

Sponges of Onotoa

M. W. DELAUBENFELS¹

ONOTOA IS AN ATOLL consisting of two principal and three lesser islets, with a lagoon, and is situated far out in the Pacific Ocean at about 1° 50' south latitude and 175° 30' east longitude. It is in the southern part of the archipelago known as the Gilbert Islands, only Tamana and Arorai being farther south.

In July and August, 1951, sponges were collected at Onotoa by Preston E. Cloud, Jr., and Albert H. Banner. These were deposited in the United States National Museum, and all were given the museum number 195237. They were sent to me for study in October, 1952 and returned to Washington in November, 1952. Many of the species were being described as new in my monograph of the Sponges of the Western Pacific, therefore publication of this Onotoa collection was postponed until the monograph appeared.

Twenty identifiable species of sponge occur in the collection, 10 collected by Banner only, 7 by Cloud only, and 3 by both. All those collected by Cloud had detailed ecological notes, but (with a few exceptions) those collected by Banner did not.

The monograph referred to covers collections from the Mariana, Palau, Caroline, and Marshall Islands. The latter are nearest to the Gilberts, and of all the Marshalls, Ebon is nearest to Onotoa. Of the present collection, approximately half the species occur also at

Ebon. The word approximately is used because of the existence of some probably mutual possessions that are based, however, upon uncertain identifications. Certainly there is significant resemblance between the sponge faunas of Ebon and Onotoa. It has been my observation that each oceanic island that one visits has very few of the same species that occur on its neighbors, but still fewer from those islands that are yet farther away.

Mid-pacific islands in general tend to have a certain type of sponge population; this consists of a few species that are peculiar to the island, (perhaps having evolved there), a few species that are cosmopolitan, but these a quite different assortment than the cosmopolitan species that are present on the nearest neighbors, and a few species (such as *Stylotella agminata*) that are widespread in the Pacific. This situation is conspicuously different from that occurring in the corals.

Only one certainly new species occurs in the present collection, but it is also a new genus. Had the collecting been done by a sponge specialist, probably two or three others would have been found. It is to be expected that there would be about 40 species at such an island as Onotoa, whereas half that number are now available. Many sponges are so placed or characterized that they are likely to be overlooked. On the other hand, other marine objects often resemble sponges most deceptively. An interesting item somewhat of this nature concerns the specimen

¹ Department of Zoology, Oregon State College, Corvallis, Oregon. Manuscript received July 6, 1954.

that received my number 52011. The field notes describe it as being a sponge that looked like a piece of red flannel. Microscopic examination revealed that it was a piece of red flannel.

DISCUSSION OF THE COLLECTION

1. *Spongia officinalis* Linné, subspecies *matamata* deLaubenfels

Two specimens were taken by Cloud on August 21 and 24. The first, my number 52064, was at a depth of 25 cm. below low tide, 810 meters N.E. of the monument on Aonteuma, N.W. Onotoa. The second, my number 52009, was at unspecified depth on a traverse from beach outward to reef front, opposite the Pacific Science Board camp site south of the Government Station on the north main island.

The species (*officinalis*) is circumequatorial in warm waters. The subspecies is described in deLaubenfels (1954: 4), and is widespread throughout the Marshall Islands. It was found, but uncommon, at Ponape. It is potentially a useful commercial variety.

2. *Spongia zimocca* Schmidt, subspecies *canaliculata* Lendenfeld

Two specimens were taken by Cloud on July 24 and August 5. The first, my number 52072, was off the end of the jetty at the Government Station at Baraitan, and was in poor condition at the time of collection, so that its identification is provisional. The second was a very large specimen, given special treatment. It was taken at a depth of slightly more than 2 meters, in an area of *Thalassia*—*Microdictyon* concentration, 550 meters S-SW from the Beach at TeKawa L.M.S. church.

The species (*zimocca*) is circumequatorial in warm waters. The variety *canaliculata* was described by Lendenfeld (1885: 502) from Australia. I found *zimocca* common in eelgrass-turtlegrass associations at depths of less than 1 meter in Ponape and the Palaus, but these

all seemed to be the subspecies *irregularis* Lendenfeld (1885: 485) also from Australia. This variety has been considered common throughout the Australian, Indian Ocean, East Indian, and Philippine regions. The distinguishing feature of *canaliculata* is the height of the rims about the oscules; they become erect tubes. This may be an ecologic modification. Some varieties of *zimocca* have commercial value, but neither *irregularis* nor the Australian *canaliculata* are especially valuable.

3. *Dysidea fragilis* (Montagu) Johnston

This sponge was taken by Cloud August 21, my number 52048, at a depth of 25 cm. below low tide, 810 meters N.E. of the monument on Aonte uma, N.W. Onotoa. It is cosmopolitan, occurring not only in the equatorial regions, but also in all seas except the Arctic and Antarctic. In the islands of the West Central Pacific, however, I found it only at Ailing-lap-lap of the Marshalls. It is re-described, based on that occurrence, by deLaubenfels (1954:35).

4. *Dysidea chlorea* deLaubenfels

This sponge was taken August 15 by Banner, my number 52013. It was named and described by deLaubenfels (1954: 37), being common at Ebon Atoll of the Marshalls, but not elsewhere.

5. *Thorectopsamma mela* deLaubenfels

Several specimens were taken July 24 by Cloud, and August 2 and 9 by Banner. The first, my number 52071, was from off the end of the jetty at the Government Station, Baraitan. The others were my numbers 52005, 52065 and 52070.

Described by deLaubenfels in 1954 (p. 29), this species is one of the most abundant in the West-Central Pacific. It was common on most of the Marshall Islands (but not at Majuro), for example at Ebon, Ailing-lap-lap, Likiep and Eniwetok, also in the Carolines at Ponape and Truk, and in the Palaus. It ap-

parently was common also in the Gilberts at Onotoa.

6. *Haliclona* species

Sponges of this genus were taken by Cloud on August 21, my number 52058, in an area of *Thalassia* patches on coarse lime-sand bottom, off N.W. end of outer rib of elevated beach rock at N. TeKawa, also by Banner on July 12, August 1 and 8, my numbers 52020, 52017, 52014 and 52031.

The genus *Haliclona* represents to an extreme the difficulties involved in sponge identification. It is abundant everywhere that sponges occur, and the general and probably correct assumption is that it represents numerous species. About a hundred species names have been placed in this genus, but these are perplexing. Almost certainly the same name has been applied to what are really several different but superficially similar species. It is equally certain that some species have received several names based upon variations that are of minor importance. Decision is outstandingly difficult. In explanation it may be pointed out that these ubiquitous sponges have only the very simplest of spiculations, merely simple oxaeas of one kind. If they had microscleres, it would be far easier to discriminate among them. Furthermore the architecture is of utmost simplicity; the sponges of the genus *Haliclona* have no ectosome at all—the structure of the endosome merely comes to the surface and stops.

Study of the living sponge, always helpful, is practically indispensable for *Haliclona*. The various species can be differentiated only by becoming familiar with numerous living specimens, and noticing fine points that do not appear in long-preserved specimens, and that are difficult to put on paper.

The preservation of these *Haliclonas* is not bad. More detailed field notes would help some, but not greatly; no collection of preserved *Haliclona* is satisfactory. Species identification under these circumstances is always conjectural and is not here attempted. It is,

however, very probable that two or more species are represented.

7. *Callyspongia fistularis* (Topsent) Burton

One specimen was taken by Banner on August 6, my number 52034. It appears definitely to be the same *Callyspongia* that is fairly common throughout the Marshalls, taken at Ebon, Majuro, Eniwetok and Rongerik. As noted, however, by deLaubenfels (1954: 85) it is perhaps a new species, rather than certainly being *fistularis*. Topsent (1892: 25) described *fistularis* from the Red Sea.

8. *Pellina carbonilla* deLaubenfels

Cloud collected this sponge on August 23 and 25, my numbers 52060, and 52053. The first was collected 5 kilometers N, 31° west from Tabu Arorae Maneaba, near center of Te Rawa ni Bao, a pass in the south part of the leeward reef. The second was collected one kilometer south and 80° west from Aiaki Maneaba, on a patch of reef in the central lagoon.

This species was described by deLaubenfels (1954: 100) based on its occurrence at Ebon Atoll of the Marshall Islands. It was common at Ebon, but has not hitherto been discovered anywhere else.

9. *Agelas mauritiana* (Carter) deLaubenfels

This sponge was taken by Cloud on August 23, my number 52054, 2790 meters north by 30° west from Tabu Arorae Maneaba in the south part of Te Rawa Tekatobibi, a pass in the south end of the leeward reef. It was described by Carter from the Indian Ocean, and it has long been known to be common throughout the Australian regions. In 1949 I found it well distributed in the Marshall Islands, at Ebon, Majuro, Bikini and Eniwetok and have redescribed it (deLaubenfels, 1954: 113 ff.).

10. *Mycale armata* Thiele

This sponge was taken by Cloud on July 25, my number 52015, at the southern portion

of the northern main island, 240 meters southwest from the offshore end of the jetty of the Government Station.

It was described by Thiele (1903: 950) from the East Indies, where it appears to be fairly common. It is redescribed by deLaubenfels (1954: 151 ff.) with records from Ebon, Ponape, and the Palaus.

11. *Spongosorites porites* deLaubenfels

This sponge was taken by Banner on July 23 and 26, my numbers 52008 and 52016. It was described from the Island of Yap (deLaubenfels 1949: 124), and redescribed by deLaubenfels (1954: 179).

12. *Spirastrella potamophora* deLaubenfels

This sponge was taken by Banner on August 15, my number 52002. It was described by deLaubenfels (1954: 197). It is extremely widespread, although as minute specimens, throughout the Marshall Islands, specifically at Ebon, Ailing-lap-lap, Majuro, and Likiep. It also occurred at Ponape. It is very close to, perhaps merely a subspecies of, *Spirastrella decumbens*, which is also widespread in the Marshalls and at Truk. This latter was described by Ridley (1884: 470) from the East Indies.

ONOTOA, new genus

This genus is established for the new species *Onotoa amphiastra* which is designated as type. Its family placement is puzzling, because it resembles *Placospongia*, and my opinion is that its closest relative is indeed *Placospongia*. It is not here placed in the Placospongiidae, however, but is put in the family Spirastrellidae, because it conforms to the diagnosis for that family. It is a sponge of the order Hadromerida, having tylostyles as megascleres and streptasters as microscleres. The latter include distinctive amphisphaerasters.

In my monograph of the phylum Porifera, (deLaubenfels 1936: 140), the new family name Choanitidae was substituted for Spira-

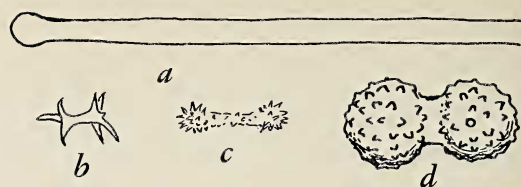


FIG. 1. Spicules of *Onotoa amphiastra* $\times 630$ (camera lucida drawings). *a*, Head of one of the tylostyles (pointed end not shown); *b*, streptaster; *c*, immature amphiaster; *d*, mature amphisphaeraster.

stellidae Hentschel, because the genus *Choanites* was established in 1822 and *Spirastrella* not until 1868. This action must be reversed because Topsent showed (1933: 27) that the type of the genus *Choanites* was not actually a sponge, as presumed, but was a compound ascidian.

13. *Onotoa amphiastra*, new species

A single specimen was collected by Banner on August 1, 1951, my number 52003. It occurred at a depth of 60 cm. in a tidepool of a *Heliopora* flat. It is a pale incrusting sponge, color in life not given. The consistency is very tough, and the surface is in polygonal areas, both items as in *Placospongia*, but the boundaries of these areas are slightly raised, instead of being grooves. The pores and oscules are closed, and were doubtless minute as is frequently the case for thin incrusting sponges.

The ectosome is a dense armour, packed with amphisphaerasters, whereas that of *Placospongia* contains sterrasters. The endosome contains fascicular tracts of megascleres, perpendicular to the surface. The megascleres are tylostyles, frequently 9 by 630 microns in dimensions. A few are somewhat larger, and those that are smaller are evidently immature. The microscleres include scattered streptasters, about 30 microns in length with few but long rays, and the abundant amphiasters. The immature forms of these latter are streptasters with abundant rays, especially at their

ends. They are about 50 to 60 microns long. They are strongly suggestive of the immature forms of the microscleres that characterize *Placospongia*, but in this latter genus the longest rays are in the center, not at the ends. The mature amphispheerasters have conical rays, not the blunted and branched rays of *Placospongia*'s sterrasters. These amphispheerasters are 30 to 40 microns in head diameter, and 60 to 80 microns in length.

14. *Stylotella agminata* (Ridley) Lendenfeld

This species was taken by both Cloud and Banner, as follows:

- July 27. Banner, my number 52056
- August 23. Cloud, my number 52059
- August 25. Cloud, my number 52050
- August 25. Cloud, my number 52052
- August 25. Cloud, my number 52057
- August 25. Cloud, my number 52062.

Number 52059 was taken 5 kilometers north by 31° west from Tabu Arorae Maneaba near center of Te Rawa ni Bao, a pass in the south part of the leeward reef. The collections on August 25 were all in the central part of the lagoon. Number 52052 was 2.5 kilometers south by 76° west of Ai Aki Maneaba on a patch of reef. The other three were from deep water 4 kilometers west of Ai Aki Maneaba.

This species was described by Ridley (1884: 466) from Australia. It is abundant there, and throughout the Indian Ocean and East Indian region. It is reported as abundant in the West Central Pacific, and redescribed, by deLaubenfels (1954: 212). It was by far the most conspicuous sponge in the Marianas, and was nearly as outstanding in the Palaus, Truk and Ponape. It was not certainly found in the Marshalls, however, although a few tiny incrustations there (not identified) may have been juveniles. That study was made in the Marshalls earlier than in the other portions of Micronesia. Perhaps there is an annual cycle, and large size is reached only as late as August in some island regions. *Stylotella* certainly seems to have become noticeable at Onotoa toward the end of Cloud's collecting.

15. *Cliona lobata* Hancock

One specimen was taken by Banner on August 8, my number 52032. This cosmopolitan boring species is redescribed by deLaubenfels (1954: 215) and recorded from Ebon, Likiep and Rongerik of the Marshall Islands, and from Truk.

16. *Jaspis stellifera* (Carter) deLaubenfels

One specimen was taken by Banner on July 31, my number 52019, 1.3 kilometers south by 32° west from Te Kawa church, at the lagoon margin of the south end of the reef stretch known as Aon te Baba. It is described as white in life. This species was described by Carter (1879: 344) from Australia. It is also recorded by deLaubenfels (1954: 225) from Eniwetok of the Marshalls and from Truk, where it is common.

17. *Tethya diploderma* Schmidt

This sponge was taken by Banner on August 2, my number 52004, and on August 6, my number 52035. It is a cosmopolitan species and is redescribed and recorded from Likiep Atoll of the Marshall Islands by deLaubenfels (1954: 232).

18. *Tethytimea stellagrandis* (Dendy) deLaubenfels

One specimen of this sponge was taken by Banner on August 6, my number 52036. The species is not described in deLaubenfels (1954) as are all the others in the present collection except the new species, therefore it will be described here. An additional justification exists for this redescription; the Onotoa specimen differs enough from that of Dendy that it is conceivable that a new species name might eventually be applied to it.

This specimen in alcohol is a pale pinkish incrustation. The pores and oscules (which are closed) must have been minute. The surface is somewhat hispid, but is covered with tubercles of the sort characteristic of *Tethya*. The specimen is so thin that no sharp differentia-

tion between ectosome and endosome is evident. The megascleres are styles, or sometimes inequi-ended strongyles up to 20 microns in diameter. Their lengths are well over a millimeter, the longest always being broken during preparation for microscopical study. The microscleres include microspined euasters (chiasters) often 9 microns in diameter, but sometimes as large as 12 microns. There are also oxyeuasters 25 to 50 microns in diameter that may be immature forms. The distinctive spicules are large asters, about 100 microns in diameter, with branched tips to their rays. This modification also occurs in the spicules called sterrasters. These asters are perhaps spherasters, but not certainly, because the spherical centrum, if present, is obscure.

Dendy (1916: 266) described a specimen from the Indian Ocean as *Donatia stellagrandis*. This was transferred to *Tethytimea* by deLaubenfels (1936: 164). It was subspherical, not incrusting, and was stony hard. Its surface was a mosaic of polygonal areas, which may or may not have originally been tubercles. The chiasters were all about 16 microns in diameter, and the distinctive spicules 250 microns in diameter, hence the species name, *stellagrandis*.

19. *Myriastria debilis* Thiele

This sponge was taken by Cloud on August 20, my number 52027. This was at the southeast end of the reef area known as Rakai Ati, at the south side of a large windward point of the reef near the center of the Atoll.

This species was described by Thiele (1900: 25) from the East Indies. It is not redescribed in deLaubenfels, 1954, but it is much like *Myriastria purpurea* which is described therein (p. 239). The difference is that the asters of *debilis* are oxyeuasters, not tylasters as in *purpurea*. This latter species is cosmopolitan, including occurrence at Ebon. Both species have as megascleres large oxeas, and somewhat more slender anatriaenes and protriaenas. They tend to have radiate endosomes, cor-

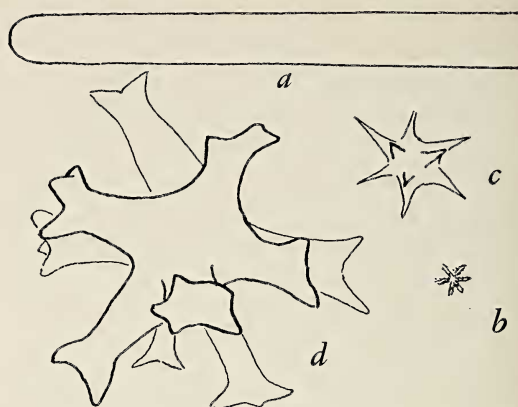


FIG. 2. Spicules of *Tethytimea stellagrandis* $\times 630$ (camera lucida drawings). *a*, Head of one of the styles (pointed end not shown); *b*, chiaster; *c*, oxyeuaster; *d*, one of the abundant distinctive asters.

ticate ectosomes, subspherical shape and hispid surfaces.

20. *Chondrosia chucalla* deLaubenfels

This species was taken by Banner on August 2, my number 52006, and on August 7, my number 52007. It was described by Lendenfeld (1888: 74) from Australia. It was redescribed and recorded from Ailing-lap-lap and Bikini by deLaubenfels (1954: 254).

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