

**THE TAXONOMY AND DISTRIBUTION OF  
THE BORING SPONGES (CLIONIDAE)  
ALONG THE ATLANTIC COAST  
OF NORTH AMERICA**

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Collectors of marine life everywhere have been impressed by the frequent evidences of holes and caverns in a wide variety of submerged calcareous objects. The literature, beginning with the nineteenth century, contains numerous descriptions of such submerged calcareous objects, limestone, marble, coral, molluscan and barnacle shells, riddled with minute perforations and cavernous galleries containing a radially symmetrical organism. Grant in 1826, from collections in the Firth of Forth, Scotland, described this organism as a new zoophyte and named it *Cliona celata*. By 1849, Hancock showed that this organism is definitely a sponge and continued the work of describing many new species of boring sponges. Hancock failed, as others since him have failed, to explain how the sponge functions as a borer of calcareous material. Gray, in 1867, organized all of the boring sponges into one family, the Clionidae, but later workers, probably through uncertainty, occasionally inserted non-boring sponge species. In 1936, de Laubenfels pointed out that the family Clionidae contains only the boring sponges, those that actually perforate calcareous objects in order to establish caverns or galleries in which to live. The similarity of certain non-boring sponges in skeleton characteristics or spiculation to boring sponges is not a valid reason for inclusion in the family Clionidae.

In North America, the first collection and observation of the boring sponge was made by Leidy about 1856 while visiting the New Jersey coast. This sponge, in 1889, erroneously became known as *Cliona*

*sulphurea* (Desor) Leidy but later studies by Topsent, 1891, proved it to be synonymous with *Cliona celata* Grant. *Cliona caribboea* was described and named by Carter in 1882 after studying a collection of boring sponges from the West Indies. In 1917-1918, George and Wilson made collections of boring sponges in Beaufort Harbor, North Carolina, and recorded two boring sponges, *C. celata* and *Poterion atlantica*, the latter of which they reported as a new species. It appears now that *P. atlantica* is not one of the Clionidae since the actual boring process is the primary requisite and not the spiculation. This sponge has been observed only as a vasiform fragment, about 12 by 11 centimeters, and not associated in any way with a calcareous object. It was believed to be closely related to the "Neptune's Cup," *Poterion patera* (Hardwicke), of the Pacific Ocean which Vosmaer, in 1908, claimed as a clionid. De Laubenfels, 1936, places *Poterion* in the family Suberitidae of non-boring marine sponges. *C. caribboea* was again found in a collection of sponges near Loggerhead Key, Florida, and described by de Laubenfels as conspecific with *caribboea* of Carter 1882.

Mention also should be made of several species that have been recorded from the West Indies, but which, because of poor descriptions and consequent confusion, are omitted from the list of legitimate species of Clionidae by de Laubenfels. They are *C. phallica* Leidy 1848, *C. subulata* Sollas 1878, *C. vermifera* Hancock 1867, and probably *C. viridis* Schmidt 1862. This last named species appears distinctive only because of its green color.

In recent years, oystermen, conservation officials and marine investigators have come to recognize the importance of the boring sponges mainly through their abundance and their probable connection with the wide-spread depletion of certain formerly prolific oyster beds, such as that experienced in the Little Choptank region of the Chesapeake Bay in 1934. Frequently oysters taken by tongers and dredgers have very brittle or broken shells, and the oyster beds themselves contain high percentages of riddled empty shells. Typically, these broken infested shells yield conspicuous yellow to orange excavations. Because of this situation many complaints have arisen over a wide oyster producing area, all centering on sponge infestations. This situation further emphasized the fact that our knowledge of boring sponges in the United States is all too limited.

This paper, dealing with taxonomy and distribution, is the first product of the boring sponge investigations begun in the summer of

1936 by the Chesapeake Biological Laboratory. Other research involving the method of boring, the histology, the embryology and life cycle of the boring sponges is being carried on in order to make additional contributions to our knowledge of the biology of these forms, as well as to gather information that may be of use in controlling them on oyster beds.

The author is especially indebted to Professor R. V. Truitt, Director of the Chesapeake Biological Laboratory, for the unlimited use of the Laboratory's many facilities, for field support, and for his many helpful suggestions.

### MATERIALS AND METHODS

During the summers of 1936, 1937, 1938 and 1939, numerous trips were made to collect material from the principal oyster beds of the Chesapeake Bay. Specimens of oysters, clams, and shells were obtained by dragging a common oyster dredge over the known natural and cultured oyster beds. Living boring sponges were thus readily discovered and collected. Shells with sponges were preserved in 70% alcohol for future study. The natural oyster bars sampled varied in depths to ten meters while cultured beds were usually about two meters below the surface of the water.

The collection of sponges from Beaufort, North Carolina, was hand gathered by the author in one to three feet of water along the shore of the island occupied by the U. S. Bureau of Fisheries Laboratory as suggested by Dr. H. F. Prytherch, Director. Specimens from the York River were obtained in August, 1936, from Dr. A. D. Hasler who at that time was with the U. S. Bureau of Fisheries in Yorktown, Virginia. Specimens from Malpeaque Bay, Prince Edward Island, Canada, were secured from Dr. A. W. Needler, in charge of the Marine Station there. Collections from Delaware Bay and the coast of Maryland were obtained by Professor R. V. Truitt. Long Island specimens were gathered during the years of 1940 and 1941. The author is greatly indebted to the above named scientists, and to Captain Harvey Mister, In Charge of Boats at the Chesapeake Biological Laboratory, for his exacting and faithful work on the extended field trips while collecting material.

Representative portions of the boring sponge together with small pieces of otherwise clean riddled shells were placed in a 100 c. c. beaker containing concentrated  $\text{HNO}_3$ , and heated over a low flame























































