
OBSERVATIONS ON SPONGILLA FRAGILIS: REORGANIZATION AND LARVAE

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During the summer of 1949 I was investigating the life history of an insect parasite (*Climacia areolaris*, a sisyrid neuropteran) of fresh water sponges. The work was carried on at the Franz Theodore Stone Laboratory, Put-in-Bay, Ohio. Since the insect larvae required living sponges for food, I spent a considerable amount of time with sponges, particularly *Spongilla fragilis*. I collected the sponges from Lake Erie and from a shallow pond on one of the islands (Haunck's Pond, Middle Bass Island), and attempted to culture them in the laboratory—without noticeable success. However, I made a few observations upon these maltreated sponges.

On June 29, I was intrigued to find 4 granular white globules, each about 0.25 mm in diameter, rolling around in the water of one of my finger-bowl cultures. The culture contained sponges collected that morning from the pond. As usual, a variety of protozoons and algae were present, and I wondered at first whether these little ciliated or flagellated balls swimming about might be colonial flagellates. The experienced limnologists whom I consulted were as baffled as I was. Next, I suspected that the revolving balls might be sponge larvae. One of the balls dried up in a depression slide while I was having supper. Examination of the remains revealed the presence of spicules, converting my suspicion to conviction. Afterward, I discovered similar larvae throughout July and during part of August. In fact, I found such larvae in various stages of development within many sponges. They seemed to be released, for the most part, within a few hours after injury to the sponge.

I kept some of these larvae for several days in watch glasses, depression slides (in moist chambers), etc., for purposes of observation. After swimming for a few hours, a larva would settle upon the substrate—often with many of its flagella still beating. Soon it was attached. Then, gradually and imperceptibly, its shape changed—like a gumdrop melting in the sun. Within a day or so, its general contour resembled a pancake rather than a golf ball, but there was a rise near the center, and the periphery spread out as a thin transparent sheet, the precise boundary of which was difficult to detect. The flagella on the outer surface had disappeared. Spicules were rather prominent toward the central, granular mass. A new young sponge was well on its way. (For an extensive discussion of larval development in fresh water sponges, see Brien and Meewis, (2)).

A second phenomenon which aroused my excitement involved reorganization. Since I was rearing my insects in such containers as Syracuse watch glasses, I needed small sponges separated from their original substrates. Such sponges were carefully shaved off rocks, etc., and placed in the dishes. Often I noticed a bit of sandy-looking material in these dishes. On August 1, I examined some of the sandy-looking material more carefully. It was composed of brownish cells and cell clumps, averaging 20-25 microns in diameter. Many of them were shimmering inside. After watching a short time, I noted that some of them were moving about by means of broad, hyaline pseudopods. When one cell or cluster encountered another, the two adhered, appearing to fuse together. Within a few hours, some of the clumps were 100 microns in diameter, practically none being less than 30 microns in diameter. This was reorganization—as clear-cut as that observed at Woods Hole on marine sponges. (For a detailed account of reorganization in a fresh water sponge, see Brien, (1)).

The third and last observation I shall mention here concerns the development of what I shall call a chimney, for want of a better term. On July 23, from 8:00 p. m. until midnight, I continuously watched a couple of my insect larvae within and upon a sponge, employing magnifications ranging from 30X to 100X. During this 4-hour period, a ridge developed around the osculum. The ridge grew into a collar, the collar into a tube—or chimney—, tapering apically. The chimney was thin-walled and transparent, with a terminal opening little more than 0.1 mm in diameter. (Although I find no record of measurements among my notes, I should estimate that the chimneys which developed on my sponges ranged from a fraction of a millimeter to almost a centimeter in length.) The current of water issuing from the chimney was quite pronounced. I found it amusing to watch the sisyrid larvae emerge from the chimney. Although but first-instar larvae, they were almost too broad to escape through the apical aperture. With what appeared to be extreme dignity, a larva would slowly and carefully back out until its hind legs had secured a firm hold upon the outer surface of the chimney. Then, as the tarsal claws of the previously-anchored forelegs were withdrawn from the inner wall of the chimney, the body of the larva was suddenly and forcibly ejected from the mouth of the tube. Flipping around beside the chimney, out of the current, the larva would calmly crawl down onto the sponge surface to

resume its probing and feeding. Should a larva lose its toehold while inside the chimney, it would be shot out like a pea from a peashooter.

Just what the cause and function of chimney formation may be, I do not know. It occurs chiefly in moribund (?) sponges. Perhaps it serves to exclude the various animals, such as annelids, which are likely to enter the sponge at such a time. It can certainly keep out the larger sisyrids which ordinarily enter the sponge at will. Or, possibly, it might serve to expel further any dead and decomposing sponge cells that might otherwise settle upon and contaminate the surface of the sponge. Whatever may be its function, I have never run across a reference to it in the literature.

LITERATURE CITED

1. BRIEN, PAUL. 1936. La réorganisation de l'éponge après dissociation par filtration et phénomènes d'involution chez *Ephydatia fluviatilis*. Arch. Biol. 48: 185-268.
 2. BRIEN, PAUL and H. MERWIS. 1938. Contribution à l'étude de l'embryogénèse des Spongillidae. Arch. Biol. 49: 177-250.
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