

stronger than 70 per cent. it will not cause this swelling of the membrane. After this the eggs can be dealt with after the regular methods.

To study the segmentation the eggs may be kept in a watch-glass, and examined with a strong lens or low power of the microscope. The formation of the furrows can be studied up to the 32-celled stage with practically no difficulty, and with some care to the 128-celled stage. Eggs at the various stages may be killed, hardened and sectioned so as to show the internal changes, the formation of the cleavage cavity, the archenteron, notochord and other organs that appear from time to time. In the process of clearing the eggs it is best to use cedar oil rather than turpentine, for the latter tends to make them even more brittle than they are.

The general progress of this development is too well described in text-books to merit any further account here. I am indebted to Prof. Th. H. Morgan, of Bryn Mawr college, for most of the above points. I have carefully tested them, and can recommend them without restricting qualifications.

Another interesting field in the study of these eggs is to separate the segments in the early stages of segmentation and observe the result. It has been found that in the two-celled stage each segment will form a perfect animal, but only about half the normal size. This has been tested as far as the eight-celled stage, each segment continuing its development, but forming specimens much smaller than ordinarily, the effects of pressure upon the developing eggs causing them to segment in a different manner. Other points of interest might be suggested, but these are sufficient to call attention to this important subject.

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POISONOUS INFLUENCE OF VARIOUS SPECIES OF CYPRIPEDIUM. By D. T. MAC-DOUGAL.

At the last December meeting of the Academy a short paper was presented by the writer detailing some observations tending to show that *C. spectabile* and *C. pubescens* have an irritant action on the human skin. This paper was printed in full in the "Minnesota Botanical Studies," Part 1, 32, 1894.

The interest in the matter shown by the comment of the scientific and daily press and by the large amount of correspondence received, was such that a series of tests were planned which would place the entire matter beyond all question or doubt.

It had been suggested by ingenious correspondents that the poisonous effects experienced by the writer in handling *C. spectabile* in a swampy location, may have been due to the action of some of the poisonous plants, such as *Rhus*, usually

found in or near sphagnum swamps. When it was found by careful examination that no plants of the genus *Rhus* grow within one mile of the locality in which the test was made, one of my correspondents, with a most admirably developed "scientific imagination" suggested that the pollen of the *Rhus* may have been carried by the wind and caught by the secretions of the glandular hairs, in such quantity that the amount of toxicodendric acid contained would be sufficient to produce the irritant effect.

A number of root clumps of *C. spectabile*, *C. pubescens* and *C. parviflorum* were obtained from Pitcher and Manda, and placed in the plant house under such conditions that leafy stems were formed and the experiments could be carried on at intervals from February 1 to June 1, 1894. In the plant house were no other known plants of poisonous influence, and since during the greater part of this period the country around Minneapolis was covered with snow to the depth of two or three feet, all danger from distant *Rhus* clumps and sphagnum swamps was held to be fairly excluded.

Detailed tests with the leaves of *C. spectabile* rubbed lightly on the skin of the wrist, arm, face or ear, were made with nine persons; of these, six were "poisoned" in a degree corresponding to the manner of application, in a time varying from ten to twelve hours. By a canvas of the students of the department it was found that nearly the same percentage were usually poisoned by *Rhus*. In order to confirm these results the test was repeated with the same result. Still farther repetitions were made by some of the persons concerned, until no question as to the result remained. The unpleasant effects of these tests were a severe drain on the enthusiasm of the subjects, and the later tests on three persons made with *C. pubescens* were equally marked. Nor is it a matter of surprise that similar effects were shown by *C. parviflorum*. It was next in order to ascertain whether this effect was due to the mechanical injury resulting from piercing the skin by the pointed hairs or to the corrosive action of the secretion found on the outside of the globular tips of the glandular hairs. To this end separate tests were made by material from *C. spectabile*. The hairs of each kind were taken from the leaf by means of a pair of fine forceps and the tip pressed against the skin. Irritation resulted from the contact of the glandular hair only, and in the form of a red macule 1 to 2 millimeters in diameter.

It was found, further, that the irritant action of the plant increased with the development of the plant, and reached its maximum with the formation of the seed-pod, from which it seems entirely reasonable to infer that this is a device, and a very efficient one, for the protection of the reproductive bodies during the period from pollination to the maturity of the seeds.