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# Supplementary Note on the Effect on the 1938 Hurricane

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# SUPPLEMENTARY NOTE ON THE EFFECT OF THE 1938 HURRICANE

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The effect of the Sept. 21, 1938, New England hurricane on the ecology of the Fresh Water Pond at Woods Hole, Mass., with specific reference to the Bryozoa was briefly discussed in a previous paper (Rogick, 1940b). Collections had been made in the littoral zone of the specified pond before the hurricane (during the summer of 1938) when the pond water was fresh and the summer after the hurricane when the pond water was brackish. It is still brackish. The present supplementary note deals with the collection made in the same pond during the summer of 1940, more specifically with the collection made on August 1, 1940.

The writer is most deeply indebted to the Woods Hole Oceanographic Institute through whose courtesy and very kind co-operation an analysis of the pond water was obtained. The results of this analysis in parts per thousand were as follows: K—.04; Cl—1.96; Salinity—3.57. Roughly speaking this would be the equivalent of 1 part of harbor water (salt) to about 10 parts of pond water (fresh).

The pond bottom is sandy, with some rocks. As regards the present plant life of the pond no submerged pond weeds were observed. There were some diatoms, filamentous and other algae on the rocks. The top surface of many of the rocks was clean and free from growths of any kind. As regards the present fauna it was found to be not very abundant and not so very different from that of the preceding year. No sponges, coelenterates, platyhelminths, mollusks nor echinoderms were encountered. Among the protozoa were the following: *Euplotes*, *Cinetochilum*, *Zoothamnium*, *Coleps*, *Actinophrys sol*, *Amoeba proteus*, *Amoeba radiosa* and *Euglena viridis*. There were some small free-living nematodes, rotifers and gastrotrichs. There were also a few bloodworms and insect larvae, some in parchment cases, others in sandy cases, copepods, an amphipod *Gammarus fasciatus* and a barnacle *Balanus eburneus*. Of all the species present *Gammarus fasciatus* seemed the most abundant. In fact, it was far more common this year than last.

Most rocks fairly teemed with *Gammarus*. The barnacles were few in number and isolated. All those found were alive and quite large. To some of them were adhering a few algae-surrounded *Fredericella sultana* statoblasts. These statoblasts were split at least partially. A small wad of material or debris was between their valves as if an attempt to germinate had been made but had not advanced very far. At first thought one might suppose that these had been all that remained of *Fredericella* colonies which had settled and grown on the barnacles. However this would be an erroneous conclusion because of several factors. They could not have been formed on the

TABLE I

MEASUREMENTS OF 13 SESSILE STATOBLASTS OF *Plumatella* sp.

| | Maximum in mm. | Average in mm. | Minimum in mm. |
|---|---|---|---|
| Total Length | 0.57 | 0.524 | 0.48 |
| Total width | .45 | .403 | .35 |
| Capsule length* | .51 | .452 | .40 |
| Capsule width* | .35 | .325 | .30 |
| Vestigial float length | .06 | .043 | .02 |
| Vestigial float width | .06 | .047 | .03 |
| Cement ring diameter | .04 | .025 | .01 |

* The capsule measurements are inclusive of the cement ring.

barnacles by living colonies because they occurred in singles, without any definite adherence or deposition pattern, and because they were surrounded and fairly well encased in a thin covering of algal material and some debris. It is quite possible that these statoblasts were formed in 1938, in time washed against the barnacles and were finally attached to them. We must assume that these statoblasts were formed in 1938 (before the hurricane) when living *Fredericella* colonies were very abundant because in 1939 and 1940 no living colonies of fresh-water Bryozoa could be found in the pond, only dead colonies.

The fresh-water forms of 1938 had been replaced by the brackish water form *Membranipora lacroixii* in the 1939 collection (i. e., after the hurricane) while in the 1940 collection neither type was found in the living state. It was a little difficult to understand why *M. lacroixii* was not present in this year's collection but perhaps it may have been due to the low

salinity of the pond or to lack of food. Not even dead colonies of *Fredericella*, *Plumatella* nor *Membranipora* were encountered in the 1940 collection. Only sessile or fixed statoblasts of the fresh-water forms (*Fredericella* and *Plumatella*) could be found and these were all dead—remains of the 1938 crop. Most were empty-looking and a number had never germinated. Insect larvae had appropriated some of the statoblast valves for their cases, particularly for those cases which were made up largely of sand grains.

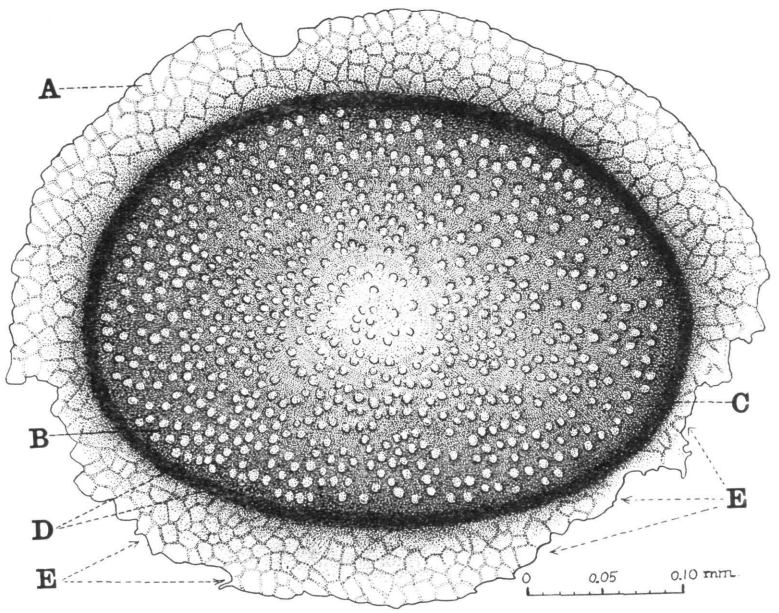


FIG. 1. A view of the upper unattached valve of a sessile *Plumatella* sp. statoblast. This specimen was collected in the Fresh Water Pond at Woods Hole, Mass., on Aug. 1, 1940. It is a very worn specimen as can be judged from the ragged appearance of the vestigial annulus or float or chitinous lamella as it is sometimes known. The annulus slants up a little from the edge of the capsule. Drawn with the aid of a camera lucida, a 5X ocular and a 45X objective. Key to the labels: *A*—vestigial annulus; *B*—capsule; *C*—cement ring; *D*—mammillations; *E*—damaged or worn area.

No free statoblasts of *Plumatella* sp. were found and that was to be expected because they rise to the surface when released, hence are more apt to be lost or missed in collecting. Moreover, they are very tiny, smaller than the sessile statoblasts. A number of sessile *Plumatella* sp. statoblasts were found. Many of these were very worn but still adhering to

the rocks, frequently in rows as they were when the colonies were alive in 1938. However, the zooecial tubes had all been worn away and lighter streaks and traceries remained on the rocks where the zooecial tubes had been in previous years. The zooecial tube ectocyst is not so resistant to disintegration as are the heavily chitinized statoblasts which may remain in water for several years without their valves disintegrating.

The identification of these *Plumatella* statoblasts further than the genus from sessile statoblasts alone is extremely difficult in the present case for several reasons: 1, the present lack of floating statoblasts and colonies; 2, the incompleteness of measurements for the various *Plumatella* species described in literature; 3, the considerable variation of both floating and sessile statoblasts of the various fresh-water Bryozoa; and 4, the confused synonymy of the *Plumatella* group. Reference to the measurements given by different authors for the several species and varieties of *Plumatella* did not solve the problem since none of the average measurements agreed completely with those of the Woods Hole *Plumatella* sp. statoblasts. The latter are larger than those of *P. repens typica* or *emarginata* of Study IX, pp. 200, 202, and are smaller than those from the *P. fungosa* var. *coralloides* of Harmer (1913, pp. 451–452). Because of this difficulty of identification it was deemed advisable to picture the statoblasts in Fig. 1 and to give their measurements in Table I.

In conclusion, one might say that there was some change in the fauna of this pond from last year to this. The Bryozoa, in which the writer is especially interested, seem to be in a period of transition. The fresh-water members had been killed off as a result of the accompanying effects of the hurricane late in 1938, the marine or brackish water forms thrived during the summer of 1939 and neither was alive in the summer of 1940. Collections in future years in the same locality should prove interesting.

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