SMITHSONIAN MISCELLANEOUS COLLECTIONS
VOLUME 121, NUMBER 6

SPONGES OF THE ALASKAN ARCTIC

BY
M. W. DE LAUBENFELS
Oregon State College

(PUBLICATION 4104)

CITY OF WASHINGTON
PUBLISHED BY THE SMITHSONIAN INSTITUTION
MARCH 19, 1953

The Lord Baltimore Press
BALTIMORE, MD., U. S. A.

SPONGES OF THE ALASKAN ARCTIC

By M. W. de LAUBENFELS
Oregon State College

In July and August 1951 it was my privilege to visit the Arctic Research Laboratory at Point Barrow for the purpose of becoming acquainted with the Porifera of the Alaskan Arctic. My study of this interesting fauna was made possible by grants received from the Oregon State College and the Office of Naval Research. I am also indebted to Dr. Ira L. Wiggins, the present director of the Laboratory, for personal and official assistance rendered me.

About 360 species of Porifera have been recorded from Arctic waters east of Greenland. Only about 125 have been recorded west of Greenland, as far as Bering Strait, and nothing is known as to the occurrence of sponges north of Siberia. The greater abundance just east of Greenland is interesting.

In some of my papers, especially the one on the ecology of the sponges of Bermuda (de Laubenfels, 1950, p. 197), there is evidence that sponges grow most abundantly where streams deposit some unknown substance—not silt. This abundant growth is not caused by the fresh water, because it occurs so far out that full oceanic salinity has been restored. Yet its relation to stream delivery is significant. It is here suggested that the Gulf Stream, especially its proliferation, the Norwegian Current, is responsible for the abundant population of Porifera north of Iceland and extending about Spitsbergen and over into Barents Sea.

At least 13 species of sponges occur at depths of less than 100 meters in the sea north of Alaska. This is about the same abundance as at Woods Hole, Mass., but somewhat less than occurs south of Bering Strait and much less than that of England or the West Indies. However, more species are to be found at all these places, including the Arctic, by dredging at greater depths.

In 1891, G. M. Dawson collected sponges that had been cast up on the beach by wave action at various places on the shores of Bering Sea. The following species were reported on by Lambe (1893):

Halichondria panicea (Pallas).—Some of the specimens may actually have been of this world-wide sponge, because the United States National Museum has sent me for identification a specimen of

panicea collected on the beach at Cape Nome, Seward Peninsula, July 16, 1949, by P. N. Hopkins. On the other hand, because of the very inclusive manner in which Lambe regarded the species, he may well have included specimens of *Halichondria lambei* and even of the genus *Topsentia.* These latter are common north of Bering Strait.

Reniera rufescens Lambe.—This is so described that one can be reasonably certain that it was a *Haliclona,* almost certainly the same *Haliclona* that I found north of Alaska. This may indicate relationship between the faunas north and south of Bering Strait. On the other hand, these specimens (both Lambe's and mine) are close to the cosmopolitan *Haliclona permollis.* If they are actually conspecific, no significant faunal relationship is proved.

Phakellia papyracea Ridley and Dendy.—Hentschel (1929) recognized that this was not *papyracea* but a new species, and named it *beringensis.* It is certainly the same species I found to be very abundant north of Alaska, but it differs significantly from the genus *Phakellia;* it is, rather, an *Echinoclathria.* In 1942 I called this *E. schmitti,* but Hentschel's specific name has priority. Here, however, we have a definite link between the faunas south and north of Bering Strait.

In 1895 Lambe published on two small lots of the American Arctic Porifera obtained by Healy and by Dall. The first collection, consisting of three species, was made by the U.S. revenue steamer *Corwin,* Capt. M. A. Healy commanding, at Peard Bay, about 80 kilometers southwest of Point Barrow:

Halichondria panicea, so identified.—This is *Halichondria lambei* Brøndsted.

Myxilla barentsi Vosmaer, so identified.—The descriptions and figures show decisively that this is the *Myxilla* that I found to be common at Point Barrow, and which I regard as being the world-wide species *Myxilla incrustans.* If *barentsi* is really conspecific, it must then fall in synonymy to the earlier *incrustans,* but *barentsi* is so briefly described that one cannot be sure.

Suberites concinnus Lambe.—This is perplexing. It cannot be a *Suberites,* because the megascleres of that genus are exclusively tylostyles, whereas *concinnus* has only styles. Lambe's specimens lacked (or he did not find) the peculiar microscleres that distinguish the genus *Neosperiopsis.* Nevertheless the opinion is here hazarded that *concinnus* is a somewhat atypical specimen of some species of *Neosperiopsis.* Burton (1935, p. 77) identified a specimen from north of Japan as being *concinnus.* No opinion is here expressed as to what this might be. *Neosperiopsis quatsinoensis* occurs along the west American coast from the vicinity of Puget Sound northward. I have

thus identified specimens now in the U.S. National Museum, collected at Sanak Island, Alaska, about 1947, by Sadie West. Lambe recorded *quatsinoensis* as far north as Hangemeister Island in Bering Sea.

The second collection was made by W. H. Dall in 1880 at Icy Cape, about 240 kilometers southwest of Point Barrow. It consisted of two species:

Esperella helios (Fristedt), so identified.—This is clearly a *Mycale,* but whether conspecific with *Mycale helios* or not cannot now be determined. I did not find any specimens of *Mycale* in Alaska.

Phakellia ventilabrum (Linné), so identified.—This, too, is instead *Echinoclathria beringensis,* discussed above.

The present collection comprises 13 species. Of them, four appear to be confined to the American Arctic. Three others occur also in Bering Sea, south of Bering Strait. The remaining six do not occur south of Bering Strait but do occur east of Greenland, in the North Atlantic—European Arctic.

There are no intertidal Arctic sponges because of the very small tidal range and because of the scouring by ice masses that grind along the shore. The collections, which have been deposited in the United States National Museum, were made near Point Barrow by dredging from the diesel-powered boat *Ivik* of the Arctic Research Laboratory. A few specimens in poor condition were found cast up on the beach.

The sponge fauna in this area had previously been extensively collected, in 1948, 1949, and 1950, by Prof. George E. MacGinitie who, while serving as director of the Laboratory during this time, was making an ecologic survey of the offshore and littoral marine life of the region. In his collections all but the first three species here reported upon are represented.

SYSTEMATIC DISCUSSION

Phylum PORIFERA

Class DEMOSPONGEA

Order KERATOSIDA

Family APLYSILLIDAE

Genus APLYSILLA Schulze

APLYSILLA GLACIALIS (Merejkowsky) Lendenfeld

This species was dredged by Dr. I. L. Wiggins from the icebreaker U.S.S. *Burton Island,* August 14, 1951, from a depth of 67 meters

(37 fathoms), lat. 71°55.5′ N., long. 156°13′ W., together with *Pellina sitiens*.

Among these was a macerated keratose skeleton. The fibers branch in a dendritic manner, without anastomoses. Each fiber tapers as it emits branches, coming almost to a point. Each may be as much as 200 microns thick at the base. These fibers are concentrically laminated, with a suggestion of central or coring pith. This skeleton is characteristic of the family Aplysillidae and is not found in other families. It may be argued that nearly all of the 5 genera and 14 species of the family have such fibers, and that therefore no more-precise identification is possible. On the other hand, one—and only one—species of the family has been recorded from the colder regions of the world—the Arctic, Antarctic, and cold-current localities such as those just west of North America. Therefore the present specimen may with some confidence be regarded as of this hardy species.

This species was first described as *Simplicella glacialis* by Merejkowsky in 1878 (p. 259), from the Arctic north of Russia. It has been found south of Australia, along the north coast of California, and in the North Atlantic. The complete sponge is normally encrusting, conulose, rose pink with more or less gray areas, with soft flesh, and spongy, elastic spongin fibers. The chamber system is eurypylous, the skeleton dendritic.

Order HAPLOSCLERIDA

Family Haliclonidae

Genus HALICLONA Grant

HALICLONA RUFESCENS (Lambe) de Laubenfels

On July 29, 1951, we dredged two fragments of a small haliclonid sponge 10 kilometers west of Point Barrow from a depth of 46 meters, on gravel bottom. The two irregular masses are each about 20 mm. high and 4 to 6 mm. in diameter. They are drab, softly fragile, comparatively smooth, and lipostomous. As usual in the family, there is no ectosome. The skeleton is a regular isodictyal reticulation with no conspicuous or definite tracts. The spicules are oxeas, about 9 by 176 to 16 by 166 microns.

Lambe (1893, p. 75) described *Reniera rufescens* from Petropaulowski, Kamchatka. In 1895 (p. 115) he recorded it as common in Bering Sea and occurring in the Arctic Ocean. His first specimen, examined dry, exhibited some dull crimson areas; hence his choice of a name. He does not mention this color for other specimens, or note its

absence. My specimens did not show this color upon collection, or in spirits, but may have been in poor physiologic condition. In other ways they agree fairly well with Lambe's descriptions.

Although both Lambe's specimens and those from Point Barrow are very similar to the world-wide species *Haliclona permollis* (Bower-

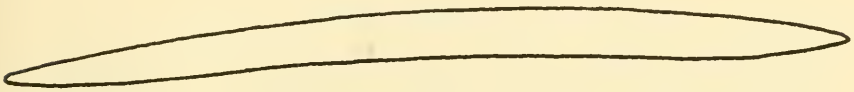

Fig. 1.—Spicule of *Haliclona rufescens,* × 650. Camera lucida drawing.

bank), there are some points of difference, and *rufescens* is not here dropped in synonymy. Instead, my *Haliclona permollis* of 1942 (p. 263), from the Foxe Basin (there identified with hesitation) is here regarded as better to be listed also as *Haliclona rufescens* (Lambe). The species possibly is restricted to the American Arctic.

Order POECILOSCLERIDA

Family Adociidae

Genus PELLINA Schmidt

PELLINA SITIENS (Schmidt) de Laubenfels

This was dredged by Dr. I. L. Wiggins from the icebreaker U.S.S. *Burton Island,* August 14, 1951, from a depth of 67 meters (37 fathoms), lat. 71°55.5′ N., long. 150°13′ W., together with *Aplysilla glacialis.*

These specimens are 2 to 3 mm. thick and up to 30 by 47 mm. in area. They are white, very fragile, smooth, and lipostomous. The

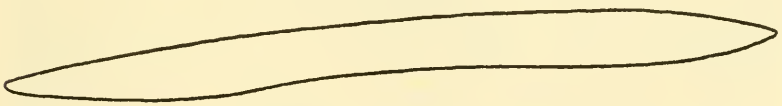

Fig. 2.—Spicule of *Pellina sitiens,* × 570. Camera lucida drawing.

surface comprises a tangent isodictyal reticulation, and the interior is a very symmetrical isodictyal reticulation. The spicules are oxeas, all about 12 by 200 microns.

This species was first described as *Eumastia sitiens* by Schmidt (1870, p. 42). It is fairly common from eastern Canada to Greenland and over to the coast of Norway. Needless to say, the identification,

being based only upon fragments, cannot be at all certain. The genus *Pellina,* however, is indicated, and the species *sitiens* is the only one to be expected.

Family Myxillidae

Genus MYXILLA Schmidt

MYXILLA INCRUSTANS (Johnston) Lundbeck

In July and August 1951 this species appeared in our dredges only a few times, from about three localities, all upward of 10 kilometers (6.2 miles) west of Point Barrow, at depths of 50 meters or more, but each time it was abundant, practically filling the dredge. *M. incrustans* has also been dredged in quantity by G. E. MacGinitie on four occasions in September and October 1948 and 1949, at 33 to 100 meters (108-328 feet) from mud and stone, gravel, and rock bottom, 4 to 7.5 miles (6.5-12 km.) off the Point Barrow base. The following description is based on July 29, 1951, material (U.S.N.M. No. 23217).

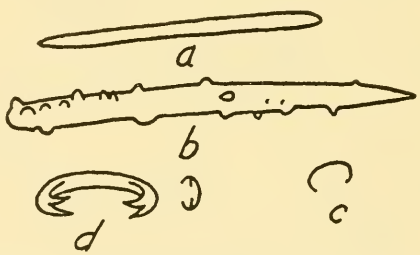

Fig. 3.—Spicules of *Myxilla incrustans,* ×210. A. Dermal tornote; B, acanthostyle; C, sigma; D, isochelas. Camera lucida drawing.

The shape is irregularly massive, up to 16 cm. in diameter, color drab, like nearly all Arctic sponges, consistency very slimy, but with little or no odor. The surface is smooth, with indications of abundant but quickly closed pores. The oscules are regularly 2 mm. in diameter, not raised, rather numerous. There is a definite, separable dermis over an endosome characterized by small (1 mm. or less) scattered cavities.

The dermal spicules, chiefly tangentially placed, are smooth, hastate tornotes, ends sometimes microspined, size about 8 by 180 microns. The endosomal spicules are acanthostyles, in "log cabin" reticulation, size about 17 by 260 microns. It is probable that this spicule arrangement represents an exaggerated development of echinating spicules, with a relative suppression of coring spicules. The microscleres are sigmas about 38 microns in chord length, and anchorate (often verging

toward arcuate) isochelas, of two size ranges, about 18 microns long, and about 76 microns long.

This species was first described as *Halichondria incrustans* by Johnston (1842, p. 122) from Great Britain. It is common in the North Atlantic and adjacent Arctic regions. The identification of the Alaskan specimens is not certain. The European specimens have a strong, characteristic odor, also found in some species of *Lissodendoryx;* the absence of this from the American Arctic specimens may be ecologic but may mean that they are a different species. As already noted, Lambe called them *barentsi,* but *barentsi* was described with extreme brevity by its author (Vosmaer, 1885, p. 21); hence Lambe may have been mistaken. The European specimens of *incrustans* are described as having only anchorate chelas, whereas there are also many arcuate chelas in the Alaskan specimens. These latter chelas, however, are not typically arcuate, but of an intermediate type, so nearly like anchorate chelas that they can be distinguished only if situated in such a way that they can be minutely studied; therefore the name *incrustans* is here preferred.

WIGGINSIA, new genus

This genus of the family Myxillidae is here established to have as genotype the following new species, *Wigginsia wigginsi.* The external appearance is much like that of *Higginsia higgini,* rather than like that of other Myxillidae. The generic diagnosis should emphasize that this is for sponges with smooth ectosomal diactines, smooth or spiny monactinal spicules coring the tracts or fibers, and (significantly) spiny diactinal spicules echinating the tracts or fibers. Diactinal echinators are very uncommon in the whole order Poecilosclerina. The microscleres of *Wigginsia* are palmate isochelas, a type that is seldom found in the family Myxillidae.

The name is given in recognition of the services to science of the eminent biologist Dr. I. L. Wiggins, director of the Arctic Research Laboratory.

WIGGINSIA WIGGINSI, new species

A single specimen of this unique sponge (U.S.N.M. No. 23222) was obtained by G. E. MacGinitie, September 9, 1949, at 143 meters (469 feet), from a bottom revealed by the dredge as consisting of worm tubes and a few rocks, located 15 miles (24 km.) north of the base.

This species is basically lamellate, but on the original wall, side walls are placed at right angles, and yet smaller ones abut against them. The

whole is covered with elevations about 1 mm. high, each of which is in turn ornamented with smaller elevations. This elaborate structure is rare in the family Myxillidae, but is found in the Axinellidae, especially in such beautiful species as *Higginsia higgini.* Our Arctic poriferan is 3 mm. high, 5 cm. wde, with walls up to 3 mm. thick, but chiefly thinner.

Sponges of the *Higginsia* type are often of a lovely red color. The field collector placed this *Wigginsia* in the same jar with an extremely different sponge, a *Polymastia.* He also placed in the bottle a field note: "Rose red sponge." *Polymastia* species are usually gray to white! Perhaps it was the *Wigginsia* that had the lovely color as well

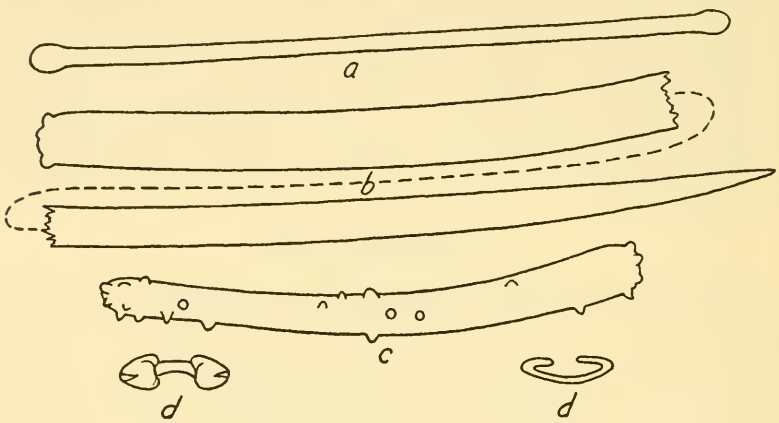

FIG. 4.—Spicules of *Wigginsia wigginsi,* × 435. A, Dermal tornote; B, coring style; C, echinating spicules, acanthostrongyles; D, palmate isochelas. Camera lucida drawing.

as the interesting structure, and *Wigginsia* is in all ways as beautiful as *Higginsia.*

The inhalant and exhalant openings of the specimen were either closed or else as minute as in *Higginsia,* and the consistency is like that of the latter genus. We have here a species with principal skeleton as in the family Myxillidae, but in general appearance, while not like that of typical axinellids, it is very much like that of one particular genus of the Axinellidae.

The skeleton includes abundant special ectosomal spicules, usually tangentially placed. These tornotes are rather tylote than strongylate, and their ends are only very minutely spined if at all. They are typically about 18 by 390 microns in size. There are thin, vague ascending tracts of large styles, some smooth, some with a few spines near the blunt end. This combination, together with spiny echinating

spicules, is usual in the Myxillidae, but in *Wigginsia* the echinators are acanthostrongyles. They are very abundant, making up the vast bulk of the skeleton. They are often so placed that parallel groups form walls to microscopic cavities which are only a little larger than the flagellate chambers. This, which I have called "log cabin" architecture, is common in the genus *Myxilla* itself. These echinating diacts are about 13 by 162 microns in size. There seems to be only one sort of microsclere present; it is abundant, a palmate isochela, usually 35 microns long.

The species name also honors Dr. I. L. Wiggins, and its choice is obviously inspired by the interesting comparisons to *Higginsia higgini* Dendy.

Family Ophlitaspongiidae

Genus ECHINOCLATHRIA Carter

ECHINOCLATHRIA BERINGENSIS (Hentschel)

This is the most conspicuous and one of the most abundant sponges in the American Arctic. It is frequently thrown on the beach as a result of wave action, and it is often dredged.

In the MacGinitie material it is represented by numerous specimens taken from 6 to 12 miles (9.5-19 km.) off the Point Barrow base from a stone, rock, and worm-tube bottom at 104 to 226 meters (341-741 feet), August and October 1949, and in Eluitkak Pass, Elson Lagoon, Point Barrow, at 9 to 12 meters (30-40 feet), from gravel, stone, and mud bottom, August 10 and 30, 1948. I dredged this species on three occasions from 2 miles (3 km.) north of Point Barrow, at 80 meters (263 feet), and 6 miles (10 km.) west of Point Barrow, at 26 and 50 meters (85 and 164 feet), in July 1951, and also found it cast up on the beach.

The specimen described below is one of a lot taken at 26 meters (85 feet), from gravel bottom, July 29, 1951 (U.S.N.M. No. 23215).

It is stalked, with a body wall 5 mm. thick and so curved as to form almost a complete inverted cone, yet the edges do not quite meet. The whole specimen is 13 cm. high, stem about 4 cm. long and 1 cm. thick. There are conspicuous root processes below. (A few specimens, probably merely fragments, appeared simply lamellate; many were completely conical, stalked, and very symmetrical.)

The color is pale brown, the consistency flexible, easily torn. The surface is smooth or punctiform, with evidence of pores quickly closed, about one for each square mm. Probably those on the concave side are exhalant, those on the outside inhalant.

The spicules are styles of two size ranges. The smaller are all close to 7 by 220 microns; the larger are often about 12 by 520 but range up to 22 by 710 microns in size.

The surfaces are covered by a dense ectosome, 0.5 mm. thick, packed with spicules of both sizes, all with their points outward. Under this is a subdermal cavity, 0.7 mm. from floor to ceiling. The latter is supported by fascicular columns of the larger styles, the columns 100 microns in diameter and about 250 microns apart, on centers. The endosome is formed of rather dense flesh, permeated by spicular tracts, of only the larger styles, diameter 75 to 150 microns. The smaller

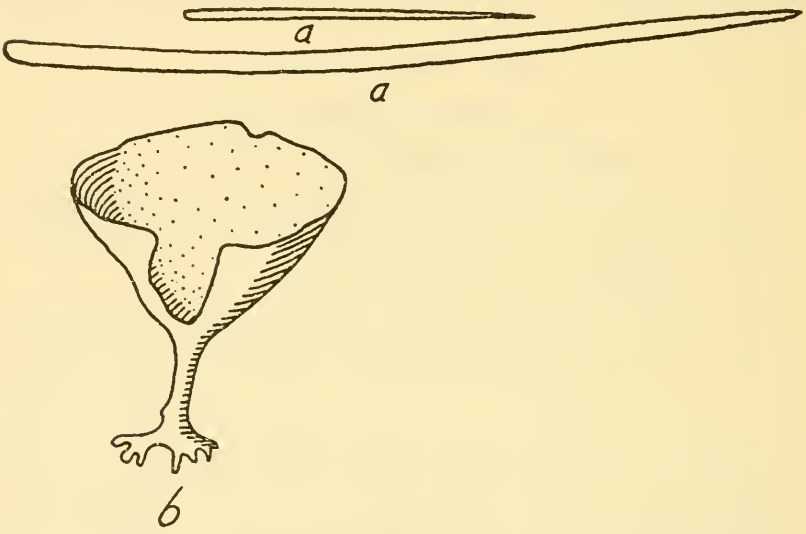

FIG. 5.—A, Spicules of *Echinoclathria beringensis*, × 210. Camera lucida drawing. B, Sketch of the sponge, × ¼. Freehand drawing.

spicules are loose in the flesh between the tracts, or in many cases appear to be echinating the tracts but not so as to render them plumose.

This species was first described by Lambe (1893, p. 76) from St. Matthew Island and identified as being *Phakellia papyracea* Ridley and Dendy. This latter species was transferred to *Phakettia* by de Laubenfels (1936, p. 131). Lambe in 1895 (p. 124) reallocated his species, this time identifying it as *Phakellia ventilabrum* (Johnston). This latter sponge does indeed have the stalked, vaselike shape, but it has a skeleton that comprises axial cores of diacts, echinated by large styles. Hentschel (1929, p. 975) recognized that Lambe's material represented a new species but still used the same genus. He called this *Phakellia beringensis*. I had a bit of this species, just part of the

wall, from Foxe Basin, and described it in my 1942 paper (p.264) as *Echinoclathria schmitti,* new species. The skeletal structure is clearly that of *Echinoclathria,* but in this latter genus no other species has the funnel or vase shape. *Echinoclathria* belongs in the family Ophlitaspongiidae, whereas *Phakellia* is in the Axinellidae, a family characterized by skeletons that have axial specializations, surrounded by contrasting structures, and that are typically very plumose in architecture. The sponge under discussion (*beringensis*) is even less plumose than *Ophlitaspongia* itself, as well as being devoid of axial specializations; it therefore appears certain that it should not be in the Axinellidae. On the other hand, the genus *Phakellia* is not typical of the Axinellidae; hence the classification of these various sponges is still far from certain or settled. It is possible that a new genus may be needed for *beringensis.*

The sponge described as *Echinoclathria favus* by Carter (1885, p. 292) is not properly placed, because of its microscleres; it is here transferred to *Axociella.*

Genus HALICHONDRIA Fleming

HALICHONDRIA LAMBEI Brøndsted

This species is abundant near Point Barrow. Nearly every one of my dredge hauls on gravel bottom in July and August 1951 fetched several specimens.

MacGinitie's records reveal the species as equally common during his earlier dredging efforts in August 1948, August and October 1949, and August 1950. His specimens were obtained 2.8 to 8 miles (4.4-13 km.) off the Point Barrow base on bottoms of gravel, stones, and rocks in various proportions with, in two instances, some admixture of mud and shells, in depths of from 36 to 138 meters (118-453 feet). The description below is based on a specimen from a lot I dredged in 50 meters (164 feet), 6 miles (10 km.) west of Point Barrow (U.S.N.M. No. 23216).

This specimen consists of about half a dozen digitate processes of various sizes, up to 24 mm. in diameter and 80 mm. high. The color is drab and the consistency fragile. The surface is smooth, with pores 50 to 100 microns in diameter, in places four or five per square milimeter, but apparently absent from large patches here and there. The oscules are about 0.3 mm. in diameter, without raised rims. In some specimens they are as much as 3 mm. in diameter. On about half the surface they are absent, but in other places there are as many as one

per square centimeter. The larger ones are much farther apart. Each small oscule is surrounded by many large spicules radially arranged.

There is a conspicuous ectosome, about 30 to 70 microns thick, over a continuous subdermal cavity. The pillars or columns supporting the dermis are about 1.5 to 2 mm. apart and are conspicuously visible through the ectosome, as viewed with the naked eye from without. The endosome has the architecture commonly and appropriately known as "crumb of bread." It is permeated by very vague spicular tracts, elsewhere with spicules in confused arrangement. The endosomal spicules in general are much larger than those of the ectosome, the

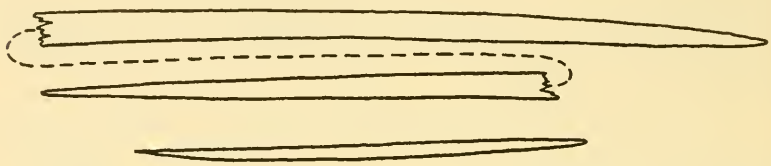

FIG. 6.—Spicules of *Halichondria lambei*, × 158. Camera lucida drawing.

latter being usually tangentially located. The flagellate chambers are about 40 to, occasionally, as much as 50 microns in diameter. The spicules are exclusively oxeas. Those of the dermis are often about 12 by 400 microns, those of the interior about 20 by 1,100, but in each location there is considerable variation in size.

This species was first described by Lambe (1893, p. 75) from St. Matthew Island and identified as *Halichondria panicea*. Brøndsted (1933, p. 15) appropriately gave it the species name *lambei*, as it is quite different from *panicea*. Brøndsted described it from near Ellesmere Land; thus it appears to be confined to the American Arctic, but to be widespread there, all the way from Bering Strait to Greenland.

Order HADROMERINA

Family CHOANITIDAE

Genus CHOANITES Mantell

CHOANITES LÜTKENII (Schmidt)

This species occurred in dredge hauls on two different occasions in July 1951. It had previously been taken by MacGinitie on three occasions, August of 1948 and 1950 and October 1949. His specimens are from 2.8 to 8 miles (4.5-13 km.) off the base and from 36 to 138

meters (118-138 feet), on mud, sand, shell, gravel, stone, and rock bottom. The following description is of a specimen from a gravel bottom, at a depth of 72 meters (236 feet), 2 miles (3 km.) north of Point Barrow, July 26, 1951 (U.S.N.M. No. 23213).

This is a flattened but rounded subspherical sponge, 2 by 6 by 6 cm. in size. The color is gray with yellowish tinges, and the consistency is like cheese. The surface is smooth, with pores about 60 microns in diameter, in places only 100 microns apart, center to center, but absent from considerable areas. The exhalant openings are not differentiated, or else are closed.

The ectosome is distinct, with a thin outer layer, only 50 microns thick, packed with microscleres. Under it are many subdermal cavities, about 150 microns in diameter. The megascleres at or near the surface

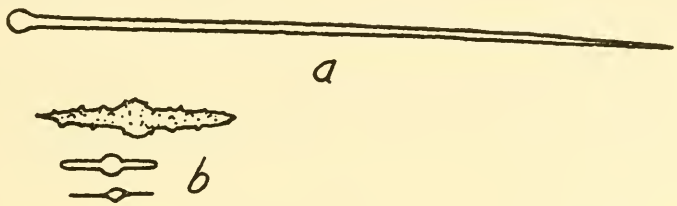

FIG. 7.—Spicules of *Choanites lütkenii*. A, Megasclere, ×210; B, microscleres, ×780. Camera lucida drawing.

are all erect, points outward, but are not conspicuously smaller than the endosomal spicules. It was to be expected that they would be much smaller.

The endosome is dense, with spicules chiefly in confusion, but showing vague traces of a fundamentally radiate arrangement. The flagellate chambers are 30 to 35 microns in diameter, spherical, and grouped in spherical clusters about the beginnings of exhalant canals.

The megascleres are straight tylostyles, about 8 by 420 microns in size. The very abundant microscleres include numerous centrotylate acanthoxeas, often about 36 microns long, also centrotylate smooth microstrongyles, a little smaller and less common, also centrotylate smooth oxeas, only about 18 microns long.

This species was first described as *Suberites lütkenii* by Schmidt (1870, p. 47) from the far northern Atlantic. It has since been found to be common and widespread throughout the whole Arctic.

Family Suberitidae

Genus POLYMASTIA Bowerbank

POLYMASTIA ANDRICA de Laubenfels

A single specimen of this species was dredged by G. E. MacGinitie, August 17, 1949, from a bottom of stones in 162 meters (522 feet), 12 miles (19 km.) out from the Point Barrow base.

It is a rounded cake, 2 cm. thick and 5 by 8 cm. in horizontal measurement. The consistency is toughly cartilaginous. The surface is beset with smooth fistules about 3 mm. in diameter, 7 mm. high, about one such fistule per square centimeter. The abundant minute pores are on these elevations. There are also five exhalant elevations, each 6 mm. in diameter, 11 mm. high, each with an apical oscule about 4 mm. in diameter. The sides of these elevations are longitudinally fluted. In between the fistules and elevations the surface is densely hispid, a characteristic not common in this genus.

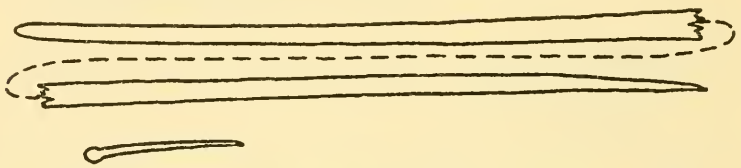

Fig. 8.—Spicules of *Polymastia andrica*, × 160. Camera lucida drawing.

The thin ectosome is characterized by the palisade of erect spicules. The endosome is only a little less dense and is permeated by numerous spicular tracts or columns, running all the way from the base of the sponge to the surface. The spicules are chiefly tylostyles, usually about 4 by 150 microns in size. The larger ones were often centrally swollen, so that there the diameter of the shaft exceeds that of the head. Large smooth styles are also present, much less numerous, but conspicuous in the dermal hispidation and in the tracts; these are often some 20 by 1,200 microns, but exhibit great variation in size.

This name was established, in my study of the sponges of Woods Hole and vicinity (de Laubenfels, 1949, p. 22), for polymastias from eastern Canada and New England, with coarse, conspicuous surface hispidations and three or more size ranges of spicules. The present specimen is unlike typical *andrica* in the fact that its larger spicules are styles rather than tylostyles, but I hesitate to erect any more names in this rather crowded genus. Brøndsted (1933, p. 9) identified a sponge from west of Greenland as *Polymastia robusta* (Bowerbank), but this name is a junior synonym of *boletiformis* (Lamarck).

Brøndsted did not describe his specimen, and it may be that he had *andrica* but assumed that its differences from *boletiformis* fell within the range of variation of that European species.

Order EPIPOLASIDA

Family JASPIDAE

Genus TOPSENTIA Berg

TOPSENTIA DISPARILIS (Lambe) Burton

This was a very common species occurring in most of the dredgings made in 1948, 1949, and 1951 over bottoms of stones or gravel occurring in 38 to 45 meters (125-150 ft.) of water, 4 to 5 miles (7-8 km.) off the Point Barrow base.

The species *Halichondria lambei* has already been described, but sponges clearly of that species warrant discussion in connection with

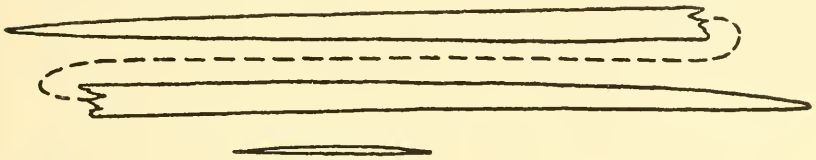

FIG. 9.—Spicules of *Topsentia disparilis*, × 210. Camera lucida drawing.

disparilis. Both have only oxeas as spicules, and these are of great variation in size. Externally they may also be perplexing. Nearly every Arctic sponge is a sort of yellowish, pale drab color. Both types now being dealt with had this same color and the same fragile consistency. Each had small pores and oscules. Small specimens, say less than 3 cm. in diameter, sometimes could not be differentiated without microscopic study. Large ones showed some field recognition marks, as follows: *Halichondria lambei* evidently tends to become quite fistulose as it enlarges; in fact it verges strongly toward the structure of such genera as *Ciocalypta,* and especially *Cioxeamastia.* It may well be argued that *lambei* belongs in *Cioxeamastia.* The sponges that are here regarded as being *disparilis* never produce these tall, sharp-pointed fistules but instead are more or less covered with low, small tubercles, less than 1 mm. high, 2 or 3 mm. in diameter. These are confined to scattered areas, however, and may be missing from small specimens.

The ectosome of the sponge now being described was less conspicuously separated than that of *lambei,* and its spicules were usually erect, even bristling, rather than horizontal or tangent, as in *lambei.*

The endosomal skeleton was chiefly confused, but vaguely radiate. This latter trait, with the erect ectosomal spiculation, suggests an epipolasid rather than a halichondrid classification. The principal criterion as here relied upon for separating *disparilis* was that it had spicules of two radically different size ranges, as is diagnostic of the genus *Topsentia*. The larger oxeas were about 20 by 900 microns in size; the smaller, perhaps to be regarded as microscleres, were about 8 by 130 microns.

Sponges of this type were described by Fristedt (1887, p. 426) from the Arctic (east of Greenland) as *Amorphina fibrosa*. Their larger spicules were not so much larger than the smaller category as is true of the Point Barrow *Topsentia,* yet *fibrosa* should be transferred to *Topsentia,* and is probably related to the present species. In 1942 I recorded, with some hesitation, a sponge from west of Greenland as being *fibrosa*.

Lambe (1894, p. 25) described a sponge from the west coast of Canada as *Halichondria disparilis,* and Burton (1935, p. 77) recorded it from Japan, correctly transferring it to the genus *Topsentia*. Its spicules are not quite so large as those of the Point Barrow *Topsentia,* but it is here considered likely that the two are conspecific.

Lundbeck (1902, p. 27) described a sponge from the Arctic east of Greenland as *Halichondria colossea*. This has specifications almost identical with those of the Point Barrow *Topsentia,* but slightly different dermal structures and shape. It is here transferred definitely to the genus *Topsentia,* and (with some hesitation) also to synonymy with *disparilis*.

Order CHORISTIDA

Family CRANIELLIDAE

Genus CRANIELLA Schmidt

CRANIELLA CRANIANA, new species

The type of this new species (U.S.N.M. No. 23233) was dredged by G. E. MacGinitie from a depth of 225 meters (741 feet), August 17, 1949, 12.1 miles (19.5 km.) north of Point Barrow. Two other specimens were obtained the same day in the same general vicinity, one from 225 meters (741 feet), the other from 133 meters (438 feet); the type and the first of these other two are preserved dry, the third and less typical one is an alcoholic specimen; all three are from a worm-tube and mud bottom. It is of interest to recall that *Craniella* is one of the rather few sponges capable of living in or on mud.

The type is subspherical, about 4 cm. in diameter. The spirit specimen has a similar shape, but is slightly smaller (3 cm.). The other dry specimen is elongate oval, 4 cm. in diameter, but 8 cm. high. The color is the usual drab, the consistency cartilaginous.

The surface of all three specimens is hairy on the lower half, or the dermis may be missing from the lower half as a result of the dredge impact. The upper surface of each, especially the dry specimens, is covered with conspicuous cone-shaped projections, much larger and more acute than the structures (probably not homologous) that are customarily termed "conules." These projections on *craniana* are 3 mm. in diameter at the base, 6 to 8 mm. high, tapering steadily to a termination that is only slightly blunted. They are so crowded that

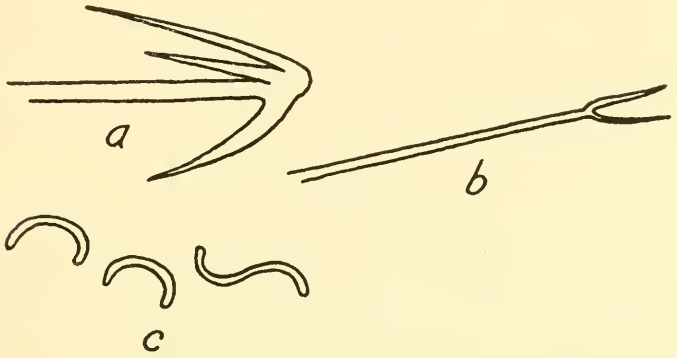

FIG. 10.—Spicules of *Craniella craniana*. A, Cladome of anatriaene, × 150; B, cladome of prodiaene, × 150; C, microscleres (sigmas), × 650. Camera lucida drawing.

their bases touch one another. Neither pores nor oscules show, doubtless being closed during the dredge haul.

The architecture is typical choristid, with huge fascicular columns, which arise from a point near the center of the base of the sponge, and continue clear to the surface. These are each about 1 mm. in diameter, and either touch one another, side by side, or (near the surface) have spaces of flesh between them as much as 1 mm. wide.

The commonest megasclere is a large oxea, often over 100 microns thick and several millimeters long. As usual in the order Choristida, the longest specimens were broken before they could be subjected to microscopic study, and there was great variation in size. There are anatriaenes, also of great variation. Some have clads about 200 microns long and rhabs 16 microns in diameter. There are probably the usual protriaenes, too, but all that I happened to find were merely

prodiaenes. The microscleres are abundant sigmas with blunted ends, chord measurement 17 to 22 microns, often 18 microns.

There are at present some 58 species names left in the genus *Craniella*. More than 50 of these have spiculation practically identical with one another and with the genotype, *Craniella crania* (Lamarck). The great majority, in fact nearly all of these 50, should probably be dropped in synonymy to *crania,* but a few may be retained for their peculiar architecture.

The present species has this typical craniellid skeleton, its only unique trait being its astonishing surface. The species *crania* is characterized by a felted or hispid surface, not always even, but never raised in such striking elevations. Therefore a means of referring by name to the Point Barrow specimens seems indicated.

Class Calcispongea

Order SYCONIDA

Family Leuconiidae

Genus LEUCONIA Gray

LEUCONIA ANANAS (Montagu)

This species frequently turned up in the dredge hauls made by G. E. MacGinitie in September 1948 and August-October 1949, over a bottom of gravel and stones, in 53 meters (175 feet), about 4 miles (6.5 km.) out from the Point Barrow base. Only a single specimen was found in July 1951, in 50 meters (164 feet), about 6.2 miles (10 km.) west of Point Barrow.

This sponge has the narrow cylindrical shape of a *Grantia*. The representative specimen is 9 mm. in diameter, 22 mm. in length. Others were even narrower and longer. The color is dirty white (doubtless actually dirty), and the consistency is fragile. The surface is astonishingly smooth, but there is a rim of coronal oxeas around the apical oscule, which is 5 mm. in diameter. The cloaca extends nearly the whole length of the sponge, a little less than 5 mm. in diameter.

The flagellate chambers are subspherical, about 50 microns in diameter. The spiculation includes many regular triaxons, rays 16 by 240 to 16 by 320 microns, and fairly numerous oxeas, 16 by 720 microns. These, like the triaxons, are chiefly confused in arrangement, not particularly oriented. There are some tetraxons, especially on the cloacal surface. Their rays are also 16 microns in diameter but vary greatly in length in the same spicule, say from 100 to 300 microns long.

This species was first described by Montagu (1818, p. 97) as *Spongia ananas,* from the extreme northern Atlantic, almost Arctic, and has since been found widespread throughout the Arctic. I recorded it in 1942 (p. 267) from just west of Greenland. Our Point Barrow specimens have oxeas much smaller than other recorded members of this species, and lack the curved hypocloacal rays of the spicules lining the cloaca. Its surface is astonishingly smooth. Perhaps it deserves a new name, but there are so many names now in *Leuconia* that many need to be reduced to synonymy. In spite of this, one sort of specimen of

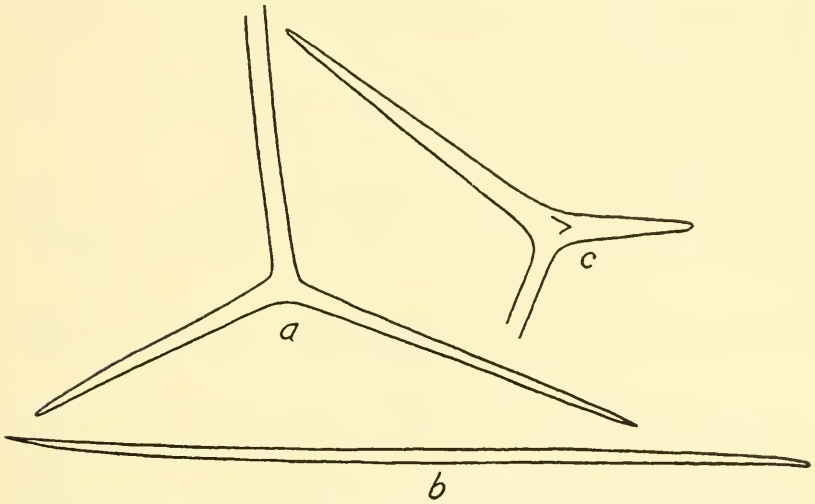

FIG. 11.—Spicules of *Leuconia ananas,* × 155. A, Triaxon; B, oxea; C, tetraxon. Camera lucida drawing.

Leuconia from Point Barrow does seem to warrant a new name, as follows:

LEUCONIA ALASKENSIS, new species

The type (U.S.N.M. No. 23220) and some five other specimens were dredged by G. E. MacGinitie, 5 miles (8 km.) off the Point Barrow base, August 30, 1949, from a stony bottom, in 55 meters (181 feet). The other five specimens are in poor condition and are identified with doubts.

This is a sprawling, repent, ramose sponge. At the base the type is 2 mm. in diameter. Four branches maintain this diameter and are respectively 7, 8, 9, and 22 mm. long. The fifth or main stem is nearly 30 mm. long (or high), and its distal or apical half attains a diameter of nearly 3 mm. It certainly terminates in an oscule of nearly its full diameter. It is not clear whether the other branches so terminate.

Perhaps their much smaller oscules closed, as some *Leuconia* oscules are certainly known to do (see de Laubenfels 1932, p. 13). The apical portion of this main branch is flattened, that is to say, compressed. The cloaca extends throughout the whole body, nearly to the base. Thus the architecture may be described as tubular, with walls only some 250 microns thick. This thinness is most remarkable in the genus *Leuconia,* and like the thin, tubular shape, is rather to be found in the genus *Grantia.*

The color is dirty white, the consistency fragile. The surface is smooth, except for the peculiar diactinal spicules to be described below. There is no conspicuous fringe about the oscule, and all or many of the pores are closed.

The flagellate chambers are oval, about 50 microns in diameter, 70 microns long.

FIG. 12.—Spicules of *Leuconia alaskensis,* × 150. A, Triaxons; B, diactines. Camera lucida drawing.

The spicules are chiefly regular triaxons, in great abundance but confused arrangement in the body wall. Many have rays only 4 by 40 microns in size. Some have rays as large as 6 by 50 to 6 by 60 microns. Much searching revealed not a single tetraxon. Throughout the body wall, at distances of about 300 microns from one another in all directions, are peculiar diactinal spicules, about 30 by 300 microns, half of this length embedded in the chamber layer, half protruding from the outer surface. These spicules are cylindrical, that is to say, of the same diameter throughout nearly their entire length. The ends are often as bluntly rounded as in strongyles or styles. More commonly one or both ends are obtusely or hastately pointed. Each is strongly curved, somewhat like an Australian boomerang.

This is a well-marked species, with no very close relatives.

LITERATURE CITED

BRØNDSTED, H. V.
1933. The Godthaab Expedition, 1928, Porifera. Medd. om Grønland, vol. 79, No. 5, pp. 1-25.

BURTON, M.
1935. Some sponges from the Okhotsk Sea and the Sea of Japan. Issledovania Morei S.S.S.R., vol. 22, pp. 61-79.

CARTER, H. J.
1885. Descriptions of sponges from the neighbourhood of Port Phillip Heads, South Australia. Ann. Mag. Nat. Hist., ser. 5, vol. 16, pp. 277-294, 347-368.

DE LAUBENFELS, M. W.
1932. The marine and fresh-water sponges of California. Proc. U. S. Nat. Mus., vol. 81, art. 4, pp. 1-140.
1936. A discussion of the sponge fauna of the Dry Tortugas in particular and the West Indies in general, with material for a revision of the families and orders of the Porifera. Carnegie Inst. Washington Publ. No. 467, pp. 1-225.
1942. Porifera from Greenland and Baffinland collected by Captain Robert A. Bartlett. Journ. Washington Acad. Sci., vol. 32, No. 9, pp. 263-269.
1949. The sponges of Woods Hole and adjacent waters. Bull. Mus. Comp. Zool., vol. 103, No. 1, pp. 1-55, pls. 1-3.
1950. An ecological discussion of the sponges of Bermuda. Trans. Zool. Soc. London, vol. 27, pt. 1, pp. 155-201.

FRISTEDT, K.
1887. Sponges from the Atlantic and Arctic Oceans and the Bering Sea. *Vega*-Expedition. Vetensk. Iakttagelser, vol. 4, pp. 401-471, pls. 22-31.

HENTSCHEL, E.
1929. Die Kiesel und Hornschwämme des nördlichen Eismeers. Fauna Arctica, vol. 5, pp. 857-1042, pls. 12-14.

JOHNSTON, G.
1842. A history of British sponges and lithophytes, pp. 1-264, pls. 1-25. Edinburgh, London, and Dublin.

LAMBE, L. M.
1893. On some sponges from the Pacific coast of Canada and Behring Sea. Proc. and Trans. Roy. Soc. Canada, vol. 10, sect. 4, pp. 67-78, pls. 3-6.
1894. Sponges from the Pacific coast of Canada. Proc. and Trans. Roy. Soc. Canada, vol. 11, sect. 4, pp. 25-43, pls. 2-4.
1895. Sponges from the western coast of North America. Proc. and Trans. Roy. Soc. Canada, vol. 12, sect. 4, pp. 113-138, pls. 2-4.

LUNDBECK, W.
1902. Porifera (part 1). Homorrhaphidae and Heterorrhaphidae. Danish *Ingolf*-Expedition, vol. 6, pp. 1-108, pls. 1-19.

MEREJKOWSKY, C.
1878. Rapport préliminaire sur les éponges de la mer Blanche. Trudi St. Petersburg Obschtsch., vol. 9, pp. 249-270.
1879. Études sur les éponges de la mer Blanche. Mém. Acad. Imp. Sci., St. Pétersbourg, ser. 7, vol. 26, No. 7, pp. 1-51, pls. 1-3.

MONTAGU, G.
1818. An essay on sponges, with descriptions of all the species that have been discovered on the coast of Great Britain. Mem. Wernerian Nat. Hist. Soc., vol. 2, pp. 67-122, pls. 3-16.

Schmidt, O.
1870. Grundzüge einer Spongien-Fauna des atlantischen Gebietes, pp. 1-88, pls. 1-6. Leipzig.

Vosmaer, G. C. J.
1885. The sponges of the "Willem Barents" Expedition, 1880 and 1881. Bijdr. Dierk., vol. 12, pp. 1-47, pls. 1-5.