

XIII. THE EGG LAYING HABITS OF *HAMINEA VIRESCENS* (SBY)**A. Richards.**

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During the summer of 1921 the writer studied the effect of a number of accelerants upon the cleavage of the eggs of the opisthobranch *Haminea virescens* (Sowerby) at the laboratory of the Scripps Institution for Biological Research at La Jolla California. The eggs of this animal are particularly favorable for experiments in which it is desired to test the effect of some special factor while leaving the egg in an environment that is normal in all respects except that investigated. The animals were brought into the laboratory and kept in a dish of running sea water supplied with a quantity of stones and sand from the tidal flat where they were first secured. Although they would at length become exhausted no difficulty was experienced for some days in getting them to produce eggs.

The manner in which the eggs are laid in *Haminea virescens* differs from the only descriptions which the writer has seen recorded. The most definite accounts deal with *Haminea solitaria*, however, and it may be that in that form the eggs are fastened as described to the rocks as masses of jelly, or are attached by stalks to the sand. The eggs of *Haminea virescens* as deposited in the laboratory certainly do not answer this description.

The eggs are laid in a jelly mass which has the appearance of a short piece of narrow but very thick ribbon. It is of rather complicated structure. The eggs appear to be extruded in a string of tough gelatinous material. The string itself is laid in a zigzag fashion so that the appearance is that of a double row of eggs. It is, however, accurately placed in the form of a flattened spiral for the loops are not formed by simple, back and forth folds, as they at first appear; but are so arranged that the loops are compressed against each other. This produces the effect of a thick cross striated ribbon. The structure of the egg mass is illustrated on Plate II, page 38. In one typical ribbon, 242 loops were counted, in each of which the eggs averaged 50; this gave a total of 21,780 eggs for this ribbon. Probably 20,000 is an average number for a ribbon produced under typical conditions.

In each ribbon the eggs are uniformly all in the same stage of development, indeed in the same stage of mitotic division. It is a remarkable fact that 20,000 eggs should be deposited in as complicated a manner as these, and all be in the same stage of division.

But it is this fact in connection with the ribbon like egg case that renders them desirable for experimental purposes. In conducting the experiments a ribbon would be cut into segments one or more of which would form a control, while the others would be placed in the various solutions as desired and the results noted in comparison to the control.

Egg laying takes place usually about the time of the first light, and it is probably that the light acts as a stimulus to the laying process. There are exception to this rule, but they do not seem to be of special significance.

The duration of the early cleavages is illustrated by one typical case which was followed through in detail. The observations were made at 21.5°C.

One cell stage first observed at 6:45 a. m.

Maturation completed at 7:45.

First cleavage (2 cells) completed at 9:10, an interval of 1 hr., 25 min.

Second cleavage (4 cells) completed at 10:01, an interval of 51 min.

Third cleavage (8 cells) completed at 11:00, an interval of 59 min.

Fourth cleavage (12 cells) completed at 11:50, an interval of 50 min.

Fifth cleavage (16 cells) completed at 12:30, an interval of 40 min.

From this and other data it appears that the early range in duration is from eighty minutes down to forty minutes. The veliger stage is reached at the end of about 48 hours. Hatching begins on the fifth day usually, and is completed in two or three days more. The percentage of embryos which hatch is very large unless some external factor interferes; it is seldom less than 85% and I have often seen from 98% to 100% reach this stage.