

## Occurrence of Sponges in an Aquarium

M. W. DE LAUBENFELS<sup>1</sup>

ON OCTOBER 6, 1947, nine species of sponge were found growing in one of the tanks of the Honolulu Aquarium. Two of these prove to be as yet undescribed.

According to information furnished by Mr. Spencer Tinker, the director of the aquarium, none of these sponges were brought to the tank as adults. Most or all of them must have reached it as larvae in the running sea-water circulation. Some may have come as minute juveniles attached to marine objects which were placed in the aquarium.

It is curious to note that this astonishing abundance of sponges occurred in only one of the many tanks of the aquarium. It appeared desirable to make a continuing study of this phenomenon, and instructions were left for careful preservation of it, but a few days later an attendant meticulously destroyed every bit of this sponge population.

Study of sponges in the tanks of the Honolulu Aquarium was then continued for 3 years. For 12 months of the year, with some seasonal fluctuation in size, one might find a few small *Tethya* and an occasional encrusting sponge in the many tanks, but the sponges were consistently too small and juvenile for identification.

This latter situation is in harmony with the usual extreme scarcity of "volunteer" sponges in aquariums.

The nine species may be described as follows:

### *Haliclona permollis* (Bowerbank) de Laubenfels

This species was represented by thin, translucent incrustations with lumpy or slightly conulose surface. Some were nearly colorless; one was bright violet, the typical color of this species. Many of the volunteers observed subsequent to October, 1947, may have been of this sort. It is described in *Pacific Science* (de Laubenfels, 1951: 258) from specimens taken elsewhere in Hawaii. It is an abundant species of world-wide distribution.

### *Adocia gellindra* de Laubenfels

This species was described (de Laubenfels, 1932: 114) from California and not recorded again until now. It is rather close to the widespread species *Adocia cinerea* (Grant), but its spicules are smaller than those of *cinerea*. In the Honolulu Aquarium it was represented by a single pale crust on a rock; it may have been fetched from the ocean along with that rock, but the rocks so brought in were so roughly treated, often out of water entirely, that this origin is not certain. In fact, it is more probable that this species is also a volunteer.

<sup>1</sup> Department of Zoology, Oregon State College, Corvallis, Oregon. Manuscript received June 25, 1953.

The Honolulu specimen showed a number of oscules, 2.5 to 4 millimeters in diameter, with raised rims. It had a distinct ectosome over extensive subdermal cavities; this dermis contained a tangent isodictyal reticulation. The spicules were all oxeas, about 5 by 140 microns in dimensions.

### *Toxadocia violacea* de Laubenfels

This species was described (de Laubenfels, 1950: 16) as occurring on the shores of Oahu. It has since been found on other Pacific islands, and there is an unpublished instance of its occurrence intertidally on the coast of California. In the Honolulu Aquarium it was represented by several small specimens on the concrete walls, each with an oscule surrounded by a rim so high that a tubular structure resulted, 2 millimeters in diameter, 3 to 5 millimeters high. The oxeas were 5 by 105 microns, the toxas 60 microns long. The flagellate chambers were especially large, commonly 50 to 60 microns in diameter.

### *Timea xena* n. sp.

The holotype of this species is designated as a spirit-preserved specimen, U. S. National Museum register number 23505. It was a thin orange crust on one of the concrete walls of the aquarium, only 550 microns thick. As is usual in such thin specimens, oscules and pores were not evident. The smooth ectosome was 15 to 30 microns thick, darker than the endosome, and was packed with microscleres. In the endosome fascicular tracts of megascleres occurred, points toward the surface, tract diameter 20 to 25 microns. These columns were perpendicular to the substrate and were 100 to 150 microns apart.

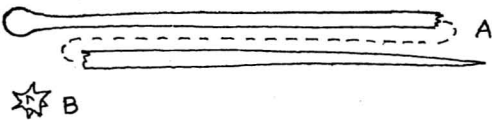


FIG. 1. Spicules of *Timea xena*, camera lucida drawing. × A, Tylostyle, B, spheraster.

The skeleton includes megascleres and microscleres. The former are tylostyles 3.5 by 200 microns in dimension. The latter are asters 10 microns in diameter, probably to be classified as oxyspherasters, but with very small centurms.

There are already some eight species in *Timea*. All have megascleres much larger than those of *xena*; conceivably this might be ecologic, but there is no dependable evidence that aquarium life produces smaller spicule size. The only species hitherto recorded from the Pacific Ocean is *tetractis* Hentschel (1912: 322) from the East Indies. It is described with excessive brevity but characterized by peculiar acanthose microscleres. Only two other species of *Timea* have oxyasters, and each of them has tylasters in addition; of these two, *squamata* was black, and *parasitica* had the oxyasters 25 microns in diameter and its smaller (12 microns) asters were tylasters.

The species name selected is derived from a Greek word meaning "guest."

### *Kotimea tethya* n. sp.

The holotype of this species is designated as a spirit-preserved specimen, U. S. National Museum register number 23504. It also was a pale orange crust on one of the concrete walls of the aquarium. Like the preceding species, it was lipostomous. Not only did it lack cortex, but there was almost no dermal specialization of any kind. The endosome showed no trace of fascicular or radiate structure.

The megascleres were styles, 14 by 700 microns in dimensions. The microscleres were oxysphereasters with relatively large centurms, up to 38 microns in diameter, also (rare) oxyeuasters 20 microns in diameter (not illustrated), and oxyspherasters only 5 to 7 microns in diameter.

This is an interesting specimen in that its spicules are practically identical with those of the genus *Tethya*. On the other hand, all species of *Tethya* are both corticate and ra-

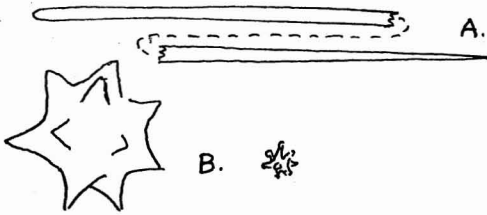


FIG. 2. Spicules of *Kotimea tethya*, camera lucida drawing. A, Style,  $\times 180$ , B, spherasters,  $\times 780$ .

diate. Even when juvenile, specimens of *Tethya* are globular and rough, often already showing the tuberculate surface that is so characteristic of the adults. Many sponge species have juvenile incrusting stages, but not so *Tethya*.

Lest one assume that the specimen now under discussion might be a *Tethya* profoundly modified by the artificial environment, it may be pointed out that *Tethya diploderma* is the commonest volunteer sponge in the Honolulu Aquarium, one that continued to be found throughout subsequent years. In the same aquarium with this *Kotimea* on October 6, 1947, there were numerous specimens of *Tethya*, some obviously very young, others older and larger. All were typical, with globular shape, pronounced cortex, and radiate internal structure.

There are two other species already in the genus *Kotimea*. The type is *moorei*, described as *Hymedesmia moorei* by Carter (1880: 472) from Ceylon. Its microscleres were much like those of *Tethya*. Its megascleres were about as long, but were twice as thick, and some were tylostyles. This latter difference is here regarded as significant. The other species was described as *Hymenaphia spiniglobata* by Carter (1879: 301) from the South Pacific. It had only tylostyles and only the largest sort of spheraster.

The species name selected calls attention to the resemblance to *Tethya*.

#### *Terpios zeteki* de Laubenfels

This species was first described from the Pacific coast of Panama (de Laubenfels, 1936: 450). It is abundant in Hawaii and therefore

was redescribed (de Laubenfels, 1950: 28).

This species is regularly yellowish as to endosome, but its exterior is in some specimens blue, in others red. The specimen in the Honolulu Aquarium was incrusting, with the normal endosome and a crimson-red ectosome.

#### *Tethya diploderma* Schmidt

This world-wide species is common in Hawaii and, as already noted, even regularly invades the Honolulu Aquarium tanks. In the tank now under discussion there were nearly a score of specimens of *Tethya*, well distributed about the walls, bottom, and loose rocks.

This species was redescribed (de Laubenfels, 1950: 30).

#### *Oscarella tenuis* Hentschel

This species was described by Hentschel (1909: 351) from Australian waters; this is its next recorded occurrence. In the Honolulu Aquarium it was represented by a single, opaque, whitish incrustation on the concrete wall, paper-thin and about 3 centimeters in diameter. Its flagellate chambers were 30 microns in diameter.

This genus has no mineral or spongin skeleton, consisting only of the protoplasmic structures and some inanimate colloidal stuff.

It is doubtless much more abundant than the few records would seem to indicate but is ordinarily overlooked. Even when noticed, it is usually hopelessly ruined in the process of scraping it off rock or coral, so that the necessary histological study becomes impossible.

#### *Leucosolenia eleanor* Urban

This species is abundant along the west coast of the United States; this is its first record from elsewhere.

This is a calcisponge of the simplest, or Ascon, type. The Ascon tubes are long, however, with many branches and anastomoses, so that a clathrous structure results.

The sponge in the Honolulu Aquarium had pale flesh-colored Ascon tubes only about 300 microns in diameter. The spicules were principally triacts, with rays 11 by 110 microns. Tetraxons were probably present but were rare, as in other specimens of *eleanor*. The oxeas were chiefly ectosomal, 10 by 150 microns in dimension, often hastately pointed at one end.

It is of exceptional interest to observe the relationship of this aquarium fauna to that of the east shore of the Pacific. Except for the two new species, and the possible exception of the *Oscarella* (probably merely overlooked), all these species occur also on the Pacific coast of North America.

#### REFERENCES

- CARTER, H. J. 1879. Contributions to our knowledge of the Spongida. *Ann. and Mag. Nat. Hist.* V, 3: 284-304.
- 1880. Report on specimens dredged up from the Gulf of Manaar. *Ann. and Mag. Nat. Hist.* V, 6: 457-510.
- DE LAUBENFELS, M. W. 1932. The marine and fresh-water sponges of California. *U. S. Natl. Mus., Proc.* 81(4): 1-140.
- 1936. A comparison of the shallow-water sponges near the Pacific end of the Panama Canal with those at the Caribbean end. *U. S. Natl. Mus., Proc.* 83 (2993): 441-464.
- 1950. The sponges of Kaneohe Bay. *Pacific Sci.* 4(1): 3-36.
- 1951. The sponges of the Island of Hawaii. *Pacific Sci.* 5(3): 256-271.
- HENTSCHEL, E. 1909. Tetraxonida. In: *Die Fauna Südwest-Australiens* [by W. Michaelson and R. Hartmeyer]. Bd. 2, pp. 347-402. G. Fisher, Jena.
- 1912. Kiesel-und Hornschwamme der Aru-und Kei-Inseln. *Senckenb. Naturf. Gesell., Abhandl.* 34: 295-448.