina vega* Fristedt, 1887: 416, pl. 23 fig. 18, pl. 26 fig. 7; Hentschel, 1929: 988.
?*Chalina groenlandica* Fristedt, 1887: 417, pl. 23 fig. 19.
Reniera voeringii Lundbeck, 1902: 50, pl. XII fig. 3.
?*Reniera glacialis* Hentschell, 1916: 15, fig. 3.
Haliclona implexa; Alander, 1942: 22, pl. 3 fig. 1.
[Non: *Reniera implexa* Schmidt, 1868: 27].
Haliclona montagui; Alander, 1942: 23, pl. 5.
[Non: *Halichondria montagui* Fleming, 1828; nec: *Chalina m.*, *Chalinula m.*, *Pachychalina m.*, and *Haliclona m.* of authors = *Haliclona cinerea* (Grant), cf. de Weerdt & Stone, in prep.].
Haliclona sp. (1st.); Hiscock et al., 1983 [1984]: 28.
"Stalked tubular *Haliclona*"; Ackers et al., 1985: 184, photo's 90 & 91.

Material examined (here also lectotype designation; for the taxonomic status of specimens of *Haliclona urceolus*, see also table III).

BRITISH ISLES AND IRELAND: BMNH 1925.11.1.680, labeled: *Reniera urceolus* (Lundbeck) determined?, Dendy collection, collected by Prof. Herdman on yacht 'Runa', south of the Minch (approx. 57°00'-58°00'N, 6°00'-7°00'W); BMNH 1932.1.5.8, *Isodictya clava* Bowerbank, Moray Firth (three specimens fixed on a card; the left one is the figured specimen of Bowerbank, 1874, pl. LIII fig. 7, and here designated as the lectotype); BMNH 1877.5.21.2039, *Isodictya clava* Bowerbank, Larne Lough, G. Hynoman, 1859; BMNH 1877.5.21.2070, *Isodictya clava* Bowerbank, Shetland, Mr. Barlee, 1859; GA 555, Calve Island, Mull, Scotland, 56°37'N, 6°2-5'W, 6-VI-1938, coll. B. Brooke, G. James, J. Chapman and G. Bishop; GA 556, Calve Island, Mull, Scotland, 56°37.5'N, 6°2-5'W, 20 m, 6-VI-1983, coll. G. Bishop; GA 570, Rusha Nan Gall East, Mull, Scotland, 56°38'N, 6°37'W,

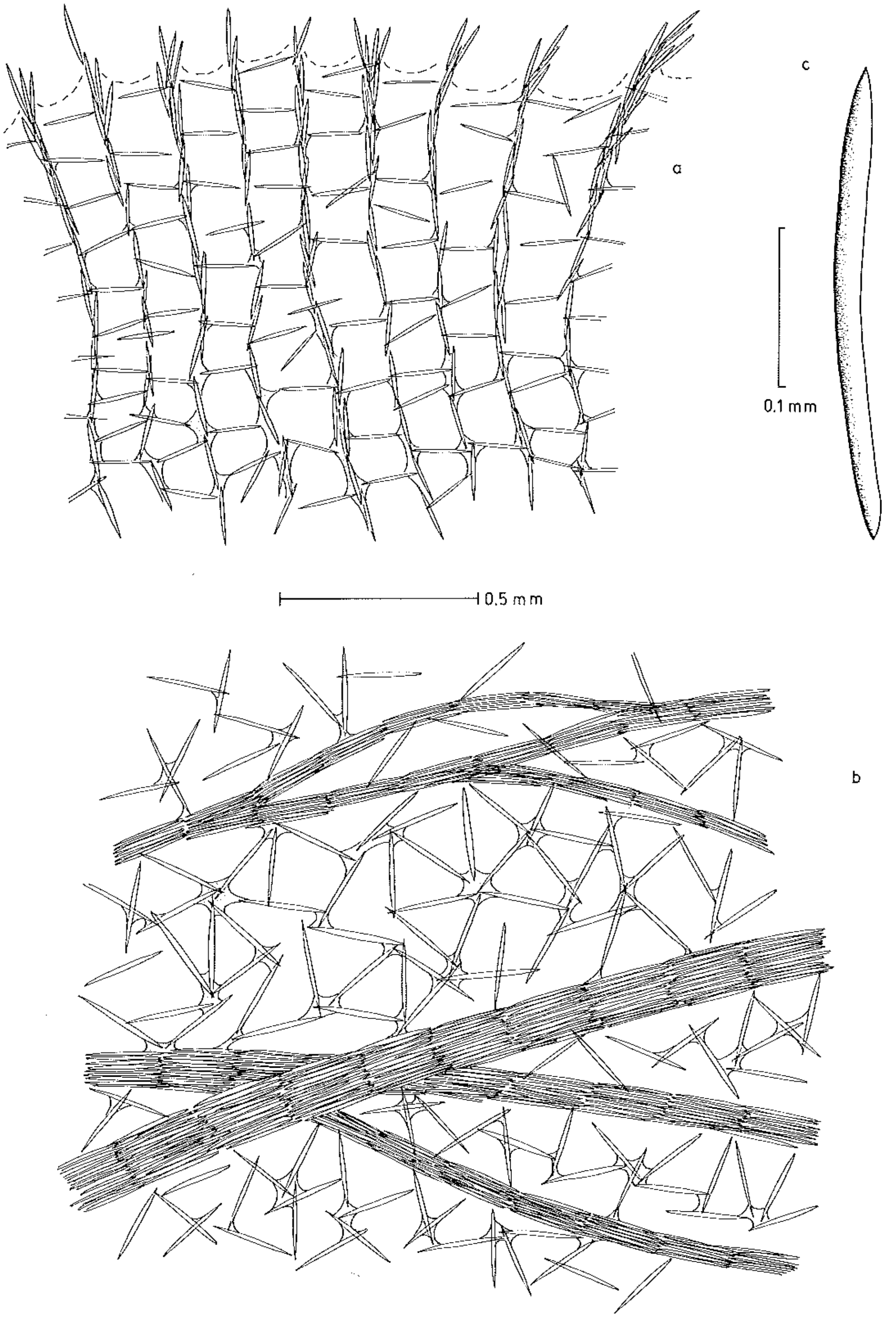

Fig. 3. *Haliclona urceolus*, a. choanosomal skeleton of small specimen, b. choanosomal skeleton of larger specimen, with reinforcing spicule tracts, c. oxe.

8-VI-1983, coll. G. James and J. Chapman; GA 588, Mull, Scotland, 56°32'N, 5°54'W, 13-VI-1983, coll. G. Bishop and B. Brooke; GA 765, Lull Rock, Lundy, 20 m, 22-V-1984, coll. G. Ackers; GA 706, Sound of Mull, Scotland, 56°34'N, 05°59'W, 9-VIII-1984, coll. B. Calf; DM 270, Loch Long, Scotland, 56°10'N, 4°50'W, 10 m, summer 1984, coll. D. Moss; DM 332, Loch Melfort, Argyll, Scotland, 56°12'N, 5°35-39'W, 20 m, on vertical, shaded cliff, summer 1984, coll. D. Moss; BMNH 1984.10.16.1, Millport, 55°56'N, 5°11'W, 10 m, on rock face, 9-VIII-1984, coll. G. Boxhall; BMNH 1984.7.1.1, Wales, 51°40'B, 4°50'W, 4.5 m, July 1984, coll. K. Hiscock.

ZMA POR. 6051, Easdale Quarry, Argyll, Scotland, 56°18'N, 05°39'W, 10 m, 25-XII-1984, coll. D. Moss; POR. 6052, Loch Long, S of Arrochar, Scotland, 10 m, 14-VII-1985, coll. D. Moss; POR. 6053, Loch Long, S of Arrochar. Scotland, 10 m, 14-VII-1985, coll. D. Moss; POR. 6054, Loch Long, S. of Arrochar, Scotland, 10 m, 14-VII-1985, coll. D. Moss; POR. 6055, Loch Long, S of Arrochar, Scotland, 10 m, 4-V-1985, coll. D. Moss; POR. 6056, Lochalvie, Sound of Mull, Scotland, 10-20 m, 9-VIII-1984, coll. B. Calf; POR. 5526, Lough Long, Scotland, July 1984, coll. K. Hiscock; POR. 5515, Crab Rock, Sherkin Island, Ireland, 20 m, 29-VI-1981, coll. S. Weinberg and S. Groot; POR. 5559, Crab Rock, Sherkin Island, Ireland, 18 m, 2-VII-1981, coll. R. W. M. van Soest and S. Weinberg; POR. 5655, Animal Rock, Sherkin Island, Ireland, 12 m, 15-IV-1983, coll. M. Reichert.

CHANNEL ISLANDS: BMNH 1910.1.1.249, labeled: *Isodictya clava*, Guernsey, 1865.

THE NETHERLANDS: ZMA POR. 6046, Gorishoek, Oosterschelde, 5 m, on sediment covered stone, 15-IX-1985, coll. M. de Kluijver; POR. 6067, Ouddorp, Grevelingen, 9 m on sediment covered stone, 27-IV-1986, coll. M. de Kluijver; POR. 6068, Dreischor, Grevelingen, 7.5 m, on sediment covered stone, 16-V-1986, coll. M. de Kluijver.

WADDENSEA: ZMK, on *Mytilus*, Oct. 1976, coll. O. Tendal.

DENMARK: ZMK, off Sofiero, Øresund, 5-V-1963, coll. H. Lemche; ZMK, Thisted Bredning, Limfjord, 7 m, 22-VI-1965, coll. O. Tendal; ZMK, Herthas Flak, Kattegat, coll. O. Tendal.

SWEDEN: ZMK, Gullmarsfjorden, 12-13 m, 29-V-1978, coll. T. Lundälv; ZMK, Gullmarsfjorden, 20-25 m, 29-V-1978, coll. T. Lundälv; ZMK, Idefjord, 10 m, 8-X-1977, coll. H. G. Hansson; ZMK, Vattenholm, 20 m, 6-V-1974, coll. O. Tendal; ZMK, Y. Vattenholmen, Sverige, 120-80 m, 6-V-1975, coll. O. Tendal; ZMK, labeled: *Haliclona montagui*, Anholt, 6-8 fms, 31-VII-1900, coll. Gundel; ZMK, labeled: *Haliclona pulcherrima*, Kostersöcken, 100 m, Gren of Större Kolen, 1-VII-1972, coll. A. Woren and H. G. Hensen; ZMK, 58°12'N, 04°E, 63 fms, coll. Ørsted.

NORWAY: Bergen Museum, Nr 50, *Reniera simplex* Arm. Hansen, Vestfjord, 68°12'N, 15°40'E, 624 m, 19-VI-1878, leg. N. Nord exp., sta. 255, specimen described by Hansen, 1885: 3, here designated as the lectotype; ZMA POR. 1924, Norway, coll. M. Weber; POR. 6047, N of Björöy, Bergen, Norway, 35-45 m, dredge, 13-VIII-1984, coll. W. H. de Weerdt; POR. 6048, Heltjefjord, Bergen, Norway, 250-150 m, dredge, 22-VIII-1982, coll. W. H. de Weerdt c.s.; POR. 6049, Marsteinsboen, Bergen, Norway, 150-130 m, dredge, 23-VIII-1982, coll. W. H. de Weerdt c.s.; POR. 6050, off Saengsbokt, Bergen, Norway, 600-350 m, dredge, 26-VIII-1982, coll. W. H. de Weerdt c.s.

FAROE: ZMK, *Reniera urceolus*, Kalsø, 60 fms, 25-V-1899, coll. Th. Mortensen, det. Lundbeck.

ICELAND: ZMK, *Reniera urceolus*, Skagestrand, 1876, coll. Steincke, det. Lundbeck; ZMK, *Reniera urceolus*, Iceland, 117 m, 1878, coll. Wandel, det. Lundbeck; ZMK, *Reniera urceolus*, Iceland, coll. Stenstrup, det. Lundbeck; ZMK, *Reniera urceolus*, Keplavik, 27-30 m, 26-VI-1901, Diana St. 12, coll. Hörring, det. Lundbeck; ZMK, *Reniera urceolus*, 63°09′N, 13°27′W, 905 m, 23-VIII-1902, coll. M. Sars, Ad. Jensen, det. Lundbeck; ZMK, microscopical slide of Schmidt, labeled: *Chalinula robustior* N. sp., Island, 41^6.

GREENLAND: ZMK, *Reniera urceolus*, Jacobshavn, 18-X-1897, coll. Assist. Olsen, det. Lundbeck; ZMK, *Reniera urceolus*, 68°28′N, 54°47′W, 475-350 m, 18-VIII-1908, coll. Tjalte, det. Brøndsted; ZMK, *Siphonochalina pulcherrima* Fristedt, Jacobshavn, 1874, legit: Pfaff, det. Lundbeck; ZMK, *Reniera clavata* Levinsen, Mikisfjord, Grönland, 175 m, 25-VIII-1932, leg. Degvbol, det. Brøndsted; ZMK, *Reniera clavata* Levinsen, Tasinsak, 55-65 m, 22-VIII-1902, leg. Krüsen, det. Lundbeck; ZMK, *Reniera clavata* Levinsen, 72°40′N, 20°00′W, 190 m, 26-VII-1891, leg. Ryder, det. Lundbeck; ZMK, *Reniera clavata*, Spragl. Bugt., Manak, >10 m, 5-IX-1928, leg. Godthaab, det. Brøndsted; ZMK, holotype *Siphonochalina mollicula* Lundbeck, Egedesminde, 1872, leg. Levinsen, det. Lundbeck.

KARA SEA: ZMK, holotype *Reniera clavata* Levinsen, Kara Havet, 1882, Dymphna, det. Levinsen; ZMK, cotype *Reniera clavata* Levinsen, Kara Havet, 1882, Dymphna, det. Levinsen.

Table III. Taxonomic status of specimens which belong to *Haliclona urceolus*.

specimen	original name	locality	taxonomic status
BMNH 1932.1.58	*Isodictya clava*	Moray Firth	lectotype (design. this paper)
Bergen Museum	*Reniera simplex*	Vestfjord, Norway	lectotype (design. this paper)
ZMK	*Siphonochalina mollicula*	Egedesminde, Greenland	lectotype (design. this paper)

Description of material

The ZMK specimen from Skagestrand (Iceland), identified as *Reniera urceolus* by Lundbeck is a very nice specimen, consisting of a single, hollow tube, 10 cm long and of uniform thickness from the base to the top, viz. 3 cm; the tube ends in a wide, circular osculum of 6 mm; it originates from a short stalk which is attached to a small stone. The sponge is very velvety to the touch and hispid. The consistency is soft, but not limp. The skeleton is a loose, widely meshed, isotropic, unispicular reticulation, reinforced by longitudinal multispicular tracts. The oxea are connected by spongin at the nodes. They have short and sharp points and measure 227 × 14.2 µm (see also table IV in which the spicule sizes of a selection of specimens is given).

The holotype of *Reniera simplex* is also one single, but very small, hollow tube, 2.5 cm high, very slender at the base but gradually increasing in diameter to 0.5 cm at the top. At the end the sponge is damaged and no osculum can be observed. The stalk is 2 cm. The specimen is strongly hispid, very limp and shaggy. The skeleton is a somewhat confused, isotropic, unispicular reticulation, reinforced by multispicular tracts. There is scarce spongin at the nodes of the spicules. These are very slightly curved, with short points; they measure 233 × 9 µm.

The lectotype of *Isodictya clava* is miniscule, but still recognizable as the figured specimen (Bowerbank, 1874, pl. LIII fig. 7). It measures only a few millimeters, and there is no stalk. In BMNH 1877.5.21.2039 a minute stalk of less than a millimeter is present. All the specimens of *Isodictya clava* are very small, hispid and extremely fragile. The skeleton of the lectotype consists partly of uni-paucispicular primary lines, regularly connected by unispicular secondaries; in other parts is it isotropic. There is a little spongin at the nodes of the spicules. The oxea are somewhat cigar-shaped, straight and rather small, viz. 119 × 5 µm. The three specimens found in the Netherlands, and ZMA POR. 5655 (Ireland) are very similar to *I. clava*, both with respect to their small size and to their skeletal architecture. On the average the spicule size of the Dutch specimens is 107 × 6 µm.

The holotype of *Siphonochalina mollicula* consists of a couple of partly fused tubes, all of them ca. 4 cm high, originating from one stalk. The tubes end terminally in an osculum of 2-3 mm. The specimen is very soft and limp. The skeleton is a very loose and open structure, isotropic and unispicular, and there are no reinforcing fibres. The oxea are cigar-shaped, straight and measure 149 × 8.8 µm.

The holotype of *Reiniera clavata* is very similar to the preceding one, and also very soft, hispid and limp. The skeleton is somewhat more confused, but still clearly isotropic and very loose; there are no reinforcing fibres. The oxea are connected by a little spongin at the nodes, they are straight and have short, sharp points; they are much longer and thicker than those of the holotype of *S. mollicula*, viz. 228 × 13.7 µm.

ZMA POR. 5559 is a very nice, delicate specimen, consisting of two hollow tubes which are fused at the base and which rise from a stalk of 1.5 cm. The height of the tubes is 5.5 cm, their diameter 0.5 cm. Both tubes end terminally in an osculum of 3 mm. The area below the apices is slightly swollen. One of the tubes has also one osculum along the side. The sponge is very velvety to the touch. The skeleton is isotropic in the centre and paucispicular towards the periphery. The amount of spongin is rather abundant in the centre, nodal at the periphery. The oxea are cigar-shaped and measure 126 × 6.5 µm.

Diagnosis

Shape and size: basically the sponge consists of hollow, cylindrical or slightly compressed tubes originating from a common flexible stalk. Generally the tubes end terminally in an osculum of varying width, but blind-ended tubes may be present. A few oscules at the sides of the tubes may be also present, but this is not a common feature. There is considerable variation in the number and degree of coalescence of the tubes, and also in the length of the stalk. Young sponges are always of a very simple form, and consist of one or two, partly fused, tubes. Older specimens vary from one large (up to 15 cm) tube to a cluster of fused tubes.
Consistency: very soft. The larger and older the sponge, the more limp it becomes.
Surface: the surface of young, undamaged sponges is slightly velvety, smooth and minutely hispid. In older specimens the surface is less velvety and becomes more shaggy.
Colour: light greyish-brown.
Ectosome: absent.
Choanosome: basically the choanosomal skeleton is a wide-meshed and open, regular reticulation of unispicular primary and secondary lines, which is reinforced by multispicular tracts in older sponges. In small, young sponges the skeleton is more close-meshed, and the primary lines are paucispicular, especially at the periphery.
Spongin: somewhat variable, but mostly moderate. It is always clearly present at the nodes of the spicules; towards the interior of the sponges the spongin may become abundant, but it is never forming reinforcing fibres.
Spicules: short-pointed, cigar-shaped oxea of variable size, ranging from 95-140 by 5-9 µm in southern specimens to 140-ca. 280 by 9-19 µm in northern specimens (see also table IV and fig. 4.

Ecology: in the infralittoral, to ca. 1000 m, on sediment covered stones. Frequently found in sheltered environments.

Distribution (fig. 2): south-east and west coast Greenland, Iceland, Faroe, British Isles, Guernsey, the Netherlands, Denmark, west coast Sweden, Norway, Bear Island, Spitsbergen, Kara Sea.

Discussion

The conspecifity of *Isodictya clava* Bowerbank, *Chalina pulcherrima* Fristedt, *Reniera clavata*

Table IV. Spicule sizes (in µm) of *Haliclona urceolus*.

specimen	locality	spicule size
ZMK *Reniera urceolus* (det. Lundbeck)	Faroe	170.4-*180.7*(8.5)-194.4 × 12.0-*12.7*(0.7)-14.2
Reniera simplex Hansen holotype	68°12′N 15°40′E (Vestfjord, Norway)	196.8-*233.3*(10.5)-244.8 × 7.7-9.0(1.0)-12.0
Chalina pulcherrima Fristedt holotype?	Koster Islands (Swedish W-coast)	258.4-*275.6*(11.3)-296.4 × 17.1-*19.0*(1.2)-21.7
Reniera clavata Levinsen holotype	Kara Sea	216.6-*228.4*(6.8)-245.1 × 11.4-*13.7*(1.0)-15.2
Chalinula robustior Schmidt slide of type?	Iceland	201.4-*219.8*(8.9)-235.6 × 12.2-*14.8*(1.3)-18.6
Siphonochalina mollicula Lundbeck, holotype	Egedesminde (Norway)	129.6-*149.1*(9.6)-165.6 × 7.0-*8.8*(1.2)-11.8
Isodictya clava Bowerbank, lectotype	Moray Firth	112.8-*119.0*(5.9)-127.2 × 4.8-*5.1*(0.5)-6.0
ZMA POR. 5655	Sherkin Island, Ireland	100.8-*106.1*(3.7)-115.2 × 4.3-*4.7*(0.2)-5.0
ZMA POR. 6050	Bergen, Norway	223.2-*229.4*(6.4)-240.0 × 9.8-*11.3*(0.9)-12.5
ZMA POR. 6046	Gorishoek, Netherlands	87.5-*92.8*(3.9)-98.4 × 4.3-*4.6*(0.3)-5.0
ZMA POR. 6068	Dreischor, Netherlands	108.0-*121.1*(5.4)-129.6 × 7.2-*7.7*(0.4)8.4

Levinsen, *Chalinula robustior* Schmidt, *Siphonochalina mollicula* Lundbeck and *Reniera simplex* Hansen with *Haliclona urceolus* is certain, since all the relevant material has been studied. Even though no type-material of *H. urceolus* has been studied (it is not present in the ZMK), the identity of the species could reliably be established through study of the large collection of specimens in the ZMK identified by Lundbeck.

The identity of *Spongia laevigata* Montagu, 1818 (Britain), *Chalina vega* Fristedt, 1887 (Liakov, Siberia), *Chalina groenlandica* Fristedt, 1887 (east coast Greenland) and *Reniera glacialis* Hentschel, 1916 (Spitsbergen) has been tentatively established on basis of the descriptions and figures; they conform to *H. urceolus*, but study of the original material is needed to assess their taxonomic status. *S. laevigata* was described as a tubular sponge of a very delicate structure. Montagu compared the species with the much "coarser" species *oculata* and *dichotoma*. His description reminds strongly of *H. urceolus*. *C. vega* was described as arbuscular and pedicelled, with compressed, frequently anastomosing branches and terminal or often lateral, slightly elevated oscules; the oxea have short points and are 170 µm long. *C. groenlandica* was described as blade-shaped with a few, larger (than *C. vega*) oscules, with an exceedingly soft and fragile consistency, and oxea of 200 µm. Because of the large size of the spicula and the extreme softness the species most probably conforms to *H. urceolus*.

R. glacialis was described as a thick-walled tube, without an ectosomal skeleton; the skeleton of the interior reinforced by spicule tracts and with a unispicular reticulation in between the tracts. The oxea are connected by abundant spongin at the nodes; they have short points and measure 144-168 by 6-8 µm. The conspecifity of *R. glacialis* with *H. urceolus* is very likely.

Alander's (1942) records of *Haliclona pulcherrima*, *H. implexa* and *H. montagui* definitely conform to *H. urceolus*. His figures (showing limp, stalked tubes) and descriptions leave no doubt about the identity of his specimens.

H. urceolus is rather variable in its growth form and consistency, but especially in the size of the spicules. These factors make it a difficult species to deal with, but the number of studied specimens is sufficiently large (64) to enable a preliminary study of the range of the variation. The size of the oxea seems to be correlated with geographical latitude, since the northern specimens have longer and thicker spicules than the more southern specimens (cf. fig. 4). A similar phenomenon has been demonstrated by Hartman (1958) in American populations of *Haliclona oculata*. Hartman found larger oxea in populations north of Cape Cod than in those south of Cape Cod. Whether this variation in spicule size is directly correlated with the water temperature or indirectly by differences in silica content is still under investigation (cf. Simpson, 1978 and Hartman, 1981).

Less variable characters of *H. urceolus* are the terminally situated oscules, the colour which is always greyish-light brown, the architecture of the skeleton and the form of the spicules. A slight variation in the skeletal architecture is that in young, small specimens the skeleton is less wider meshed than in older specimens and that it tends to be paucispicular instead of unispicular and isotropic. The longitudinal reinforcing tracts are absent in young specimens. Thus, the older the sponge becomes, the looser its skeleton and the more it is reinforced by multispicular tracts. These tracts are, however, not very strong, since large specimens collapse immediately when they are taken out of the water. A slight variation was also observed in the form of the oxea. In young specimens they are slightly more cigar-shaped than in older sponges. They are, however, always very sharply and shortly pointed.

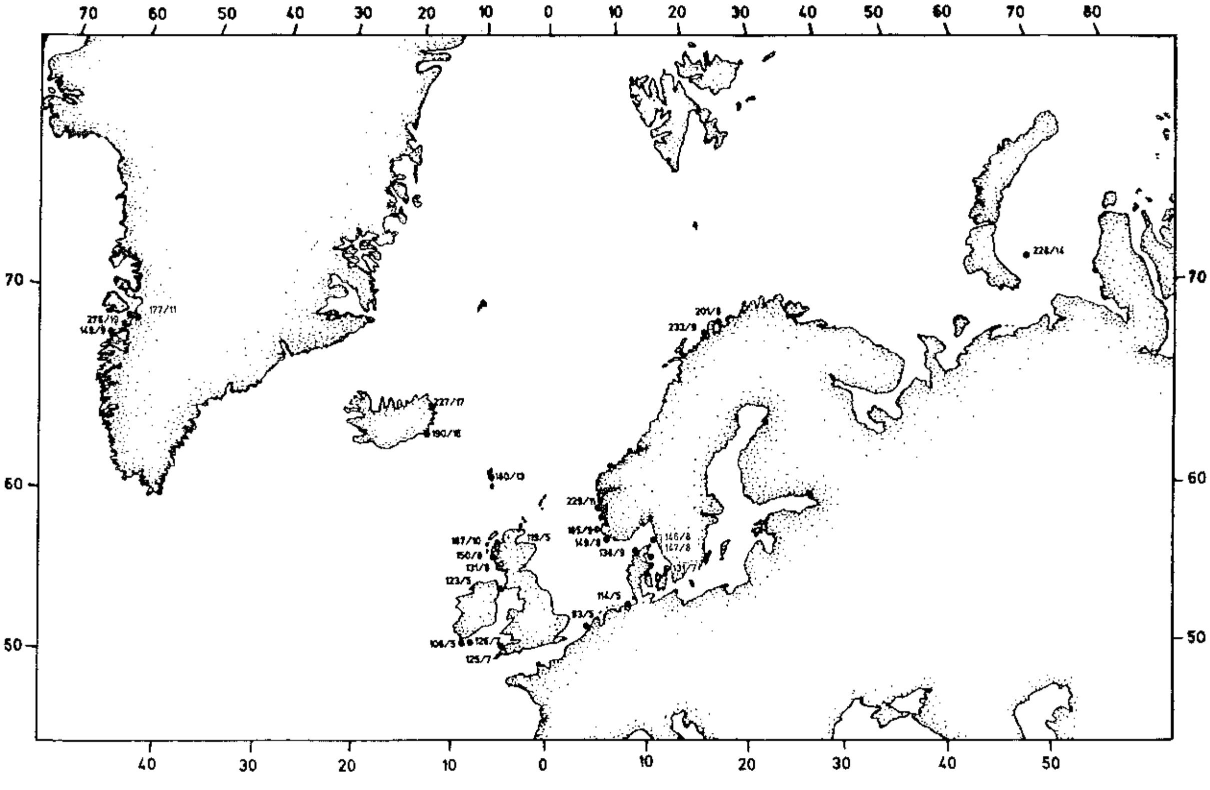

Fig. 4. Spicule sizes of *Haliclona urceolus* at different geographical localities.

In habit *H. urceolus* is quite similar to *Haliclona implexa* (Schmidt, 1868), a stalked Mediterranean-Atlantic species. Young specimens may be confused with the sympatric, also stalked species *Haliclona oculata* (Pallas). Furthermore the species must be compared with another stalked chalinid, viz. the Mediterranean species *Reniera* (= *Haliclona*) *rhizophora* Vacelet, 1969.

H. urceolus differs morphologically from *H. oculata* by its terminally placed oscules, but especially by its hollow tubes. In *H. oculata* the oscules are normally not terminal. The branches usually end blind and they are not hollow. Full grown specimens are easily separable, but when the sponges are very small and somewhat damaged they might be confused. The skeletal architecture may be very similar in extreme cases, and the same holds true for the size and shape of the oxea. Generally the skeleton of *H. oculata* is more rigid, heavily reinforced by spongin, and not by tracts as in *H. urceolus*. The oxea of *H. oculata* are always characteristically cigar-shaped and although they vary in size as well they never reach the size of *H. urceolus*. Geographically the species overlap largely.

H. implexa is not included in the present study, but material of this species which was collected by the CANCAP-expeditions of the Rijksmuseum van Natuurlijke Historie, Leiden (RMNH) at the Canary Islands, Madeira and the Azores, has been described by de Weerdt & van Soest (1986). Morphologically the species differ only slightly; the stalk of *H. urceolus* is more strongly developed and longer than in *H. implexa*, but both species are tubiform, and consists of coalescent tubes with terminally placed oscules. The main and distinguishing difference is the skeletal architecture and the size of the oxea: *H. implexa* has a tangential ectosomal skeleton, which consists of the size of a rather irregular, unispicular reticulation of oxea which are at the nodes connected by a little amount of spongin. The choanosome is irregularly paucispicular, with ill-defined primary and secondary lines. The oxea are very slender and fusiform, and measure only 110 by 2-6 µm. Geographically the two species are well separated.

H. urceolus differs from *Reniera rhizophora* especially in its skeletal architecture. Through the courtesy of Dr. J. Vacelet I was able to study his type specimen; it has an ectosomal skeleton, like *H. implexa*, but is denser and more confused. The choanosomal skeleton is also more confused. The oxea are very slender and long: 220-330 × 5-7.5 µm (Vacelet, 1969: 213, and my observations). *R. rhizophora* is only known from the Mediterranean. Griessinger (1971) erected the genus *Rhizoniera* for the species, on the basis of the "rooted" stalk. This character is not considered to be a unique evolutionary development, and thus there seems to be no objective argument to erect a new genus for this single species. *Reniera rhizophora* is here transferred to *Haliclona*.

Haliclona simulans (Johnston, 1842)
(fig. 5, pl. I fig. 5, pl. II figs. 4-6, pl. V figs. 4-6)

Halichondria simulans Johnston, 1842: 109, pl. VIII figs. 1-6; Carter, 1874b: 331, pl. XXI figs. 21-24, pl. XXII figs. 28-34.

Haliclona simulans; Bowerbank, 1861: 71; Borojevic et al., 1968: 28; Ackers et al., 1985: 179, photo's 38 & 89.

Chalina simulans; Bowerbank, 1864: 101, pl. XIX fig. 299.

Isodictya simulans; Bowerbank, 1866: 308; 1874: 131, pl. LI figs. 5 & 6; 1882: 125.

Adocia simulans; Gray, 1867: 552; Topsent & Olivier, 1943: 3; Lévi, 1950: 23; 1956: 119; Sarà & Siribelli, 1962: 51; Descatoire, 1969a: 201; Griessinger, 1971: 158, fig. 12a; Sarà, 1971-72: 85, fig. 10E; Pulitzer-Finali, 1978: 84; van Soest & Weinberg, 1980: 10; van Soest et al., 1981 [1983]: 43; Jones, 1984: 242.

Reniera simulans; Schmidt, 1870: 77; Topsent, 1888: 101, pl. V fig. 3; 1890: 201; 1891a: 527; 1894a: 8; 1896: 118; 1899: 105; 1901: 356; 1925a: 14; 1925b: 712; 1928: 326; Stephens, 1912: 24; 1917: 6; 1921: 7; Tuzet, 1932: 169-190, figs. I-VIII.

Isodictya densa (pars) Bowerbank, 1866: 292; 1874: 127, pl. L figs. 5-7; 1882: 125.

Chalinula densa; Schmidt, 1870: 77.

Reniera densa; Topsent, 1890; 201; 1891: 527; Delage, 1892: 377, pl. XIX fig. 1, 1a-t; Crawshay, 1912: 313.

Adocia densa; Lévi, 1950: 23.

Haliclona densa; Borojevic et al., 1968: 26.

Isodictya pallida (pars) Bowerbank, 1866: 297.

[Non: Bowerbank, 1874: 127, pl. L figs. 8-10 = *Haliclona cinerea* (Grant), cf. de Weerdt & Stone, in prep.].

Chalinula pallida; Schmidt, 1870: 77.

Isodictya ingalli Bowerbank, 1874: 241, pl. LXXVIII figs. 1-4, 1882: 126.

Reniera ingalli; Hanitsch, 1890: 199.
Halichondria condensa Bowerbank, 1882: 102, pl. VI figs. 1-3.
Siphonochalina crassa Topsent, 1925b: 713, fig. 27n, pl. VIII fig. 8; 1928: 329; Vosmaer, 1933-35, pl. 58 fig. 16; Sarà 1971-72: 84, fig. 10C.
Reniera crassa; Griessinger, 1971: 126, fig. 4b & c.
[Non: *Isodictya crassa* Bowerbank = *Halichondria panicea* (Pallas)].
?*Adocia varia* Sarà, 1958b: 267, pl. II fig. G, fig. 26a-c; Griessinger, 1971: 159, fig. 12, b, pl. II fig. 4.
Adocia cinerea; (pars) Arndt, 1935: 93.

Lectotype: BMNH 1847.9.7.9.

Lectotype-locality: Britain.

Material examined (here also lectotype designation, for the taxonomic status of specimens of *Haliclona simulans* see also table V).

BRITISH ISLES AND IRELAND: BMNH 1847.9.7.9, JC, *Halichondria simulans* Johnston, type, Britain, figured specimen of Johnston, 1842, pl. VIII fig. 5, here designated as the lectotype; BMNH 1847.9.7.5-6, JC, *Halichondria simulans* Johnston, type, Britain, five fragments fixed on a card, among which the figured specimen of Johnston, 1842, pl. VIII fig. 2, and two other fragments; BMNH 1847.9.7.4, JC, *Halichondria simulans* Johnston, type, Britain, two larger and four smaller fragments, among which the figured specimen of Johnston, 1842, pl. VIII fig. 1; BMNH 1847.9.7.8, JC, *Halichondria simulans* Johnston, type, Britain, the left one of the figured specimens of Johnston, 1842, pl. VIII fig. 4; BMNH 1932.1.5.2a, BC, *Isodictya simulans*, Hastings, figured specimen of Bowerbank, 1874, pl. LI fig. 5, designated as generolectotype of *Adocia* by Burton, 1934a: 534; BMNH 1877.5.21.2071, *Isodictya simulans*, BC, Hastings; BMNH 1877.5.21.2072, *Isodictya simulans*, BC, Tenby; BMNH 1877.5.21.2073, *Isodictya simulans*, BC, Brighton; BMNH 1877.5.21.2074, *Isodictya simulans*, BC, Torquay; BMNH 1910.1.1.337, *Isodictya simulans*, NC, Westport Bay; BMNH 1910.1.1.355, *Isodictya simulans*, NC, Aberyst, with Mr. Bolton, Mr. Ingall; BMNH 1910.1.1.366, *Isodictya simulans*, NC, Strangford Lough; BMNH 1910.1.1.255, NC, Polperro, Cornwall, holotype *Isodictya densa* Bowerbank, designated by Bowerbank, 1874: 127; BMNH 1910.1.1.256, *Isodictya densa*, NC, Polperro, Cornwall; BMNH 1877.5.21.2075, *Isodictya densa*, BC, Polperro, Cornwall; BMNH 1877.5.21.2076, *Isodictya densa*, BC, Liverpool; BMNH 1877.5.21.2063, *Isodictya pallida* Bowerbank, BC, Hastings (five specimens in one box, four belonging to *Haliclona cinerea* (Grant), and one to *Haliclona simulans*, cf. de Weerdt & Stone, in prep.); BMNH 1877.5.21.2064, *Isodictya pallida*, BC, Torquay; BMNH 1877.5.21.2065, *Isodictya pallida*, BC, Torquay, here designated as the lectotype; BMNH 1877.5.21.2066, *Isodictya pallida*, BC, Torquay; BMNH 1877.5.21.2067, *Isocictya pallida*, BC, Torquay; BMNH 1932.1.5.1,*Isodictya ingalli* Bowerbank, NC, Southport Lancashire, G. Graves, figured specimen of Bowerbank, 1874, pl. LXXVIII fig. 1, here designated as the lectotype; BMNH 1910.1.1.290, *Isodictya ingalli*, NC, Southport Lancashire, G. Graves; BMNH 1877.5.21.2077, *Isodictya ingalli*, BC, Southport; BMNH 1877.5.21.2078, *Isodictya ingalli*, BC, Southport; BMNH 1910.1.1.180, *Halichondria condensa* Bowerbank, NC, Isle of Man, Mr. D. Robertson, figured specimen of Bowerbank, 1882, pl. VI fig. 1, here designated as thelectotype; BMNH 1910.1.1.181, *Halichondria condensa*, NC, dredged off Girvan, 142D; BMNH 1910.1.1.182, *Halichondria condensa*, NC, loc?. ZMA POR. 6029, off Seals Hole, Lundy, 15 m, 30-VII-1985, coll. D. Moss; GA 266, Brange Bay, Alderney, 10 m, 24-V-1980, coll. G. Ackers; GA 473, Outer Halbary, Porghan, Sussex, 4 m, 3-VII-1983, coll. G. Ackers; POR. 4436, Hake Island, Sherkin Island, Ireland, under littoral stones, 29-VIII-1977, coll. R. W. M. van Soest; POR. 5524, Carriganorana, Sherkin Island, Ireland, LLWS, 0.5 m, under littoral stones, 29-VI-1981, coll. W. H. de Weerdt and R. W. M. van Soest; POR. 5980, The Sound, Sherkin Island, Ireland, 5 m, 18-VIII-1982, coll. M. Reichert and W. Doesburg; POR. 5988, Carrigleamore Rock, Sherkin Island, Ireland, 8 m, 30-VII-1982, coll. W. Doesburg and M. Reichert;

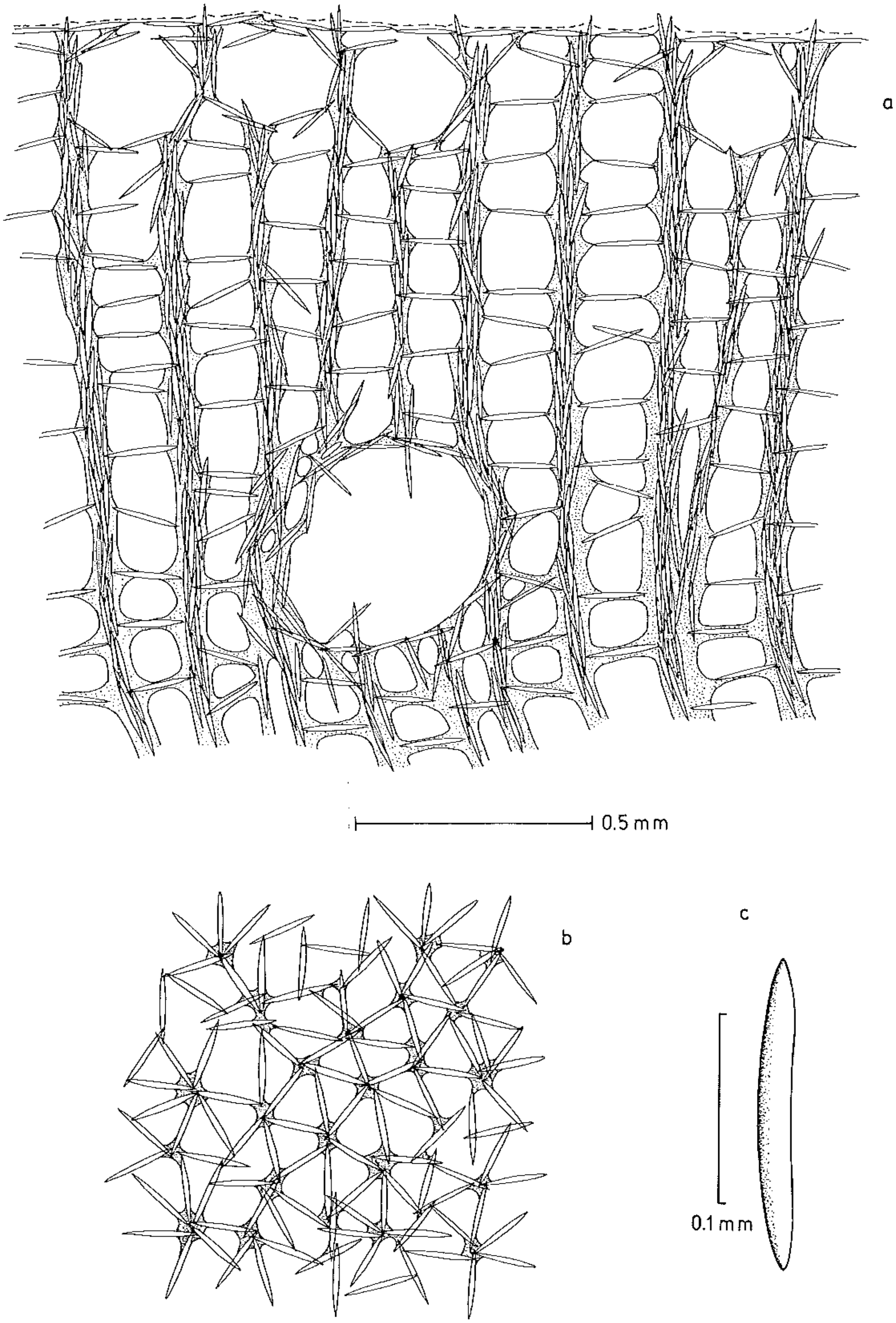

Fig. 5. *Haliclona simulans*, a. choanosomal skeleton, b. tangential view of ectosomal skeleton, c. oxe.

POR. 5985, E of East Calf Island, Roaring Water Bay, Ireland, 6 m, 6-VIII-1982, coll. M. Reichert and W. Doesburg; POR. 4438, Lough Ine, Co. Cork, Ireland, under littoral stones, 4-X-1978, coll. R. W. M. van Soest; POR. 4536, Lough Ine, Co. Cork, Ireland, rapids, under littoral stones, 25-VIII-1980, coll. R. W. M. van Soest; POR. 5521, Lough Ine, Co. Cork, Ireland, 10 m, 12-IX-1983, coll. W. H. de Weerdt; POR. 5522, Lough Ine, Co. Cork, Ireland, 4-10 m, 27-VI-1981, coll. R. W. M. van Soest and W. H. de Weerdt; POR. 5603, Lough Ine, Co. Cork, Ireland, 12 m, 27-VI-1981, coll. R. W. M. van Soest and W. H. de Weerdt; POR. 5659, Lough Ine, Co. Cork, Ireland, 10 m, 12-IX-1983, coll. W. H. de Weerdt.

CHANNEL ISLANDS: BMNH 1910.1.1.344, *Isodictya simulans*, NC, Guernsey.

FRANCE: MNHN D.T. 3016, *Siphonochalina crassa* Topsent, Peufret, Iles de Glénans, 16-IX-1921; MNHN D.T. 2944, *Siphonochalina crassa* Topsent, Iles de Glénans, St. XV, 25-VIII-1922.

ZMA POR. 105, La Tortue, Baie de Morlaix, Finistère, 15-30 m, XI-1963, coll. A. Descatoire; POR. 237, La Tortue, Baie de Morlaix, Finistère, 15-25 m, 18-VII-1964, coll. G. Kleeton; POR. 253, La Tortue, Baie de Morlaix, Finistère, 20-25 m, 7-VIII-1964, coll. G. Kleeton; POR. 4435, Château du Taureau, Baie de Morlaix, Finistère, 25 m, 12-VIII-1954, coll. excursion Roscoff; POR. 4843, La Tortue, Baie de Morlaix, Finistère, 15 m, 9-VI-1982, coll. W. H. de Weerdt; POR. 5549, Château du Taureau, Baie de Morlaix, Finistère, 28 m, 14-VIII-1981, coll. W. H. de Weerdt and S. Groot; POR. 5550, La Tortue, Baie de Morlaix, Finistère, 12-15 m, 7-VIII-1981, coll. W. H. de Weerdt and S. Groot; POR. 5556, La Tortue, Baie de Morlaix, Finistère, 12-15 m, 7-VIII-1981, coll. W. H. de Weerdt; POR. 5601, Château du Taureau, Baie de Morlaix, Finistère, 20 m, 11-VIII-1981, coll. W. H. de Weerdt; POR. 238, Pointe de Primel, Finistère, on littoral rock, 9-VIII-1964, coll. G. Kleeton; POR. 262, Chenal d'Ile Verte, Roscoff, LLWS, on littoral stones, 23-VII-1964, coll. G. Kleeton; POR. 5523, Pointe de Bloscon, Roscoff, LLWS, on littoral stone, 6-VIII-1981, coll. W. H. de Weerdt and S. Groot; POR. 5548, Pointe de Bloscon, Roscoff, LLWS, 2-3 m, 6-VIII-1981, coll. W. H. de Weerdt and S. Groot; POR. 5547, Pointe de Rostiviec, Brest, LLWS, 3 m, 9-VIII-1981, coll. W. H. de Weerdt and S. Groot; POR. 4722, Etretat, Seine-mar, on roof of cave, LLWS, 0 m, 2-VI-1981, coll. J. H. Stock and R. W. M. van Soest.

PORTUGAL: ZMA POR. 5673, Foz do Douro, under stone, 11-VII-1983, coll. R. Ates.

MEDITERRANEAN: MNHN, *Adocia varia*, Banyuls, coll. J.-M. Griessinger.

Table V. Taxonomic status of specimens which belong to *Haliclona simulans*.

specimen	original name	locality	taxonomic status
BMNH 1847.9.7.9	*Halichondria simulans*	Britain	lectotype (design. this paper)
BMNH 1910.1.1.255	*Isodictya densa*	Polperro, Cornwall	holotype (design. Bowerbank, 1874: 127)
BMNH 1877.5.21.2065	*Isodictya pallida*	Torquay	lectotype (design. this paper)
BMNH 1932.1.5.1	*Isodictya ingalli*	Southport, Lancashire	lectotype (design. this paper)
BMNH 1910.1.1.180	*Halichondria condensa*	Isle of Man	lectotype (design. this paper)

Description of material

The lectotype of *Halichondria simulans* consists of a rather thin, flat base of 5.5 × 2.5 cm with one pronounced volcano-shaped elevation and two smaller ones. The larger elevation is ca. 2 cm high. There are a few small, circular, not elevated oscules at the basal part of the sponge, and at the top of the smaller elevations. The large elevation ends blind but has two small oscules halfway. The diameter of the oscules is ca. 2 mm. The colour is brown (dried) and the consistency is very firm. The surface is smooth. The ectosomal skeleton is a regular tangential, unispicular reticulation of oxea, which partly intercross and which are connected by spongin at the nodes. The choanosomal skeleton is a strong reticulation of pauci-multispicular primary lines, regularly connected by unispicular secondary lines. The oxea are cigar-shaped and measure 129 × 7.8 µm (see also table VI in which the spicule sizes of a selection of specimens are given).

The lectotype of *Isodictya pallida* is a flat patch, 2.3 × 1.3 × 0.3 cm, growing on a solid conglomerate of tube worms and calcareous algae. There are three circular oscules flush with the surface, ca. 1 mm in diameter. The colour (dried) is light yellowish-brown, the consistency very firm and the surface smooth. The ectosome is again a rigid, isotropic reticulation of spicules which partly intercross and which are at the nodes connected by spongin. The choanosome is a strong, dense reticulation of pauci-multispicular primary lines, regularly connected by unispicular secondary lines. There are many choanosomal spaces. The oxea are cigar-shaped and measure 136 × 8.8 µm.

The lectotype of *Isodictya ingalli* is laterally branched, fully corresponding to Bowerbank's figure (Bowerbank, 1874, pl. LXXVIII fig. 1). The colour is light yellowish-brown, the consistency very firm and the surface smooth. The skeletal architecture and shape of the oxea is the same as the other specimens. The oxea measure 144 × 8.6 µm.

MNHN D.T. 2944, *Siphonochalina crassa* consists of one, coarse tube ending in a wide osculum. The colour (spirit) is yellowish-brown, and the consistency very firm. The skeletal architecture is completely similar to Johnston's and Bowerbank's specimens. The oxea measure 153 × 9.4 µm.

ZMA POR. 5549 (pl. II fig. 6 of the present paper) is a bush of partly fused branches, which are 0.5-1 cm thick. A few branches have broken off, but the remainder of the bush is 18 cm high, and ca. 8.5 cm at its largest breadth. It consists of 10 branches, which originate from two basal branches; these were attached to the substratum with a small base. The oscules are circular, some of them with a slightly elevated rim, 1-2 mm. They are situated on all sides of the branches at regular intervals; the area around the oscules is swollen. The colour (spirit) is light yellowish, with darker coloured areas.

Diagnosis

Shape and size: extremely polymorphic. At the underside of intertidal stones it grows as thin, flat encrustations with small circular oscules which are slightly elevated or flush with the surface. It may form large, laterally spreading masses, from which arise chimney- and volcano-shaped, osculiferous, and also branching elevations. The sponge may also be repent ramose, forming bushes of branches which fuse at irregular distances and which are intermittently attached to the substratum. The osculiferous elevations may, in extreme cases, be so large as to become thick-walled tubes which end in a wide osculum. Commonly the number of oscules is rather high; they are situated at regular distances on the encrusting basal part and they are very regularly distributed on all sides of the branches. The area directly around an osculum is frequently somewhat swollen, especially in the branched and tube-like forms. The size varies from a few centimetres in diameter in the encrusting forms to 20-30 cm in the branched forms.

Consistency: very firm and incompressible, corky.

Surface: smooth and even, in places slightly hispid.
Colour: various shades of brown, dark-yellow, orange and grey. Most frequently there are several different coloured areas adjacent to each other, with a sharp boundary. The areas around the oscula are often whitish.
Ectosome: a strong, very regular, unispicular and isotropic, tangential reticulation of oxea. Frequently the oxea inter-cross.
Choanosome: a rigid, rather close-meshed skeleton of straight paucispicular primary lines which are connected by single or double secondary spicules at regular distances. Many choanosomal spaces.
Spongin: moderate to abundant, yellowish, clearly visible. Always present at the nodes of the spicules, but it becomes very abundant towards to interior. Here it forms thick fibres, which are enclosing the spicules entirely.
Spicules: short, fat, cigar-shaped oxea, with rather short and sharp points, 130-155 by 8-11 µm (see also table VI).

Ecology: under intertidal stones and in the infralittoral, to 30 m. Rather common.

Distribution (fig. 6): British Isles, Channel Islands, France, Portugal, reaching south to the Mediterranean, Madeira and the Canary Islands.

Discussion

Haliclona simulans is well characterized by its firm consistency, the different coloured areas within the same individual, and by its skeletal characteristics.

The conspecifity of *Isodictya densa*, *Isodictya pallida* (the majority of the specimens in the BMNH collection belong to *H. simulans*, a few however appeared to be *Haliclona cinerea* (Grant)), *Isodictya ingalli*, *Halichondria condensa* and *Siphonochalina crassa* is certain. The established synonymy of the species is based on a thorough comparison of all the original specimens.

Table VI. Spicule sizes (in µm) of *Haliclona simulans*.

specimen	locality	spicule sizes
BMNH 1847.9.7.9 *Halichondria simulans* Johnston, lectotype	Britain	111.6-*129.3*(8.0)-150.0 × 7.0-*7.8*(0.7)-9.1
BMNH 1932.1.5.21 *Isodictya simulans*	Hastings	108.0-*119.7*(8.9)-141.6 × 5.0-*6.6*(1.0)-9.1
BMNH 1910.1.1.255 *Isodictya densa*, holotype	Polperro	124.8-*136.1*(8.1)-156.0 × 7.2-*8.0*(0.6)-9.6
BMNH 1877.5.21.2064 *Isodictya pallida*	Torquay	127.2-*136.6*(5.7)-148.8 × 7.4-*8.8*(0.8)-9.6
BMNH 1932.1.5.1 *Isodictya ingalli*, lectotype	Lancashire	120.0-*143.6*(18.5)-168.0 × 7.2-*8.6*(1.2)-10.8
BMNH 1910.1.1.180 *Halichondria condensa*, lectotype	Man	134.4-*156.2*(8.6)-168.0 × 8.2-*9.5*(0.8)-10.8
MNHN D.T. 2944 *Siphonochalina crassa*	Iles de Glénans	136.8-*153.0*(9.6)-170.4 × 7.7-*9.4*(1.1)-11.8
ZMA POR. 5522	Lough Ine	134.4-*145.2*(7.9)-153.6 × 8.4-*9.8*(0.9)-10.6
ZMA POR. 5547	Brest	132.0-*156.1*(11.6)-175.2 × 9.4-*11.4*(1.3)-13.9
ZMA POR. 5549	Roscoff	127.2-*138.2*(6.7)-160.8 × 7.4-*8.8*(0.9)-11.8

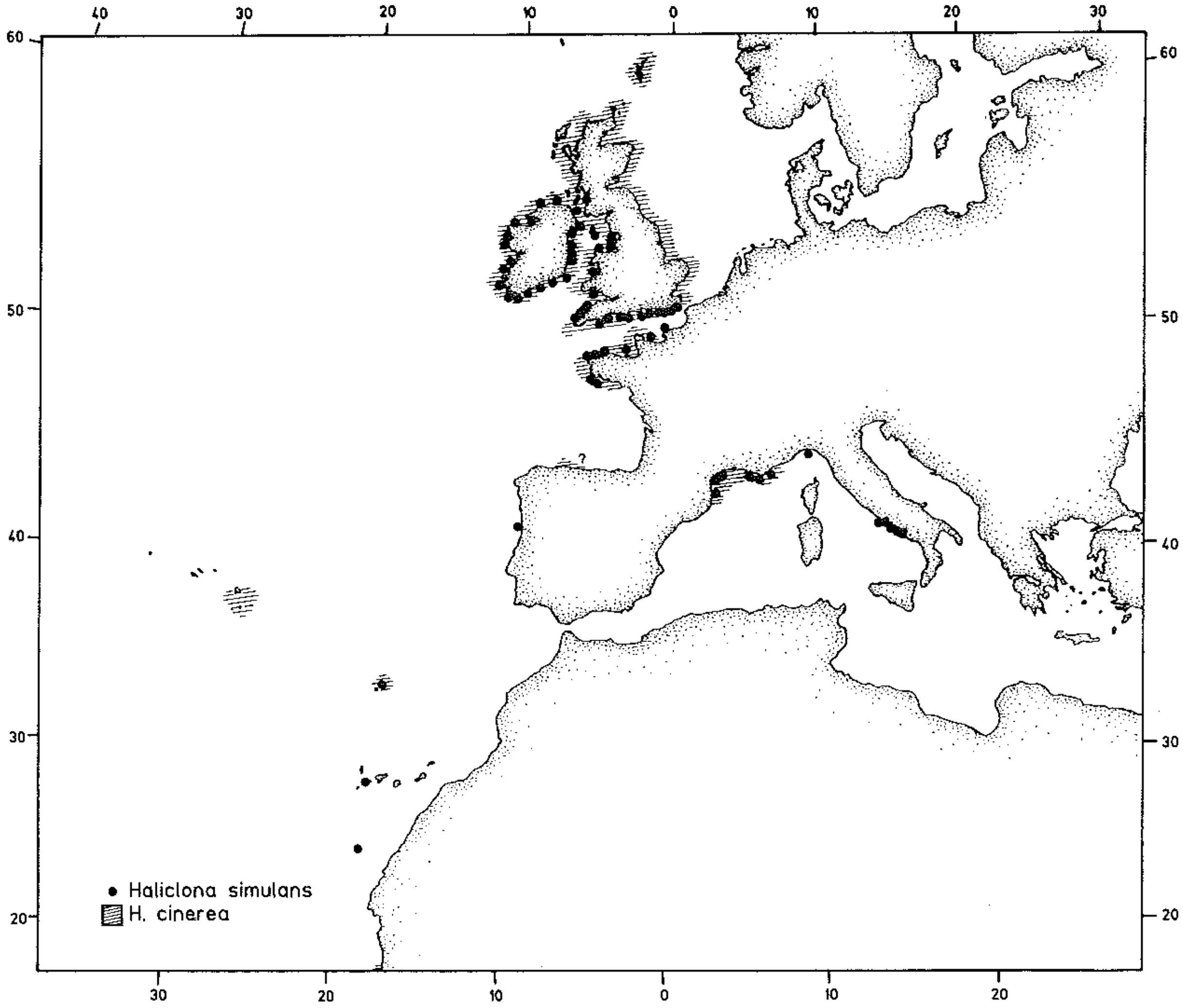

Fig. 6. Distribution of *Haliclona simulans* and generalized distribution of *H. cinerea*.

The conspecifity of the Bowerbank's species with *H. simulans* needs no further discussion here; all specimens fall within the range of the most common growth forms, viz. encrusting patches, patches with elevated oscules, and repent ramose branching forms. They are all of the firm, corky consistency of *H. simulans* and they have the characteristic skeletal architecture. The spicula sizes of a selection of specimens is given in table VI.

The conspecifity of the Mediterranean species *Siphonochalina crassa* Topsent, 1925b with *H. simulans* may need some explanation here. Topsent (l.c.: 713) described the species from a specimen identified by Schmidt as *Siphonochalina coriacea* Schmidt (1868), but which he considered as a different species. This specimen was branched, firm, and with robust, slightly curved and shortly pointed oxea of 160-190 by 8-10 μm. Topsent recorded *S. crassa* as a common species in the Gulf of Naples. The here studied specimens of *S. crassa* are from the Iles de Glénans (south Brittany); both specimens consists of large, thick-walled tubes which end in a wide osculum. That this form occurs in northern representatives of *H. simulans* is demonstrated by the specimen of pl. II fig. 5 (GA 266); this sponge is a smaller representation of Topsent's specimens of *S. crassa*. The form is not a common one, but the figured sponge proves that it does exist. The firm consistency, the different coloured areas and the skeletal characteristics leave no doubt about the identity of Topsent's material and the figured specimen. Griessinger (1971: 126) described Topsent's species, as *Reniera crassa* and treated *Haliclona simulans*, as *Adocia*, in the same paper (l.c.: 158). It is hard to understand why he assigned the two species to different genera. In his description of *R. crassa* he mentioned the high similarity of this species with tubiform specimens of *A. simulans*. As only difference and as a characteristic feature of *R. crassa* he mentioned the spicule brushes projecting through the surface. *H. simulans* varies somewhat in the degree of hispidity; it may be rather hispid in some places (caused by projection of the primary lines through the surface) and entirely smooth in other places. The studied specimens of *Siphonochalina crassa* showed a similar variation in the degree of hispidity.

H. simulans is related to the Mediterranean species *Adocia* (= *Haliclona*) *varia* Sarà, 1958b, *Adocia* (= *Haliclona*) *reptans* Griessinger, 1971, *Adocia* (= *Haliclona*) *laevis* Griessinger, 1971, and *Adocia* (= *Haliclona*) *cribrata* Pulitzer-Finali, 1983.

H. simulans is most similar to *H. varia*. Sarà (1958b: 267, pl. II fig. G, fig. 26 a-c) described this species from the Gulf of Naples as a branched, lobate sponge with circular oscules of 1 mm, with a regular tangential ectosomal skeleton, with a paucispicular choanosomal skeleton, and oxea of 100-118 × 4-7 μm. Many centrotylote oxea, styles and strongles were intermixed. I have not studied Sarà's material, but instead I could make a microscopical slide of Griessinger's material of the species, described from the Adriatic and Banyuls. The fragment of which I made the slide was strikingly similar to *H. simulans*, as far as the form (one lobate osculiferous fragment) and the consistency are concerned. The colour was greyish. The skeletal architecture, especially of the ectosome is very similar to *H. simulans*: the extosomal skeleton consists of regular, intercrossing oxea; the choanosome is paucispicular. The oxea are ca. 122-132 × 5 μm. As only difference there is very little spongin in Griessinger's material of *H. varia*, which agrees with Sarà's description. Tentatively I consider *H. simulans* and *H. varia* as conspecific.

H. simulans differs mainly from *H. reptans* by the much smaller oxea of the latter species, viz. ca. 90 × 5 μm; the same holds true for *H. laevis*, which is indistinguishable from *H. reptans*. From both species the type specimens, which are stored in the MNHN have been studied.

The difference between *H. simulans* and *H. cibrata* is the more fragile consistency of the latter species, and its much smaller and fusiform oxea (60-100 × 2.5-4.5 μm, according to Pulitzer-Finali, 1983: 583). In addition *H. cribrata* has little spongin.

Haliclona cinerea (Grant, 1826)

(fig. 7, pl. I fig. 6, pl. III fig. 1, pl. VI figs. 1-3)

Remark: *Haliclona cinerea* is one of the most complicated species of the family, and its taxonomic history was in great need of revision. The species has been revised, but the results of this study will be published in a separate paper (de Weerdt & Stone, in prep.). To avoid an unacceptable overlap of the two publications, only the most important synonyms and references are given here. The same applies to the material studied and lectotype designation. For the discussion concerning the references one is referred to the forthcoming publication.

Spongia cancellata; Sowerby, 1806: 131, pl. IX; Turton, 1807: 208; Montagu, 1818: 110.

[Non: *Spongia cancellata* Linnaeus, 1767; nec: Lamarck, 1813].

Spongia cinerea Grant, 1826: 204, pl. II fig. 3.

Halichondria cinerea; Fleming, 1828: 521; Johnston, 1842: 110, pl. IV figs. 3-4.

Isodictya cinerea Bowerbank, 1866: 274; 1874: 121, pl. XLVIII figs. 1-5; 1882: 115.

Halichondria montagui Fleming, 1828: 522.

Chalina montagui; Bowerbank, 1866: 366; 1874: 173, pl. LXVIII figs. 3-5; 1882: 185.

Haliclona montagui; van Soest et al., 1981: 45.

[Non: *Haliclona montagui*; Alander, 1942: 23, pl. 5 = *Haliclona urceolus* (Rathke & Vahl].

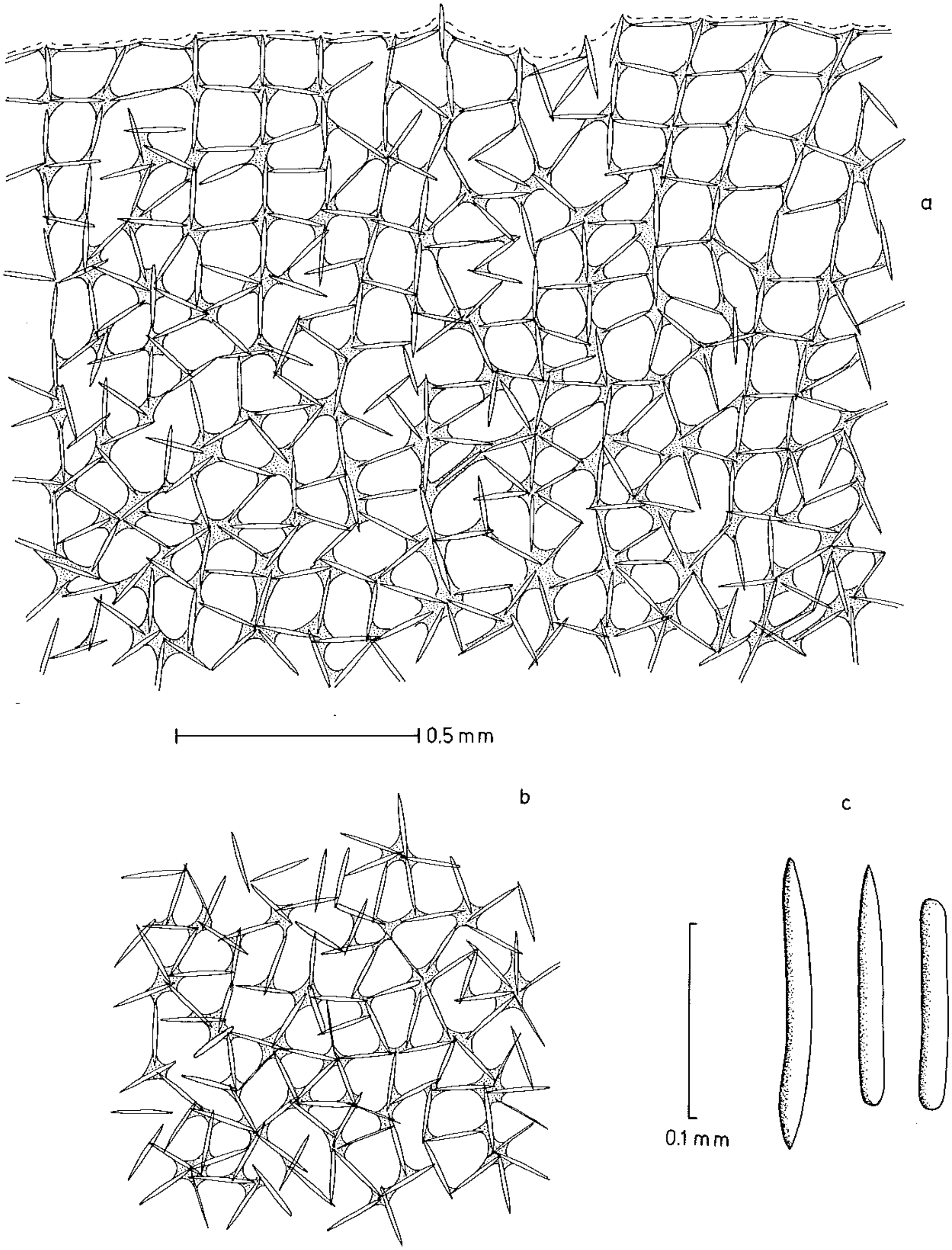

Fig. 7. *Haliclona cinerea*, a. choanosomal skeleton, b. tangential view of ectosomal skeleton, c. spicula.

Isodictya peachii Bowerbank, 1866: 276; 1874: 123, pl. XLVIII figs. 6-8; 1882: 120.
Isodictya permollis (pars) Bowerbank, 1866: 278; 1874: 123, pl. XLVIII figs. 9 & 10; 1882: 115.
Isodictya simulo Bowerbank, 1866: 279; 1874: 123, pl. XLVIII figs. 11-13.
Isodictya varians Bowerbank, 1866: 281; 1874: 124, pl. XLVIII figs. 14-16; 1882: 121.
[Non: *Isodictya varians* Bowerbank, 1874: 307, pl. LXXXVIII figs. 1-6 = *Haliclona oculata* (Pallas).
Isodictya elegans Bowerbank, 1866: 283; 1874: 125, pl. XLIX figs. 1-5; 1882: 121; Higgin, 1886: 82.
Isodictya pallida (pars) Bowerbank, 1866: 297; 1874: 127, pl. L figs. 8-10; 1882:125.
Isodictya mammeata Bowerbank, 1866: 306; 1874: 132, pl. LI figs. 7-9; 1882: 115.
Isodictya dichotoma Bowerbank, 1866: 309; 1874: 136, pl. LIII figs. 12-14; 1882: 123.
Isodictya ramusculus Bowerbank, 1866: 314; 1874: 135, pl. LIII figs. 1-3; 1882: 115.
Chalina flemingii (pars) Bowerbank, 1866: 370; 1874: 173, 357, pl. LXVIII figs. 1 & 2; 1882: 185.

Neotype: BMNH 1932.1.5.7.

Neotype-locality: Cornwall, Great Britain.

Material examined.

British Isles and Ireland; numerous specimens in the BMNH and ZMA collection, among which: BMNH 1932.1.5.7, neotype *Haliclona cinerea*, BC, Cornwall, designation by Burton, 1934a: 535; BMNH 1910.1.1.339, holotype *Isodictya simulo*, NC, Bantry Bay, Ireland; BMNH 1910.1.1.261, lectotype *Isodictya elegans*, NC, Herm, designation by de Weerdt & Stone, in prep.; BMNH 1932.1.5.5, lectotype *Isodictya pallida*, BC, Hastings, designation by de Weerdt & Stone, in prep.; BMNH 1932.1.5.16, holotype *Isodictya dichotoma*, NC, Hastings; BMNH 1932.1.5.4, lectotype *Isodictya ramusculus*, BC, Torbay, designation by de Weerdt & Stone, in prep.; BMNH 1932.1.5.13, holotype *Chalina flemingii*, BC, unknown British locality.

Channel Islands: numerous specimens in the BMNH collection, among which: BMNH 1910.1.1.303, lectotype *Isodictya mammeata*, NC, Guernsey, designation by de Weerdt & Stone, in prep.

France: numerous specimens in the ZMA collection.

Diagnosis

Shape and size: polymorphous, varying from small, thinly encrusting patches, with a few small oscules flush with the surface, to laterally spreading masses of anastomosing branches. Oscules are irregularly scattered and commonly situated at the top of volcano- or shimney-shaped elevations. The size ranges from a few centimeters in diameter in the small encrusting forms to 20-25 cm in the larger, branched forms.
Colour: varying from light-brown to dark-purple.
Consistency: very soft, compressible and fragile, with slime-strands when torn.
Surface: smooth.
Ectosome: a regular, six-angled, unispicular reticulation of spicules, which are connected by spongin at the nodes.
Choanosome: basically the skeleton consists of a regular, isotropic, unispicular reticulation.
Spongin: variable, mostly in fair amounts.
Spicules: characteristically short, rather thick, abruptly pointed oxea, often with strongylote or stylote modifications, 80-120 by 4-8 μm.

Ecology: under intertidal stones, in the infralittoral, to ca. 50 m. It has a preference for places with strong tidal currents.

Distribution (fig. 6): Shetland, British Isles, France, reaching south to the Mediterranean, Azores, Madeira and West Africa (Senegal).

Discussion

Haliclona cinerea is characterized in the living state by the slime-strands, but morphologically the species is difficult to describe. When it is growing as thinly encrusting patches under intertidal stones it may be easily confused with *Haliclona rosea*, which occurs in the same form in this habitat. It differs from this species by the skeletal architecture (*H. rosea* has no ectosomal skeleton and a choanosomal skeleton of pauci-multispicular primary lines). More characteristic is the so-called cancellated growth form; the species exhibits this form when it is growing in cavities between stapled boulders at the inlets of sheltered "loughs", for instance. In these circumstances it is found in its most luxurious form and it is frequently covering the greater part of the stone, partly as a thickly encrusting, laterally spreading mass, partly arising to a cluster of inosculating branches.

The skeletal architecture is variable in so far that the amount of spongin greatly influences the regularity of the skeleton. When the amount of spongin is scarce or moderate the skeleton is a regular, mainly isotropic, unispicular reticulation of oxea which are at the nodes connected by spongin. When the spongin is more abundant the skeleton becomes more irregular; in extreme cases the skeleton is built up by spongin fibres, which are cored by spicules of reduced size. The ectosomal skeleton shows a similar variation. These factors have been the main reason why so much confusion has risen over the identity of the species in the past.

Species of the **aquaeductus**-*group*

Ground-plan: the choanosomal skeleton a very regular, isotropic, unispicular reticulation of spicules. Ectosomal skeleton, if present, of the same structure as the choanosomal skeleton. Spongin present, but not abundant, commonly confined to the nodes of the spicules. Spicula of various size.

Species: *Haliclona primitiva* (Lundbeck).

Haliclona primitiva (Lundbeck, 1902)
(fig. 8, pl. III fig. 2, pl. VI figs. 4, 5)

Gellius primitivus Lundbeck, 1902: 69, pl. XIII fig. 11; Koltun, 1959: 213, fig. 172.
Haliclona primitivus; (sic) Burton, 1935: 67.
Gellius proximus Lundbeck, 1902: 70, pl. XIII fig. 12.
?*Toxadocia proxima*; de Laubenfels, 1936b: 445.

Syntype-series: ZMK, seven specimens of *Gellius primitivus*.

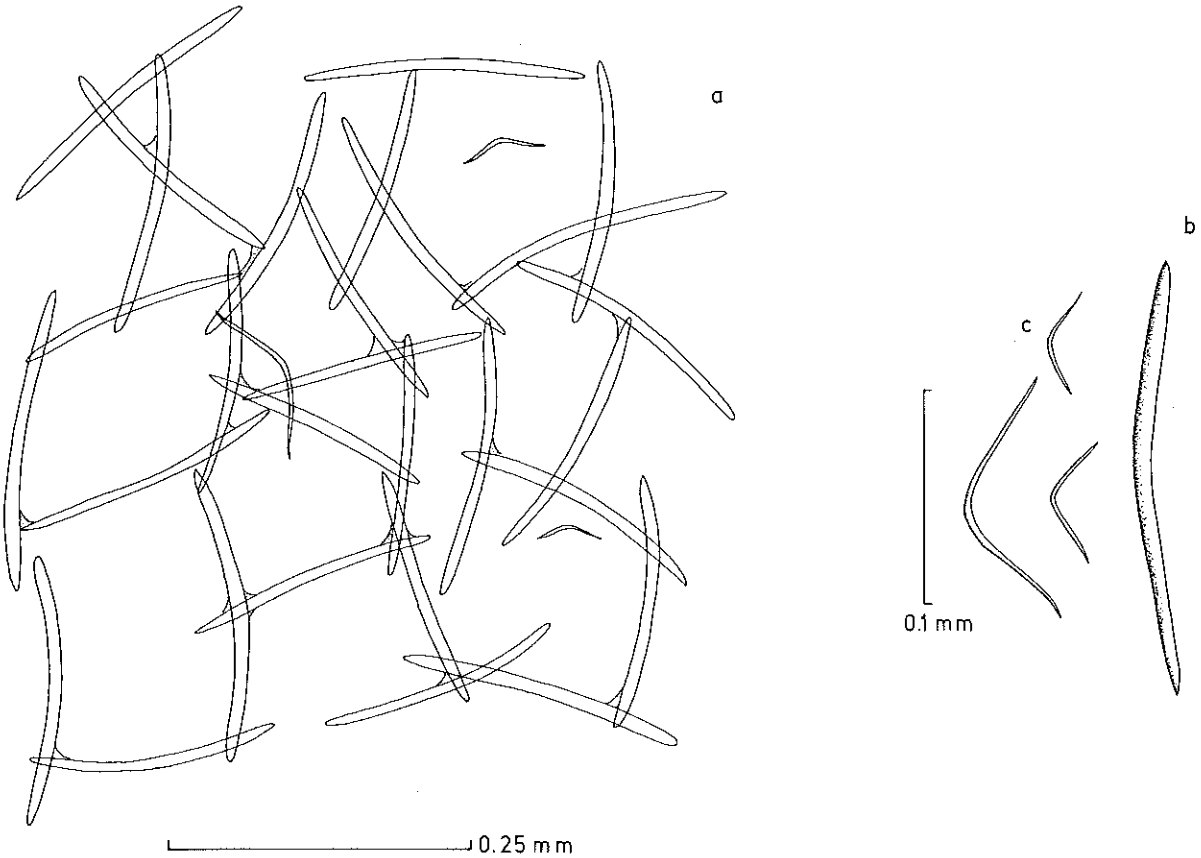

Fig. 8. *Haliclona primitiva*, a. choanosomal skeleton, b. oxe, c. toxa.

Type-locality: Julianehaab (Greenland).

Material examined.

GREENLAND: ZMK, *Gellius primitivus*, 7 specimens incrusting on branched *Lithothamnion*, Julianehaab, Greenland; ZMK, *Gellius proximus*, Egedesminde, Greenland, coll. Bergendal.

Description of material

Gellius primitivus is only represented in the ZMK collection by the seven specimens encrusting *Lithothamnion*, which were described by Lundbeck (1902: 69). They are stored in one box, added to which there is a label with: "Type". Four of the seven pieces of *Lithothamnion* are of equal size, viz. ca. 1.8 × 1.5 × 1.3 cm; they are roundish, branched clumps. Two of the other pieces are larger, viz. 2.5 × 1.8 × 1 cm; the largest piece is oblong, branched and measures 3 × 1.8 × 1.5 cm. In all the pieces there are very small encrustations of the sponges; in the largest *Lithothamnion* it occupies the smallest area, viz. only 5 × 4 mm; the thickness is less than 1 mm. In the other *Lithothamnion* pieces the sponges occupy ca. 3/4 of the area in between the branches. The colour (dried) is dark yellowish-brown, the consistency is extremely fragile. Lundbeck (l.c.) stated that one of the specimens shows a tube. This tube is still recognizable in one of the smallest *Lithothamnion* pieces (see pl. III fig. 2 of the present paper). The tube is completely enclosed by two branches of the *Lithothamnion*; it is ca. 6 mm long and 3 mm thick and ends in a circular osculum of 2 mm. The surface of the little tube is very loose and slightly hispid. The skeletal architecture is an open, isotropic, unispicular reticulation of strongylote oxea of 150 × 5.7 μm, which are connected by a little spongin at the nodes. Toxa of various length and thickness, rather weakly bent and with slightly recurved apices, are rather abundantly scattered in between the megascleres; they range in size from 33.6 × 0.7 to 70 × 1.9 μm.

Gellius proximus is represented in the ZMK collection by one specimen from Egedesminde, described by Lundbeck (1902: 70). It is a small encrustation on a *Balanus*-shell, very similar to the specimens of *Gellius primitivus*. The skeletal architecture is also similar to the other specimens.

Diagnosis

Shape and size: small, rather amorphous encrustations on *Lithothamnion*, *Balanus* etc., occasionally with a tubiform osculum. Possibly not exceeding 4-5 mm in diameter.
Consistency: very fragile.
Surface: slightly to strongly hispid.
Colour: light yellowish-brown.
Ectosome: absent?
Choanosome: a unispicular, dominantly isotropic reticulation.
Spongin: scarce, confined to the nodes of the spicules.
Spicules: short-pointed, robust oxea of 130-190 by 4.8-9.8 μm; toxa of varies size, rather weakly bent, with slightly recurved apices, 31.2-70 by 0.7-2.2 μm (see also table VII).

Ecology: in the infralittoral, to ca. 200 m, on *Lithothamnion* etc.

Distribution (fig. 2): Greenland, White Sea (?sub-arctic).

Table VII. Spicule sizes (in μm) of *Haliclona primitiva*.

specimen	locality	oxea	toxa
ZMK *Gellius primitivus*	Julianehaab, Greenland	132.0-*150.7*(9.4)-170.4 × 4.8-*5.7*(0.7)-7.2	33.6-*55.0*(11.3)-69.6 × 0.7-*1.2*(0.3)-1.9
ZMK *Gellius proximus*	Egedesminde, Greenland	144.0-*170.6*(9.9)-187.2 × 6.7-*8.3*(1.0)-9.8	31.2-*51.6*(14.9)-64.8 × 1.2-*1.6*(0.5)-2.2

Discussion

The conspecificity of *Gellius primitivus* and *Gellius proximus* is evident. Burton (1935), followed by Koltun (1959), already synonymized the two species, and there is no reason to change this viewpoint. The species is difficult to characterize morphologically on basis of the specimens studied; it may be that the small, encrusting habit is characteristic but this needs to be further established with freshly collected material.

De Laubenfels (1936b) reported a violet, very soft sponge as *Toxadocia proxima* from Taboga Island, at the Pacific entrance of the Panama Canal. His description of the skeleton reminds of *H. primitiva* (the skeleton an isodictyal reticulation, oxea of 140 × 5 µm, toxa of 80 × 2 µm). Possibly his record conforms to the species or a related form.

The skeletal architecture relates the species to a number of species, all of them with a much more southern distribution. For this reason I have included the species in this study, even though it has not been found in the study area. These species are *Reniera* (= *Haliclona*) *aquaeductus*, Schmidt, 1862 (from the Mediterranean-Atlantic), *Reniera* (= *Haliclona*) *cratera*, Schmidt, 1862 (from the Mediterranean-Atlantic), *Gellius* (= *Haliclona*) *abbreviatus* Topsent, 1918 (West Africa), and *Reniera* (= *Haliclona*) *neens*, Topsent, 1918 (south-eastern N Atlantic). They share the regular, unispicular isotropic reticulation of the choanosome and, if present (like in *H. aquaeductus*) of the ectosome. A conspicuous similarity between these species is the tendency to have strongylote oxea; these occur in *H. primitiva*, *H. cratera*, *H. abbreviata*, and *H. neens*. They are of different sizes in all the species, *H. cratera* having the largest strongyles, viz. ca. 300 × 8 µm.

H. primitiva is most similar to *H. abbreviata*. This similarity was also mentioned by Topsent in his description of the species (Topsent, 1918: 538), but he emphasized the presence of toxa as a character relating the species. *H. abbreviata* was described as very small, white, with a loose structure, finely hispid, without distinct oscules, and with a regular, unispicular reticulation of strongyles, connected by spongin at the nodes. The main differences are the larger size of the (strongylote) oxea of *H. primitiva*. In *H. abbreviata* they are ca. 90-110 × 5-7 µm according to Topsent; this agrees with my study of Topsent's slide in the MNHN collection (D.T. 2057, from Sao Thomé). Furthermore the oxea of *H. primitiva* are slightly less strongylote than in *H. abbreviata*. The toxa of *H. primitiva* and *H. abbreviata* are indistinguishable.

Topsent noticed that all the species related to *G. abbreviatus* (by the possession of toxa), viz. *Gellius pumiceus* (Fristedt, 1885) (from the Swedish west coast; originally described as *Desmacella*), *Gellius primitivus* Lundbeck, 1902 (northern Europe), *Gellius proximus* Lundbeck, 1902 (northern Europe), *Gellius toxius* Topsent, 1897 (Indonesia), *Gellius toxophorus* Hentschel, 1912 (Indonesia), *Gellius toxotes* Hentschel, 1912 (Indonesia), and *Gellius arcuarius* Topsent, 1913 (Antarctic) were small, amorphous species, and confined to the littoral area. It may be mentioned here that *G. pumicea* belongs to another haplosclerid family, viz. the Niphatidae van Soest (1980), and that *G. arcuarius* (type-species *Vagocia*) belongs to the family Oceanapiidae van Soest (1980).

Species of the **fistulosa**-*group*

Ground-plan: the choanosomal skeleton a dense, subisotropic reticulation of single oxea. The ectosomal skeleton, if present, of the same structure as the choanosome. Spongin scarce or absent. Oxea usually robust, straight and with long, sharp points.

Haliclona fistulosa (Bowerbank, 1866)

(fig. 9, pl. I fig. 1, pl. III fig. 3, pl. VII figs. 1-4)

Isodictya fistulosa Bowerbank, 1866: 299; 1874: 136, pl. LIII figs. 15-17; 1882: 123; Higgin, 1886: 82.

Reniera fistulosa; Schmidt, 1870: 77; Topsent, 1888: 106, pl. V fig. 6; 1890: 201; 1891a: 527; 1894a: 8; 1894b: 43; 1904: 244; Hanitsch, 1889: 160; Stephens, 1912: 24; 1921: 8; Farran, 1915: 29; Jones, 1984: 242.

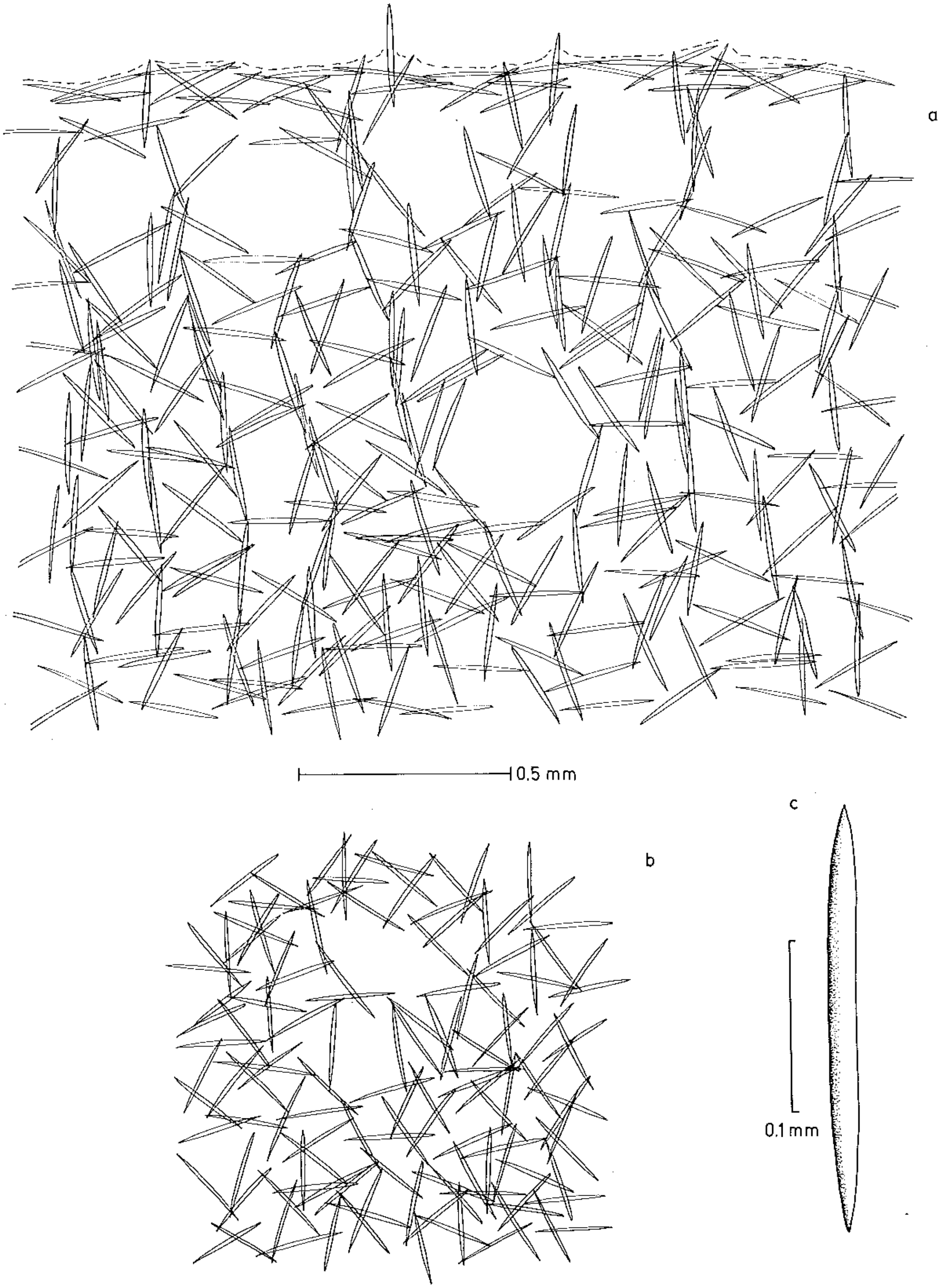

Fig. 9. *Haliclona fistulosa*, a. choanosomal skeleton, b. tangential view of ectosomal skeleton, c. oxe.

[Non: *Reniera fistulosa*; Topsent, 1897: 473; nec: Desqueyroux-Faundez, 1981: 746, fig. 65 = ? *Oceanapia* spec.].

Adocia fistuloa; Arndt, 1935: 94, fig. 201; Lévi, 1950: 23.

Haliclona fistulosa; Borojevic et al., 1968: 26; Könnecker, 1973: 459; Ackers et al., 1985: 175, photo's 96, 98 & 99.

[Non: *Pellina fistulosa*; Griessinger 1971: 150, fig. 10c, e, f & g, pl. II fig. 5; nec: Pulitzer-Finali, 1983 = *Oceanapia isodictyiformis* (Carter)].

Isodictya mcandrewii Bowerbank, 1866: 284; 1874: 125, pl. XLIX, figs. 9-11; 1882: 122.

Chalinula mcandrewii; Schmidt, 1870: 77.

Reniera mcandrewii; Topsent, 1894a: 8; van Soest & Weinberg, 1980: 10; van Soest et al., 1981 [1983]: 45; Jones, 1984: 242.

Adocia mcandrewii; Arndt, 1935: 95, fig. 203.

Haliclona mcandrewii; Burton, 1935: 651; Borojevic et al., 1968: 26.

Halichondria regularis Bowerbank, 1874: 197, 202, pl. LXXIII figs. 10 & 11; 1882: 95.

Reniera simplex; Descatoire, 1969a: 199; 1969b: 12, photo 1.

[Non: *Isodictya simplex* Bowerbank, 1866 = *Haliclona rosea* (Bowerbank); nec: *Reniera simplex* Hansen, 1885 = *Haliclona urceolus* (Rathke & Vahl)].

Holotype: BMNH 1910.1.1.270.

Type-locality: Guernsey.

Material examined (for the taxonomic status of specimens of *Haliclona fistulosa* see table VIII).

British Isles and Ireland: BMNH 1910.1.1.271, *Isodictya fistulosa* Bowerbank, NC, Birterbuy Bay; BMNH 1877.5.21.2085, *Isodictya fistulosa* Bowerbank, BC, Diamond Ground, Hastings, 1873; BMNH 1910.1.1.301, *Isodictya mcandrewii* Bowerbank, NC, Polperro, Mr. Laughrin; BMNH 1910.1.1.302a-d, *Isodictya mcandrewii* Bowerbank, Birterbuy Bay; BMNH 1930.7.3.327, *Halichondria regularis* Bowerbank, NC, Sark, June 1860, From Mrs Collings, holotype, figured specimen of Bowerbank, 1874, pl. LXXIII fig. 10, designated as the type by Bowerbank on p. 197 of the same volume.

ZMA POR. 6020, off Jenny's Hole, Lundy, 24 m, 1-VIII-1985, coll. W. H. de Weerdt; POR. 6021, outer Knoll Pin, Lundy, 18 m, 27-VII-1985, coll. G. Ackers; POR. 6022, Montagu Wrack, Lundy, 7 m, 1-VIII-1985, coll. J. D. George; POR. 6023, Rat Island, Lundy, 13 m, 29-VII-1985, coll. D. Moss; POR. 6025, Brazen Ward, Lundy, 13 m, 29-VII-1985, coll. J. D. George; POR. 6026, off Seal's Hole, Lundy, 17 m, 30-VII-1985, coll. J. D. George; POR. 5562, with *Dysidea fragilis* (Montagu), N Sandy Island, Sherkin Island, Ireland, 5 m, 29-VI-1981, coll. W. H. de Weerdt; POR. 5563, N Sandy Island, Sherkin Island, Ireland, 10 m, 3-VII-1981, coll. W. H. de Weerdt; POR. 5564, Kinish Harbour, Sherkin Island, Ireland, rapids, 6 m, 10-VII-1981, coll. W. H. de Weerdt; POR. 5567, Kinish Harbour, Sherkin Island, Ireland, 6 m, 10-VII-1981, coll. W. H. de Weerdt; POR. 5565, Landing Station, Sherkin Island, Ireland, 7 m, 11-VII-1981, coll. W. H. de Weerdt; POR. 5566, Truhane Point, Sherkin Island, Ireland, 12 m, 14-VII-1981, coll. W. H. de Weerdt; POR. 5981, The Sound, Sherkin Island, Ireland, 7 m, 15-VIII-1982, coll. M. Reichert & W. Doesburg; POR. 5990, Carrigleamore Rock, Sherkin Island, Ireland, 8 m, 30-VII-1982, coll. M. Reichert & W. Doesburg; POR. 5561, East Calf Island, Roaring Water Bay, Ireland, 6 m, 26-VI-1981, coll. R. W. M. van Soest & W. H. de Weerdt; POR. 5590, East Calf Island, Roaring Water Bay, 6 m, 26-VI-1981, coll. R. W. M. van Soest; POR. 5519, Lough Ine, Co. Cork, Ireland, 12 m, 12-IX-1983, coll. R. W. M. van Soest & W. H. de Weerdt; POR. 5604, Lough Ine, Co. Cork, Ireland, 10 m, 12-IX-1983, coll. W. H. de Weerdt.

Channel Islands: BMNH 1910.1.1.270, *Isodictya fistulosa* Bowerbank, NC, off Saints Bay, Guernsey, holotype, figured specimen of Bowerbank, 1874, pl. LIII fig. 15, designated as the type by Bowerbank on p. 136 of the same volume; BMNH 1877.5.21.2038, *Isodictya fistulosa* Bowerbank, BC, Saints Bay, Guernsey, 1845, Rev. A. M. Norman.

France: ZMA POR. 5568, La Tortue, Baie de Morlaix, Finistère, 16 m, 9-VI-1982, coll. W. H. de Weerdt; POR. 5569, Château du Taureau, Baie de Morlaix, Finistère, 40 m, dredge, 15-VI-1982, coll. W. H. de Weerdt; POR. 5605, Château du Taureau, Baie de Morlaix, Finistère, 20 m, dredge, 10-V-1984, coll. W. H. de Weerdt; POR. 5670, Iles de

Table VIII. Taxonomic status of BMNH specimens which belong to *Haliclona fistulosa*.

specimen	original name	locality	taxonomic status
BMNH 1910.1.1.270	*Isodictya fistulosa*	Guernsey	holotype (design. Bowerbank, 1874: 136)
BMNH 1930.7.3.378	*Isodictya mcandrewii*	Orkney	holotype (design. Bowerbank, 1874: 125)
BMNH 1930.7.3.327	*Halichondria regularis*	Sark	holotype (design. Bowerbank, 1874: 197)

Glénans, 12 m, 1-VIII-1981, coll. A. Castric.

SPAIN (ATLANTIC COAST): ZMA POR. 5656, Gijon, 12-VII-1982, coll. S. Groot; POR. 5666, San Roman, Viveiro, 1-VIII-1984, coll. R. Ates.

SHETLANDS: BMNH 1877.5.21.2084, *Isodictya fistulosa* Bowerbank, BC, Shetland, Mr. Barlee.

ORKNEY ISLANDS: BMNH 1930.7.3.378, *Isodictya mcandrewii* Bowerbank, NC, Orkney Islands, Mr. McAndrew, holotype, figured specimen of Bowerbank, 1874, pl. XLIX fig. 9, designated as the type by Bowerbank on p. 125 of the same volume.

Description of material

The holotype of *Isodictya fistulosa* is a roundish clump of 6 x 3.5 x 2.5 cm with a few, scattered oscules, 3-5 mm, some of which are slightly elevated. The fistules, which are clearly visible in Bowerbank's figure of the holotype (Bowerbank, 1874, pl. LIII fig. 15) are for the greater part lost. Nevertheless, the specimen is well recognizible as the figured sponge. The skeleton of both the ectosome and choanosome is a dense, subisotropic reticulation of robust, straight and long-pointed oxea which measure 156-178 by 6-7.9 µm (see also Table IX in which spicule sizes of a selection of specimens are given). There is only very little, hardly discernible spongin at the nodes of the spicules.

The holotype of *Halichondria regularis* is a rather small, roundish clump, ca. 2 x 1.5 x 1 cm, with one small, circular osculum of 1 mm, and without fistules. The skeletal architecture is similar to that of the preceding specimen.

The specimens in the ZMA collection are all, without exception, roundish massive, some of them with numerous fistules, like the specimen of pl. III fig. 3 (ZMA POR. 6020), some of them missing the fistules completely (POR. 5656, 5519 and several others). The presence of fistules is, therefore, not a constant feature. The fistules may be functional, asexual reproductive proliferations in that they may attach to the substratum again and grow out into another massive sponge, as was observed once by the present author. The overall size of the ZMA specimens is 4-8 cm in diameter; in height they range from 0.5 to 2-3 cm. The oscules are few, large and mainly circular; they range in diameter from 3 to 6 mm. The fistules are 1-4 mm thick and usually they remain rather short, viz. 2 mm to 1 cm; occasionally they reach a length of 5 or more cm.

Diagnosis

Shape and size: roundish massive, commonly with fistules arising from the upper and side parts of the sponge. Size usually not exceeding 10 cm.

Consistency: rather firm, friable, slightly brittle.

Surface: smooth, even, rather strongly punctate.

Colour: whitish transparent at the surface and fistules, yellowish-brown or purplish in the endosome.

Ectosome: the ectosomal skeleton is a rather dense, but regular, subisotropic reticulation of single spicules.

Choanosome: a rather dense, subisotropic reticulation of single or double spicules; there is no clear distinction between primary and secon-

Table IX. Spicule sizes (in µm) of *Haliclona fistulosa*.

specimen	locality	spicule sizes
BMNH 1910.1.1.270 *Isodictya fistulosa*, holotype	Guernsey	156.0-*167.9*(5.0)-177.6 × 6.0-*7.1*(0.5)-7.9
BMNH 1930.7.3.378 *Isodictya mcandrewii*, holotype	Orkney	158.4-*169.9*(5.6)-177.6 × 7.7-*8.3*(0.8)-9.6
BMNH 1930.7.3.327 *Halichondria regularis*, holotype	Sark	146.4-*159.2*(8.5)-171.6 × 6.7-*7.6*(0.5)-8.6
BMNH 1877.5.21.2084 *Isodictya fistulosa*	Shetlands	165.6-*181.0*(8.7)-201.6 × 7.7-*8.8*(0.7)-10.1
MNHN D.T. 2685 *Reniera fistulosa*	Luc	136.8-*154.2*(11.2)-175.2 × 5.0-*7.5*(1.0)-9.4
ZMA POR. 5561	Sherkin Island	163.2-*196.4*(10.7)-220.8 × 7.2-*10.2*(1.1)-12.3
ZMA POR. 5560	Roscoff	171.6-*192.3*(9.9)-216.0 × 9.4-*10.4*(0.9)-12.0
ZMA POR. 5670	Iles de Glénans	182.4-*196.1*(7.2)-208.8 × 7.7-*8.9*(0.8)-9.8
ZMA POR. 5656	Gijon (Atlantic coast Spain)	146.4-*170.3*(9.9)-194.4 × 8.4-*9.5*(0.5)-10.1

dary lines. There are many subdermal and choanosomal spaces.

Fistules: the skeletal architecture of the fistules is the same as that of the ectosome; there are no supporting tracts.

Spongin: very scarce, confined to the nodes of the spicules.

Spicules: robust oxea, straight or slightly, evenly curved, with a long and sharp point, 140-220 by 5-12 µm (see also table IX).

Ecology: In the infralittoral, to 50 m, in places with moderate water movement. On stones, *Laminaria*-roots, etc. Rather common.

Distribution (fig. 10): Shetland, British Isles, Channel Islands, France, Atlantic coast of Spain, reaching south to the Azores and the Mediterranean.

Discussion

Haliclona fistulosa is related to the Mediterranean species *Reniera* (= *Haliclona*) *latens* Topsent, 1892b, *Reniera* (= *Haliclona*) *magna* Vacelet, 1969 and *Pellina semitubulosa* (Lamarck, 1813) (not Lieberkühn, 1859 as suggested by authors, cf. below) sensu Topsent (not sensu Schmidt, 1870).

H. fistulosa has larger spicules with longer points than *H. latens*, in which they measure 120-130 × 5-6 µm (Topsent, 1892b: XIX, and a slide in the MNHN collection: D.T. 146). Other differences are the colour, which is orange-greenish in *R. latens*, and the presence of two sorts of connective filaments in this species, which lack in *H. fistulosa*, according to Topsent. Although the species share the architecture of the skeleton, which is subisotropic in both species, the skeleton of *H. fistulosa* is denser than that of *R. latens*. Topsent & Olivier (1943) considered *H. latens* as a variety of *H. fistulosa*. I do not agree with this; although I have only studied Topsent's slide of *H. latens*, the above mentioned differences are distinct enough.

Haliclona magna has oxea of rather similar length as *H. fistulosa*, but they are thinner, viz. 170-185 × 5-7.5 µm (Vacelet, 1969: 211; Griessinger, 1971: 148, as *Pellina*, and a specimen in the ZMA collection: ZMA POR. 5468), and the points are very short. Another difference is the much larger size and coarser habit of *H. magna*.

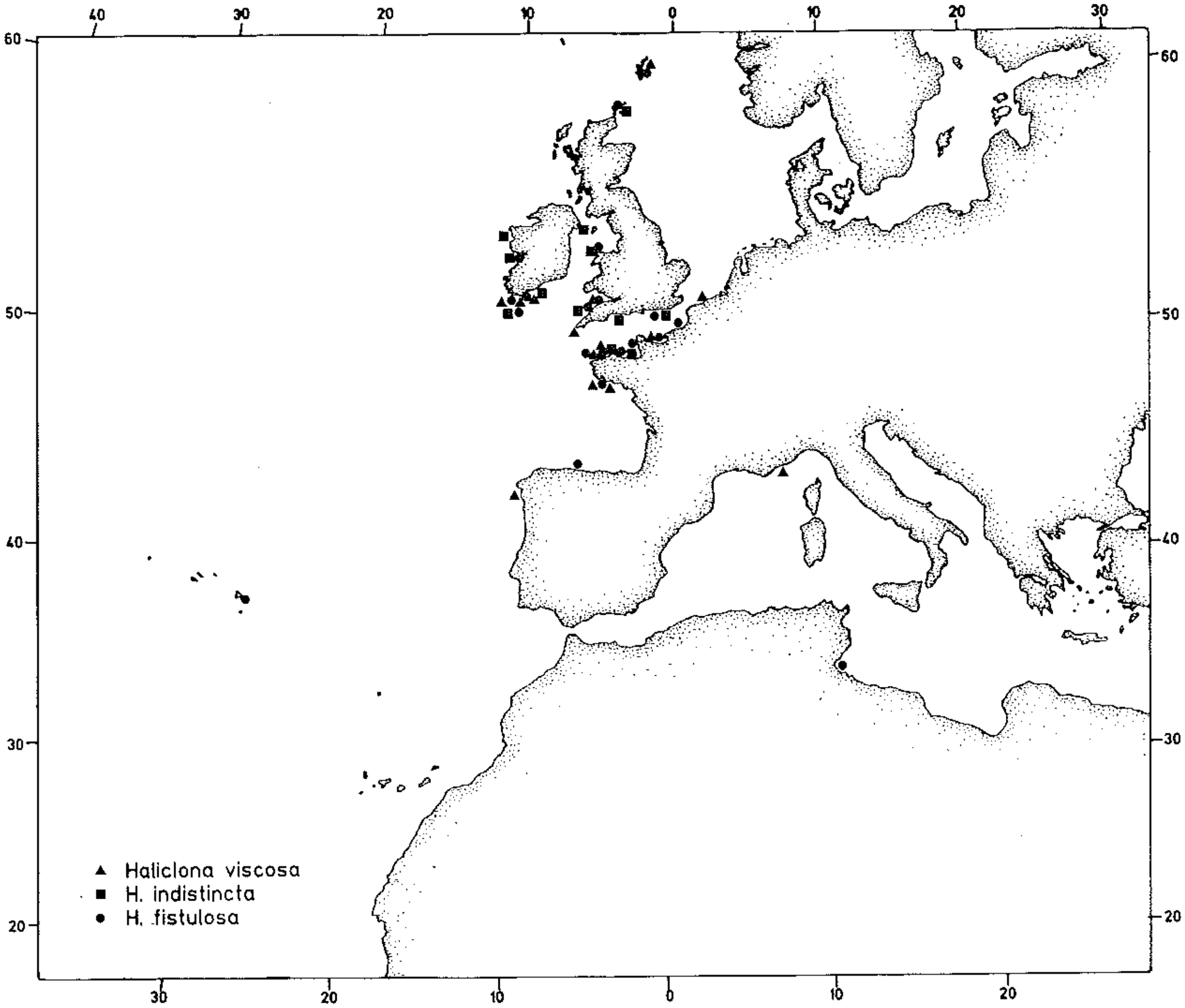

Fig. 10. Distribution of *Haliclona fistulosa*, *H. viscosa* and *H. indistincta*.

Spongia semitubulosa Lamarck, 1813 was used as type-species for a new genus *Pellina* by Schmidt (1870). He ascribed the original description of this species to Lieberkühn (1859, as *Halichondria*), and placed *Spongia semitubulosa* Lamarck with a question mark in the synonymy. Lieberkühn (l.c.: 524) described the species, however, as *Spongia*, not as *Halichondria*, and ascribed the species evidently to Lamarck. Since Schmidt's creation of *Pellina* several species have been transferred to this genus, among which *H. fistulosa*. Griessinger (1971) reported *Pellina fistulosa* from three Mediterranean localities, but his description and figure (pl. II fig. 5) leave no doubt about the identity of his material, viz. *Phloeodictyon isodictyiforme* Carter (1882). This little known, cryptic species has been transferred to *Oceanapia* by the present author (de Weerdt, 1985) on the basis of study of the type-specimen (BMNH 1872.5.4.1) and other material. Griessinger redefined the genus *Pellina* as having a very dense, irregularly meshed choanosomal skeleton, a regular ectosomal skeleton, many subdermal spaces, fistules only built up by ectosomal spicules, no spongin, sponge very fragile. Van Soest (1980) emphasized in his definition of *Pellina* the longitudinal supporting spicule tracts of the fistules. Van Soest & Sass (1981) listed *fistulosa*, as *Pellina*, in an array of species which they assigned to this genus. De Weerdt (1985) and de Weerdt & van Soest (1986) mentioned the fact that the type-species of *Pellina* was formerly misinterpreted and that *Pellina* had to be considered as a synonym of *Haliclona*.

However, it now appears that there is sufficient evidence to demonstrate that *Pellina*, on basis of its type-species, most probably is a synonym of *Halichondria* instead of *Haliclona*. The species described as *Pellina semitubulosa* by Topsent (1925b: 709), and which has later been recorded by several authors, is a species which is closely related to *H. fistulosa*, but which is not conspecific with Lamarck's *Spongia semitubulosa*, nor with Schmidt's *Pellina semitubulosa*. The latter most probably conforms to *Halichondria bowerbanki* or a related form.

Lamarck's description seems to be based on a figure of Plancus (= S. G. Bianchi), in "Conchis minus", but this work is very rare (cf. also Burton, 1930: 513). It is, therefore, very difficult to assess the taxonomic status of the original *Spongia semitubulosa*. Lieberkühn's description of *Spongia semitubulosa* agrees with *Halichondria* (Halichondrida). Lieberkühn described the species as an amorphous mass from which rise roundish, sometimes slightly compressed, frequently anastomosing branches. The skin resting loosely on the rest of the sponge, enveloping the sponge as a transparant "bag" ("...und umhüllt den Schwamm wie ein durchsichtiger Sack."). The colour greenish or whitish. Spicula pointed at both ends, ca. 508 × 8 µm (recalculated from Lieberkühn's unnumbered figure of pl. XI). No spongin. Most common Venetian species.

Later references of this species evidently conform to different species (cf. below). Schmidt (1870: 41) erected the genus *Pellina* for sponges with an easily detachable dermal membrane. The ZMK holds an original slide of Schmidt, labelled "*Reniera semitubulosa* (*Pellina* N.g.), Kattegat", containing two cross-sections and one tangential preparation of the ectosome. Most probably the slide has been erroneously labelled *R. semitubulosa* by Schmidt, since he never mentioned the occurrence of this species at Kattegat. Probably the label should have been *Pellina bibula*. Without doubt the sponge of this slide is *Halichondria panicea*. In the MNHN there is a slide (D.T. 2226), prepared by Topsent from Schmidt's original specimen (which we must assume), from Venice, labelled in Topsent's handwriting: "*Reniera semitubulosa* O.S., Venedig, Mus. Strasb." This slide contains fragments of a sponge which again is without doubt a *Halichondria*. The surface characteristics of *H. panicea* agree very well with Schmidt's description of *Reniera* (Later as *Pellina*) *semitubulosa*: a dermal membrane lying loosely on the rest of the skeleton, many subdermal spaces, which further contribute to making the membrane easily removable, and the conspicuous presence of numerous exhalant canals running to the oscules. When comparing Schmidt's description of *Pellina bibula* (Schmidt, 1870: 42) with his first description of *Reniera semitubulosa* (Schmidt, 1862: 75), the affinity of two species with *Halichondria* becomes also more apparent. The ectosome of *P. bibula* (and also of *R. semitubulosa*) consists of "ein schönes vielreihiges Netz"; the only difference between the two species being the somewhat larger spicules of *R. semitubulosa* than *P. bibula*, in which they measure 230-240 µm. In Schmidt's slide the ectosome is a very regular network of multispicular fibres; the choanosome is a somewhat confused reticulation of pauci-multispicular fibres; there is no spongin and the oxea measure ca. 300 by 7.5 µm. In Topsent's slide they measure ca. 340-380 by 7.5µm. From the two slides and Schmidt's descriptions of *P. bibula* (from the Kattegat) and *R. semitubulosa* it is evident that *Pellina* most probably is a junior synonym of *Halichondria*, not of *Haliclona* as was erroneously suggested by de Weerdt & van Soest (1986). Schmidt (1870: 41) furthermore described *Pellina* as sponges with "Renierennadeln in unregelmässigen Zügen und bunt durch einander". He placed the genus close to *Amorphina* in the family Renierinae.

It must be remarked here that *P. semitubulosa* was described by de Weerdt & van Soest (l.c., as *Haliclona*) from the Azores. The specimen, however, is *Oceanapia isodictyiformis* (Carter). The species was furthermore recorded as a Mediterranean-Atlantic species, reaching up to the English Channel. This remark was based on the study of a slide in the BMNH (1954.8.12.242), off Plymouth, which we interpreted as being conspecific with *H. semitubulosa*. It now seems more likely that we have misinterpreted this slide.

Although the apparently confusing taxonomic status of *P. semitubulosa* can not be sufficiently solved in this study, it seems useful to review the main literature data concerning the species. Keller (1878: 564-579) reported the species, as *Reniera*, from Triest. His description and figures (l.c., pl. XXXVI figs. 1-4, pl. XXXVII fig. 1) remind of *Haliclona aquaeductus* (Schmidt, 1862). The size of the oxea of Keller's material was 140-150 µm.

Ridley & Dendy (1887: 14) redefined the genus *Reniera* Nardo, and explained in the same chapter why they did not agree with Schmidt to erect the new genus *Pellina*. They wrote (l.c.: 15): "We can not agree with Schmidt in referring those species which have a separable dermal membrane ("Zusammenhängende Oberhaut") to a distinct genus, *Pellina*, as we do not regard this character as being of generic importance. His original type of *Pellina* is *P. semitubulosa* Schmidt. The so-called dermal membrane is also a very distinct feature of *Halichondria panicea*, yet Schmidt keeps this species out of his genus *Pellina*, into which it ought certainly to fall according to his definition, if such it can be called." They are evidently right in this critical remark.

Hanitsch (1889: 160) reported the species, as *Reniera* (agreeing with Ridley & Dendy) from Puffin Island (Great Britain); his material consisted of branches arising from the base, with oxea of 300 µm, arranged in "multispiculous triangular or quadrangular meshes." This record most probably conforms to *H. panicea*.

Dendy (1922: 30) reported the species, as *Reniera*, from the Indian Ocean (Diego Garcia), but his identification was solely based on Keller (1878). Dendy seriously misinterpreted the taxonomic status of both Lieberkühn's and Schmidt's records. He wrote that the species was characterized by its branching habit, slender spicules and absence of spongin. The skeleton is weakly developed and consists of a sub-isodictyal reticulation of slender oxea, in which many feebly developed, loose, plurispicular, longitudinal fibres can be recognized. There is no special dermal skeleton and little if any spongin. The oxea are slender, slightly curved, rather abruptly sharp-pointed, 164 × 4 µm. This record must be assigned to another chalinid species.

Topsent (1925b: 709, pl. VIII fig. 5) described and figured *Pellina semitubulosa* from Naples, but his material represents evidently another species, as will be shown below. Topsent described the sponge as white (alive), with a smooth ectosome and with a regular, unispicular reticulation of spicules. The fistules are partly fused, 7-8 cm long, and 5 mm thick at the base, diminishing in diameter to 2-3 mm at the top. They are reinforced by multispicular fibres, in between which there is an unispicular reticulation. The sponge is very fragile by the pronounced development of the aquiferous system, in combination with the simplicity of the skeleton and the scarce amount of spongin at the nodes of the spicules. The oxea are curved, with rather short points, and measure 200-220 × 8-9 µm. Topsent (l.c.: 710) remarked the fact that the oxea of his material were slightly smaller than the sizes given by Schmidt for *P. semitubulosa* and *P. bibula*, but larger than those given by Keller (1878). In addition there are spicules of a much smaller size, viz. 50 × 2 µm. Through the kindness of Dr. N. Boury-Esnault I could borrow and examine Topsent's microscopical slide of his Naples sponge (MNHN D.T. 347). The slide agrees fully with Topsent's description; the skeleton is a loose, unispicular, subisotropic reticulation, and there are multispicular reinforcing fibres; the smaller oxea are clearly observable. In a few places they form part of the skeleton, but the majority is randomly scattered. It is obvious that Topsent's material from Naples represents a species which is different from Schmidt's *R. semitubulosa*.

After Topsent there are several other records of *semitubulosa*, and very obviously they all conform to Topsent's species. Among them are Siribelli (1963: 5), who listed *Pellina semitubulosa* in a table of sponges occurring in the Gulf of Naples. Rützler (1965: 38) reported the species, as *Pellina*, from the Adriatic. He described his material as fistules arising from a massive base, the skeleton being a reticulation with three-four-sided meshed of oxea of 150-180 µm; microxea of 45-60 µm scattered in between the normal oxea. Griessinger (1971: 147) recorded the species, again as *Pellina*, as a common species of the Adriatic. Griessinger also mentioned the presence of microxea. Sarà (1971-72: 84, fig. 10D), reported the species as a Mediterranean-boreal species. Sarà also noticed the presence of microxea besides the normal oxea. Pulitzer-Finali (1978: 77, from the Bay of Naples) gave as size of the oxea: 175-214 × 5-7 µm, and of the microxea 54-83 × 2 µm. In 1983 (Pulitzer-Finali, 1983) he described the species, as *Pellina*, as fistules arising from a massive base, with a whitish colour varying to various grades of mauve, the oxea being 145-180 × 4-6.5 µm, the microxea being 59-75 × ca. 2-5 µm.

Summarizing, it is quite certain that the species referred to as *P. semitubulosa* sensu Topsent has to be described as a new species, since it differs from Lamarck's, Lieberkühn's and Schmidt's species. A taxonomic revision of "*Pellina*" *semitubulosa* s.l., based on original material, is highly needed.

Species of the **arenata**-*group*

Ground-plan: the choanosomal skeleton consisting of a rather irregular reticulation with ill-defined, paucispicular primary lines which are irregularly connected by unispicular secondary lines. There is a tendency to form rounded meshes, both in the ectosome (if present) and in the choanosome. Ectosomal skeleton (if present) a discontinuous, but coherent, tangential reticulation of single spicules. Spongin always present at the nodes of the spicules, sometimes enclosing an individual spiculum, but never abundant. Megascleres fusiform, slender oxea.

Remark: this group is called *arenata*-group, since there is a relatively high number of Mediterranean species, among which *Reniera arenata* Griessinger, 1971, belonging to this group. The new species described below is the only north-eastern Atlantic representative.

Species: *Haliclona xena* spec. nov.

Haliclona xena spec. nov.

(fig. 11, pl. I fig. 3, pl. III fig. 4, pl. VII figs. 5, 6)

Holotype. ZMA POR. 5000, NE of Yerseke, Oosterschelde, the Netherlands, LLWS, 0 m, on oysterbeds, 6-XI-1982, coll. W. H. de Weerdt.

Paratypes. ZMA POR. 6032, NE of Yerseke, Oosterschelde, the Netherlands, LLWS, 0 m, on oysterbeds, 22-X-1983, coll. W. H. de Weerdt; ZMA POR. 6033, NE of Yerseke, Oosterschelde, the Netherlands, LLWS, 0 m, on oysterbeds, 8-XI-1983, coll. W. H. de Weerdt; ZMA POR. 6034, NE of Yerseke, Oosterschelde, the Netherlands, LLWS, 0 m, on oysterbeds, 15-X-1984, coll. M. Wapstra and J. Vermeulen; BMNH 1986.7.31.1, NE of Yerseke, Oosterschelde, the Netherlands, LLWS, 0 m, on oysterbeds, 8-XI-1983, coll. W. H. de Weerdt; BMNH 1986.7.31.2, NE of Yerseke, Oosterschelde, the Netherlands, LLWS, 0 m, on oysterbeds, 15-X-1984, coll. M. Wapstra and J. Vermeulen.

Type-locality: Yerseke, Oosterschelde, the Netherlands.

Material examined

THE NETHERLANDS: ZMA POR. 5000 (holotype); POR. 6032; 6033; 6034 (paratypes); BMNH 1986.7.31.1; 1986.7.31.2 (paratypes); ZMA POR. 4335, Westgat of Mosselkreek, Oosterschelde, 51°27′N, 4°10′E, 5 m, 24-XI-1977, coll. J. Vermeulen and R. W. M. van

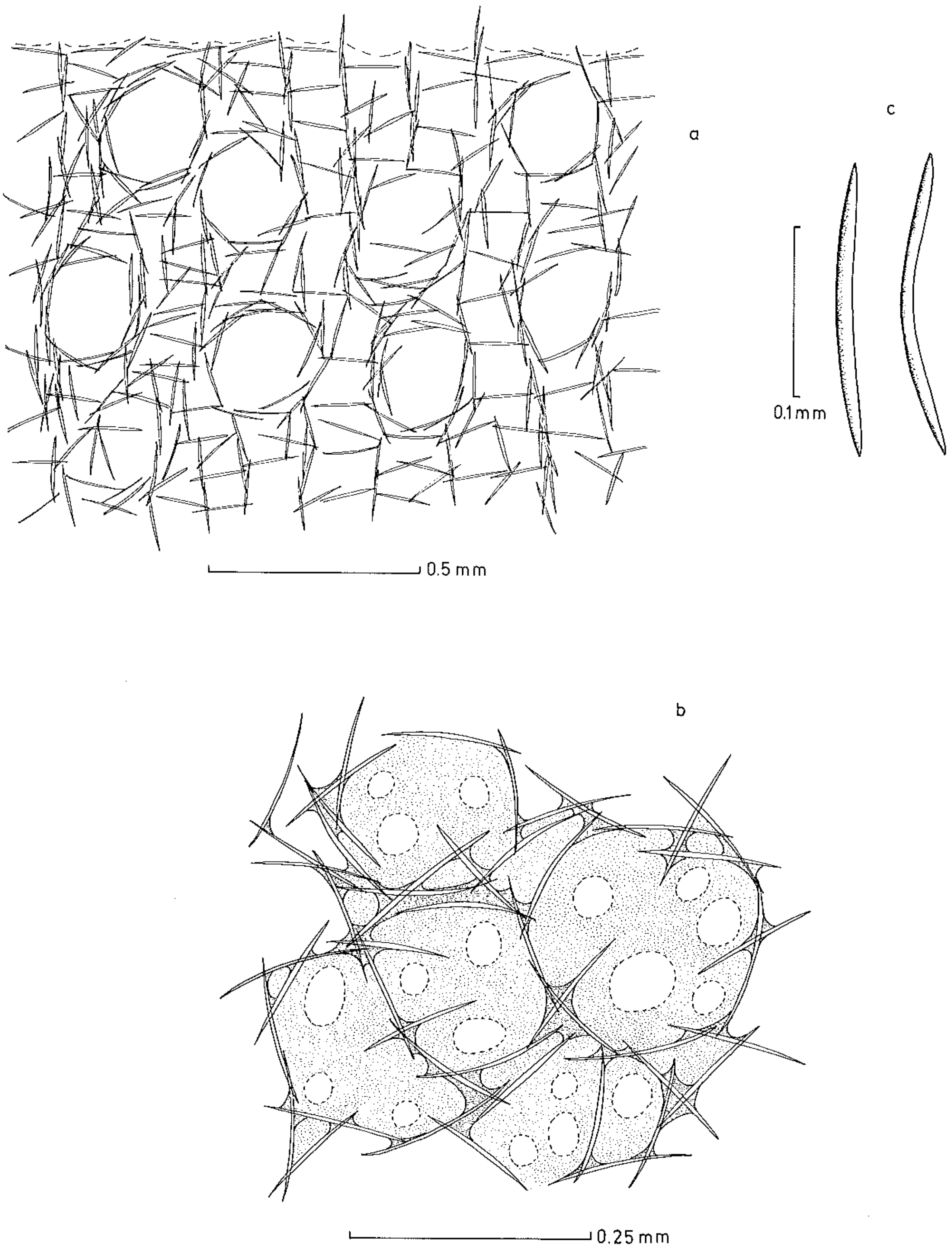

Fig. 11. *Haliclona xena* spec. nov., a. choanosomal skeleton, b. tangential view of ectosomal skeleton, c. spicula.

Soest; POR. 4363, Westgat of Mosselkreek, Oosterschelde, 5 m, dredge, 24-XI-1977, coll. J. Vermeulen and R. W. M. van Soest; POR. 6002, Wemeldinge, Oosterschelde, LLWS, 1 m, 19-X-1985, coll. A. Oosterbaan; POR. 6035, NE of Yerseke, Oosterschelde, LLWS, 0 m, on oysterbeds, 8-XI-1983, coll. W. H. de Weerdt; POR. 6036, NE of Yerseke, Oosterschelde, LLWS, 0 m, on oysterbeds, 22-XI-1983, coll. M. Wapstra; POR. 6037, NE of Yerseke, Oosterschelde, LLWS, 0 m, on oysterbeds, 22-XI-1983, coll. J. Vermeulen; POR. 6038, NE of Yerseke, Oosterschelde, LLWS, 0 m, on oysterbeds, 6-XI-1982, coll. W. H. de Weerdt; POR. 6039, NE of Yerseke, Oosterschelde, LLWS, 0 m, on oysterbeds, 15-X-1984, coll. J. Vermeulen and M. Wapstra; POR. 6040, NE of Yerseke, Oosterschelde, LLWS, 0 m, on oysterbeds, 22-X-1983, coll. W. H. de Weerdt and M. Wapstra; POR. 6043, Zonnemaire, Grevelingen, 2 m, 19-X-1983, coll. C. ter Kuile; POR. 6044, Sas van Goes, Oosterschelde, LLWS, 0 m, on oysters, 6-XII-1985, coll. W. Prud'homme van Reine; POR. 6045, Wemeldinge, Oosterschelde, LLWS, 1 m, 19-X-1985, coll. A. Oosterbaan; POR. 6065, Dreischor, Grevelingen, 3.5 m, 4-V-1986, coll. W. H. de Weerdt and P. van Vliet; POR. 6066, Ouddorp, Grevelingen, 4 m, 19-V-1986, coll. M. de Kluijver.

Description of material

The holotype is a dense cluster of hollow, largely coalescent tubes, rising from a massively encrusting base, which is growing over the snail *Crepidula fornicata*. The whole body, including the tubes, is a roundish mass, measuring 7.5 x 6 x 4.5 cm. The tubes are, as a mean, 1-2 cm long; they end terminally in a circular or irregularly outlined osculum.The oscula range from 1 mm in diameter in the smallest tubes to 6 mm in the largest ones. The surface in between the tubes is densely covered with blind, solid digitations arising from the massive, basal part of the sponge and also from the sides of the tubes. These digitations are thin, 1-1.5 mm, and 1-10 mm long. The consistency is very soft and fragile. The colour (alive) is purple; in spirit it is greyish. The ectosome is rather easily peeled off and contains an irregularly discontinuous tangential reticulation of single spicules which are connected by a fair amount of spongin at the nodes. The choanosomal skeleton is also rather irregular, with many subdermal and choanosomal spaces and with ill-defined paucispicular primary lines; they are irregularly connected by unispicular secondaries. The spicula are evenly, sometimes rather strongly curved, slender oxea with long and sharp points.

ZMA POR. 6034 (one of the paratypes) is a rather amorphous clump, 12.5 x 7.5 x 4 cm, consisting of one large cluster of highly coalescent tubes and blind digitation. The tubes, which are hardly recognizable as such do not rise above the upper, flat side of the sponge, but here they end abruptly into oscula of 2-6 mm wide. The colour, consistency and skeletal characteristics are the same as the preceding specimen.

BMNH 1986.7.31.1 (one of the paratypes) is again a cluster (7.5 x 5.5 x 5 cm) of coalescenet tubes, rising from a massively encrusting base, but in this specimen the tubes are more isolated than in ZMA POR. 6034. The tubes are all of rather equal length, viz. 3-4 cm, and width, viz. 3-6 mm, but in each tube the diameter increases suddenly towards the end. The area below the apices is swollen. The oscula are circular and measure 2-4 mm. Short, blind and solid digitations branch off from the sides of the tubes.

Diagnosis

Shape and size; basically the sponge consists of a massively encrusting base, from which rise osculiferous, hollow tubes and solid digitations. The tubes coalesce in various degrees; they are 1-ca. 5 cm long and 2-6 mm thick. The oscules at the end of the tubes are wide, circular or with an irregular outline, 1-6 mm in diameter. The species may develop a considerable size; it may grow out to thick masses of tubes and digitations up to 15-40 cm in diameter.

Consistency: soft, very fragile.
Surface: rather irregular caused by the numerous digitations which branch off from the main body and the tubes; fairly to strongly hispid; very slightly crispy.
Colour: soft purple.
Ectosome: the ectosomal skeleton consists of a discontinuous, but coherent, tangential reticulation of single spicules.
Choanosome: the choanosomal skeleton is a somewhat confused reticulation of paucispicular primary lines which are interconnected by rather irregularly scattered secondary spicules. In places the skeleton is more regularly ladder-like. There are many subdermal and choanosomal spaces.
Spongin: moderate, mostly confined to the nodes of the spicules; occasionally enclosing an individual spicule.
Spicules: evenly but rather strongly curved, slender oxea, which are gradually tapering towards a sharp point, 110-160 × 3-8 µm (see also table X).

Etymology: the new species is named after the Greek word "*xenos*", which means "strange, outsider"; most probably the species has been introduced in the Netherlands through the import of oysters.

Larval release: August.

Ecology: the species occurs in high abundance on the oysterbeds in the eastern part of the Oosterschelde.

Distribution (fig. 12): the species is only known from its type-area, the Oosterschelde and from two places in the Grevelingen, a closed-off sea-arm, to the north of the Oosterschelde.

Discussion

Haliclona xena is characterized by the tubular/massive form, the large size, the fragility, and the curved, slender oxea. In the north-eastern Atlantic area there are no species with which it could be confused, but outside the area there are several species which seem closely related. These are the Mediterranean species *Reniera flavescens* Topsent, 1893b, *Reniera arenata*, Griessinger, 1971, *Reniera mamillata* Griessinger, 1971, *Reniera mucosa* Griessinger, 1971, *Reniera valliculata* Griessinger, 1971, the North American species *Reniera tubifera* George & Wilson, 1919, and the West Indian species *Sigmadocia caerulea* Hechtel, 1965. All these species are here transferred to *Haliclona*. They share the skeletal architecture which consists of ill-defined paucispicular primary lines, irregularly connected by unispicular secondaries. There is a strong tendency to form rounded meshes, but these reach never the stur-

Table X. Spicule sizes (in µm) of *Haliclona xena* spec. nov.

specimen	locality	spicule sizes
ZMA POR. 5000 holotype	Yerseke	112.8-*129.5*(10.0)-144.0 × 2.9-*5.2*(1.1)-7.2
ZMA POR. 6032 paratype	Yerseke	110.4-*126.7*(8.0)-141.6 × 3.6-*5.4*(0.7)-7.0
ZMA POR. 6034 paratype	Yerseke	117.6-*139.1*(8.9)-158.4 × 4.8-*7.1*(0.8)-7.7
BMNH 1986.7.31.1 paratype	Yerseke	127.2-*136.7*(5.5)-144.0 × 5.0-*6.1*(0.5)-7.0
BMNH 1986.7.31.2 paratype	Yerseke	129.6-*139.2*(5.7)-147.6 × 5.0-*7.2*(0.7)-8.4
ZMA POR. 4335	Westgat of Mosselkreek, Oosterschelde	134.4-*147.6*(5.3)-158.4 × 4.8-*5.6*(0.5)-6.7

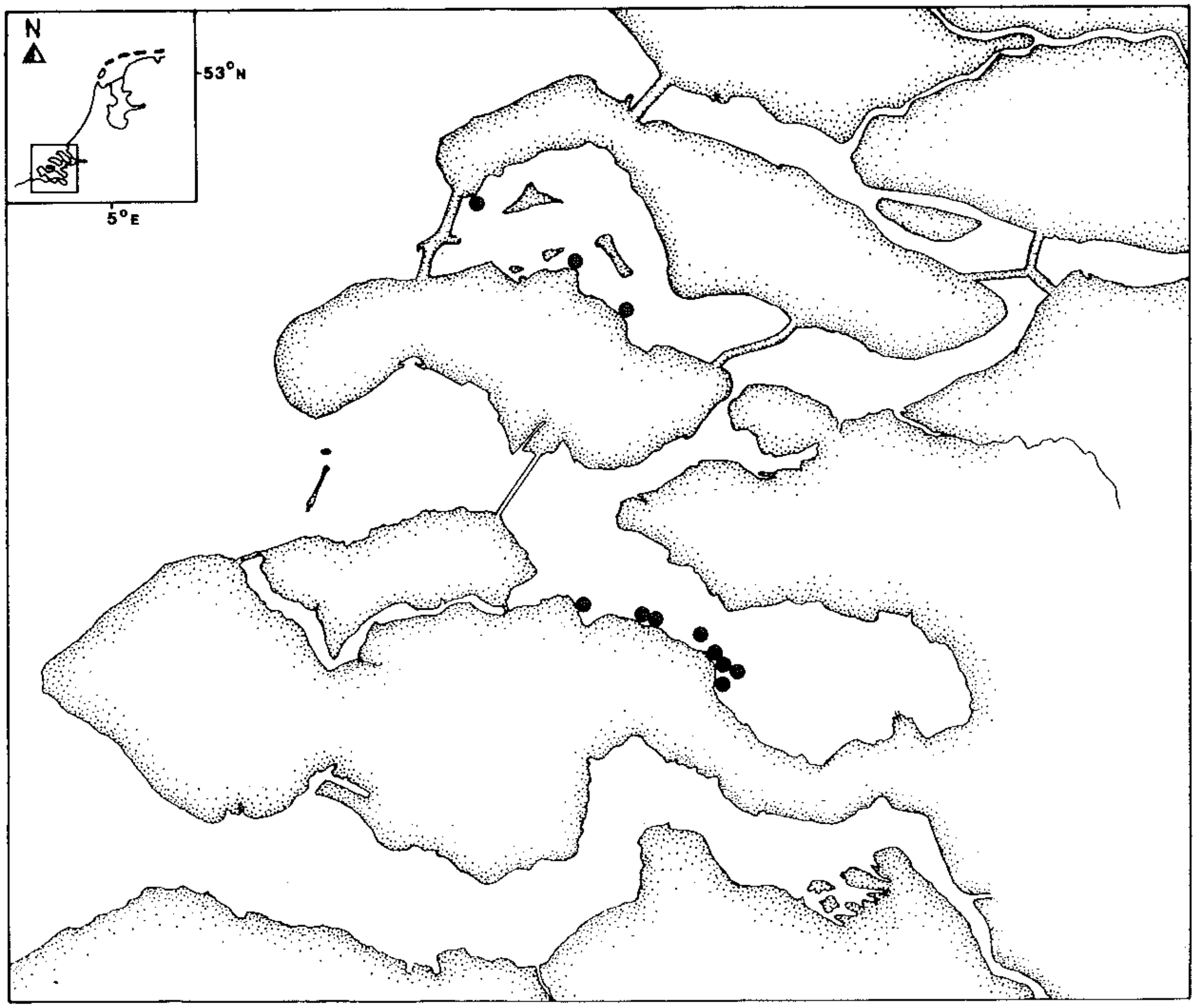

Fig. 12. Distribution of *Haliclona xena* spec. nov.

diness of, for instance, *Petrosia.* In all the species the skeleton is very delicate. The ectosomal skeleton, present in all the species which belong to this group, is a discontinuous, but still coherent reticulation of spicules which are at the nodes connected by spongin.

The new species differs from *H. arenata* especially by the verrucose surface, the greyish colour and slimy consistency of the latter species. *H. flavescens* is massive and light yellow. *H. mamillata* has a very regular and smooth surface and gives off a considerable amount of mucous when it is teared. *H. mucosa* is extremely slimy and cream-yellow. *H. valliculata* is massive, beige, and it has a conspicuous irregular surface. All Griessinger's type-material, which is present in the MNHN, has been studied; *H. flavescens* is in the MNHN represented by a microcopical slide (MNHN D.T. 278). In addition several specimens of the species were recently collected at Banyuls by F. van Lent (ZMA POR. 5677, 5458, *H. valliculata*, POR. 5444, 5448, *H. mucosa*, POR. 5425, 5461, *H. mamillata*). The difference between the new species and the Mediterranean species are obvious enough, and it is quite certain that neither of them is conspecific (see also Table XI in which the main characteristics of the species are given).

Haliclona caerulea differs from *H. xena* by the

Table XI. Characteristics of *Haliclona xena* nov. spec. and species which are closely related.

species	habit	consistency	surface	colour	spongin	spicules		distribution
						oxea	sigmata	
xena	tubiform	soft, fragile	hispid	purple	++	fusiform 135/6	—	Netherlands
mamillata	mammiform	soft	slightly hispid	rose	+	fusiform 150/5	—	Mediterranean
arenata	tubiform	soft	slightly hispid	grey	+	fusiform 140/4	—	Mediterranean
mucosa	thickly encrusting	friable	irregular smooth	creme	+	fusiform 200/5	—	Mediterranean
valliculata	massive	soft	smooth	beige	′	fusiform 157/3.5	—	Mediterranean
flavescens	massive	soft	slightly hispid	light-orange	?	fusiform 165/6	—	Mediterranean
tubifera	tubiform	soft	smooth	purple	+	fusiform 130/4	—	New England (U.S.A.)
caerulea	massive/ ramose	soft	smooth	blue	+	fusiform 160/5.3	12-19	West Indies

presence of sigmata, the colour (blue) and the much larger oxea (140-200 µm).

H. xena is most similar to *H. tubifera*, a species which is recorded as being endemic to North Carolina (Wells et al., 1960), but which has recently been found at Tenerife (Canary Islands) by Cruz (cf. de Weerdt & van Soest, 1986). *H. tubifera* is in the ZMA collection represented by a number of specimens from Bogue Sound, Beaufort (ZMA POR. 40), collected at 3-5 m by J. H. Stock and identified by J. W. Wells. The differences between this material and the Netherlands new species are subtle: in general *H. xena* is much coarser in its structure than the studied specimens of *R. tubifera*, the growth form of *H. tubifera* is much more delicate. The surface of *H. xena* is more hispid, and also much looser, in *H. tubifera* the surface is very smooth and not, or only slightly hispid. The ectosome of *H. xena* lies very loosely on the rest of the skeleton and is, therefore, easily removed, which is not the case in *H. tubifera*. The oxea of *H. xena* are slightly larger than of *H. tubifera* in which they measure 120-140 × 2.5-4.5 µm, but they are especially more strongly curved. The high number of rather strongly curved oxea in *H. xena* is considered as a distinguishing feature of this species.

Species of the **rosea**-group

Ground-plan: choanosomal skeleton consisting of a regularly ladder-like system of pauci-multispicular primary lines which are regularly connected by unispicular secondaries. Spongin scarce. Megascleres fusiform, robust oxea.

Species: *Haliclona rosea* (Bowerbank), *Haliclona indistincta* (Bowerbank), and *Haliclona viscosa* (Topsent).

Haliclona rosea (Bowerbank, 1866)

(fig. 13, pl. III figs. 5, 6, pl. VIII figs. 1-3)

Remarks: *Haliclona rosea* has been frequently misinterpreted in the past; it has been confused with several species, especially with *Haliclona cinerea*. The species has been taxonomically revised in the paper dealing with *H. cinerea* (de Weerdt & Stone, in prep.). The synonyms and references here given, as well as the material examined is restricted in the same way as in *H. cinerea*.

Isodictya rosea Bowerbank, 1866: 282; 1874: 126, pl. XLIX figs. 12-14; 1882: 118.

[Non: *Reniera rosea*; Topsent, 1925b: 712; nec: *Haliclona rosea*; Sarà, 1971-72: 85, fig. 10 H & I = *Haliclona mediterranea* Griessinger].

Isodictya permollis (pars) Bowerbank, 1866: 278; 1874: 123, pl. XLVIII figs. 9 & 10; 1882: 115.

Isodictya simplex Bowerbank, 1866: 294; 1874: 107, pl. XLIV, fig. 6, pl. L fig. 18; 1882: 119.

[Non: *Reniera simplex* Hansen, 1885: 3, pl. I fig. 9, pl. VI fig. 1; nec: Arnesen, 1903: 5 = *Haliclona urceolus* (Rathke & Vahl); Descatoire, 1969a: 199; 1969b: 12, photo 1 = *Haliclona fistulosa* (Bowerbank)].

Isodictya gregorii Bowerbank, 1866: 301; 1874: 128, pl. L figs. 15-17; 1882: 125.

Isodictya obscura Bowerbank, 1874: 224, pl. LXXVI figs. 1 & 2, pl. LXXXVII fig. 11; 1882: 118.

Isodictya luteosa Bowerbank, 1874: 288, pl. LXXXV figs. 5-7; 1882: 120.

Halichondria mcintoshii Bowerbank, 1874: 340, pl. XCI figs. 18 & 19; 1882: 95.

Isodictya ferula Bowerbank, 1882: 116, pl. VIII figs. 1-3.

Isodictya paupercula Bowerbank, 1882: 129, pl. X figs. 6-8.

Reniera laxa Lundbeck, 1902: 46, pl. II fig. 6, pl. XI fig. 13; Brøndsted, 1914: 480; 1916: 480; Hentschel, 1929: 900.

Reniera heterofibrosa Lundbeck, 1902: 47, pl. II fig. 8, pl. XI fig. 14; Hentschel, 1929: 900; Burton, 1930: 20.

Reniera tubulosa Fristedt, 1887: 419, pl. 24 fig. 1; Lundbeck, 1902: 44, pl. II fig. 5, pl. XI fig. 11, 12; 1909: 432; Topsent, 1913: 57; Brøndsted, 1914: 479; 1932: 24; 1933b: 8; Hentschel, 1916: 14; 1929: 899.

[Non: *Reniera tubulosa* Hansen, 1885 = *Oceanapia robusta* (Bowerbank, 1866)].

Lectotype: BMNH 1932.1.5.3.

Lectotype-locality: Tenby, Great Britain.

Material examined

BRITISH ISLES AND IRELAND: numerous specimens in the BMNH and ZMA collections,

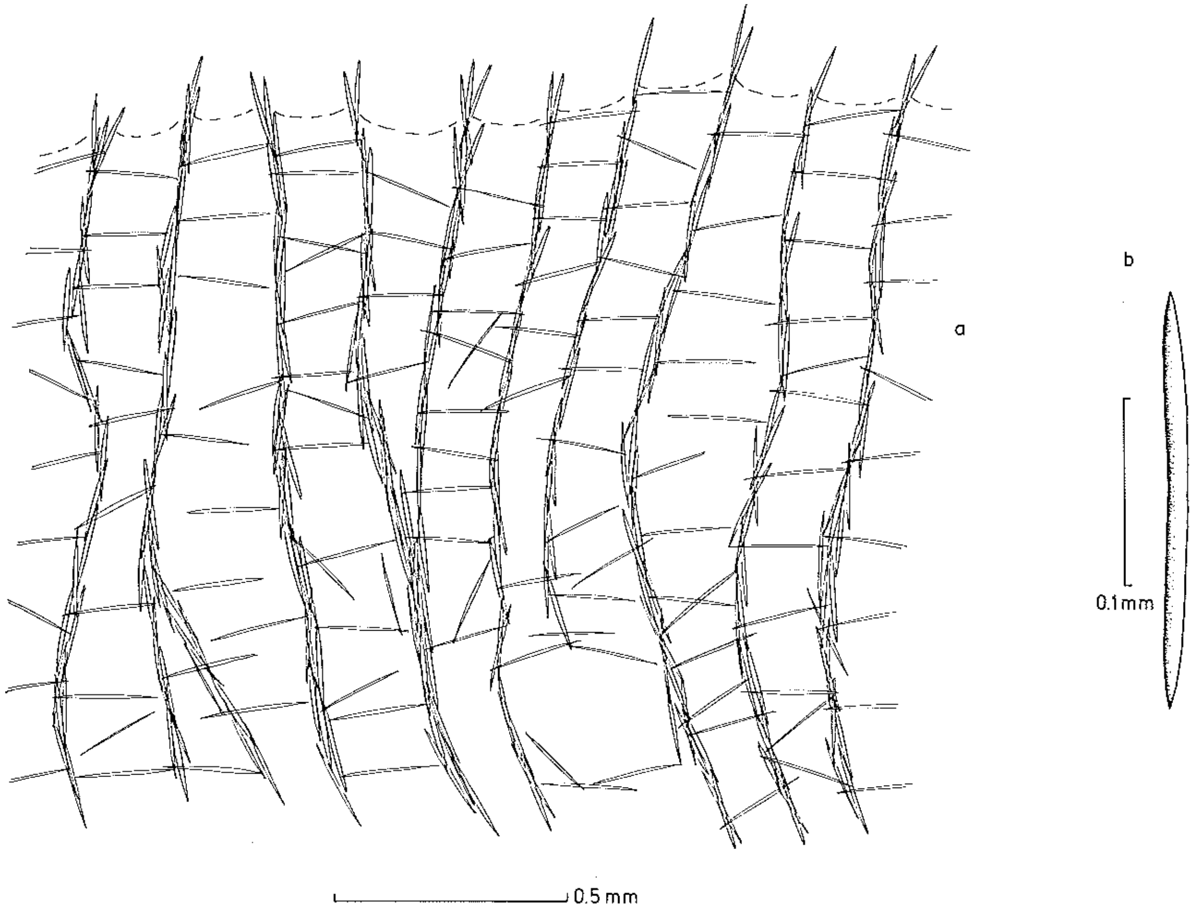

Fig. 13. *Haliclona rosea*, a. choanosomal skeleton, b. oxe.

among which: BMNH 1932.1.5.3, lectotype *Isodictya rosea*, BC, Tenby, designated as the lectotype by de Weerdt & Stone, in prep.; BMNH 1910.1.1.331, lectotype *Isodictya simplex* Bow., NC, Strangford Lough, designated as the lectotype by de Weerdt & Stone, in prep.; BMNH 1930.7.3.356, holotype *Isodictya gregorii*, BC, Moray Frith; BMNH 1930.7.3.388, holotype *Isodictya obscura*, BC, Diamond Ground, Hastings; BMNH 1910.1.1.300, holotype *Isodictya luteosa*, NC, Portaferry; BMNH 1932.1.5.15, holotype *Halichondria mcintoshii*, BC, St. Andrews; BMNH 1910.1.1.267, lectotype *Isodictya ferula* Bow., NC, Birterbuy Bay, designated as the lectotype by de Weerdt & Stone, in prep.; BMNH 1910.1.1.315, holotype *Isodictya paupercula*, NC, Birterbuy Bay.

CHANNEL ISLANDS: specimens in the BMNH collection.

FRANCE: numerous specimens in the ZMA collection.

THE NETHERLANDS: ZMA POR. 4470, Stompetoren, Oosterschelde, 6 m, 14-IX-1979, coll. W. Prud'homme van Reine; POR. 6004, S of Hompelvoet, Grevelingen, Zeeland, 13-X-1983, 0 m, coll. J. Vermeulen; POR. 4517, Ex NIOZ-aquarium, Texel, 19-VIII-1978, coll. A. Vethaak.

DENMARK: specimens in the ZMA and ZMK collection.

SHETLANDS: ZMA POR. 5661, Mousa, Shetland, under intertidal stones, LLWS, 16-VII-1983, coll. J. de Visser.

FAROE: ZMK, *Reniera tubulosa* Fristedt, Loc.: 9 km E of Nolsø.C. 30 fms., Farøerne, 9-VI-1899, coll. Th. Mortensen, det. Lundbeck.

ICELAND: numerous specimens in the ZMK collection, among which: ZMK, holotype *Reniera laxa* Lundbeck, coll. Stenstrup; ZMK, holotype *Reniera heterofibrosa* Lundbeck, Sklasnes Island, 12-15 m, coll. H. Jöhnsson.

NORWAY: specimens in the ZMA and ZMK collection.

SWEDEN: ZMA POR. 5675, Vasholmarna, Sweden, 58°13′N, 11°20′E, 9-VI-1984, coll. G. van Moorsel.

SPITSBERGEN: ZMK, holotype *Reniera tubulosa* Fristedt, coll. Spetske Exp., 1872-83.

GREENLAND: numerous specimens in the ZMK collection.

DAVIS STRAIT: ZMK, cotype *Reniera laxa* Lundbeck, Davisstr., 200 m, 7-VII-1884, coll. Th. Holm.

Diagnosis

Shape and size: the form varies from thinly encrusting patches, not exceeding 3 cm in diameter, to thickly encrusting cushion shaped masses, up to 15 cm in diameter. The oscules vary from 0.5-2 mm in the thinly encrusting growth form to 0.5 to 1.0 cm in the more massive and larger forms. They may be flush with the surface or be situated at the summits of chimney-shaped elevations. In the larger specimens there are commonly a few thin, solid digitations branching off from the main body.
Colour: varying from light brown to lavender, purple. The colour disappears completely in spirit.
Consistency: soft and fragile.
Surface: slightly hispid from projecting spicules.
Ectosome: absent.
Choanosome: the choanosomal skeleton consists of paucispicular primary lines, which are connected by irregularly scattered, single secondary spicules. The primary lines are often somewhat wavy.
Spongin: absent, or scarce, and confined to the nodes of the spicules.
Spicules: rather long oxea, with long points, 150-220 × 4-11.5 μm.

Ecology: under intertidal stones and in the infralittoral, to ca. 100 m.

Distribution (fig. 14): Davis Strait, south-west and east coast Greenland, Iceland, Spitsbergen, Murmansk, Norway, Denmark, Swedish west coast, the Netherlands, British Isles, France.

Discussion

Like *H. cinerea*, *Haliclona rosea* is morphologically difficult to characterize. It is rather

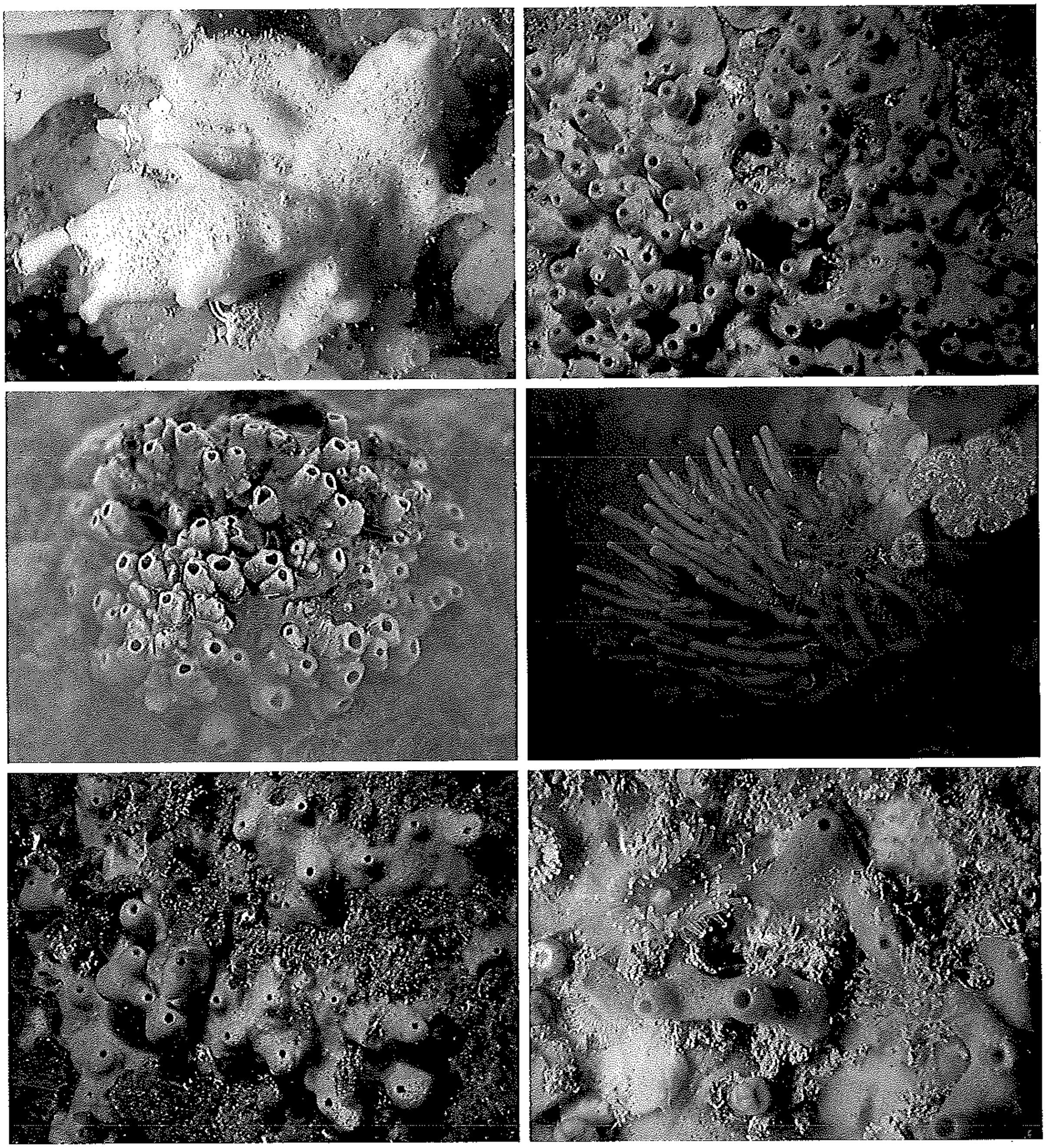

Plate I.

Fig. 1 (upper left). *Haliclona fistulosa* (Bowerbank, 1866), Baie la Tortue, Morlaix, France, 15 m. (photo: W. H. de Weerdt). Fig. 2 (upper right). *Haliclona viscosa* (Topsent, 1888), Lundy, Great Britain, 15 m. (photo: J. D. George). Fig. 3 (middle left). *Haliclona xena* spec. nov., Oosterschelde, the Netherlands, oysterbeds, low tide. (photo: M. de Kluijver). Fig. 4 (middle right). *Haliclona oculata* (Pallas, 1766), Oosterschelde, the Netherlands, 10 m. (photo: G. van Elswijk). Fig. 5 (below left). *Haliclona simulans* (Johnston, 1842), Clare Island, Ireland, 12 m. (photo: J. D. George). Fig. 6 (below right). *Haliclona cinerea* (Grant, 1826), Baie la Tortue, Morlaix, France, 14 m. (photo: W. H. de Weerdt).

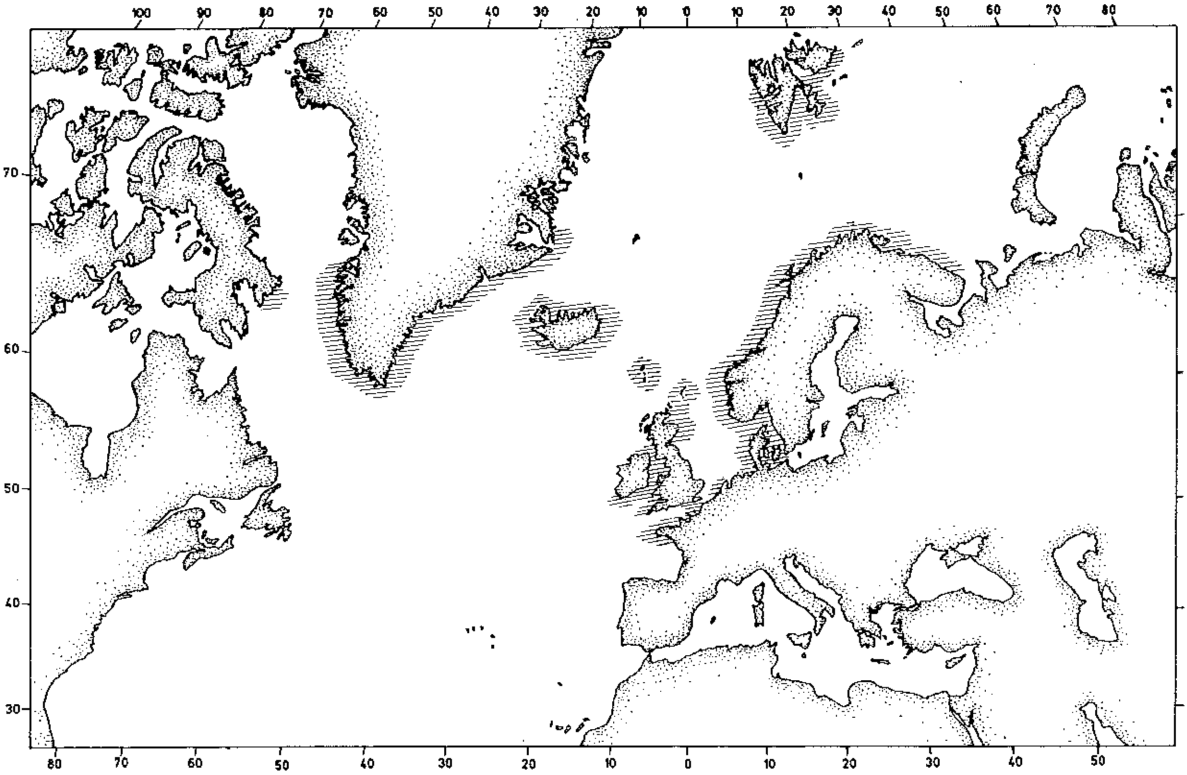

Fig. 14. Generalized distribution of *Haliclona rosea*.

polymorphous, but to a lesser degree than *H. cinerea*. Most distinguishing is its skeletal architecture. It differs from *H. cinerea* in the absence of an ectosomal skeleton, and in the pauci-multispicular primary lines.

Haliclona rosea is closely related to *Haliclona indistincta* (Bowerbank, north-eastern Atlantic, ?Amphi-Atlantic), *Haliclona viscosa* (Topsent, north-eastern Atlantic) and *Reniera* (= *Haliclona*) *curacaoensis* van Soest (West Indies). They share the architecture of the choanosomal skeleton, viz. pauci-multispicular primary lines, which are connected by single secondary spicules, and with scarce spongin. The differences in skeletal architecture between *H. rosea*, *H. indistincta* and *H. viscosa* are so small that they are hardly distinguishable on the basis of this character. In *H. indistincta* (which is probably conspecific with *Haliclona canaliculata* Hartman, 1958) and *H. viscosa* the skeleton is more close-meshed than in *H. rosea*. The primary lines are built up by more spicules, and the secondary spicules are more confused. The oxea of *H. indistincta* and *H. viscosa* are completely similar in shape and size, and measure 110-150 × 3-7.5 μm, thus slightly smaller than in *H. rosea*. The three species are, however, well distinguished by their external features and also by their habitat preference.

The high similarity between *H. rosea* and the West Indian species *Haliclona curacaoensis* is very conspicuous. The species differ only in the somewhat smaller spicules in *H. curacaoensis* which measure 110-140 × 3-6.5 μm.

Brøndsted (1923, as *Reniera*) and Bergquist & Warne (1980) recorded *Haliclona heterofibrosa* and *Haliclona laxa* from New Zealand. Brøndsted's material of *Reniera heterofibrosa*, from the Campbell Islands, is present in the ZMK and has been studied. The material consists of a few cushions, the largest of which measures 6.5 × 3 × 1 cm. The oscules are ca. 2-4 mm, flush with the surface and irregularly scattered. The skeletal architecture is indistinguishable from *H. rosea*; regularly ladder-like, with pauciscular primary lines, interconnected by single secondary spicules. A very scarce amount of spongin is present at the nodes of the spicules. The oxea are long-pointed and measure 134-*154.5*-175.2 × 5.3-*6.3*-8.4 µm.

Bergquist & Warne (l.c.: 16) mentioned the similarity between their specimens of *Haliclona heterofibrosa* and Lundbeck's holotype of the species, which they have studied for comparison. In addition Prof. P. Bergquist has kindly donated a collection of sponges, recently collected at Tamaki Waterfront and Westmere Reef (New Zealand). This material consists of two species, one of which is very similar to *H. rosea*. The specimens are all rather flat patches with small oscules flush with the surface. The skeleton is of the architecture of *H. rosea*; the oxea measure 148.8-*154.1*-163.2 × 6.7-*7.4*-8.4 µm.

Another subantarctic record of *H. rosea* is that of Carter (1877, Kerguelen, as *Isodictya rosea*). His material is deposited in the BMNH (1876.9.12.5-7) and represents apparently two different species. BMNH 18769.12.5 is the *Melobesia* encrusting specimen, described by Carter (l.c.: 286). This specimen is very similar to *H. rosea*. The skeleton is a very regular, ladder-like structure, with paucispicular primary and unispicular secondary lines. The oxea have long points and measure 160.8-*170.4*-180 × 9.1-*10.2*-12 µm.

From these subantarctic records it may be concluded that *H. rosea* has a bipolar distribution. Such a distribution has already been suggested by Burton (1959) and Bergquist & Warne (1980). Before reaching this conclusion it needs to be established whether the species really lacks in the tropics (it may have a continuous latitudinal distribution by tropical submergence, cf. Ekman, 1953). Tropical records of *H. rosea* are rare, and none of them is fromarchibenthal or abyssal depth. Ridley (1884) reported *Reniera rosea* from the Amirantes, but the taxonomic status of this species is difficult to assess. Other records include those of Topsent (1893a, Seychelles, as *Reniera rosea*), Topsent (1897, Ambon, as *Reniera rosea*) and Desqueyroux-Faundez (1981, Ambon, as *Reneira rosea*, redescription of Topsent's material). Topsent's material from the Seychelles has been studied (MNHN D.T. 3117); it consists of a few, rather fragile, amorphous fragments. The skeleton is unlike that of *H. rosea*; it is most probably a *Halichondria* (Halichondrida) or a related form. The extosomal skeleton consists of intercrossing oxea and the choanosomal skeleton is of a halichondroid structure. The oxea are ca. 315 × 7.5 µm; there is no spongin. Topsent's material from Ambon is also present in the MNHN (two microscopical slides), but it has not been studied. His material has been redescribed by Desqueyroux-Faundez; the figure given by her (l.c., fig. 59) evidently does not conform to *H. rosea*, since it clearly shows a unispicular, isotropic reticulation of oxea, which never occurs in this species.

On the basis of these few records, none of which is positively assignable to *H. rosea*, no tropical distribution has been ascertained.

Haliclona viscosa (Topsent, 1888)

(fig. 15, pl. I fig. 2, pl. IV fig. 1, pl. VIII figs. 4-6)

Reniera viscosa Topsent, 1888: 149; 1891a: 534; 1896: 114; Descatoire, 1969a: 200; 1969b: 15; van Soest & Weinberg, 1980: 8, fig. 10; van Soest et al., 1981 [1983]: 45; Jones, 1984: 242.

Reniera viscosa forma *similaris* Descatoire, 1969a: 200; 1969b: 13, fig. 1, photo 2.

Haliclona viscosa; Borojevic et al., 1968: 28; Ackers et al., 1985: 181, photo's 93, 100 & 101.

[Non: *Haliclona viscosa* Sarà, 1961 = *Reniera sarai* Pulitzer-Finali, 1969].

Reniera indistincta; Descatoire, 1969a: 200; 1969b: 13.

Haliclona indistincta: Benito, 1976: 499.

Holotype: MNHN D.T. 3043.

Type-locality: Luc (Calvados), France.

Material examined

BELGIUM: MNHN D.T. 2998, *Reniera viscosa* Topsent, Mer des Flandres.

FRANCE: MNHN D.T. 3623, *Reniera viscosa* Topsent, Luc (Calvados), 1906; MNHN D.T.

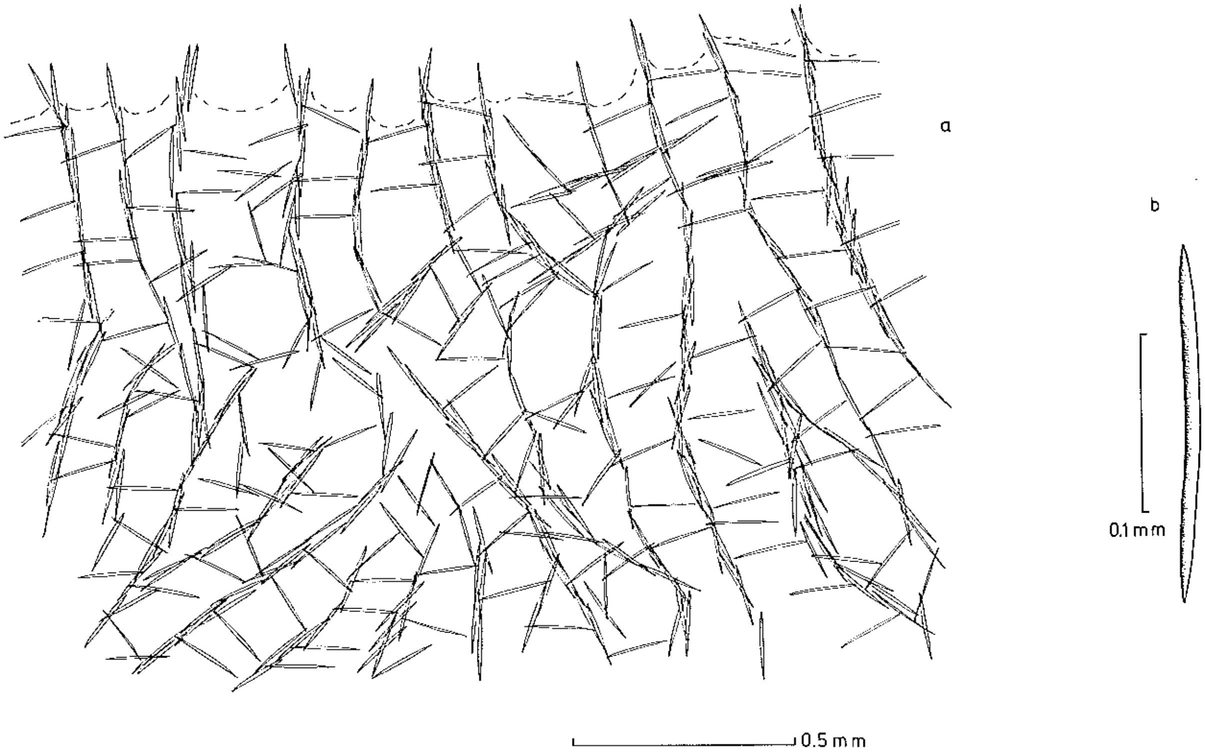

Fig. 15. *Haliclona viscosa*, a. choanosomal skeleton, b. oxe.

2693, microscopical slide, *Reniera viscosa* Topsent, Luc (Calvados); ZMA POR. 261, Château du Taureau, Baie de Morlaix, Finistère, ca. 25 m, dredge, 16-VII-1963, coll. G. Kleeton; POR. 5551, Astan, off Ile de Batz, 20 m, on vertical rock, 15-VIII-1981, coll. W. H. de Weerdt and S. Groot; POR. 5554, N of Ile de Batz, Roscoff, 85 m, dredge, 14-VI-1982, coll. R. W. M. van Soest and W. H. de Weerdt; POR. 5555, Men Ar C'hy, Iles de Glénans, 25 m, 30-VII-1981, coll. A. Castric; POR. 5669, Men Ar C'hy, Iles de Glénans, 18 m, 30-VII-1981, coll. A. Gastric.

British Isles and Ireland: ZMA POR. 6017, Outer Knoll Pin, Lundy, 18 m, 27-VII-1985, coll. G. Ackers; POR. 6024, off Rat Island, Lundy, 17 m, 29-VII-1985, coll. J. D. George; POR. 6028, Brazen Ward, Lundy, 19 m, 29-VII-1985, coll. J. D. George; POR. 6030, off Jenny's Hole, Lundy, 24 m, 1-VIII-1985, coll. W. H. de Weerdt; POR. 5553, Truhane Point, Sherkin Island, Ireland, 12 m, 14-VII-1981, coll. W. H. de Weerdt; POR. 5984, Carrigleamore Rock, Sherkin Island, Ireland, 9 m, 31-VII-1982, coll. M. Reichert and W. Doesburg; POR. 6007, Landing Stage, Sherkin Island, Ireland, 8 m, 15-VII-1982, coll. W. Doesburg and M. Reichert; POR. 6009, East Calf Island, Roaring Water Bay, Ireland, 6 m, 6-VIII-1982, coll. M. Reichert and W. Doesburg; POR. 5658, Lough Ine, Co. Cork, Ireland, 4 m, 12-IX-1983, coll. W. H. de Weerdt.

Shetlands: ZMA POR. 5662, Stacks of Stuis, Whale Firth, Midyell, 17-VII-1983, coll. J. de Visser.

Mediterranean: MNHN D.T. 3223, *Reniera viscosa* Topsent, Monaco.

Description of material

ZMA POR. 5555 consists of six larger specimens and a few smaller fragments. The largest specimen is massive, somewhat laterally compressed, 7 × 4 × 4 cm. At the upper side there are nine oscules of 2-4 mm; they are lineary arranged. The sides of the sponge are roughly undulating by the presence of grooves. The other specimens are smaller, but similar in habit.

The sponge of pl. I fig. 2 is a laterally spreading crust from which arise numerous partly isolated, partly fused tube-like elevations, each with an osculum at the summit.

Diagnosis

Shape and size: thickly encrusting to massive with chimney- or volcano-shaped osculiferous elevations. Commonly the oscules are large in number and situated in series at the top of isolated or fused elevations. The degree of fusing of these elevations is variable. The species may reach a considerable size: it may grow out to patches with a diameter of 30-40 cm and a height of 1.5-5 cm. The diameter of the oscules varies from 1-5 mm.
Consistency: rather firm, but very friable; extremely slimy.
Surface: the surface is punctate, smooth, but somewhat irregular caused by ridges and grooves.
Colour: greyish-purple, commonly verging to yellow towards the base. The colour turns to blackish-brown when the sponge is exposed to the air.
Ectosome: there is no ectosomal skeleton, but spicules of the primary lines project through the dermal membrane.
Choanosome: rather close meshed, with pauci-multispicular primary and unispicular secondary lines and with many spicules in confusion. The interior of the sponge is frequently built up by lines which are arranged in different directions. There are many choanosomal spaces.
Spongin: scarce, confined to the nodes of the spicules.
Spicules: rather slender and fusiform oxea, 110-150 by 3-7.5 µm (see also table XII).

Ecology: in the infralittoral, to 50 m, on vertical or horizontal sides of rocks in places with strong currents and low turbidity.

Distribution (fig. 10): Shetlands, British Isles, Belgium, France, Portugal, Mediterranean.

Table XII. Spicule sizes (in µm) of *Haliclona viscosa.*

specimen	locality	spicule sizes
MNHN D.T. 2998	Mer de Flandres	122.4-*133.8*(8.1)-148.8 × 3.6-*4.8*(0.7)-6.2
MNHN D.T. 3037	Luc	127.2-*150.0*(8.4)-160.8 × 3.6-*5.0*(0.5)-6.
MHNH D.T. 3223	Monaco	127.2-*140.5*(6.2)-151.2 × 3.1-*4.8*(0.5)-5.3
ZMA POR. 5551	Roscoff	113.0-*137.4*(8.6)-149.0 × 3.0-*5.9*(0.8)-8.0
ZMA POR. 5554	Roscoff	152.4-*162.1*(6.4)-172.8 × 6.7-*7.1*(0.3)-7.4
ZMA POR. 5555	Iles de Glénans	146.4-*156.7*(5.1)-165.6 × 5.3-*7.3*(0.6)-8.4
ZMA POR. 5552	Sherkin Island	134.4-*148.0*(5.7)-158.4 × 5.0-*6.7*(0.5)-7.7
ZMA POR. 5553	Sherkin Island	132.0-*146.9*(6.3)-163.2 × 4.8-*6.5*(0.5)-7.4
BMNH 1930.7.3.363 *Isodictya indistincta* (= *H. viscosa*)	Guernsey	129.6-*143.3*(4.7)-148.8 × 3.6-*5.0*(0.4)-5.5

Discussion

Haliclona viscosa is well characterized by its rather uniform shape and slimy consistency.Among the chalinids of the study area it is one of the most constant, and thus easily recognizable species. The form is always thickly massive with oscules placed at the top of chimney- or volcanoshaped elevations. The tendency to have the oscules placed in rows is observable even in young, small specimens. The ridges are almost always present. This stability holds true also for the colour, consistency, skeletal architecture, size and shape of the oxea and the amount of spongin. Furthermore the species is ecologically characterized by its preference for bare rock faces in places with strong currents and low turbidity.

The surprisingly few records of this common species may be explained by its occurrence in deeper water in places which require either SCUBA- or special dredging equipment.

A positive result of low variability of *H. viscosa* is the stability of its taxonomic status. Apart from one of Bowerbank's specimens of *Isodictya indistincta*, which most probably belongs to *H. viscosa*, and Descatoire's (1969a, b) misinterpretation of the sponges found at the Iles de Glénans, which she partly identified as *Reniera indistincta* and *Reniera viscosa*, and partly described as a variety of *R. viscosa*, there are no other species names confused with *H. viscosa*. It is not exaggerated to say that this is a rarity for the haplosclerids of the study area.

H. viscosa is closely related to *Haliclona indistincta* (Bowerbank, 1866) and *Haliclona rosea* (Bowerbank, 1866). Topsent (1888), who evidently misinterpreted *H. rosea* (cf. de Weerdt & Stone, in prep.), mentioned the close relationship between *H. viscosa* and *H. indistincta*, but left *H. rosea* out of consideration. According to him the first two species share spherical cells which are filled with "amidon", and the production of mucus. Topsent did not mention the high similarity in skeletal architecture, which is very obvious. According to Topsent the differences between *H. viscosa* and *H. indistincta* were: the massive habit of *H. viscosa* and the encrusting habit of *H. indistincta*; the colour, which is orange-brown in *H. viscosa* (more purple according to my observations), verging to black under suboptimal conditions, and greyish in *H. indistincta*; the oxea, which are slightly larger in *H. viscosa* than in *H. indistincta* (this difference is minimal, both species overlap completely, cf. Table 12 & 13), and the ecology: *H. viscosa* occurring deeper than *H. indistincta* which is confined to the infralittoral fringe zone. Most of Topsent remarks conform to the present author's observations.

Haliclona indistincta (Bowerbank, 1866) (fig. 16, pl. IV fig. 2, pl. IX figs. 1-3)

Isodictya indistincta Bowerbank, 1866: 290; 1874: 131, 356, pl. LI figs. 1-4; 1882: 119.
Reniera indistincta; Topsent, 1891a: 527; 1892a: 69; 1894a: 18; Stephens, 1912: 25; 1921: 8; van Soest et al., 1981 [1983]: 45; Jones, 1984: 242.
Adocia indistincta; Arndt, 1935: 94, fig. 202.
Haliclona indistincta; (pars) Burton, 1947: 369-372; Lévi, 1950: 22; 1956: 118, fig. 57; Borojevic et al., 1968: 27; Könnecker, 1973: 459.
Adocia indistincta; Arndt, 1935: 94, fig. 202.
?*Haliclona canaliculata* Hartman, 1958: 73, figs. 26, 27, pl. 5 fig. 2, pl. 15 fig. 1.

Lectotype: BMNH 1930.7.3.366.

Lectotype-locality: Diamond Ground, Hastings, Great Britain.

Material examined

BRITISH ISLES AND IRELAND: BMNH 1930.7.3.366, *Isodictya indistincta* Bowerbank, NC, Diamond Ground, Hastings, figured specimen of Bowerbank, 1874, pl. LI fig. 1, designated as the lectotype by Burton, 1947: 369; BMNH 1930.7.3.361, *Isodictya indistincta* Bowerbank, BC, Diamond Ground, Hastings; BMNH 1930.7.3.362, *Isodictya indistincta* Bowerbank, BC, Fowey, Peach, 1847; BMNH 1930.7.3.364, *Isodictya indistincta* Bowerbank, BC, Exmouth; BMNH 1910.1.1.287, *Isodictya indistincta* Bowerbank, NC, Strangford Lough, tide mark, Oct. 8. 1869; BMNH 1910.1.1.288, 288a, *Isodictya indistincta* Bowerbank, NC, Westport Bay, 1874; BMNH 1910.1.1.289,

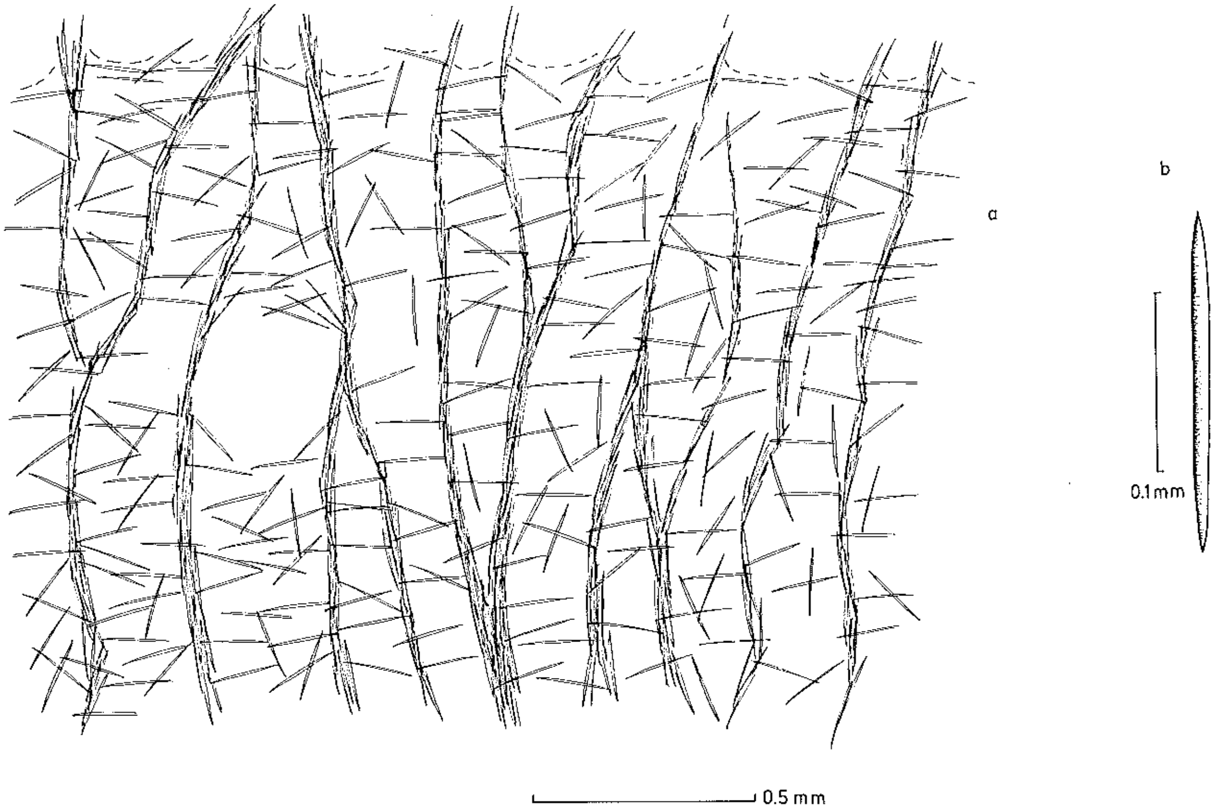

Fig. 16. *Haliclona indistincta*, a. choanosomal skeleton, b, oxe.

Isodictya indistincta Bowerbank, NC, Biterbuy Bay.

ZMA POR. 5987, Carrigleamore Rock, Sherkin Island, Ireland, 8 m, 30-VII-1982, coll. M. Reichert & W. Doesburg; POR. 5592, Truhane Point, Sherkin Island, Ireland, 6 m, 21-VII-1982, coll. W. Doesburg & M. Reichert; POR. 4367, 4380, Lough Ine, Co. Cork, Ireland, under stones, 10-VIII-1978, coll. R. W. M. van Soest; POR. 4434, Lough Ine, Co. Cork, Ireland, 4-X-1978, coll. R. W. M. van Soest.

CHANNEL ISLANDS: BMNH 1930.7.3.363, *Isodictya indistincta* Bowerbank, BC, Guernsey; BMNH 1910.1.1.284, *Isodictya indistincta* Bowerbank, NC, Guernsey; BMNH 1910.1.1.285, *Isodictya indistincta* Bowerbank, NC, Guernsey; BMNH 1910.1.1.286, *Isodictya indistincta* Bowerbank, NC, Guernsey.

ORKNEY ISLANDS: BMNH 1930.7.3.365, *Isodictya indistincta* Bowerbank, BC, Orkney.

FRANCE: ZMA POR. 263, Chenal d'Ile Verte, Roscoff, 23-VII-1964, coll. G. Kleeton; POR. 264, Chenal d'Ile Verte, Roscoff, 15-VII-1964, coll. G. Kleeton; POR. 2699, Chenal d'Ile Verte, Roscoff, 29-V-1965, coll. J. H. Stock; POR. 2700, Chenal d'Ile Verte, Roscoff, 28-V-1965, coll. J. H. Stock; POR. 2701, Chenal d'Ile Verte, Roscoff, 4-VI-1965, coll. J. H. Stock; POR. 4854, Chenal d'Ile Verte, Roscoff, LLWS, under stones, 9-VI-1982, coll. R. W. M. van Soest; POR. 5517, Chenal d'Ile Verte, Roscoff, LLWS, 0.5 m, under stones, 4-VIII-1981, coll. W. H. de Weerdt; POR. 5585, Chenal d'Ile Verte, Roscoff, LLWS, 0.5 m, under stones, 4-VI-1982, coll. R. W. M. van Soest & W. H. de Weerdt; POR. 5584, Pointe de Bloscon, Roscoff, LLWS, 0.5 m, under stones, 12-VIII-1981, coll. S. Groot; POR. 5663, Etretat, LLWS, under stones, 22-VII-1983, coll. R. W. M. van Soest.

Description of material

The lectotype of *Isodictya indistincta* (BMNH 1930.7.3.366) is a thick cushion of 6.5 × 3.5 × 1.5 cm with four, very wide (5-8 mm) oscular openings at the summit of short, thick-walled, mammiform elevations. The surface in between the oscules is very irregular by numerous grooves and depressions. The specimen (dried) is dark-brown, and very fragile.

ZMA POR. 5585 consists of five larger and three smaller specimens, one of which is shown in pl. IV, fig. 2. This specimen is a laterally spreading thick crust, 10 × 6 × 0.3-0.5 cm, with 10 circular oscules which are flush with the surface. The diameter of the oscules ranges from 3-5 mm. In the other sponges they are of similar size. Exhalant canals are radiating to the oscules from a distance of ca. 4-5 mm. The surface is somewhat irregular. All the other specimens in the ZMA collection are similar in size and shape to the sponges of POR. 5585.

Diagnosis

Shape and size: the sponge is always thickly encrusting, forming patches from a few cm to 20-25 cm in diameter. Oscules are few, irregularly scattered, not or only slightly elevated, circular, 1.5-3 mm in diameter.
Consistency: softly friable.
Surface: strongly punctate, slightly irregular and shaggy; with clearly visible exhalant canals radiating to the oscules.
Colour: greenish-brown.
Ectosome: absent.
Choanosome: close meshed, with pauci-multispicular primary and unispicular secondary lines. Many spicules in confusion.
Spongin: very little, confined to the nodes of the spicules.
Spicules: rather slender and fusiform oxea, 110-150 by 3-7.5 µm (see also table XIII).

Ecology: mainly found at the undersides of intertidal rocks.

Distribution (fig. 10): British Isles, Atlantic coasts of France, ?Amphi-Atlantic.

Discussion

Unfortunately the lectotype of *Isodictya indistincta* is an atypical representation of the species, and it is very difficult to trace the morphological characteristics from this specimen. When this specimen, which is figured in Bowerbank, 1874, pl. LI fig. 1, is compared with the specimen of fig. 2 of the same plate, it is difficult to believe that the two specimens belong to the same species. The sponge of fig. 2 reminds strongly of *Haliclona viscosa*. This

Table XIII. Spicule sizes (in µm) of *Haliclona indistincta*.

specimen	locality	spicule size
BMNH 1930.7.3.366 lectotype	Hastings	139.2-*146.7*(5.2)-156.0 × 4.8-*5.9*(0.8)-7.0
ZMA POR. 5585	Roscoff	120.0-*139.7*(10.0)-175.2 × 4.8-*6.0*(0.8)-8.6
ZMA POR. 5517	Roscoff	124.8-*135.7*(6.6)-146.4 × 5.0-*6.0*(0.6)-7.2
ZMA POR. 5584	Brest	120.0-*126.7*(4.4)-134.4 × 4.3-*5.1*(0.6)-6.0
ZMA POR. 5987	Sherkin Island	120.0-*135.0*(8.2)-146.4 × 2.6-*5.3*(1.3)-6.7
ZMA POR. 4380	Lough Ine	96.0-*105.9*(9.4)-122.4 × 2.6-*4.3*(1.1)-6.0

specimen (BMNH 1930.7.3.363) is also cushion-shaped, 3 × 4 × 1.2 cm, but densely covered with seven volcano-shaped elevations which have a small osculum at their summit. The oscules are obviously placed in series. The specimen is far less fragile than the lectotype, and the surface is covered with a thin transparant film which reminds strongly of dried mucous. However, the skeletal architecture of the two specimens is similar, as well as the size and shape of the oxea (146.7 × 5.9 µm in the lectotype, 143.3 × 5.0 µm in the other specimen). The sponge of fig. 2 is furthermore obtained from a dredge haul at Guernsey; *H. viscosa* is typically a species which is easily collected by swab dredging since it prefers bare rock faces. Another thing to be mentioned here is the conspicuous absence of a species description by Bowerbank which turns out to be *H. viscosa*. The species is not uncommon in the British Isles and the Channel Islands. It is most likely that Bowerbank's collection of *Isodictya indistincta* is a mixture of *H. indistincta* and *H. viscosa*.

H. indistincta is probably conspecific with the North American species *Haliclona canaliculata* Hartman, 1958, described from Branford, New England and Connecticut. *H. canaliculata* is described as a thickly encrusting, brownish sponge, with oscules flush with the surface and with exhalant canals radiating to the oscules. The oxea are fusiform and measure 74-148 × 3.3-8.2 µm; they form vertical, multispicular tracts, held together by small quantities of spongin, with unispicular secondary lines, and with many spicules in confusion (partly literally cited from Hartman). The species reminds strongly of *H. indistincta*. Remarkably the species seems to have not been found the last few years along the New England coast (pers. comm. R. W. M. van Soest). It might be that *H. indistincta* has been imported from Europe to North America, but that the environmental conditions are less suitable for the species than in the European coastal area. Of course this needs to be further investigated.

Species of the **angulata**-*group*

Ground-plan: the choanosomal skeleton a rather confused, sub-halichondroid reticulation of paucispicular primary and unispicular secondary lines. Spongin scarce or absent. Spicula robust, long oxea.

Remark: microscleres occur quite frequently within this group, but are not necessarily present.

Species: *Haliclona angulata* (Bowerbank), *Haliclona fibulata* (Schmidt), and *Haliclona rava* (Stephens).

Haliclona angulata (Bowerbank, 1866) (fig. 17, pl. IV fig. 4, pl. IX figs. 4-6)

Halichondria angulata Bowerbank, 1866: 233; 1874: 101, pl. XLI figs. 4-8; 1882: 99.
Orina angulata; Gray, 1867: 540; Pulitzer-Finali, 1983: 584.
Desmacodes angulatus; Vosmaer, 1880: 107.
Gellius angulatus; Ridley & Dendy, 1887: 44; Topsent, 1890: 200; 1891a: 528; 1891b: 127; 1982a: 76; 1894a: 8; 1986: 111; 1925a: 12; Arndt, 1935: 91, fig. 194; Lévi, 1950: 21; 1956: 120, fig. 58: Descatoire, 1969a: 201; Pulitzer-Finali, 1978: 80; Ackers et al., 1985: 171, photo 88; Jones, 1984: 242.
[Non: *Gellius angulatus*; Topsent, 1901: 356 = *Gellius marismedi* Pulitzer-Finali, 1978; nec: Topsent, 1904: 231; Lundbeck, 1902: 63; Koltun, 1959: 210, fig. 166 = *Gellius arcoferus* Vosmaer, 1885].
Amorphina angulata; Topsent, 1888: 145.
Haliclona angulata; (pars) Burton, 1948: 279; 1956: 124; de Weerdt & van Soest, 1986: 18, figs. 12, 13.
Isodictya indefinita Bowerbank, 1866: 286; 1874: 126, pl. XLIX figs. 15-17; 1882: 118.
Reniera indefinita; Ferrer-Hernandez, 1922: 17.
Isodictya fallax Bowerbank, 1866: 302; 1874: 132, pl. LI figs. 10-13; 1882: 121.
Gellius fallax; Topsent, 1896: 114; Kirkpatrick, 1907: 86.
Amorphina connexa Topsent, 1888: 144, pl. VI fig. 15.
Gellius luridus; (pars) Topsent, 1928: 315.
[Non: *Gellius luridus* Lundbeck, 1902 = *Gelliodes luridus*, cf. de Weerdt & van Soest, in prep.].

Holotype: BMNH 1910.1.1.173.

Type-locality: Guernsey.

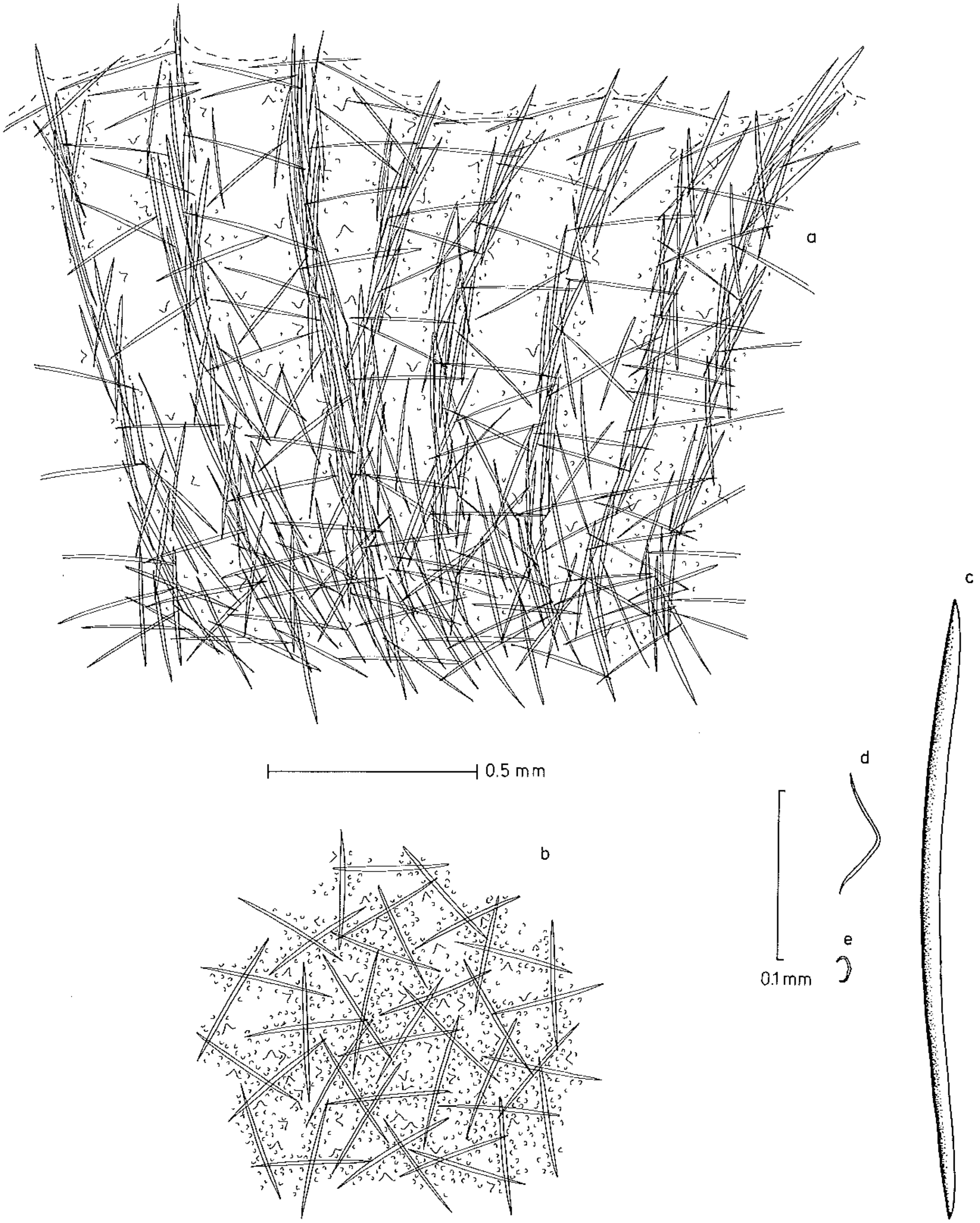

Fig. 17. *Haliclona angulata*, a. choanosomal skeleton, b. tangential view of ectosomal skeleton, c. oxe, d. toxa, e. sigma.

Table XIV. Taxonomic status of specimens which belong to *Haliclona angulata.*

specimen	original name	locality	taxonomic status
BMNH 1910.1.1.173	*Halichondria angulata*	Guernsey	holotype (design. by Bowerbank, 1874: 101)
BMNH 1930.7.3.360	*Isodictya indefinita*	Ilfracomb	holotype (design. by Bowerbank, 1874: 125)
BMNH 1910.1.1.266	*Isodictya fallax*	Guernsey	holotype (design. by Bowerbank, 1874: 132)

Material examined (see table XIV for the taxonomic status of specimens which belong to *Haliclona angulata*).

British Isles: BMNH 1930.7.3.360, holotype *Isodictya indefinita*, BC, Ilfracombe, figured specimen of Bowerbank, 1874, pl. XLIX fig. 15, designated as the type by Bowerbank on p. 125 of the same volume.

Channel Islands: BMNH 1910.1.1.173, holotype *Halichondria angulata*, NC, Guernsey, figured specimen of Bowerbank, 1874, pl. XLI fig. 4, designated as the type by Bowerbank on p. 101 of the same volume; BMNH 1910.1.1.266, holotype *Isodictya fallax*, NC, Guernsey, figured specimen of Bowerbank, 1874, pl. LI fig. 10, designated as the type by Bowerbank on p. 132 of the same volume.

France: BMNH 1910.1.1.481, *Gellius angulatus*, NC, Luc, det. E. Topsent; MNHN D.T. 2695, *Gellius angulatus*, Luc (Calvados), det. E. Topsent; ZMA POR. 2472, La Tortue, Roscoff, 18-VII-1964, 15-25 m, coll. G. Kleeton; POR. 5851, Iles des Glénans, 30-VII-1981, 25 m, coll. A. Castric.

Mediterranean: MNHN D.T. 3198, *Gellius angulatus*, det. E. Topsent.

Description of material

The holotype of *Halichondria angulata* is a rather amorphous clump of 2.5 × 1 × 1 cm, without oscules. The specimen agrees with Bowerbank's figure (Bowerbank, 1874, pl. XLI fig. 4). The colour (dried) is yellowish-brown, and the consistency is rather firm and friable. The ectosome is for the greater part lost, but is still present in a few places. It consists of a very regular reticulation of intercrossing oxea, with numerous sigmata and toxa. The ectosomal skeleton agrees also fully with Bowerbank's figure (l.c., fig. 5). The choanosomal skeleton is a somewhat confused, sub-halichondroid reticulation, in places consisting of paucispicular primary lines, irregularly connected by single secondary spicules. The oxea are long, rather thin, with long and sharp points, they measure 277 × 7.7 µm, the sigmata are slightly accolada-shaped; they measure 12 × 0.9 µm; the toxa are sharply bent and have recurved apices; they measure 56 × 1.2 µm (see also Table XV, in which the spicule sizes of a selection of specimens is recorded). There is no spongin.

The holotype of *Isodictya indefinita* reminds somewhat of a walnut; it is slightly damaged but still recognizable as the figured specimen (Bowerbank, 1874, Pl. XLIX fig. 15). It is a roundish, amorphous clump of ca. 2 × 2 × 1.5 cm, without oscules; the colour (dried) is cream-white, and the consistency is rather firm. The ectosome is lost. The choanosomal skeleton is also sub-halichondroid, but more fibrous than that of the holotype of *Halichondria angulata*. The oxea are long-pointed and long: 233 × 7.9 µm; the sigmata measure 8.7 × 0.6 µm; the toxa measure 40 × 1.1 µm.

The holotype of *Isodictya fallax* is very similar to the holotype of *Halichondria angulata*, but slightly larger. It is a roundish clump of 4.2 × 2.2 × 2 cm, yellowish-brown, rather firm and friable. There are no oscules. It agrees with Bowerbank's figure (1874, pl. LI fig. 10). The ectosome is clearly present in a few places; it consists of the same regular reticulation of intercrossing oxea. The choanosomal skeleton is also very similar to that of the holotype of *H. angulata*. The oxea are 270 × 8.6 µm, the sigmata 12.5 × 0.8 µm, and the toxa 56.2 × 1.6 µm.

ZMA POR. 2472 consists of four roundish clumps and several smaller fragments. One of the clumps is 6 × 4.5 × 3 cm; there are six oscules at the upper-and side part of the clump; these are circular, except for one which is oval, and range from 3 to 7 mm in diameter; they are level with the surface. The ectosome is lost. The other larger fragments are very similar to this specimen, but they have fewer or no oscules. In two specimens there is still ectosome left in a few places. The specimens (spirit) are softly friable, and old rose in colour. The ectosomal skeleton is a regular, tangential, unispicular reticulation of intercrossing oxea; the choanosome is sub-halichondroid. The oxea of one of the larger clumps are 228 × 9.3 µm, the sigmata are 9.2 × 0.6 µm, the toxa 57 × 0.7 µm.

ZMA POR. 5851 consists of three specimens and a few fragments. The specimens are of similar size and shape. The sponge of pl. IV, fig. 4 is a massive clump of 3.8 × 2 × 1 cm; at the upperside there are ca. eight hollow fistules which range from 4 to 8 mm in height and 2 to 4 mm in thickness. There are no oscules. The consistency is rather firm and brittle. The surface is smooth. All the specimens still have their ectosome. The colour (spirit) is white. The ectosomal and choanosomal skeletons are of the same structure as the other described material. The oxea are 304 × 11.8 µm, the sigmata 11.6 × 0.7 µm and the toxa 53 × 1.5 µm.

Diagnosis

Shape and size: massive, sometimes with fistular processes arising from the upper side of the sponge. Oscules few, rather large (ca. 0.5 cm), not elevated.
Consistency: brittle, fragile.
Surface: smooth, even.
Colour: (dried) yellowish-brown, (spirit) light purplish-brown or whitish, (alive) light-purple, whitish semitransparant at the surface.
Ectosome: a regular, isotropic reticulation of characteristically intercrossing oxea. The ectosomal skeleton rests very loosely on the choanosomal skeleton, and is therefore easily peeled off, but consequently also easily damaged or lost.
Choanosome: the choanosomal skeleton is sub-halichondroid, consisting of loosely organized paucispicular primary lines with irregularly scattered secondary spicules.
Spongin: absent.
Spicules: oxea: straight or slightly curved, with a long and sharp point, 200-350 × 3.5-14 µm. Sigmata: strongly curved, somewhat accolada-shaped, small, 7-15 × 0.2-1.2 µm. Toxa: very slender, sharply bent, with recurved apices, 43-75 × 0.2-2.5 µm (see also table XV).

Ecology: in the infralittoral, to 500 m.

Distribution (fig. 18): Shetlands, British Isles, Atlantic coasts of France and Spain, reaching south to the Azores, Madeira and the Mediterranean.

Discussion

Haliclona angulata is characterized by the regular ectosomal skeleton of intercrossing oxea, the strongly bent, angulated toxa and by the small, accolada-sigmata.

Isodictya indefinita and *Isodictya fallax* are without doubt conspecific with *H. angulata*. *H. angulata* has already been revised by Burton (1948), who also placed these two species in the list of synonyms. However, I do not agree with Burton's opinion to consider *Isodictya jugosa* Bowerbank and *Halichondria couchii* Bowerbank synonymous with *H. angulata* as well. These species are in my opinion conspecific with *Haliclona fibulata* (Schmidt, 1862). *H. fibulata* (cf. below) shares the skeletal architecture with *H. angulata*, but is morphologically well distinguished from it. It is well characterized by its thickly encrusting, laterally spreading habit, but especially by its strongly reticulate surface. *H. fibulata* can not be confused with any other species. Burton observed small, toxiform oxea

Table XV. Spicules sizes (in µm) of *Haliclona angulata.*

specimen	locality	oxea	sigmata	toxa
BMNH 1910.1.1.173 *Halichondria angulata* holotype	Guernsey	237.5-*227.9*(19.1)-307.8 × 6-*7.7*(0.8)-9.1	9.6-*12.0*(1.9)-14.4 × 0.7-*0.9*(0.2)-1.2	43.2-*55.6*(6.8)-63.6 × 1.0-*1.2*(0.1)-1.4
BMNH 1930.7.3.360 *Isodictya indefinita* holotype	Ilfracomb	209.0-*232.6*(13.9)-269.8 × 3.4-*7.9*(1.5)-10.6	7.2-*8.7*(1.1)-10.1 × 0.5-*0.6*(0.1)-0.7	36.0-*40.0*(7.0)-48.0 × 1.0-*1.1*(0.1)-1.2
BMNH 1910.1.1.266 *Isodictya fallax* holotype	Guernsey	214.7-*270.8*(15.0)-288.8 × 7.6-*8.6*(1.0)-11.4	12.0-*12.5*(0.8)-13.2 × 0.7-*0.8*(0.2)-1.2	43.2-*56.2*(6.3)-64.0 × 0.7-*1.6*(0.2)-1.2
MNHN D.T. 3198 *Gellius angulatus* det. Topsent	Mediterr-anean	209.0-*237.3*(10.3)-254.6 × 4.6-*7.0*(0.8)-7.6	7.2-*9.5*(1.3)-11.3 × 0.5-*0.7*(0.1)-1.0	24.0-*55.2*(18.9)-74.4 × 0.2-*1.0*(0.7)-2.2
MNHN D.T. 296 *Gellius luridus* det. Topsent	Banyuls	266.0-*281.8*(14.8)-315.4 × 8.4-*10.4*(0.9)-11.2	11.0-*14.0*(1.4)-15.6 × 0.6-*0.9*(0.2)-1.2	50.4-*60.0*(5.7)-67.2 × 1.0-*1.5*(0.4)-1.9
ZMA POR. 2472	Roscoff	197.6-*228.3*(60.8)-372.4 × 7.2-*9.3*(1.1)-11.0	7.0-*9.2*(1.2)-10.8 × 0.2-*0.6*(0.2)-0.8	48.0-*57.1*(5.7)-64.8 × 0.5-*0.7*(0.1)-1.0
ZMA POR. 5851	Iles de Glénans	277.4-*304.1*(11.9)-338.2 × 10.6-*11.8*(0.8)-14.4	9.6-*11.6*(1.3)-13.2 × 0.5-*0.7*(0.1)-1.0	43.2-*52.9*(4.6)-57.6 × 1.0-*1.5*(0.4)-2.4

in *I. jugosa*, but these are juvenile oxea according to my observations (*H. fibulata* has only sigmata and no toxa; the sigmata are irregularly bent and larger than in *H. angulata*, viz. 10-37 µm). According to Burton the variation in size and shape of the sigmata were a normal feature of *H. angulata*. I do not agree with this; they are rather constant in shape and size.

Another species which Burton placed in the synonymy of *H. angulata* is *Gellius* (*Haliclona*) *ravus* Stephens, 1912. *G. ravus* differs clearly from *H. angulata* by its habit (encrusting patches), the smaller oxea (ca. 180 × 8.5 µm), the larger and much more irregularly bent toxa (38.5-120 × 0.2-1.6 µm), the smaller sigmata (4.8-12 × 0.2-0.5 µm), and by the presence of scarce spongin at the nodes of the spicules.

Topsent's (1901) record of *Gellius angulatus* quite certainly conforms to *Gellius* (*Haliclona*) *marismedi* Pulitzer-Finali (1978). This species has microtoxa in addition to the normal toxa (cf. de Weerdt & van Soest, 1986).

Topsent's (1904), Lundbeck's (1902), and Koltun's (1958) records of *Gellius angulatus* conform to *Gellius arcoferus* Vosmaer, 1885. This species has oxea of 350-550 × 10-20 µm, sigmata in different size categories, the largest being ca. 80 µm, and toxa of 60-120 µm. The ectosomal skeleton is a strong reticulation of short paucispicular lines, which form rounded meshes. The choanosomal skeleton is also a strong, rigid reticulation of multispicular primary lines, which are irregularly connected by unispicular secondary lines. On the basis of the skeletal architecture the species belongs to the family Niphatidae van Soest (1980) and will be treated in a separate paper (de Weerdt & van Soest, in prep.).

Topsent's (1928) record of *Gellius luridus* conforms to *H. angulata* (cf. de Weerdt & van Soest, 1986). *Gellius luridus* Lundbeck (1902) belongs to the Niphatidae and will be treated in a separate paper (de Weerdt & van Soest, in prep.).

The original material of *Amorphina connexa* has not been studied but Topsent's description and figure of the spicules (Topsent, 1888: 144, pl. VI fig. 15) conform to *H. angulata*, by his own admission (Topsent, 1892a: 76).

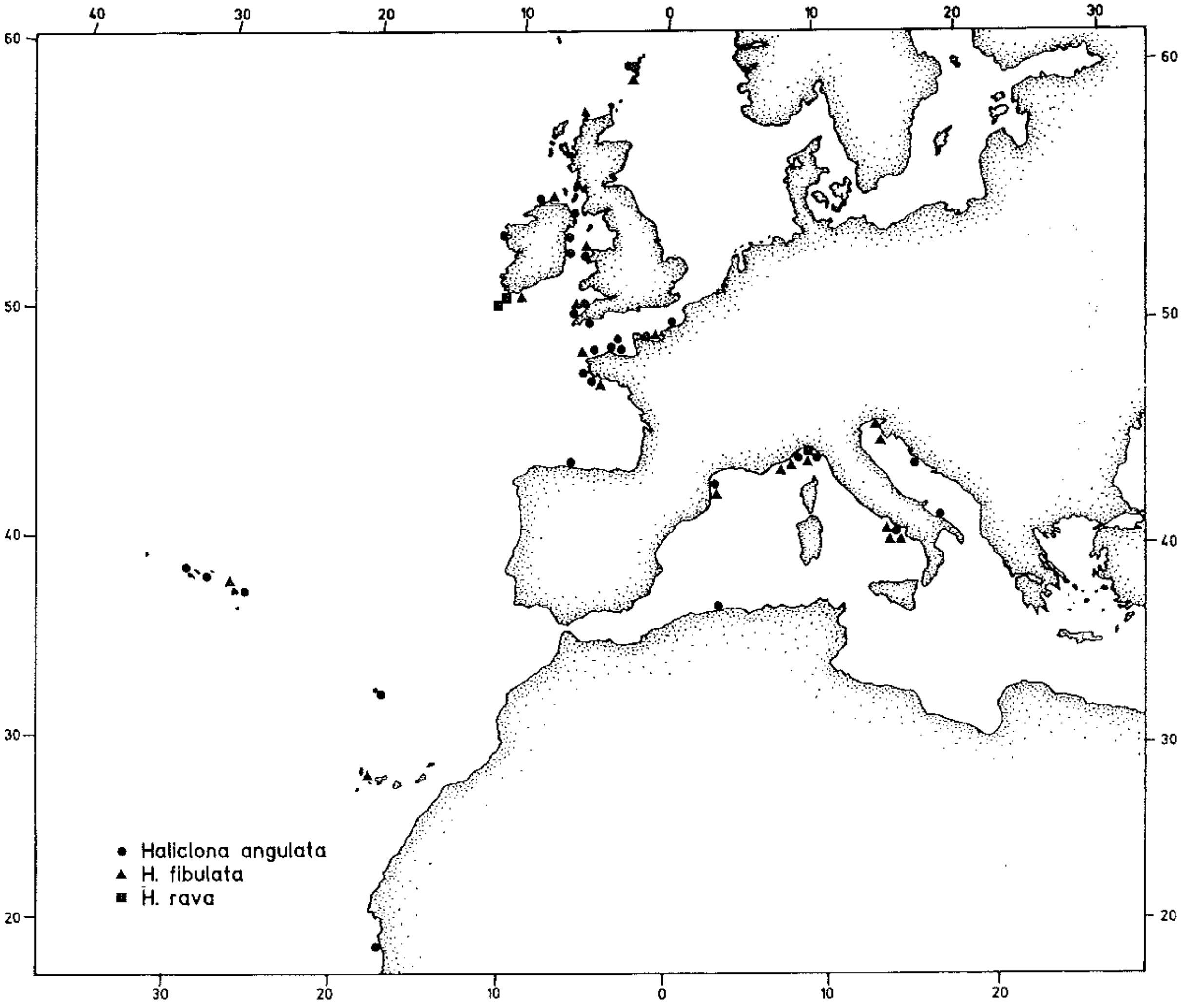

Fig. 18. Distribution of *Haliclona angulata*, *H. fibulata* and *H. rava*.

H. angulata is related to *Reniera* (= *Haliclona*) *fibulata* Schmidt, 1862 (Mediterranean-Atlantic), *Gellius* (= *Haliclona*) *lacazei* Topsent, 1893 (Mediterranean, south-eastern N Atlantic), *Rhaphisia* (= *Haliclona*) *laxa* Topsent, 1892b (Mediterranean-south-eastern N Atlantic), *Rhaphisia* (= *Haliclona*) *spissa* Topsent, 1892b (south-eastern N Atlantic), *Isodictya* (= ? *Haliclona*) *tenera* Marenzeller, 1877 (Arctic, transferred to *Haliclona* by Burton, 1959), and *Gellius* (= *Haliclona*) *ravus* Stephens, 1912 (?Mediterranean-Atlantic). All these species share the somewhat confused sub-halichondroid structure of the choanosomal skeleton, in places consisting of paucispicular primary lines. *Haliclona tenera* is the only species without microscleres. The megascleres of all these species are furthermore of a considerable size.

Haliclona fibulata (Schmidt, 1862) (n. comb.) (fig. 19, pl. IV fig. 5, pl. X figs. 1, 2)

Reniera fibulata Schmidt, 1862: 73, pl. VII fig. 9; Carter, 1874a: 250, pl. XV fig. 44; 1876: 313.

[Non: *Reniera fibulata*; Schmidt, 1870: 40 = ?*Desmacella vagabunda* Schmidt (cf. Topsent, 1925b: 706)].

Gellius fibulatus; Topsent, 1890: 201; 1892a: 76; 1896: 115; 1904: 23; 1925b: 706, pl. VIII fig. 6; Lévi, 1957: 209, fig. 11; Sarà, 1958a: 234, fig. 9; 1958b: 266; Siribelli, 1963: 5; Rützler, 1965: 65; Descatoire, 1969a: 201; Boury-Esnault, 1971: 331.

Gelliodes fibulatus; Babic, 1922: 268; Pulitzer-Finali, 1983: 586.

[Non: *Gelliodes fibulata* Ridley, 1884: 472; nec: Vacelet, 1961: 42; 1969: 209].

Isodictya jugosa Bowerbank, 1866: 296; 1874: 128, pl. L figs. 11-14; 1882: 131.

Gellius jugosus; Gray, 1867: 538; Arndt, 1935: 92, fig. 197.

[Non: *Gellius jugosus*; Koltun, 1959: 211, fig. 167; nec: *Haliclona jugosa*; Burton, 1934b: 7 = *Gellius arcoferus* Vosmaer].

Halichondria couchii Bowerbank, 1874: 203, pl. LXXIII figs. 12-15; 1882: 99.

Gellius couchii; Ridley, 1884: 371; Topsent, 1894a: 8; Arndt, 1935: 92, fig. 196.

Amorphina couchii; Topsent, 1888: 145.

?*Gellius pyrrhi* Hanitsch, 1895: 211.

?*Gellius arcticus* Hentschel, 1916: 12, fig. 2: 1929: 976.

Haliclona angulata; (pars) Burton, 1948: 279.

Holotype: unknown.

Type-locality: Lesina (Triest), Mediterranean.

Material examined (see table XVI for the taxonomic status of specimens which belong to *Haliclona fibulata*).

British Isles and Ireland: BMNH 1877.5.21.2091, holotype *Halichondria couchii*, BC, Cornwall, figured specimen of Bowerbank, 1874, pl. LXXIII fig. 12, designated as the type by Bowerbank on p. 198 of the same volume; GA 451, Ravens Point, Anglesey, 18-VI-1983, 4 m, vertical cliff; ZMA POR. 5520, Lough Ine, Co. Cork, Ireland, 12-IX-1983, 10 m, coll. W. H. de Weerdt & R. W. M. van Soest.

Shetlands: BMNH 1910.1.1.294, holotype *Isodictya jugosa*, NC, Shetland, figured specimen of Bowerbank, 1874, pl. L fig. 11, designated as the type by Bowerbank on p. 128 of the same volume.

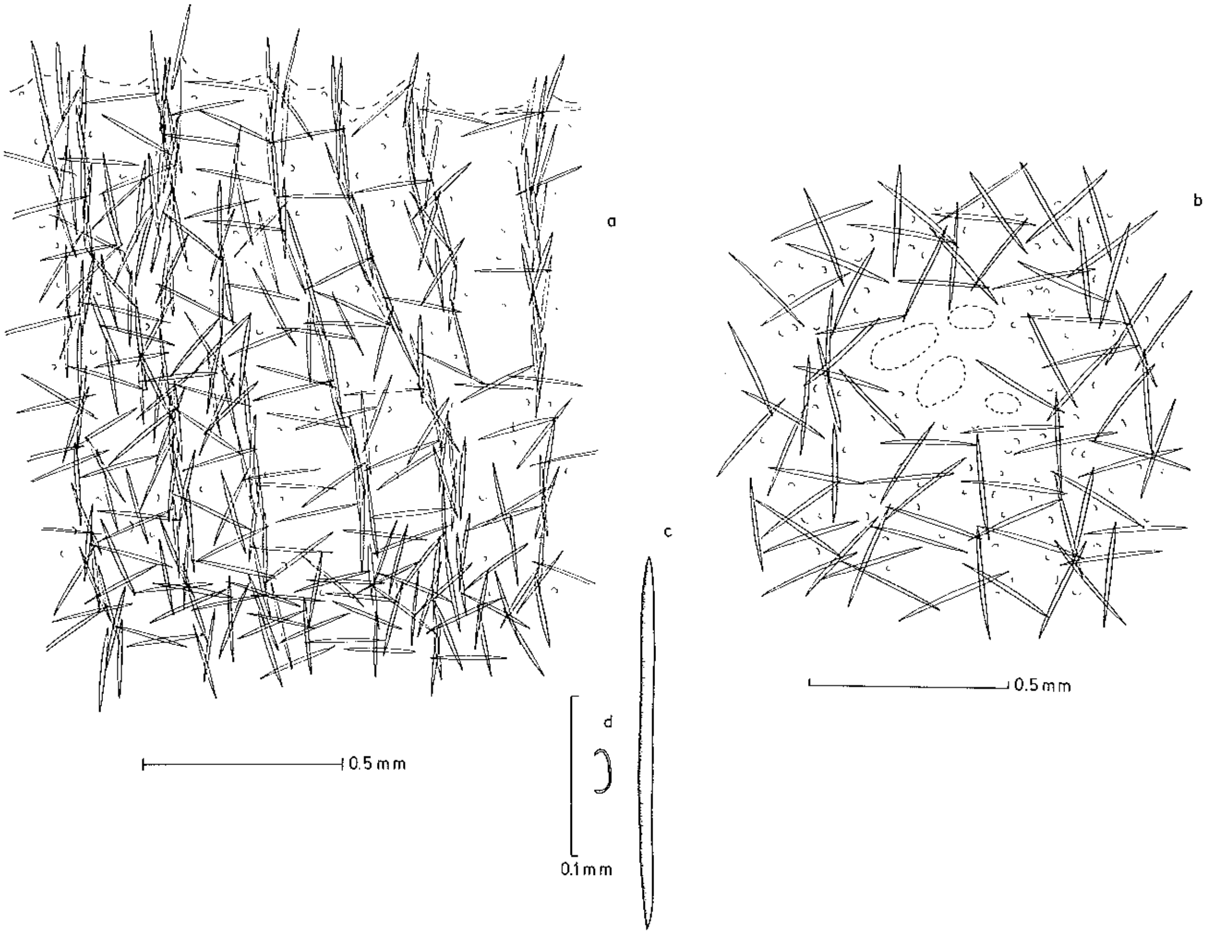

Fig. 19. *Haliclona fibulata*, a. choanosomal skeleton, b. tangential view of ectosomal skeleton, c. oxe, d. sigma.

Table XVI. Taxonomic status of specimens which belong to *Haliclona fibulata*.

specimen	original name	locality	taxonomic status
BMNH 1910.1.1.294	*Isodictya jugosa*	Shetlands	holotype (design. by Bowerbank, 1874: 128)
BMNH 1877.5.21.2091	*Halichondria couchii*	Cornwall	holotype (design. by Bowerbank, 1874: 198)

France: MNHN D.T. 3204, *Gellius fibulatus*, Luc (Calvados), 29-VIII-1892, det. E. Topsent; MNHN D.T. 3069, *Gellius fibulatus*, Saint-Jean-de-Luz, det. E. Topsent; ZMA POR. 6069, Iles des Glénans, 30-VII-1981, 25 m, coll. A. Castric.

Mediterranean: MNHN D.T. 3204, *Gellius fibulatus*, Mediterranean, 7-X-1892, det. E. Topsent; MNHN D.T. 3125, *Gellius fibulatus*, Monaco, 19-IV-1927, det. E. Topsent; ZMA POR. 5469, Banyuls-sur-Mer, 21-VI-1984, 14 m, in cavity, coll. F. van Lent.

Description of material

The holotype of *Isodictya jugosa* is a small, amorphous cushion on a piece of conglomorated bryozoans, calcareous algae and tube worms. There are no oscula. The ectosome is lost. The consistency is rather firm. The colour (dried) is light yellowish-brown. The choanosomal skeleton is a sub-halichondroid reticulation, in places consisting of paucispicular primary lines, connected by unispicular secondaries. The oxea are straight or slightly curved, with long and sharp points; they measure 260 × 8.2 μm; there are a few, very irregularly bent sigmata of 22 × 1.4 μm (see also table XVII in which the spicule sizes of a selection of specimens are given).

The holotype of *Halichondria couchii* is even more smaller than the holotype of *Isodictya jugosa*, but still recognizable as the figured specimen (Bowerbank, 1874, pl. LXXIII fig. 12). There are no oscules and no ectosome. The colour (dried) is light yellow, the consistency rather firm. The skeletal architecture is not well observable, but some vague paucispicular lines are present. The oxea are slightly smaller than those of *I. jugosa*, viz. 207 × 8.9 μm; the sigmata are irregularly bent and measure 17.2 × 0.8 μm.

ZMA POR. 5520 consists of three specimens, and one smaller fragment. The sponges are similar in size and shape; they are all ca. 1.5 × 3 × 0.2-0.4 cm, and cushion-shaped. One specimen has a small, circular osculum of 1.5 mm. In one of the other specimens there are two hollow fistules of 7 mm long and 1.5 mm thick, which arise from one of the sides. The smaller fragment consists mainly of 5 very slender fistules, which are 1.8 cm long and ca. 1 mm thick. They branch off from one, basal fistule which originates from the spider part of a sponge which is only ca. 1 cm in diameter. The surface of the three larger specimens as well as the small piece with the fistules is strongly reticulated. The consistency is firm. Their colour alive was light purple. In spirit it is yellowish-white.

GA 450 is a beautiful specimen, consisting of a large, laterally spreading, thickly encrusting mass, growing on a globular specimen of *Stelletta grubii*. The size of this sponge is 10 × 8 × 6 cm. The specimen of *H. fibulata* covers the greater part of the upperside and side parts of the other sponge. It has an irregular outline. There are only five oscules which are level with the surface; four of them have a diameter of 1.5 mm, the other of 6 mm. The surface is smooth, and strongly reticulated. The consistency is rather firm but compressible.

Diagnosis

Shape and size: cushion-shaped, which may become laterally spreading masses, occasionally with fistular proliferations. The sponge may

reach a size of 10 cm or more. Oscules few, 1-2 mm, flush with the surface.
Consistency: rather firm, but compressible.
Surface: smooth, strongly reticulated.
Colour: (alive) old rose, (spirit) cream yellowish-white.
Ectosome: an irregular and rather confused, subisotropic reticulation.
Choanosome: the choanosomal skeleton consists of a rather irregular and dense reticulation with paucispicular primary and unispicular secondary lines, with many spicules in confusion.
Spongin: scarce, nodal.
Spicules: oxea: straight or slightly curved, with a rather long and sharp point, sometimes with a few strongylote and centrotylote modifications intermixed, 160-270 × 5-11 µm. Sigmata: irregularly and weakly curved, 9.6-37 × 1.0-2.4 µm (see also table XVII).

Ecology: in the infralittoral, to ca. 60 m. On stones, conglomorates of shells, calcareous algae, sponges etc.

Distribution (fig. 18): British Isles, Atlantic coasts of France, Mediterranean, ?Spitsbergen.

Discussion

Haliclona fibulata is morphologically well characterized by its strongly reticulated surface, and its laterally spreading, thickly encrusting habit. Furthermore the sigmata are characteristically irregularly bent. The differences with *H. angulata* and *H. rava* are discussed above. Unfortunately the identity of *H. fibulata* could not be established on basis of the original material. However, although Schmidt's description of *Reniera fibulata* is meagre, he figured the spicules, from which it can be calculated that the oxea measure ca. 160 × 5.7 µm, and the sigmata ca. 17 µm. The best available, and reliable description of the species is that of Topsent (1925b: 706, pl. VIII, fig. 6). The photo of the sponge clearly shows the characteristic morphologial features of the species.

Schmidt's (1862) first record of *R. fibulata* is from Lesina (Triest). Later (1870) he reported the species from Portugal. According to Ridley (1884) and Topsent (1925b), who re-examined Schmidt's material from Portugal, this record conforms to *Desmacella* (= *Gelliodes*) *vagabunda* Schmidt, 1870. It is a thick-walled, tubiform

Table XVII. Spicules sizes (in µm) of *Haliclona fibulata*.

specimen/reference	locality	oxea	sigmata
Reniera fibulata Schmidt, 1862, pl. VII, fig. 9 (recalculated)	Lesina, Mediterranean	160 × 5.7	17
MNHN D.T. 3204 *Gellius fibulatus* det. Topsent	Mediterranean	211.2-*229.7*(9.3)-242.4 × 7.4-*9.6*(0.8)-11.8	14.4-*17.4*(1.7)-19.2 × 0.6-*0.8*(0.2)-1.0
MNHN D.T. 2699 *Gellius fibulatus* (cf. Topsent, 1890: 201)	Luc	141.6-*147.6*(5.3)-156.0 × 5.3-*6.4*(0.8)-7.4	18.0-*28.8*(7.7)-37.2 × 1.0-*1.7*(0.7)-2.4
MNHN D.T. 3069 *Gellius fibulatus* det. Topsent	Saint-Jean-de-Luz	172.8-*205.2*(25.0)-237.6 × 6.2-*8.4*(1.5)-9.8	9.6-*13.5*(1.9)-15.6 × 0.2-*0.9*(0.4)-1.2
BMNH 1910.1.1.294 *Isodictya jugosa*, holotype	Shetland	239.4-*260.2*(11.3)-277.4 × 7.2-*8.2*(0.9)-10.6	16.0-*21.7*(3.9)-30.4 × 1.1-*1.4*(0.3)-1.9
BMNH 1877.5.21.2091 *Halichondria couchii*, holotype	Cornwall	199.2-*207.3*(7.9)-220.8 × 7.7-*8.9*(0.7)-9.6	15.6-*17.2*(1.0)-19.2 × 0.5-*0.8*(0.2)-1.0
GA 451	Anglesey	180.0-*195.4*(8.9)-216.0 × 6.0-*7.5*(0.6)-8.9	14.6-*19.1*(3.1)-25.2 × 0.7-*1.0*(0.2)-1.4
ZMA POR. 5521	Lough Ine	168.0-*196.3*(10.2)-212.2 × 5.0-*7.0*(0.9)-8.4	16.8-*18.5*(2.3)-21.6 × 0.5-*1.0*(0.5)-1.7

sponge with oxea of 190-220 × 8-9 µm (very similar to *H. fibulata*), but with sigmata in three size categories, viz. 30 × 1.5 µm, 65-75 × 7-5 µm, and 80-110 × 4 µm.

Isodictya jugosa and *Halichondria couchii* are without doubt conspecific with *H. fibulata*, but it must be said that the material of both species is scanty (both species are only represented in the BMNH by the small and rather amorphous holotypes). The skeletal characteristics agree very well with the other specimens studied. A possible synonymy of *H. couchii* and *H. fibulata* has already been suggested by Topsent (1892a).

I. jugosa has been recorded from E-Greenland by Burton (1934b, as *Haliclona*), but this record can not be assigned to *H. fibulata*. This record was before Burton revised *Haliclona angulata* (Burton, 1948, see above), where he placed *I. jugosa* in the synonymy of *H. angulata*. In this earlier publication he listed a number of other species and references in the synonymy of *H. jugosa*, among which *Gellius stylifera* Lendenfeld, 1897 (which is no haplosclerid, but probably a poecilosclerid, it has long styles, strongyles, oxea and sigmata), *Gellius angulatus* sensu Lundbeck (1902), *Gellius massa* Arnesen, 1903 and *Gellius arnesenae* Arndt, 1927. The latter three references conform to *Gellius arcoferus* Vosmaer, 1885, a species which belongs to the Niphatidae (cf. de Weerdt & van Soest, in prep.).

Gellius pyrrhi Hanitsch, 1895, described from Portugal, is tentatively considered synonymous with *H. fibulata*. The description of the habit fits within the species; the size of the oxea is 150 × 6 µm, the size of the sigmata 12 × 0.4 µm, which is somewhat smaller than those of *H. fibulata*.

Gellius arcticus Hentschel, 1916 reminds strongly of *H. fibulata*, but I have not studied the original material. Hentschel's description and figure are, however, striking similar to the species. He described the species as massive, with a conspicuous reticulated surface, simple, not elevated, circular oscules of 4-8 mm; the sponge reminding of a polished stone. Colour in spirit whitish. Ectosomal skeleton "renieroid"; choanosomal skeleton confused, with a few paucispicular lines, and with spongin at the nodes of the spicules. Oxea slightly curved, with rather short points (this is the only difference with *H. fibulata*, which has long points), size 200-280-336 × 6-10 µm. Sigmata of irregular shape, weakly curved, 27-34 × 1.0 µm. Hentschel reported the species from Spitsbergen, from 57-60 m. If Hentschel's material turns out to be *H. fibulata*, the species has a remarkably wide geographical range, viz. from the Mediterranean and Azores up to the Arctic. This is an unlikely, but not impossible distribution.

H. fibulata is related to the same species as *H. angulata* (cf. discussion *H. angulata*). In addition it is very similar to *Sigmadocia* (= *Haliclona*) *piscaderaensis* van Soest, 1980 (West Indies).The latter species has slightly smaller oxea (165-216 × 5-5.9 µm), and much smaller sigmata (7.5-1.2 µm). They are quite certainly closely related.

Haliclona rava (Stephens, 1912) (n. comb.) (fig. 20, pl. IV fig. 3, pl. X figs. 3, 4)

Gellius ravus Stephens, 1912: 22, pl. I figs. 10-12; 1917: 6.
Haliclona angulata; (pars) Burton, 1948: 279.
?*Orina* sp.; Pulitzer-Finali, 1983: 585, fig. 76.

Holotype: National Museum of Ireland, Dublin (cf. O'Riordan & O'Connor, 1985).

Type-locality: Clare Island (Ireland).

Material examined

IRELAND: BMNH 1913.5.12.1, slide preparation of holotype, Clare Island, July 1910, Prestd. Miss J. Stephens; ZMA POR. 5674, Sherkin Island, Ireland, 13-VII-1981, under intertidal stones, coll. W. H. de Weerdt.

Description of material

The slide of the holotype contains a large cross-section. The skeletal architecture of this section is largely isotropic, but in a few places it consists of paucispicular primary lines which are irregularly connected by unispicular secondary lines. The oxea are slender and fusiform, and measure 150 × 5.5 µm (see also table XVIII).

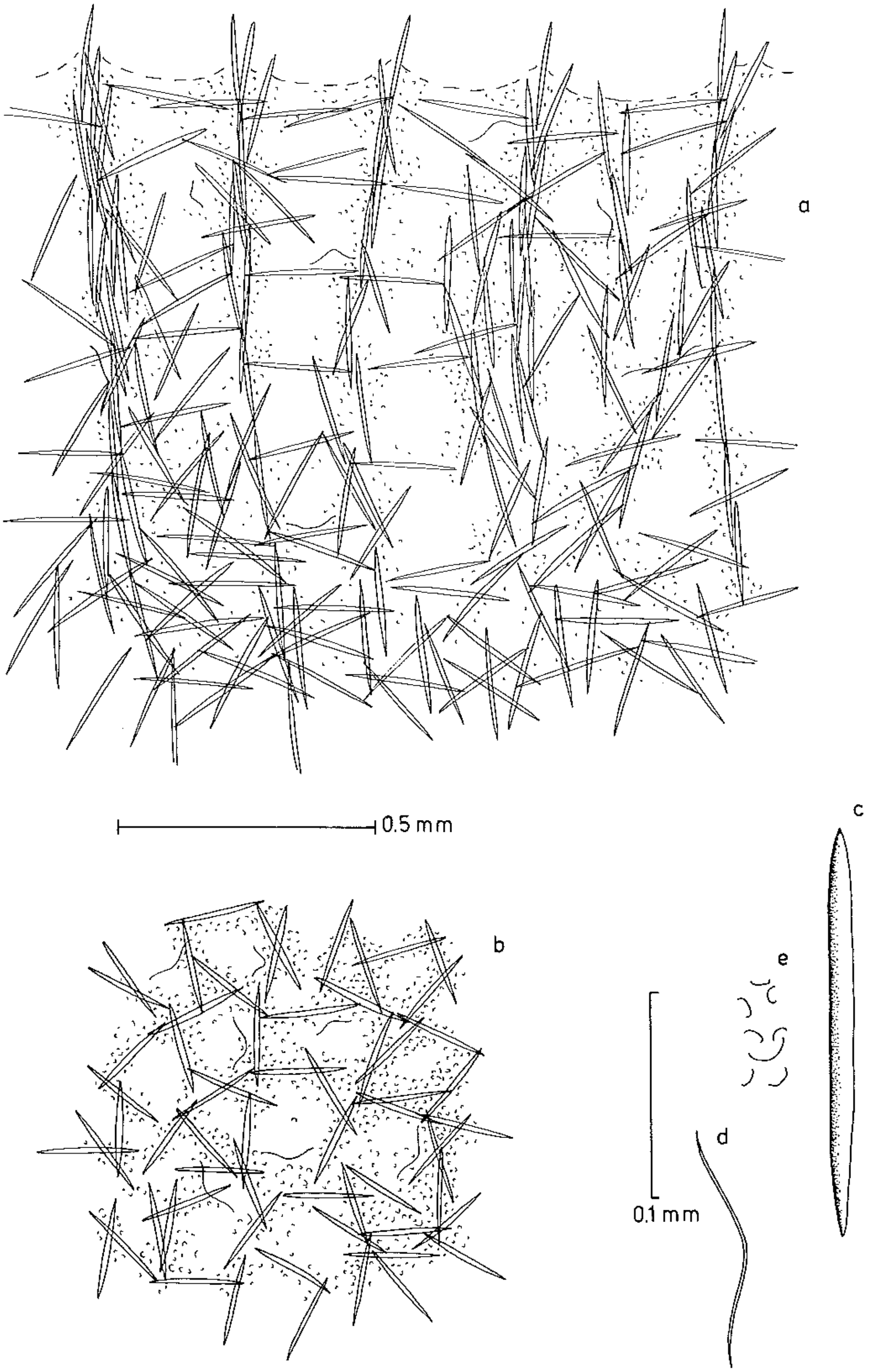

Fig. 20. *Haliclona rava*, a. choanosomal skeleton, b. tangential view of ectosomal skeleton, c. oxe, d. toxa, e. sigmata.

Table XVIII. Spicules sizes (in μm) of *Haliclona rava*.

specimen	locality	oxea	sigmata	toxa
BMNH 1913.5.12.1 *Gellius ravus*, microscopical slide from type	Clare Island	129.6-*149.9*(8.1)-160.8 × 4.8-*5.5*(0.7)-7.2	4.8-*7.0*(1.0)-8.4 × 0.2-0.5	38.4-*56.0*(11.7)-84.0 × 0.2-0.5
ZMA POR. 5674	Sherkin Island	134.4-*147.5*(8.5)-163.2 × 6.2-*7.3*(0.5)-8.4	7.2-*8.6*(1.7)-12.0 × 0.2-*0.3*(0.1)-0.5	55.4-*93.0*(22.4)-12.00 × 0.3-*1.0*(0.5)-1.6

The microscleres (sigmata and toxa) are not abundant, but evenly distributed throughout the section. The sigmata are very small and irregularly bent, 7/0.3 μm; the toxa are also irregularly bent, some of them are almost straight; they vary considerable in length, but they are all very thin; on the average they measure 56 × 0.3 μm.

ZMA POR. 5674 consists of four specimens; all are small, flat encrusting patches of equal size, viz. ca. 2 × 1.5 × 0.3-0.4 cm. Two of them have an osculiferous process rising from the side part. These processes are 5, resp. 8 mm high and 3 mm thick. The oscula at the end of these processes are 2 mm wide in both specimens. In one of the other specimens there is a small circular osculum flush with the surface, 1 mm in diameter; there are a few inconspicuous exhalant canals radiating to this osculum. In the fourth specimen there is no observable osculum. The sponges were greyish brown alive; the colour has disappeared only slightly in spirit. The consistency is softly friable; the surface smooth.

The sponges have an irregular ectosomal skeleton, consisting of tangential spicules which are loosely organized into an unispicular network. The choanosome is also rather irregular and dense, in a few places consisting of paucispicular primary lines, connected by unispicular secondaries. Spongin is very scarce at the nodes of the spicules. The sigmata are more abundant than in the slide of the holotype; the toxa are fewer in number. There is some variation in the size of the megascleres among the four specimens, but not in the microscleres. In one of the sponges the oxea are very similar in size to those in Stephen's slide, viz. 147.5 × 7.3 μm; in one of the other sponges they are much longer, viz. 219 × 7.4 μm. The microscleres are of the same size and shape as those of the holotype.

Diagnosis

Shape and size: thinly encrusting patches, probably not exceeding 4 cm in diameter. Osculiferous processes may be present. Oscules also level with the surface, small.
Consistency: soft, somewhat fragile, but not friable.
Surface: smooth, even.
Colour: (alive and spirit) greyish-yellow.
Ectosome: irregularly disposed oxea make up a confused tangential reticulation.
Choanosome: the choanosomal skeleton is somewhat confused, with irregular paucispicular primary and unispicular secondary lines. Many spicules in confusion.
Spongin: scarce, nodal.
Spicules: oxea: slender, with long and sharp points, 130-230 × 4.8-9.5 μm; Sigmata: irregularly bent, very small, 4.8-12 × ca. 0.5 μm. Toxa: very slender, with an indistinct and irregular angle, sometimes almost straight, with slightly recurved apices 38.5-120 × ca. 0.5 μm (see also table XVIII).

Ecology: possible confined to the upper intertidal zone, under stones.

Distribution (fig. 18): only known with certainty from South-Ireland). Possibly Mediterranean-Atlantic.

Discussion

The ZMA specimens conform in every respect to Stephens' description of *Gellius ravus* and to the BMNH slide of the type. The ZMA material is the first published Irish record after Stephens' descriptions, but the species seems to be rather common in Anglesey, Wales (Dr. W. C. Jones, pers. comm.).

H. rava is morphologically characterized by its small size and encrusting habit. The irregularly curved toxa, which are sometimes almost straight, distinguish the species from the other two sympatric, microsclere bearing chalinids, *H. angulata*, and *H. fibulata*. It is well distinguished from *H. angulata* by its habit, colour and consistency. *H. angulata* is much more massive, purplish and friable. The oxea are of a smaller size in *H. rava* (*H. angulata* has oxea of 200-350 × 3.5-14 μm), the sigmata are slightly smaller (in *H. angulata* they measure 7-15 × 0.2-1.2 μm), but the toxa are clearly different. In *H. rava* they are very weakly bent, sometimes almost straight, and rather large (up to 120 μm). In *H. angulata* they are characteristically strongly curved and much smaller, viz. 43-75 × 0.2-2.5 μm.

H. rava differs from *H. fibulata* by the absence of a reticulated surface, by the colour (*H. fibulata* is light purple) and by the presence of both sigmata and toxa (*H. fibulata* has only sigmata). Furthermore the sigmata are of a much smaller size than in *H. fibulata*.

Pulitzer-Finali (1983) reported an *Orina* sp. from the Mediterranean, from 14-33 m, which he compared with *Orina rava*. He did not describe the skeletal architecture, but his figure of the spicules, as well as his description of the morphological features correspond to Stephens' species. A Mediterranean-Atlantic distribution of *H. rava* is therefore possible.

Other species reported from the area

Apart from the here treated species of *Haliclona*, there are several other species described from the study area, under different generic names, but which are left out of consideration for different reasons. A number of species is, for instance, described as *Reniera*, but these are of uncertain identity or they are no haplosclerids at all. Among these are *Reniera pons* Schmidt, 1870 (Denmark, uncertain identity), *Reniera oblonga* Hansen, 1885 (unknown North Atlantic locality, uncertain identity), *Reniera velamentosa* Hansen, 1885 (Barents Sea), *Reniera membranacea* Hansen, 1885 (unknown North Atlantic locality), *Reniera digitata* Hansen, 1885 (north coast Norway), *Reniera nivea* Hansen, 1885 (unknown North Atlantic locality), *Reniera palescens* Hansen, 1885 (south-west coast Norway), *Reniera dubia* Hansen, 1885 (Barents Sea), *Reniera infundibiliformis* Hansen, 1885 (Norway), *Reniera complicata* Hansen, 1885 (Norway), and *Reniera inflata* Hansen, 1885 (unknown North Atlantic locality).

Another group consists of species with a predominantly deep-water distribution and is therefore left out of consideration in this study. These species are *Chalinula folium* Schmidt, 1870 (Finmark), *Reniera ventilabrum*Fristedt, 1887 (Spitsbergen), *Reniera parenchyma* Lundbeck, 1902 (Greenland), *Reniera folium* Lundbeck, 1902 (Faroe, Greenland), *Reniera hyalina* Lundbeck, 1902 (Greenland), and *Reniera calamus* Lundbeck, 1902 (Iceland).

Finally there is a group of species which are described under the generic name *Gellius*, but which belong to the genus *Gelliodes* of the Niphatidae. An annotated check-list of these species will be presented in a forthcoming paper (de Weerdt & van Soest, in prep.). They are *Gellius arcoferus* Vosmaer, 1885 (Barents Sea), *Gellius laurentinus* Lambe, 1900a (Canada, possibly also eastern Atlantic), *Gellius microtoxa* Lundbeck, 1902 (Iceland), *Gellius luridus* Lundbeck, 1902 (Iceland), *Gellius esperi* Arnesen, 1903 (Norway), *Gellius massa* Arnesen, 1903 (Norway), *Gellius hartlaubi* Hentschel, 1929 (Norway), and *Gellius digitatus* Koltun, 1959 (Arctic).

Genus **Acervochalina** Ridley, 1884.

Definition: Chalinidae with pauci-multispicular secondary lines.

Species: *Acervochalina limbata* (Montague) and *Acervochalina loosanoffi* (Hartman).

Acervochalina limbata (Montagu, 1818) (fig. 21, pl. IV fig. 6, pl. X fig. 5)

Spongia limbata Montagu, 1818: 111, pl. XIV figs. 2 & 3; Johnston, 1842: 168, pl. XIX figs. 3-5.
Chalina limbata; Bowerbank, 1866: 373; 1874: 172, pl. LXVII figs. 7-13; 1882: 186; McIntosh, 1874: 145; Fristedt, 1885: 49; Higgin, 1886: 76; Hanitsch, 1889: 161; Topsent, 1891a: 527; Prenant, 1927: 6.
Chalinula limbata; Schmidt, 1870: 77; Griessinger, 1971: 164, fig. 13b; Jones, 1984: 242.
Acervochalina limbata; Ridley, 1884: 398; Topsent & Olivier, 1943: 5.
Pachychalina limbata; Stephens, 1912: 26; Farran, 1915: 10; Ferrer-Hernandez, 1922: 18.
Haliclona limbata; Arndt, 1935: 99, fig. 213; Meewis, 1939: 201-243; Alander, 1942: 24, pl. 3 fig. 2 & 3; Borojevic et al., 1968: 27; Descatoire, 1969a: 201; Benito, 1976: 500; Pulitzer-Finali, 1978: 83; van Soest et al., 1981 [1983]: 45.
Chalina gracilenta Bowerbank, 1866: 372; 1874: 171, pl. LXVII figs. 4-6; 1882: 186; Topsent, 1890: 201; Hanitsch, 1890: 198.
Acervochalina gracilenta; Topsent, 1894a: 7.
Chalina zostericola Topsent, 1892b: xviii.

Material examined

British Isles and Ireland: BMNH 47.9.7.88, *Spongia limbata*, JC, Hab?, figured specimen of Johnston, 1842, pl. XIX fig. 5; BMNH 47.9.7.89, *Spongia limbata*, JC, Hab?, stored in the same box as 47.9.7.88; BMNH 47.9.7.91, *Spongia limbata*,JC, 14J, 44C, Britain: BMNH 47.9.7.92, *Spongia limbata*, JC, 14J, 44B; BMNH 1877.5.21.2086, *Chalina limbata*, BC, Cornwall, figured specimens of Bowerbank, 1874, pl. LXVII figs. 7-10; BMNH 1877.5.21.2087, *Chalina limbata*, BC, Fowey, Cornwall, C. W. Peach, figured specimen of Bowerbank, 1874, pl. LXVII fig. 11; BMNH 1877.5.21.2088, *Chalina limbata*,

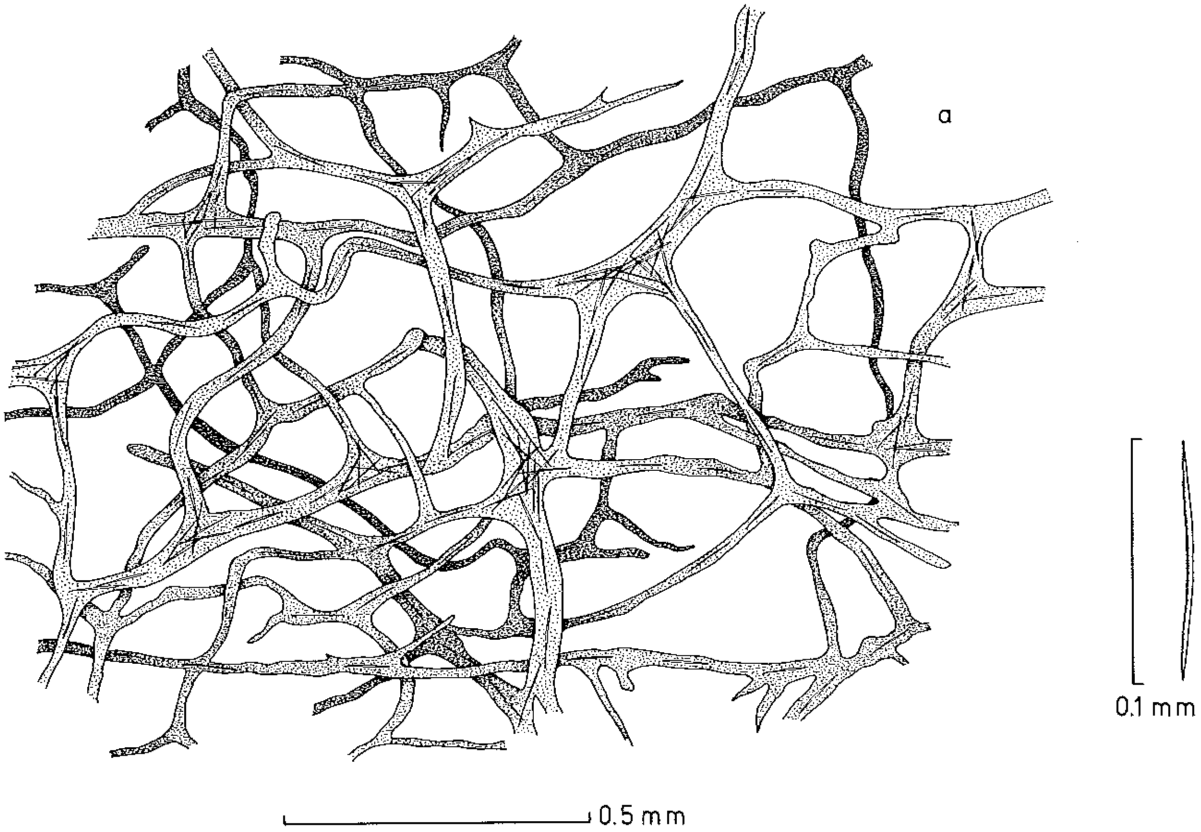

Fig. 21. *Acervochalina limbata*, a. choanosomal skeleton, b. oxe.

BC, St. Andrews; BMNH 1910.1.1.386, *Chalina limbata*, NC, loc?; BMNH 1910.1.1.387, *Chalina limbata*, NC, loc?, Mr. Ingall; BMNH 1910.1.1.389, *Chalina limbata*, NC, Roundstone; BMNH 1877.5.21.2089, *Chalina gracilenta* Bowerbank, BC, holotype, on *Codium tomentosum*, Torquay, from Mrs. Griffith, figured specimen of Bowerbank, 1874, pl. LXVII fig. 4, designated as the type by Bowerbank on p. 171 of the same volume; BMNH 1877.5.21.2090, *Chalina gracilenta* Bowerbank, BC, Scarborough, Bean, 1853, in the same box as 1877.5.21.2089; BMNH 1910.11.59, *Chalina gracilenta* Bowerbank, BC, Hastings, in the same box as 1877.5.21.2089; BMNH 1910.1.1.382, *Chalina gracilenta* Bowerbank, NC, North Devon, Mr. Ingall; BMNH 1910.1.1.384, *Chalina gracilenta* Bowerbank, NC, on seaweed, Cumbra, Mr. D. Robertson.

ZMA POR. 4316, MWeenish Island, Co. Galway, Ireland, 24-XII-1964, coll. J. H. Stock; POR. 4370, Hake Island, Sherkin Island, Ireland, under littoral stones, 16-VIII-1978, coll. R. W. M. van Soest; POR. 4381, Kinish Harbour, rapids, Sherkin Island, Ireland, 14-VIII-1978, coll. R. W. M. van Soest; POR. 4542, Leith Illaun, Sherkin Island, Ireland, LLWS, under stones, 15-VIII-1980, coll. R. W. M. van Soest; POR. 4396, East Calf Island, Roaring Water Bay, Ireland, LLWS, under stones, 7-VIII-1978, coll. R. W. M. van Soest; POR. 4537, Lough Ine, Co. Cork, Ireland, rapids, LLWS, under stones, 26-VIII-1980, coll. R. W. M. van Soest.

FRANCE: ZMA POR. 4217, Cap Gris Nez, Pas-de-Calais, 10-III-1976, coll. J. H. Stock; POR. 4462, Roscoff, among *Zostera*, 17-X-1977, coll. P. Jacobs; POR. 5586, Ile de Callot, Bretagne, LLWS, 0.5 m, 6-VI-1982, coll. R. W. M. van Soest & W. H. de Weerdt.

DENMARK: ZMA POR. 3561, Grönsund, Vordingbugt, 1886, coll. Fisker Hansen.

SWEDEN: ZMA POR. 4548, Bohuslän, Havstens Fjorden, Havsten, 2.5 m, 28-VII-1980, coll. J. H. Stock.

NORWAY: ZMA POR. 5654, Kuhl, Bergen, 1 m, 18-VIII-1982, coll. O. Tendal; POR. 6060, Kvidurdvikpollen, Bergen, 0.5 m, 17-VIII-1982, coll. O. Tendal; POR. 6061, Kuhl, 3 m, under stones, 21-VIII-1982, coll. W. H. de Weerdt; POR. 6062, Landing Stage, Marine Station, Bergen, 0.1 m, 17-VIII-1982, coll. O. Tendal.

Description of material

BMNH 47.9.7.88 consists of two small, cushion-shaped specimens growing on *Fucus*; both have a very small circular osculum. They are strongly hispid. The skeleton consists of spongin fibres of 20-75 μm, enclosing spicules of 65 × 1.5 μm.

BMNH 1910.1.1.382 is a small patch with a very open structure; there are 4 small circular oscules flush with the surface. The skeleton is identical to the other specimen.

ZMA POR. 3561 is a cushion of 4.5 × 1.5 × 1 cm, with 6 oscules at the summit of short chimney-shaped elevations; these are 4 mm thick. The skeleton consists of fibres which are mainly built up by spicules; the spongin is moderate. The oxea are cigar-shaped andmeasure 103 × 5.0 μm.

ZMA POR. 4548 is a cusion growing on all sides of a *Fucus*-branch, 4.2.5 × 1.3 cm, with two rather large, not elevated oscules which are 4, resp. 7 mm wide. The skeleton is rather delicate, consisting of thin spongin fibres of 10-27 μm, enclosing oxea of 68 × 1.6 μm.

Diagnosis

Shape and size: cushion-shaped with a few, rather large, not elevated oscules.
Consistency: resilient, compressible, very spongy.
Surface: strongly hispid.
Colour: brown.
Ectosome: absent.
Choanosome: the skeleton consists of an irregular reticulation of spongin fibres of varying thickness, cored by 1-5 oxea. Usually the primary fibres are thicker and cored by more spicules than the secondary fibres.
Spongin: variable, but generally abundant, forming the main part of the skeleton.

Table XIX. Spicule sizes, and thickness of primary and secondary spongin fibres of *Acervochalina limbata*.

specimen	locality	spicule sizes	primary fibres	secondary fibres
BMNH 47.9.7.788 *Spongia limbata*, JC, figured spec. of Johnston, 1842, pl. XIX fig. 5	unknown British locality	52.8-*65.1*(6.8)-74.4 × 1.0-*1.5*(0.4)-2.2	45.6-76	19-23
BMNH 1910.1.1.382 *Chalina gracilenta*	North Devon	60.0-*73.1*(10.3)-100.8 × 1.0-*2.1*(1.0)-4.3	23-38	9.5-23
ZMA POR. 4537	Lough Ine	69.6-*76.2*(4.9)-88.8 × 1.4-*2.2*(0.5)-3.8	7.2-10.8	4.8-7.2
ZMA POR. 4462	Roscoff	60.0-*77.8*(7.8)-86.4 × 1.4-*2.6*(0.4)-3.1	20-26.6	11.4-15
ZMA POR. 3561	Grönsund, Denmark	96.0-*103.0*(4.6)-110.4 × 4.6-*5.0*(0.5)-6.0	47.5-118	28.5-38
ZMA POR. 4548	Sweden	55.2-*67.9*(5.8)-79.2 × 0.7-*1.6*(1.5)-1.7	11.5-34.2	9.5-12
ZMA POR. 6060	Bergen, Norway	31.2-*49.4*(8.6)-57.6 × 0.5-*0.8*(0.2)-1.2	11-20	7.6-11

Spicules: oxea of variable size, usually ca. 55-90 by 0.5-1.5 µm. Centrotylote modifications occur occasionally (see table XIX for spicule sizes and thickness of the fibres).

Ecology: in the intertidal area, growing on *Fucus* etc.

Distribution (fig. 22): Norway, Denmark, west coast Sweden, British Isles, France, Spain, Portugal, Mediterranean.

Discussion

Acervochalina limbata is characterized by its resilient, spongy consistency. It differs from the only other *Acervochalina* species of the study area (*A. loosanoffi*, see below) by its much firmer consistency, by the higher development of spongin, and by the absence of gemmulae. These are characteristically present in *A. loosanoffi*. Remarkable is the variation in the size of the oxea and the amount of spongin (cf. also van Soest, 1976). *A. limbata* is quite similar to *Haliclona* (= *Acervochalina*) *molitba* de Laubenfels, 1949 (West Indies, cf. van Soest, 1980: 9). This species is of softer consistency than *A. limbata*, and violet. In skeletal architecture the species show a high similarity, and they are both strikingly variable in spicules size and amount of spongin.

Acervochalina loosanoffi (Hartman, 1958) (n. comb.)

(fig. 23, pl. IV fig. 7, pl. X fig. 6)

Haliclona loosanoffi Hartman, 1958: 62, figs. 21-25, pl. 12 figs. 1-4; Wells et al., 1960: 208; Fell, 1978: 261; van Soest, 1976: 177-187, figs. 1-3, pl. 1 figs. A-F; van Soest & Weinberg, 1980: 8, fig. 9.

Material examined

NORTH AMERICA: BMNH 1965.7.31.4, paratype, Milford Harbour, Connecticut, U.S.A., 1-XI-1949, coll. W. D. Hartman.

THE NETHERLANDS: ZMA POR. 3552, Zierikzee, Oosterschelde, on piles, LLWS, 2 m, 19-VIII-1975, coll. R. W. M. van Soest and J. Vermeulen; POR. 4176, Zierikzee, Oosterschelde, on wall of sluice, gemmulae, on *Mytilus*, 10-XII-1975, coll. J. Vermeulen; POR. 4178, Zierikzee, on wall of sluice, 8-I-1976, coll. R. W. M. van Soest and J. Vermeulen; POR. 4192, Zierikzee, on piles

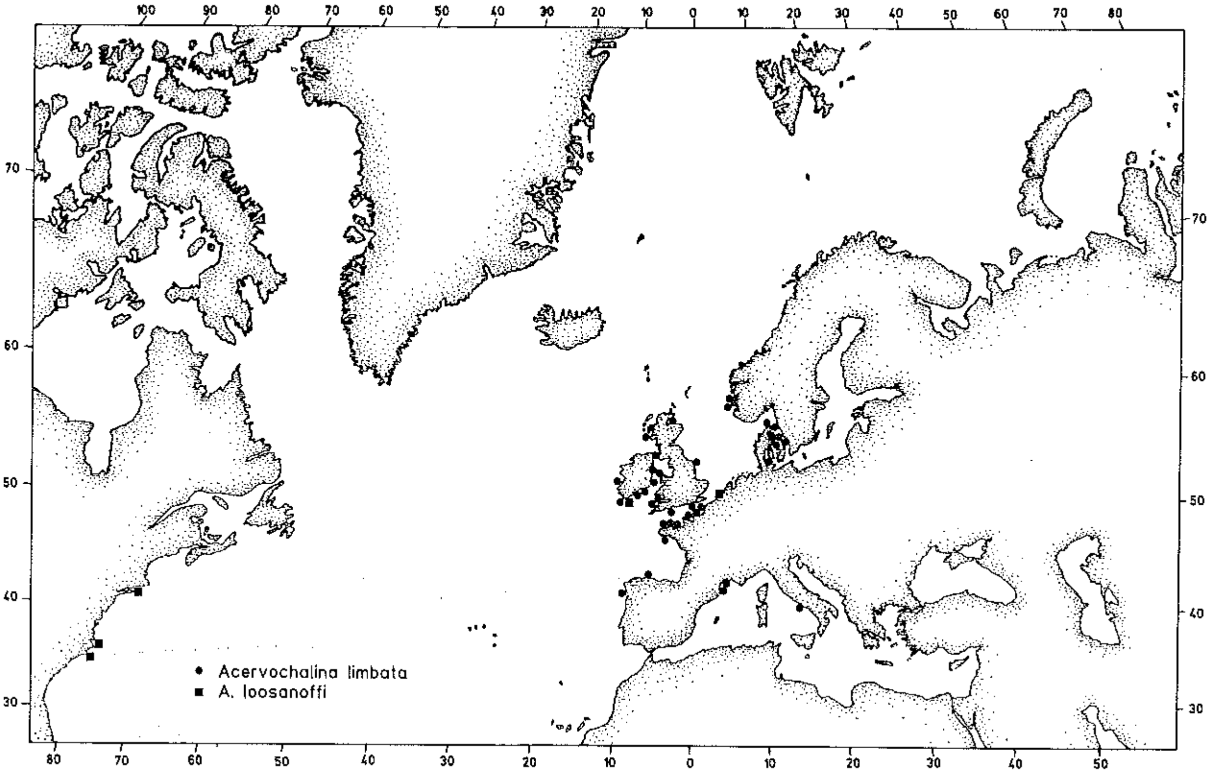

Fig. 22. Distibution of *Acervochalina limbata* and *A. loosanoffi*.

outside sluice, 19-VIII-1975, coll. R. W. M. van Soest and J. Vermeulen; POR. 5652, Zierikzee, on piles, LLWS, 2 m, 23-IX-1982, coll. W. H. de Weerdt; POR. 4324, Wemeldinge, on piles, LLWS, 2 m, 20-VIII-1975, coll. R. W. M. van Soest and J. Vermeulen; POR. 6003, Wemeldinge, LLWS, 1 m, 22-VII-1985, coll. J. Kaandorp and A. Oosterbaan; POR. 6005, Wemeldinge, LLWS, 2 m, 1-VI-1985, coll. A. Oosterbaan; POR. 4084, Oostsluis, Wemeldinge, Oosterschelde, on wall of sluice, 16-VIII-1976, coll. S. Weinberg and J. Vermeulen; POR. 4100, Vlissingen, kanaal door Walcheren, 19-VIII-1976, coll. S. Weinberg and J. Vermeulen; POR. 6018, Scharendijke, Grevelingen, 4 m, 11-VIII-1985, coll. M. de Kluijver.

IRELAND: ZMA POR. 4300, Lough Ine, Co. Cork, Ireland, under stones in rapids, LLWS, 2-IX-1977, coll. R. W. M. van Soest.

Description of material

ZMA POR. 6018 consists of two specimens. One is a hollow tube of 3 cm high and 5 mm thick, which tapers gradually towards a blind end. The other specimen is a roundish, flat patch, 2.5 cm in diameter. In the centre there is a small osculiferous tube of 4 mm long and 2 mm thick. The consistency of the two specimens is extremely soft and compressible, but still resilient. The colour (alive and spirit) is greyish-brown with an orange tinge. The skeleton of both specimens is a very delicate reticulation of fibres of spicula and spongin. On the average the oxea are 80 × 1.5-2 μm.

All the other specimens in the ZMA collection are similar in habit to the preceding ones; in skeletal architecture there is some variation in the spicules size, the amount of spongin and in the distinction between primary and secondary fibres.

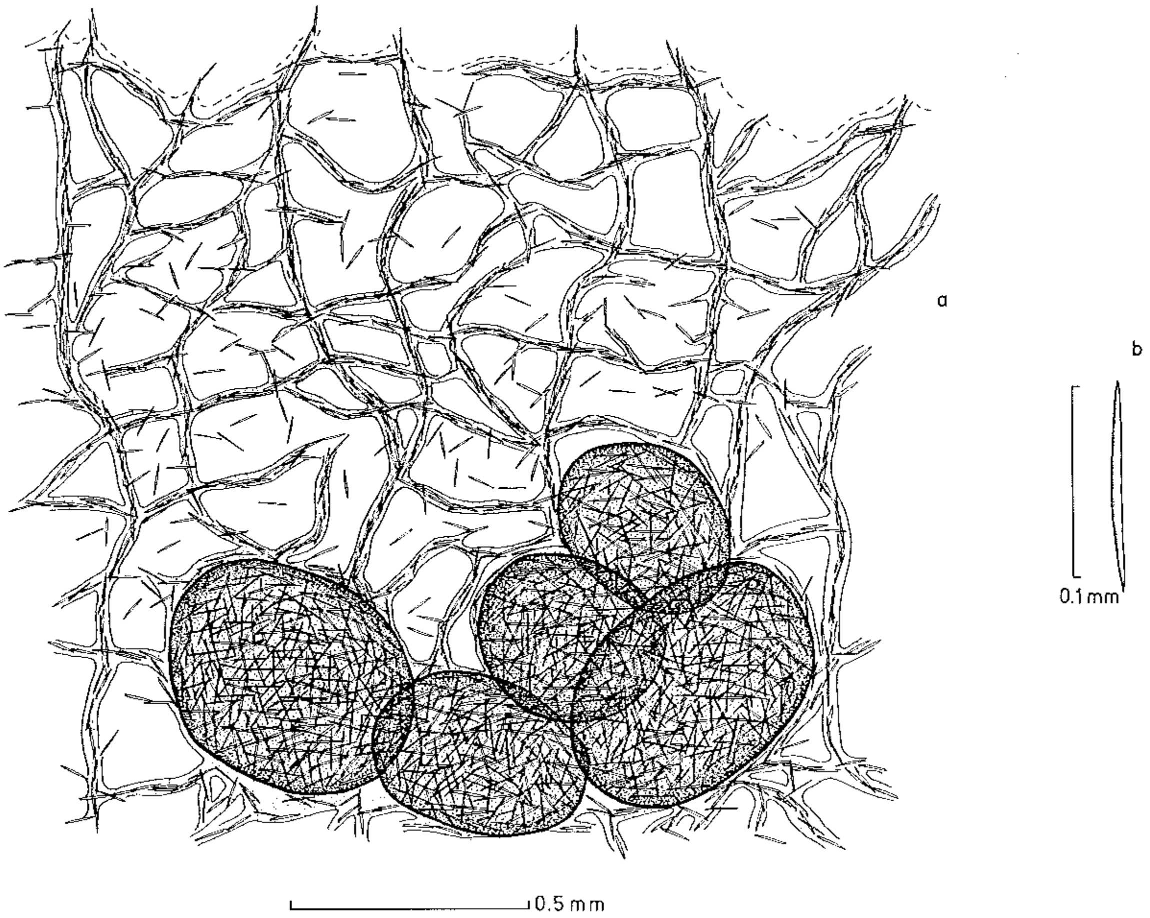

Fig. 23. *Acervochalina loosanoffi*, a. choanosomal skeleton, with gemmulae at the base, b. spicula.

Diagnosis

Shape and *size*: varying from thinly encrusting to tubular. In the tubular sponges there are generally more tubes arising from a common encrusting base. They coalesce and anastomose in various degrees and are gradually tapering into small terminal oscules.

Consistency: extremely soft and compressible.

Surface: slightly to strongly hispid, somewhat shaggy.

Colour: light greyish-brown.

Ectosome: absent.

Choanosome: basically the skeleton consists of an irregular reticulation of fibres of spongin with ill-defined primary and secondary lines. Generally the primary lines are cored by more spicules (2-5) than the secondary lines (1-3). The skeletal structure is rather variable, however, in that it may also consists of more clearly distinguishable primary and secondary lines. In this case the spongin is less prevalent (cf. also Hartman, 1958). It should be remarked here that in European specimens of this species only spongin-reinforced skeletons were found.

Spongin: generally very pronounced, forming the main part of the skeleton.

Spicules: oxea of variable size and form, generally 70-120 by 2-4.5 μm. Conspicuous is the high number of malformed spicules: thin, centrotylote oxea are the most common abnormalities, but also short, thick centrotylote strongyles or even two spicules joined by a common thickening, occur quite frequently.

Gemmules: Functional gemmules are formed during the late summer and early autumn. They are characteristic for the species, size 300-400 μm.

Ecology: Intertidal and in the infralittoral, probably to ca. 15 m. Often growing on shells of mussels and oysters, on wharf piles, under pontoons etc., also in brackish water and estuarine environments.

Distribution (fig. 22): New England (U.S.A.), the Oosterschelde (S.W.-part of the Netherlands). One specimen found in the rapids of Lough Ine (Ireland, van Soest & Weinberg, 1980).

Discussion

Acervochalina loosanoffi is clearly distinct from the other European chalinids by its extreme softness and by the presence of gemmules which is unusual for encrusting/tubular chalinids. The conspecifity of the Dutch sponges with the North American species *Haliclona loosanoffi* has been demonstrated by van Soest (1976). Van Soest & Weinberg (1980) reported the first occurrence of the species in Ireland (Lough Ine).

It is almost certain that the species has been introduced in the Netherlands through the import of oysters. Its occurrence in the estuary of the Schelde is rare, and there are only a few places where the species is regularly found. These populations appear, however, to be stable, which is obviously due to the gemmules.

A common feature in the Dutch sponges is the abundant presence of malformed spicules, usually irregularly centrotylote oxea, but also centrotylote styles and strongyles. This was already mentioned by van Soest (1976), but not by Hartman (1958) in his description of the species. In the slide on one of the paratypes, from Milford Harbour, there are only a few styles. Possibly the form of the spicules is influenced by salinity fluctuations, but this needs to be investigated.

Remarks: in the study area there are no other *Acervochalina* species, but in the south-eastern part of the N Atlantic there are three representatives. These are *Acervochalina fertilis* (Keller, 1879) (Mediteranean-south-eastern N Atlantic, recently recorded from the Azores by de Weerdt & van Soest, 1986), *Acervochalina parasimulans* (Lévi, 1959) (West Africa), and *Chalinula* (= *Acervochalina*) *nigra* Boury-Esnault & Lopes, 1985 (Azores).

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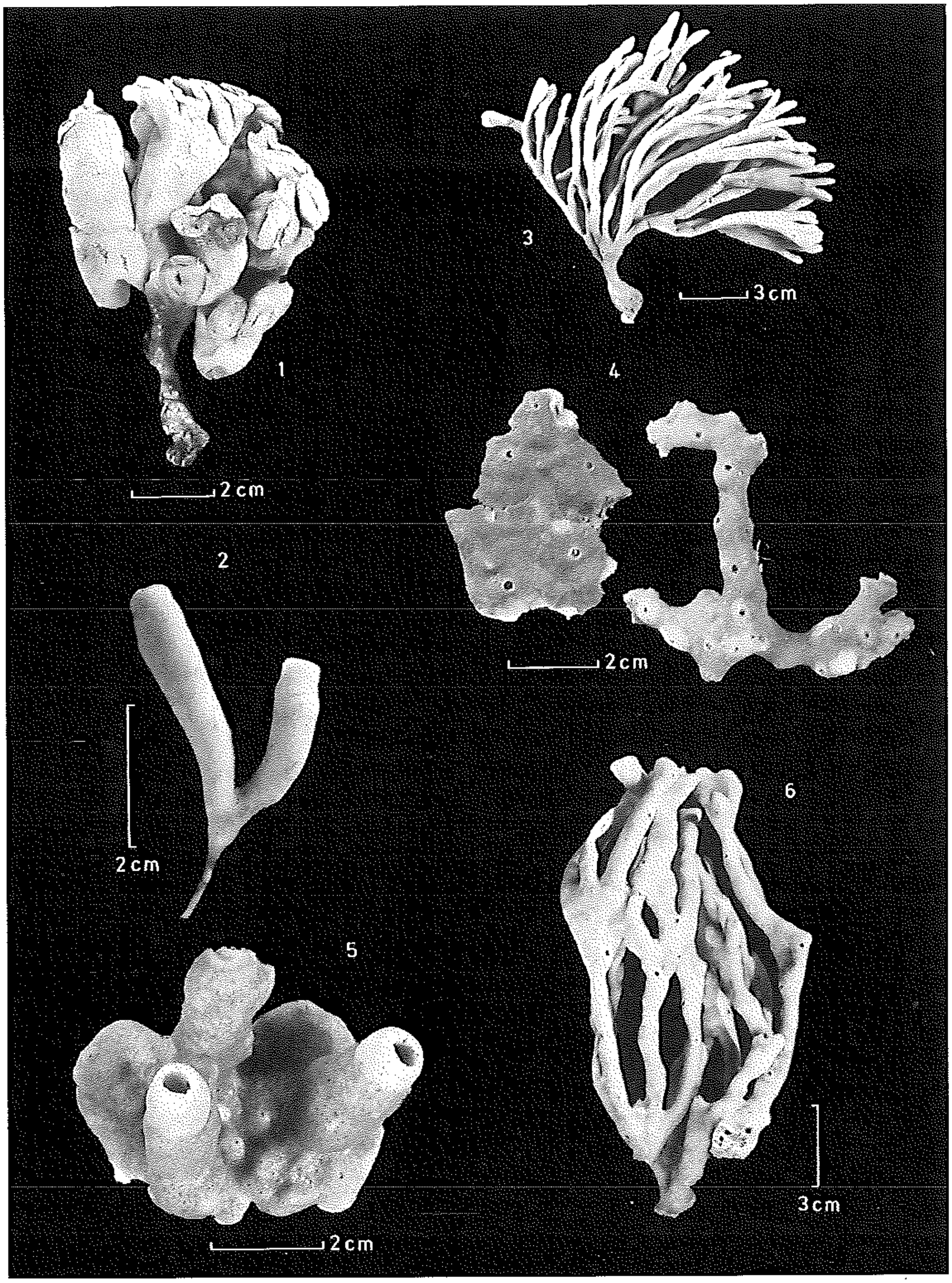


Plate II.
Fig. 1. *Haliclona urceolus*, complex of fused branches (GA 706). Fig. 2. *Haliclona urceolus*, simple branched form (ZMA POR. 5515). Fig. 3. *Haliclona oculata* (ZMA POR. 6031). Fig. 4. *Haliclona simulans*, encrusting form (ZMA POR. 5548). Fig. 5. *Haliclona simulans*, encrusting with osculiferous tubes (GA 266). Fig. 6. *Haliclona simulans*, repent ramose (ZMA POR. 5549).

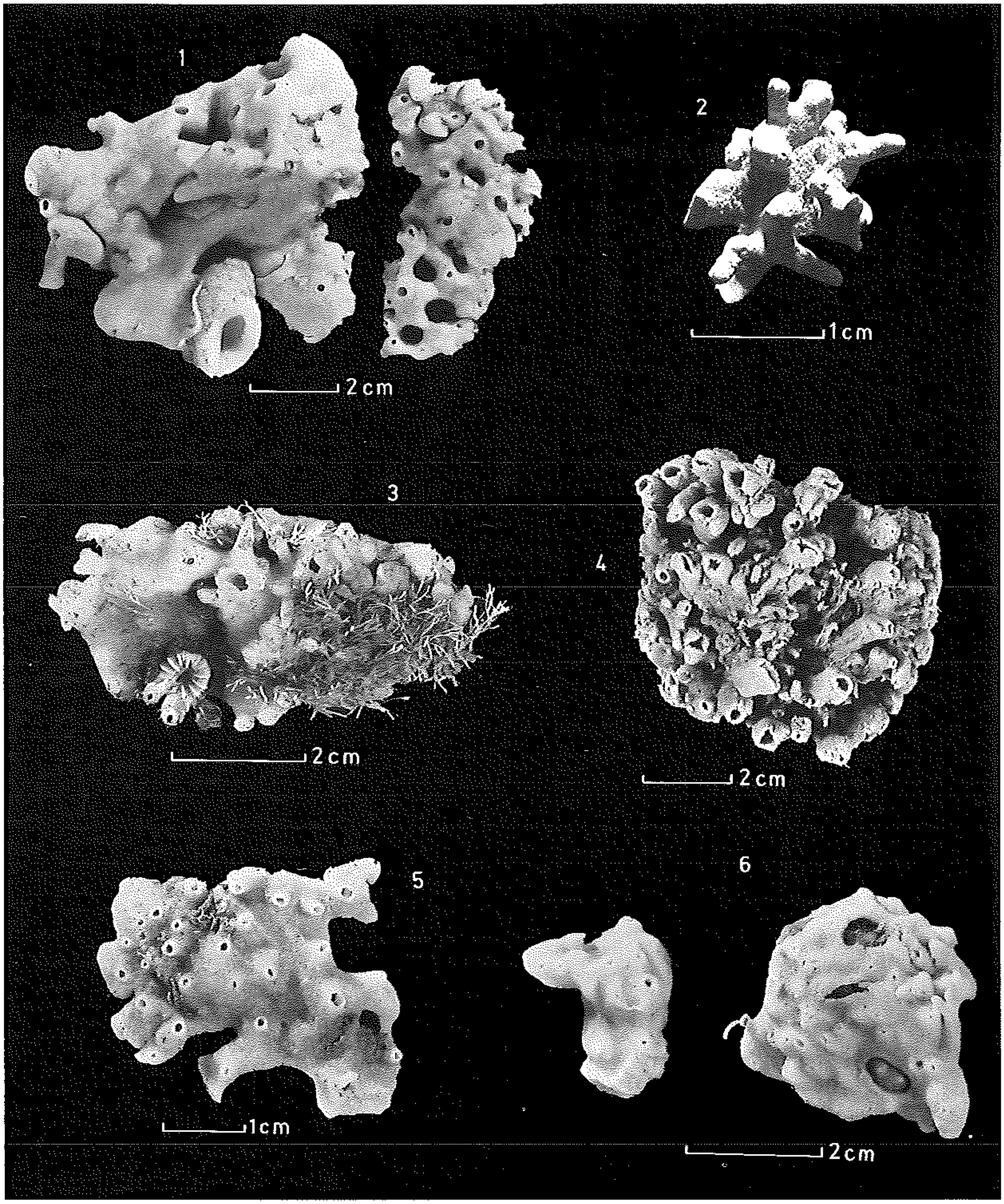


Plate III.
Fig. 1. *Haliclona cinerea* (ZMA POR. 5516). Fig. 2. *Haliclona primitiva* (ZMK, part of syntype-serie, specimen described by Lundbeck, 1902: 69). Fig. 3. *Haliclona fistulosa* (ZMA POR. 6020). Fig. 4. *Haliclona xena* spec. nov., holotype (ZMA POR. 5000). Fig. 5. *Haliclona rosea* (ZMA POR. 5653). Fig. 6. *Haliclona rosea* (ZMA POR. 4512).

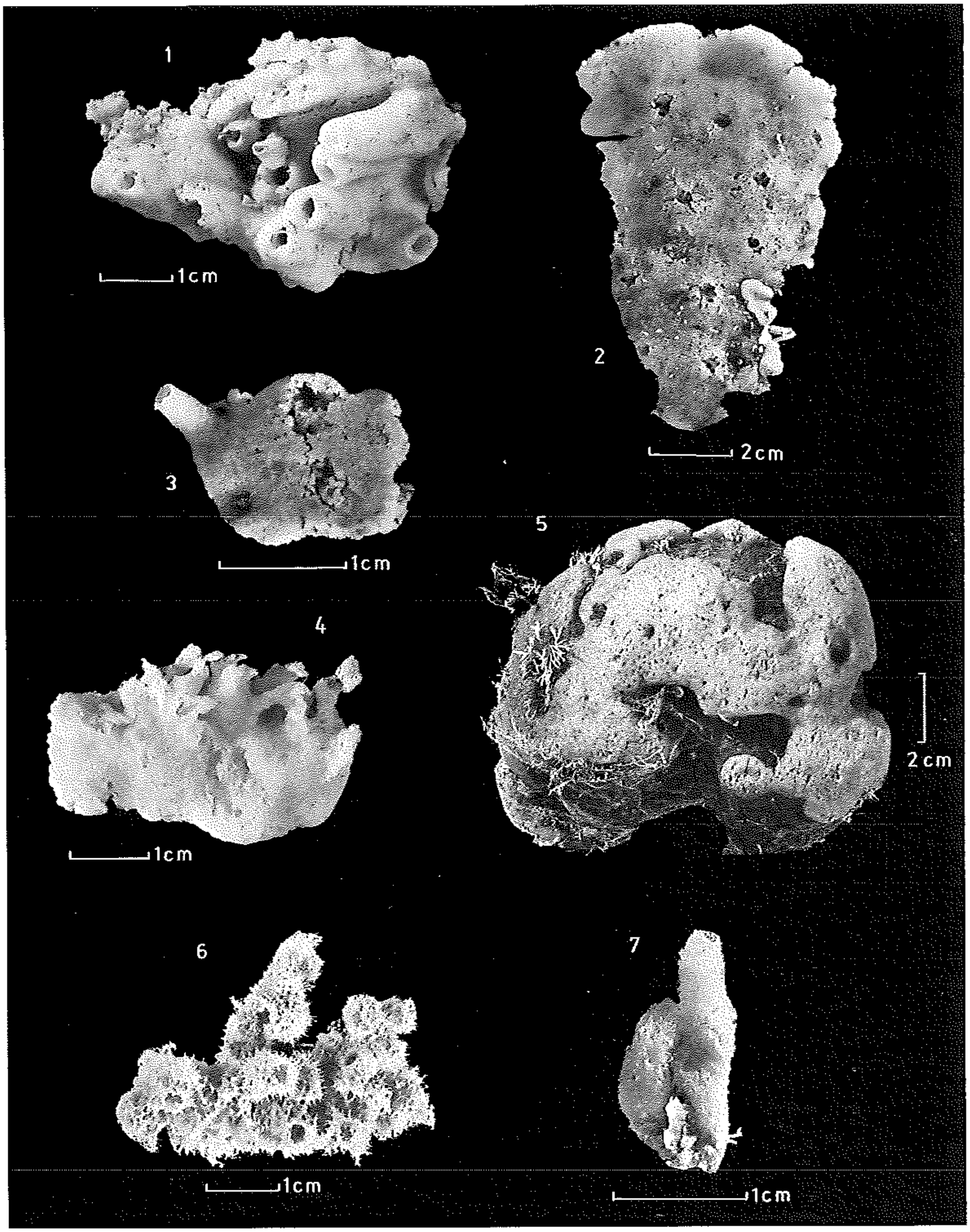


Plate IV.
Fig. 1. *Haliclona viscosa* (ZMA POR. 4849). Fig. 2. *Haliclona indistincta* (ZMA POR. 5585). Fig. 3. *Haliclona rava* (ZMA POR. 5674). Fig. 4. *Haliclona angulata* (ZMA POR. 5851). Fig. 5. *Haliclona fibulata* (GA 450). Fig. 6. *Acervochalina limbata* (ZMA POR. 3561). Fig. 7. *Acervochalina loosanoffi* (ZMA POR. 4192).

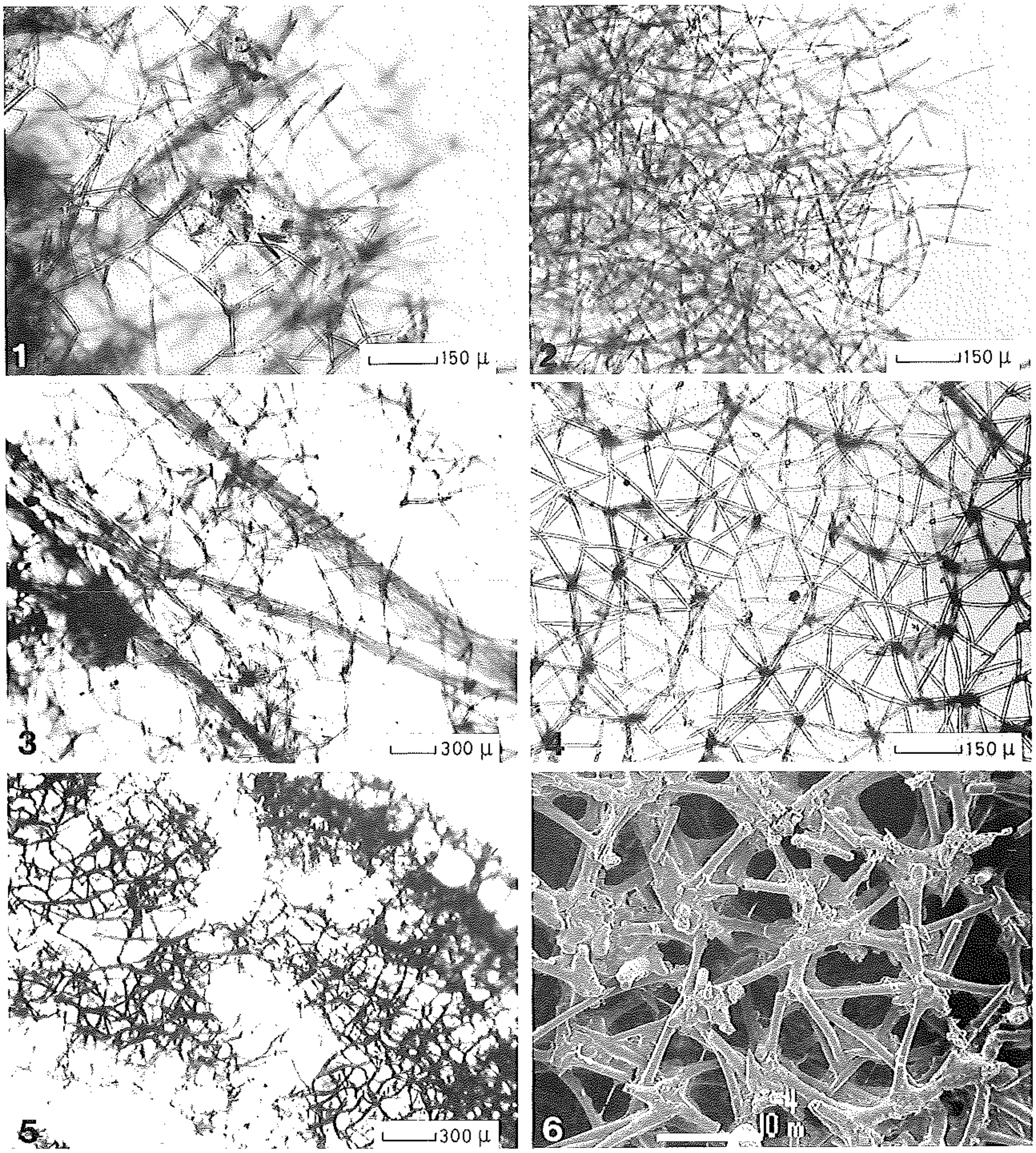
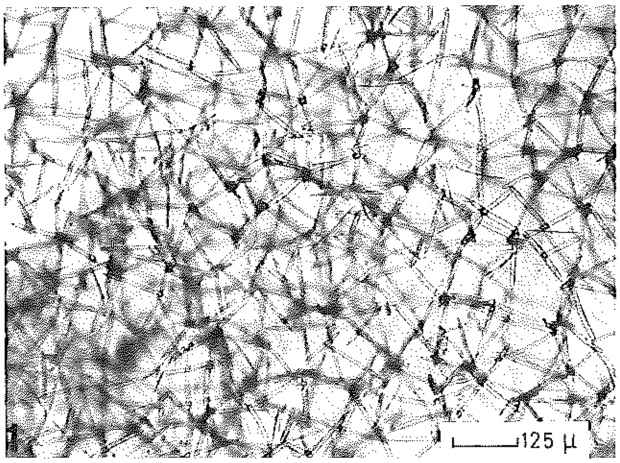
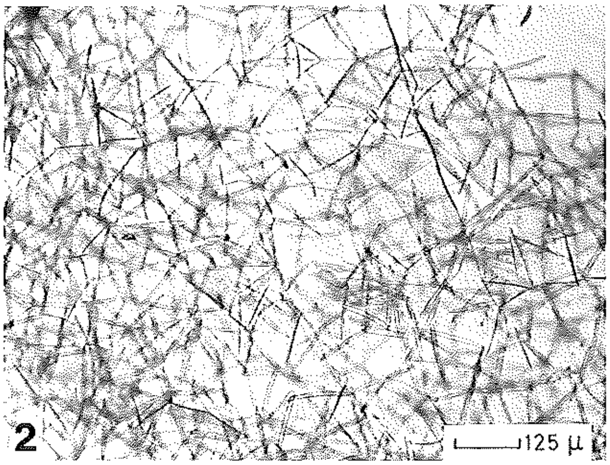
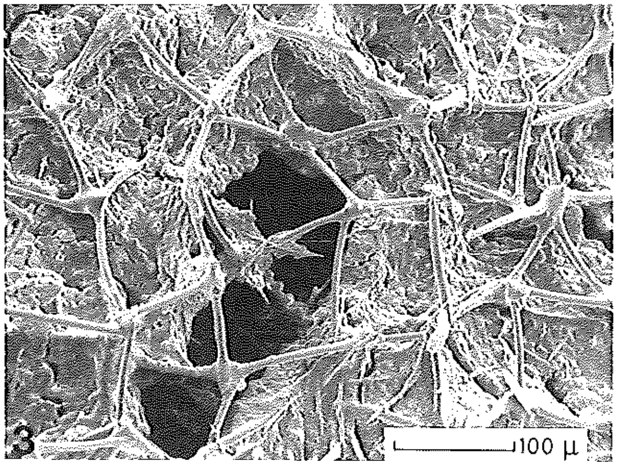


Plate V.
Fig. 1. *Haliclona oculata*, cross-section of choanosome. Fig. 2. *Haliclona urceolus*, cross-section of choanosome of small specimen. Fig. 3. *Haliclona urceolus*, cross-section of choanosome, showing isotropic reticulation with reinforcing spicule tracts. Fig. 4. *Haliclona simulans*, ectosomal skeleton. Fig. 5. *Haliclona simulans*, cross-section of choanosomal skeleton. Fig. 6. *Haliclona simulans*, surface structure, scanning electron micrograph.







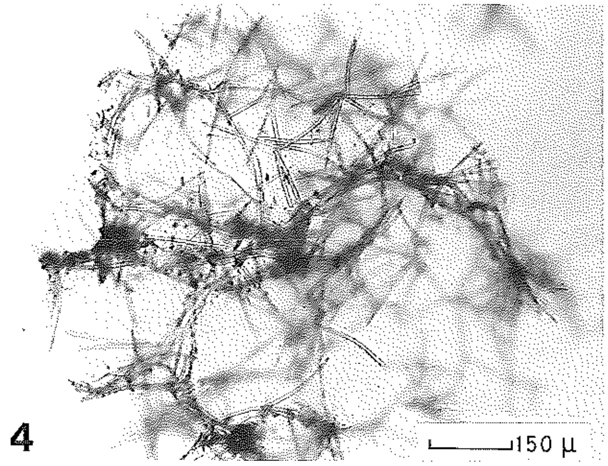


Plate VI.
Fig. 1. *Haliclona cinerea*, ectosomal skeleton. Fig. 2. *Haliclona cinerea*, cross-section of choanosome. Fig. 3. *Haliclona cinerea*, surface structure, scanning electron micrograph. Fig. 4. *Haliclona primitiva*, choanosomal skeleton. Fig. 5. *Haliclona primitiva*, toxa.

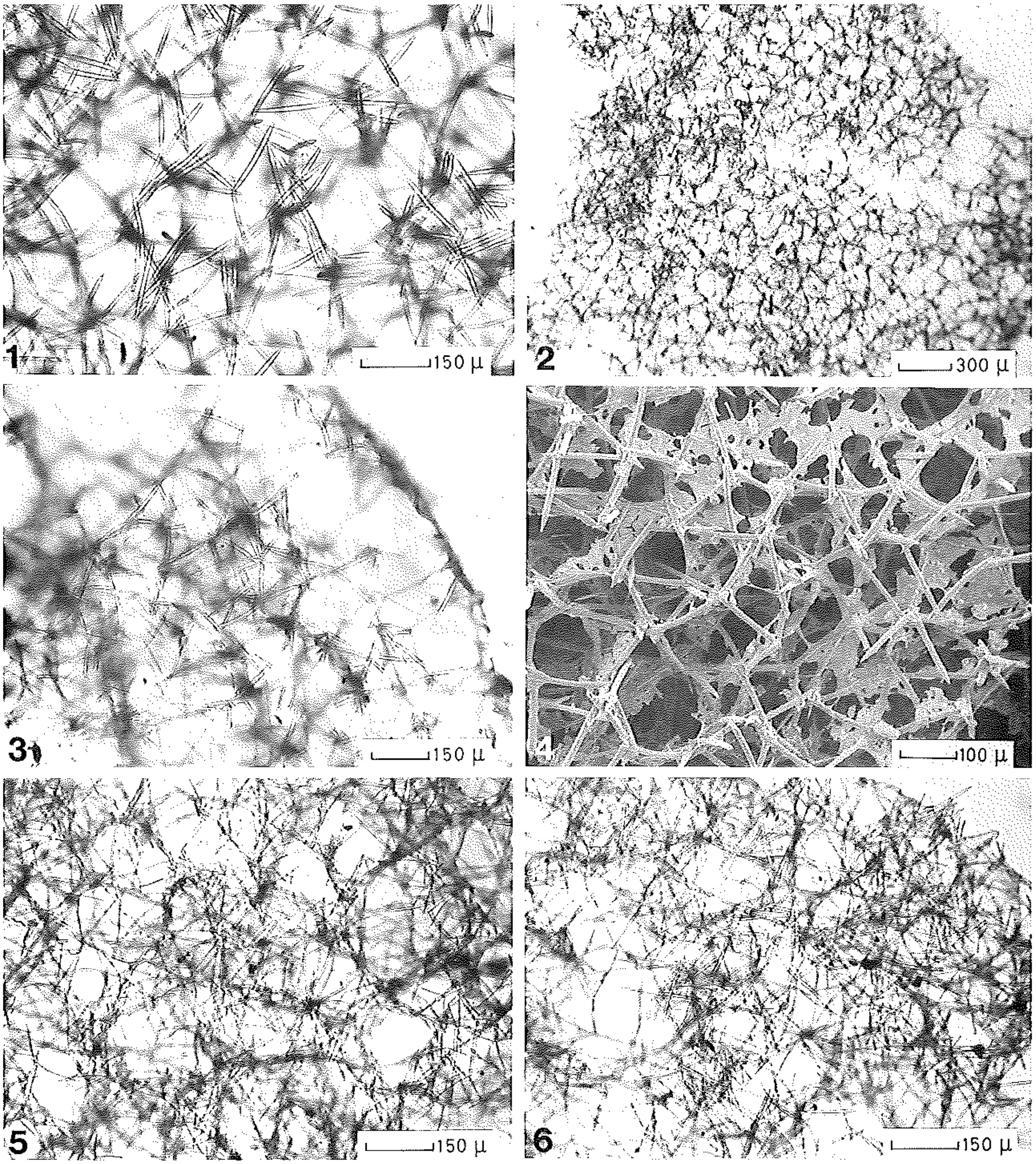


Plate VII.
Fig. 1. *Haliclona fistulosa*, ectosomal skeleton. Fig. 2. *Haliclona fistulosa*, cross-section of choanosome. Fig. 3. *Haliclona fistulosa*, detail of choanosomal skeleton. Fig. 4. *Haliclona fistulosa*, surface structure, scanning electron micrograph. Fig. 5. *Haliclona xena* spec. nov., ectosomal skeleton. Fig. 6. *Haliclona xena* spec. nov., cross-section of choanosome.

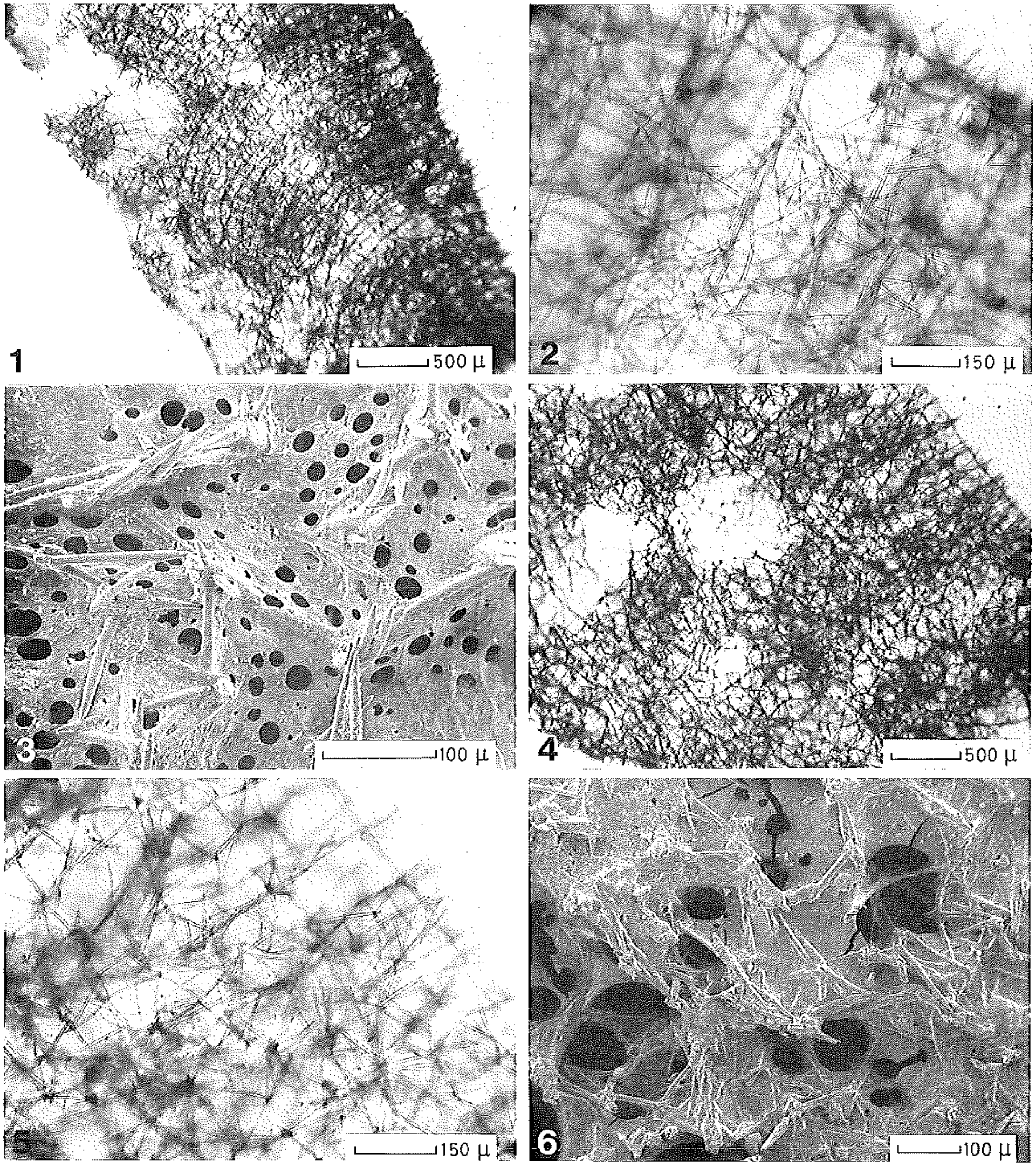


Plate VIII.
Fig. 1. *Haliclona rosea*, cross-section of choanosome. Fig. 2. *Haliclona rosea*, detail of choanosomal skeleton. Fig. 3. *Haliclona rosea*, surface structure, scanning electron micrograph. Fig. 4. *Haliclona viscosa*, cross-section of choanosome. Fig. 5. *Haliclona viscosa*, detail of choanosomal skeleton. Fig. 6. *Haliclona viscosa*, surface structure, scanning electron micrograph.

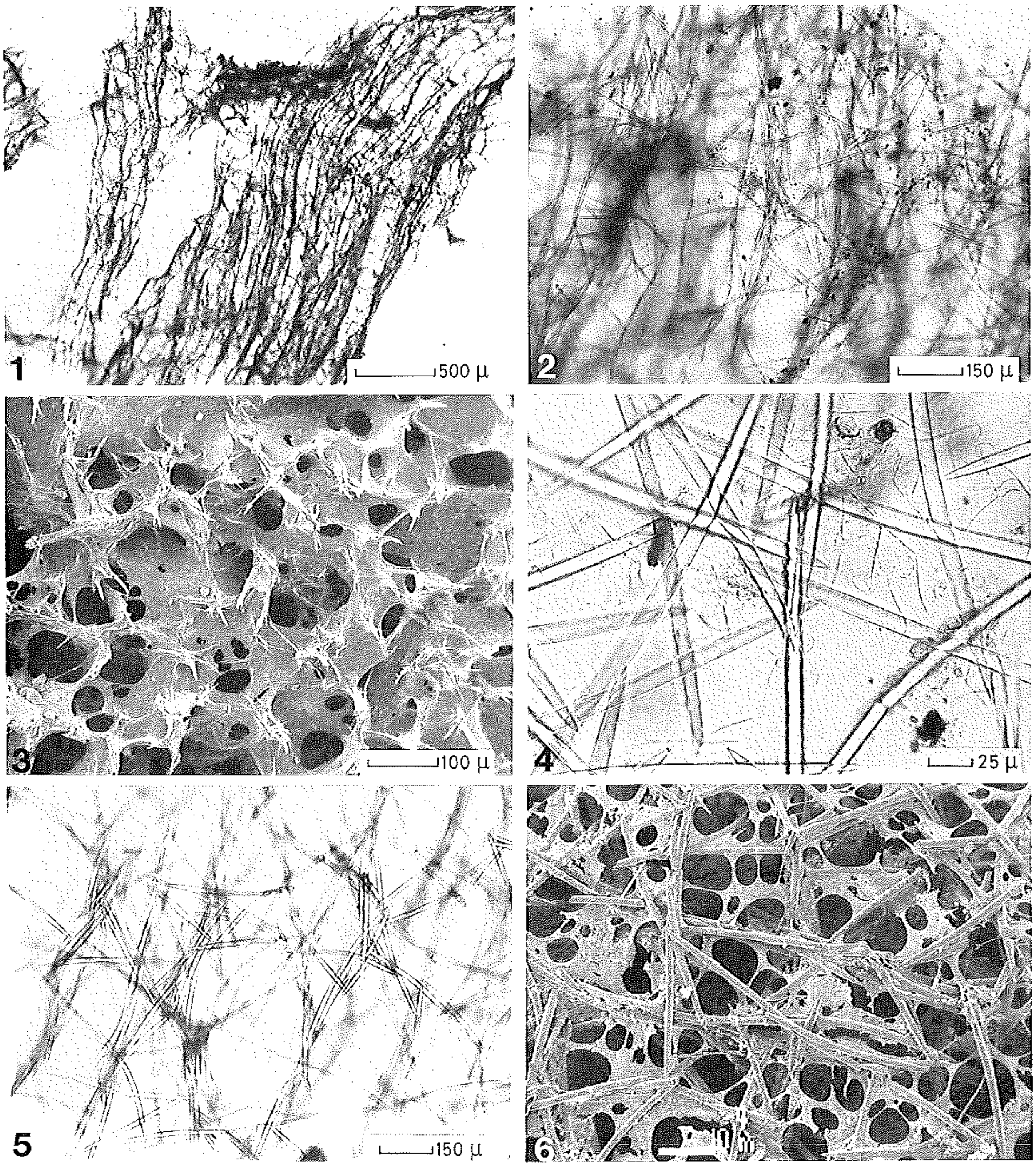
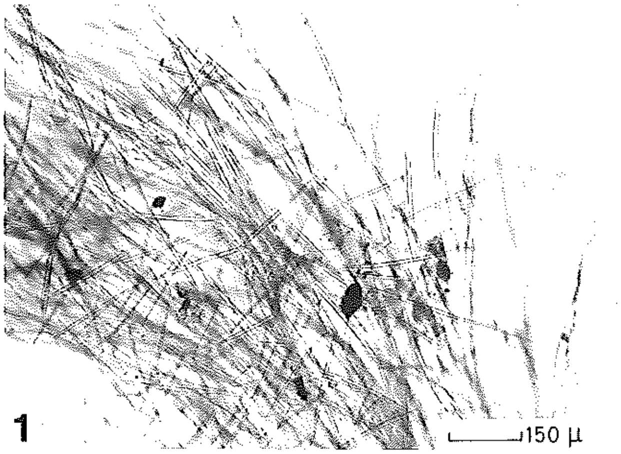
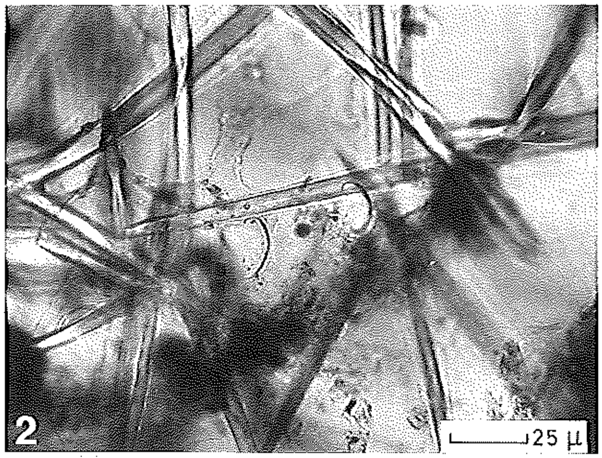
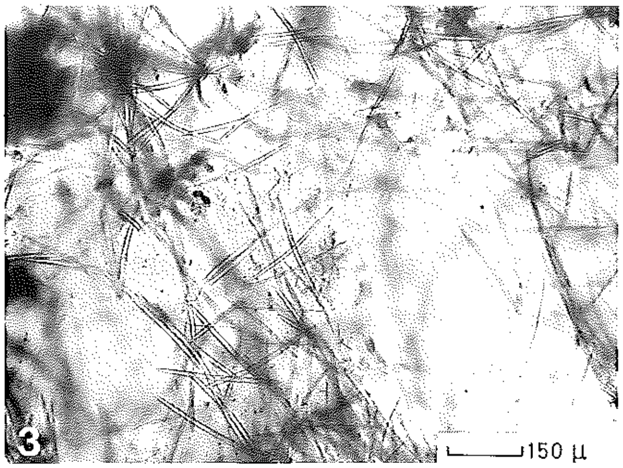
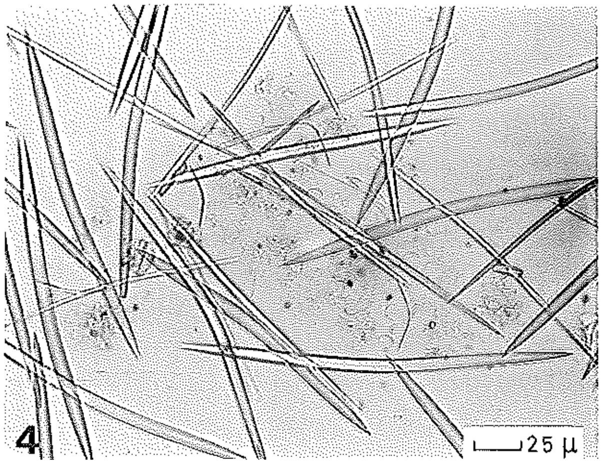


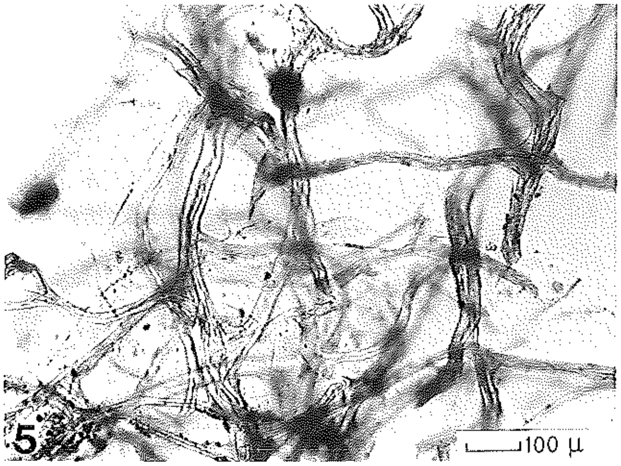
Plate IX.
Fig. 1. *Haliclona indistincta*, cross-section of choanosome. Fig. 2. *Haliclona indistincta*, detail of choanosomal skeleton. Fig. 3. *Haliclona indistincta*, surface structure, scanning electron micrograph. Fig. 4. *Haliclona angulata*, ectosomal skeleton, with microscleres. Fig. 5. *Haliclona angulata*, cross-section of choanosomal skeleton. Fig. 6. *Haliclona angulata*, surface structure, scanning electron micrograph.











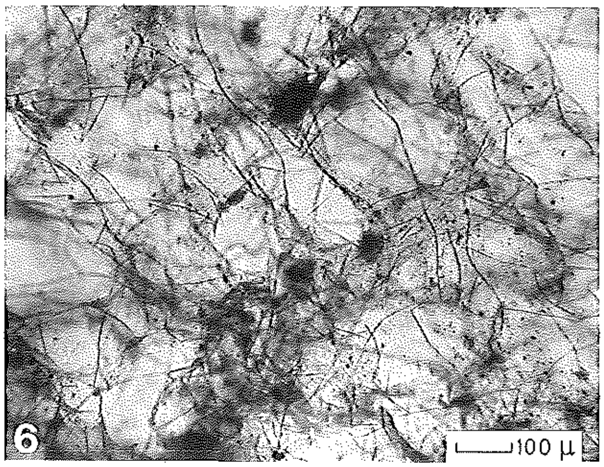


Plate X.
Fig. 1. *Haliclona fibulata*, cross-section of choanosome. Fig. 2. *Haliclona fibulata*, sigmata. Fig. 3. *Haliclona rava*, cross-section of choanosome. Fig. 4. *Haliclona rava*, microscleres. Fig. 5. *Acervochalina limbata*, cross-section of choanosome. Fig. 6. *Acervochalina loosanoffi*, cross-section of choanosome.

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