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Determination of Polarity in *Fucus* Eggs by Temperature Gradients.

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About 18 hours after fertilization the spherical egg of *Fucus furcatus*, reared in sea water in the dark at 15° C., develops a rhizoid protuberance at one point on its surface.[1] By the time it has appeared the primary developmental axis of the embryo is fixed. It has been shown by other workers that the point of rhizoid origin can be determined by exposing the egg to unilateral white light,[2-5] to electricity,[6] to the proximity of neighboring eggs,[3, 4, 7, 8] or to a pH gradient.[9] The results of this study show that temperature gradients are effective in determining the point of rhizoid origin and therefore the primary polarity of the embryo. A detailed account of experiments and results of this study will be published elsewhere.

The experiments were performed in a constant temperature room at 15° C. Eggs embedded in sea water-agar jelly* were reared between glass capillaries used as thermodes. These were placed parallel, one mm. apart. A cold, dilute glycerol solution circulated through one thermode. The other thermode inclosed a nichrome wire which produced a definite amount of heat when a measured current passed through it.

Gradients of salinity and osmotic pressure that might develop parallel to the temperature gradients were prevented by causing filtered sea water at room temperature to flow over the top of the sea-water agar in which the eggs were embedded.

Temperatures were measured directly with very small copper-

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* This medium served to hold the eggs in place and to eliminate convection currents between the thermodes.

constantan thermocouples and with a high sensitivity galvanometer. The thermocouples were embedded in the sea water-agar medium near the eggs.

Eggs were grouped into 2 main classes: those with rhizoids originating on the sides toward the warm thermode and those with rhizoids originating on the sides toward the cold thermode.

As a control, 225 eggs were reared at 15°C., embedded in sea water-agar, but with the temperature gradient omitted. Of these, 111 (49%) formed rhizoids on the sides toward the thermode which inclosed the unheated nichrome wire. This approximates 50% and indicates randomness. Eighty-two eggs were reared at 14.0° to 15.9°C., and were exposed to temperature gradients of 0.6° to 0.8°C. per 75 microns† for 24 hours beginning 2 hours after fertilization. The rhizoids of all (100%) of these eggs originated on the warmed sides. A photomicrograph of the results of a typical experiment is shown in Fig. 1.

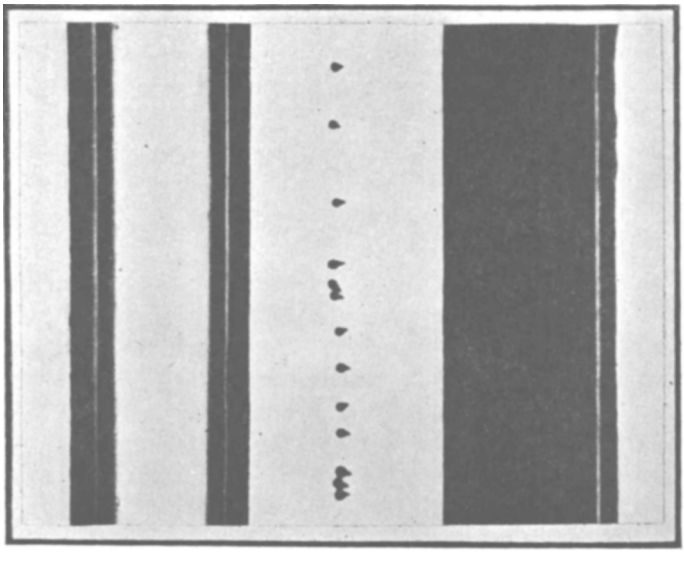

FIG. 1.
Eggs in sea water-agar developing in temperature gradient of 0.8° C. per 75 microns. Warm thermode is shown on right. Rhizoids originate on warmed sides of eggs.

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† 75 microns is the mean diameter of *Fucus furcatus* eggs used.