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## MARINE AND FRESHWATER SPONGES (PORIFERA) OF THE NETHERLANDS

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With 5 text-figures and 3 plates

### SUMMARY

The collections of the Rijksmuseum van Natuurlijke Historie at Leiden and the Zoologisch Museum of Amsterdam contain 19 species of Porifera (15 marine and 4 freshwater species), originating from the Netherlands. Among the marine species, *Halichondria panicea* (Pallas, 1766), *Halichondria bowerbanki* Burton, 1930, *Haliclona oculata* (Pallas, 1766), *Cliona celata* (Grant, 1826), *Scypha ciliata* (Fabricius, 1780) (two forms) and *Leucosolenia botryoides* (Ellis & Solander, 1786) (two forms) appeared to be most common. Rare or moderately rare species proved to be *Ficulina ficus* (Linnaeus, 1767), *Prosuberites epiphytum* (Lamarck, 1816), *Mycale contareni* (von Martens, 1824) and *Haliclona loosanoffi* Hartman, 1958. *Hymeniacidon perlevis* (Montagu, 1812), *Ciocalypta penicillus* Bowerbank, 1866, *Grantia compressa* (Fabricius, 1780), *Raspailia pumila* (Bowerbank, 1866) and *Clathrina coriacea* (Montagu, 1818) are each represented by only one sample.

Of the freshwater sponges two species are quite common: *Spongilla lacustris* (Linnaeus, 1758) and *Ephydatia fluviatilis* (Linnaeus, 1759). Two other species, *Eumapinus fragilis* (Leidy, 1851) and *Ephydatia muelleri* (Lieberkühn, 1856) have been found only a few times.

### INTRODUCTION

Literature data on sponges from the Netherlands are extremely scarce. Next to occasional records of common species such as *Halichondria panicea* (Pallas, 1766) and *Haliclona oculata* (Pallas, 1766), only few authors provided more data. Vosmaer, eminent student of Porifera, at one time mentioned some species he found among oyster beds in the SW-part of the Netherlands (1882: *Sycandra ciliata* (Fabricius, 1780), *Halichondria panicea* and *Chalinula fertilis* Keller, 1879). Maitland (1897) provided a list of sponges from Holland and Flanders (based on information supplied by Vosmaer): *Vioa celata* (Grant, 1826), *Spongilla lacustris* (Linnaeus, 1759), *Spongilla fluviatilis* (Linnaeus, 1759), *Halichondria panicea* (Pallas, 1766), *Halichondria*

*coalita* (Grant, 1825), *Chalinula fertilis* (Keller, 1879), *Suberites domuncula* (Olivier, 1792), *Grantia compressa* (Fabricius, 1780), *Sycon ciliatum* (Fabricius, 1780), *Ascandra complicata* Montagu, 1812 and *Ascandra fabricii* (Schmidt, 1870).

Rousseau (1902), reporting on sponges from Belgium, also provided a few records of sponges from Holland (also on Vosmaer's authority): *Leucosolenia botryoides* (Ellis & Solander, 1786), *Leucosolenia fabricii* (Schmidt, 1870), *Leucosolenia complicata* (Montagu, 1812) and *Prosuberites epiphytum* (Lamarck, 1816).

Arndt (1935), in his monograph of the North Sea and Baltic sponges, recorded in addition to above mentioned species, *Mycale contareni* (von Martens, 1824) (a piece of which, originating from Bergen op Zoom, was apparently donated to the Berlin Museum), and *Isodictya palmata* (Johnston, 1842) (on the authority of Marshall, 1895). According to Arndt *Chalinula fertilis* is a Mediterranean species and not identical with Vosmaer's Dutch material; he presumed that the species concerned is *Haliclona limbata* (Montagu, 1812). Korringa (1954), describing epifauna of oystershells, took over Arndt's suggestion and called his material, which is doubtless identical to Vosmaer's, *Haliclona limbata*. Van Soest (1976) recently demonstrated that this material conforms to *Haliclona loosanoffi* Hartman, 1958.

Penney & Racek (1968), in their monograph of the fresh water sponges of the world, recorded four species from the Netherlands: *Spongilla lacustris* (Linnaeus, 1759), *Eunapius fragilis* (Leidy, 1851), *Ephydatia fluviatilis* (Linnaeus, 1759) and *Ephydatia muelleri* (Lieberkühn, 1856).

In all 17 species have been reported to occur in the Netherlands. Almost all species have been recorded without any other specification than "Holland" or "coasts of Holland"; neither figures nor spicula drawings have been given as yet (except for *Haliclona loosanoffi*, cf. Van Soest, 1976).

The present study is a preliminary survey of the sponges of the Netherlands and their distribution. The material consists of all sponge specimens originating from the Netherlands, incorporated in the collections of the Rijksmuseum van Natuurlijke Historie, Leiden and the Zoologisch Museum, Amsterdam.

A total of 19 species has been found, including most of the earlier reported species. Only *Isodictya palmata* (Johnston, 1842) was not represented in the studied collections. New records are *Hymeniacidon perlevis* (Montagu, 1812), *Raspailia pumila* (Bowerbank, 1866), *Ciocalypta penicillus* Bowerbank, 1866 and *Clathrina coriacea* (Montagu, 1818). The species will be treated systematically below. Figure 1 shows all localities from which one or more samples of sponges were available.

## ACKNOWLEDGEMENTS

A great number of collectors assembled the present material over a great number of years. All persons and institutions concerned are thanked for their contributions. The Delta Institute for Hydrobiological Research donated a large collection of sponges from the Delta area (= SW estuarine area of the Netherlands) to the Zoologisch Museum of Amsterdam. Prof. Dr. W.

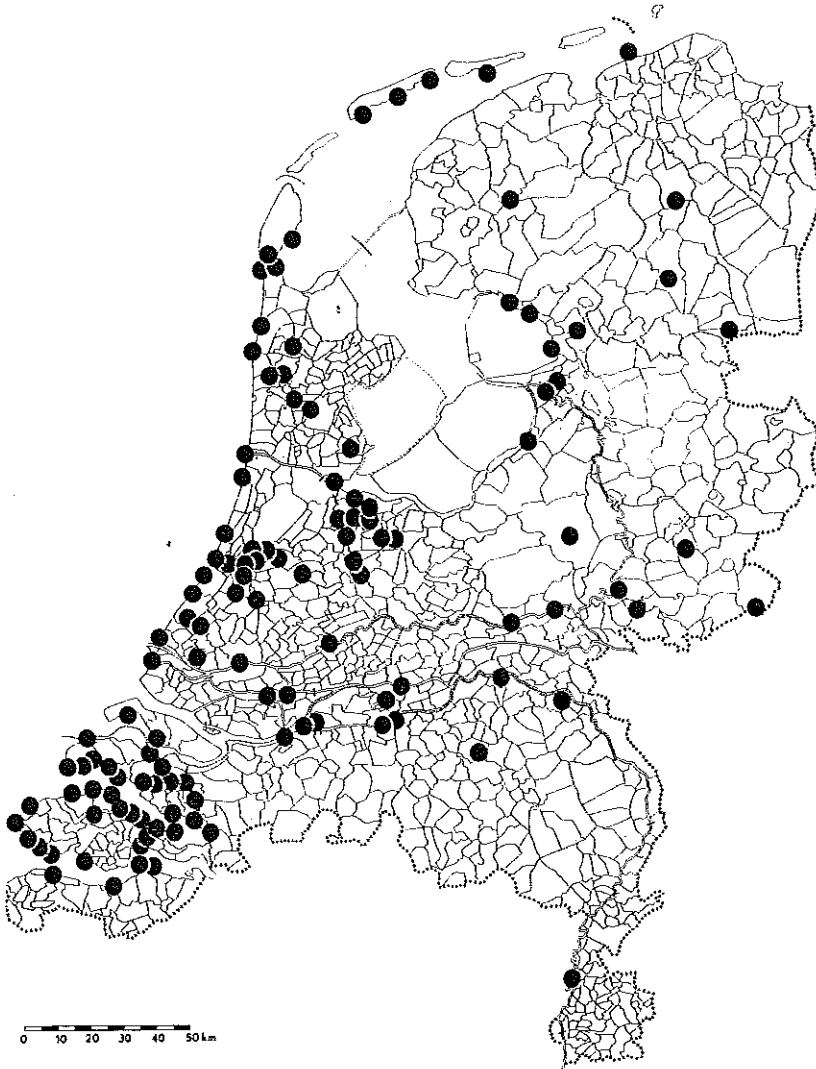


Fig. 1. Localities from which sponge samples have been studied.

Vervoort kindly permitted the author to study the collections of the Rijksmuseum van Natuurlijke Historie. Dr. O. S. Tendal (Zoological Laboratory, University of Copenhagen) kindly checked some identifications and provided advice. Mr. J. Vermeulen assisted in the preparation of microscopical slides and collected additional fresh material.

#### A. MARINE SPONGES

##### LEUCOSOLENIIDAE

#### **Leucosolenia botryoides** (Ellis & Solander, 1786)

sensu lato (pl. I figs. A, B)

Recently, Burton (1966) revised the Calcarea, which resulted in the synonymizing of many forms up till then distinguished as separate species. It is tempting to follow Burton's proposal, the more so as the differences between the "species" as far as the spicules are concerned, seem indeed non-existent. In the coastal water of the Netherlands two more or less distinct morphological forms are present. The one form has been at one time identified as *Leusolenia botryoides* sensu stricto by Borojévic and Graat-Kleeton (not published). It is a bushy mass of upright tubuli, anastomosing only on the substratum or immediately above it, but not in terminal parts (pl. I fig. A). The second form is an intricate mass of irregular and frequently anastomosing, mostly flattened tubes (pl. I fig. B); specimens of this form have been labeled as *L. complicata* (Montagu, 1818) by Vosmaer (RMNH-collection) and *L. variabilis* Haeckel, 1870 by Borojévic and Graat-Kleeton (ZMA-collection). Whether or not this form is specifically different from *L. botryoides* can only be decided after a careful study of the life cycle. The spicules do not seem to be very much different, either in form or size. The frequently cited species *L. fabricii* (Schmidt, 1870) is generally considered conspecific with *L. complicata* (cf. Burton, 1966).

Distribution. — The *botryoides*-form is more common than the *variabilis*-form; *L. botryoides* s.l. is a common sponge on all suitable substrata along the entire coast of the Netherlands.

#### **Clathrina coriacea** (Montagu, 1818) (pl. I fig. C)

This species so far has not been reported from Dutch waters. The present collections contain one sample collected near Wemeldinge (province of Zeeland, leg. J. H. Stock, 1971). It conforms in all details with earlier descriptions (e.g. Burton, 1966): a flattened, tightly anastomosing network with triradial spicules only. It is apparently autochthonous.

## SYCETTIDAE

**Scypha ciliata** (Fabricius, 1780) sensu lato (pl. 2 figs. A, B)

Synonym: *Sycon ciliatum* (Fabr.).

Vernacular Dutch name: Zakspoons.

The present material has all been assigned to *Scypha ciliata*, although there are at least two distinct forms. Among the large numbers of "normal" *S. ciliata* specimens, occasionally samples of greyish, very "hairy" specimens were met. The hairy aspect is caused by tight bundles of very large oxea (cf. pl. 2 fig. A), attached to the apices of the radial tubuli. No intermediates between hairy and smooth forms have been found. The hairy form could be identical with *Sycon villosum* (Haeckel, 1872), but this must await more thorough studies, as Burton (1966) considered all "Sycon" species to belong to one species only: *Scypha ciliata*. *Sycon coronatum*-like specimens (reported from the Netherlands by Maitland, 1897) have not been found so far. Differences between *Scypha ciliata* and *Sycon coronatum* (Ellis & Solander, 1786) allegedly are the width of the oxea, the more solitary occurrence of *S. coronatum* and particularly the reproduction (Tuzet, 1973).

Distribution. — *Scypha ciliata* is one of the commonest sponge species in the Netherlands, occurring on hard substrata along the entire coast.

## GRANTIIDAE

**Grantia compressa** (Fabricius, 1780)

Only one specimen of this very characteristic species has been found in the present collections. It originates from the beach of Camperduin, where it was found attached to a lump of vegetation. It is doubtful, whether this species really belongs to the fauna of the Netherlands, although it is rather common on the coasts of France and Belgium. For the time being it is best considered an allochthonous species.

## SUBERITIDAE

**Ficulina ficus** (Linnaeus, 1767) (pl. 2 fig. C)

Synonymy: *Suberites ficus* (L.); *Suberites domuncula* sensu Maitland, 1897 (not *S. domuncula* (Oliv)).

Vernacular Dutch name: Vijgspoons.

This well known species is represented by only five samples. Most specimens are attached to or surround mollusc shells, a.o. *Dentalium* (cf. pl. 2 fig. C). Only one specimen contained the characteristic centrotylote microscleres.

Distribution. — The specimens originate from the Den Helder-Texel area, probably all were found well away from the strictly coastal areas. It is presumed, that the species is well established on the North Sea bottom.

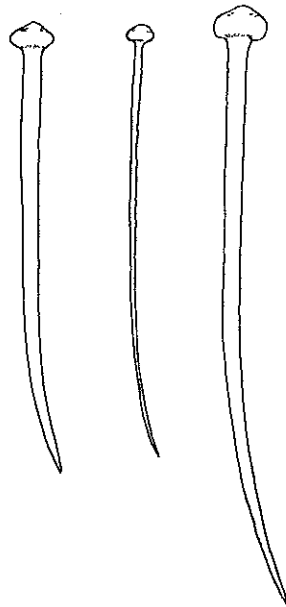


Fig. 2. Spicules of *Prosuberites epiphytum* (Lamarck, 1816).

***Prosuberites epiphytum*** (Lamarck, 1816) (fig. 2)

This yellow-brown encrusting species has been collected in five instances. The pieces are quite small (up to 4 cm long) and surround the stalks of hydroid and bryozoan colonies or encrust oyster shells. The spicula are delicate tylostyles with a typical semiglobular knob, resembling very much a common pin (fig. 2). Size of the spicules: 90-340  $\mu$  long, 0.5-5.5  $\mu$  wide ( $n = 50$ ).

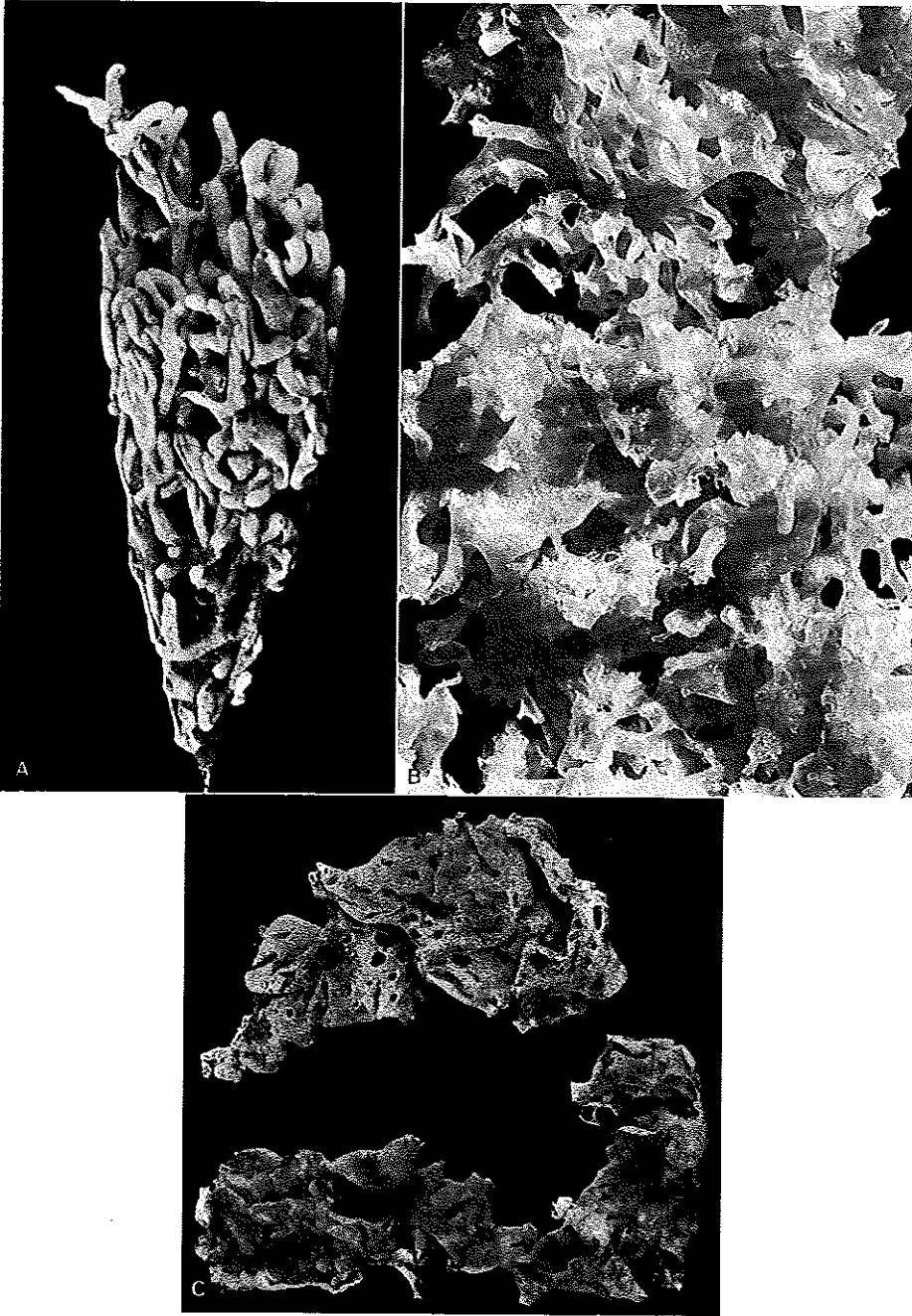
Distribution. — Delta area (Yerseke, Zierikzee and Wemeldinge). Rousseau (1902) mentioned this species for the coasts of Holland, but did not provide further information.

CLIONIDAE

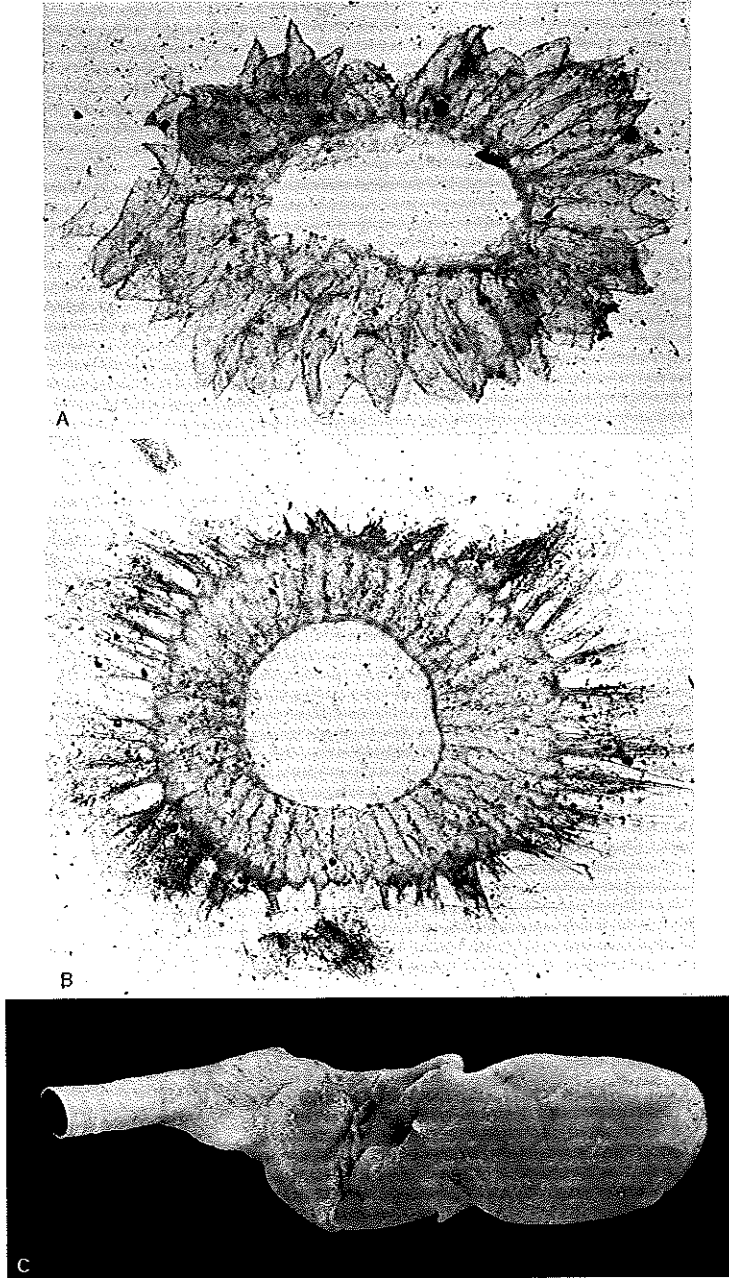
***Cliona celata*** Grant, 1826

Vernacular Dutch name: Boorspons.

This well known cosmopolitan oyster pest is represented by numerous samples, all from oyster beds in the Oosterschelde. Most specimens consisted of a large number of papillae (measuring all over 1 mm in diameter), sometimes interconnected by sponge tissue overgrowing the shells entirely.

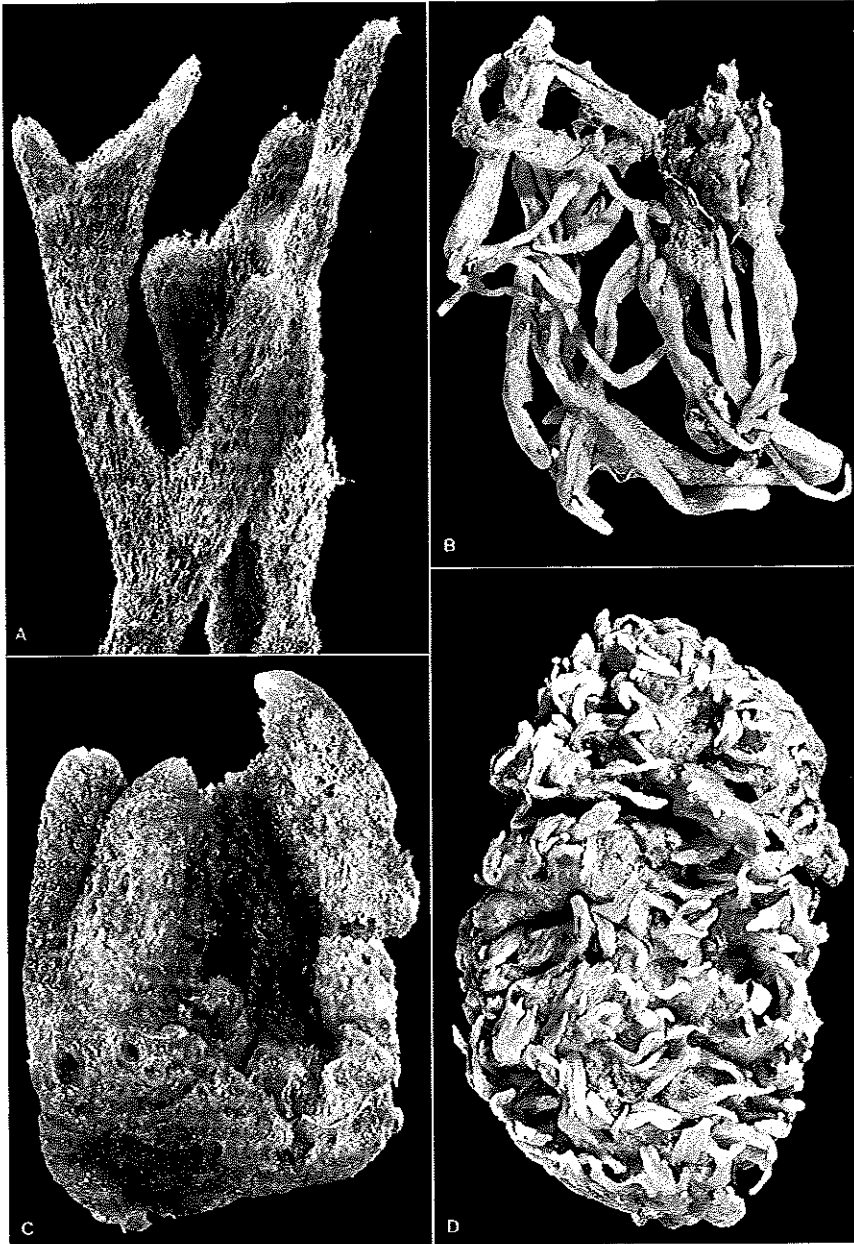


A, *Leucosolenia botryoides* (Ellis & Solander, 1786) sensu stricto ( $\times 14$ ). B, *L. botryoides*, *variabilis*-form ( $\times 4$ ). C, *Clathrina coriacea* (Montagu, 1818) ( $\times 10$ ).



A, *Scypha ciliata* (Fabricius, 1780), normal form, transverse section ( $\times 20$ ). B, *S. ciliata*, "hairy" form (*Sycon villosum* Haeckel, 1872?), transverse section ( $\times 10$ ). C, *Ficulina ficus* (Linnaeus, 1758) attached to *Dentalium*-shell ( $\times 1.2$ ).





A, *Raspailia pumila* (Bowerbank, 1866) ( $\times 2.0$ ). B, *Halichondria bowerbanki* Burton, 1930 ( $\times 1$ ). C, *Ciocalypta penicillus* (Bowerbank, 1866) ( $\times 1.2$ ). D, *Hymeniacidon perlevis* (Montagu, 1812) ( $\times 1.2$ ).

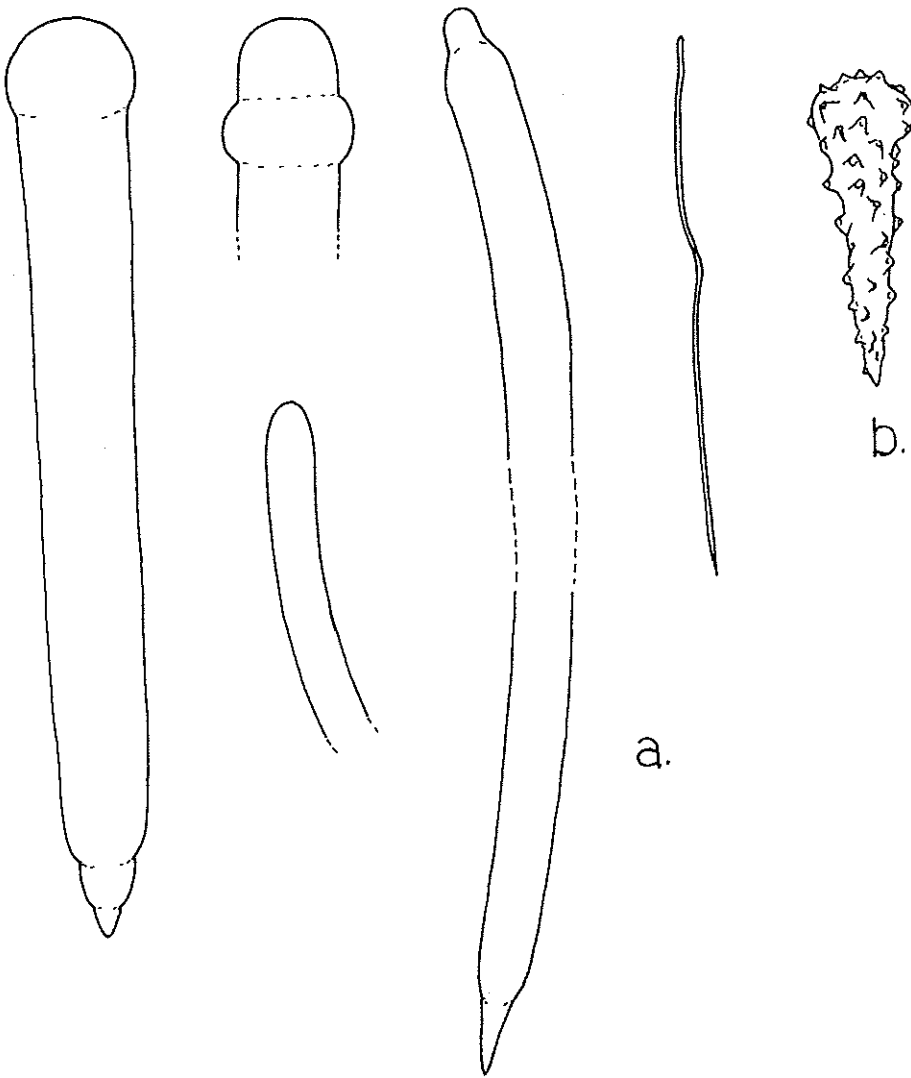


Fig. 3. Spicules of *Raspailia pumila* (Bowerbank, 1866). a, (tylo)styles; b, acanthostyl.

RASPAILIIDAE

***Raspailia pumila*** (Bowerbank, 1866) (fig. 3; pl. 3 fig. a)

One, probably allochthonous, specimen occurs in the present collection. It was collected on the beach of Westkapelle (province of Zeeland) after a

violent storm. Its skeleton contains relatively few acanthostyles (115-172  $\mu$  long, 8-11  $\mu$  thick) ( $n = 15$ ) and very stout styles and (sub)tylostyles (up till 1000  $\mu$  long and 25  $\mu$  thick) ( $n = 50$ ) (cf. fig. 3). Rarely, also long, thin, irregular styles are found.

#### MYCALIDAE

##### **Mycale contareni** (von Martens, 1824) (fig. 4)

Several specimens presumably belonging to this species have been found. All consisted of a thin, greyish, non-descript crust on oyster and mussel shells, of about 0.5 mm thick. The only means of specific identification are the spicules (fig. 4): (sub)tylostyles (180-300  $\mu$  long, 3.5-14  $\mu$  thick ( $n = 50$ )), sigmata 54-81  $\mu$  long ( $n = 50$ ), anisochelae in two size categories: 12-18  $\mu$  long and 23-34  $\mu$  long ( $n = 50$ ), toxa in two size categories: 40-80  $\mu$  long and 100-160  $\mu$  long. Vosmaer identified this species as *M. contareni*, and as far as the spicules are concerned, this identification seems to be correct; French specimens of this species in the ZMA-collection, though differing quite strongly in shape, exhibit the same variation in spicule sizes and shapes.

Distribution. — The species has been found only in the Delta area, where it occurred not infrequently.

#### HALICHONDRIIDAE

##### **Halichondria panicea** (Pallas, 1766)

Vernacular Dutch name: Broodspoons.

This species is represented by hundreds of samples. The specimens exhibit a great variation of shape, from flatly encrusting pieces to thick cushions with or without long osculiferous turrets, which are often branched. The living colour is either brightly orange or beautiful orange green (due to symbiotic algae). It has a characteristic, slightly disagreeable odour. Spicules are oxea only, arranged quite confused or, more rarely, somewhat regular. The arrangement of the spicules in the dermis is tangential and considerably more confused than in the next species.

Distribution. — The bread crumb sponge is doubtless the most numerous and wide spread species in the Netherlands. It occupies all suitable substrata along the entire coast.

##### **Halichondria bowerbanki** Burton, 1930 (pl. 3 fig. B)

Synonym: *Halichondria coalita* (Grant, 1825).

Numerous samples are present in the studied collections. They show the characteristic irregularly branched shape (pl. 3 fig. B), as described and pictured by Hartman (1958) and Graat-Kleeton (1965). The colour is beige or dull brownish grey. Apart from the external appearance, the differences

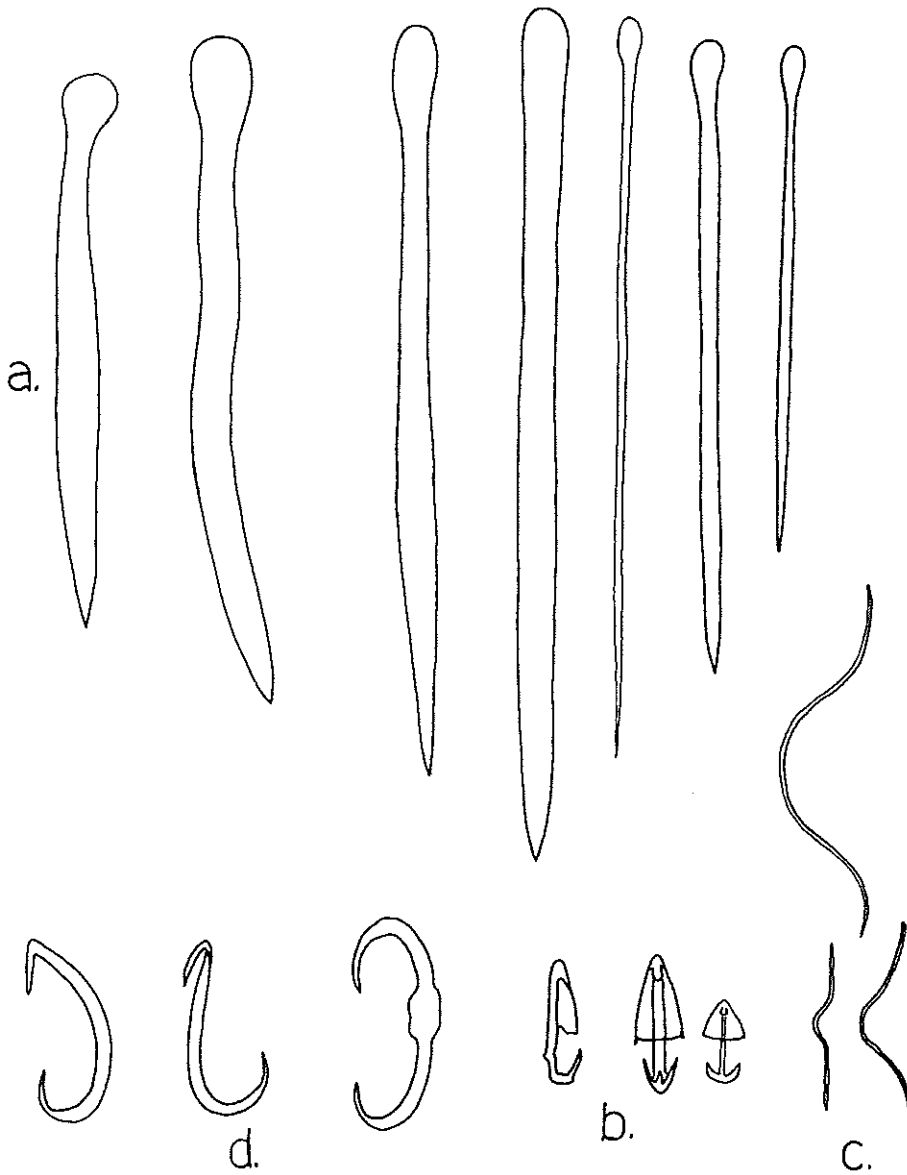


Fig. 4. Spicules of *Mycale contareni* (von Martens, 1824). a, tylostyles; b, anisochelae; c, toxa; d, sigmata.

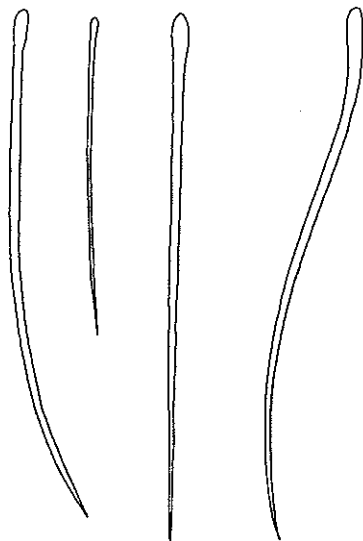


Fig. 5. Spicules of *Hymeniacidon perlevis* (Montagu, 1812).

with *H. panicea* are very small. The spicules are identical (long, thin, arched oxea), but their arrangement in the dermal membrane is more regular, leaving open spaces (in which pores are terminating) between spicule bundles (cf. Hartman, 1958: figs. 8, 9).

Distribution. — This species has been found in the SW-part of the Netherlands and in the harbour of West-Terschelling (Wadden Sea).

#### **Ciocalypta penicillus** (Bowerbank, 1866) (pl. 3 fig. C)

Only one specimen of this species, originating from the harbour of West-Terschelling, is at present known from the Netherlands (the identification has been checked by Dr. O. S. Tendal). The shape is characteristic, but the skeleton consists, remarkably enough, almost entirely of oxea (210-420  $\mu$  long, 3.5-13.5  $\mu$  thick,  $n = 50$ ), next to a few thin styles (140-240  $\mu$  long, 1.0-2.5  $\mu$  thick,  $n = 19$ ). The species is known to be variable. It is apparently autochthonous.

#### HYMENIACIDONIDAE

#### **Hymeniacidon perlevis** (Montagu, 1812) (fig. 5)

Synonym: *Hymeniacidon sanguinea* (Grant, 1826).

Only one remarkable specimen in the present collection belongs to this species. It is a thick cushion, densely packed with long irregular papillae (pl. 3 fig. D). Its spicules are long thin styles: 175-394  $\mu$  long, 4.0-4.5  $\mu$

( $n = 50$ ). Compared to some specimens of this species from Brittany (France) (present in the collection of the Zoologisch Museum, Amsterdam) the Dutch specimens have remarkably thin spicules (French specimens averaged 7-8  $\mu$  in thickness). The specimen originated from Wemeldinge (coll. J. H. Stock, 1951); it is apparently autochthonous.

#### HALICLONIDAE

##### **Haliclona oculata** (Pallas, 1766)

Synonym: *Chalina oculata* (Pallas),

Vernacular Dutch name: Geweispens.

This common species is represented by hundreds of samples. Its ramose shape with oscular rows on the branches and thick cigar-like spicules make it readily recognizable. At the base of many specimens several gemmules are found; these may occur throughout the year. The size of these whitish gemmules averages 900  $\mu$  (almost twice as large as those of the next species).

Distribution. — Along the entire coast of the Netherlands on suitable substrata.

##### **Haliclona loosanoffi** Hartman, 1958

Synonymy: *Chalinula fertilis* sensu Vosmaer, 1882 (not *C. fertilis* Keller, 1879); *Haliclona limbata* sensu Korringa, 1954 (not *H. limbata* (Montagu, 1812)).

A full description is published by Van Soest, 1976. This species is encrusting and its oscula are terminal on small tubes. The spicules both of the skeleton and of the gemmules are much thinner and more slim than those of *H. oculata*. Gemmules are about half the size of those of *H. oculata*. The species apparently is absent during the colder part of the year.

### B. FRESHWATER SPONGES

#### SPONGILLIDAE

##### **Spongilla lacustris** (Linnaeus, 1759)

This common species is represented by about 50 samples. It differs from the next species by the presence of microscleres (acanthoxea) and by the irregular distribution of gemmules throughout the flesh.

Distribution. — All over the Netherlands in rivers, lakes and canals. Not in brackish water.

##### **Eunapius fragilis** (Leidy, 1851)

Synonym: *Spongilla fragilis* Leidy, 1851.

Two specimens are known from the Netherlands, incorporated in the collections of the Zoologisch Museum, Amsterdam. The species is readily

distinguished from the preceding species by the absence of microscleres and the concentration of gemmules at the base of the sponge.

Distribution. — Found in the rivers IJssel and (Binnen-) Maas.

#### **Ephydatia fluviatilis** (Linnaeus, 1759)

This appears to be the commonest freshwater species, as it is represented by over 100 samples in the present collections. It is distinguished from the next species by the mostly smooth appearance of the megascleres.

Distribution. — All over the Netherlands in rivers, lakes and canals. It is the only species to be found in the oligo- to mesohaline waters of North Holland.

#### **Ephydatia muelleri** (Lieberkühn, 1856)

The first specimens of the species in this country were collected by Hugo de Vries in 1887 from a freshwater basin in Rotterdam, where it probably had been introduced accidentally. Since then few other records have been given. The present material comprises 5 samples, including the original Rotterdam material. The species is distinguished from the preceding by the strongly spinous megascleres (acanthoxea).

Distribution. — All records are from the province of Zuid-Holland.

#### DISCUSSION

The absence of a natural rocky shore habitat along the coasts of the Netherlands is reflected in the poverty of marine sponge species reported from this country. Most of the samples of the collections studied here have been collected on the dykes, artificial rocky shores, which comprise almost the only type of shore in the southwestern part of the Netherlands. Natural habitats for marine sponges are rather scarce: mussel- and oyster-banks, occasional stones, etc. Nevertheless, it seems logical to expect, that more species will be found to occur in Dutch waters, when a proper sponge survey of the Delta area and other artificial coastlines has been carried out.

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