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by V. M. Koltun

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FOUR-RAYED SPONGES OF THE NORTHERN AND FAR EASTERN SEAS OF THE USSR

(Order Tetraxonida)

By

V.M. Koltun

"Nauka" Publishing House

Moscow 1966 Leningrad

PREFACE

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The present key is the second of four proposed keys to sponge fauna of the northern and far eastern seas of the Soviet Union. The first key which deals with horny siliceous sponges was published earlier and the two remaining keys to glass sponges and calcareous sponges are slated for publication in the near future. It is expected that the completion of these four books will bring to an end the first stage of the study on sponge fauna which inhabit our northern and far eastern seas.

Numerous collections of four-rayed sponges, made as a result of various native expeditions and kept at the Institute of Zoology of the Academy of Sciences of the USSR, have been used in compiling this key. The most important of these is the material collected during the Polar expedition on "Zarya" (1900-1903), the Expedition for the Scientific and Commercial Research of Murman (1898 - 1906), the Hydrographic Expedition of "Taimyr" and "Vaigach" (1910 - 1915), expeditions conducted by the Arctic Scientific-Research Institute on "Sadko" (1935 - 1938), "G. Sedov" (1936 and 1937), "F. Litke" (1948 and 1954), and "Ob'" (1955) and a number of other expeditions during which research has been conducted in the Arctic Ocean. Large collections of four-rayed sponges from our far eastern seas are those of the Korean-Sakhalin expedition conducted by the Geographic Society (1900 - 1901), the Hydrographic expedition of the

Eastern Ocean (1908 - 1918), the Pacific Ocean expedition conducted by the State Institute of Hydrology (1923 - 1932), the Kuril--Sakhalin and Northern Kuril Expeditions conducted by the Institute of Zoology of the Academy of Sciences of the USSR on "Vityaz'" (1949 - 1954) and some others. In addition, collections of sponges were processed and used which had been collected in the past ten years by the Arctic Institute of Fisheries and Oceanography in the northern part of the Atlantic Ocean and which provided important comparative material for conducting a partial revision of four-rayed sponge fauna of the Arctic Basin and adjoining water areas.

Four-rayed sponge fauna of our northern seas has been studied most thoroughly and, therefore, is most completely reflected in the key. The fauna of the far eastern seas has not yet been studied in sufficient detail: it is quite possible that new species of sponges will be disclosed, particularly in the Sea of Japan and in the region of the southern Kuril Islands, during an examination of additional material.

The book includes diagnoses of 76 species and varieties of sponges, belonging to 24 genera and 11 families. The majority of the diagnoses are based on a study of collections which have been substantially augmented and processed when compared to the data in the literature. For almost all species of sponges, original diagrams of the characteristic elements of the skeleton (spines) and diagrams of the sponges themselves have been provided. /4

The part of the key devoted to classification is preceeded by introductory chapters on the morphology, biology and the distribution of four-rayed sponges which give a general picture of this group of sponges and facilite use of the key.

While studying the collections of four-rayed sponges, the author constantly availed himself of the assistance of A. Grin'ko, laboratory technician of the division on sponges and Coelentrata at the Institute of Zoology of the Academy of Sciences of the USSR, who prepared several thousands of preparations of spines of sponges; M.M. Zharenkov and A.A. Koren'kov provided the illustrations and photographs for the book.
The author is deeply indebted to the above-mentioned individuals and to Professor A.A. Strelkov, the editor of this publication, for their assistance in the compilation of the key.

KEY TO CLASSIFICATION OF SPECIES

Order TETRAXONIDA

I. Fam. Pachastrellidae

1. Gen. *Pachastrella* Schmidt, 1868

2. Gen. *Poecillastra* Sollas, 1888

3. Gen. *Sphinctrella* Schmidt, 1870

II. Fam. Theneidae

1. Gen. *Thenea* Grey, 1867

III. Fam. Stellettidae

1. Gen. *Stelletta* Schmidt, 1862

2. Gen. *Penares* Gray, 1867

3. Gen. *Stryphnus* Sollas, 1886

IV. Fam. Geodiidae

1. Gen. *Geodia* Lamarck, 1815

2. Gen. *Geodinella* Lendenfeld, 1903

3. Gen. *Pachymatisma* Johnston, 1842

V. Fam. Tetillidae

1. Gen. *Tetilla* Schmidt, 1868

VI. Fam. Polymastiidae

1. Gen. *Polymastia* Bowerbank, 1866

2. Gen. *Sphaerotylus* Topsent, 1898

3. Gen. *Tentorium* Vosmaer, 1885

4. Gen. *Rhizaxinella* Keller, 1880

INTRODUCTION

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The majority of present day specialists on sponges accept the division of the phyllum of sponges into three classes: Calcispongea (= Calcarea), Hyalospongea (= Triaxonida or Hexactinellida) and Demospongea. The bulk of the species of sponges belongs to the last class. This is a rather dissimilar group whose subdivision into categories of a lower suborder presents considerable difficulties and which hitherto has been a subject of discussion. Most commonly, Demospongea is divided into two subclasses or orders. According to the nomenclature and classification of Hentschel (1923), such orders are Cornacuspongida and Tetraxonida, i.e., horny siliceous and four-rayed sponges.

ANATOMICAL AND MORPHOLOGICAL OUTLINE OF FOUR-RAYED SPONGES

External appearance. Many representatives of Tetrazonida have quite a regular spherical, ovate, cup-shaped, disc-shaped, cupola-shaped or club-shaped body; among them, one also encounters asymmetrical and irregular forms in the form of cushion-shaped incrustation, unevenly dilated plates, loaf-shaped, lump-like or (rarely) pediculate formations. The surface of the body is often setose, but it may also be smooth. Certain body protuberances - papillae - take on an unusal development within the order, attaining a length of 5 - 12 cm (Fam. Polymastiidae). A distinguishing feature of the majority of four-rayed sponges is a considerable development of the cortical layer which sometimes has the appearance of a solid shell (Fam. Geodiidae and

others). There is a direct relationship between constancy in body shape of the sponges in reference to its basic pattern and the degree of differentiation in the cortical layer. Therefore, in four-rayed sponges, the radial symmetry of the body is much more clearly delineated than in horny siliceous sponges.

In terms of body size, Tetraxonida differs little from other sponges. The majority are between 1 and 50 cm in height, but some, as for example, Sidonops neptuni, may attain a height of 1.5 m. Four-rayed sponges are often brightly coloured: red, yellow, brown, orange and violet colours of various shades predominate; gray or beige occur less frequently.

Anatomy. The sponges belong to the lowest form of multicellular animals whose bodies not yet differentiated into organs and genuine tissue. The body basically consists of unstructured gelatinous matter, mesogloea, with cells of various types: archaeocytes, collencytes, scleroblasts, spongioblasts, myocytes, etc. The surface of the body is covered with a dermal layer of flat cells (pinacocytes). Inside, there are cavities and canals which form the so-called irrigational system of sponges. Extremely common is the presence of special cavities /9 or flagellated chambers which are lined with special collared cells (choanocytes). On the surface of the sponges there are numerous pores and oscula which connect with the canals and cavities of the body. Four-rayed sponges possess round oval or pear-shaped flagellated

chambers and a complex system of incurrent and excurrent canals. Thus, as in all other siliceous sponges (and some calcareous sponges), the irrigational system of Tetraxonida is of the leuconoid type.

The skeleton. The soft tissues of four-rayed sponges are supported by the skeleton which is made up of siliceous spicules. As the very name of these sponges implies, characteristic are the four-rayed spicules - tetractines - usually encountered in conjuction with non-branched monaxial spicules which are biacuminate; rather characteristic, also, are the cephalate spicules (tylostyles) and their derivatives (subtylostyles and styles), which form the skeleton of these sponges without the participation of tetractines. The skeleton of the majority of four-rayed sponges are constructed according to the radial type and very often, even with the naked eye, one may notice fascicles and fibres of spicules going from the base (or the medulla) of the sponges towards the surface; sometimes, the skeleton is irregularly radial-when the radial arrangement of the spicules is only retained in the surface sections of the body of the sponge; in rare cases, the skeleton is completely irregular or scattered, without a hint of radiality. The horny substance - the spongin - which in horny siliceous sponges is sometimes involved in great quantity in the formation of the skeleton, agglutinating separate spicules, here, is either completely absent or is very insignificant. In connection with the special

development in four-rayed sponges of the cortical layer there is formation a special dermal skeleton, formed of minute spicules arranged in a palisade fashion or of branched ends of radial tetractines and a mass of minute stelate spicules; in the latter case, the cortical layer acquires considerable strength (Fam. Geodiidae and Stellettidae) and is in the nature of a shell so that one can speak of the presence of a special outer skeleton in these sponges.

The spicules of the sponges are very diverse in external appearance and have a significant taxonomic meaning. The different shapes of spicules were given special names which are used in the /10 diagnoses of sponges. Thus, it is necessary to examine in greater detail the types of spicules which are encountered in four-rayed sponges. The spicules are firstly divided into megascleres and microscleres which differ from each other not only in size but also in shape and in their importance in the formation of the skeleton; megascleres form the basic part of the skeleton whereas microscleres play a more secondary role. Therefore, instances are not rare when microscleres are completely absent in the make-up of the skeleton of four-rayed sponges (Fam. Polymastiidae, most of the representatives of Fam. Suberitidae and some others). Among magascleres, monaxial spicules are the most simply constructed (Fig. 1). These are the style-spicules with one round and one sharp end, the cephalate spicules of varying degrees — subtylostyles, tylostyles- and the rather rare but very

characteristic spherostyles. All of these monaxial spicules with differently constructed ends are combined under the general name of monactine or variously-ended spicules. Monaxial spicules with similar endings (diactines) which are most often represented in sponges by oxeas (ends of the spicules are acuminate), and less often by strongyles (the ends of the spicules are rounded).

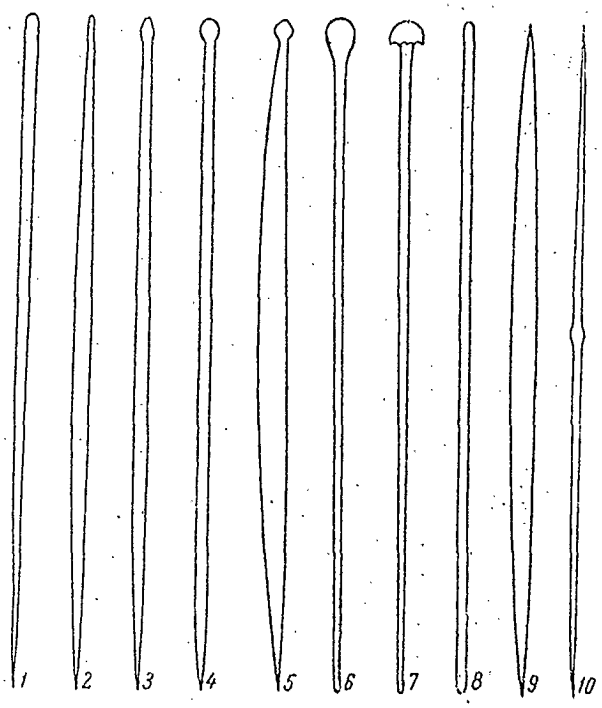

Fig. 1. Megascleres of four-rayed sponges. Monaxial spicules (monactines and diactines).

1 - cylindrical style; 2 - spindle-like style; 3-- subtylostyle; 4 - cylindrical tylostyle; 5 - spindle-like tylostyle; 6, 7 - spherotyles; 8 - strongyle; 9 - spindle-like oxea; 10 - centrotylote oxea.

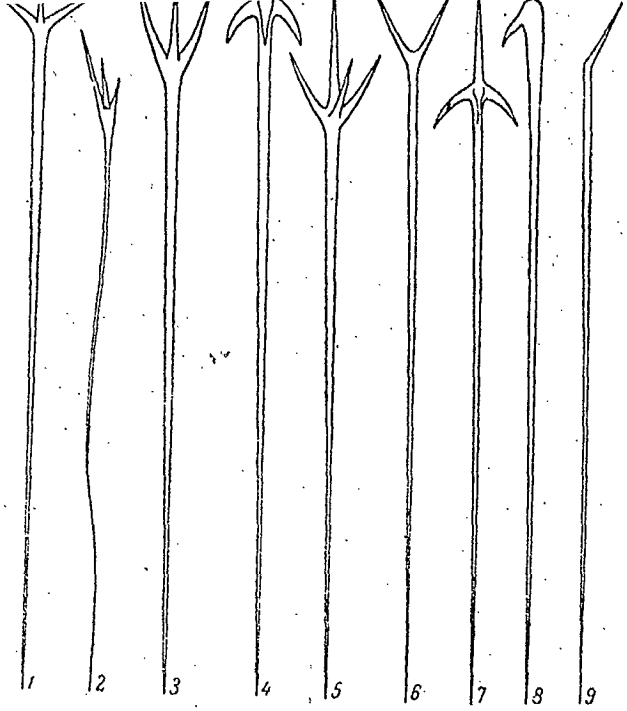

Fig. 2. Megascleres of four-rayed sponges.
Four-rayed spicules (tetractines) and their derivatives.

1 - plagiotriaene; 2 - sagittal protriaene;
3 - ordinary protriaene; 4 - anatriaene; 5 - promezotriaene;
6 - prodiaene; 7 - anamezotriaene; 8 - anamonaene; 9 - pronaene

Four-rayed spicules of various kinds have a more complex structure (Fig. 2, 3). So-called triaenes - spicules which consist of a long basic virgula with three rami or with rays on one of its ends - are most often encountered. Depending on /11 the position of the rami in respect to the main axis of the basic virgula, protriaenes, anatriaenes, orthotetraenes and plagiotriaenes can be distinguished; triaenes with dichotomous branching acquired the name of dichotriaenes. Sometimes, the rami of the triaenes are reduced to a certain degree and instead of three, two or even one branch is retained (Fig. 2 - 6,8,9; Fig. 3 - 2,5). In rare instances, the rami are arranged somewhat away from the end of the spicules. Such spicules are called mesotriaenes

(Fig. 2 - 5-7; Fig. 3 - 4). Regular tetractines with rays of approximately the same length acquired the special name of helotrop.*

The microscleres of four-rayed sponges are mainly represented by various kinds of small stellate spicules or asters (Fig. 4). Asters are subdivided into real asters or euasters and their derivatives, psuedoasters. The real asters have the appearance of a star, the rays of which emerge from one centre. The length and nature of the rays of the real asters are divided into oxyasters, strongylasters, tylasters, spherasters, sterrasters, etc. depending on the degree of development of the central part of the spicule. When the central part of the spicule is stretched out into virgulae of different lengths, derivatives of real asters are obtained - psuedoasters: amphiasters, metasters, spirasters, discasters, etc. Encountered considerably less often among microscleres of the four-rayed sponges are sigmas, microxeas, /12 microstongyles, microstyles; and encountered very rarely are raphides. The microscleres generally range from 4 to 150 mk in size; microscleres frequently attain a length of 1 - 3 mm and more.

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*Caltrop is a synonym - translator

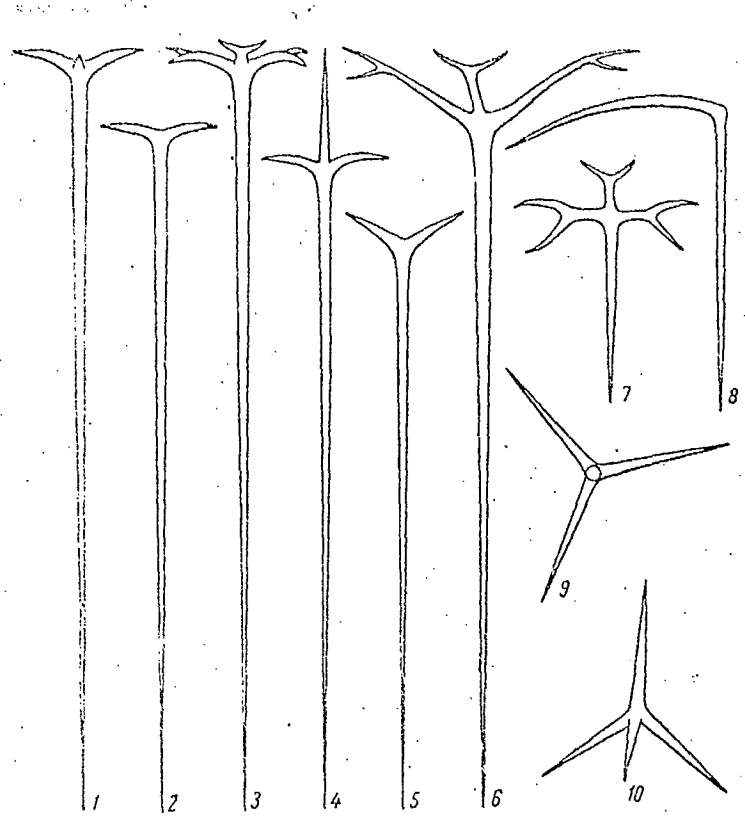

Fig. 3. Megascleres of four-rayed sponges.
Four-rayed spicules (tetractines) and their derivatives

1 - orthotriaene; 2 - orthodiaene; 3 - dichotriaene;
4 - orthomezodiaene; 5 - plagiodiaene; 6,7 - dichotriaenes; 8 - diaene;
9,10 - helotrops

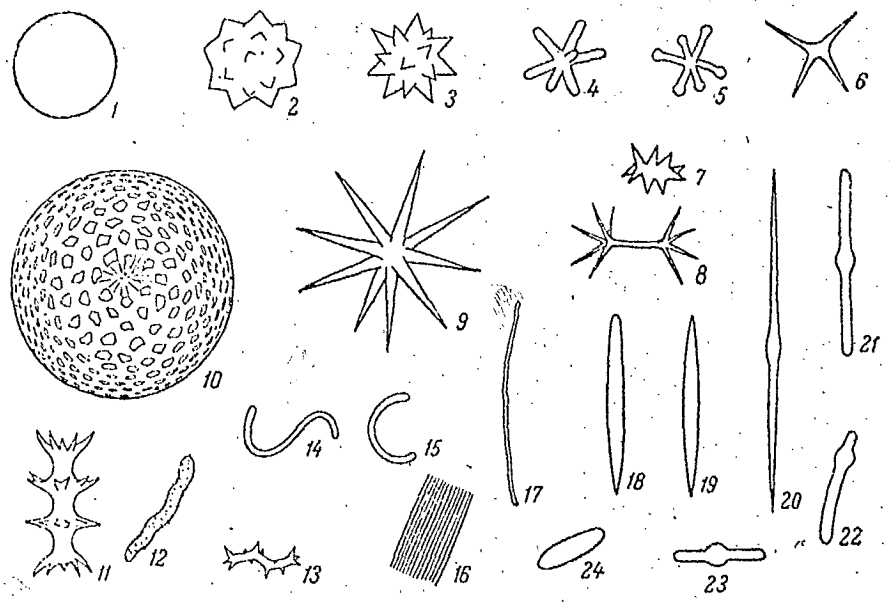

Fig. 4. Microscleres of four-rayed sponges.

1 - sphaer; 2,3 - sphaerasters; 4 - strongylaster; 5 - tylaster; 6,7 - metasters; 8 - amphiaster; 9 - oxyaster; 10 - sterraster; 11 - discaster; 12, 13 - spirasters; 14, 15 - sigmas; 16 - raphides; 17 - microrhabd; 18 - microstyle; 19 microxea; 20 - centrotylote microxea 21 - 23 - centrotylote microstrongyles; 24 - oval microrhabd.

BRIEF DATA ON THE BIOLOGY OF FOUR-RAYED SPONGES

Four-rayed sponges - marine animals exclusively. Similar to all other sponges, they lead an immobile mode of life, attaching themselves to various objects on the bottom or they lie freely on the ground. The basic vital functions - feeding, excreting and breathing - are carried out in sponges by means of a well developed irrigational system. Due to the energetic movement of the flagella of the collared cells through the pores, the water enters the body

of the sponge, passes along the system of incurrent canals towards the flagellated chambers and, subsequently, along the outcurrent canals towards the oscula and then goes outside. Entering the organism of the sponge together with the water are minute unicelled animals and plants as well as bacteria on which the sponge generally feeds. In four-rayed sponges, the food particles are seized by the collared cells and are transmitted to the mesogloea where they are digested by amoebocytes.

Sponges multiply sexually and asexually. Among four-rayed sponges both hermaphrodite and dioecious forms are encountered; however, various types of asexual reproduction attain a certain diversity in these. All known cases of asexual reproduction of sponges can be subdivided into five groups: 1) asexual formation of free-swimming larvae, 2) reproduction by budding, 3) reproduction by simple fission, 4) formation of dormant internal buds and 5) reproduction by an accumulation of regenerative cells (outside the maternal organism). /13

The asexual formation of the free-swimming ciliated larva is obviously widespread in sponges. This process begins with the appearance inside the sponge of archeocytes which are filled with vitellus and which unite in groups and after a certain period of fission they form a spherical larva which does not essentially differ from larvae which are formed sexually. The accumulation of archeocytes can form a solid syncytial mass (litter) during the development of which the embryo is formed from a single cell,

feeding at the expense of the remaining part of the syncytium In the last instance a definite similarity is observed with the sexual parthenogenetic reproduction which is encountered in other multicellular animals.

During reproduction by budding which is very frequently observed in four-rayed sponges, the archeocytes migrate to the surface of the sponge and form a small bud on it. With the passing of a certain amount of time the bud breaks away from the maternal organism and assumes an independent existence. This method of reproduction is known for example in Tethya aurantium, Polymastia mammillaris, P. Kurilensis (Plate I - 2,3,5,; Plate XXVII, 7). In some cases, (particularly in calcareous and glass sponges) the sponge is formed by a simple isolation of a small part of the body of the sponge.

Vegetative reproduction by means of fission of the organism into two or more parts can be encountered as a random phenomenon in many sponges since their capacity for regeneration is exceptionally large. By cutting the sponge into sections in this way one may, for example, cultivate commercial bath sponges (Spongia officinalis). Evidently, natural reproduction by fission takes place in four-rayed sponges of Suberites domuncula f. spermatozoon which inhabit our northern and far-eastern seas. The photographs of this sponge which are given in Plate XXXI show the different stages of this process of fission.

Reproduction by using gemmules is observed in fresh water and various marine sponges, including four-rayed sponges - Suberties domuncula, S. carnosus and others. Gemmules represent resting stages which can tolerate unfavourable conditions of existence and are usually found at the base of the sponge.

Relatively recently another method of asexual reproduction was noted (Burton, 1949) in four-rayed sponges which consists of the migration of archeocytes outside of the sponge simultaneously with the expulsion of several spicules from it. The migrating archeocytes which are entirely independent of the maternal organism, produce a new sponge on these spicules. This method of reproduction is observed in Geodia barretti.

Connected with the tendency in sponges towards asexual reproduction is the ability to form colonies. Since in sponges the zooids easily lose their isolation in the early stages of their formation and fuse with one another into a single whole, a part of the body with one osculum is tentatively taken as a separate individual. On the whole, the colony character is somewhat less marked than in horny siliceous sponges.

Sponges are widespread on the bottom of seas and oceans and sometimes form considerable accumulations (thickets). Particularly favourable for the massive development of four-rayed sponges is the presence of a large number of boulders and pebbles on the bottom of a body of water. Thus, Tetraxonida, particularly the representatives of families Geodiidae and Stellettidae, can serve as reliable indices of rocky ground. Some of the four-rayed sponges are well suited to /14

living on very silt-covered ground. Thus, a number of species of genus Polymastia are disc-like or cup-like in body shape which prevents the sponges from being submerged in the silt. In many representatives of family Polymastiidae long papillae which have pores and oscula on the ends form on the surface of the body; this position of incurrent and outcurrent apertures in sponges are most beneficial during the life of the sponge on a bottom where there is a considerable amount of silt. The same end is attained by an intensive growth of the sponge in height with the formation of a long strong peduncle (genera Stylocordyla, Rhizaxinella and others).

Four-rayed sponges inhabit various depths: from the most shallow to depths in the order of 4,000 m; they usually attain greatest development at a depth of 100 to 400 m.

The temperature and salinity of the water are important factors which determine the development of the sponges. The majority of Tetraxonida are thermophilic animals. Only a few of them can live at a temperature which is constantly below zero* (in the Arctic and Antarctic). As regards fluctuations in the salinity of marine waters, four-rayed sponges on the whole are rather sensitive to them. It is true that the occurrence of 11 species of four-rayed sponges in the White Sea (24-30% salinity) testifies to the fact that with other conditions being favourable they can adjust to a certain reduction in salinity.

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* Temperatures are given in ^{o}C - translator.

As we know, because of the presence of hard mineral skeleton in the form of spicules and a sharp unpleasant odour, sponges are hardly used as food by other animals. However, sponges play an important role in the life of the population at the bottom of a body of water, being a part of many animal groups and biocenoses. They are also one of the important biolgical filters and take an active part in the processes of sedimentation in the seas. Insofar as four-rayed sponges use silicic acid dissolved in water in forming their skeleton they are important in the general circulation of silicon in nature.

DISTRIBUTION OF FOUR-RAYED SPONGES IN THE NORTHERN AND FAR-EASTERN SEAS OF THE USSR

Four-rayed sponges, as has already been mentioned above, are thermophilic forms, abundantly represented in tropical and subtropical waters. This circumstance shows up in a definite way in their composition and distribution in our northern and far eastern seas (see Table).

As can be seen from the data which is given here, richest in four-rayed sponges are the marginal sections of the bodies of water under consideration: the Barents Sea in the west, the bathyal of the Arctic Basin in the north and the Sea of Japan and the waters off the Pacific coast of the Kurile Islands in the east.

FOUR-RAYED SPONGES IN NORTHERN & FAR EASTERN SEAS

№№	name of species	Sea of Greenland	Sea of Norway	Barents Sea	White Sea	Kara Sea	Sea of Laptevykh	East Siberian Sea	Chukchi Sea	Central part of Arctic Ocean	Bering Sea	Sea of Okhotsk	Eastern Shore of Kurile Is.	Sea of Japan (northern prt.)	Eastern coast of Japan	Pacific caost of North America
	Parhastrellidae															
1	*Pachastrella monilifera* Schmidt	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–
2	*Poecillastra compressa* (Bowerbank)	–	+	–	–	–	–	–	–	–	+	+	+	+	+	+
3	*P. c. compressa* (Bowerbank)	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–
4	*P. c. japonica* (Thiele)	–	–	–	–	–	–	–	–	–	+	+	+	+	+	+
5	*Sphinctrella porosa* (Lebwohl)	–	–	–	–	–	–	–	–	–	–	–	+	–	+	–
	Theneidae															
6	*Thenea muricata* (Bowerbank)	+	+	+	–	+	+	+	–	+	–	–	–	–	–	–
7	*T. abyssorum* Koltun	+	+	–	–	–	–	–	–	+	–	–	–	–	–	–
	Stellettidae															
8	*Stelletta normani* Sollas	+	+	+	–	–	–	–	–	+	–	–	–	–	–	–
9	*S. n. normani* Sollas	–	+	+	–	–	–	–	–	–	–	–	–	–	–	–
10	*S. n. rhaphidiophora* (Hentschel)	+	–	–	–	–	–	–	–	+	–	–	–	–	–	–
11	*S. japonica* Thiele	–	–	–	–	–	–	–	–	–	–	–	–	+	+	–
12	*S. validissima* Thiele	–	–	–	–	–	–	–	–	–	+	–	+	+	+	–
13	*S. v. f. validissima* Thiele	–	–	–	–	–	–	–	–	–	+	–	+	+	+	–
14	*S. v. f. orthotriaena* Koltun	–	–	–	–	–	–	–	–	–	–	–	–	+	–	–
15	*Penares cortius* Laubenfels	–	–	–	–	–	–	–	–	–	–	–	–	+	–	+
16	*P. c. cortius* Laubenfels	–	–	–	–	–	–	–	–	–	–	–	–	–	–	+
17	*P. c. orientalis* Koltun	–	–	–	–	–	–	–	–	–	–	–	–	–	+	–
18	*Stryphnus ponderosus* (Bowerbank)	+	+	+	–	–	–	–	–	–	–	–	–	–	–	–
	Geodiidae															
19	*Geodia macandrewii* (Bowerbank)	–	+	+	–	–	–	–	–	–	–	–	–	–	–	–
20	*G. orthomesotriaena* Lebwohl	–	–	–	–	–	–	–	–	–	–	–	+	+	+	–
21	*G. mesotriaena* (Hentschel)	+	–	–	–	+	+	–	–	+	–	–	–	–	–	–
22	*G. barretti* Bowerbank	+	+	+	–	–	–	–	–	+	–	–	–	–	–	–
23	*G. phlegraei* (Sollas)	+	+	+	–	+	–	–	–	+	–	–	–	–	–	–
24	*Geodinella hyotania* Tanita	–	–	–	–	–	–	–	–	–	–	–	–	+	–	–
25	*G. robusta* Lendenfeld	–	–	–	–	–	–	–	–	–	–	–	–	+	–	+
26	*Pachymatisma johnstonia* (Bowerbank)	–	+	–	–	–	–	–	–	–	–	–	–	–	–	–
	Tetillidae															
27	*Tetilla polyura* Schmidt	+	+	+	–	+	+	–	–	–	–	–	+	–	–	–
28	*T. sibirica* (Fristedt)	–	–	+	–	+	+	+	+	–	–	–	+	–	–	–
29	*T. cranium* (Müller)	+	+	+	–	–	+	–	–	+	–	+	+	+	–	–
30	*T. sigmoancoratum* Koltun	–	–	–	–	–	–	–	–	–	–	–	+	–	–	–
31	*T. hamatum* Koltun	–	–	–	–	–	–	–	–	–	–	–	+	–	–	–
32	*T. infrequens* (Carter)	+	+	+	–	+	–	–	–	+	–	–	–	–	–	–

№ п.п.	name of species	Sea of Greenland	Sea of Norway	Barents Sea	White Sea	Kara Sea	Sea of Laptevykh	East Siberian Sea	Chukchi Sea	Central part of Arctic Ocean	Bering Sea	Sea of Okhotsk	Eastern shore of Kurile Is	Sea of Japan (northern pr	Eastern coast of Japan	Pacific coast of North America
	Polymastiidae															
33	*Polymastia mammillaris* (Müller) Bowerbank	+	+	+	+	+	+	+	—	+	—	—	+	—	—	—
34	*P. m. mammillaris* (Müller) Bowerbank	—	+	+	+	—	—	—	—	—	—	—	—	—	—	—
35	*P. m. grimaldi* (Topsent)	+	+	+	+	+	+	+	—	+	—	—	—	—	—	—
36	*P. m. rara* Koltun	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—
37	*P. affinis* Thiele	—	—	—	—	—	—	—	—	—	—	—	+	—	+	—
38	*P. hispidissima* Koltun	—	—	—	—	—	—	—	—	—	—	—	+	+	—	—
39	*P. robusta* (Bowerbank)	—	+	+	+	—	—	—	—	—	—	—	+	—	—	—
40	*P. r. robusta* (Bowerbank)	—	+	+	+	—	—	—	—	—	—	—	—	—	—	—
41	*P. r. toporoki* Koltun	—	—	—	—	—	—	—	—	—	—	—	+	—	—	—
42	*P. uberrima* (Schmidt)	—	+	+	—	—	—	—	—	—	—	—	—	—	—	—
43	*E. thielei* Koltun	+	+	+	—	+	+	—	—	+	—	—	—	—	—	—
44	*P. bursa* (Müller)	+	+	+	—	—	—	—	—	+	—	—	—	—	—	—
45	*P. kurilensis* Koltun	—	—	—	—	—	—	—	—	—	+	+	+	+	—	—
46	*P. hemisphaericum* (Sars)	+	+	+	—	—	—	—	—	+	—	—	—	—	—	—
47	*P. sol.* (Schmidt)	+	+	+	—	—	+	—	—	+	+	—	—	—	—	—
48	*P. s. sol* (Schmidt)	+	+	+	—	—	+	—	—	+	—	—	—	—	—	—
49	*P. s. pacifica* Koltun	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—
50	*P. laganoides* Lambe	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—
51	*Sphaerotylus borealis* (Swarczewsky)	—	+	+	+	—	—	—	—	+	—	—	—	—	—	—
52	*S. schoenus* (Sollas)	—	+	+	—	—	—	—	—	—	—	—	—	—	—	—
53	*Tentorium semisuberites* Schmidt	+	+	+	—	+	+	+	+	+	—	—	—	—	—	—
54	*Rhizaxinella burtoni* Koltun	—	—	—	—	—	—	—	—	—	—	+	—	—	—	—
55	*Rh. schaudinni* Hentschel	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—
56	*Rh. clavata* Thiele	—	—	—	—	—	—	—	—	—	—	—	—	+	+	—
57	*Quasillina brevis* (Bowerbank)	+	+	+	—	+	+	—	—	+	—	—	—	—	—	—
58	*Vosmaeria crustacea* Fristedt	+	+	+	+	—	—	—	—	—	—	—	—	—	—	—
	Suberitidae															
59	*Suberites domuncula* (Olivi)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
60	*S. d. domuncula* (Olivi)	—	+	—	+	—	—	—	—	—	—	+	+	+	+	+
61	*S. d. ficus* (Johnston)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
62	*S. d. f. spermatozoon* (Schmidt)	+	+	+	+	+	+	—	—	+	—	+	—	—	—	—
63	*S. montiniger* Carter	+	—	+	+	—	—	—	+	—	+	+	+	+	—	—
64	*S. japonicus* Thiele	—	—	—	—	—	—	—	—	—	+	+	+	+	+	—
65	*Pseudosuberites hyalinus* (Ridley et Dendy)	+	+	+	—	—	—	—	—	+	—	—	—	—	—	—
66	*P. carnosus* (Johnston)	+	+	+	—	—	—	—	—	—	—	—	+	—	—	—
67	*P. sadko* Koltun	+	—	—	—	+	+	—	—	+	—	—	—	—	—	—

№ п. п.	NAME OF SPECIES	Sea of Greenland	Sea of Norway	Barents Sea	White Sea	Kara Sea	Sea of Laptevykh	East Siberian Sea	Chukchi Sea	Central part of Arctic Oc.	Bering Sea	Sea of Okhotsk	Eastern shore of Kurile Is.	Sea of Japan (northern prt.)	Eastern coast of Japan	Pacific coast of North America
	Stylocordylidae															
68	*Stylocordyla borealis* (Lovén)	+	+	+	—	+	+	—	—	+	—	—	+	—	+	—
69	*S. b. typica* Burton	+	+	+	—	+	+	—	—	+	—	—	—	—	—	—
70	*S. b. eous* Koltun	—	—	—	—	—	—	—	—	—	—	—	+	—	+	—
	Tethyidae															
71	*Tethya aurantium* (Pallas)	+	+	+	+	—	—	—	—	+	—	—	—	—	—	—
	Spirastrellidae															
72	*Cliona vastifica* Hancock	—	+	+	—	—	—	—	—	—	—	—	—	—	+	—
73	*C. argus* Thiele	—	—	—	—	—	—	—	—	—	—	—	—	+	+	—
74	*Latrunculia triloba* (Schmidt)	+	+	+	—	—	—	—	—	+	—	—	—	—	—	—
75	*L. tricincta* Hentschel	—	+	+	—	—	—	—	—	—	—	—	—	—	—	—
	Oscarellidae															
76	*Oscarella lobularis* (Schmidt)	+	+	+	+	+	+	—	—	+	+	+	+	+	—	—

The number of species (and varieties) of sponges in individual seas has the following distribution:

Barents Sea	34
White Sea	11
Kara Sea	15
Sea of Laptevykh	15
East Siberian Sea	5
Chukchi Sea	4
Arctic Basin	25
Bering Sea	9
Sea of Okhotsk	10
Sea of Japan (northern half)	18
Pacific Ocean coast of the Kurile Islands	21

Barents Sea (34 species). The abundance of four-rayed /17 fauna in the Barents Sea is explained by the penetration of a large number of boreal species, together with the warm Atlantic current, into the south-western part of the sea. These species are Polymastia robusta, P. uberrima, P. bursa, Vosmaeria crustacea, Stryphnus ponderosus, Geodia macandrewii, G. Barretti, Tethya aurantium, Cliona vastifica and a number of others. Almost one half of all of the species mentioned for the Barents Sea (15 out of 34) consist of these thermophylic species (Fig. 7 -1; 8 -1). Some of them in their distribution in the north reach the western and northern shores of Spitzbergen (Fig. 5, 6). These species are not encountered in our other northern seas (apart from the White sea). It is interesting to note the existence of populations of separate boreal species (Polymastia bursa and P. hemisphaericum) in the south-eastern corner of the Barents Sea (Fig. 6), where, as we know, the warm waters of the Atlantic current do not penetrate at the present time. It is very probable that in explaining this

fact we must turn our attention to the time in the history of the bodies of water under consideration when a more intensive penetration of warm Atlantic waters into the Arctic took place and the south-eastern sections of the Barents Sea were under their direct influence. With the subsequent recession of the Altantic current in the west, the separate populations of the boreal species could be preserved here and could exist right up to the present time since, despite the overall severe conditions, the summer warm-up of the water in the south-western part of the Barents sea is quite significant. There is a basis for assuming the presence of such sections of existing relict populations of separate elements of boreal fauna /18 off the western coast of Novaya Zemlya, south-west of Zemlya Frantsa-Iosifa and, possibly, in the south-western corner of the Kara Sea. Represented quite abundantly in the Barent Sea are also the Arctic boreal species (Thenea muricata, Tetilla cranium, Tentorium semisuberites, Suberites domuncula, Polymastia mammillaris and others) and a certain number of Arctic species (Polymastia thielei, Tetilla infrequens and others).

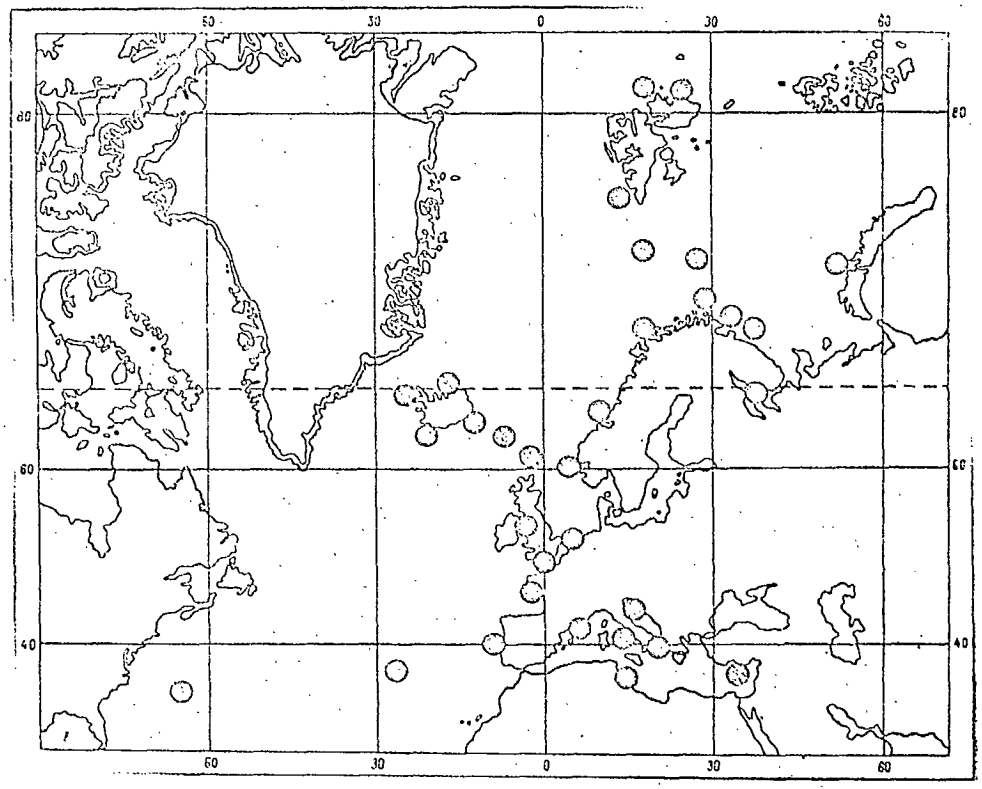

Fig. 5. Distributions of sponge Tethya Aurantium (Pallas)

White Sea (11 species). Despite the significant demineralization of the White Sea many four-rayed sponges find living conditions completely favourable. Testifying to this is the fact that in terms of number of species the White Sea is not behind the Kara Sea and the Sea of Laptevykh and is even ahead of the East Siberian, Chukchi and Bering seas and the Sea of Okhotsk. Occupying an important place in the fauna of four-rayed sponges of this body of water are the boreal species and subspecies which ought to be considered as having been preserved here in the relic state: Tethya aurantium, Vosmaeria crustacea, Polymastia robusta, P. mammillaris mammillaris, Suberites domuncula domuncula.

The remaining six species belong to the category of Arctic boreal and Arctic species.

Kara Sea (15 species). Approximately half of the species are Arctic forms of a bathyal nature which penetrate into the sea along the channels from the central part of the Arctic Ocean, i.e. from the Arcitc Basin (Polymastia thielei, Pseudosuberites sadko, Geodia mesotriaena, Tetilla infrequens /19 and others). The most characteristic Arctic boreal species are Thenea muricata, Polymastia mamillaris, Tentorium semisuberites, Suberites domuncula, Tetilla polyura. Boreal species were not detected here.

Sea of Laptevykh (15 species). The fauna of four-rayed sponges is almost completely identical with that of the Kara Sea and in essence may be regarded as the depleted fauna of the bathyal of the Arctic Basin.

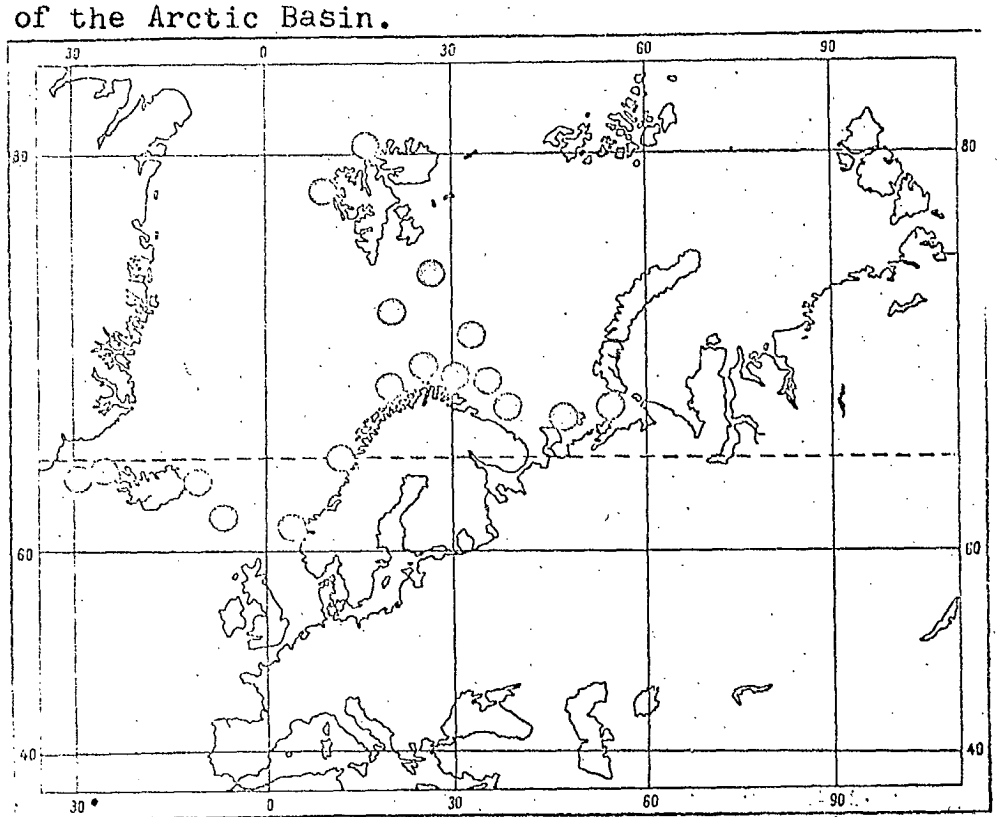

Fig. 6. Distribution of sponge Polymastia bursa (Muller)

East-Siberian Sea (5 species). The four-rayed sponges are represented exclusively by the Arctic boreal species: Thenea muricata, Tentorium sibirica, Suberites domuncula and Polymastia mammillaris.

Chukchi Sea (4 species). Similar to the previous sea, sponge fauna is extremely poor here which is mainly related to the shallow nature of these bodies of water which excludes the penetration here of any fauna elements from the bathyal of the Arctic Basin.

When we examine four-rayed sponges of the northern seas and the Arctic Basin as a whole (43 species) we find that zoogeographically they consist of 46% boreal species, 28% Arctic boreal species and 26% Arctic species. Among the latter one should separate the bathyal species Geodia mesotriaena, Polymastia thielei, Tetilla infrequens and several others, as well as the unique abyssal Thenea abyssorum. The majority of these species are endemic species of the Arctic. Eight species may be mentioned which are confined in their distribution to the Arctic Ocean: Geodia mesotriaena (Fig. 8 - 2), Polymastia thielei (Fig. 7 - (Fig. 7 - 2), Latrunculia triloba, L. tricincta, Rhizaxinella schaudinni, Tetilla infrequens, Thenea abyssorum, Geodia phlegraei. Closely related to the endemic species are the bipolar species, Sphaerotylus borealis and Sphaerotylus schoenus, which while living in the Arctic and Antarctic are not encountered anywhere else. /20

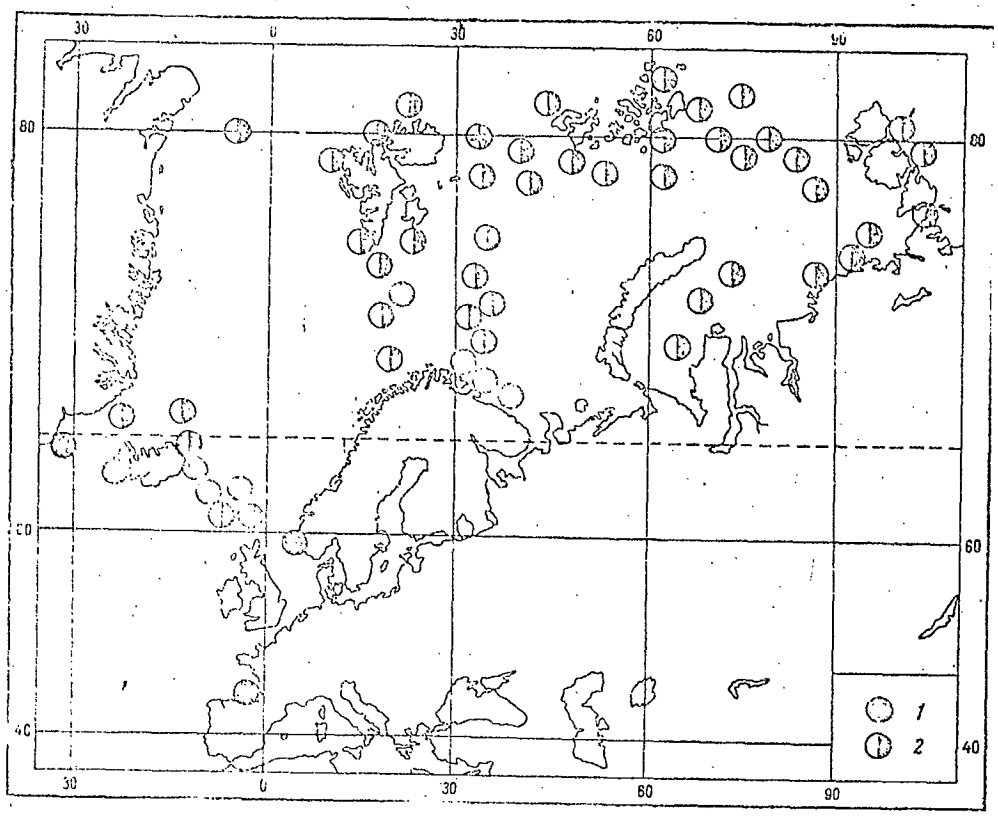

Fig. 7. Distribution of sponges,
1- Polymastia uberrima (Schmidt); 2- P. thielei Koltun

In our far-eastern seas there are 31 species of four-rayed sponges (with variants), i.e. considerably less than in the Arctic. For boreal waters, to which the northern part of the Pacific Ocean belongs, this fact is quite noteworthy and can hardly be explained by the inadequate knowledge of sponge fauna of the far-eastern seas.

Bering Sea (9 species). Sponge fauna is represented by a small number of boreal species (Poesillastra compressa, Stelletta validissima, Polymastia kurilensis, P. laganoides, Suberites japonicus) and Arctic-boreal species (Suberites

domuncula, S. montiniger and Oscarell lobularis); in addition, /21 one deep-sea form of species Polymastia sol has been noted which is widespread in the Arctic Basin where it is encountered at considerable depths.

Sea of Okhotsk (10 species). In terms of composition, the four-rayed sponges differ little from those of the Bering Sea. An exception is the north-western part of the sea where the unique species Rhizaxinella burtoni has been detected and the occurrence of which in any neighbouring sea is hardly likely.

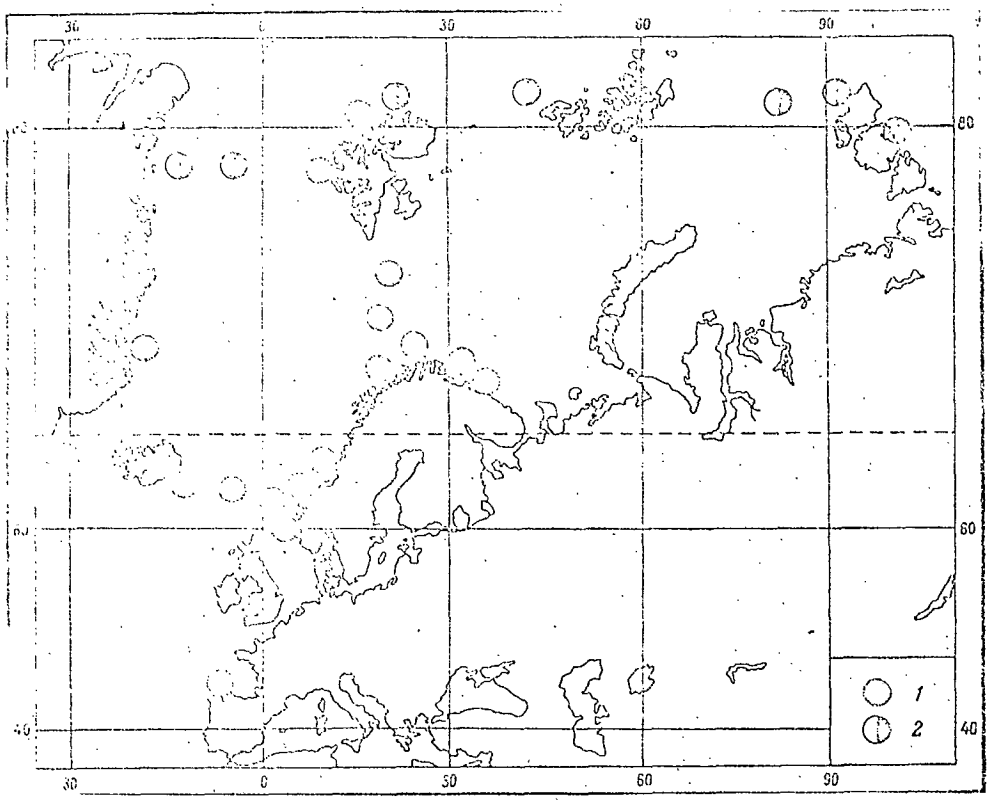

Fig. 8. Distribution of sponges.
1 - Geodia barretti (Bowerbank); 2 - G. mesotriaena (Hentschel)

Sea of Japan (18 species). Along side of the species which are also common to the remaining far-eastern seas, there are representatives of southern boreal and subtropical fauna (Geodia orthomesotriaena, Geodinella hyotania, Rhizaxilla clavata and, probably, Cliona argus) which have an extreme northern limit in distribution in the Sea of Japan.

Among the far-eastern seas, the Sea of Japan is first in terms of number of sponge species. However, the most abundant fauna of four-rayed sponges is near the Pacific coast of the southern Kurile Islands. A large number of southern boreal and subtropical forms have been found: Sphinctrella porosa, Geodia orthomesotriaena, Tetilla hamatum, Polymastia affinis P. robusta toporoki and others.

Species endemism of four-rayed sponge fauna in our /22 far-eastern seas is small. At the present time only four endemic species may be named - Polymastia Kurilensis (Fig. 9), P. laganoides, Rhizaxinella burtoni and, possibly, Polymastia hispidissima which comprise approximately 13% of all the fauna. It is assumed that the specificity of four-rayed sponge fauna in the far-eastern seas is considerably less marked than in the Arctic.

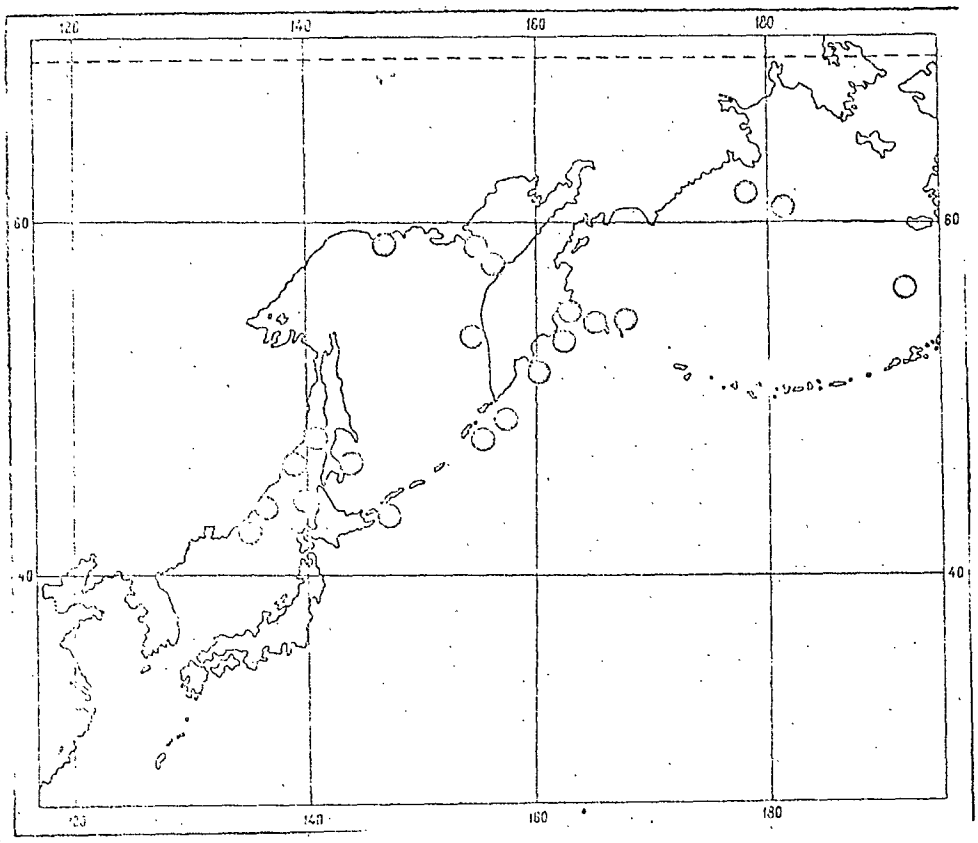

Fig. 9. Distribution of sponge Polymastia kurilensis Koltun.

In comparing the distribution of four-rayed sponges in the Arctic Ocean and in the north-western part of the Pacific Ocean the curious fact of the zoogeographic heterovalency of certain identical or closely related elements of the fauna in the western and eastern part of the body of water under consideration attracts attention. Thus, the representatives of family Geodiidae in the western part penetrate northwards to the south-western sections of the Barents Sea and some species (Geodia barretti and G. phlegraei), into the Arctic Basin (Fig. 10). In the east the species which belong to this family are found in our waters only in the Sea of Japan (near the islands of Hokkaido and Monneron) and off

the Pacific coast of the southern Kurile Islands. Insofar as one may determine from the data on hand, they do not penetrate farther north (Fig. 11). In other words, in the west the representatives of family Geodiidae emerge as boreal species (Geodia macandrewii, G. barretti, Pachymatisma johnstonia), Arctic-boreal species /23 (Geodia plegraei) and even Arctic species (Geodia mesotriaena) and in the east, as southern-boreal and subtropical species (Geodia orthomesotriaena, Geodinella robusta, G. hyotania).

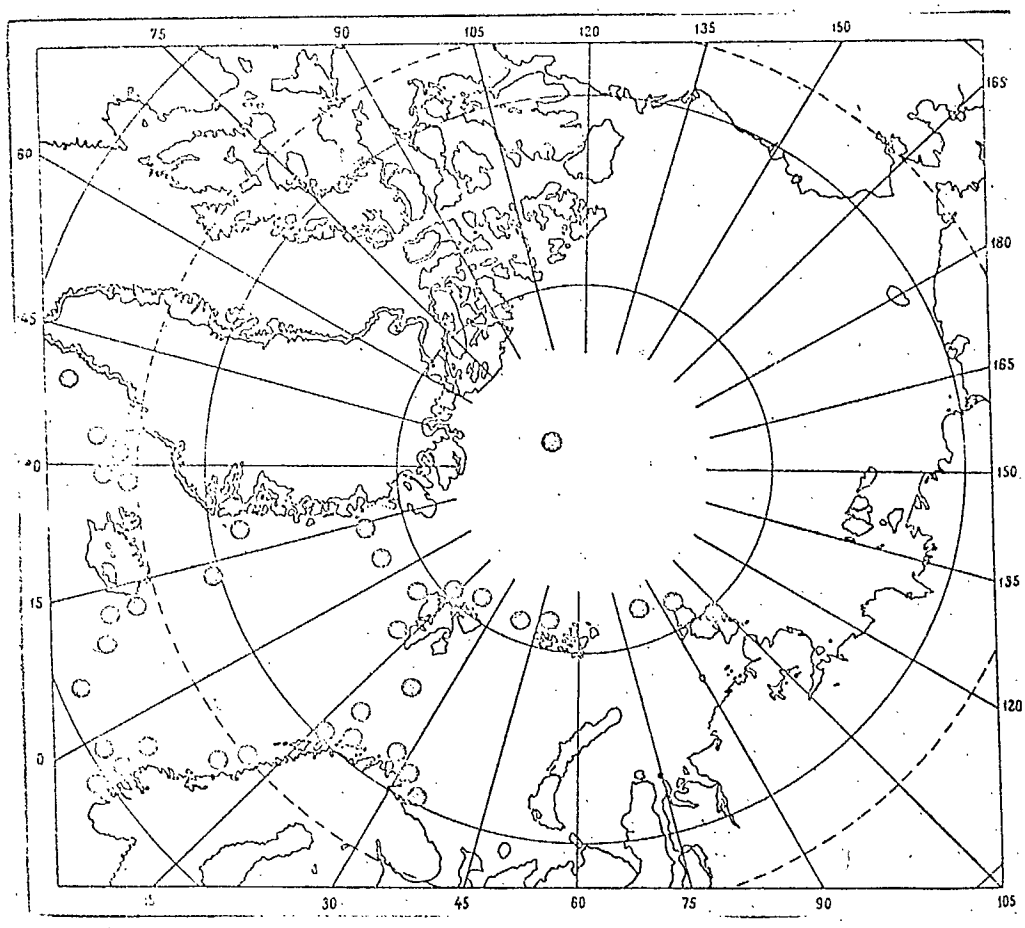

Fig. 10. Distribution of sponges of family Geodiidae in the Arctic Ocean

A similar picture is observed when we look at the family Stellattidae. In the west/there are the boreal species (Stryphnus ponderosus) and those related to the Arctic boreal species (Stellatta normani) and in the east - the southern boreal and subtropical species (Stetella japonica, S. validissima, Penares cortius). Differing even more markedly are the corresponding species of genera Thenea and Tethya. Genus Thenea is represented west and north of the body of water under consideration by the Arctic-boreal species T. muricata and the abyssal species T. abyssorum. In the east related species of this genus are encountered off the Pacific coast of Japan (and farther south) and are completely absent in our far-eastern seas, being therefore subtropical and tropical forms (T. grayi and others). Also occuring in the east are the species of genus T. aurantium which, penetrating into the Arctic, are encountered in the south-western part of the Barents Sea off the western and northern coasts of Spitzbergen and in the form of a relict in the White Sea and off Novaya Zemlya (Fig. 5). Differing in the same way to a lesser degree are the identical and /24 closely related species and variants of many other genera of four-rayed sponges when comparing their distribution in the Arctic and in the north-western part of the Pacific Ocean.

An explanation of the noted zoogeographic heterovalency of identical and closely related elements of four-rayed sponge fauna in the west and east should be sought, evidently, in the history of the formation of the basins under discussion and in the tropical and subtropical nature of this group as a whole.

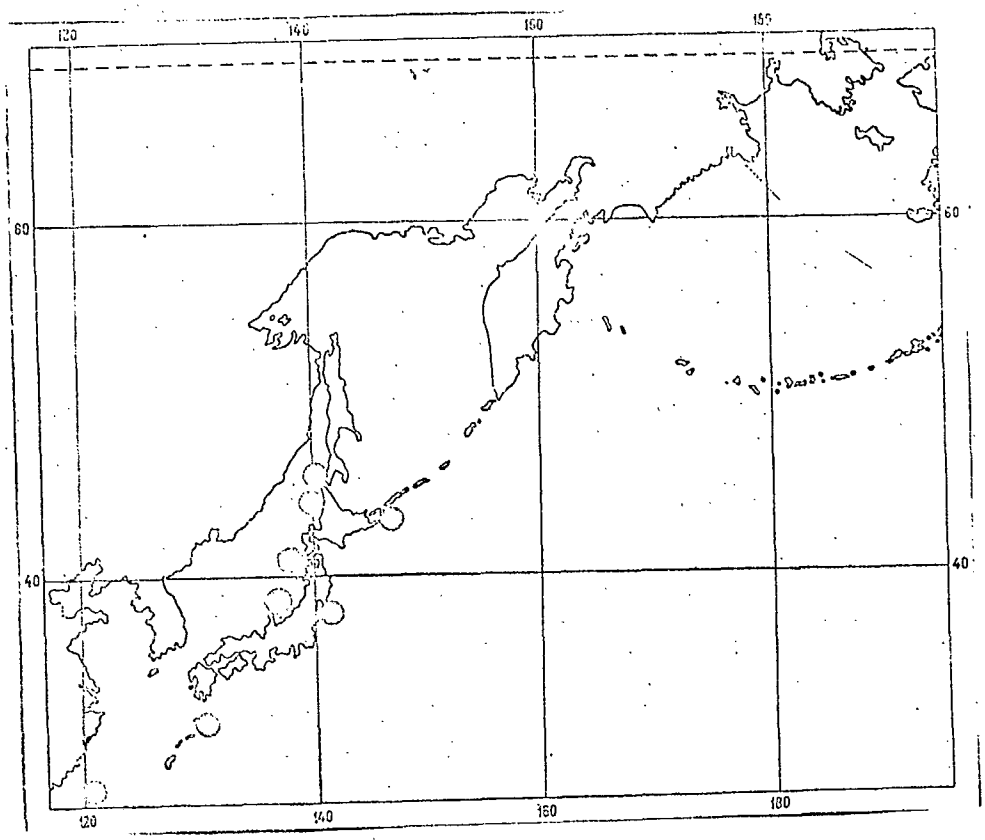

Fig. 11. Distribution of sponges of family Geodiidae in the north-western part of the Pacific Ocean.

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Отряд T

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CLASSIFICATION /29

Order TETRAXONIDA - FOUR-RAYED SPONGES

Solitary or colonial organisms, frequently with a well marked radial symmetry of the body. In the majority of cases the body of the sponge is covered with a cortical layer of varied thickness and strength. A well developed irrigational system of the leuconoid type consisting of flagellated chambers (rounded, oval or pear-shaped) with incurrent and outcurrent channels. The subdermal cavities are usually poorly developed.

The skeleton is most often radial; less often, irregularly radial or irregularly distributed The horny substance - spongin - is absent, or it takes part in the formation of the skeleton in a very small amount. Four-rayed spines - tetractines - are typical of the order; along side of these megascleres there frequently are monaxial spines (oxeas, and less frequently, styles and strongyles). In the absence of tetractines the skeleton is formed of smooth tylostyles, subtylostyles or styles and sometimes of oxeas or strongyles. The microscleres are represented by asters (stellate spicules), less frequently of sigmas, rhabds and raphides. In a very few sponges the mineral skeleton is completely absent.

TABLE FOR IDENTIFYING FAMILIES OF ORDER TETRAXONIDA

1 (20). Mineral skeleton.

2 (3). Among the microscleres there are sterrasters (in the cortical layer of the sponge).....IV. Geodiidae (p.48).

3 (2). No sterrasters.

4 (11). Four-rayed megascleres (tetractines).

5 (6). Microscleres in the form of sigmas (typical tetractines - anatriaenes, protriaenes and their derivatives). V. Tetillidae (p. 60)

6 (5). Microscleres are represented by asters (on rare occasion there may be raphides or rhabds).

7 (10). Typical microscleres - spirasters and other pseudasters (amphiasters, oxyasters).

8 (9). Tetractines with rays of the same length (calthrops) or their basic ray is only slightly longer than the other rays (asymmetrical forms).....I. Pachastrellidae (p. 30).

9 (8). No calthrops; the basic ray of the tetractines is considerably longer that the remaining rays (the forms are more or less regular).....II. Theneidae (p. 35).

10 (7). Typical microscleres - euasters (oxyasters, spherasters and others); spirasters are not observed.....III. Stellettidae (p. 39

11 (4). No tetractines; megascleres are represented by monaxial sp cules.

12 (15). Microscleres are represented by asters. /30

13 (14). Asters in the form of pseudasters (spirasters or discasters), skeleton is irregularly radial or scattered... X. Spirastellidae (p.10

14 (13). Asters in the form of euasters (spherasters, oxyasters and others); radial skeleton.....IX. Tethyidae (p. 102).

15 (12). Usually there are no microscleres and if there are they are represented by rhabds only (oxeas, styles, strongyles and others).

16 (17). Usually there are well developed papillae on the surface of the sponge (skeleton is usually radial; typical megoscleres - tylostyles and their derivatives; there are no microscleres;

in the majority of cases there is a well marked cortical layer which contains minute tylostyles which are arranged in a palisade manner).....VI. Polymastiidae (p. 67).

17 (16). Papillae on the surface of the sponge are not developed.

18 (19). Megascleres in the form of oxeas (microscleres are represented by rhabds; solitary club-like sponges with a long firm peduncle).....VIII. Stylocordylidae (p. 100).

19 (18). Megoscleres in the form of tylostyles and their derivatives (skeleton is irregularly radial or scattered)....VII. Suberitidae (p. 91).

20 (1). No skeleton.....XI. Oscarellidae (p. 107).

I Fam. PACHASTRELLIDAE

Sponges of asymmetrical and irregular shape: lamellar, cup-like, lozenge-like, round loaf-shaped, lump-like or cortical. The skeleton is irregular inside; it may be radial to some extent near the surface. Megascleres are represented by oxeas, calthrops and triaenes with a shortened (usually) basic ray; microscleres in the form of spirasters, oxyasters, amphiasters, and microrhabds.

TABLE FOR IDENTIFYING THE GENERA OF FAM. PACHASTRELLIDAE

1 (2). There are oval microrhabds among the microscleres.....
.....1. Pachastrella Schmidt.

2 (1). No oval rhabds.

3 (4). Oscula are surrounded by a corona of long spicules.....
.....3. Sphinctrella Schmidt.

4.(3). Oscula in the form of simple apertures without a corona of spicules.....2. Peocillastra Sollas.

1. Genus PACHASTRELLA Schmidt, 1868

S c h m i d t,,1868:15; L e b w o h l, 1914: 72.

Genus type: P. monilifera Schmidt, 1868.

Megascleres are represented by oxeas and calthrops; microscleres in the form of spirasters and oval microrhabds (sometimes, there are also thin curved microrhabds). Primarily round-loaf-shaped or cup-like forms.

1. Pachastrella monilifera Schmidt, 1868 (Fig. 12; Plate Plate I, 1).

S c h m i d t, 1868:15, Taf. III, Fig. 7.

Body is lump-shaped, round-loaf-shaped or cup-like, up to 20 cm in length when the width is 15 cm and the thickness is 5-8 cm. The surface is spicular. The sponge is strong and hard. The colour ranges from a light yellow to brown.[1]

The basic skeleton is made up of a mass of irregularly /31 distributed tetractines (calthrops) and their derivatives. There is a multitude of minute oval microrhabds in the dermal layer.

Spicules. Megoscleres: long oxeas are up to 7 mm long when the thickness is 0.030 mm; small oxeas (sometimes, centrotylotic), up to 0.350 mm long and 0.009 mm thick; tetractines (calthrops) - their rays are up to 1.3 mm long when the thickness (at the base) is 0.100 mm; small tetractines (regular) with rays of 0.050-0.200 mm

1. Where it is not stipulated the colour is given according to alcholic substance.

long and 0.003-0.202 mm thick. Among the derivative tetractines one may encounter dichotriaenes and dichodiaenes, and at times strongyles and styles. Microscleres: oval (frequently centrotylotic) microrhabd (usually smooth) 0.010-0.020 mm long and 0.003-0.007 mm thick, spirasters (to amphiasters) 0.008-0.021 mm in diameter; rough and bent, thin microrhabds 0.013-0.052 mm long and 0.004 mm thick are encountered at times.

Distribution. Sea of Norway, northern part of the Atlantic Ocean, Mediterranean Sea, and the Antaractic. Depth, 30-1,557 m. One may expect this species to occur in the south-western part of the Barents Sea.

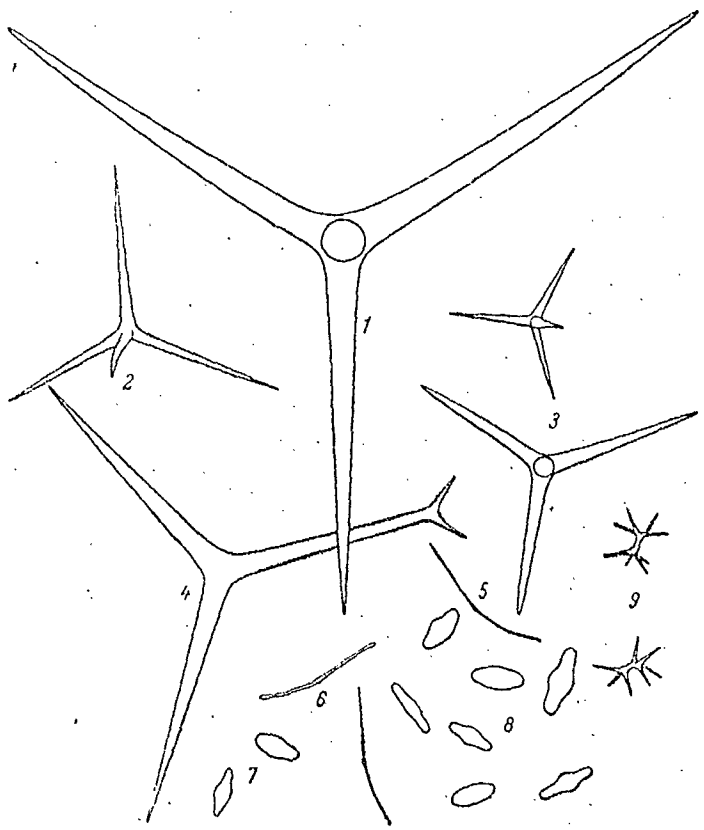

Fig. 12. Pachastrell monilifera Schmidt

1- large calthrop (x100); 2,3- small calthrops (x100); 4- dichodiaenes (x100); 5,6- curved microrhbds (x500); 7,8- oval microrhabds (x500); 9- amphiasters (x500).

Two specimens of the species from the Sea of Norway /32 which are in the collections are almost identical with the specimens of P. monifera which were found in the Antarctic. However, both the small and the large are, evidently, not intrinsic to this sponge; at least, we did not succeed in finding large oxeas in our specimens.

2. Genus POECILLASTRA SOLLAS, 1888

S o l l a s, 1888:79

Species type: P. compressa (Bowerbank, 1866).

Megascleres are represented by oxeas, calthrops and triaenes with a shortened basic ray; microscleres in the form of spirasters, oxyasters and microoxeas (frequently rough). The oscula are simple (in large quantities), frequently arranged on one side of a lamellar sponge body while the other side is taken up with pores. Primarily lamellar and petal-like forms.

1. Poecillastra compressa (Bowerbank, 1866) (Fig. 13; Plate I -7; Plate III - 1,2; Plate V - 8).

A r n d t, 1935: 25, Fig. 33; K o l t u n, 1962:183 (Pachastrella japonica).

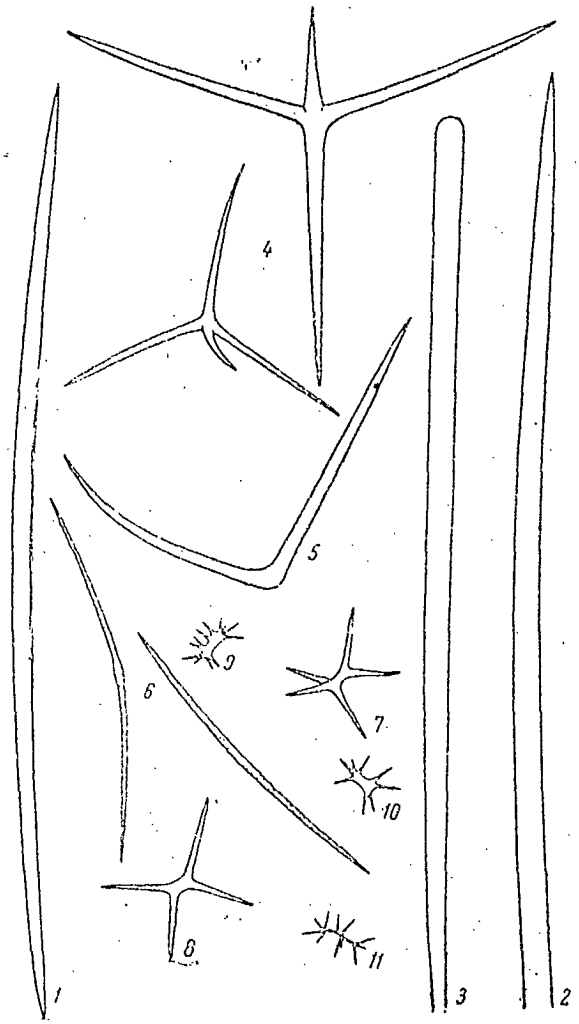

Fig. 13. Poecillastra compressa japonica (Thiele).

1 - fusiform oxea (x100); 2 - long oxea (9x100); 3 - style (x100); 4 - calthrops (x100); 5 - monaene 9x100); 6 - microoxeas (x200); 7,8 - metasters (x500); 9-11 - spirasters (x500)

Body is lamellar, oblate or goblet-like. The oscula and pores occur on different sides of the oblate sponge body. The dermal membrane is filmy. The colour varies from light gray to dark brown. The inside of the skeleton is made of randomly distributed oxeas and closer to the surface they are replaced by tetractines.

Spicules. Megascleres: fusiform oxeas, 1.3-3.5 mm long and 0.022-0.110 mm thich; thin oxeas, up to 5 mm long and 0.065 mm thick; calthrops and triaenes with rays 0.170-1.100 mm long and 0.015-0.055 mm thick. Microscleres: microoxeas(rough or tuberculate) 0.080-0.270 mm long and 0.003-0.008 mm thick, spirasters 0.010-0.024 mm long, metasters (with three to five rays) 0.027-0.076 mm in diameter.

Distribution. The Sea of Norway, the northern part of the Atlantic Ocean, The Mediterranean Sea, the Antarctic, the northern part of the Pacific Ocean. Depth 32-3,500 mm. /33

In the northern hemisphere the species forms two very closely related subspecies.

1 (2). Fusiform oxeas, not exceeding a thickness of 0.060 mm; microoxeas are rough, up to 0.005 mm thick.....
.....la. P. compressa compressa (Blowerbank).

2 (1) Fusiform oxeas, considerably thicker (up to 0.110 mm thick); minutely tuberculate microoxeas, approximately 0.008 mm thick.
.....lb. P. compressa japonica (Thiele).

la. Poecillastra compressa compressa (Bowerbank, 1866) Plate I - 7; Plate V - 8).

L e n d e n f e l d, 1907: 234, Taf. XXXIX, Fig. 26-36, Taf. XL, Fig. 1-12 (Pachastrella tenuipilosa); B u r t o n, 1959:8 (compressa).

Body is lamellar (frequently with rounded edges), oblate or goblet-like, up to 7 cm in diameter. The sponge is brittle. The dermal membrane is thin and filmy. The oscula

(up to 2.5 mm in diameter) and the pores are located on different sides of the body. The colour is light-gray, yellowish, grayish-brown or dark brown. The skeleton inside the sponge consists of irregularly distributed oxeas and calthrops; closer to the surface the latter are replaced by triaenes.

Spicules. Megascleres: fusiform oxeas, 1.3-3.3 mm long and 0.022-0.052 mm thick; thin oxeas (they may be absent) up to 2.5 mm long when the thickness is 0.016 mm; orthotriaenes with a shortened basic ray and calthrops and their derivatives - length of the rays is 0.170-0.670 mm, width is 0.015-0.030 mm; also frequently encountered are styles and strongyles - derivatives of oxeas. Microscleres: microoxeas are rough (sometimes, the rays are slightly rough) 0.027-0.076 mm long; there are also numerous transitional forms between spirasters and metasters.

Distribution. Sea of Norway (off the coast of Norway and the Orkney Islands), northern part of the Atlantic Ocean, the Meditarranean Sea. Depth, 36-320 m and up to 3,500 m in the Sea of Norway.

1b. Peocillastra compressa japonica (Thiele, 1898) (Fig. 13; Plate II; Plate III - 1,2).

T h i e l e, 1898: 19, Taf. VII, Fig. 9 (Pachastrella japonica).

Body is lamellar or oblate, up to 17 cm in diameter when the thickness is 2.5 cm. The edges of the sponge are somewhat raised and are considerably thinner than its central part. The surface is uneven. The dermal membrane is in the form of a film;

in places where the dermal membrane is absent the surface of the body is setose. The colour is dark gray.

Spicules. Megascleres: fusiform oxeas, up to 3-3.5 mm long and 0.110 mm thick, long oxeas are up to 5.0 mm long and 0.065 mm thick; orthotriaenes with a shortened basic ray and calthrops, length of rays up to 0.750 mm, thickness up to 0.055 mm. Microscleres: microoxeas (minutely tuberculate) 0.134-0.270 mm long and 0.008 mm thick, spirasters 0.014-0.020 mm long, metasters (with three to five smooth or slightly rough rays) 0.060-0.070 mm in diameter.

Distribution. Bering Sea and Sea of Okhotsk, eastern /34 coast of Japan and the Kuril Islands, the Sea of Japan (off the Hokkaido and Moneron islands), Pacific coast of Canada. Depth, 32-301 m and up to 2,440 m off the Commander Islands.

Very changeable polymorphic species which is represented in colonies mainly by specimens from the far eastern seas. During an examination of these specimens of sponges considerable variability in the features was detected which compels us to sceptically refer to "new" species of the given genus (Pachastrella scrobiculosa, P. cribrum, P. fusca), which were found by Lebwohl (1914a) off the eastern coast of Japan. Evidently, these sponges, much like Pachastrella japonica, are only forms of one and the same species /35 of Peocillastra compressa. In addition to the diagnosis of the far-eastern subspecies it is necessary to note that the rays of tetractines are frequently very curved and, sometimes, some of

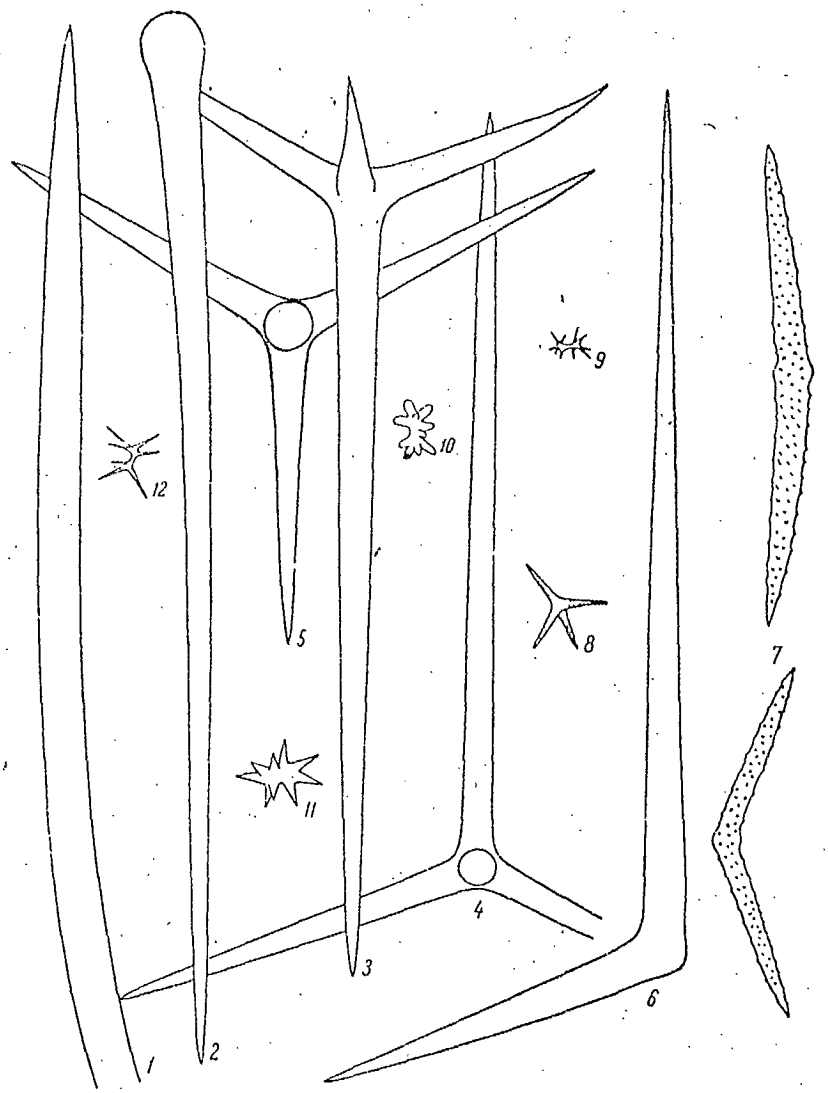

Fig. 14. Sphinctrella porosa Lebwohl.

1 - large oxea (x100); 2 - club-shaped style (x100); 3,4 - plagiotriaenes (x100); 5 - clathrop (x100); 6 - monaene (x100); 7 - microoxeas (x400); 8 - metasters (x400); 9-12 - spirasters (x400).

them are branched at the ends, having a tendency towards reductions; oxeas may be rounded off at one end (styles) or they have a lateral protuberance in the central part; microoxeas frequently have a swelling in the middle; spirasters are extremely varied in terms of outer appearance, and metasters may be completely absent.

3. Genus SPINCTRELL Schmitdt, 1870

S c h m i d t, 1870: 65; W i l s o n, 1925: 280.

Genus Type: S. horrida Schmidt, 1870.

Megscleres are represented by oxeas, triaenes and calthrops. Microscleres in the form of spirasters, metasters and microoxeas (frequently rough). Oscula (in large numbers) are surrounded by a rim made of long spicules and are usually covered with a dermal membrane. Primarily oblate, lamellar or cortical forms.

1. Sphintrella porosa Lebwohl, 1914 (Fig. 14; Plate I - 6).

L e b w o h l, 1914a: 49, Taf. V, Fig. 9-32.

Body is irregularly lamellar, up to 22 cm wide when the thickness is 2.5 cm. The sponge is hard and rather porous. The surface is uneven and spicular. The oscula are up to 8 mm in diameter and the pores approximately 1 mm. The dermal membrane is thin, in places it forms protuberances of up to 0.5 cm in height which contain clusters of very long spicules. The colour is light yellow, gray or brown. The basic skeleton is made of irregularly distributed clusters of large oxeas; closer to the surface radially arranged triaenes are mainly observed, above them are large oxeas which are arranged tangentially. The skeleton of the dermal membrane are made of microrhabds.

Spicules. Megascleres: large oxeas are 0.8-3.8 mm long and 0.030-0.125 mm thick, thin oxeas (long) are up to 12 mm long when the thickness is 0.016-0.030 mm, club-shaped styles

(few) are 1.2-2.0 mm long when the thickness of the head is 0.120-0.134 mm; plagiotriaenes with a virgula which is 0.500-1.470 mm long and 0.030-0.080 mm thick (rami 0.090-0.670 mm long), orthotriaenes and calthrops with rays which are 0.300-0.800 mm long (in the former the rami are twice the length of the basic virgula). In addition to the megascleres mentioned, their derivatives are encountered - diaenes, monaenes and others. Microscleres: microoxeas (rough, centrotylotic) 0.100-0.405 mm long and 0.003-0.014 mm thick, spirasters (varying to metasters) 0.015-0.028 mm long.

Distribution. Off the eastern coast of Japan (Sagami Bay) and off the southern Kuril Islands. Depth, 137 m.

One specimen of sponge which differs from the initial description by somewhat larger plagiotriaenes was studied.

II. Fam. THENEIDAE

The sponges are more or less symmetrical, with a definite body form: oval, round or mushroom-like. The skeleton is radial. The megascleres are represented by oxeas and triaenes: among the latter there are always dichotriaenes. The microscleres are in the form of spirasters, metasters and oxeasters.

1. Genus THENEA Gray, 1867 /36

W i l s o n, 1925: 278.

Genus type: T. muricata (Bowerbank, 1858).

Megascleres are represented by oxeas, dichotriaenes, plagiotriaenes (or prototriaenes) and anatriaenes. Microscleres in the form of spirasters and metasters (to oxeasters). One or two oscula

on the vertex of the body. Noticed in the upper part of the sponge is a transverse fissure which is lined with a dermal membrane which is pierced with pores; at the bottom there often are root outgrowths.

1 (2). Metasters (oxeasters) smooth and slightly rough; large sponges up to 10 cm in diameter.....1. T. muricate (Bowerbank).

2 (1). Metasters (oxeasters) are primarily prickly; small sponges, usually considerably less than 2 cm in diameter.....
.....2. T. abyssorum Koltun.

1. Thenea muricata (Bowerbank, 1858) (Fig. 15; Plate IV-4-6; Plate V - 1 - 3).

V o s m a e r, 1882:5, pl. I, Figs. 1-8, pl. II, Figs. 1-21 pl. IV, Figs. 114-115: 1885:5; H a n s e n, 1885: 18, pl. V, Fig. 6; F r i s t e d t, 1887:436 (Tethya); L e n d e n f e l d, 1903: 53 (Ancorina); 1907: 190, Taf. XVII, Fig. 6-49. Taf. XVIII,Fig. 1-19, Taf. XIX, Fig. 1-21 (valiviae).

Body is most frequently sperical, up to 10 cm in diameter; at the bottom there are long root outgrowths. In the upper part of the body there is a deep transverse furrow or groove, sometimes supplied with a capula made of long spicules and lined with a mesh-like membrane. The surface of the sponge is rough or densely setose, less often it is smooth. The colour ranges from light gray to a grayish-yellow and brown. Large osculum, round, up to 5 mm in diameter, usually located on the vertex of the body; there are pores on the bottom of the transverse groove.

Spicules. Megascleres: oxeas 2-15 mm long (and longer) when the thickness is 0.010-0.090 mm, dichotriaenes with a basic virgula 3.20-6.0 mm long and 0.050-0.110 mm thick (rami of the first order 0.120-0.330 mm long, rami of the second order 0.270-1.600 mm long), plagiotriaenes (less frequently protriaenes) with a virgula 2-10 mm long (and longer) when the thickness is 0.024-0.090 mm (rami 0.200-1.600 mm long), antriaenes with a basic virgula 1.5-20 mm long (and longer) and 0.007-0.030 mm thick (rami 0.050-0.250 mm long). Microscleres: spirasters 0.018-0.035 mm long, metasters and oxeasters (usually with three to six primarily smooth rays) 0.050-0.150 mm in diameter.

Distribution. Barents Sea, Kara Sea, Sea of Laptevykh and the East Siberian Sea, north of Spitsbergen and Zemlya Frantsa Iosifa, Sea of Greenland and the Sea of Norway, northern part of the Atlantic Ocean (to the Azores and West India), Mediterranean Sea. Lives at a depth of 8-820m.

A widely distributed polymorphic species. In our northern seas (particularly in the Barents Sea) it is encountered in great quantities. The form of the body of the sponge, the size of the spicules and their numerical relationship in the skeleton is subject to considerable fluctuation in different representatives of the species. Plagiotriaenes (or protriaenes) are in essence underdeveloped dichotriaenes; metasters (oxeasters) may be encountered singly or they may be completely absent.

In addition to the dichotriaenes which are noted in the diagnosis, sometimes dichotriaenes of a smaller size are observed with short /37 rami (basic virgula up to 2 mm long, rami of the first order 0.200-0.300 mm long, rami of the second order 0.060-0.100 mm long). These spicules, evidently, should be regarded as young underdeveloped forms of dichotriaenes. Frequently, side by side with the spirasters are metasters and oxeasters of the same size (0.030-0.040 mm in diameter) which form microscleres which are transitional between spirasters and larger metasters and oxeasters.

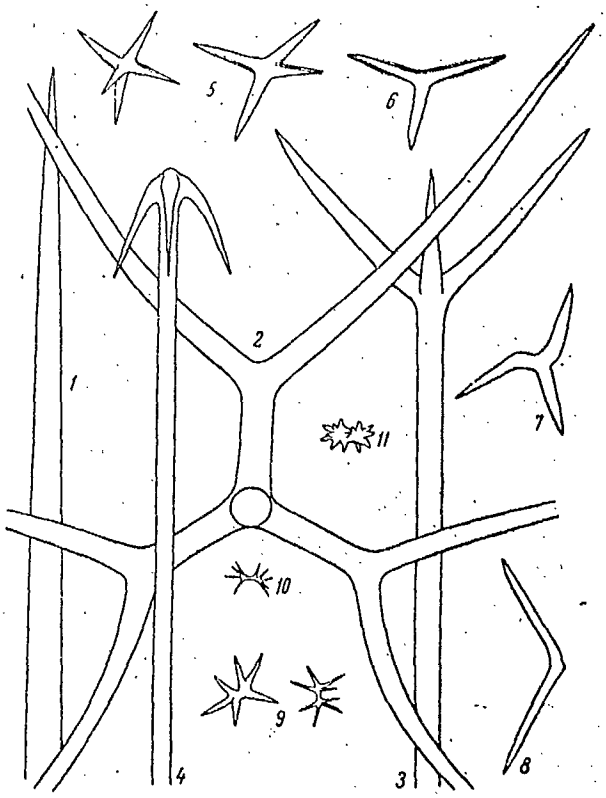

Fig. 15. Thenea muricata (Bowerbank)
1- oxea (x100); 2 - dichotriaene (x100); 3 - plagiotriaene (x100); 4- anatriaene (x100); 5,8 - metasters (x200); 9-11 -spirasters (x300).

2. Thenea abyssorum Koltun, 1964 (Fig. 16; Table V-4-5)

H a n s e n, 1885:18, pl. V, Fig. 7-9 (muricata, part); K o l t u n, 1959b:662 (muricata abyssorum); 1964:146, Fig. 1.

Body is sperical, up to 2 cm in height; at the bottom there are root outgrowths made of spicules. On the side there is a transverse groove above which there is a capula which is made of long spicules. The surface is spicular. The colour is from light gray to brown. The osculum occurs on the apex of the body and is surrounded by a rim of spicules which form a cone; pores occur at the bottom of the transverse groove.

Spicules. Megascleres: oxeas 0.9-5.5 mm long (and longer) when the thickness is 0.008-0.060 mm, dichotriaenes with a basic virgula which is 0.7-2.5 mm long and 0.030-0.070 mm thick (rami of the first order are 0.100-0.180 mm long, rami of the second order are o.200-1.400 mm long), orthotriaenes or plagiotriaenes (protriaenes) with a basic virgula which is 1.0-3.7 mm long (andllonger) and 0.020-0.050 mm thick (rami are 0.100-0.900 mm long), anatriaenes (seldom) are 0.9-1.2 mm long when the thickness of the virgula is 0.008-0.010 mm (rami are 0.070-0.110 mm long). Microscleres: spirasters are 0.020-0.035 mm long, metastera and oxeastes are primarily echinate (with two to six rays) and 0.070-0.280 mm in diameter.

Distribution. The central part of the Arctic Ocean, the Sea of Greenland and the Sea of Norway. Depth. 1,073-3,622m.

Deep sea species which is characterized by small body sizes and the presence among microscleres of echinate metasters (or oxeasters) by which it differs from T. muricate. In outer appearance T. abyssorum is identical with the young specimen of T. muricata which permits the assumption of the neotenic derivation of the former. During the study of more than 250 specimens of T. /38 muricata of both the mature and the young, echinate oxeasters were not once found in the composition of their skeleton. This constantly observable difference in the skeleton existing in T. mruicata and T. abyssorum provides the basis for regarding them as independent species. Similar to T. muricata, in this species, among the microscleres, spicules are frequently encountered which in size and shape are somewhere in between spirasters and metasters (0.040-0.050 mm long) and which are markedly echinate. In a number of cases the smooth metasters (oxeasters) are not observed and sometimes even the echinate metasters are reduced and do not form part of the skeleton, but then there are the intermediate spirasters (up to metasters) with echinate rays which in this case is the difference /39 between T. muricata and T. abyssorum.

In addition to inhabiting the deep parts of the Arctic Ocean the present species, we must assume, inhabits the depth above 1,000 m of the northern part of the Atlantic Ocean. Thus, among the specimens of T. muricata studies by Topsent (1894:375, pl. XV, Fig. 1-5) there undoubtedly were specimens of T. abyssorm which is indicated by the sketches of the spicules given by the author which also contain echinate metasters which are so characteristic of the species under discussion.

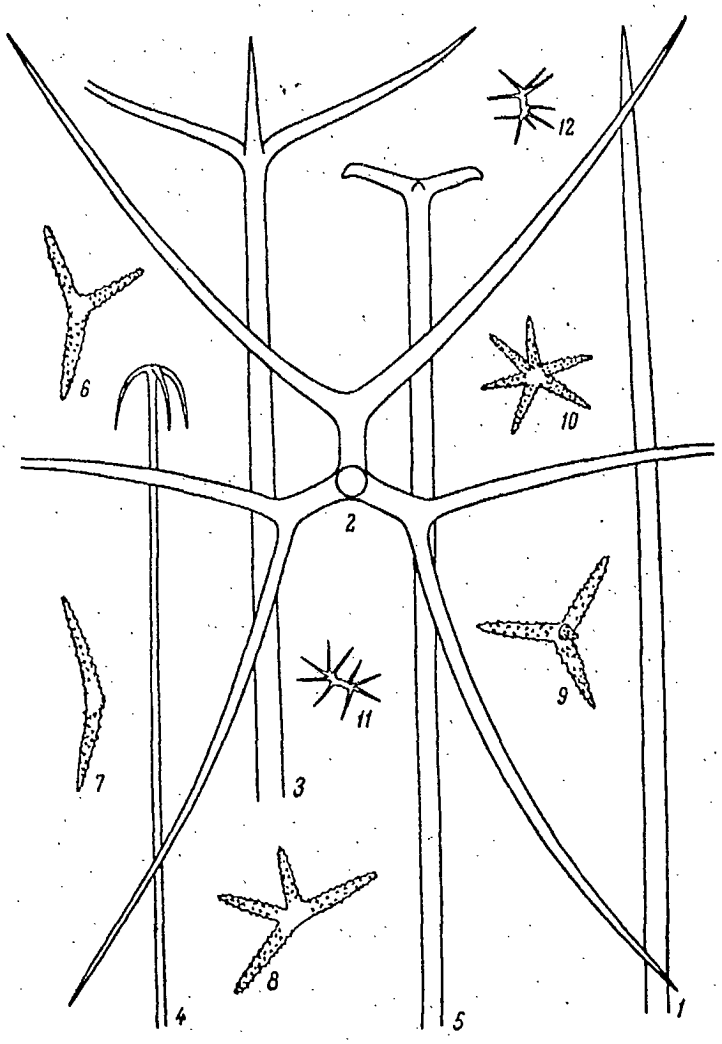

Fig. 16. Thenea abyssorum Koltun

1 - oxeas (x100); 2 - dichotriaene (x100); 3 - plagiotriaene (x100); 4 - anatriaene (x100); 5 - orthotriaene (x100); 6-10 - metasters and oxeasters (x200); 11,12 - spirasters (x300).

In our material from the far eastern seas no representatives of genus Thenea were found although in the region of the southern Kuril Islands the existence of these sponges is entirely probable. Species T. grayi Thiele (1898) which is morphologically related to T. muricata inhabits the eastern coast of Japan.

III Fam. STELLETTIDAE

The sponges are of varied, sometimes, rather regular body shape: sperical, funnel-shaped, lump-like, cushion-like or oblate. There is a cortical layer. The skeleton is radial or (less often) irregularly distributed. The megascleres are represented by monaxial spicules (most often oxeas) and triaenes. Microscleres in the form of euasters, in addition there may be amphiasters, raphides and microrhabds.

TABLE FOR IDENTIFYING GENERA OF FAM. STELLETTIDAE

1 (2). Among the microscleres there are rhabds (strongyles) which form the skeleton of the cortical layer.....2. Penares Gray.

2 (1). No microrhabds.

3 (4). Microscleres are represented by one sort of euaster and amphiasters (or their derivatives); irreuglarly distributed skeleton.....3. Stryphnus Sollas

4 (3). Several kinds of euasters; amphiasters or their derivatives are absent. Radial skeleton.....1. Stelletta Schmidt.

1. Genus STELLETTA Schmidt, 1862

S c h m i d t, 1862:46; V o s m a e r, 1932:1

Genus type: S. boglicii Schmidt, 1862.

Megascleres are represented by oxeas, triaenes and their derivatives. Microscleres in the form of euasters (oxeasters, spherasters and others) and, sometimes, raphides. Sponges with a well developed cortical layer.

1 (2). Among microsclers there are raphides (in the form of trichodragma). The rami of dichotriaenes are long (exceeding 0.500 mm).....1. S. normani Sollas.

a (b). Ortanatriaenes are encountered among triaenes.....
.....1b. S. normani rhaphidiophora Hentschel

b (a). Ortanatriaenes are absent.....1a. S. normani normani Sollas.

2 (1). Raphides are not represented among microscleres. Rami of dichotriaenes (or their derivatives) are short (less than 0.500 mm long.

3 (4). Triaenes with club-shaped dilatation (near branching) of the basic virgula.....2. S. japonica Lebwohl.

4 (3). Triaenes with a cylindrical basic virgula.....
.....3. S. validissima Thiele.

a (b). Minute microscleres in the form of strongylasters; there are dichotriaenes among the triaenes.....3a. S. valdissima f. validissima Thiele.

b (a). Minute microscleres in the form of tylasters; dichotriaenes are absent.....3b. S. validissima f. orthotriaena /40 Koltun.

1. Stelletta normani Sollas, 1880 (Fig. 17; Table IV-1-3).

Sollas, 1880: 132, pl. VI, VII; Hentschel, 1929:862.

Body is more or less spherical, up to 10 cm in diameter. The surface is spicular or densely setose. The cortical layer is up to 2.5 mm thick. The sponge is hard and strong. The colour ranges from light gray to yellow and light red. Radial skeleton.

Spines. Megascleres: oxeas up to 7 mm long (and longer) when the thickness is 0.064-0.110 mm, dichotriaenes up to 6 mm long (and longer) when the thickness of the basic virgula is 0.080-0.120 mm, protriaenes (and plagiotriaenes) up to 5.5 mm long when the thickness of the basic virgula is 0.032 mm, anatriaenes (and ortanatriaenes) up to 5.5 mm long (and longer) when the thickness of the basic virgula is 0.025-0.060 mm. Microscleres: oxeasters 0.019-0.050 mm in diameter, spherasters((and their derivatives) 0.010-0.015 mm /40 in diameter,spherasters (in clusters) 0.020-0.050 mm long.

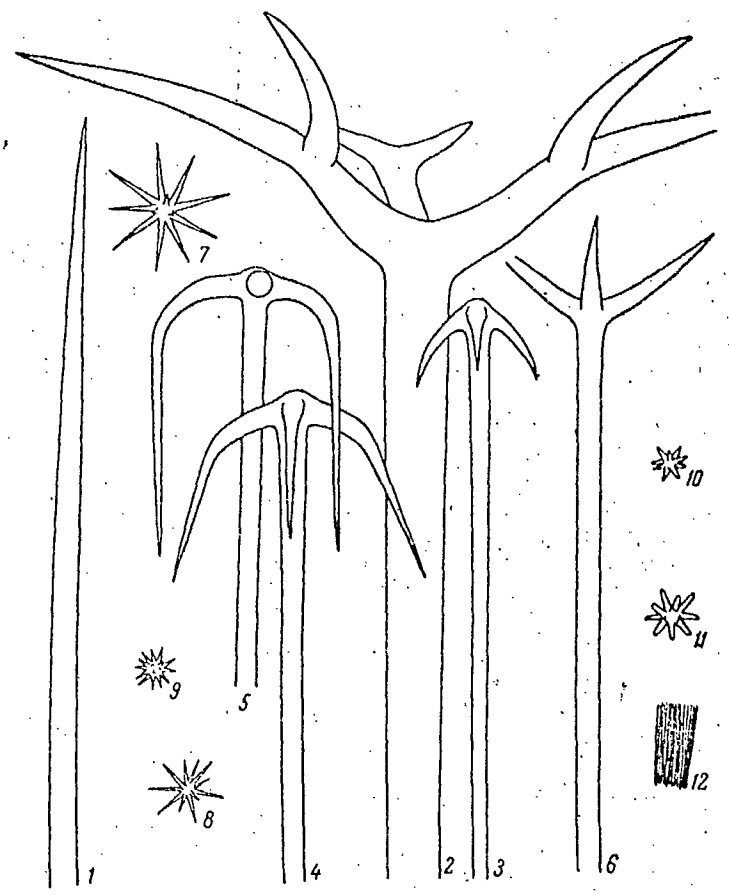

Fig. 17. Stelletta normani rahaphidiophora Hentschel.

1- oxea (x100); 2- dichotriaene (x100); 3- antriaene (x100); 4,5- ortanatriaenes (x100); 6- plagiotriaene (x100); 7,8- oxeasters (x400); 9,10- spherasters (x400); 11- strongylaster (x400); 12- cluster of raphides or trichodragma (x400).

Distribution. Barents Sea (south-western part), central part of the Arctic Ocean, The Sea of Norway and the Sea of Greenland, the northern part of the Atlantic Ocean. Depth, 220-1,265 m.

Within the species it is reasonable to distinguish between two very closely related subspecies: S. n. normali and S. n. rhaphidiophora; the first is boreal and the second is Arctic bathyal.

1a. Stelletta normani normani Sollas, 1880 (Plate IV - 3)

S o l l a s, 1880:132, pl. VI, VII; 1888:187 (Dragmastra normani); T o p s e n t, 1892:45 (Dragmastra normani).

Body is spherical, in more mature individuals it is flattened and oblate, up to 10 cm in diameter. The surface is extremely setose. The colour is gray on the outside and light-yellow or gray on the inside. The coritical layer is up to 2.5 mm thick.

Spicules. Megascleres: oxeas up to 6 mm long when the thickness is 0.064-0.110 m, dichotriaenes up to 3.2 mm long when the thickness of the basic virgula is 0.094-0.100 mm (rami of the first order are 0.390-0.550 mm long, branches of the second order are 0.250-0.570 mm long), protriaenes (and plagiotriaenes) up to 5.5 mm long and 0.032 mm thick (rami 0.130 mm long). Microscleres: oxeasters 0.019-0.033 mm in diameter, spherasters (up to strongylasters and tylasters) 0.010-0.012 mm in diameter, raphides (in clusters) 0.030-0.050 mm long. /41

Distribution. Barents Sea (south-western part), Sea of Norway, northern part of the Atlantic Ocean. Inhabits the depth of 220-329 m to 1,265 m (in the northern Atlantic); noted at a temperature of 0.1-6.59°.

1b. Stelletta normani rhaphidiophora Hentschel, 1929 (Fig. 17; Table IV - 1-2)

Hentschel, 1929:862, 917, Taf. XII, Fig. 2; Burton, 1959:8.

Body is sperical, in more mature specimens it is less regular, frequently it is flattened at the top, up to 16.5 cm in width and up to 7 cm in height. The surface is spicular; the sponge has a cortical layer up to 3.5 mm thick. The colour is gray, yellowish-gray or light red.

Spicules. Megascleres: oxeas up to 7.3 mm long (and longer) when the thickness is 0.090 mm, dichtoriaenes 2.5-6.0 mm long (and longer) when the thickness is the basic virgula is 0.080-0.120 mm (rami of the first order are 0.400-0.490 mm long, rami of the second order are 0.350-0.650 mm long), anatriaenes are up to 6.7 mm long (and longer) when the thickness of the basic virgula is 0.015-0.025 mm(rami 0.100-0.308 mm long), orthanatriaenes up to 5 mm long (and longer) when the thickness of the basic virgula is 0.025-0.060 mm (rami 0.070-0.400 mm long); sometimes plagiotriaenes are also encountered. Microscleres: oxeasters 0.020-0.050 mm in diameter, spherasters (with conical or rounded rays) 0.010-0.015 mm in diameter, raphides (in clusters) 0.020-0.040 mm long.

Distribution. North of Spitsbergen and Zemlya Frantsa-Iosifa, Sea of Greenland, north-west of Iceland. Inhabits the depth between 377 and 1,00 m. Recorded for a temperature ranging from -0.41 to 2.57°.

In the collections there are 10 specimens of the subspecies under consideration. Among the microscleres there are /42 usually spicules which are transitional, between oxeasters to spherasters both in terms of size and shape.

2. Stelletta japonica Lebwohl, 1914 (Fig. 18, Plate V-6)

L e b w o l h, 1914b:8, Taf. I, Fig. 20-32.

Body is ellipsoidal, cushion-like, with a flat base, up to 8 cm long, 5 cm wide and 3 cm high. The surface is slightly rough. The sponge is very strong and hard. The cortical layer is made up of branched ending of triaenes, up to 2-3 mm thick. The oscula are approximately 1 mm in diameter (on the upper side of the body); the pores are very small (on the lower and lateral sides). Colour is light-brown or brown. Radial type of skeleton. /43

Spicules. Megascleres: oxeas 1.6-4.2 mm long and 0.022- 0.099 mm thick. styles (seldom) 0.650.1.1 mm long and 0.090-0.140 mm thick; plagiotriaenes 0.7-3.3 mm long when the thickness of the club-shaped virgula is 0.070-0.170 mm (the sharp end is sometimes rounded), rami 0.100-0.268 mm long; dichotriaenes (derivatives of previous spicules) 0.180-1.6 mm long when the thickness of the basic virgula is 0.012-0.036 mm in diameter, spherasters (with tapered or blunt rays) 0.004-0.011 mm in diameter, spheres (seldom) 0.060-0.070 mm in diameter.

Distribution. Pacific coast of Japan (Sagami Bay and the Sea of Japan off Hokkaido Island. Depth, 286 m.

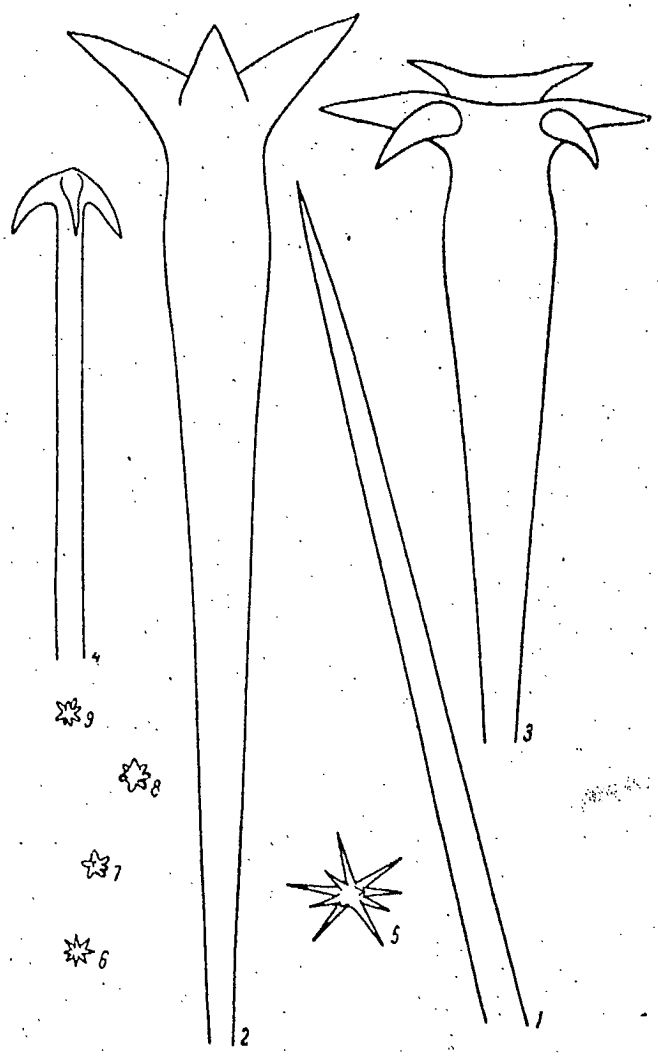

Fig. 18. Stellata japonica Lebwohl.

1 - oxea (x100); 2 - orthotriaenes (x100); 3 - dichotriaenes (x100); 4 - anatriaene (x100); 5 - oxeaster (x100); 6-9 - spherasters (x500).

Compared to the first description of the single specimen of this sponge in the collections, it differs in a number of features: dichotriaenes are considerably longer, plagiotriaenes are also larger, styles and strongyles are not detected, anatriaenes are few (exceeding 4 mm in length when the thickness of the virgula is 0.033 mm, rami 0.040-0.074 mm long). Noticed in places (on the side) on the surface of our specimen is a seta of long spicules (probably oxeas and anatriaenes). Despite the indicated differences, it appears to be quite possible that this sponge specimen from the Sea of Japan belongs to the species S. japonica.

3. Stelletta validissima Thiele, 1898 (Fig. 19, 20; Plate VI; Plate VII - 1-2).

T h i e l e, 1898:13, Taf. I, Fig. 5, Taf. VII, Fig. 1.

Body is spherical or somewhat funnel-like, up to 25 cm in height. The surface is rough; there is a dense setose cover on the upper side of the body. The sponge is very strong. There is a cortical layer (up to 2.5 mm thick) which is formed by branched parts of triaenes and parts of the body which are bounded at the bottom by a subdermal membrane which lie beneath it. The colour is dark gray on the outside and yellow gray on the inside (in dry form); brown or light grey (in alcohol). Radial skeleton.

Spicules. Megascleres: oxeas up to 8.8 mm long when the thickness is 0.034-0100 mm, dichotriaenes or orthotriaenes up to 9 mm long when the thickness of the basic virgula is 0.107-0.180 mm (rami 0.120-0.502 mm long protriaenes or plagiotriaenes approximately 1.8 mm long when the thickness of the virgula is 0.040 mm (rami

0.067-0.110 mm long); there are also smaller anatriaenes. Microscleres: oxeasters 0.008-0.054 mm in diameter, strongylasters or tylasters 0.005-0.021 mm in diameter.

Distribution. Sea of Japan (off Hokkaido Island and Moneron), Pacific coast of Japan and the southern Kuril Islands, Bering Sea (off the Commander Islands). Depth, 60-137 m.

This species is probably much more widespread that is indicated above. Thus, for the Indian Ocean the sponge S. trichotriaena (Dendy and Burton, 1926:241) has been recorded and not without basis has been considered identical with S. validissima (Burton and Rao, 1932); very closely related to the latter is also the species S. clarella which was established by Laubenfles (1932:29) for the Californian coast.

Approximately 10 specimens from the Berring Sea and the region of the southern Kuril Islands which are distinguished by /44 longer rami of the dichotriaenes (as compared to the initial description). Specimens from the Sea of Japan which are absolutely the same in outer appearance are represented by two forms which clearly differ from on another in the nature of several skeletal elements. Dichotriaenes and strongylasters are peculiar to one form and orthotriaenes and tylasters to another.

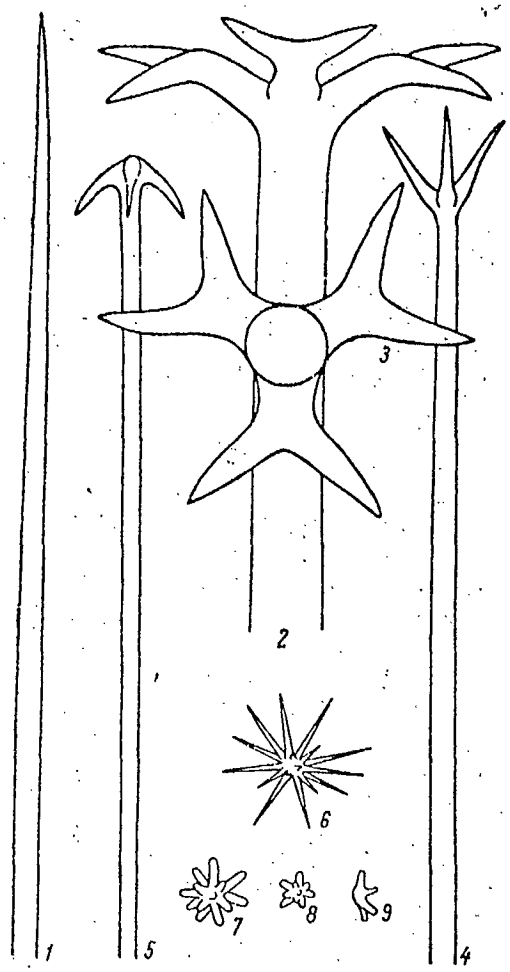

Fig. 19. Stelletta validissima f. validissima Thiele.

1- oxea (x100); 2,3- dichotriaenes (x100); 4- protriaene (x100); 5- anatriaene (x100); 6- oxeaster (x500); 7,9- strongylasters(x500).

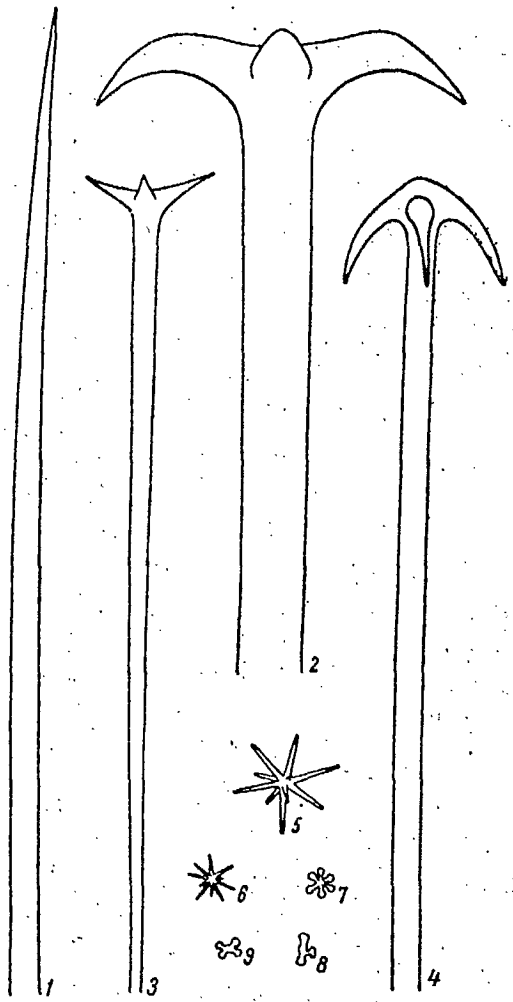

Fig. 20 Stelletta validissima f orthotriaena Koltun.

1- oxea (x100); 2- orthotriaene (x100); 3- plagiotrieane (x100); 4- anatriaene (x100); 5,6- oxeasters (x500); 7-9- tylasters (x500).

3a. Stelletta validissima f. validissima Thiele, 1898 (Fig. 19; Plate VI).

T h i e l e, 1898:13, Taf. I, Fig. 5, Taf. VII, Fig. 1 (validissima).

Spicules. Megascleres: oxeas approximately 5.5 mm long (and longer) when the thickness is 0.050 mm, dichotriaenes up to 9 mm long when the thickness of the virgula is up to 0.180 mm (rami 0.167-0.502 mm long but more often up to 0.350 mm long), /45 protriaenes (and their derivatives) up to 1mm long (rami approximately 0.200 mm long), large anatriaenes up to 1mm long (rami approximately 0.080 mm long), thin anatriaenes with rami approximately 0.010 mm long. Microscleres: stongylasters 0.005-0.021 mm in diameter (rays may be reduced to three and even two), oxeasters 0.020-0.054 mm in diameter (usually in small numbers).

Distribution. The Sea of Japan, the Pacific of Japan and the southern Kuril Islands, Bering Sea (off the Commander Islands). Depth, 60-137 m.

3b. Stelletta validissima f. orthotriaena Koltun, f. n. (Fig. 20; Plate VII - 1-2).

Spicules. Megascleres: oxeas up to 8.8 mm long when the thickness is 0.034-0.100 mm, orthotriaenes up to 6.7 mm long when the thickness of the virgula is 0.107 mm (rami 0.120-0.400 mm long), dichotriaenes (seldom) - derivatives of orthotriaenes of corresponding size, plagiotriaenes approximately 1.8 mm long when the thickness of the virgula is 0.040 mm (rami approximately 0.087 mm long), anatriaenes up to 1 mm long when the thickness of the virgula is 0.038 mm (rami 0.067-0.110 mm long). Microscleres: tylasters (most often with four to six rays) approximately 0.005 mm in diameter, oxeasters 0.008-0.038.

Distribution. Sea of Japan (off Hokkaido), Depth, 93 m.

2. Genus PENARES GRAY, 1867

Gray, 1867:542; W i l s o n, 1904:111.

Genus type: P. helleri (Schmidt, 1864).

Megascleres are represented by oxeas (or their derivatives), dichotriaenes and orthotriaenes. Microscleres in the form of oxeasters, oxespherasters and microrhabds (stongyles, oxeas). Usually, lump-like or cushion-like sponges which are covered with a thin cortex which is formed mainly of microrhabds.

1. Penares cortium Laubenfels, 1930 (Fig. 21; Table V-7).

L a u b e n f e l s, 1932:35, Fig. 15.

Body is lump-shaped or cushion-like. The surface is smooth; the cortical layer is approximately 0.200 mm thick. Brittle sponge. Colour is brown or light-brown. The basic skelton is represented by irregularly distributed clusters and individual oxeas. The skeleton of the cortical layer is made up of minute strongyles which are curved at the ends and branched parts of the dichotriaenes.

Spicules. Megascleres: oxeas (frequently with blunt ends) up to 2.4 mm long and 0.050 mm thick, dichotriaenes 0.400-0.970 mm long when the thickness of the virgula is 0.050-0.120 mm (rami up to 0.335 mm long). Microscleres (to oxeaspherasters) 0.009-0.081 mm in diameter.

Distribution. Off the coast of northern California and the Sea of Japan. Shallow water.

The one specimen of this sponge which is in the collections differs somewhat from the typical example which was described by Laubenfels (1932) for the Californian coast which forces one to regard these two sponges as different subspecies of P. cortius.

1 (2). Microscleres are represented by strongyles and spherasters (pointed oxeas, dichotriaenes with a short basic ray approximately 0.400 mm long).....1a. P. cortius cortius Laubenfels. /46

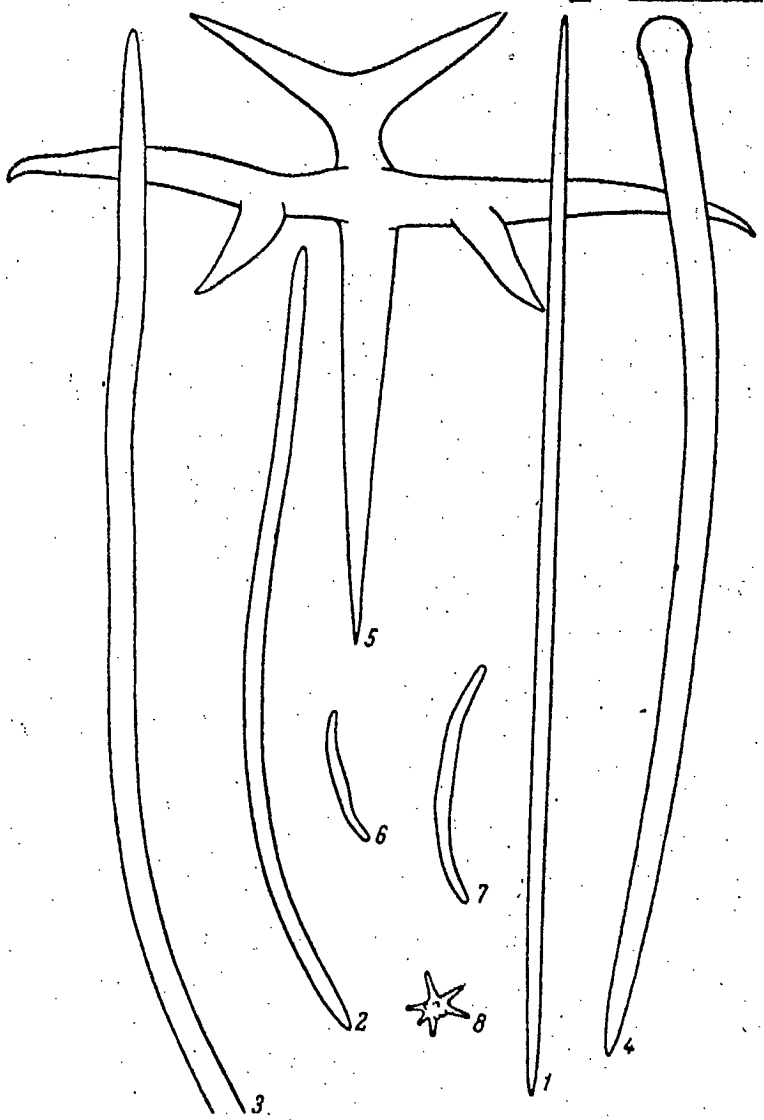

Fig. 21. Penares cortius orientalis Koltun

1-3- oxeas (x100); 4- club-shaped style (x100); 5- dichotriene (x100); 6,7- microstrongyles (x200); 8- oxeaster (x200).

2 (1). Microscleres are represented by strongyles and oxeasters (oxeas frequently with blunt endings, dichotriaene with a long basic ray up to 0.9 mm long).....1b. P. cortius orientalis Koltun.

1a. Penares cortius cortius Laubenfels, 1930

L a u b e n f e l s, 1932-35, Fig. 15.

Body is lump-like, up to 10 cm in diameter when the /47 thickness (height) is 4 cm. Oscula are oval, approximately 1-2.5 mm in diameter, frequently on lower outgrowths of the body (to 3 mm in height). Small pores approximately 0.065 mm in diameter. Colour is brown.

Spicules. Megascleres: oxeas up to 0.950 mm long when the thickness is 0;022 mm, dichotriaenes with a basic ray of approximately 0.400 mm long when the thickness is 0.050 mm (rami up to 0.310 mm long when the thickness is 0.050 mm). Microscleres: strongyles 0.050-0.160 mm long and 0.003-0.008 mm thick (some of them are centrotylotic), oxeaspherasters 0.009-0.025 mm in diameter.

Distribution. Off the Californian coast. Shallow waters.

1b. Penares cortius orientalis Koltun, ssp. n. (Fig. 21; Plate V - 7)

Body is cushion-like, up to 3.5 cm wide when the height was 1.5 cm. Oscula are unnoticeable. The pores are approximately 0.100 mm in diameter. The colour is light-brown.

Spicules. Megascleres: oxeas (with blunt endings, to strongyles and styles) 1.8-2.4 mm long and 0.033-0.050 mm thick, dichotriaenes with a basic ray 0.670-0.920 mm long and 0.093-0.120 mm thick (rami 0.268-0.335 mm long). Microscleres: strongyles 0.080-0.174 mm long and 0.005-0.011 mm thick oxeasters 0.040-0.081 mm in diameter.

Distribution. Sea of Japan (off Okusiri Island). Shallow waters.

3. Genus STRYPHNUS Sollas, 1886

T o p s e n t, 1894: 365.

Genus type: S. niger Sollas, 1886.

Megascleres are represented by oxeas and triaenes (dichotriaenes ortno- or plagiotriaenes). Microsclers in the form of oxeasters and amphiasters (and their derivatives). Primarily lump-like sponges with a poorly expressed radial symmetry of the body. The cortical layer is poorly developed. Irregular skeleton.

1. Stryphnus ponderosus (Bowerbank, 1866) (Fig. 22; Plate VIII -1-2).

B o w e r b a n k, 1866:56 (Ecionemia); 1874: 18, pl. VIII, Fig. 8-15 (Ecionemia); V o s m a e r, 1885:6, pl. IV, Fig. 30-32, pl. V, Figs. 48-49 (Stelletta fortis); S o l l a s, 1888:193; T o p s e n t, 1894:365, pl. XII, Figs. 6,7 (fortis); 1894:368, pl. XII, Figs. 7,8 (var. rudis); 1904:83 (fortis); B r e i t f u s, 1911:213 (fortis); K o l t u n, 1964:147 (fortis).

Body is clump-like, irregularly lobed, up to 40 cm in height (when the width is up to 30 cm). The surface is spicular (most frequently) or smooth. Colour ranges from light-gray to brown and violet-red. The oscula are small (up to 1.5 mm in diameter), usually, they occur on the vertices of lobes, sometimes (in groups) at the bottom of small depressions. The pores are small, indistinguishable by the naked eye.

Spicules. **Megascleres:** oxeas 1.5-3.0 mm long and 0.030-0.060 mm thick, dichotriaenes 0.7-1.65 mm long when thickness of the basic virgula is 0.030-0.060 mm (rami of the first order

0.070-0.240 mm long, rami of the second order 0.090-0.350 mm long), plagiotriaenes 0.6-1.6 mm long when the thickness of the basic ray is 0.030-0.070 mm (rami 0.080-0.700 mm long). Microscleres: oxeasters 0.023-0.070 mm in diameter, amphiasters 0.007-0.018 mm long.

Distribution. Barents Sea (south-western part), off the western coast of Spitsbergen, the Sea of Norway, the northern part of the Atlantic Ocean. Inhabits the 73-327 m depth (and up to 800 m off the Azores). Recorded for a temperature of 0.94-4.4° (in the Arctic).

Boreal species, represented in the collection by 35 /48 specimens. Number of dichotriaenes and plagiotriaenes in the skeleton is subject to considerable fluctuation: in some cases some of those elements may be entirely absent. In addition to the oxeasters and amphiasters which have been noted in the diagnosis smaller oxeasters (0.010-0.016 mm in diameter) and in rare cases spherasters (0.006-0.010 mm in diameter) with short rounded rays are observed.

IV. Fam. GEODIIDAE

Primarily spherical, slightly funnel-shaped, less often lump-like, round-loaf-shaped or cushion-shaped. Well developed cortical layer (frequently in the form of a shell), made of individual spherical microcleres-sterrasters. Radial skeleton. Megascleres are represented by oxeas and (usually) by triaenes. Microscleres in /49 the form of euasters and sometimes microrhabds.

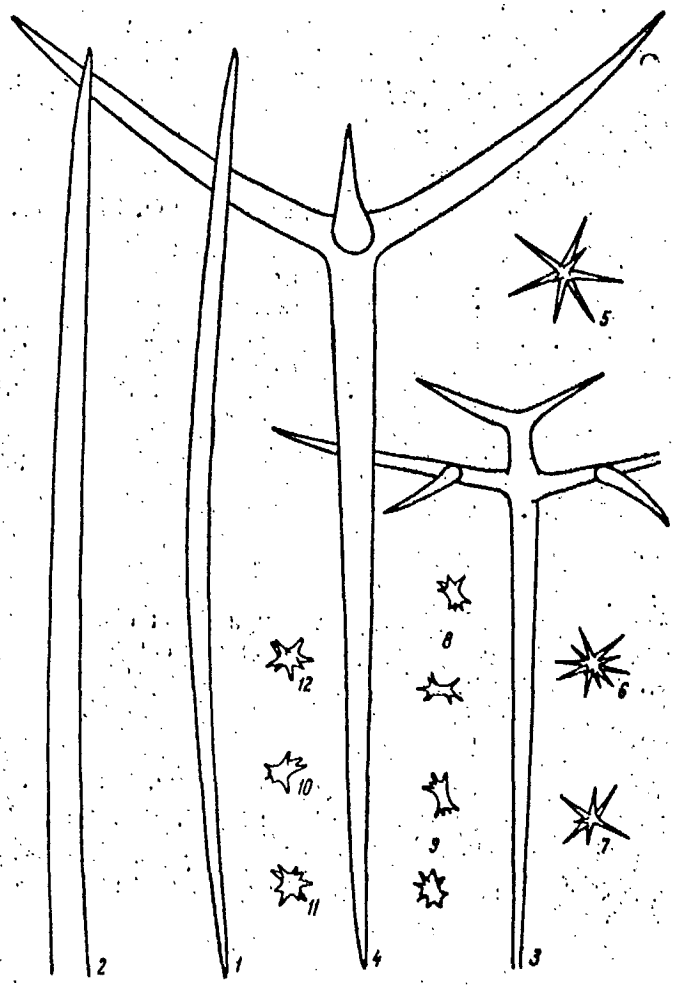

Fig. 22. Stryphnus ponderosus (Bowerbank)

1.2- oxeas (x100); 3-dichotriaene (x100); 4- plagiotriaene (x100); 5-7- oxeasters (x200); 8-10- amphiasters (x500); 11- speraster (x500); 12- stronglaster (x500).

TABLE FOR IDENTIFYING GENERA OF FAM. GEODIIDAE

1 (2). Microrhabds (microstrongyles) among microscleres.....
.....3. Pachymatisma Johnston.

2 (1). No microrhabds.

3 (4). Triaenes with normally developed rami....1. Geodia Lamarck.

4 (3). Triaenes with greatly reduced rami (until they disappear completely).....2. Geodinella Lendenfeld.

1. Genus GEODIA Lamarach, 1815.

D e n d y. 1916:254.

Genus type: G. gibberosa Lamarck, 1815.

Megascleres are represented by oxeas and triaenes with well developed rays; tetractines are arranged radially in the surface sections of the body. Microscleres in the form of sterrasters (spherical or ellipsoidal), oxeasters, spherasters and other euasters.

1 (2). Sterrasters exceed 0.150 mm in diameter (oxeasters with smooth rays).....1. G. macandrewii Bowerbank.

2 (1). Sterrasters are less than 0.150 mm in diameter.

3 (6). Mezotriaenes among tetractines.

4 (5). Euasters in the form of spherasters and oxeasters; the latter with rough rays.....2. G. orthomesotriaena Lebwohl.

5 (4). Eausters in the form of strongylasters and oxeasters; the latter with smooth rays (very fusiform small oxeas); sponges with a regular spherical body shape....3. G. mesotriaena (Hentsche

6 (3). Tetractines are not represented among mezotriaenes.

7 (8). There are small oxeas (0.250-0.500 mm long) in addition to the large oxeas; euasters are represented by strongylastera and oxeasters.....4. G. barretti Bowerbank.

8 (7). Usually no small oxeas; euasters in the form of spheraster and oxeasters.....5. G. phlegraei (Sollas).

1. Geodia macandrewii Bowerbank, 1858 (Fig. 23, Plate XIII-1)

Bowerbank, 1872:196, pl. X; Sollas, 1888:265 (synops); Lendefeld, 1903:100 (Sidonops); Brondsted, 1932:5, Fig. 1 (Sidonops).

Body is spherical, sometimes somewhat flattened, up to 26.3 cm in diameter. The surface has a long thick seta (because of its weakness it is frequently not preserved on the specimens of the collections. The colour ranges from light gray to light yellow and brown. The oscular and porous apertures (the former up to 1 mm and the latter 0.050-0.238 mm in diameter) occur at the bottom of numerous small holes which are evenly distributed almost throughout the entire surface of the sponge; the distance between the apertures is 1.5-3 mm. The sponge is very strong, the cortical layer is up to 3.26 mm thick.

Spicules. Megascleres: large oxeas are 2.5-5.2 mm long and 0.04-0.06 mm thick, small oxeas are 0.250-0.500 mm long and 0.006-0.008 mm thick, dichotriaenes are up to 9.6 mm long when the thickness of the virgula is 0.120 mm (rami of the first order up to 0.5 mm long, rami of the second order up to 0.4 mm long); orthotriaenes are the same size as the dichotriaenes (rami up to 0.7 mm long),, / 50

promezotriaenes up to 8.92 mm long and 0.032 mm thick (rami 0.070-0.200 mm long). Microscleres: sterrasters 0.150-0.320 mm in diameter, spherasters 0.006-0.025 mm in diameter (the larger ones have long cone-like rays), oxeasters 0.015-0.025 mm in diameter (rays sometimes slightly rough).

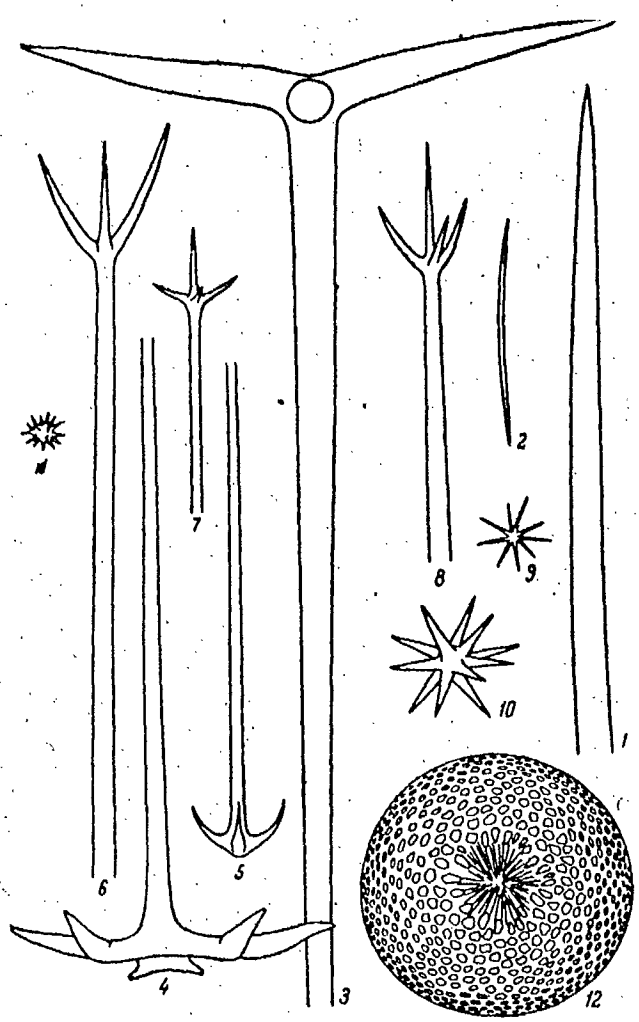

Fig. 23. Geodia macandrewii (Bowerbank).

1- large oxea (x100); 2- small osea (x100); 3- orthotriaene (x100); 4- dichotriaene (x100); 5- anatriaene (x100); 6- protriaene (x100); 7,8- mezotriaenes (x100); 9,10- oxeasters (500); 11- spheraster (x500); 12- sterraster (x200).

Distribution. The Barents Sea (south-western part), Sea of Norway, Strait of Denmark, off the Shetland and Farer islands. Inhabits the 146-350 m depth when the temperature is 0.72-8.17°.

Boreal species, represented in the collections by 10 species. Noted for the first time for the Barents Sea.

2. Geodia orthomesotriaena Lebwohl, 1914 (Fig. 24; Plate XIV - 1-2). /51

L e b w o h l, 1914:42, Taf. II, Fig. 37-50.

Body usually funnel-shaped, up to 27 cm in height; diameter of the funnel is approximately 20 cm, depth 11 cm. Young specimens are spherical or oval in shape. Very small oscula (inside the funnel) and pores (on the outside) uninterruptedly cover a considerable part of the surface of the body of the sponge; discernible in spherical specimens are isolated sections with oscula and pores. The colour is light brown. The thickness of the cortical layer is up to 1 mm. The skeleton inside the sponge is formed of distinctly discernible clusters and fibres which are arranged radially to the surface.

Spicules. Megascleres: large oxeas 2.5-9.5 mm long and 0.050-0.110 mm thick, small oxeas or styles (rare), 0.150-0.752 mm /52 long and 0.005-0.16 mm thick, orthotriaenes 2.1-6.7 mm long when the thickness of the basic virgula is 0.070-0.200 mm (rami 0.070-0.680 mm long), dichotriaenes 1.4-3.8 mm long when the thickness of the virgula is 0.060-0.200 mm (rami of the first order up to 0.268 mm, rami of the second order up to 0.435 mm long) large

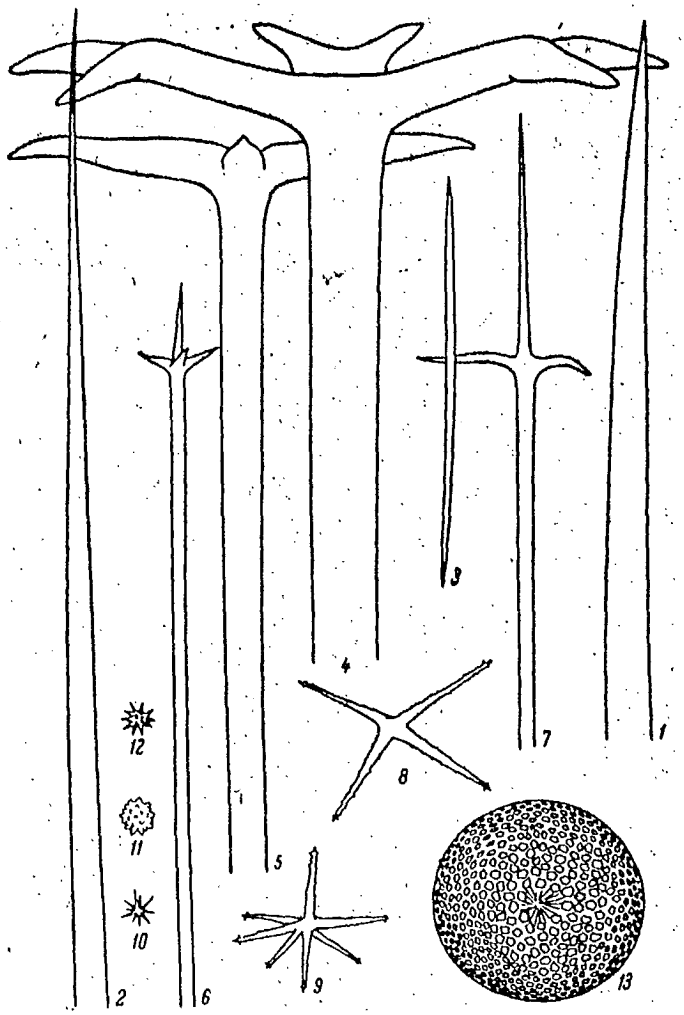

Fig. 24. Geodia orthomesotriaena Lebwohl

1,2 - large oxeas (x100); 3 - small oxea (x100); 4 - dichotriaene (x100); 5 - orthotriaene (x100); 6 - plagiotriaene (x100); 7 - orthomezotriaene (x100); 8,9 - oxeasters (x200); 10 - oxeaster (x400); 11 - speraster (x200); 12 - oxeaspheraster (x600); 13 - sterraster (x200).

promezotriaenes or plagiomezotriaenes 4.3-7.3 mm long when the thickness of the virgula is 0.025-0.052 mm (lateral rami 0.090-0.180 mm long, axial ramus 0.035-0.174 mm long), orthomezotriaenes (diaenes and moneas) 2.24-4.2 mm long (laterial rami 0.150-0.360 mm long, axial ramus 0.370-0.610 mm long), large anatriaenes 5.5-9.3 mm long and 0.027-0.050 mm thick (rami 0.090-0.150 mm long), small antariaenes (rare) approximately 0.5 mm long when the thickness of the virgula (at the basis of the ramus) is 0.0018-0.0025 mm (rami 0.005-0.008 mm long). Microscleres: sterrasters (oval) 0.110-0.140 mm in diameter, oxeasters (with three

to ten conical, slightly echinate rays) 0.025-0.130 mm in diameter, oxeaspherasters with long rays 0.010-0.018 mm in diameter, spherasters with very short rays, o.020-0.024 mm in diameter. There may also be strongylospherasters 0.005-0.008 mm in diameter and other spicules which are intermediate in shape and size.

Distribution. Sea of Japan (off Hokkaido) off the east coast of the southern Kuril Islands and Japan. Depth, 95-998 m.

Three specimens are represented in the collection; one of these is a large, funnel-shaped form from the Sea of Japan (depth 95 m) and two are small (spherical) form from the region of the southern Kuril Islands (depth, 998 m).

3. Geodia mestriaena (Hentschel, 1929) (Fig. 25; Plate X - 5).

H e n t s c h e t, 1929:865, Taf. XII, Fig. 1,2, Taf. XIII, Fig. 1 (Sidnops); B u r t o n 1934:6; K o l t u n, 1964:148, Fig. 2.

Body is usually spherical, less often it is less regular (sometimes in the form of a eucalyptus fruit), up to 14 cm in diameter. The surface is smooth, partially covered with a dermal seta. The colour ranges from light gray to light yellow. The oscula are small, located at the base of small pre-oscular cavities. Generally, only one pre-oscular cavity is formed on the body of the sponge (on the top). The pores are mesh-like and are located on the side and are well seen by the naked eye. The cortical layer attains a thickness of 1 mm.

Spicules. Magascleres: large oxeas 2.2-3.4 mm long and 0.028-0.042 mm thick, small oxeas (very fusiform) 0.130-0.400 mm long and 0.009-0.022 mm thick, dichotriaenes (and orthotriaenes) up to 4.06 mm long when the thickness of the virgula is 0.077-0.090 mm (rami of the first order 0.098-0.250 mm long, rami of the second order 0.250-0.337 mm long), premozotriaenes up to 3.64 mm long and 0.026 mm thick (rami 0.140-0.200 mm long); anatriaenes of the same size as the promezotriaenes (rami 0.160-0.220 mm long). Microscleres: sterrasters 0.065-0.087 mm in diameter, spherasters (to strongylasters) 0.006-0.012 mm in diameter, oxeasters 0.014-0.035 mm in diameter.

Distribution. Sea of Laptevykh (north-western part), Kara Sea (northern part), north of Spitsbergen and Zemlya Frantsa Iosifa, Sea of Greenland. Inhabits the 137-1,450 mm depth when the temperature ranges from 0.4 to -1.76°.

There is no doubt that G. mesotriaena is genetically closely related to G. barretti, which is indicated by the considerable morphological similarity which exists between them. G. mesotriaena is one of the few Geodia whose habitat is the bathyal of the central part of the Artic Ocean (Fig. 8). Lendenfeld (1910:96) describes still another sponge, which has nothing in common /53. with the present species, under the name of G. mesotriaena from the region of southern California. Thus, the name of the Arctic sponge under consideration should be changed, however, it is better to postpone this until the family Geodiidae has been revised.

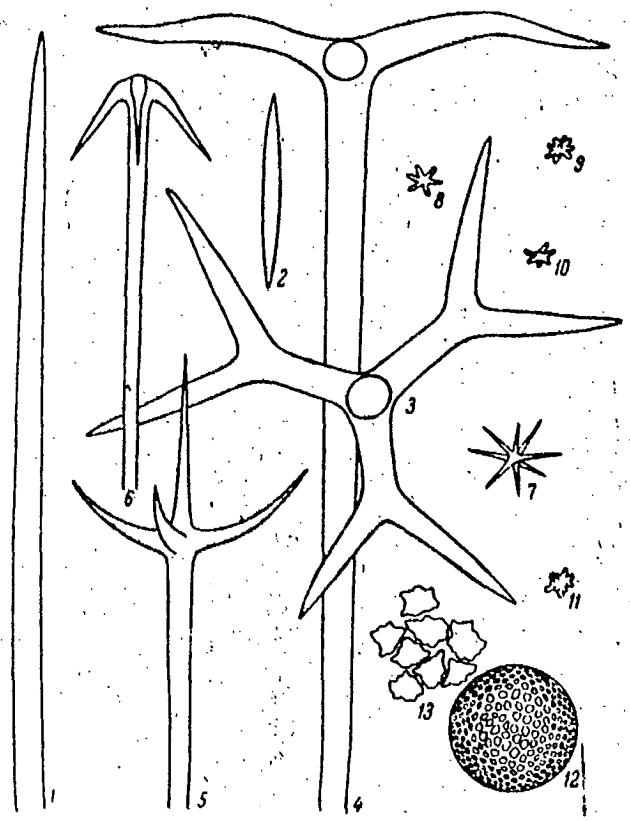

Fig. 25. Geodia mesotriaena (Hentschel).

1- large oxea (x100); 2- small oxea (x100); 3- dichotriaene (x100); 4- orthotriaene (x100); 5- plagiotriaene (x100); 6- anatriaene (x100); 7- oxeaster (x400); 8-11- strongylasters (x500); 12- sterraster (x200); 13- section of the surface of a sterraster (x1000).

4. Geodia barretti Bowerbank, 1858 (Figs. 26; Plate XI-1-2 Plate XII).

B o w e r b a n k, 1872:198, pl. XI, Figs. 1-7; V o s m a e r, 1882: 23, pl. III, Figs. 50-51, pl. IV, Figs. 120-122; 1885:10; F r i s t e d t, 1887:463; L e n d e n f e l d, 1903:101 (Sidonops); H e n t s c h e l, 1929:919 (Sidonops); 1929:867 K o l t u n, 1964:147.

Body is sperical in young specimens, non-uniformly massive - the more mature are up to 31 cm high. The surface is even and smooth (to the naked eye), devoid of a setose cover. The colour ranges from light gray to light brown. The oscula are small,

concentrated in the oscular cavities which have the appearance of /54
small depressions in mature specimens. Pores are mesh-like, occuring directly on the surface of the body. The sponge has a cortical layer 0.4-0.6 mm thick.

Spicules. Megascleres: large oxeas 2.0-3.6 mm long and 0.040-0.071 mm thick, small oxeas (slightly curved) 0.250-0.400 mm long and 0.010-0.014 mm thick, dichotriaenes (and orthotriaenes) 2.3-4.1 mm long when the thickness of the virgula is 0.070-0.100 mm (rami of the first order are 0.150-0.300 mm long, rami of the second order are 0.110-0.250 mm long), anatriaenes 2.8-4.46 when the thickness of the basic virgula is 0.013-0.015 mm (rami 0.080-0.167 mm long), protíaenes (rare) of the same dimensions as the anatriaenes (rami up to 0.070 mm long). Microscleres: sterrasters 0.064-0.095 mm in diameter, spherasters (up strongylasters) with short rounded rays 0.005-0.012 mm in diameter, oxeasters 0.012-0.050 mm in diameter.

Distribution. Barents Sea (south-western part), north of Spitsbergen, Sea of Greenland and Sea of Norway, Strait of Denmark, off the south-eastern coast of Greenlandand the northern coast of /55
of Spain. Inhabits the depth of 91-500 m at a temperature of $0.8-8.48^{\circ}$.

In the collections there are approximately 100 specimens of this species. Frequently, in the composition of the skeleton there are, in addition to dichotriaenes, orthotriaenes of the same size (their rami, up to 0.500 mm long); spherasters, frequently with

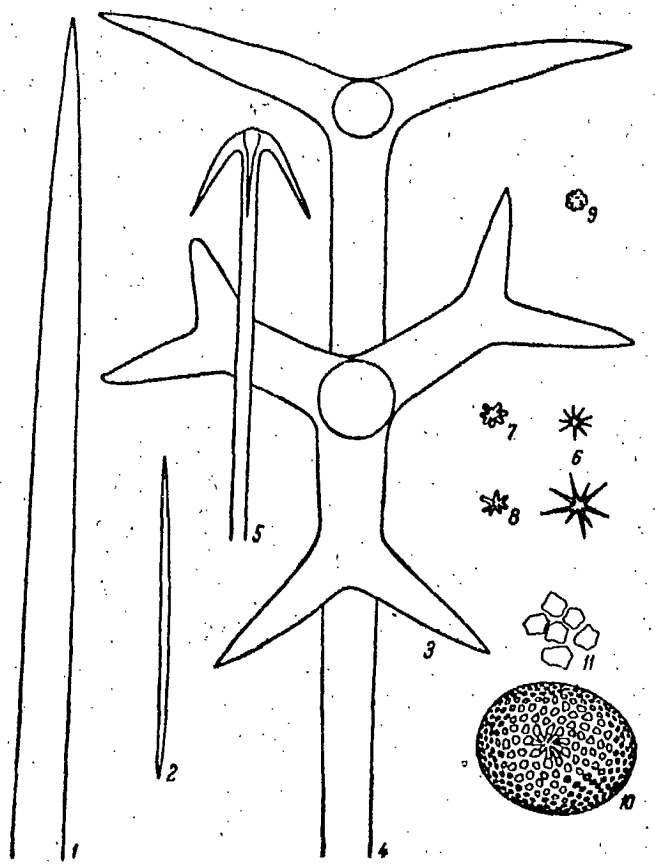

Fig. 26. Geodia barretti Bowerbank.

1- large oxea (x100); 2- small oxea (x100); 3- dichotriaenes (x100); 4- orthotriaene (x100); 5- anatriaene (x100); 6- oxeasters (x200); 7-9- stongylasters (x400); 10- sterraster (x200); 11- section of the surface of a sterraster (x800).

such short rays that the latter have the appearance of tubercles; protriaenes and large oxeasters in small numbers. The occurrence of G. barretti in the norther part of the Kara Sea, noted in the work of G.P. Gorbunov (1946:37), is very doubtful. This species belongs to the boreal species which are encountered in the Arctic in places where there is quite a considerable influence of the warm Arctic current. Widespread in the northern part of the Atlantic Ocean is the sponge G. nodastrella Carter, which is evidently with the species under consideration.

5. Geodia phlegraei (Sollas, 1880) (Fig. 27; Plate IX -1; Plate X - 1-4).

S o l l a s, 1880:396, pl. XVII (Isops); V o s m a e r, 1882:13, pl. I, Figs. 10-11, pl. II, Figs. 27-28, 39-49, pl. IV, Fig. 116 (Isops sphearoides); 1882: 16, pl. I, Figs. 9,15, pl. II, Figs. 22-26, 29-38, pl.IV, Fig. 117 (Isops pallida); 1882:20, pl. III, Figs. 52-63, pl. IV, Figs. 119, 154 (Synops pyriformis); 1885:10 (Synops pyriformis); H a n s e n, 1885:17, pl. V, Fig. i (parva); 1885:17, Fig. 15 (Pachymatisma johnstonia).

Body is spherical, frequently very flattened on the top and somewhat narrowed towards the bottom, up to 14 cm in height and 20 cm wide; sometimes, thick root outgrowths are formed at the base. The surface is usually slightly uneven, with small tubercles; dermal seta up to 1 cm long and longer (observed only in places on the surface and not in all specimens). The colour ranges from light gray to light brown and light rose. Numerous oscular and pore apertures which are surrounded by a small number of elevations. Oscula, up to 1 mm in diameter, occur on the upper part of the body; the pores are approximately 0.3 mm in diameter. The cortical layer is up to 2.5 mm thick.

Spicules. Megascleres: large oxeas (often with one rounded end) up to 6.6 mm long and 0.080 mm thick, orthotriaenes 2.5-5.4 mm long when the thickness of the virgula is 0.060-0.110 mm (rami are 0.400-0.900 mm long), dichotriaenes (rare in adult specimes) are 1.2-5.4 mm long when the thickness of the basic virgula is 0.050-0.110 mm (rami of the first order 0.150-0.200 mm long, rami of the second order 0.250-0.500 mm long), anatriaenes up to 5 mm long when the thickness of the basic virgula is 0.032 mm

(rami 0.030-0.100 mm long). Sometimes small oxeas (slightly curved) are encountered in very small numbers which are 0.230-0.420 mm long and 0.008-0.010 mm thick. Microscleres: sterrasters 0.060-0.130 mm in diameter, spherasters (with well marked central part and with low conical rays which are sometimes rounded at the ends) 0.012-0.024 mm in diameter, oxeasters (with smooth or rough and echinate rays) 0.014-0.070 mm in diameter.

Distribution. Barents Sea (south-western part), Kara Sea (northern part), central part of the Arctic Ocean, Sea of Greenland, Sea of Norway, Strait of Denmark. It inhabits the depth of 171-1,450 m; observed when the temperature ranges from -0.92 to 2.38°.

Off all of the Geodia which have been considered G. phlegraei is one of the most labile according to morphological and ecological features. It is not by chance that many authors described modifications of this sponge under different species names. Burton (1930b),,according to an examination of preparations of spicules made from typical specimens of G. parva Hanse, Isops pallida Vosmaer, I. sphaeroides Vosmer and Synops pyriformis Vosmaer, /56 comes to the conclusion that all of these Geodia names should be regarded as synonyms of G. phlegraei (Sollas). The study of the collections of the Institute of Zoology of the Academy of Sciences of the USSR, which contain more that 100 specimens of sponges belonging to this species, corroborates this opinion of Burton. Specimens which were obtained in the south-western part of the

Barents Sea (depth, 91-299 m) completely fit the description given by Vosmaer (1882) of Synops pyriformis. At considerable depths (usually exceeding 300 m) in the Sea of Norway and the Sea of Greenland and in the central part of the Arctic Ocean representatives of G. phlegraei are also encountered, but they are smaller in size, brighter in colour and their cortical layer is thinner (an average thickness of 0.5-0.9 mm); the spherasters frequently have rays which are rounded at the ends. These specimens mostly approach the description of the sponge Isops sphaeroides Vosmaer, which is evidently the young form of G. phlegraei. A specimen was ob obtained from a depth of 1,860 m in the Sea of Norway which had the appearance of an irregular tablet (19x15x10 cm) with an uneven folded surface. This sponge generally fits the description of G. phlegraei but differs in having, in addition to otrhotriaenes and anatriaenes, its derivatives - orthomonzenes, mezanatriaenes and orthopromezotriaenes; spherasters mainly have rays which are rounded at the ends. Evidently, the sponge under consideration represents an aberrant form of G. phlegraei.

For various sections of the Arctic Ocean (including the Sea of Norway) in addition to the four species of Geodia which are considered here, G. mulleri (Fleming), G. simplex Schmidt and G. nodastrella Carter are worth mentioning; G. mulleri has been recorded off the coast of Norway and Iceland (Burton, 1930b, 1959). However, the data on the occurrence of this thermophilic species in the northern part of the Kara Sea (Gorbunov, 1949) and in the south-western part of the Bering Sea (Breitfus, 1912:62)

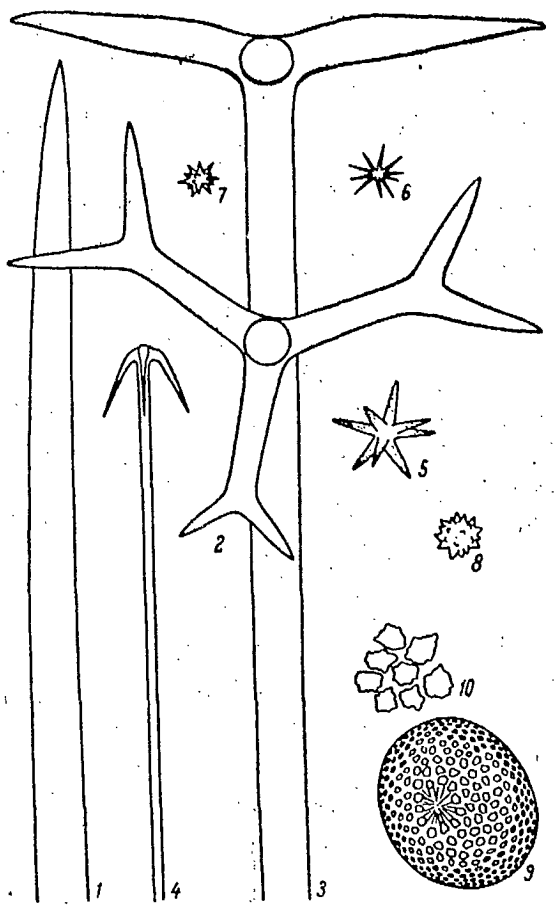

Fig. 27. Geodia phlegraei (Sollas).

1- large oxea (x100); 2- dichotriaene (x100); 3- orthotriaene (x100); 4- anatriaene (x100); 5,6- oxeasters (x400); 7,8- spherasters (x400); 9- sterraster (x200); 10- section of the surface of sterrasters (x800);

are wrong: a study of corresponding samples of sponges showed that in fact they belong to the species G. phlegraei. Of course, if G. mulleri does occur off the coast of Norway it is entirely right to expect it to occur in the south-western part of the Barents Sea as well. Nevertheless, this species does not occur here if we base our judgment on the collections of sponges which exist at the Institute of Zoology of the Academy of Science of the USSR. Although G. simplex /57

is recorded for the coast of Norway (Burton, 1930b) and the eastern part of Greenland (Schmidt, 1870) it is not described in sufficient detail; for this reason there are grounds for doubting the real existence of G. simplex as an independent species. We have already commented on G. nodastrella as a probable synonym of G. barretti. The species G. megastrella is also unlikely.

2. Genus GEODINELLA Lendenfeld, 1903

L e n d e n f e l d, 1910:252; W i l s o n, 1925:322

Genus type: G. cylindrica (Thiele, 1898).

The megascleres are represented by monaxial spicules (oxeas, styles and strongyles) and sometimes by triaenes with greatly reduced rami. Microscleres are in the form of spherical or ellipsoidal sterrasters, spherasters, oxeasters and other euasters. The skeleton is radial: triaenes are encountered both in the surface layers and inside. The sponges are digitiform, spherical or funnel-shaped.

1 (2). Body of the sponge is funnel-shaped or sacciform; there are no triaenes (the rays are completely reduced until the triaenes are reduced to styles and strongyles); the euasters are represented by spherasters and oxeasters.....1. G. hyotania Tanita.

2 (1). The body of the sponge is cortical, cushion-shaped or digitiform; the triaenes have greatly reduced rays (usually diaenes or monaenes); the euasters are represented by strongylasters and oxeasters.....2. G. robusta Lendenfeld.

1. Geodinella hyotania Tanita, 1965 (Fig. 28, Plate XV).

T a n i t a, 1965:53, pl. III, Fig. 13, text-Fig. 7

The body is funnel-shaped or saciform, up to 30 cm in height; diameter of the incurrent aperture in the spacious atrial cavity reaches 22-28 cm; the wall thickness of the saciform body of the sponge is approximately 1 cm. The surface is smooth. The oscula (approximately 1 mm in diameter) occur on the inner surface, pores are on the outside; these and other apertures completely cover the body of the sponge and are equidistant from one another. The colour is beige or light brown. The sponge is very strong because of an armoured cortical layer which is up to 2 mm thick. Under it are the soft tissues of the sponge with a poorly developed skeleton which is formed by individual fibers and clusters of monacanthine spicules.

Spicules. Megascleres: oxeas with blunt ends (to styles and strongyles), usually curved in the middle, 1.4-2.8 mm long and 0.032-0.065 mm thick. Microscleres: sterrasters (oval or somewhat irregular) 0.080-0.170 mm in diameter, oxeasters (with six to twelve rays, frequently with spinules at the ends) 0.013-0.032 mm in diameter, spherasters (with short conical rays) 0.004-0.015 mm in diameter.

Distribution. Sea of Japan (off Hokkaido, Moneron and Sado). Depth, 60-100 m.

This species is represented in the collections by three specimens and differs from other known species of this genus by the absence of triaenes; instead of these there are styles which can /58 be regarded as derivative triaenes which are formed as a result of the complete reduction of their rami.

2. Geodinella robusta Lendenfeld, 1910 (Fig. 29; Plate XIII, 2-3).

L e n d e n f e l f, 1910:205, 252, pl. 1-IV.

Body is cortical, cushion-shaped or digitiform, up to 10 cm long when the width is 3 cm. The surface is smooth, usually slightly uneven, with small spherical tubercles. The oscula are approximately 1.5 mm in diameter. The colour is light brown or light yellow. The cortical layer is up to 3 mm thick.

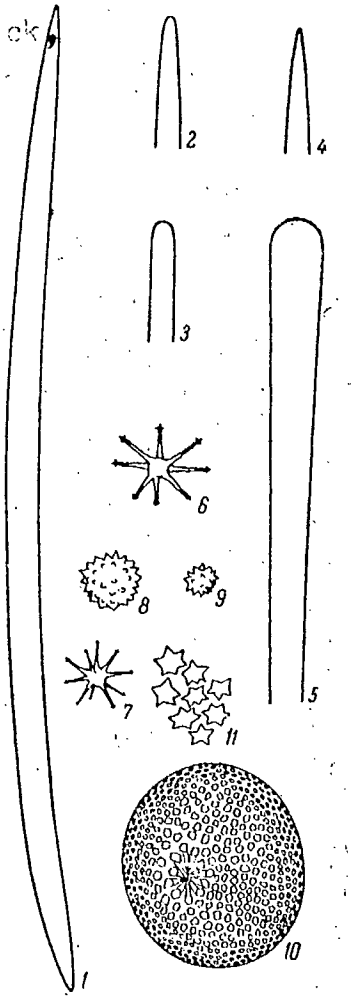

Fig. 28. Geodinella gyotania Tanita.

1- oxea (x100); 2-4-ends of oxeas (x100); 5- part of style (x100); 6,7-oxeasters (x400); 8,9- spherasters (x500); 10- sterraster (x200); 11-part of the surface of a sterraster (x800).

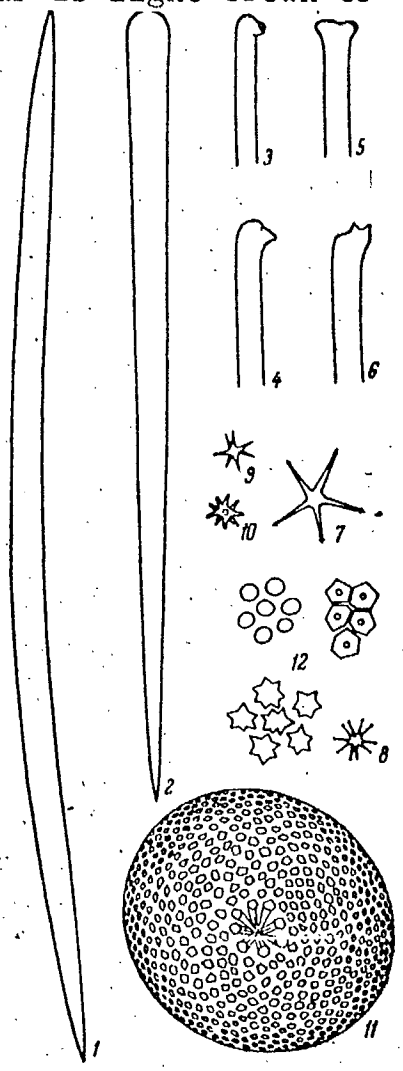

Fig. 29. Geodinella robusta Lendenfeld.

1- oxea (x100); 2- style (x100); 3-6-ends of triaenes with reduced rami (x100); 7-9-oxeasters (x400); 10- strongylaster (x500); 11-sterraster(x200); 12-sections of the surface of sterrasters (x800).

Spicules. Megascleres: oxeas frequently with blunt ends (to styles and strongyles), 0.370-2.500 mm long and 0.040-0.080 mm thick; monaenes, diaenes and triaenes with greatly reduced rami, 1.1-2.1 mm long when the thickness of the virgual is 0.026-0.042 mm (rami up to 0.105 mm long). Microscleres: sterrasters (oval) 0.130-0.237 mm in diameter, oxeasters and oxeaspherasters (with six to twelve cylingrica rays which are sometimes echinate) 0.008-0.038 mm in diameter, strongyles 0.0035-0.009.

Distribution. Sea of Japan (near Okushiri Island) and of the western coast of North America (from southern California to Alaska). 75-274 m depth.

We shall examine two specimens; the reduction of the rami of the triaenes and their derivatives (monaenes and diaenes) had progressed to such an extent in these sponges that the rami have the appearance of small tubercles or antennae; the sterrasters are 0.130-0.180 mm in diameter.

3. Genus PACHYMATISMA Johnston, 1842

L e n d e n f e l d, 1903:90.

Genus type: P. johnstonia (Bowerbank, 1842).

The megascleres are represented by oxeas, triaenes and their derivatives. Microscleres are in the form of spherical sterrasters euasters and microrhabds. The sponges are semispherical or irregular in form.

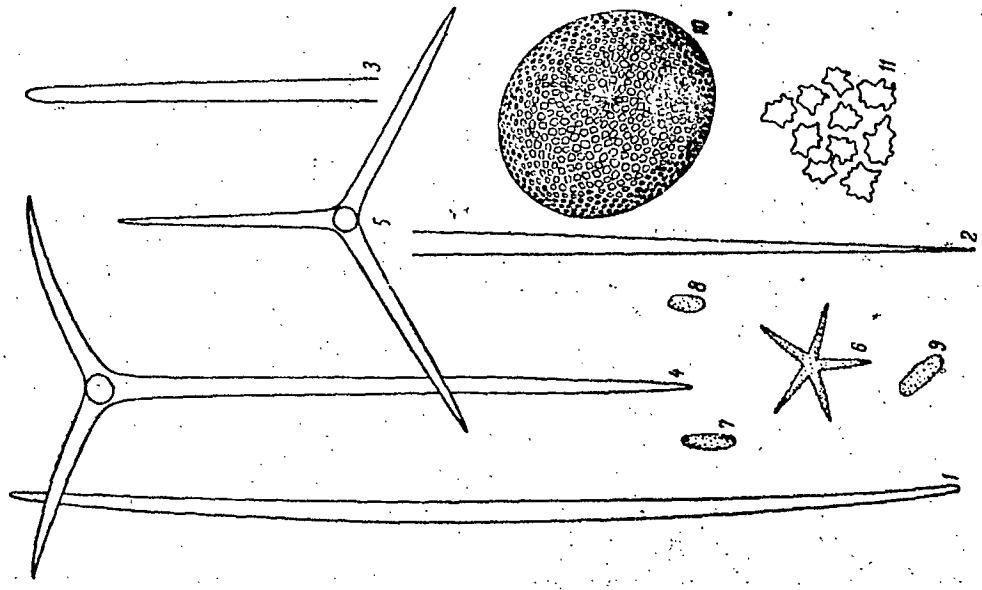

Fig. 30 Pachymatisma johnstonia (Bowerbank).

1- oxea (x100); 2,3- ends of oxeas (x100); 4,5- orthotriaenes (x100); 6- oxeaster (x200); 7-9- microstrogyles (x400); 10- sterraster (x200); 11- section of the surface of a sterraster x1,000)

1. Pachymatisma johnstonia (Bowerbank, 1842) (Fig. 30).

S o l l a s, 1888:243 (normani); Arndt, 1935: 28, Fig. 39.

Body is semispherical or irregularly lobed, up to 15 cm in diameter. The sponge is strong, hard, with a well developed cortical layer (approximately 1 mm thick). The colour is bluish, violet-gray, rose or reddish on the outside and light yellow on the inside (during life).

Spicules. Megascleres: oxeas with blunt end (to strongyles and styles) 0.600-1.680 mm long and 0.013-0.027 mm thick, orthotriaenes a virgula 0.400-0.830 mm long and 0.013-0.026 mm thick (rami are /60 0.130-0.446 mm long). Microscleres: sterrasters (almost spherical) 0.071-0.200 mm in diameter, oxeasters (with rough rays) 0.034-0.080 mm in diameter, microscleres (finely echinate, frequently centrotylotic) 0.019-0.32 mm long.

Distribution. Sea of Norway, northern part of the Atlantic ocean (to the Azores). Depth, 0-329 m.

Boreal species; it may be expected to occur in the south-western part of the Bering Sea.

V. Fam. TETILLIDAE

Sponges of a definite body shape, primarily radially symmetrical: spherical, egg-shaped or dome-shaped. Megascleres are represented by oxeas and triaenes. Microscleres in the form of sigmas (and their derivatives). Cortical layer (fibrous) usually well developed. The skeleton is radial (frequently of the spiral type).

1. Genus TETILLA Schmidt, 1868

L e n d e n f e l d, 1903:16

Genus type: T. cranium (Muller, 1776).

Megascleres are represented by oxeas and triaenes. Microscleres in the form of usual or anchor-like sigmas. Oscula, singly or two to three.

1 (4). Among the triaenes there are sagittal protriaenes (with rami of various lengths); cortical layer is not developed.

2 (3). Sigmas are centrotylotic (with a swelling on the virgula).....
.....1. T. polyura Schmidt.

3 (2). Common sigmas (without a swelling on the virgula.....
.....2. T. sibirica (Fristedt).

4 (1). Sagittal protiaenes are absent; cortical layer is usually well developed.

5 (8). Triactines are represented by normal anatriaenes and protriaenes.

6 (7). Common sigmas.....3. T. cranium (Müller).

7 (6). Sigmas with denticles on the ends (anchor-like sigmas).....

.....4. T. sigmoancoratum Koltun.

8 (5). Among the triaenes there are a considerable number of derivative anatriaenes or protriaenes.

9 (10). There are anodiaenes, anamonaenes and other derivative anatriaenes.....5. T. hamatum Koltun.

10 (9). Anatriaenes are normal; there are protriaenes with denticles on the end of the rami (right to the dichotriaenes).....

.....6. T. infrequens (Carter).

1. Tetilla polyura Schmidt, 1870 (Fig. 31; Plate XVIII,

S c h m i d t, 1870:66, pl VI, Fig. 8; V o s m a e r, 1885:9, pl. I, Figs. 1-3, pl. II, Fig. 16; M a r e n s e l l e r, 1886:13, pl. I, Fig. 4 (geniculata); S o l l a s, 1888:1, pl. I, Figs. 16-27 (sandalina); T o p s e n t, 1904:97, pl. II, Fig. 1. pl IV, Figs. 12-13, pl. XI, Fig. 2 (longipilis); R e z v o j, 1924:242; 1928: 76; B r ø n d s t e d, 1933:7 (sandalina).

Body is egg-shaped or spherical, up to 7 cm in height. /61 The surface is velvety, spicular and frequently supplied with small conules; in the lower part of the sponge body the spicules on the surface attain a considerable size, forming a root attachment pubescenc Colour is from light gray to grayish yellow and brown. The osculum on the apex reaches 4 mm in diameter. The cortical layer is not pronounced. The skeleton is radially spiral.

Spicules. Megascleres: large oxeas (sometimes variously-ended) are 1.5-5.0 mm long and 0.010-0.035 mm thick, thread-like oxeas are 0.340-1.8 mm long, the protiaenes (sagittal) are 1.3-8.7 mm

long (and longer) when the thickness of the virgula is 0.003-0.005 mm (the large ramus is 0.070-0.200 mm long and the small rami are 0.019-0.070 mm long), anatriaenes (may be absent) reach a length of 10 mm (and longer) when the thickness of the virgula is 0.006-0.008 mm (the rami are 0.050-0.120); single prodiaenes and promonaenes are encountered. Microscleres: sigmas (centrotylotic) are 0.013-0.020 mm long (and sometimes reach a length of 0.020-0.028 mm).

Distribution. Barents Sea, Kara Sea, Sea of Laptevykh, Sea, of Greenland and Sea of Norway, Baffin Bay, off the Azores, the 4th Kuril Strait. Depth, 25-595 m (and to 1,846 m off the Azores).

Rather common for the western sector of the Arctic, the sponge is represented in the collections by 70 specimens. Undoubtedly, the species is genetically and morphologically related to T. sibirica; it differs markedly from the latter by sigmas which have swellings on the virgula (centrotylotic sigmas). In a few specimens, apart from large and thread-like oxeas, one can observe small oxeas (0.6-1.1 mm long and 0.016-0.020 mm thick); a certain connection is noted between the presence of anatriaenes and small oxeas in the skeleton. In the far-eastern seas the species is encountered rather seldom; in the collections there are only 2 specimens; they are distinguished by a poorly expressed centrotylotic quality of the sigmas.

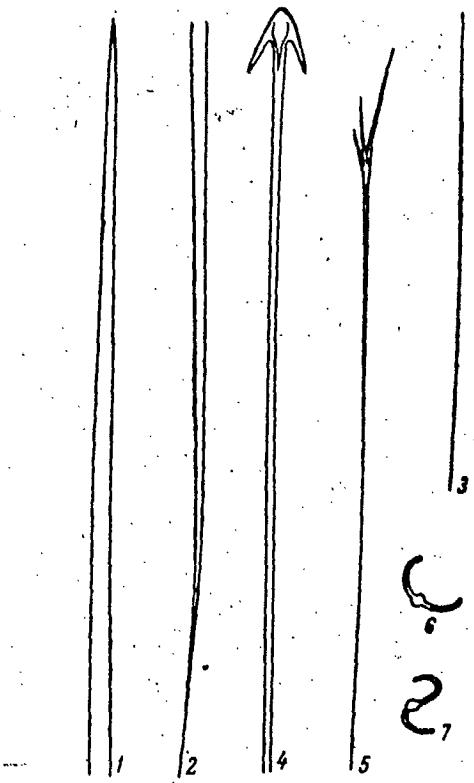

Fig. 31. Tetilla polyura Schmidt.

1,2- ends of a large oxea (100); 3- thread-like oxea (x100); 4- anatriaene (x100); 5- sagittal protriaene (x100); 6,7- sigmas (x400).

2. Tetilla sibirica (Fristedt, 1887) (Fig. 32, 33; Plate XVII, 1-3; Plate XVIII, 1).

F r i s t e d t, 1887:436, pl. XXIV, Figs. 22-28, pl. XXVIII, Fig. 17 (Tethya); H e n t s c h e l, 1929:861, 916 (Tethya); K o l t u n, 1962:184.

Body is egg-shaped, spherical, dome-like or slightly club-shaped with root outgrowths at the bottom; the sponge attains a height of 12.5 cm. The surface is slightly setose and to some degree is longitudinally ribbed. The colour is gray or grayish-yellow. The cortical layer is not pronounced. The oscula on the apex attain a diameter of 2 mm, usually slit-like, and are few in number.

Spicules. Megascleres: large oxeas (frequently variously-ended) 2.0-6.0 mm long and 0.032-0.050 mm thick, small /62 oxeas are 0.440-1.300 mm long and 0.020-0.040 mm thick, anatriaenes are 1.7-4.0 mm long when the thickness of the virgula is 0.008-0.020 mm (rami are 0.070-0.270 mm long), protiaenes (with rami of varying lengths) are 0.650-2.0 mm long (and longer) when the thickness of the virgula is 0.002-0.004 mm (rami are 0.020-0.140 mm long), normal protriaenes are 2.0-3.7 mm long when the thickness of the virgula is 0.006-0.012 mm (rami are 0.070-0.150 mm long). Microscleres: sigmas are 0.012-0.030 mm long.

Distribution. Red Sea (off the northern coast of Taimyr), the Sea of Laptevykh (off the north-eastern and eastern coast of Taimyr, west of the Novosibirskii Islands), East Siberian Sea (north of the Anzhu Islands), Chukchi Sea (Pitlekai), Barents Sea (off the eastern coast of Spitsbergen), off the Pacific coast of the Kuril Islands. Depth, 7-54 m (in the Arctic) and 127-414 m (in the Pacific Ocean).

In the collections there are approximately 40 specimens of the species which have been collected mainly off the coast of Taimyr Peninsula and the Novosibirskii Islands. It should be noted that the young individuals of T. sibirica are very similar to those of T. polyura in outer appearance which allows us to regard the latter as neotenic forms of T. sibirica, morphologically and ecologically individualized to the position of an independent species. The far-eastern specimens of T. sibirica have a great similarity to

the sponge T. ovata which lives off the eastern coast of the Sea of Japan (Thiele, 1898:24; Lebwohl, 1914a:5).

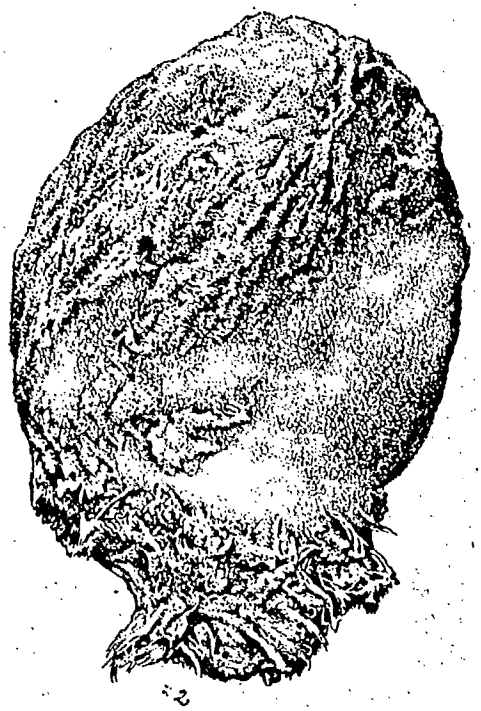

Fig. 32. Tetilla sibirica (Fristedt). External appearance the sponge (x1).

3. Tetilla cranium (Müller, 1776) (Fig. 34; Plate XVI, 1-4).

S c h m i d t, 1889:14 Taf. I, Fig. 14 (Tethya); B o w e r b a nkk, 1872:118 pl. V, Figs. 7-10 (Tethea unca); C a r t e r, 1872:417, pl. XXII, Figs. 1-6 (Tethya zethlandica); V„o s m a e r, 1885:6, pl. II, Figs. 9-15, pl. V. Figs. 1-2 (Craniella mulleri); S o l l a s, 1888:51 (Craniella); T o p s e n t, 1913:13, pl. V. Figs. 4-6 (Tethya abyssorum); 1913:14, pl. II, Fig. 10; K o l t u n, 1962:184; 1964:146 (ssp. cranium).

Body is spherical, up to 9 cm in diameter. The surface has conules which are formed of clusters of spicules. The colour is from light-gray to yellow and grayish-brown. The oscula (one or several) attain a diameter of 5 mm. The cortical layer is well marked and reaches a thickness of 1.5 mm.

Spicules. Megascleres: the oxeas are variously ended, 2.1-9.2 mm long and 0.027-0.070 mm thick, dermal oxeas are 0.4-1.4 mm long and 0.032-0.055 mm thick, protriaenes are 3.2-8.5 mm long when the thickness of the virgula is 0.008-0.030 mm (rami are 0.050-0.236 mm long), anatriaenes are 2.1-20 mm long when the thickness of the virgula is 0.011-0.035 mm (rami are 0.050-0.220 mm long). /64 Microscleres: sigmas (sometimes absent) 0.009-0.020 mm long.

Distribution. Barents Sea (south-western and western parts), south-western part of Zemlya Frantsa-Iosifa, the central bathyal part of the Arctic Ocean, Sea of Laptevykh (north-western part), Sea of Greenland and Sea of Norway, northern part of the Atlantic Ocean, Sea of Japan, Sea of Okhotsk (north of Sakhalin), Pacific coast of the southern Kuril Islands. Inhabits the depth of 19-669 m (in exceptional cases it occurs at a depth of 1,300 m).

Widely distributed in the northern hemisphere, the sponge varies considerably in external appearance. The conules on the surface of the body are usually cone-shaped and flattened on the sides, attaining a height of 5 mm; in some cases they are very low and in such cases the surface is finely nodular and warty; sometimes the body has a thick cover of spicules.

4. Tetilla sigmoancoratum Koltun, sp. n. (Fig. 35; Plate XIX, 1-3).

The species type is kept at the Institute of Zoology of the Academy of Sciences of the USSR, preparations No. 5162 and No. 5067.

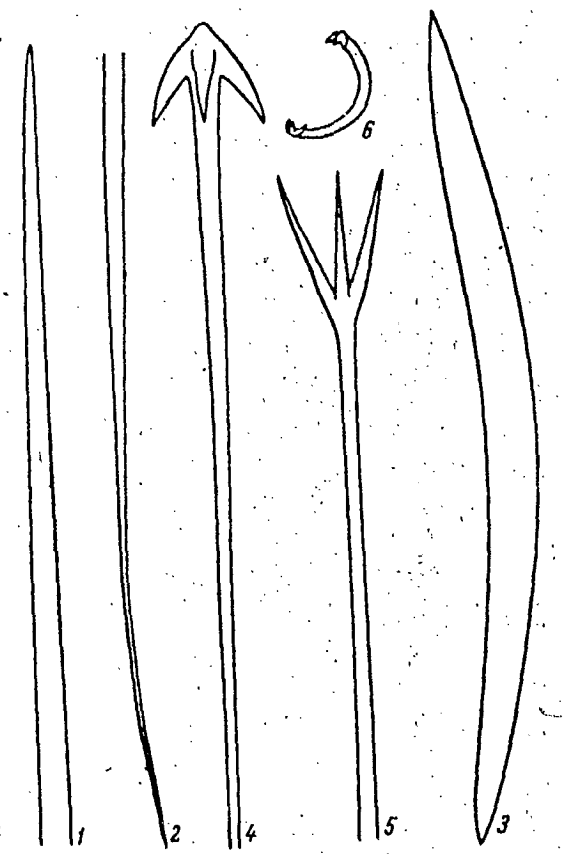

Fig. 35. Tetilla sigmoanchoratum Koltun.

1,2- ends of a large oxea (x100); 3- small oxea (x100); 4- anatriaene (x100); 5- protriaene (x100); 6- anchor-shaped sigmas (x400).

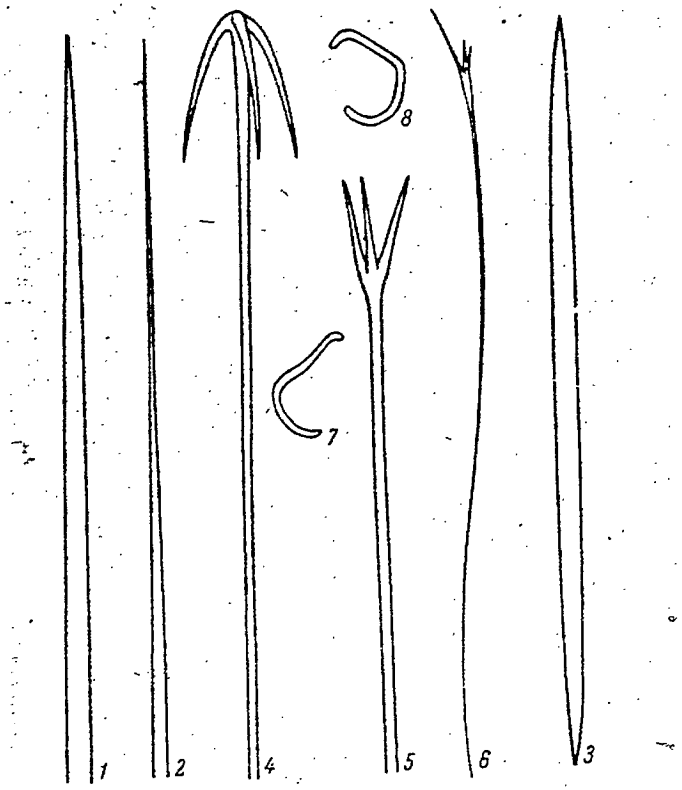

Fig. 33. Tetilla sibirica (Fristedt.)
1,2- ends of a large oxea (x100);
3- small oxea (x100); 4- anatriaene (x100);
5- usual protriaene (x100); 6- sagittal protriaene (x100); 7,8- sigmas (x400).

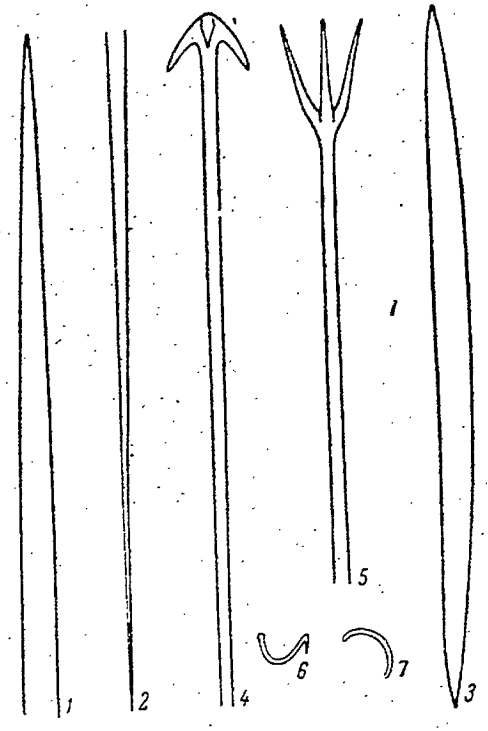

Fig. 34. Tetilla cranium (Muller).
1,2- ends of a large oxea (x100);
3- small oxea (x100); 4- anatriaene (x100);
5- protriaene (x100); 6,7- sigma (x400).

Body is spherical, up to 5 cm in diameter. The surface of the sponge is covered with long conules (up to 0.5 cm long). The colour is light-yellow. The cortical layer is well developed (approximately 1 mm thick). The skeleton is radially spiral.

Spicules. Megascleres: variously ended oxeas are 3.35-7.1 mm long and 0.050-0.078 mm thick, dermal oxeas are 0.46-1.34 mm long and 0.026-0.067 mm thick (rami are 0.087-0.235 mm long), anatriaenes are 3.0-8.7 mm long when the virgula is 0.013-0.040 mm thick (rami are 0.026-0.094 mm long). Microscleres: anchor-shaped sigmas are 0.022-0.034 mm long.

Distribution. The Pacific coast of the southern Kuril Islands and the 4th Kuril Strait. Depth 100-188 m.

In outer appearance the sponge under consideration is completely indentical with some representatives of T. cranium, having well developed conules. The only difference between these species is the shape and size of the sigmas. In T. sigmoancoratum small denticles occur on the ends of the sigma so that the spicule may be assigned to the category of anchor-shaped spicules which are characteristic of representatives of Order Tetraxonida. /65

5. Tetilla hamatum Koltum, sp. n. (Fig. 36; Plate XVI, 5-7)

Species type is kept at the Institute of Zoology of the Academy of Sciences of the USSR, preparation No. 12392.

Body is egg-shaped, up to 3cm high when the width is 2cm. The surface is densely covered with thin hard conules approximately 2 mm high; at the bottom there are root outgrowths with which the sponge attaches itself to the substrate. At the apex, or somewhat to the side, there are 1-3 small apertures (approximately 1 mm in diameter) which lead to a small pre-oscular cavity. The colour is light yellow or brown. The cortical laver is poorly developed (up to 1 mm thick); there is a coriaceous dermal membrane. The basic skeleton is radially spiral, represented by fibres of long spicules; the skeleton of the conules are formed by large oxeas and distinct harpoon-shaped spines (anamonaenes); the skeleton of the dermal membrane consists of a few short tangentially arranged oxeas.

Spicules. Megascleres: large oxeas (variously ended) are approximately 3.35-4.7 mm long and 0.032-0.058 mm thick, small oxeas (short) 0.60-0.94 mm long and 0.029-0.046 mm thick, harpoon-shaped spicules (anamonaenes) 2.68-5.70 mm long and 0.009-0.011 mm thick, protriaenes (and prodiaenes) 1.3-3.4 mm long when the virgula is 0.008-0.016 mm thick (rami are 0.060-0.140 mm long), anatriaenes (frequently with the complete reduction of one or two rami) 1.0-1.5 mm long and 0.005-0.007 mm thick (rami are 0.020-0.040 mm long), anatriaenes (and protiaenes) of the root outgrowths are /66 approximately 5 mm long when the thickness of the virgula is 0.021 mm. Microscleres: sigmas are 0.008-0.012 mm long.

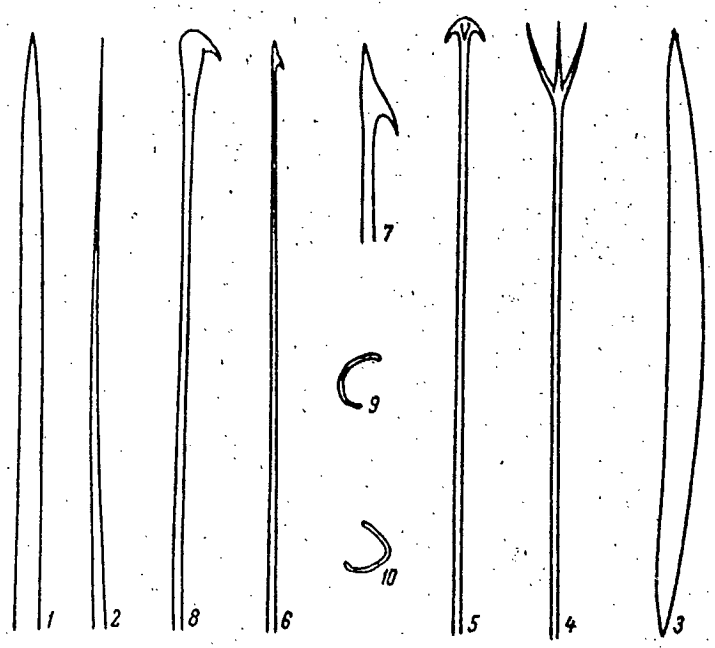

Fig. 36. Tetilla hamatum Koltun.

1,2 - ends of a large oxea (x100); 3 - small oxea (x100); 4 - protriena (x100); 5 - anatriena (x100); 6 - end of harpoon-shaped needle (x100); 7 - same (x400); 8 - anamonaene (x100); 9, 10 - sigmas.

Distribution. Pacific coast of the southern Kurile Islands. Depth, 414 m.

The new species differs from other representatives of the genus by the presence of distinct harpoon-shaped spicules in the skeleton. Three specimens have been studied.

6. Tetilla infrequens (Carter, 1876) (Fig. 37; Plate XVI, 8)

C a r t e r, 1876:405, pl. XVI, Fig. 16 (Tethya cranium var.); H a n s e n, 1885:18, pl. V, Fig. 5 (Tethya cranium var.); T o p s e n n t, 1913:16 (Craniellopsis infrequens); H e n t s c h e l, 1929:861 917 (Tethyopsilla infrequens).

Body is spherical, up to 4 cm in diameter. Surface usually has a dense cover of spicules. The colour is yellow or brown. The cortical layer is well developed. The skeleton is radially-spiral.

Fig. 37. Tetilla infrequens (Carter)

1,2- ends of a large oxea (x100); 3- small oxea (x100); 4,5- dichotriaenes (x100); 6- anatriaene (x100); 7,8- protriaenes (x100).

Spicules. Megascleres: variously ended oxeas 2.2-3.4 mm long and 0.034-0.046 mm thick, dermal oxeas are 0.42-0.58 mm long and 0.019-0.023 mm thick, protriaenes (ends of the rami are truncated and have denticles or are ramified) 2.1-3.3 mm long when the virgula is approximately 0.033 mm thick (rami are 0.112-0.238 mm long), anatriaenes are approximately 2.9 mm long when the virgula is 0.013-0.020 mm (rami are 0.098-0.160 mm long). Microscleres: sigmas are sometimes encountered in very small numbers (typical shape), they are 0.010-0.018 mm long.

Distribution. North and east of Spitsbergen and Zemlya Frantsa-Iosifa, western and southern Spitsbergen, off the coast of Norway between the Shetlan and the Farer islands. It /67 inhabits the depth of 418-1,156 m (when the temperature ranges from -1 to 0.94°); only east of Spitsbergen does it occur at a depth of 80 m.

Bathyal Arctic species, closely related to T. cranium. 15 specimens have been examined.

VI. Fam. POLYMASTIIDAE

The sponges are mainly radially symmetrical in body shape with well developed papillae and an individual cortical layer. Megascleres are represented by two or more types of tylostyles (and their derivatives). There are no microscleres. The skeleton is radial.

TABLE FOR DETERMINING THE GENERA OF FAM. POLYMASTIIDAE

1 (2). Among the megascleres there are distinct club-shaped spicules-spherotyles.....2. Sphaerotylus Topsent.

2 (1). Spherotyles are absent.

3 (10). Megascleres are represented by tylostyles, subtylostyles and styles.

4 (5). Sponges have a club-shaped body, sometimes ramified (in exceptional cases goblet-shaped.....4. Rhizaxinella Keller.

5 (4). Sponges of another shape.

6 (9). The sponges have well developed papillae on the surface.

7 (8). The body of the sponges is mushroom-shaped.....

.....3. Tentorium Vosmaer.

8 (7). Sponges of another body shape (frequently cushion-shaped, disc-shaped, lump-shaped ect.).....1. Polymastia Bowerbank.

9 (6). Papillae are absent.....5. Quasillina Norman.

10 (3). Among the megascleres there are oxeas which form the dermal skeleton; papillae are well developed; the species are cortical.

....6. Vosmaeria Fristedt.

1. Genus POLYMASTIA Bowerbank, 1866

B o w e r b a n k, 1864:177; G r a y, 1867:524 (Spinularia) 1967:527 (Penicillaris); S c h m i d t, 1870:48 (Radiella); 1870:51 (Rinalda); S a r s, 1872:15 (Trichostemma); M e r e z h k o v s k i i, 1879:68 (Clathroscula); V o s m a e r, 1885:66 (Weberella); T o p s e n t 1898:244 (Rhaphidorus); 1900:131; B u r t o o n, 1930a:670; 1930a:671 (Radiella).

Genus type: P. mamillaris (Muller, 1806),

Megascleres are represented by tylostyles, subtylostyles or styles. Microscleres are absent. The skeleton is radial; there is always an individual cortical layer the skeleton of which, to some degree, is formed by small spicules which are arranged in a the form of a palisade. There are usually well developed papillae on the surface. The sponges are mainly cushion-shaped, lump-shaped, sperical or disc-shaped (to slightly cup-shaped).

1 (10). The sponges are disc-shaped; when they are cushion-shaped or spherical then the surface is spicular to some extent.

2 (3). Among large spines there are polytylotic styles (or subtylostyle .....2. P. affinis Thiele.

3 (2). Polytylotic styles are absent.

4 (5). Papillae in large numbers (usually above 30 in adult specimens); often the oscular papilla differs from the bulk of porous papillae by being larger.....1. P. mammillaris (Müller).

a (b). The body is disc-shaped or cup-shaped (it usually has a marginal corona composed of long spicules) or cushion-shaped with a very spicular surface.....1b. P. mammillaris grimaldi (Topsent). /68

b (a). The body is cushion-shaped (less often spherical); the surface is slightly spicular or rough (no marginal corona of long spicules).

c (d). Large spicules do not exceed 1.2 mm in length..... .....1a. P. mammilaris mammillaris (Müller).

d (c). Large spicules considerably exceed 1.2 mm in length.....
.....1c. P. mammillaris rara Koltun.

5 (4). Papillae in small numbers (one or several, but considerably fewer than 30).

6 (9). There is one small papilla on the upper part of the body; disc-shaped, cup-shaped, less often cushion-shaped species.

7 (8). There is a marginal corona made up of long spines.....
.....10. P. sol (Schmidt).

a (b). Spindle-shaped tylostyles attain a thickness exceeding 0.015 mm.....10a. P. sol sol (Schmidt).

b (a). Spindle-shaped tylostyles do not attain a thickness of 0.015 mm.....10b. P. sol pacifica Koltun.

8 (7). The marginal corona of long spicules is not developed; the body of the spong is cushion-shaped.....3. P. hispidissima Koltun

9 (6). On the upper part of the body there are several papillae; the sponges are dis-shaped or cushion-shaped, usually with a well developed marginal corona of spicules (the remainder of the surface is smooth).....9. P. hemisphaericum (Sars).

10 (1). The sponges are lump-shaped, spherical or cushion-shaped; the surface of the body is smooth.

11 (12). Among large monactines there are distinct harpoon-shaped spines.....8. P. kurilensis Koltun.

12 (11). There are no harpoon-shaped spicules.

13 (20). Papillae are well developed; the dermal skeleton is formed of small tylostyles which are arranged in a palisade fashion.

14 (19). The basic skeleton is radial with well discernible fibres; the large spicules attain a length of 1 mm and longer.

15 (16). Small tylostyles cylindrical (shortly tapered); the papillae are very long (up to 5 cm long).....
.....4. P. robusta (Bowerbank).

a (b). Large tylostyles attain a length of more than 1.5 mm when the thickness is 0.030 mm.....4b. P. robusta toporoki Koltun

b (a). Large tylostyles not longer that 1.5 mm when the thickness is 0.022 mm.....4a. P. robusta robusta (Bowerbank).

16 (15). Small tylostyles which are spindle-shaped; short papillae (usually no longer than 1 cm).

17 (18). Papillae in large numbers (usually, more than 20), cylindrical (closed); small top-shaped tylostyles.....5. P. uberrima (Schmidt).

18 (17). Papillae in small numbers, crater-like (open); small tylostyles of another shape.....6. P. thielei Koltun.

19 (14). Basic skeleton composed of spicules in a random arrangement not forming distinct radial fibres; the large spicules are considerably shorter than 1 mm.....7. P. bursa (Müller).

20 (13). Papillae are poorly developed (represented by short papillose outgrowths); dermal skeleton formed of small tylostyles arranged randomly.....11. P. laganoides Lambe.

1. Polymastia mammillaris (Muller, 1806) Bowerbank, /69 (Fig. 38-41; Plate XX, 1-6; Plate XXIX, 6).

B o w e r b a n k, 1866:71 1874:31. pl. XII, Figs. 1-11; T o p s e n t, 1900:131, pl. IV, Figs. 8-13; H e n t s c h e l, 1929:923.

Body is cushion-shaped or disc-shaped (sometimes spherical), up to 13 cm in diameter when the height is 2 cm. The surface is usually spicular or densely setose, with numerous papillae which attain a length of 1.5 cm. The papillae are smooth, considerably varied in form: they may be conical, flat or cylindrical, club-shaped or in the shape of the tubercles. Pores and oscula occur on the apices of the papillae. The oscular papillae are few in number (one, two, three), they usually occur in the centre of the disc-shaped body of the sponge and are distinguished by their large size. The colour varies from yellow and orange to gray and brown. The papillae are in a lighter tone. The skeleton is of the radial type. The basic skeleton is represented by fibres of long spicules, extending from the base of the sponge to the surface; the dermal skeleton consists of small tylostyles which are arranged in a palisade manner and the ends of long spicules of the basic skeleton which penetrate the cortical layer.

Spicules. Megascleres: large and medium tylostyles (to styles) are 0.400-3.240 mm long and 0.010-0.029 mm thick, small tylostyles are 0.120-0.270 mm long and 0.004-0.008 mm thick, styles or subtylostyles are spindle-shaped (not always), up to 0.680 mm long and 0.024 mm thick.

Distribution. Arctic Ocean, northern part of the Atlantic Ocean, Mediterranean Ocean, northern part of the Pacific Ocean. Depth, 6-600 m.

One of the abundant and widely distributed sponges in the Arctic which is variable and polymorphous is represented in the northern and far-eastern seas by three sub-species.

1a. Polymastia mammillaris mammilaris (Müllers, 1806) 1866 (Fig. 39; Table XX, 6).

B o w e r b a n k, 1866:71 (mamillaris); M e r e z h k o v s k i i, 1879;5 (Rinalda arctica).

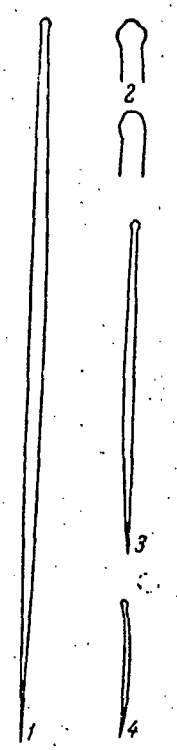

Fig. 38. Polymastia mammillaris mammillaris (Müller)

1- large tylostyle (x100); 2- ends of tylostyles (x100); 4- small tylostyle (x100).

Body of sponge is cushion-shaped (to spherical). The surface is finely spicular. The cortical layer reaches a thickness of 1.5 mm; its skeleton consists of small tylostyles which are arranged in a palisade manner, medium sized tylostyles which lie tangentially below them and the large ends of spicules which penetrate the cortical layer and protruding above the surface.

Spciules. Megascleres: large and medium tylostyles (to styles) are 0.400-1.200 mm long and 0.010-0.025 mm thick, the small tylostyles are 0.120-0.240 mm long and 0.002-0.007 mm thick.

Distribution. Barents Sea (south-western and south-eastern part), White Sea, Sea of Norway and Arctic Sea, northern part of the Atlantic Ocean, Mediterranean Sea. Depth, 6-340 m.

1b. Polymastia mamillaris grimaldi (Topsent, 1913) /70 (Fig. 39, 40; Plate XX, 1-5).

V o s m a e r, 1882:26 (penicillus); 1885:14, pl. III, Figs. 10-11 (mammillaris); H a n s e n, 1885:9 (penicillus); L e v i n s e n, 1886:8, Table XXIX, Fig. 2-3 (penicillus); F r i s t e d t, 1887:484 (penicillus); H e n t s c h e l, 1916:8 (var. hyperborea); K o l t u n, 1964:149 (Radiella grimaldi).

Body is disc-shaped, less often cushion-shaped (when growing on rocks). Surface is densely setose; usually it has a corona of long spines, framing the edge of the disc-shaped body. A cortical layer up to 2 mm thick.

Spciule. Megascreres: large tylostyles (to styles) to 3.24 mm long and 0.029 mm thick, average spindle-shaped tylostyles are up to 0.670 mm long and 0.024 mm thick, small tylostyles (to styles) are 0.147-0.270 mm long and 0.004-0.008 mm thick, styles (to subtylostyles) are up to 7 mm long.

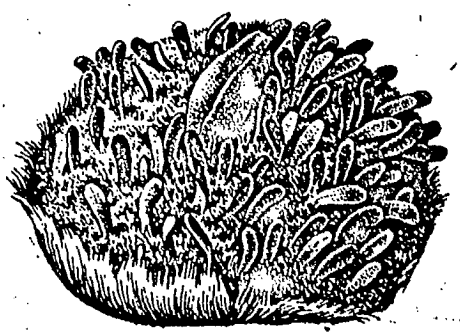

Fig. 39. Polymastia mammillaris grimaldi (Topsent). External view of sponge (xl).

1C. Polymastia mammillaris rara Koltun, ssp. n. (Fig. 41; Plate XXIX, 6).

Body is cushion-shaped, up to 9 cm when the height is 3 cm, the top is completely covered with cylindrical papillae (approximately 1 cm long and 1-4 mm thick) among which one or two oscular papillae of distinct shape (considerably widened at the base) are outlined. The surface is spicular. The colour is light-yellow. The cortical layer is well developed and attains a thickness of 2 mm. The sponge is soft. The skeleton is radial; inside, it consists of clusters of large spicules whose points are directed towards the surface. The dermal skeleton is made of a palisade layer of soft tylostyles and irregularly distributed average styles which lie beneath them (but most likely tangentially); also making up the dermal skeleton are large spicules of the basic skeleton which penetrate the cortical layer and the bases of long thin spicules which protrude considerably above the surface and which give the sponge a setose appearance.

Spicules. Megascleres: large styles are 0.87-1.60 mm long and 0.016-0.027 mm thick, medium styles (straight) are 0.335-0.536 mm long and 0.010-0.016 mm thick, small tylostyles (to styles) are 0.130-0.187 mm long and 0.004-0.008 mm thick, long styles (thin, oxea-like) are approximately 2.2-3.7 mm long and 0.010-0.012 mm thick.

Distribution. Off the eastern coast of Kamchatka and the southern Kuril Islands. Depth, 105-126 m.

The diagnosis of the subspecies is based on a study of two specimens which being closely related to P. m. grimaldi /72 differ mainly by the shape of the spicules and in part by the outer appearance of the sponges themselves.

2. Polymastia affinis Thiele, 1898 (Fig. 42; Plate XXVIII, 1,2).

T h i e l e, 1898:31, Taf. I. Fig. 16, Taf. VII, Fig. 21.

The body is oblate or cushion-shaped, up to 11 cm in diameter when the height is 3 cm. There is a large number of papillae on the surface which are usually conical in shape, up to 1.5 cm long when the thickness at the base is 0.6 cm; sometimes the papillae are low (warty) approximately 1 cm in diameter. The surface is smooth or spicular to a certain degree; in some cases a marginal corona of spicules is observed. The cortical layer is up to 1 mm thick. The colour is light gray or brown. The basic skeleton is formed of radial fibres of long spicules. The dermal skeleton consists of an outer layer of small tylostyles which are arranged in

/71

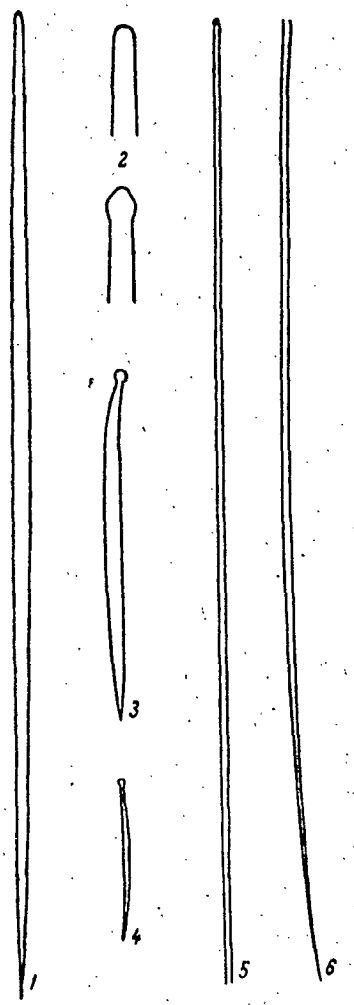

Fig. 40. Polymastia mammillaris grimaldi (Topsent).

1- large style (x100); 2- ends of large styles (x200); 3- spindle-shaped tylostyle (x100); 4- small tylostyle (x100); 5,6- ends of long style (x100).

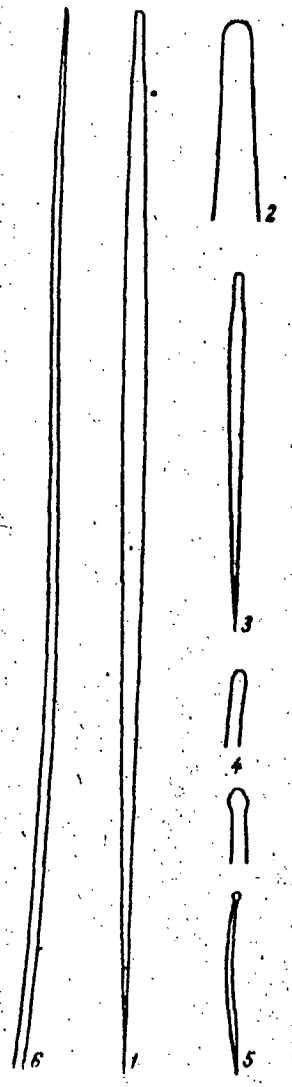

Fig. 41 Polymastia mammillaris rara Koltun.

1- large style (x100); 2- basal end of style (x300); 3- style (x100); 4- ends of small tylostyles (x300); 5- small tylostyle (x100); 6- long style (x100).

a palisade manner; under them there is a layer of average tylostyles which are irregularly distributed (at times tangentially). The ends of the radial fibres may pierce the cortical layer and protrude outside.

Spicules. Megascleres: styles or subtylostyles (among them there are polytylotic spines) 0.737-0.478 mm long and 0.015-0.030 mm thick, average tylostyles (spindle-shaped) are up to 0.646 mm long and 0.002-0.008 mm thick, styles or long subtylostyles (may be absent) are up to 6 mm long.

Distribution. Off the Pacific coast of Kamchatka, the southern Kuril Islands and Japan. Depth, 102-303 m.

In the collections there are 10 specimens. The size of the spines in various representatives of the species may vary considerably; in particular this applies to small tylostyles of the palisade layer and also of the large substyles of the basic skeleton. In the majority of the sponges studied the palisade layer is formed of very thin small tylostyles (averaging 0.081-0.140 mm long and 0.002-0.003 mm thick); the specimens which differs in the presence of a marginal corona consisting of long spines around the body has small tylostyles which are larger than usual (0.134-0.234 mm long and 0.005-0.008 mm thick). /73

3. Polymastia hispidissima Koltun, sp. n. (Fig. 43; Plate XXVIII, 3 - 5).

Species type is kept at the Institute of Zoology of the Academy of Sciences of the USSR, preparations NO. 25 and No. 12311.

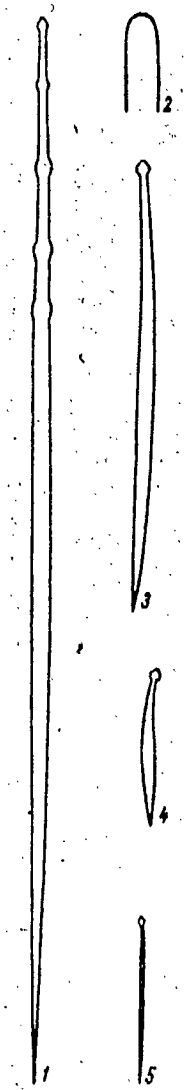

Fig. 42. Polymastia affinis Thiele.

1- large tylostyle (x100);
2- basal end of large style (x300); 3,4- average tylostyle (x100); 5- small tylostyle (x100).

Fig. 43. Polymastia hispidissima Koltun.

1- large tylostyle (x100);
2- basal end of tylostyle (x300);
3- average tylostyle (x100);
4- small tylostyle (x100);
5- long style (x100).

The body is cushion-shaped, up to 4 cm in width and 2 cm in height. The surface of the sponge is covered to a certain degree with a dermal seta which is up to 0.7 cm long. Usually, in the middle of the upper part of the body there is only one papilla which is raised above the dermal seta. The papilla attains a length of 1.5 cm; its form is very variable: papillose, cylindrical or leaf-like. The sponge is quite soft; it usually grows on a pebble, sometimes covering it on all sides. The cortical layer is poorly developed and is represented by almost a single leathery dermal membrane. The colour is light gray or dark brown. The skeleton is radial; inside, it is consists of fibres of large spicules, short pointed ends which are directed towards the surface. The dermal skeleton consists of a palisade layer of small tylostyles; under them there are larger spindle-shaped tylostyles which occur in a loose and random fashion; here, and sometimes in the radial fibres of the basic skeleton, long spicules begin which form the dermal seta.

Spicules. Megascleres: large styles (to subtylostyles) 0.872-2.68 mm long and 0.013-0.046 mm thick, average spindel-shaped tylostyles (to styles) are 0.435-1.072 mm long and 0.019-0.046 mm thick, small tylostyles are 0.107-0.221 mm long and 0.004-0.008 mm thick, long styles are up to 6.7 mm long and 0.046 mm thick.

Distribution. Sea of Japan, eastern coast of the southern and middle Kuril Islands. Depth, 44-209 m (and 1,530 m off the southern Kuril Islands).

The present species was found by Berton in the material from the far-eastern seas which was sent to him for processing. But, as far as we know, hitherto the diagnosis of this species had not been published and it is here being presented for the first time. The species is closely related to P. affinis which differs from it by a poorly developed cortical layer, the presence of only one papilla on the surface and large average tylostyles. In different representatives of the species the size of the spicules varies considerably; their shape is also varied, particularly that of the small tylostyles.

4. Polymastia robusta (Bowerbank, 1861) (Fig. 44, 45; Plate XXI, 1-4; Plate XXII, 1-2).

B o w e r b a n k, 1861:236 (Euplectella); 1874:23, pl. X, Figs. 5-8.

The body is cushion-shaped, up to 10 cm wide and 2.5 cm high; the small specimens may sometimes be almost spherical. The surface is smooth, with numerous, usually, cylindrical papillae which attain a length of 5 cm (and longer) when the width is 0.5 cm. There is a well developed cortical layer which is approximately 1 mm thick. The colour is yellowish-orange, beige, light gray or brown. The pores and oscula are microscopically small and occur on the apices of the papillae. The skeleton inside the sponge consists of thin radial clusters and fibres of large spicules or it is irregularly distributed. The skeleton of the cortex of the sponge consists of an outer palisade layer which consists of small tylostyles; under this layer there are tangentially arranged clusters of large spicules.

Spicules. Megascleres: large substyles (to styles and tylostyles) 0.500-1.800 mm long and 0.008-0.030 mm thick, cylindrical tylostyles (to substyles) are 0.095-0.260 mm long and 0.003-0.006 mm /74 thick; tylostyles are observed which are in between the large and the small in size.

Distribution. Barents Sea (south-western part), White Sea, Sea of Norway and North Sea, the northern part of the Atlantic Ocean; the southern Kuril Islands. Depth, 0-390 m (found in the littoral part off the British Isles).

Boreal species, represented in the collections by 20 specimens. The sponge P. euplectella, described by P.D. Rezvyi (1927), is regarded here as a synonym of P. robusta. Evidently, also belonging to the present species are sponges which have been recorded for the Sea of Norway by Topsent (1913:19) as P. agglutinans. Vaceltet (1961) mentions the occurrence of P. robusta in the Mediterranean Sea but, unfortunately, he does not give a diagram of the spicules of this sponge, noting, however, that only by the spicules is it possible to distinguish P. robusta from P. mammillaris. Meanwhile, the shape of the small spines - tylostyles - of the specimens being considered of the given species is very characteristic and clearly distinguished it from other closely related species of the genus Polymastia (P. mammillaris, P. uberrima, P. thielei). Characteristic of P. robusta, in addition to the specific shape of the small tylostyles (cylindrical and short-pointed) is the presence of very long papillae which have a rather regular skeleton (sometimes in the form of an openwork mesh). It is reasonable to regard the north-Atlantic forms of this species and the morphologically related sponges which occur off the Kuril Islands as two independent subspecies.

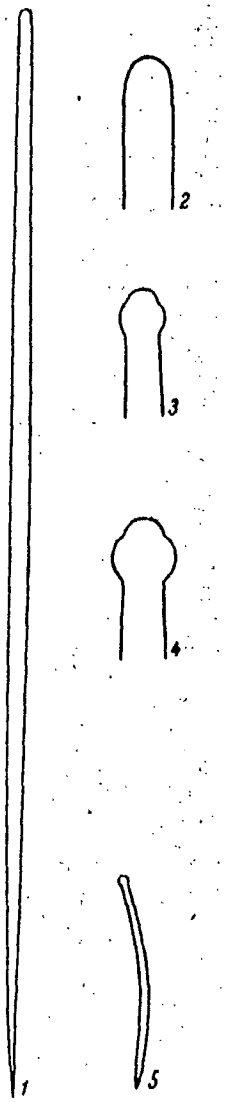

Fig. 44. Polymastia robusta robusta (Bowerbank)

1- large styles (x100); 2-4- basal ends of large styles (x400); 5- small tylostyle (x100).

4a. Polymastia robusta robusta (Bowerbank, 1861) (Fig. 44; Plate XXI, 1-4).

L a m b e, 1896:195, pl. II, Fig. 6; R e z v o i, 1927:301 (euplectella); A r n d t, 1928:31, Fig. 29a (robusta); H e n t s c h e l, 1929:922 (robusta); A r n d t, 1935:34 (robusta).

The body is cushion-shaped, up to 10 cm wide and 2.5 cm high. The cortical layer is up to 1 mm thick. The papillae attain a length of 5 cm (longer when the width is 0.5 cm. The colour is yellowish-orange, beige or light gray.

Spicules. Megascleres: large substyles (to styles and tylostyles) are 0.500-1.450 mm long 0.008-0.022 mm thick, cylindrical tylostyles (to subtylostyles) 0.095-0.260 mm long and 0.003-0.006 mm thick.

Distribution. Barnets Sea (south-western part), White Sea, Sea of Norway and North Sea, off the coast of Spain, British Isles, Western Europe, North America (Gulf of St. Lawrence, off Portland, Nova Scotia, Prince Edward Islands) and off the coast of southern Greenland. Dept, 0-394 m.

4b. Polymastia robusta toporoki Koltun, ssp. v. (Fig. 45; Plate XXII, 1-2). / 75

The body is cushion-shaped, up to 7 cm in diameter when the height is 2 cm; the sponge grows over the valve of the mollusk Chlamis and thus gives the edge of the shell a disc-shaped body. The surface is smooth, with numerous long papillae (cylindrical or flattened on the sides) up to 4.5 cm long and 0.9 cm wide. The sponge is soft; the cortical layer is approximately 0.5 mm thick. The colour is brown. The skeleton is radial, typical for the species.

Spicules. Megascleres: the styles (to subtylostyles) are 0.670-1.800 mm long and 0.013-0.030 mm thick, tylostyles are small (cylindircal) 0.130-0.190 mm long and 0.004-0.006 mm thick.

Distribution. Off the southern Kuril Islands. Depth, 60-80 m.

5. Polymastia uberrima (Schmidt, 1870) (Fig. 46; Plate XXV, 1-3; Plate XXVI, 1).

S c h m i d t, 1870:51, Taf. VI, Fig. 3 (Rinalda).

The body is cushion-shaped, oblate or lump-like (to spherical), attaining a diameter of 12 cm. The surface is smooth, with numerous densely arranged papillae (up to 1 cm in height) lying one under another. The papillae differ in shape in different specimens: most frequently they are cylindrical or conical, sometimes flattened at the sides, either reduced or papillose. On the apices of the papillae there are small oscula of approximately 1 mm in diameter. The colour is light yellow, yellow, orange or light gray. There is a well developed cortical layer of up to 2 mm thick. The skeleton inside the sponge is comprised of thick radial clusters and fibres which are formed of large spicules. The skeleton of the cortical layer consists of small tylostyles which are arranged in a palisade fashion on the very surface (points on the outside); average tylostyles lie beneath them at random (also tangentially); the ends of the radial fibres of the basic skeleton penetrate here as well.

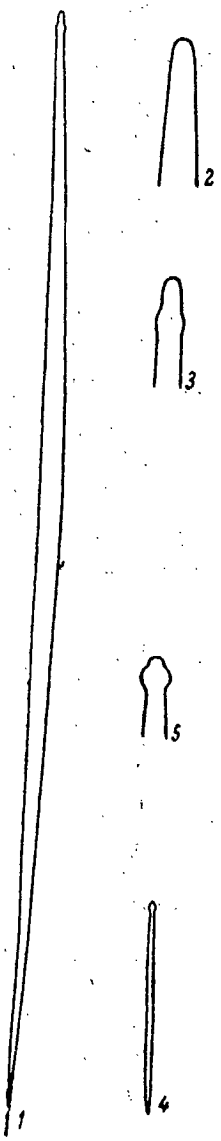

Fig. 45. Polymastia robusta toporoki Koltun.

1- large subtylostyles (x100); 2,3- basal ends of the subtylostyles (x300); 4- small tylostyle (x100); 5- basal end of small tylostyle (x400).

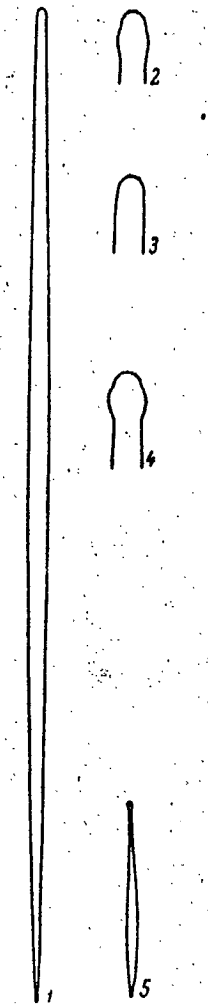

Fig. 46. Polymastia uberrima (Schmidt).

1- large style (x100); 2-4- basal ends of large styles (x300); 5- small style (x100).

Spicules. Megascleres: large tylostyles or subtylostyles (to styles) are 0.7-1.6 mm long and 0.010-0.025 mm thick, average /76 subtylostyles (to styles) are 0.450-0.650 mm long and 0.010-0.014 mm thick, small tylostyles (top-shaped) are 0.130-0.260 mm long and 0.003-0.006 mm thick.

Distribution. Barents Sea (south-western part), Sea of Norway, northern part of the Atlantic Ocean. Inhabits the depth of 124-465 mm recorded for the north when the temperature is 1-7°.

Boreal species. In the collections there are over 80 specimens of this sponge, very similar (even identical) with P. bursa in external appearance but differs from it in the nature of the skeleton and the shape of the small tylostyles.

6. Polymastia thielei Koltun, 1964 (Fig. 47, 48; Plate XXVII, 1-5).

H a n s e n, 1885:8, pl. VI Fig. 18 (Rinalda uberrima); T h i e l e, 1903:376, Fig. 2 (Rinalda uberrima); L u n d b e c k, 1909: 450, Taf. XIV, Fig. 4 (uberrima); T o p s e n t, 1913:18, pl. II, Fig. 5 (uberrima); Koltun, 1964:149, Fig. 4.

The body is lump-like, spherical or cushion-shaped, up to 7.5 cm in diameter, firm and pulpy. The surface of the sponge is smooth. There are tubular, crater-shaped or conical papillae up to 1 cm in height. Their numbers are small, usually 1-12, but no more than 20. Wide oscular apertures up to 1 cm in diameter occur on the apices of the papillae. There is a well marked cortical layer (up to 2.5 mm thick), distinctly noticeable in a cross-section of the sponge. The colour is gray, gray-yellow or light brown, sometimes light gray. The skeleton inside of the sponge consists of three layers: the outer consists of

small tylostyles which are irregularly distributed; the lowest layer consists of the ends of radial fibres, which penetrate into the second layer in places, and relatively sparse clusters of small tylostyles.

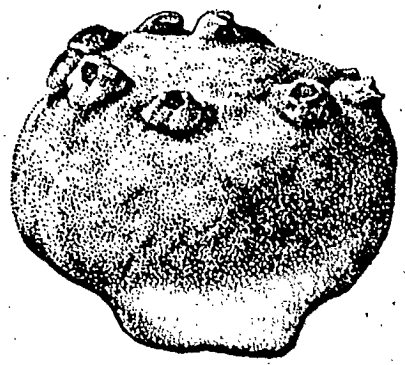

Fig. 47. Polymastia thielei Koltun. Outer appearance of the sponge (xl).

Spicules. Megascleres: large subtylostyles (to tylostyles and styles) 0.7-1.7 mm long and 0.012-0.025 mm thick, small tylostyles are 0.220-0.360 mm long and 0.004-0.009 mm thick; in addition to these spicules one also encounters average tylostyles (to substyles) 0.450-0.650 mm long and 0.010-0.012 mm thick. The latter may be quite fusiform and may resemble the spicules of P. m. grimaldi.

Distribution. The Barents Sea, Sea of Laptevykh and Kara Sea, north of Zemlya Frantsa-Iosifa, Sea of Greenland and the Sea of Norway. Mainly inhabits the depth of 23-446 m; it may occur down to 1,280 m in the Sea of Norway and the Sea of Greenland. A bathyal Arctic species which is closely related to P. uberrima.

7. Polymastia bursa (Müller, 1806) (Fig. 49; Plate IX, 2; Plate XXIII, 1-2; Plate XXIV, 1-2).

M ü l l e r, 1806:43, Table CLVIII, Fig. 1 (Alcyonidium); V o s m a e r, 1885:16, pl I, Figs. 12, 19, pl. III, Figs. 6-9, 15-20 (Weberella); K o l t u n, 1964:149.

The body is cushion-shaped, oblate or lump-like (to /77 spherical); it attains a diameter of 13 cm. The surface is smooth. There are numerous conical tuberculate or cylindrical papillae up to 0.5 cm heigh. Small oscula (approximately 1 mm in diameter) occur on the apices of the papillae. The body of the sponge is cork-like, pulpy. The cortical layer is well developed (to 2 mm thick). The colour is light yellow, orange, grayish-yellow or light gray. The skeleton of the inner parts of the sponge is poorly developed and consists of generally randomly arranged individual styles, clusters and short ribres of spicules which have a tendency towards radial distribution. The skeleton of the dermal layer consists of a palisade layer of small subtylostyles and a layer under it which consists of randomly distributed large spicules.

Spicules. Megascleres: large styles (to subtylostyles) are 0.420-0.700 mm long and 0.010-0.016 mm thick, small subtylostyles (to styles) 0.125-0.270 mm long and 0.002-0.004 mm thick.

Distribution. Barents Sea (south-western and southern part), north and west of Spitsbergen, Sea of Norway, northern part of the Atlantic Ocean. Inhabits depth of 62-485 m; in the Arctic it is seen at a temperature of 0.72-5.7°.

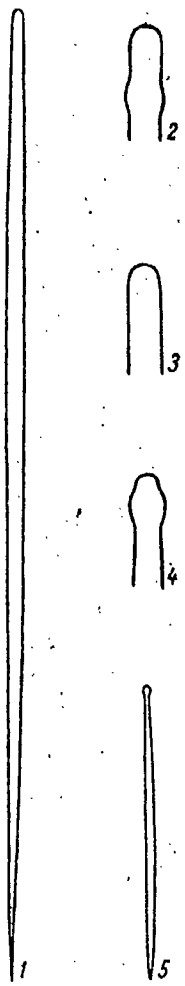

Fig. 48. Polymastia thielei Koltun

1- large styles (x100); 2-4- basal ends of large styles (x300); 5- small tylostyle(x100).

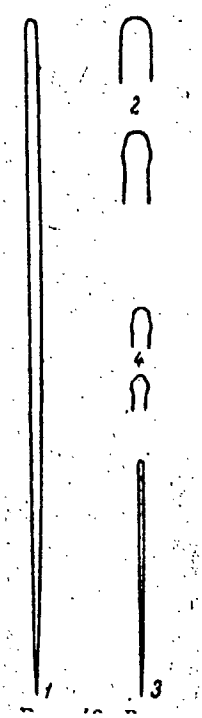

Fig. 49. Polymastia bursa (Muller).

1- large style (x150); 2- basal ends of large styles (x400);3- small style (x150); 4- basal ends of small styles (x400).

A boreal species represented in the collections by more than 100 specimens. In this species as in P. uberrima we find forms with almost completely reduced papillae. Until recently, P. bursa was regarded as a synonym of P. uberrima. However, these are completely different species which only have similar external features. They are well distinguishable by the nature of their skeleton and the shape of the spicule (particularly the small sybtylostyle). In the former the small spicules are usually straight and long-pointed, in the second they are fusiform (top-shaped) with a distinctly rounded head and narrowed neck. The basic skeleton of P. bursa consists of irregularly distributed spicules and in P. uberrima they consist of thick radial fibres which are seen with the naked eye. Burton (1935:78) notes the occurrence of P. bursa (= Weberella bursa) in the Sea of Japan (Olga Bay), however this information must be verified).

8. Polymastia Kurilensis Koltun, 1962 (Fig. 50; Table XXVI, 2; Table XXVII, 6-7).

B u r t o n, 1935:77 (laganoides); K o l t u n, 1962:183, Fig. 1

The body is spherical, spherical, up to 4.5 cm in height. The surface is even and smooth (to the naked eye). On the upper /78 pare of the sponge there are papillose papillae which are open to the outside by osculae (up to 1 mm in diameter). The sponge usually grows on a pebble. The colour is gray or grayish-yellow. The cortical layer is well marked and attains a thickness of 1 mm. The basic skeleton is radial, composed of fibres of long spicules. The dermal skeleton consists of papisadely arranged small tylostyles whose sharp ends are directed outwards.

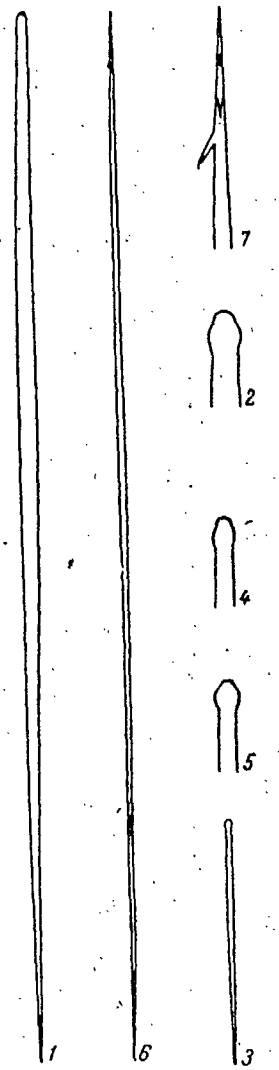

Fig. 50. Polymastia kurilensis Koltun.

1- large style (x100); 2- basal end of large styles (x300); 3- small subtylostyle (x100); 4,5- basal ends of small subtylostyles (x300); 6- harpoon-shaped spine (x100); 7- its end (x300).

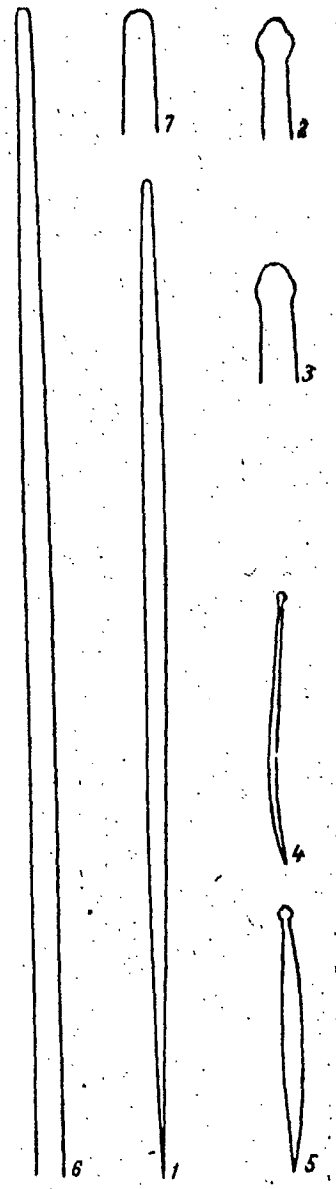

Fig. 51. Polymastia hemisphaeiricum (Sars).

1- large style (x100); 2,3- basal ends of large tylostyles (x300); 4- small tylostyles (x15); 5- fusiform tylostyle (x150); 6- long style (x100); 7- basal end of long style (x200).

Spicules. Megascleres: large and average styles (to subtylostyles) are 0.410-2.400 mm long and 0.010-0.024 mm thick, the dermal tylostyles (to subtylostyles) are 0.100-0.400 mm long and 0.010 mm thick, the variously ended spicules (harpoon-shaped) are 0.9-2.4 mm long and 0.006-0.010 mm thick. The latter spicules are encountered in small numbers.

Distribution. Bering Sea, Sea of Okhotsk and Sea of Japan, off the Pacific coast of the Kuril Islands. Depth, 51-301 m; noted at a temperature of 0.7-1.8°.

9. Polymastia hemisphaericum (Sars, 1872), (Fig. 51; Plate XXIX, 1-5).

Sars, 1872:62, pl. VI, Fig. 1-15 (Trichostemma); Marenzeller, 1877:374, pl. XV (Halicnemia); Vosmaer, 1885:12, pl. I, Figs. 4, 20, pl. V, Figs. 10-16; Hansen, 1885:7 pl. I. Fristedt, 1887:435 (Trichostemma); Lundbeck, 1909: 451 (Trichostema); Topsent, 1913:20, pl. I, Fig. 2, pl. II, Figs. 1,2 (Trichostemma); Burton, 1930b:510 (Radiella sol part.).

The body is cushion-shaped, up to 6.5 cm in diameter and 3.5 cm high. The surface is slightly velvety (almost smooth). Along the edges of the disc-like body there is a dense fringe consisting of long spicules. On the sruface there are papillae which usually /79 occur in small numbers (1-12, rarely more than 20). The conical papilla are short, up to 0.6 cm; oscula with a diameter of approximately 2 mm occur on their apices. The colour is light-gray or yellowish-gray. There is a well-developed cortical layer. The basic skeleton consists of radial clusters and fibres of large spicules. The skeleton of the cortical layer consists of palisadely arranged small tylostyles in the upper part of the body, at the bottom (at the base of the sponge) it consists of tangential and radial clusters of large

styles and separate very fusiform average tylostyles; the latter usually occur in the other parts of the body of the spong.

Spicules. Megascleres: large styles (to tylostyles) are 0.6-5.4 mm long and 0.011-0.032 mm thick, the thin tylostyles (dermal) are 0.160-0.300 mm long and 0.004-0.008 mm thick, the fusiform tylostyles are 0.160-0.368 mm long and 0.010-0.016 mm thick, the long styles (to subtylostyles) which form a fringe along the edge of the body of the sponge is up to 8 mm long and 0.045 mm thick.

Distribution. Barents Sea (south-western and western parts, off Novaya Zemlya and east of Kanin Peninsula), north and west of Spitsbergen, the Sea of Norway (off the coast of Norway, Spain and the Farer Islands), south-west of Greenland, Baffin Bay, northern part of the Atlantic Ocean (off the coast of Iceland, near Newfoundland). Depth, 175-530, (and 790 m in Baffin Bay).

More than 40 specimens represented in the collections have been studied. In additions, of the sponges which completely fit the above diagnosis there are 5 specimens in the collections (specimens from the regions of south-eastern Greenland, Spain and south-western Norway) which differ somewhat in outer appearance and nature of skeletal elements. These sponges have reduced papillae (in the form of very low tubercles which are sometimes scarcely discernable) and in the skeleton the dermal tylostyles are replaced by longer spicules (styles and tylostyles which resemble spicules of the basic skeleton), 0.650-1.400 mm long and 0.010-0.014 mm thick; in addition, the fusiform tylostyles attain a large size (up to 0.7 mm long when the thickness is 0.019 mm). The sponges under consideration are tentatively assigned to species P. hemisphaeiricum as its atypical aberration form.

Generally, P. hemisphaeircum is a boreal form whose occurrence in the Arctic is connected with the warm Atlantic current. Testifying to this is the occurrence of P. hemisphaeircum primarily during above zero temperatures off the coast of Spitsbergen, in the Barents Sea and the Sea of Norway as well as in Baffin Bay. Of course, in the latter case (Brønsted, 1933:7) at depths which are mazimal for this species (610-790 m) the fixed temperature is -0.4 and 0.6°.

10. Polymastia sol (Schmidt, 1870) (Fig. 52, 53; Plate XXX, 8-10; Plate XXXI, 10,11).

S c h m i d t, 1870:48, Taf. IV, Fig. 6 (Radiella); B u r t o n, 1930b:510 (Radiella, part.); G o r b u n o v, 1946:37 (Radiella sarsi); K o l t u n, 1964:149. Fig. 3 (Radiella).

The body is cup-shaped, disc-shaped, polyspherical or cushion-shaped, up to 1.5 cm in diameter. The surface is spicular, velvety; the margins of the body are trimmed with spicules which are 0.4 cm long. The lower part of the freely growing specimens is covered with a solid layer of tangentially arranged spicules. On /81 the upper part of the sponge there is usually a small papilla in the form of a tubercle. The colour is light gray or light brown; the upper part of the body is darker due to the spicule particles sticking to its fluffy surface; at the base of the sponge these fibres are arranged tangentially forming something like a thin dermal cortex. The dermal skeleton of the remaining part of the body (the upper part) consists of palisadely arranged small tylostyles and ends of radial fibres of the basic skeleton; sometimes below the palisade layer one can also observe a layer of irregularly destributed small tylostyles. Along the margins taking part in the formation of the dermal skeleton are the bases of longsspicules which comprise the marginal trim.

/ 81

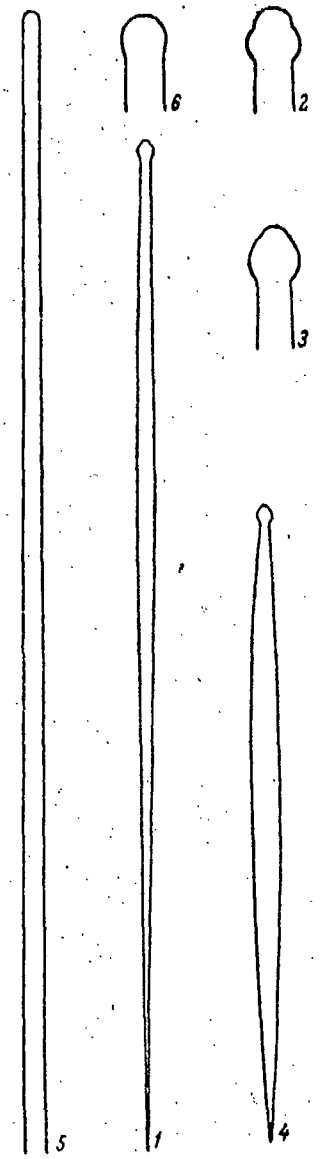

Fig. 52. Polymastia sol sol (Schmidt)

1- large tylostyle (x100); 2,3-basal ends of large tylostyles (x300); 4- fusiform tylostyle (x100); 5- long style (x100; 6- basal end of long subtylostyle (x300)

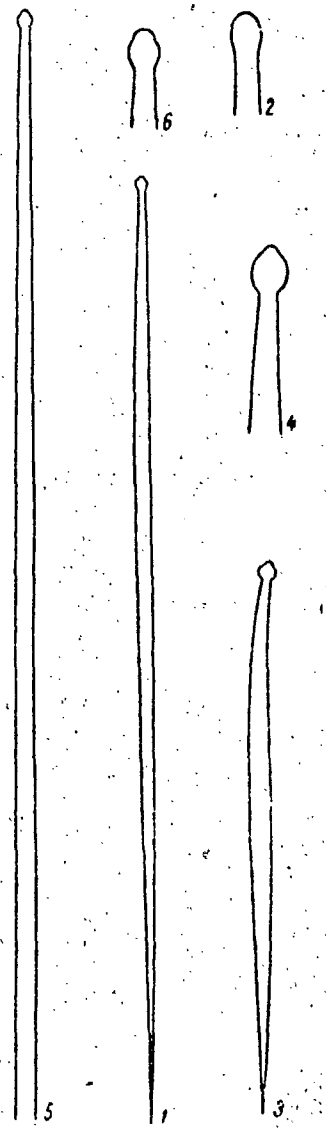

Fig. 53. Polymastia sol pacifica Koltun.

1- large tylostyles(x100); 2- basal end of large tylostyle (x300); 3- fusiform tylostyle (x150); 4- basal end of fusiform tylostyle (x200); 5- long tylostyle (x150); 6- basal end of long tylostyle (x300).

Spicules. Megascleres: styles (to tylostyles) 0.870-2.880 mm long and 0.013-0.027 mm thick, small tylostyles (fusiform) 0.250-0.958 mm long and 0.008-0.023 mm thick; long styles (to subtylostyles) forming a trim on the margin, up to 5 mm long and 0.027 mm thick.

Distribution. Central part of the Arctic Ocean, Sea of Greenland and Sea of Norway, northern part of the Atlantic Ocean, Bering Sea. Inhabits the depth of 800-3,940 m; in the channels of the Barents Sea (south Zemlya Frantsa-Iosifa), the Kara Sea (off Novaya Zemelya) and in the Sea of Laptevykh (Shokal'skii Strait) the species may be encountered at a depth of 145-440 mm.

The species is represented in the collections by a mass of small sponges (usually less than 1 cm in diameter) collected primarily during deep-water trawling in the central part of the Arctic Ocean and in the Sea of Greenland. The shape of the body of these sponges in the majority of cases is cup-like or disc-shaped and considerably less often cushion-shaped, which depends on what type of substrate the larva of the sponge settles and where its subsequent development and growth occurs. During its growth on a grain of sand the sponge acquires a cup-shaped body shaped with a convexed side facing the substrate; when a sponge grows on a pebble it covers the pebble in the form of a cushion-shaped growth.

Hitherto, P. hemisphaericum and P. sol have been regarded as synonyms (Burton, 1930b). There is a definite meaning in this identification since these two sponges are undoubtedly very closely

related to one another and the latter was evidently derived from the former in neotenically. Here, P. hemisphaericum and P. sol are treated as independent species differing in a number of morphological and ecological features which were reflected in the diagnoses given above. In the northern and far-eastern seas P. sol forms two sub-species.

10a. Polymastia sol sol (Schmidt, 1870) (Fig. 52; Plate XXX, 8,9; Plate XXXI, 10,11).

S c h m i d t, 1870:48, Taf. IV Fig. 6 (Radiella).

Dermal skeleton of the upper part of the body is considerably reduced and is composed of sparse radially arranged fusiform tylostyles and the ends of large spicules of the basic skeleton. Fusiform tylostyles in large numbers are found in the base of the sponge (in the cortical layer) and also in other parts of the body.

Spicules. Megascleres: styles (to tylostyles) are 0.871-2.880 mm long and 0.013-0.024 mm thick, small tylostyles (fusiform) are 0.250-0.958 mm long and 0.008-0.023 mm thick, long styles (to subtylostyles) up to 5 mm long and 0.027 mm thick. /82

Distribution. Central part of the Arctic Ocean, the Sea of Greenland and the Sea of Norway, the northern part of the Atlantic Ocean. Depth, 800-2,892 m (at a depth of 145-440 m in the troughs of the northern seas).

10b. Polymastia sol pacifica Koltun, ssp. n. (Fig.53; Plate XXX,

Dermal skeleton of the upper part of the body consists of palisadely arranged fusiform tylostyles (small); but these tylostyles are somewhat lower than the palisade layer and occur in the form of irregular clusters.

Spicules. Megascleres: tylostyles (to subtylostyles) are 0.870-2.100 mm long and 0.016-0.027 mm thick, fusiform tylostyles are 0.350-0.600 mm long and 0.010-0.014 mm thick, long styles are up to 3 mm long.

Distribution. Barents Sea. Depth, 3,940 m.

In the collections the sub-species is represented by only one specimen (approximately 1.4 cm in diameter when the height is 1 cm), cushion-shaped or semispherical with a trim on the edge which is up to 3 mm long. The sponge adheres tightly to a pebble. The colour is light brown, sections of the trim are dark brown.

11. Polymastia lagonoides Lambe, 1894 (Fig. 54; Plate XXIV, 4).

L a m b e, 1894:129, pl. IV, Figs. 5.

The body is cortical (up to 11.5 cm in width when the height is 0.8 cm), cushion-shaped or lump-like, irregular in shape. The surface is spicular in places or more often it is smooth, sometimes it has wide conical (papillose) papillae on whose apices there occur small oscula (up to 1 mm in diameter). The sponge is very firm with a well developed cortical layer up to 2 mm thick. The colour is light yellow or beige. The basic skeleton has radial fibres of long spicules clearly visible to the naked eye; the skeleton (cortical) of the dermal layer consists of smaller tylostyles which are irregularly distributed.

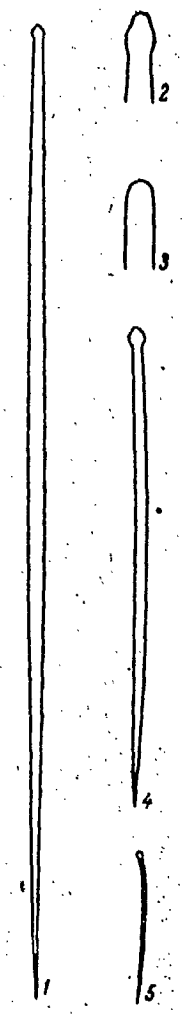

Fig. 54. Polymastia laganoides Lambe.

1- large tylostyle (x150); 2,3- basal ends of large styles)x400); 4- average tylostyles (x150); 5- small tylostyles (x150).

Spicules. Megascleres: large tylostyles) approximately 1.5 mm long when the thickness is 0.020 mm, average tylostyles (dermal) are 0.2-0.5 mm long and 0.006-0.013 mm thick, small tylostyles (to styles) are 0.093-0.117 mm long and 0.002-0.003 mm thick.

Distribution. Off the Commander Islands. Depth, 100m.

Four specimens collected from the littoral part of Mednyi Island washed in from the sea have been studied. The species is easily distinguished from other closely related species by the existence of a dermal skeleton which is formed of average tylostyles irregularly distributed; characteristic of the species are also small thin tylostyles which are encountered in different sections of the body. The sponge from the Sea of Japan, identified by Burton (1935:78) as P. laganoides, belongs in fact of another species of /83 of this genus, namely P. kurilensis.

In the material from the region of Newfoundland more than 10 specimens of sponges have been disclosed which in terms of the skeletal structure is intermediate between the representatives of genera Polymastia and Sphaerotylus. Here, this sponge is referred to as P. actinioides Koltun, sp. n. This name has been used because in external appearance the sponge greatly resembles a fixed actine with barely visible tentacles (Plate XXX, 11). P. actinioides is absent in P. affinis. The presence of long tylote spicules in the skeleton as well as the tendency of large styles towards semi-tylosteness makes P. actinioides closely related to the typical representatives of genus Sphaerotylus.

2. Genus SPHAEROTYLUS Topsent, 1898

T o p s e n t, 1898:225; H e n t s c h e l, 1914:50.

Genus type: S. schoenus (Sollas, 1882).

The megascleres are represented by tylostyles (to styles) and spherotyles which are characteristic of it. The skeleton is radial in type; there is a dermal skeleton of palisadely arranged small tylostyles. The sponges are lump-like or cushion-shaped with a small number of papillae on the surface.

1 (2). Spherotyles usually with a mushroom-like head, long, exceeding 2 mm.....1. S. borealis (Swarczewsky).

2 (1). Spherotyles with a spherical or oval head, short, less than 1.5 mm long.....2. S. schoenus (Sollas).

1. Sphaerotylus borealis (Swarczewsky, 1906) (Fig. 55; Plate XXX 1-5).

S w a r c z e w s k y, 1906:315, Plate x, Fig. 1 Plate XIII, Fig. 2 (Proteleia); K i r k p a t r i c k, 1908:16 (antarcticus); R e z v o i, 1928:78, Fig. 4,5; H e n t s c h e l, 1929:925 (schoenus var. borealis).

The body is lump-like, cushion-shaped or spherical, up to 6 cm in diameter. The surface is usually very spicular, setose. A small number (1-12) have cylindrical papillae which attain a length of 2 cm. Small microscopic apertures occur on the apices of the papillae. The colour is gray, beige or gray-brown. There is a thin cortical layer approximately 0.5 mm thick. The basic skeleton consists of radial clusters and fibres of large spicules. The skeleton of the cortex consists of three layers: the outermost layer is formed of palisadely arranged small tylostyles, beneath these is a layer of irregularly distributed spicules which resemble tylostyles and, finally, a layer of tangentially arranged larger spicules. The dermal seta a very long tylostes (or styles) among which spherotyles with a mushroom-like head are encountered.

Spicules. Megascleres: large styles (to tylostyles), frequently polytylote, 1.1-2.1 mm long and 0.012-0.040 mm thick, average styles (to tylostyles) 0.200-0.792 mm long and 0.005-0.014 mm thick, small tylotes (dermal) 0.102-0.160 mm long and 0.002-0.004 mm thick, spherotyles (with a mushromm-shaped, usually rough, head) /84 and tylotes up to 5.0-7.5 mm long and 0.014-0.027 mm thick. Sometimes very thick short individual strongyles are encountered approximately 0.464-1.300 mm long and 0.050-0.059 mm thick.

Distribution. Barents Sea (western and south-western parts), White Sea, off the northern shores of Spitsbergen, Zemlya Frantsa-Iosifa and Severnaya Zemlya, Sea of Norway, off the coast of Iceland. Depth, 73-500 m; in the White Sea it inhabits the depth of 4.5-54 m.

Twenty-seven specimens were examined. S. antarcticus /85 which is identical with the present species inhabits the waters of Arctic Ocean (Rezvoi, 1928:80). Actually, similarity is exceptionally great among these sponges which have an extremely distant range. Thus, there is no doubt that we are dealing here with a bi-polar species.

2. Sphaerotylus schoenus (Sollas, 1882) (Fig. 56; Plate XXX, 6-7).

V o s m a e r, 1885:16, pl. IV, Figs. 25-28 (Polymastia capitata); Topsent, 1913:23 pl. II, Fig. 6; Breitfus, 1911:218 (Polymastia capitata).

The body is lump-like or cushion-shaped, up to 5 cm wide and 2.5 cm high. The surface is slightly rough or even smooth. Papillae are small in numbers, short (up to 4 mm high), frequently

papillose. The colour is yellow, gray-brown or beige. There is a cortical layer which is up to 0.5 mm thick. The basic skeleton is formed of radial clusters and fibres of large spicules, the dermal skeleton is composed of palisadely arranged small tylostyles and spherotyles.

Spicules. Megascleres: large tylostyles (to styles), frequently semi-tylotic, 0.650-1.504 mm long and 0.014-0.024 mm thick, average tylostyles 0.416-0.605 mm long and 0.010 mm thick, small tylostyles (dermal) 0.096-0.230 mm long and 0.002-0.006 mm thick, spherotyles with spherical or oval head 0.60-1.25 mm long and 0.008-0.020 mm thick (head of the spherotyles is usually rough and finely dentate).

Distribution. Barents Sea (south-western part), off the coast of Norway, Antarctica. Depth, 50-440 m.

In the collections there are 5 specimens. This species which is similar to the previous species is bi-polar. S. schoenus and S. borealis are very closely related species. Testifying to this is the fact that spherotyles with large heads are encountered in some specimens of S. borealis. However, these species are quite sharply separated from each other. The small tylostyles in S. borealis are usually slightly fusiform, sometimes shaped like a sabre with a sharp curved end; frequently both types of spicules are encountered together. In S. schoenus the small tylostyles are fusiform, usually curved in the basal part.

3. Genus TENTORIUM Vosmaer, 1885

S c h m i d t, 1970:50 (Thecophora); B u r t o n, 1930a:674.

Genus type: T. semisuberites (Schmidt, 1870).

The megascleres are represented by tylostyles and subtylostyles. The basic skeleton is of the radial type and consists of clusters of long spicules which rise vertically from the base of the sponge towards the surface; the skeleton of the cortical layer is composed of radial clusters of smaller tylostyles. The sponges are clyindrical, mushroom-shaped or semi-spherical with short tubular papillae on the apex.

1. Tentorium semisuberites (Schmidt, 1870) (Fig. 57; Plate XIX, 4-8; Plate XXXI, 12).

S c h m i d t, 1870; 50, Tad. VI, Fig. 2 (Thecophora); V o s m a e r, 1885:18, (Thecophora); Fig. 9, pl. III, Figs. 22-25; H a n s e n, 1885:8 (Thecophora); V o s m a e r, 1882:30, pl. III, Figs. 96-98, pl. IV, Figs. 133-136 (Thecophora); F r i s t e d t, 1887:433 (Thecophora); L a m b e, 1896:198, pl. III, Fig. 2; H e n t s c h e l, 1929:924.

The body is cylindrical with dome-shaped part (mushroom-shaped) up to 3.5 cm in height when the width is 3 cm. The surface is smooth. On the apex there are short tubular papillae which open out to the outside by an aperture. The number of papillae is usually small, frequently one and seldom more than six. The body is covered /86 with a solid cortical layer which attains a thickness of 1.5 mm (in the upper part of the sponge). The colour is yellowish or beige; the dome-like apex is darker than the rest of the body. The basic skeleton is composed of paraller fibres of long tylostyles (to subtylostyles); the skeleton of the cortical layer of the upper part of the body consists of radial clusters of small fusiform tylostyles, the skeleton of the cortical layer of the rest of the body is composed of larger tangentially arranged fusiform tylostyles.

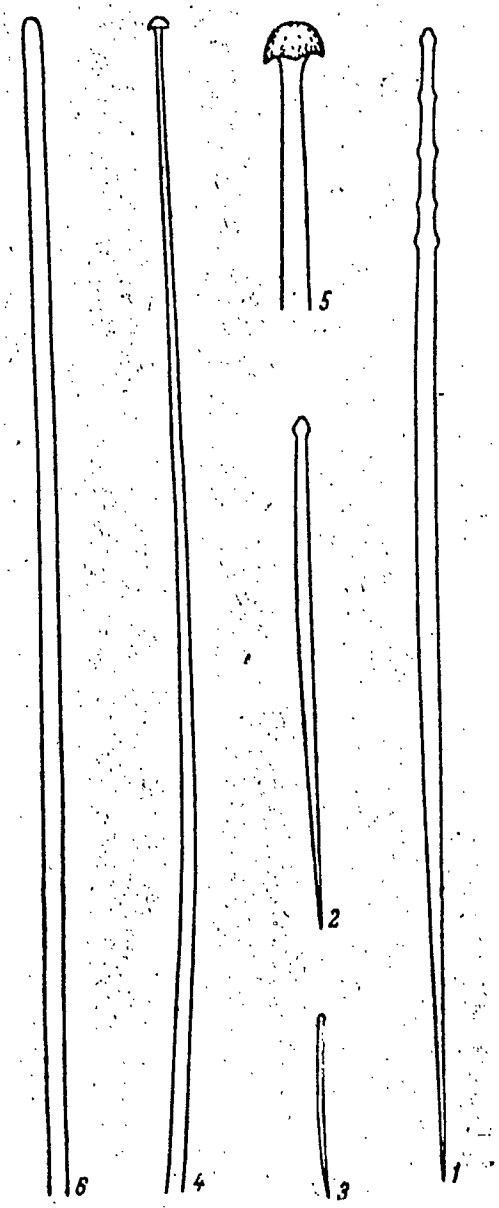

Fig. 55. Sphaerotylus borealis (Swarczewsky).
1 - large subtylostyle (x100);
2,3 - average tylostyle (x100);
3 - small subtylostyle (x150);
4 - spherotyles (x100);
5 - basal end of spherotyles (x400); 6 - long style (x100).

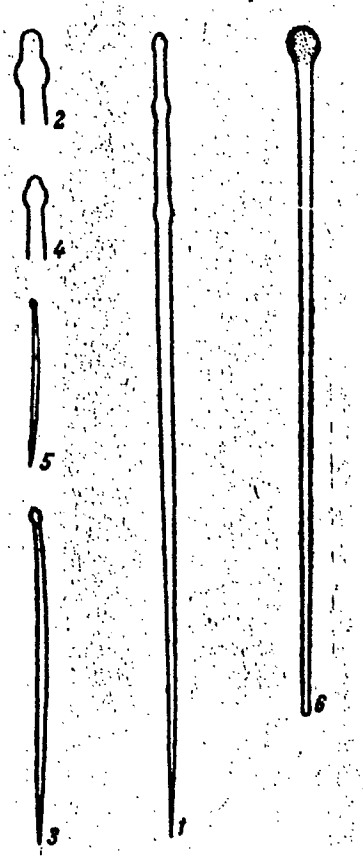

Fig. 56. Sphaerotylus schoenus (Sollas).
1 - large subtylostyle (x100);
2 - basal end of large subtylostyle (x200); 3 - average tylostyle (x150);
4 - basal end of average tylostyle (x300); 5 - small tylostyle (x150);
6 - spherotyle (x100).

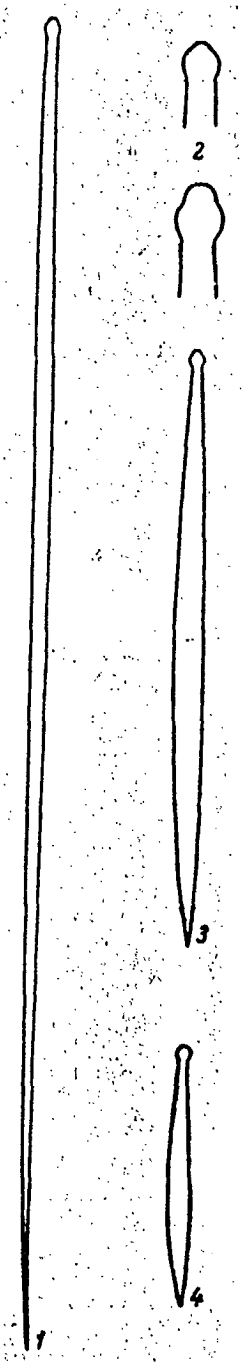

Fig. 57. Tentorium semisuberites (Schmidt).
1- large subtylostyle (x100); 2- basal ends of large subtylostyles (x300);
3- average fusiform tylostyle (x100); 4- small fusiform tylostyles (x100);

Spicules. Megascleres: large tylostyles (to subtylostyles) are 0.960-2.400 mm long and 0.013-0.024 mm thick, average fusiform tylostyles are 0.808-1.14 mm long and 0.021-0.033 mm thick, small fusiform tylostyles are 0.274-0.670 mm long and 0.013-0.021 mm thick.

Distribution. Arctic Ocean (in addition to White Sea), northern part of the Atlantic Ocean. Depth, 26-2,800 m.

One of the abundant and widespread sponges of the Arctic. In external appearance it greatly resembles a youn specimen of the white sponge; this similarity is intensified in view of the various coloration of the cylindrical body of the sponge and its hat-shaped upper part. In rare instances aberrations are encountered, greatly stretched out, sometimes having the appearance of a thin stalk which becomes thinner towards the free end; this sponges attains a length of 20 cm when the thickness is 1.5 mm at the base.

4. Genus RHIZAXINELLA Keller, 1880

T o p s e n t, 1900:243; W i l s o n, 1925:351.

Genus type: T. pyrifera (Chaije, 1828).

The megascleres consist tylostyles (to styles) of two or more types. The cortical layer is developed to some extent. The sponges are club-shaped with round, oval or stretch body and are on a solid pedicel - in the form of an axial pedicel.

1 (2). Papillae exist.....1. R. burtoni Koltun.

2 (1). Papillae are lacking.

3 (4). Small fusiform tylostyles; sponges are goblet-shaped (the young specimens are club-shaped).....2. R. schaudinni Hentschel.

4 (3). Small cylindrical tylostyles; the sponge is club-shaped, frequently branching.....3. R. clavata Thiele.

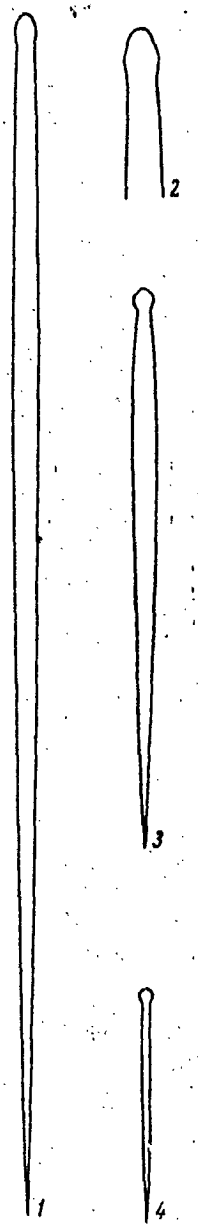

Fig. 58. Rhizaxinella burtoni Koltun.

1- large subtylostyles (x100); 2- basal end of the subtylostyle (x200); 3- average fusiform tylostyle (x150); 4- small tylostyle (x150).

1. Rhizaxinella burtoni Koltun, sp. n. (Fig. 58; Plate XXII, 3-4). 187

The species type is kept at the Institute of Zoology of the Academy of Sciences of the USSR, preparation Nos. 9407, 12313.

The body is spherical, it is transformed quite abruptly into a solid virgula at the bottom. The sponge attains a height of 9 cm; the head is up 5 cm in diameter and the virgula is up to 1.2 cm thick. The surface is smooth (to the naked eye). There are a considerable number of low papillose papillae having apertures (approximately 1 mm in diameter) on the apex of the sponge. There may be 20 or more papillae. There is a well developed cortical layer which covers the entire sponge (including the virgula). The colour is beige, light gray or rosy-brown. The skeleton of the virgula consists of a solid axial virgula which formed by longitudinally arranged large spicules; the axial skeleton which continues in the widened part of the sponge fills its base in the form of a compact mass from which fibres of spicules radiate (somewhat spirally) in the direction of the surface. The skeleton of the cortex of the sponge consists of an outer layer which is formed of small tylostyles which are palisadely arranged; under this layer is a layer of tangentially arranged clusters of average tylostyles.

Spicules. Megascleres: large subtylostyles (to styles) attain a length of 2.5 mm and a width of 0.030 mm, average tylostyles (fusiform) are 0.268-0.670 mm long and 0.010-0.024 mm thick, small tylostyles are 0.114-0.300 mm long and 0.002-0.007 mm thick.

Distribution. Sea of Okhotsk (north-western part). Depth, 132 m.

Seven specimens were examined; one of these is a young specimen with a poorly delineated head. The present species is similar to R. pyrifera (Chiaje), which occurs off the Axores and in the Mediterranean Sea. The species is named after English spongeologist, M. Burton.

2. Rhizaxinella schaudinni Hentschel, 1929 (Fig. 59).

H e n t s c h e l, 1929:870, Taf. XIV, Fig. 1.

The body is goblet-shaped or club-shaped (the head is up to 12 mm high), rather strong. The surface is very setose. In the goblet-shaped form the upper edge of the goblet is bordered with a cortical layer is up to 0.5 mm thick. The skeleton at the pedicel is in the form of an axial virgula which penetrates the head and braks up into radially directed clusters of spicules; the ends of radial fibres take part in the formation of the dermal skeleton.

Spicules. Megascleres: large tylostyles (straight) and small (fusiform) 0.180-3.0 mm long and 0.010-0.025 mm thick; tylostyles of the marginal corona are up to 4 mm long; the stongyles or subtylostyles are 0.126-0.210 mm long and 0.020-0.070 mm thick.

Distribution. North of Spitsbergen, Depth, 1,000 m. The species is not represented in our material. /89

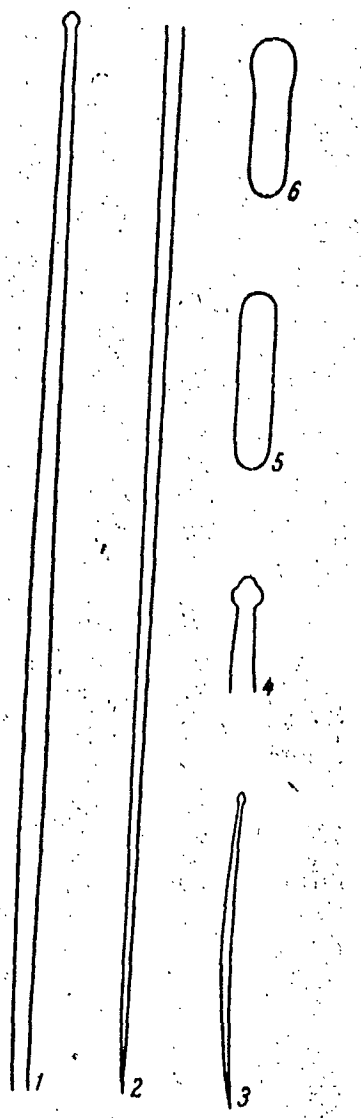

Fig. 59. Rhizaxinella schaudinni Hentschel.

1.2- ends of a long tylostyle (x100); 3- small tylostyles (x150); 4- basal ends of a small tylostyle (x400); 5- strongyles (x150); 6- tylostrongyle (x150).

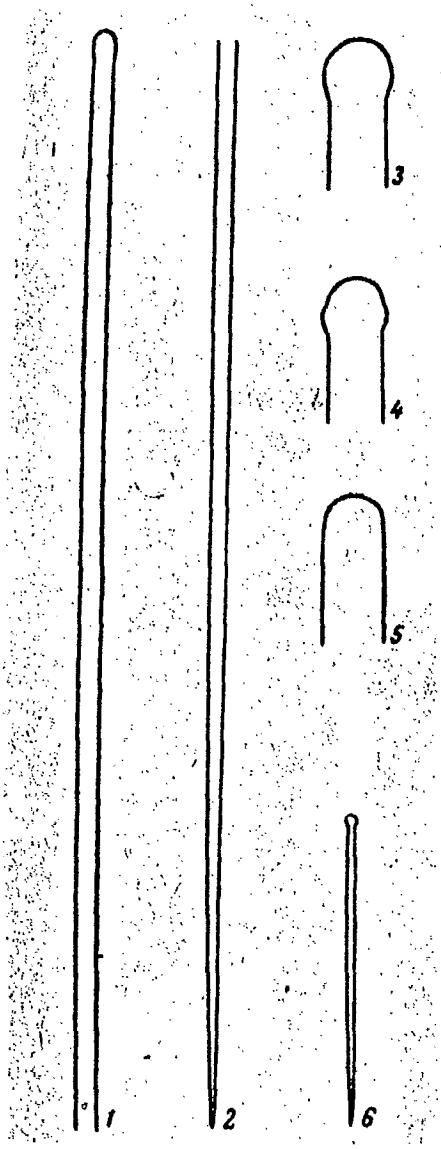

Fig. 60. Rhizaxinella clavata Thiele.

1,2- ends of large subtylostyles (100); 3-5- basal ends of large tylostyles (x300); 6- small tylostyle (100).

3. Rhizaxinella clavata Thiele, 1898 (Fig. 60).

T h i e l e, 1898:34, Taf. i, Fig. 19, Raf. V, Fig. 27, Taf. VIII, Fig. 1; 1898:34, Taf. III, Fig. 2 (excellens); 1898:35, Taf. III, Fig. 3b, Raf. (elevata); 36, Taf. IV, Fig. 6, Taf. VIII, Fig. 5 (incrassata); 1898:36, Taf. III, Fig. 4, Taf. VII, Fig. 6 (cervicornis); B u r t o n, 1932:202, pl. VIII, Fig. 14.

The body is club-shaped, frequently branched, up to 17 cm in height. The surface is spicular. The sponge is dense and strong. In colour it is various shades of gray. The skeleton is represented by an axial virgula from which fibres and clusters of spicules branch out arranged radially at the surface of the sponge.

Spicules. Megascleres: large subtylostyles (to styles and tylostrongyles) 0.8-1.9 mm long (and longer) and 0.020-0.050 mm thick; small tylostyles 0.21-1.0 mm long and 0.006-0.013 mm thick.

Distribution. Off the eastern coast of Japan (Sagami Bay), Sea of Japan. Depth, 183 m.

The fragment of sponge from the Sea of Japan which is in the collection differs from the typical representatives of this species by much longer spicules of the basic skeleton (large subtylostyles 1.6-4.5 mm long and 0.024-0.032 mm thick, small tylostyles 0.210-0.638 mm long and 0.009-0.014 mm thick, individual subtylostrongyles approximately 0.300mm long when the thickness is 0.043 mm). Burton (1932:202, pl. VIII, Fig. 14) notes the occurrence of R. clavata off the eastern coast of Southern Sakhalin, however, the diagram of this sponge which is presented by Burton creates some doubt as to the correctness of assigning it to the given species.

5. Genus QUASILLINA Norman, 1868

N o r m a n, 1868:329; S c h m i d t, 1875:116 (Bursalina); B u r t o n, 1930a:670.

Genus type: Q. brevis (Bowerbank, 1861).

Megascleres are represented by two types of tylostyles (to styles). There is a solid dermis; the choanosome (inner parts of the body) is poorly developed. The basic skeleton consists of few individual spicules and their clusters. The dermal skeleton is formed of tangentially arranged large spicules and radial clusters of small tylostyles. Small sponges are spherical or oval in shape, with a pedicel and devoid of papillae.

1. Quasillina brevis (Bowerbank, 1861) (Fig. 61; Plate XIX, 9,10; Plate XXVI, 3-5).

B o w e r b a n k, 1861:71 (Euplectella); 1866:64 (Polymastia); N o r m a n, 1868:329, S c h m i d t, 1875:116, Taf. I, Fig. 3,4 (Bursalina muta); V o s m a e r, 1885:20, pl. I. Fig. 7, pl. IV, Figs. 1-3, pl. V, Figs. 21-24; T r i s t e d t, 1887:433 (Polymastia); D e n d y, 1888:520, pl XLII, Figs. 8-12; T o p s e n t, 1900-158, pl. VI, Figs. 11-12; 1913:19, pl. III, Fig. 7, pl. V, Fig. 14 (richardi); R e z v o i, 1928:81; L e v i, 1950:9; B u r t o n, 1959:13 (brevis, richardi).

The body is spherical or oval (usually compressed at the sides), narrowing towards the bottom it forms a short pedicel. The sponge attains a height of 5.5 cm. The surface is velvety. The osculum (usually one) is slit-like, located at the apex of the body. The pores are in small groups. The colour is orange, yellow or gray-yellow. The dermal membrane is in the form of a strong / 90 rind. The inside of the sponge consists of a shapeless porous mass frequently in small quantities. The dermal skeleton consists of longitudinal and transverse fibres which are composed of tangentially arranged styles; smaller spicules are assembled into fan-like clusters

and occur vertically (radially) causing the velvety nature of the surface of the sponge. The skeleton of the choanosome is particularly poorly developed and consists of a few styles which occur separately or in loose clusters.

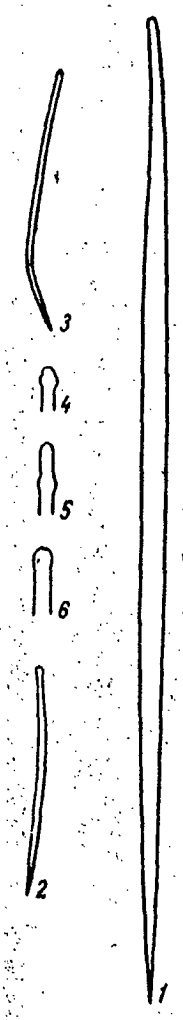

Fig. 61. Quasillina brevis (Bowerbank).

1- large style (x150); 2,3- small styles (x150); 4-6- basal ends of small subtylostyles (x300).

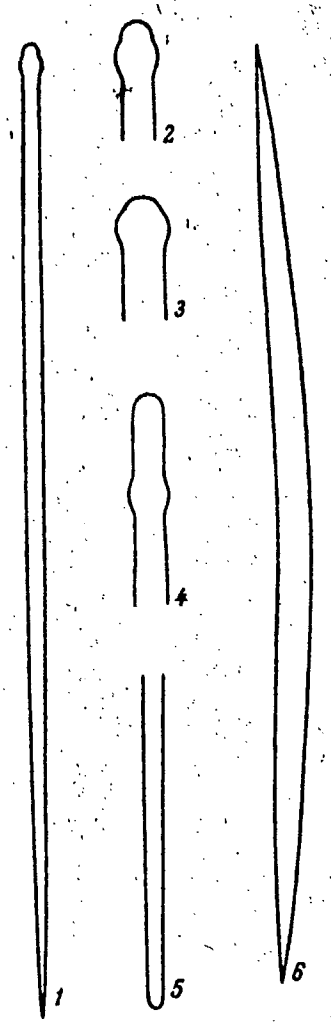

Fig. 62. Vosmaeri crustacea Kristedt.
1 - subtylostyle (x150); 2-4 - basal ends of subtylostyles (x300); 5 - apical end of subtylostyle (x150); 6 - oxea (x150).

Spicules. Megascleres: large styles (to subtylostyles) 0.570-1.246 mm long and 0.010-0.025 mm thick, small styles (to tylostyles)0.140-0.300 mm long and 0.002-0.010 mm thick.

Distribution. Barents Sea, Kara Sea (northern part), Sea of Laptevykh (Vil'kitskii Strait), off the northern and south-western coast of Spitsbergen, Sea of Norway, northern part of the Atlantic Ocean (off the coast of Iceland, the Shetland Islands, south-western Ireland, La Manche, Nova Scotia), the Mediterranean Sea (western part). Depth, 15-710 m (in the northern seas it inhabits the depth of 67-500 m).

Large styles in the present species are usually fusiform. Sometimes, however, cylindrical styles are also encountered among these spicules as for example in several specimens from the region of Zemlya Frantsa-Iosifa and Bil'kitskii Strait. Small styles (or subtylostyles) are usually curved in the basal or apical parts; sometimes such styles with a sharp curved end are thinner than the other small spicules. The latter condition enabled Topsent (1913:19) to separate a new species Q. richardi which he detected in the region between northern Norway and Medvezhii Island. The study of more than 39 specimens from different points of the Arctic Ocean belonging to genus Quasillina does not provide the basis for regarding Q. richardi as an independent species. Small thin styles with the characteristic curved sharp end exist in many of the specimens which have been studied; in some of them such spicules have been located singly or they are completely absent. Apart from this feature which has a doubtful taxonomic value, no morphological or ecological features which might distinguish Q. richardi from Q. brevis could be found. Because of this Q. richardi is here regarded as a synonym of Q. brevis.

6. Genus VOMAERIA Fristedt, 1885

F r i s t e d t, 1885:24; Burton, 1930a:672.

Genus type: V. crustacea Fristedt, 1885.

Megascleres are represented by tylostyles and oxeas. The basic skeleton consists of radial clusters of long spicules; the dermal skeleton consists of tangentially arranged oxeas. The sponges are cortical or cushion-like; Usually, there are papillose outgrowths on the surface of the body.

1. Vosmaeria cristacea Fristedt, 1885 (Fig. 62; Plate XXIV, 5,6). /9

V o s m a e r, 1885:21, pl. I, Fig. 8, pl. V, Figs. 17-19 (Inflatella? sp.); F r i s t e d t, 1885:24, Taf. II, Fig. 5a-5d: S w a r c z e w s k y, 1906:320, Plate. 14, robusta); R e z v o i, 1928:81).

The body is cortical or cushion-like, up to 4 mm in height when the width is 4 cm. The surface has many conical outgrowths (papillae) up to 7 mm long when the thickness is 1 mm (at the base). The dermal membrane is filmy, leathery. The colour is light-yellow, beige or brown. The basic skeleton is formed of pronounced clusters of tylostyles, which are vertical to the surface of the sponge. The dermal skeleton consists of tangentially arranged oxeas (and a small number of tylostyles).

Spicules. Megascleres: tylostyles (to styles) 0.6-1.0 mm long and 0.021-0.022 mm thick, fusiform oxeas 0.440-1.100 mm long and 0.018-0.038 mm thick.

Distribution. Barents Sea (south-eastern and south-western part), White Sea, off the western coast of Spitsbergen, Norway,

Skagerak Bay. Inhabits the depth of 46-256 m when the temperature is above zero, found at a depth of 13-57 m in the Barents Sea. The sponge usually settles on a pebble and on shells of a two-valved mollusk.

The boreal species is represented in the collections by 25 specimens. In some specimens the spicules vary somewhat in size; frequently tylostyles are encountered with a rounded apical end; oxeas may also have rounded ends (one or both).

VII. Fam. SUBERITIDAE

The sponges are primarily lump-like, cushion-shaped, less frequently they are pedunculately branched and digitate with a very poorly expressed radial symmetry of the body. Papillae are not developed. The skeleton is irregularly radial or scattered. The megascleres are represented by tylostyles (to styles). The microscleres, if they exist, are in the form of microrhabds or raphides.

TABLE FOR IDENTIFYING THE GENERA OF FAM. SUBERITIDAE

1 (2). Dermal skeleton of radial or palisadely arranged spicules; sponges are usually lump-like or cushion-like.....1. Suberites Nardo

2 (1). Dermal skeleton of tangentially arranged spicules; body of /92 the sponge is most often pedunculately branched or papillose.....

.....2. Pseudosuberites Topsent.

1. Genus SUBERITES Nardo, 1833

L i e b e r k ü h n, 1859:520 (Lithumena); S c h m i d t, 1862:65; G r a y, 1867:523 (Ficulina); T h i e l e, 1905:416 (Suberella).

Genus type: S. domuncula (Olivi, 1792).

Megascleres are represented by tylostyles (to styles); microscleres are sometimes present - in the form of oxeas or styles and strongyles. The basic skeleton is irregularly radial, the dermal skeleton consists of palisadely arranged spicules. The cortical layer is usually undeveloped. The sponges are lump-like, rarely cortical or, as an exception, they are peduncluate.

1 (2). There is a well-developed cortical layer; spicules in the form of tylostyles (large and small) with a large spherical head; microscleres are lacking.....3. S. japonicus Thiele.

2 (1). The cortical layer is not developed.

3 (4). The spicules are in the form of subtylostyles of a single type with a regular oval head; microscleres are lacking..... .....2. S. montiniger Carter.

4 (3). Spicules in the form of tylostyles (to styles) and sometimes oxeas; if there are only subtylostyles then their head is irregular in shape; microrhabds (strongyles or oxeas and styles) serve as microscleres.....1. S. domuncula (Olivi).

a (d). The body of the sponge is lump-shaped, oblate or corticate, and attains a considerable size.

b (c). The sponge usually grows over shells of univalve mollusks in whick a recluse cray-fish frequently lives; sometimes there are microrhabds. The body is dense, cork-like..... .....1a. S. domuncula domuncula (Olivi).

c (b). The sponge grows on stones or on other benthonic objects; it does not enter into symbiosis with the recluse cray-fish; microscleres in the form of microrhabds always exist. The body is usually soft, elastic.....lc. S. domuncula f. spermatozoon (Schmidt).

1. Suberites domuncula (Olivi, 1792) (Fig. 63-68; Plate XXXI, 1-9; Plate XXXIV, 1-4; Plate XXXV, 1-5; Plate XXXVI, 1-2).

V o s m a e r, 1932:426; B u r t o n, 1953:368

The body is lump-shaped, spherical or irregularly lobed and oblate, attaining a height of 40 cm and a width of 10 cm; it usually grows on the shells of mollusks or on stones. Sometimes, growing over a uni-balved mollusk containing a live recluse cray-fish, the sponge enters into a permanent symbiotic relationship with the latter. The surface of the sponge is more often smooth and even, sometimes it is wrinkled with small depressions and ribs. The oscula are small in number on the apex of the sponge. The colour is most varied but the bright tones predominate: light gray, gray-brown, yellow, orange and red. The skeleton is in the form of a dense irregular mesh of spicules; the spicules are arranged in radial clusters on the surface.

Spicules. Megascleres: tylostyles (to styles) 0.090-0.700 mm long. and up to 0.010 mm thick (sometimes, apart from these spines, there are oxeas which are similar in size). Microscleres: microstrongyles or microxeas, centrotylote, smooth or finely echinate, 0.015-0.045 mm long; sometimes the microscleres are encountered in very small numbers or are completely absent. /93

Distribution. Arctic Ocean, northern part of the Atlantic Ocean (including the Mediterranean Sea), northern part of the Pacific Ocean, Indian Ocean. Depth, 0-330 m.

Very changeable polymorphous species. S. domuncula and Ficulina ficus which are here considered as synonyms were for a long time regarded as independent species; moreover, they were even assigned to different genera. It was assumed that these sponges, being similar in skeleton, differ from one another in that the former, in growing over the shell of a uni-valved mollusk, usually lives together with a recluse cray-fish and does not have microscleres among the skeletal spicules; but the second, Ficulina ficus, grows on a pebble, mollusk valves, and contains microscleres in the skeleton. This view prevailed until the appearance of the work done by Vosmer (1932) and, particularly, by Burton (1953), in which the authors conclude that S. domuncula and Ficulina ficus are indentical. However, very recently, Hartman (1958), while studying the sponges of the southern coast of the New England States (USA), again raises the idea of the independence of these species. In the opinion of Hartman, S. domuncula is a species which has relatively permanent body shape, lives together with the recluse cray-fish and is devoid of microscleres, but which has a tendency to contain a considerable amount of oxeas among the megascleres. S. ficus on the other hand is more variable in shape, always has microscleres and does not usually contain oxeas among the megascleres. The study of a rich collection of sponges of the species under consideration, located at the Institute of Zoology of the Academy of Sciences of

the USSR and containing more than 200 specimens representing this species from different parts of the northern hemisphere, leads to the conviction that the features which were raised by Hartman for purposes of defining S. domuncula and S. ficus as independent species cannot be features which are conclusive. Vosmaer and Burton and other authors are absolutely right in assuming that the presence or absence of microscleres and oxeas in the skeleton in the given case cannot serve as a criterion of species definition. Actually, the specimens which are typical of S. domuncula from the Sea of Japan and from the region of the Farer Islands (completely identical in terms of the spicules contained in the skeleton) frequently have microscleres, and oxeas are observed in exceptional cases. In other words, it should be noted that a more accurate position is that S. domuncula and S. ficus are forms of the same species. However, in having established this union it is necessary to differentiate the subspecies and different categories of this species. which has a long history development in exceptionally varied ecological conditions. Characteristically, the typical S. domuncula, i.e., the sponge which usually lives in symbiosis with the recluse cray-fish and grows over uni-valved mollusks, is only encountered in the southern-most parts of the body of water under consideration: in the west, off the Farer Islands and south-western Norway; in the east, in the southern part of Tatar Strait, in Aniva Bay and off the southern Kuril Islands. This sponge is not encountered in symbiosis with the recluse cray-fish north of the regions mentioned, it grows more often on stones and takes on a more drawn out body form. In /94

addition, there is a definite tendency for differences to develop in the nature of the skeletal elements in the northern and more southern (typical) forms of the species under consideration. Thus, in the northern and far-eastern seas the present species is represented by two sub-species: S. d. domuncula and S. d. ficus. The opinion expressed here about the necessity of dividing S. domuncula into two sub-species approaches the point of view of Hartman. In addition to the named sub-species, the collections contain an original sponge S. spermatozoon which is, evidently, a neotenic form of S. d. ficus and is regarded here as S. domuncula f. spermatozoon.

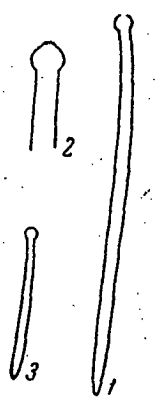

Fig. 63. Suberites domuncula domuncula (Olivi) from the far-eastern seas.

1- large tylostyle (150); 2- basal end of large tylostyle (x300); 3- small tylostyle (x150).

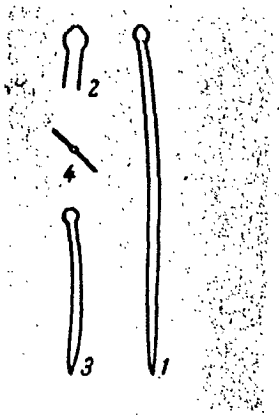

Fig. 64. Suberites domuncula domuncula (Olivi) from the Sea of Norway.

1- large tylostyle (x150); 2- basal end of large tylostyle (x300); 3- small tylostyle (x150); 4- microstrongyle (x300).

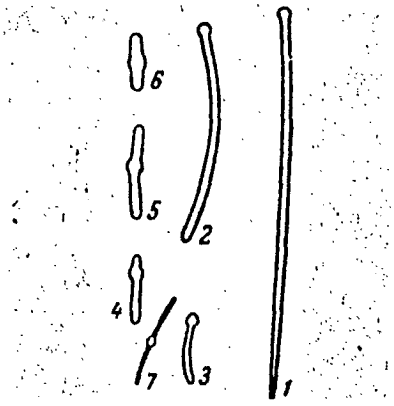

Fig. 65. Suberites domuncula domuncula (Olivi from the far eastern seas.

1- large tylostyle (x100); 2- small tylostyle (x150); 3-7- microstrongyles a and microtylostrongyles (x300).

1a. Suberites domuncula domuncula (Olivi, 1792) (Fig. 63-65; Plate XXXIV, Plate XXXV, 1-5).

B u r t o n, 1932:201, pl. VIII, Fig. 13 (domuncula); B u r t o n, 1935:77 (domuncula); H a r t m a n, 1958:12 (domuncula);

The body is lump-like, round or irregularly lobed, usually growing over the shell of a uni-valved mollusk. The sponge is

frequently encountered in symbiosis with the recluse cray-fish. The surface is even and smooth. The body is dense, cork-like and brittle.

Spicules. Megascleres: tylostyles (to styles), frequently curved, sometimes with rounded apical ends, 0.090-0.450 mm long and up to 0.008 mm thick; oxeas may be encountered among the megascleres. The microscleres are in small numbers as a rule or are completely absent.

Distribution. White Sea, Sea of Norway (off the south-western coast of Norway and the Farer Islands), North Sea, coast of Western Europe, Mediterranean Sea, Caribbean Sea, Pacific coast of Japán and the southern Kuril Islands, Aniva Bay, Sea of Japan (Bay of Peter the Great, southern part of Tatar Strait), pacific coast of North America (right up to southern Alaska). / 95

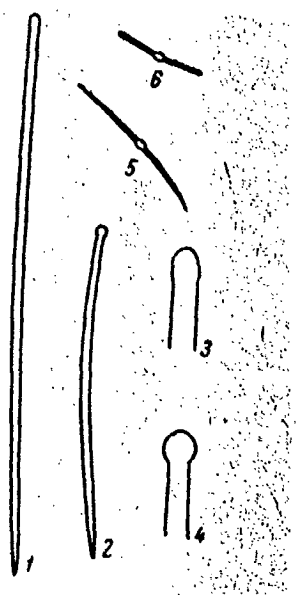

Fig. 66. Suberites comuncula ficus (Johnston) from the northern seas.

1- style (x150); 2- tylostyle (x150); 3,4- basal ends of styles and tylostyles (x300); 5- microxea (x300); 6- microstrongyle (x300).

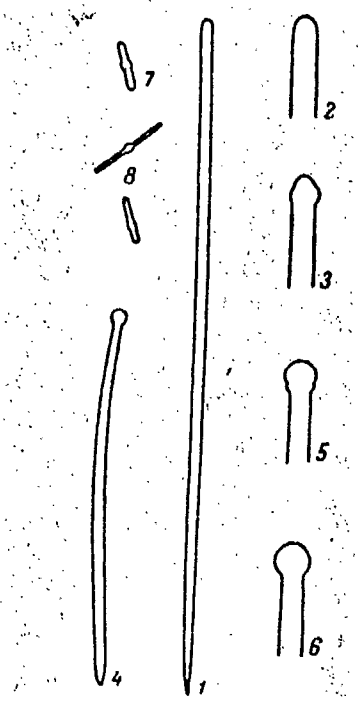

Fig. 67. Suberrites domuncula ficus (Johnston) from the far eastern seas.

1- style (x150); 2,3 - basal ends of styles (x300); 4- tylostyle (x150); 5,6- basal ends of tylostyles (x300); 7,8- microstrongyles (x300).

1b. Suberites domuncula ficus (Johnston, 1842) (Fig. 66,67; Plate XXXIV, 1-3: Plate XXXVI, 1,2).

C a r t e r, 1880:256 (montalbidus); V o s m a e r, 1882: 32, pl. I, Figs. 22, 23, pl. IV, Figs. 140-144 (Suberites sp.); L a m b e, 1894:127, pl. III, Fig. 6 (montalbidus); H a r t m a n, 1958:4, Fig. 1 (ficus).

The body is lump-like or oblate, usually growing on stones or shells of mollusks. The surface is smooth, even or rugose. The body is soft, elastic and frequently large-pored.

Spicules. Megascleres: tylostyles (to styles) are usually straight, to 0.700 mm long and to 0.10 mm thick. Microscleres: oxeas, strongyles strongyles, less often styles, frequently centrotylostes, smooth or slightly echinate.

Distribution. Arctic Ocean (including the Sea of Norway), off the eastern coast of North America, Bering Sea, Sea of Okhotsk and the Sea of Japan.

1c. Suberites domuncula f. spermatozoon (Schmidt, 1872) (Fig. 68; Plate XXXI, 1-9). /96

T h i e l e, 1903:378, Taf. XXI, Fig. 4 (Cometella); R e z v o i, 1928:82, Fig. 6,7 (Ficulina ficus var. spermatozoon); H e n t s c h e l, 1929:872, 929 (Ficulina spermatozoon).

The body is club-shaped (stalk-like), with a thin, weak peduncle; frequently, the body is also represented by an unevenly dilated stalk the ends of which gradually become thinner and terminate in rhizoids. The overall length attained by the sponge is 7 cm, the greatest width is 0.5 cm. The surface is smooth. The colour is light red, yellow (when alive) and light gray or gray-brown (in alcohol). The skeleton of the peduncle is in the form of an axis of spicules; in the widened part the skeleton is irregularly distributed although the usually sharp ends of the spicules are directed towards the surface. Smaller spicules are arranged radially in the dermal layer; the bulk of microscleres occur here.

Spicules. Megascleres: sybtylostyles (to styles and tylostyles) 0.220-0.636 mm long and 0.006-0.016 mm thick. These spicules vary considerably in one and the same specimen; their apical ends may be blunt. Microscleres: centrotylotic oxeas (or strongyle), slightly echinate, 0.013-0.052 mm long and 0.001-0.004 mm thick.

Distribution. Barents Sea, White Sea, Kara Sea, Sea of Laptevykh, central part of the Arctic Ocean, Sea of Greenland, Sea of Norway and the Sea of Okhotsk. Depth, 19-500 m (and 1,100 m on the Sea of Okhotsk).

Okhotsk the most part, this sponge is encountered at the

For the most part, this sponge is encountered at the bottom of the bodies of water in great numbers although it is also relatively rare (only approximately 30 have been known to have been found in the Arctic Ocean and only one in the Sea of Okhotsk). Evidently, this sponge is able to multiply asexually by means of fission and is a neotenic form of the northern sub-species of S. domuncula.

2. Suberites montiniger Carter, 1880 (Fig. 69; Plate XXIV, 3; Plate XXXIII, 1,2).

V o s m a e r, 1882:31, pl. I, Fig. 25, pl. IV, big. 137:;39; L a m b e, 1894:128, pl. II, Fig. 12 (concinus); S w a r c z e w s k y, 1906:319, Plate XIIIm Fig. 5 (glasenapii); H e n t s c h e l, 1916:6 (Pseudosuberites); K e z v o i, 1931:511 (Stylotella gorbunovi); B u r t o n, 1935:77; Koltun, 1962:182.

The body is lump-like, oblate or cushion-like, up to 10 cm in height (and higher). The surface is smooth. The body is compact (cork-like). Sometimes oscula with a diameter of up to 1 mm are noted, situated on the apices of low outgrowths. The colour is yellow-orange (when alive) or light yellow to brown (in alcohol). The skeleton in the form of an irregular dense mesh of spicules; in the dermal layer the spicules are in radial clusters. The cortical layer is not developed.

Spicules. Megascleres: subtylostyles are usually straight, cylindrical (sometimes semi-tylotic) with an oval head, 0.200-0.600 mm long when the thickness is 0.003-0.010 mm. Microscleres are lacking.

Distribution. Barents Sea, White Sea, Sea of Greenland, northern part of the Atlantic Ocean, the northern part of the /97

Pacific Ocean (Bering Sea, Sea of Okhotsk, Tatar Strait, Aniva Bay, eastern coast of Kamchatka and the Kurile Islands), Chukchi Sea, Antarctica. Depth, 10-426 m.

In the collections there are 150 specimens. The spicules vary insignificantly in size in the representatives of this species; most often, their length is 0.200-0.270 mm when they are 0.003-0.006 mm thick. Only in a few specimens do the subtylostyles attain a length of 0.330-0.600 mm and a thickness of 0.010 mm; in the latter case the spicules are usually semi-tylotic. The sponge recorded by Lambe (1894:128, pl. IV, Fig. 4) for the region of southern Alaska as S. montiniger hardly belongs to the given species if we judge by the diagram of the spicules; the shape of the spicules and their thickness (.016 mm) are unusual for S. montiniger. Off the Pacific coast of the southern Kuril Islands a sponge was found (Plate XXXVIII, 5-7) which differed sharply from the typical S. montiniger in outer appearance although it was identical with the latter in terms of the nature of the spicules. The specimens of this sponge are club-shaped with a well developed strong peduncle; the body itself is somewhat softer than in the usual forms and the surface is small-celled; a small oscular aperture is noted on the apex. As yet, it is not known whether this sponge is a closely related species, sub-species or only a special form of S. montiniger. Tentatively, it is here recorded as S. montiniger Var. (Plate XXXVIII, 6,7).

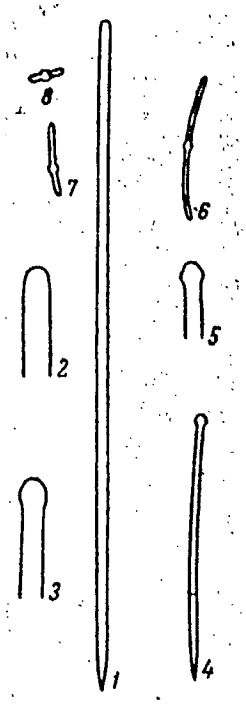

Fig. 68. Suberites domuncula f. spermatozoon (Schmidt.)
1 - style (x150); 2,3 - basal ends of styles (x300); 4 - tylostyle (x150); 5 - basal end of tylostyle (x300); 6-8 - microstrongyles (x300).

Fig. 69. Suberites montiniger.(Carter).

1- sybtylostvle (x150); 2- basal end of subytylostyle (x300); 3- apical end of subtylostyle (x300).

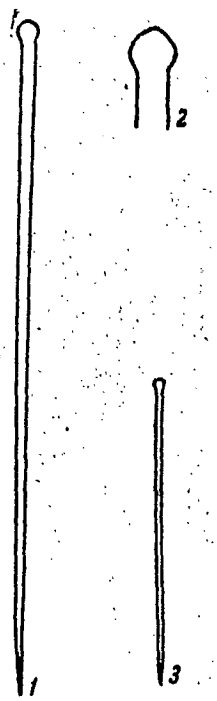

Fig. 70. Subertiles japonicus Thiele.

1- large tylostyle (x100); 2- basal end of large tylostyle (x300); 3- small subtylostyle (x100).

3. Suberites japonicus Thiele, 1898 (Fig. 70; Plate XXXII, Fig. 9; T h i e l e, 1898:39, Taf. I. Fig. 13, 14 Taf. VIII, T a n i t a, 1963:125, pl. IV, Fig. 4.

The body is lump-shaped, oblate or tuberiform, up to 7 cm in height when the width is 12 cm. The surface is smooth, covered with a thin film-like dermal membrane. Sometimes, conical outgrowths up to 0.4 cm high form on the surface of the body. The sponge is dense, slightly elastic (cork-like). The colour is dark brown or light yellow. There is a cortical layer which is up to 1 mm thick and which is somewhat darker in colour than the inner sections of the body. The skeleton is composed of individual spicules and spicule cluster which are irregularly distributed inside the sponge; closer to the surface they are arranged radially and in the cortical layer the skeleton consists of palisadely arranged spicules. The dermal membrane is devoid of a skeleton. Usually, the sponge grows on stones, mollusk shells and barnacles.

Spicules. Megascleres: large tylostyles with a well delineated round head 0.5-1.0 mm long and 0.010-0.021 mm thick, small tylostyles 0.2-0.4 mm long and 0.005-0.008 mm thick. Microscleres are lacking. /98

Distribution. Bering Sea (off Kamchatka and the Commander Islands) Sea of Japan (Tatar Strait and off Honshu), the Sea of Okhotsk (Terpeniya Bay), Pacific coast of the southern Kuril Islands and Japan. Depth, 70-414 m.

Approximately 20 specimens were examined. Generally, small tylostyles in the skeleton of these sponges exist in small

numbers and are of the same type as the large spicules. In some cases blunt tylostyles are observed as well as individual tylostrongyles, short and thicker that the usual tylostyles (up to 0.033 mm thick).

2. Genus PSEUDOSUBERITES Topsent, 1896

T o p s e n t, 1896:127; B u r t o n, 1930a:674.

Genus type: P. hyalinus (Ridley and Dendy, 1887).

Megascleres are represented by tylostyles (to subtylostyles and styles). Microscleres are lacking. A dermal membrane usually exists; the cortical layer is not developed. The inside of the skeleton is irregularly distributed or in the form of an irregular mesh, sometimes, somewhat radial at the surface. The skeleton of the dermal membrane consists of tangentially arranged spicules. The sponges are primarily stalk-like, lamellilobate or lump-like with a very poorly expressed radial symmetry.

1 (2). Long-spicules distinctly subdivided into large and small .....2. P. carnosus (Johnston).

2 (1). Short-spicules, not subdivided into large and small.

3 (4). Cylindrical tylostyles, their length varies insignificantly (from 0.450 to 0.670 mm).....3. P. sadko Koltun.

4 (3). Slightly fusiform tylostyles, their length varies between 0.240 and 1.330 mm.....1. P. hyalinus (Ridley et Dendy).

1. Pseudosuberites hyalinus (Ridley et Dendy, 1887) (Fig. 71; Plate XXXIV, 5,6).

R i d l e y a. D e n d y, 1887:168, pl. XLV, Fig. 6 (Hymeniacidon); T o p s e n t, 1913:26, pl. III, Fig. 10, pl. V, Fig. 17; H e n t s c h e l, 1929:928; B u r t o n, 1959:11.

The body is lump-like, lamellar or pedunculate and branched, up to 9.5 cm high. The surface is smooth or villose. Soft sponge, elastic, sometimes large-pored. The dermal membrane is film-like. Oscula up to 4 mm in diameter (frequently covered on top with tongue-like outgrowths of dermal membrane). Light gray, yellow-gray or brown colour. Basic skeleton consists of scattered spicules, loose clusters of them and fibres. Dermal skeleton consists of tangentially arranged spicules.

Spicules. Megascleres: tylostyles (to styles) slightly fusiform, 0.240-1.330 mm long and 0.006-0.026 mm thick.

Distribution. Barents Sea (south-western part), central part of the Arctic Ocean (off Zemlya Frantsa-Iosifa, Severnaya Zemlya), Sea of Greenland (off Spitsbergen and Medvezhyi Island), Sea of Norway (off northern Norway and Spain), the Mediterranean Sea, Red Sea, Indian Ocean off the coast of south-western Patagonia, Antarctica. Depth, 100-900 m.

Approximately 10 specimens are represented in the /99 collections. The size of the spicules in one and the same specimen varies within considerable limits. Tylostyles have a tendeny towards a rounding and reduction of the sharp end; Blunt tylostyles and short thick tylostrongyles are encountered in a small number. Tylostyles in Arctic specimens ranges from 0.240 to 1.072 mm in length.

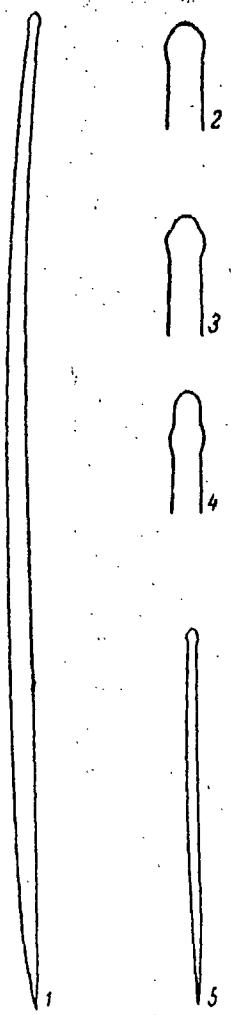

Fig. 71. Pseudosuberites hyalinus (Ridley et Dendy).

1- style (x150); 2-4- basal ends of subtylostyles (x300); 5- tylostyle (x150).

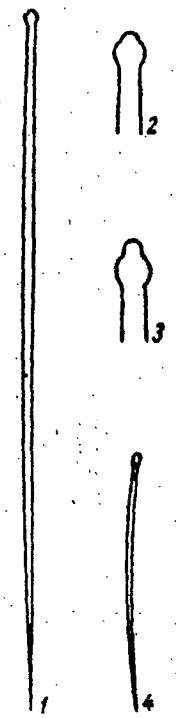

Fig. 72. Pseudosuberites carnosus (Johnston).

1- large tylostyle (x150); 2,3-basal end of tylostyles (x300); 4- small tylostyle (x160).

2. Pseudosuberitus carnosus (Johnston, 1842) (Fig. 72; Plate XXXIII, 3,4).

V o s m a e r, 1885:21, pl. I, Fig. 9, IV, Fig. 33 (Suberites sp.); T o p s e n t, 1900:233, pl. VII, Figs. 1-5 (Suberites); 1913:26 (Suberites carnosus var. ramosus); R e z v o i, 1928:82 (var. ramosus); H e n t s c h e l, 1929:926 (Suberites); B u r t o n, 1959:10 (Suberites).

Body varies from crust-like and lump-like to lobate, club-like, digitate and branched in a stalk-like fashion. The sponge attains a height of 15 cm; the body is quite strongy and elastic. The surface is slightly uneven; there is a thin film-like dermal membrane. Small oscula are frequently covered with tongue-like outgrowths of the dermal mambrane. Light gray, yellow or brown colour. The basic skeleton consists of irregularly distributed fibres, clusters of spicules and individual spicules; on the surface there are radially arranged clusters of spicules, upright with points on the outside. The skeleton of the dermal membrane consists of tangentially arranged spicules.

Spicules. Megascleres: tylostyles are long-tapered (slightly curved), large and small, 0.140-0.740 mm long and 0.004-0.013 mm thick.

Distribution. Barents Sea (south-western and western part), Sea of Greenland (off the coast of Spitsbergen), Sea of Norway (off the coast of Norway, Spain, Greenland), northern part of the Atlantic Ocean, the Meditarranean Sea, Sea of Japan (Tatar Strait), Depth, 49-394 m (and 823 m off the Azores).

Specimens of this species are represented in the collections by pedunculate, branched forms (frequently with anastomasis of the branches). Approximately 60 specimens were examined.

3. Psudosuberites sadko Koltun, sp. n. (teg. 13).

The species type is located at the Institute of Zoology of the Academy of Science of the USSR, preparation No. 6126.

The body is pedunculate lamellilobate (to several centimeters in height). The surface is slightly uneven and finely spicular. The body is soft and elastic. Gray-yellow colour. /100
The skeleton consists of loose long fibres and individual spicules forming something like a mesh.

Spicules. Megascleres: sybtylostyles (to styles and tylostyles) short-tapered or blunt, 0.450-0.670 mm long and 0.008-0.016 mm thick.

Distribution. Kara Sea (northern part), Sea of Lapevykh Inorth-western part, Vil'kutskii Strait), north of Zemlya Frantsa-Iosifa, Sea of Greenland. Depth, 121-368 m.

The species is represented in the collections by isolated fragments which testifies to the lack of strength of the sponge. In processing the material of the "Sadko" expedition in 1935 and 1937-38, Burton considered the specimens of this sponge which were found to be identical with S. capillitium (Topsent, 1892:130). Evidently, this statement of identicality is wrong since a comparison of the descriptions of S. capillitium and the present species shows an essential difference. Five fragments of the sponge were examined.

VIII. Fam. STYLOCORDYLIDAE

Club-like sponge with quite a regular radial symmetry of the body. Radial skeleton. Megascleres are represented by oxeas and their derivatives. Microscleres in the form of microrhabds (oxeas, styles and strongyles).

1. Genus STYLOCORDYLA Thomson, 1873

Ridley & Dendy, 1887:222; Schmidt, 1879:79 (Stylorhiza).

Genus type: S. borealis (Loven, 1868).

Megascleres are represented by oxeas and their derivatives. Microscleres in the form of oxeas, strongyles or styles. Club-shaped sponges, rather regular in shape, consisting of long strong stalk-like peduncles and a spherical or oval head. The skeleton of the peduncle in the form of an axial virgula, or spiral radial skeleton of the head.

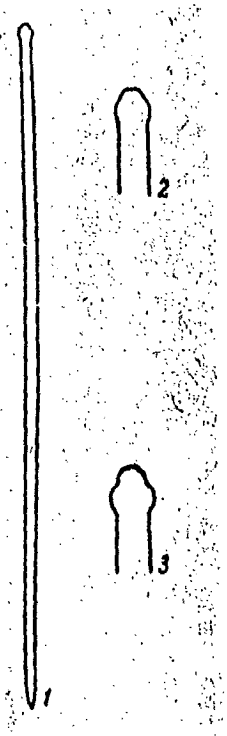

Fig. 73. Pseudosuberites sadko Koltun.

1- blunt tylostyle (x150); 2,3- basal ends of tylostyles (x400).

1. Stylocordyla borealis (Lovén, 1868) (Fig. 74, 75; Plate XXXVII, 1-5).

L o v é n, 1868:105, Taf. II (Hyalonema); S a r s, 1872:70, pl. VI, Figs. 35-45 (Hyalonema longissimum); H a n s e n, 1885:3; V o s m a e r, 1885:10; H e n t s c h e l, 1929:921.

Body of the sponge (its head) is spherical or somewhat elongated, to 2.5 cm in diameter, with a long thin peduncle. The entire sponge attains a height of 19.5 cm. The surface of the head is spicular (velvety) or almost smooth. The peduncle is very strong. There is one tubular osculum on the apex of the head. The colour is gray, light-gray or yellow. The skeleton of the head is radial /101 or spiral; in the peduncle it consists of longitudinal axial fibres of clusters of densely arranged spicules. There is a special dermal skeleton of the peduncle which consists of microscleres (oxeas and their derivatives). In the dermal skeleton the head generally contains variously ended oxeas (with one clearly curved end); sometimes these spicules are lacking or they are partially or completely replaced by microxeas or microstrongyles.

Spicules. Megascleres: small fusiform oxeas (in the axial skeleton of the peduncle) 0.790-4.087 mm long and 0.025-0.064 mm thick; thin fusiform oxeas 0.040-1.340 mm long and 0.010-0.019 mm thick. (the spicules under consideration may be centrotylotic); variously ended oxeas 0.220-0.871 mm long and 0.001-0.008 mm thick. Microscleres: microxea or microstyronyles (fusiform) 0.037-0.380 mm long and 0.0005-0.011 mm thick.

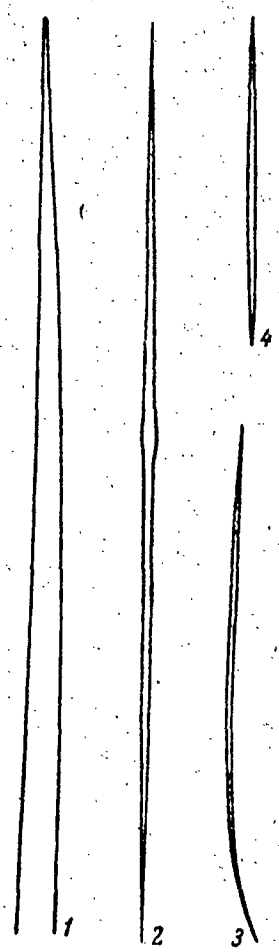

Fig. 74. Stylocordyla borealis typica Burton.

1- large oxea (x100); 2- fusiform oxea (x100); 3- variously ended oxea (x100); 4- microxea (x400).

Distribution. Arctic Ocean, northern part of the Atlantic Ocean, Antarctica and Sub-Antarctica, off the coast of Brazil, Japan and Kunashir Island. Depth, 13-2,880.

The species under consideration is represented in the collections by 45 specimens, rather widspread in the oceans of the world, forming several sub-species (Burton, 1928:63). S. borealis typica Burton inhabits the Arctic and the northern part of the Atlantic Ocean. S. borealis globosa (Ridley et Dendy) inhabits Sub-Antarctica and Antarctica and S. borealis acuata Kirkpatrick and S. borealis irregularis Hentschel occupy Antarctica. In addition, one other sub-species can be isolated which occurs off the coast of Japan and the southern Kuril Islands - S. borealis eous. Thus, the present species is represented by two sub-species in the northern and far-eastern seas.

1 (2). Large oxeas do not exceed 1.5 mm; thread-like oxeas with different ends are approximately 0.001 mm thick. 1b. S. borealis eous Koltun.

2 (1). Large oxeas attain a length of much greater than 1.5 mm thick; variously ended oxeas (more than 0.004 mm thick).....

.....1a. S. borealis typica Burton.

1a. Stylocordyla borealis typica Burton, 1928 (Fig. 74: Plate XXXVII, 1-3).

B u r t o n, 1928:63; R e z v o i, 1928:77, Fig. 3; B u r t o n, 1934:13.

The sponge attains a height of 15 cm; diameter of the head is approximately 2 cm.

Spicules. Megascleres: large oxeas (frequently with blunted ends) 1.790-4.087 mm long and 0.029-0.064 mm thick, thin oxeas 0.400-1.340 mm long and 0.010-0.019 mm thick, variously ended oxeas 0.301-0.871 mm long and 0.004-0.008 mm thick. Microscleres: microxeas 0.037-0.124 mm long and 0.005-0.0027 mm thick. /102

Distribution. Barents Sea, Kara Sea and Sea of Laptevykh, central part of the Arctic Ocean, Sea of Norway and Sea of Greenland, northern part of the Atlantic Ocean. Depth, 13-2,880 m.

Burton (1928:69) also assigns Wagnerella borealis - described by Merezhkovskii (1879:36) for the White Sea as a new species - to the present sub-species. According to Burton, W. borealis represents S. borealis at a very early stage in development. However, Merezhkovskii (1881) himself subsequently recognized the mistake in assigning W. borealis to sponges and regards this organism as belonging to the most simple organisms (Protozoa). According to our data, S. borealis does not inhabit the White Sea and it is difficult to expect to find this primarily deep water sponge in such fresh and shallow bodies of water as the White Sea.

1b. Stylocordyla borealis eous Koltun, ssp. n. (Fig. 75; Plate XXXVII, 4,5).

T h i e l e, 1898:31, Taf. I, Fig. 15, Taf. VII, Fig. 20 (longissima).

The body of the sponge has an oval head up to 0.7 cm in diameter, it sits on a peduncle which is up to 5 cm long when the thickness is approximately 1 mm.

Spicules. Megascleres: large oxeas (usually with blunt ends) 1.0-1.4 mm long and 0.019-0.035 mm thick, thin oxeas 0.402-1.100 mm long and 0.007-0.014 mm thick, variously-ended oxeas (to styles) 0.220-0.480 mm long and 0.005-0.001 mm thick. Fusiform microscleres: miroxeas and microstyles 0.037-0.121 mm long and 0.0015-0.0004 mm thick.

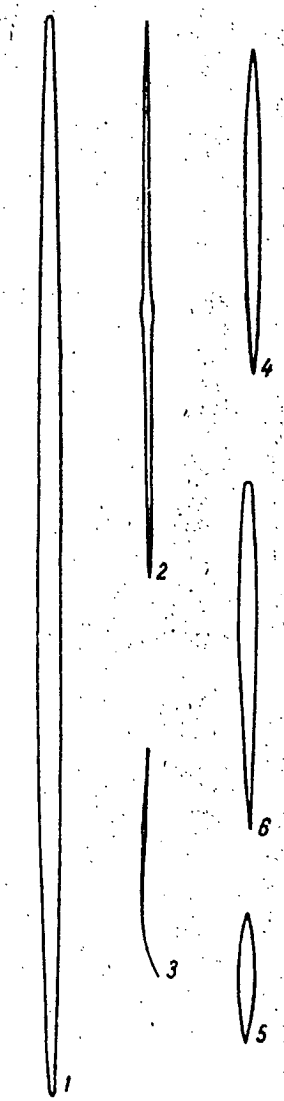

Fig. 75. Stylocordyla borealis eous Koltun.

1- large oxea (x150); 2- centrotylote oxea (x150); 3- differently-ended oxea (x100); 4,5- microxeas (x400); 6- microstyle (x400).

Distribution. Off the coast of the southern Kuril Islands and Japan. Depth, 200 m.

There are 5 specimens in the collections. The new sub-species differs from the type species by smaller large oxeas, very small thread-like variously ended oxeas and a dwarfed growth of the sponges themselves which evidently are not significantly larger than that which is shown in the diagnosis.

IX. Fam. TETHYIDAE

The sponges are spherical in shape with a distinctly expressed symmetry. Radial skeleton. Cortical layer is frequently well developed. Megascleres are represented by styles and their derivatives. Microscleres in the form of euasters.

1. Genus TETHYA Lamarch, 1815 /103

N a r d o, 1833:522 (Donatia); L i e b e r k ü h n, 1859:5.5 (Tethyum); B u r t o n, 1924:1034 (Donatia).

Genus type: T. aurantium (Pallas, 1766).

Megascleres are represented by styles and their derivatives. Microscleres in the form of spherasters, strongylasters, oxeasters and other euasters. There is a well developed fibrous cortical layer. Radial skeleton. Sponges are more or less spherical in shape.

1. Tethya aurantium (Pallas, 1766) (Fig. 76; Plate I, 2-5)

V o s m a e r, 1882:25, pl. IV, Figs. 123-126 (lyncurium var. obtusum); 1885:10 (lyncurium); T o p s e n t, 1900:204, pl. VIII, Figs. 8,9,14,15 (lyncurium); H e n t s c h e l, 1929:921 (Donatia lyncurim); B u r t o n, 1959:15.

The body is spherical in shape, up to 6 cm in diameter. The surface is completely covered with warty tubercles. Dense sponge. There is a well developed cortical layer which does not contain a special skeleton. Pores occur among the tubercles; mesh-like oscula on the apices of the latter. The colour is light gray to orange (when alive), light gray or beige (in alcohol). Radial or even spiral skeleton.

Spicules. Megascleres: styles (usually fusifrom, frequently with a blunt apical end) 0.536-2.0 mm long and 0.010-0.035 mm thick. Spherical microscleres 0.040-0.110 mm in diameter, strongylasters (with none or ten rays) 0.010-0.015 mm in diameter.

Distribution. Barents Sea (south-western part and off Novaya Zemlya), White Sea, off the northern and western coast of Spitsbergen, the Sea of Norway (off Norway and Iceland), central part of the Atlantic Ocean, the Mediterranean Sea. In the northern seas it occurs at the 5-440 m depth at above zero temperatures.

Boreal species, 60 specimens are represented in the collections.

X. Fam. SPIRASTRELLIDAE

The sponges are lump-like, cushion-like, cortical, etc. with a poorly delineated radial symmetry. Papillae are developed on the surface to some extent. The skeleton is irregular and scattered. Megascleres are represented by tylostyles, styles and sometimes by oxeas. Microscleres in the form of spirasters and their derivatives (discasters and others).

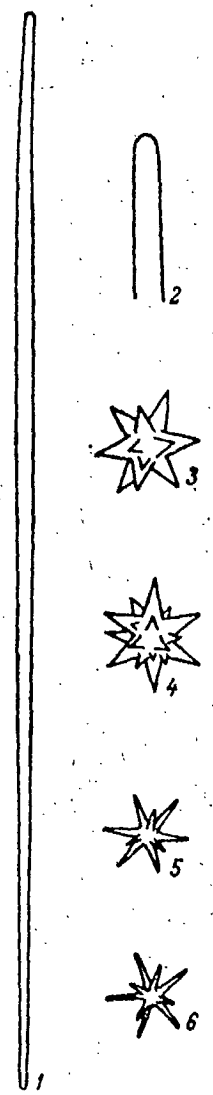

Fig. 76. Tethya aurantium (Pallas).

1- blunt styles (x100); 2- basal end of style (x200); 3,4- spherasters (x200); 5,6- strongylasters (x1,000).

KEY FOR THE IDENTIFICATION OF GENERA OF FAM. SPIRASTRELIIDAE

1 (2). Microscleres in the form of spiraster; boring sponges.....
.....1. Cliona Grant.

2 (1). Spirasters are lacking; microscleres in the form of discasters...
.....2. Latrunculia Bocage.

1. Genus CLIONA Grant, 1826 / 104

T o p s e n t, 1900:32.

Genus type: C. celata (Grant, 1826).

Boring sponges; poorly developed skeleton. Megascleres are represented by tylostyles (and sometimes by acanthoxeas). Microscleres in the form of spirasters.

1 (2). Rough oxeas (acanthoxeas); spirasters with rays in the form of very small denticles.....1. C. vastifica Hancock.

2 (1). Rough oxeas are lacking; spirasters with rounded rays in the form of small tybercules.....2. C. argus Thiele.

1. Clion vastifica Hancock, 1894 (Fig. 77).

T o p s e n t, 1900:56, pl. II, Figs. 3-9; N a s o n o c, 1925:139; H a r t m a n, 1958:21.

The body of the sponge fills the passages and cavities which it has bored in the valves of mollusks and in other calcareous formations. Papillae approximately 0.5-0.8 mm in diamter have oscula and pores and come in contact with the outer environment, protruding from numerous round apertures (of a appropriate diameter) which have been bored by the sponge in the calcareous body in which it lives. Red, orange or yellow colour (when alive). Rather soft sponge. Skeleton of papillae are composed of fusiform clusters of tylostyles.

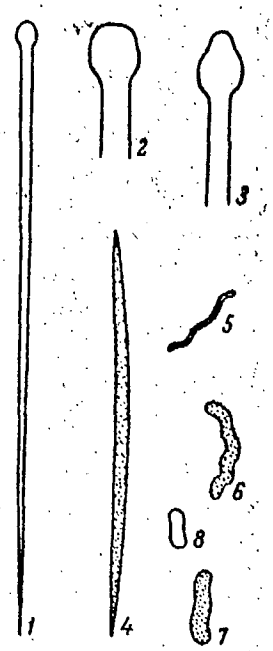

Fig. 77. Cliona vastifica Hancock.

1- tylostyle (x300); 2,3- basal ends of tylostyles (x600); 4- acanthoxea (x600); 5-8- spirastes (x600).

Spicules. Megascleres: tylostyles 0.150-0.300 mm long and 0.003-0.005 mm thick, acanthoxeas 0.054-0.100 mm long and 0.002-0.004 mm thick (the latter may be centrotylote). Microscleres: spirasters 0.010-0.065 mm long and 0.002-0.004 mm thick.

Distribution. Barents Sea (south-western part), Sea of Norway and North Sea, northern part of the Atlantic Ocean, Mediterranean Sea, Black Sea and Caspian Sea, Indian Ocean, off the coast of New Zealand and Japan. Depth, 5-600 m.

The single specimen of this species in the collections was found at a depth of 140 mm in the Barents Sea (Kola Bay) where it was first noted by Nasonov (1925:139).

2. Cliona argus Thiele, 1898 (Fig. 78).

T h i e l e, 1898:41, Taf. VIII, Fig. 14; 1898:41, Taf. VIII, Fig. 15 (var. laevicollis); B u r t o n, 1935:78 (lobata).

The body of the sponge fills the small cavities and cnanals which are bored by the sponge in mollusk shells. There are spherical apertures up to 2.5 mm in diameter on the surface of the shell which have been bored by the sponge and in which short papillae are located having oscula and pores on the apex. Light brown colour. Skeleton is formed of tylostyles and tuberculate spirasters.

Spicules. Megascleres: tylostyles (large and small) 0.140-0.550 mm long and 0.005-0.020 mm thick. Microscleres: spirasters 0.015-0.500 mm long and 0.005-0.020 mm thick. Microscleres: spirasters 0.015-0.020 mm long and 0.005-0.008 mm thick.

Distribution. Sea of Japan (Pos'yet Bay), off the /105 coast of Japan. Depth, 1-140 m.

There is one specimen, C. argus, in the collections, from Posyet Bay which was found in the shell of an oyster. Burton (1935:78) identified this sponge as C. lobata Hancock. Actually, its megascleres are similar to the spicules of C. lobata, however, the microscleres - spirasters - are entirely different which makes it necessary to assign the specimens which were studied to C. argus. The sizes of the spicules of the Posyet cliones : tylostyles 0.214-0.402 mm long and 0.005-0.011 mm thick, spirasters 0.016-0.019 mm long and 0.005-0.008 mm thick.

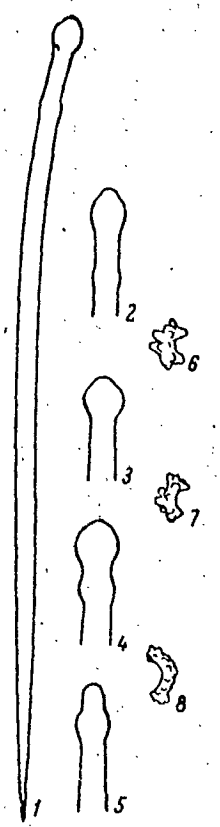

Fig. 78. Cliona argus Thiele.

1- tylostyle (x200); 2-3- basal ends of tylostyles (x200); 6-8- spirasters (x400).

2. Genus LATRUNCULIA Bocage, 1869

R i d l e y a. D e n d y, 1887:233; S c h m i d t, 1875:119 (Sceptrella, part.).

Genus type: L. crateri Bocage, 1869.

Megascleres are represented by styles (or oxeas) of one kind. Microscleres in the form of discasters. Lump-like, cushion-like or cortical sponges. There are usually short conical or crater-like papillae on the surface. Irregular skeleton.

1 (2). Discasters with three sizes of rays.....2. L. tricincta Hentschel.

2 (1). Discasters with four sizes of rays.....1. L. triloba (Schmidt).

1. Latrunculia triloba (Schmidt, 1875) (Fig. 79; Plate XXXVII, 6).

S c h m i d t, 1875:119, Taf. I, Fig. 17, 18 (Sceptrella); T h i e l e 1903:377, Taf. XXI, Fig. 3 (Sceptrella); H e n t s c h e l, 1929:926; K o l t u n, 1965:150.

The body is in the form of cortical overgrowth on different benthic objects (stones, the tubes of worms, etc.). The surface is smooth, but uneven, rugose. There are conical papillae, up to 0.6 cm long on which there are small oscula. Beige or brown colour. Strong leathery dermal membrane. The basic skeleton is poorly developed and is represented by clusters of spines and without any particular order in the arrangement of individual spicules. Dermal skeleton - of tangentially arranged (in a dense layer) styles and discasters.

Spicules. Megascleres: styles (usually straight, sometimes semitylotic) 0.350-0.570 mm long and 0.10-0.013 mm thick. Microscleres: discasters (with four coronas of lateral rays on the virgula) 0.045-0.054 mm long. In some case a partial or complete reduction of one of the middle coronas is observed in the discasters.

Distribution. Barents Sea (south-western part), off the northern and north-western coasts of Zemlya Frantsa Iosifa, off the coast of eastern Greenland, off Norway and Iceland. Depth, 125-418 m.

Comparatively rare species; only five specimens have been found in the collections.

2. Latrunculia tricincta Hentschel, 1929 (Fig. 80; Plate XXXVII, 7). /106

H e n t s c h e l, 1929:869.

The **body** is in the form of a cortical overgrowth. Smooth surface but uneven, forming rugose folds. There are conical or cylindrical papillae up to 0.4 cm long. Beige colour. Strong leathery dermal membrane. Basic skeleton is represented by rather thick fibres (0.080-0.150 mm thick) and individual spicules. Dermal skeleton consisting of tangentially arranged styles; the latter are in fibres or they are irregularly distributed; mainly microscleres-disasters - are concentrated here.

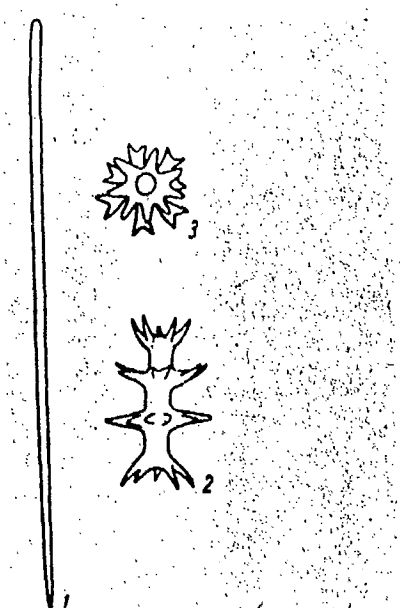

Fig. 79. Latrunculia triloba (Schmidt)
1 - style (x200); 2 - discasters (x400); 3 - same, view from above (x400).

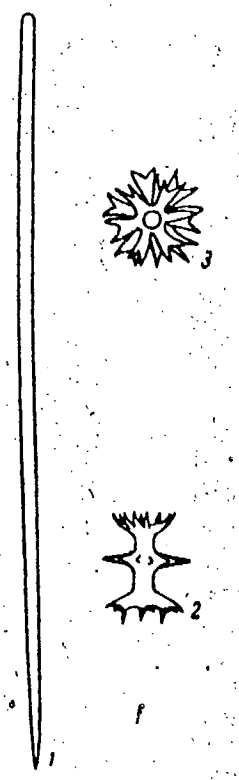

Fig. 80. Latrunculia tricincta Hentchel
1- style (x200); 2- discaster (x400); 3- same, view from above (x400).

Spicules. Megascleres: straight styles, 0.536-0.680 mm long and 0.010-0.014 mm thick. Microscleres: discasters (with three coronas of rays on the virgula; each corona contains 5-6 rays) 0.040-0.048 mm long.

Distribution. Barents Sea (south-western part), off the coast of Norway. Depth, 192-342 m.

One specimen in the collections. Although there is still insufficient comparative material the ability noted above in discasters of L. triloba to reduce one of the average coronas of

rays (denticles) makes one doubt the necessity of isolating L. tricincta as an independent species. Because of this, found among microscleres of L. tricincta are individual discasters.

XI. Fam. OSCARELLIDAE /107

Sponges of irregular shape: cortical, cushion-like or lump-like. Skeleton is lacking.

1. Genus OSCARELLA Vosmaer, 1887

V o s m a e r, 1932:296.

Genus type: O. lobularis (Schmidt, 1862).

Flagellated chambers are spherical. Small pulpy, resilient sponges, devoid of a skeleton.

1. Oscarella lobularis (Schmidt, 1862) (Plate XXXVIII, 1-4).

A r n d t, 1928:28, Fig. 25, 26; B u r t o n, 1934:5; K o l t u n, 1962:182; 1964:150.

The body is cortical or cushion-like and lump-like. The surface is usually folded, smooth. Small apertures, one or several, mainly occurring on the apices of short cone-like outgrowths of the body. Soft resilient sponge. Colour (when alive) is yellow, brown, red, azure or violet. Flagellated chambers are spherical, approximately 0.040-0.050 mm in diameter.

Distribution. Barents Sea (northern part), White Sea, Kara Sea, and Sea of Laptevykh north of Zemlya Frantsa-Iosifa, Berings Sea, Sea of Okhotsk and Sea of Japan, Pacific coast of Kuril Islands, Sea of Norway, northern part of the Atlantic Ocean, Mediterranean Sea and Black Sea, Antarctica. Depth, 0 - 459 m.