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CONWAY MACMILLAN

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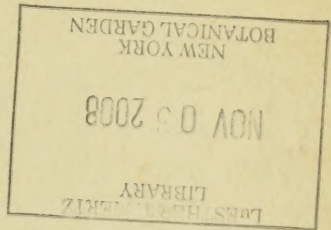
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## XXV. POISONOUS INFLUENCE OF VARIOUS SPECIES OF *CYPRIPEDIUM*.

D. T. MACDOUGAL.

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In a brief note published in a previous number of this bulletin (Part I. p. 32. 1894.) the writer detailed the results of some observations tending to show that the leaves and stems of adult plants of *Cypridium spectabile* and *C. pubescens* exert a poisonous influence on the human skin. The experiments from which this conclusion was derived were performed in the open air, in the localities in which the plants grew. Although no specimens of *Rhus* or other poisonous plant were known to occur within a mile of the scene of the experiments, it was determined that they should be repeated under circumstances in which every possible source of error should be eliminated. In order to accomplish this, a number of root-clumps of *C. spectabile*, *C. pubescens* and *C. parviflorum* were procured from a reliable dealer and placed in the plant-house under such conditions that leafy stems could be obtained during a period from February 1, to May 10, 1894. During the earlier part of this time the temperature of the outside air was such as to preclude any interference from plants growing in a state of nature, and the plant house contained no known poisonous plants. Careful tests were made with *C. spectabile* on nine persons, six of whom were poisoned in a degree corresponding to the manner of application of the plants to the skin. A similar percentage of the students in the department were reported to be susceptible to the action of various species of *Rhus*. Tests with the stems and leaves of *C. pubescens* gave about the same results as *C. spectabile*. Although these tests were a severe drain on the enthusiasm of the subjects they were repeated with *C. parviflorum*, which also exhibited a dermatitic action. These tests were also repeated in April, 1895, and the poisonous influence of the three species named may be considered as established beyond all doubt.

Specimens of the pointed and glandular hairs, which are found in abundance over the entire plant, and were described in the previous note, were taken from the plant and touched separately to the skin. It was shown that the irritant action was due to the secretion of the glandular hairs only. If the development of the glandular hairs is followed it will be

found that the secretion begins to accumulate in the distal end of the cell shortly before it reaches maturity, and filters through the wall forming a reservoir between the wall and the outer cuticular layer. As the amount of the secretion increases, since the cuticular layer is capable of only a slight distension, the wall is pushed backward into the cell-cavity, finally the glandular cell is in the form of a double walled cup with the protoplasm occupying the space between the parallel walls, and the secretion filling the bowl of the cup, and covered by the arched cuticle. In the advanced stages the cuticle is easily torn and it may be found ruptured with the secretion escaping in the form of an an irregular mass. On account of the extremely small quantity of the secretion its exact chemical nature could not be ascertained. It was found to be soluble in alcohol, and gave the reactions of an oily substance. This is of especial interest in view of the recent researches of Pfall and Orr, which have demonstrated that the poisonous action of *Rhus* is due to an oil, *cardol*.\*

It was found further that the irritant action of the plants on the skin increased with the development of the plant, and reached a maximum effect during the formation of the seed capsules. This corresponds with the activity of the glandular cells and the amount of secretion present. While this poisonous property of the plant serves as a partial protection for the vegetative organs, yet it is in all probability a device primarily for the security of the reproductive bodies. It is to be noted in this connection that the glandular secretions do not form the sole means of protection of plants of this genus. It has been noted by Stahl,<sup>1</sup> Mobius<sup>2</sup> and others<sup>3</sup> that the peripheral layers over the entire body of plants of this group are furnished with a large number of cells containing raphides, which serve as a more or less effective protection against the ravages of animals.

\*Science. New. Ser. **1**:119. 1895.

1. Stahl. Pflanzen und Schnecken. p. 91. 1888.

2. Moebius. Ueber den anatomischen Bau den Orch.deenblätter und dessen Bedeutung fuer das System dieser Familie. 1887.

3. Frank. Ueber die anatomische Bedeutung und die Entstehung der vegetabilischer Schleim. Jahrb. f. Wiss. Bot. **5**:161. 1867.

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