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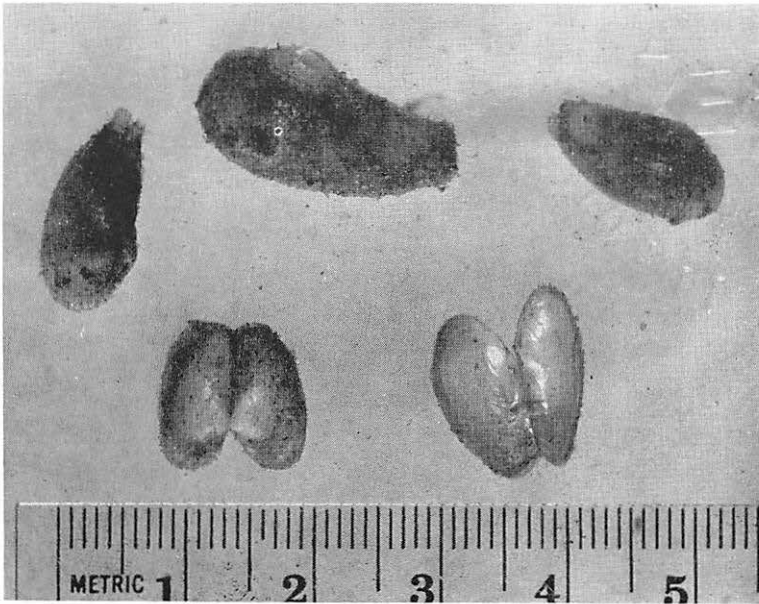


Figure 1. Adult *Lyonsia hyalina*. Top row: Living clams. The one at left and the one at right have siphons extended. Bottom row: Exterior view of empty valves at left. Interior view of empty valves at right.

LARVAL DEVELOPMENT OF THE PELECYPOD *LYONSIA HYALINA*¹

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Lyonsia hyalina (Conrad) is a small ($\frac{1}{2}$ to $\frac{3}{4}$ inch) odd-shaped clam (Fig. 1) common along the Atlantic Coast from Nova Scotia to South Carolina (Abbott, 1954). It is usually found in sand in shallow water with a coating of small sand grains attached to the periostracum.

The only published description of larval Lyonsiidae is a tentative identification of *Lyonsia norvegica* (Gmelin) found in plankton samples (Rees, 1950). Rees also tentatively identified larvae of *Thracia* sp., and *Cochlodesma praetenuae*. These species belong to closely related families and are grouped with the

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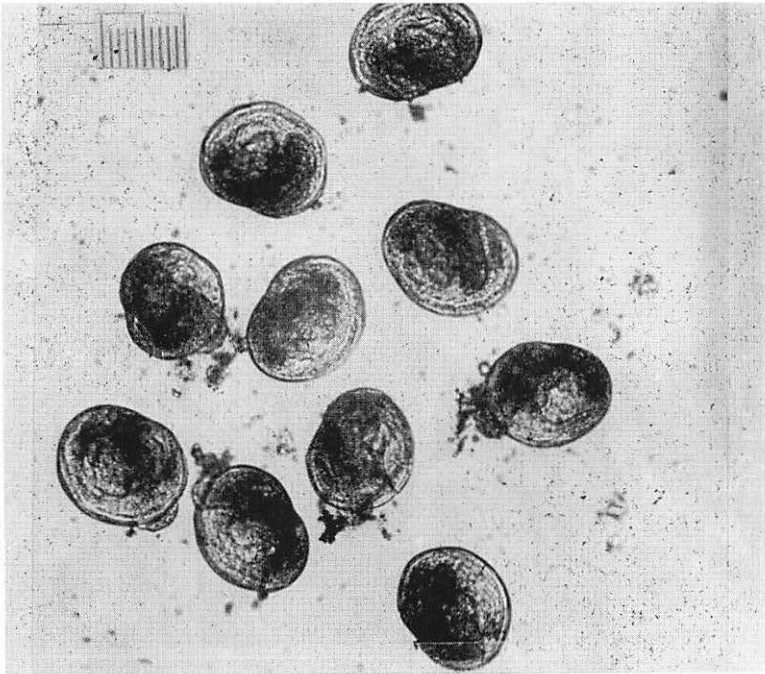


Figure 2. Larval *Lyonsia hyalina*. Scale equals 100 microns.

Lyonsiidae in the super-family Pandoracea. They are described by Rees as being slightly inequivalve and having, in each valve, a single long narrow hinge tooth. The hinge teeth are alternate, rather than opposite, and are poorly defined. A small ligament is located at the posterior end of the hinge. Sullivan (1948) describes juvenile *Pandora gouldiana* Dall, another member of the Pandoracea, and from the shape of the prodissoconch shell concludes that metamorphosis occurs when larvae are 235 microns long and 160 microns high. She notes that a "flattened dorsal edge with no projecting umbones" and "almost black viscera" are characteristic. Her photomicrograph of the hinge structure shows the hinge teeth opposite each other. The larva that Stafford (1912) has tentatively identified as the same species, *Chidiophora (Pandora) gouldiana*, bears no resemblance to Sullivan's account. But, larval *P. inaequivalvis* is similar.

The purpose of this report is to describe the pelagic larvae of

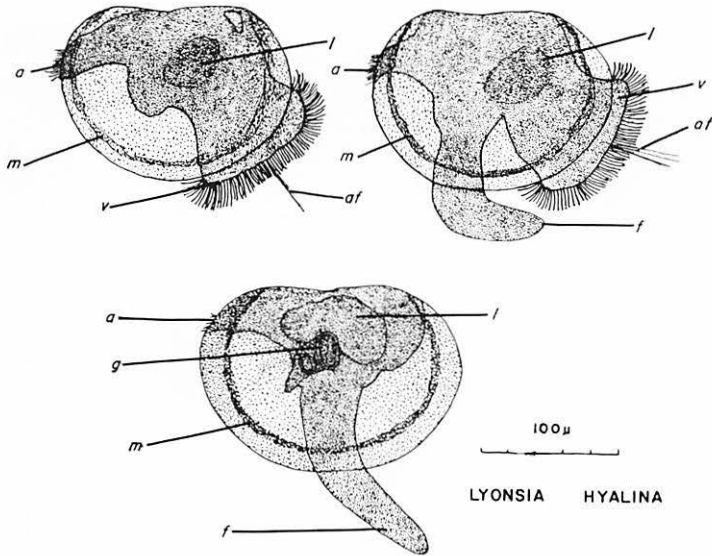


Figure 3. Diagram of major visible anatomical features of larval *Lyonsia hyalina*: a-anus, af-apical flagella, f-foot, g-gills, l-liver or digestive diverticulae, m-mantle edge, v-velum.

L. hyalina so that they can readily be identified in plankton samples. The terms used to describe the larvae are the same as those used for *Barnea truncata* (Chanley, 1965).

Materials and Methods. *L. hyalina* were collected from Mason's Beach on the Chesapeake Bay side of the Eastern Shore Peninsula of Virginia on 1, 8 and 15 April, 1965. Clams were collected by skimming off a layer of sand, near *Zostera* beds, and screening it. On the day following collection, clams were washed in salt water, to remove adhering grains of sand, and placed in finger bowls with filtered or centrifuged salt water. Spawning was induced by increasing water temperature to 24-25° C. Eggs were cultured in 10-liter polyethylene containers and larvae were fed and examined daily. The food consisted of a mixture of *Isochrysis galbana* and *Phaeodactylum tricornutum*. In some cases, clams were isolated in individual polyethylene containers from the time of collection and the gametes from isolated clams were then cultured separately. On one occasion, clams were reared to metamorphosis without the addition of food. All water (at about 20 ‰) was

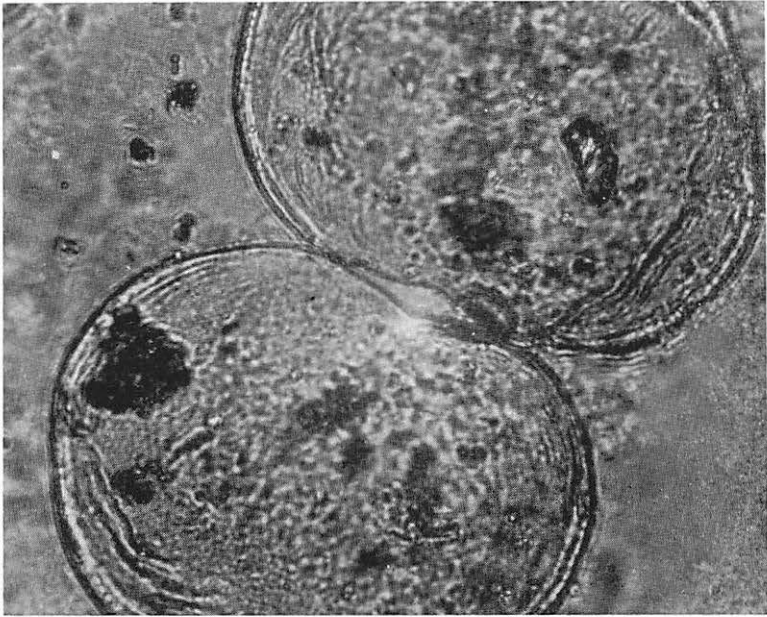


Figure 4. Interior opened valves of *L. hyalina* larvae showing ligament.

either filtered through a one-micron orlon filter or centrifuged by a cream separator. Water temperature of the cultures ranged from 18 to 22° C.

Results. *L. hyalina* released gametes within a few minutes after an increase in water temperature. Eggs were released in a thin stream through the excurrent siphon. They are sand colored and settle quickly to the bottom even after being stirred vigorously. The yolk is large, dark and opaque, measuring 100 to 115 microns in diameter, and surrounded by a lamellate membrane or membranes. The total egg diameter, including membrane, is 160-175 microns. Individual adults released from 8,000 to 16,500 eggs in a single spawning.

The actual release of sperm was not observed. The spermatozoan head is triangular, with blunted angles. It is 3.5 microns long, 2.5 microns wide at the base and has a tail 45-50 microns long.

L. hyalina is functionally hermaphroditic and autofertilization

occurred when individuals were isolated. Larvae obtained from autofertilized eggs developed normally and were reared to metamorphosis. In all spawnings, many eggs did not fertilize or develop normally; however, there was no apparent relation between autofertilization and abnormal development.

Larvae developed to an ovoid "straight hinge" stage 24 hours after fertilization. The hinge line differs from that of most pelecypod larvae in that it is normally slightly indented in the center. The transition from the hinge line to the anterior and posterior slope of the shell is gradual. This results in an oval shape rather than the typical D-shape of most pelecypod straight hinge larvae (Fig. 2). Larvae are dark gray to black and opaque. The internal structure (Fig. 3) is consequently obscured. Usually one to four apical flagella can be seen on the velum.

Larvae range from 155 to 175 microns in length and from 120 to 130 microns in height. Depth is approximately 85 microns. No identifiable hinge teeth are present in the larval shell although a U-shaped ligament 15 microns long and about 11 microns wide extends from one valve to the other (Fig. 4). No appreciable change in shape occurs during the brief larval period and metamorphosis begins in three days. At metamorphosis larvae develop a long ciliated foot, the velum disappears and on the fourth or fifth day, gills begin to develop. Recently metamorphosed individuals attach readily by a byssus thread.

Discussion. Possibly sufficient food occurred naturally in the water to support the development of *L. hyalina* larvae in cultures that were not fed cultured algae. However, the large size of the egg yolk, the small size at metamorphosis and the short pelagic period all suggest that larval requirements for an outside food supply may be negligible.

Larval *L. hyalina* are distinctive and resemble no other known pelecypod larvae except *Pandora gouldiana* (Sullivan, 1948). They can readily be distinguished from the latter by the difference in larval length. *L. hyalina* ranges from 155-175 microns in length while *P. gouldiana* is over 200 microns.

Apparently the tentative identifications of Pandoracea larvae by Stafford (1912) and Rees (1950) are in error since they bear no resemblance to *L. hyalina* or Sullivan's (1948) *P. gouldiana* in either shape or hinge structure.

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