Letters to the Editor

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NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 686.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

A New Type of Skeletal Movement

FIGS. 1 and 2 reproduce photographs of a model demonstrating a type of skeletal movement which depends upon automatic adjustments of hydrostatic pressure acting upon an elastic body wall. Neither muscular nor nervous mechanism is demanded. These skeletal movements, according to investigations I have made recently, appear to have characterised some of the Cambrian Cystoidea—the earliest and most primitive of all the Echinodermata. The automatic adjustments of body wall and skeleton, it is suggested, were brought about by varying ciliary activity during the rise and fall of the tide.

The model consists of a football bladder, representing the elastic body wall of the animal. Upon this are fixed a double row of oblong thin blocks of rubber representing a portion of the food grooves. Fig. 1 shows the body collapsed and the grooves closed. Air blown into the bladder (Fig. 2) increases the tension on the elastic wall. This causes a pull on fibres attached to the blocks and to the body wall. The blocks, working on the hinge of attachment to the wall, are pulled over and the groove opens.

The place of air as a means of inflation was taken, in the lifetime of the Cystid, by water introduced into the body through the stone canal (here the neck of the bladder). Cilia in the stone canal drove a water current through it and so increased the hydrostatic

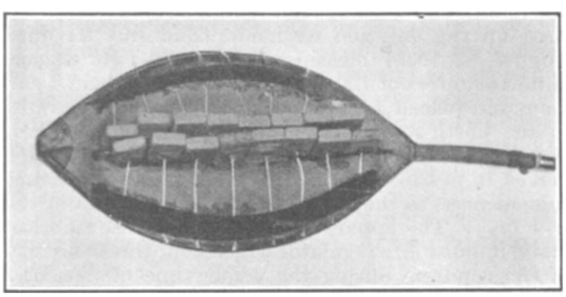

FIG. 1.

pressure. A change of conditions (suggested below) caused the ciliary movement to cease. The elastic tension of the body wall would reverse the current, force water out through the stone canal, with consequent collapse of the form and closure of the groove again.

The suggested mechanism fits in with what is known of the state of preservation of the fossils and the conditions under which the beds containing them were deposited. *Stromatocystis* found in the Lower and Middle Cambrian affords a good example. The Lower Cambrian beds of Newfoundland, in which

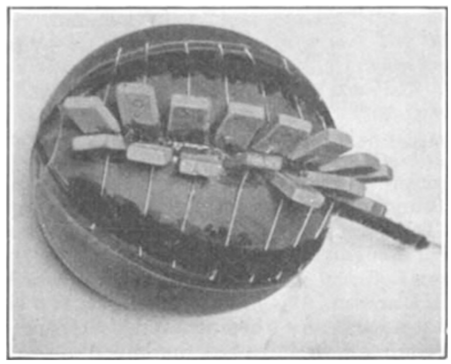

FIG. 2.

forms were discovered by Schuchert, have, as that author has shown, rain pits and all the other evidences of shallow water deposition. All the specimens of *Stromatocystis* both from Newfoundland and Bohemia (Middle Cambrian) which I have examined show the body collapsed and the groove closed. Related forms from deeper waters show an open groove and a firmer skeleton. Comparison of these various forms suggests that the collapsible skeleton and groove of *Stromatocystis* was adapted to intertidal conditions. When the tide came in, freshly aerated water would be brought in, which would stimulate the cilia of the stone canal. The animal would swell, rise above the surface of the sand, the groove would open and the animal begin to feed. After the tide had retreated, the water immediately around the animal's body would become saturated with carbon dioxide, the cilia would cease motion and the animal would collapse into the wet sand which would preserve it from desiccation.

Gray[1] has described a somewhat similar phase in the feeding periods of *Mytilus*, and it is because of this work that I am venturing these views, which do much to clear up many difficult points in Cystid structure.

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Sept. 25.

[1] "Ciliary Mechanisms".