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VI. ON THE POISONOUS INFLUENCE OF CYPRIPEDIUM SPECTABILE AND CYPRIPEDIUM PUBESCENS.[1]

D. T. MacDougal.

The plants which are poisonous to the skin, in a more or less degree, include a large number, many of which are common and well known species. In this connection reference is had only to those plants which, during some stage of their existence, will produce poisoning by contact, or by means of a volatile principle, which acts upon the skin of any person approaching them, and is exclusive of those which are injurious either in the form of extracts or preparations, or in their lengthened application, or in their manipulation in the manufactures.

Without doubt the larger percentage of the common plants known to be poisonous, is due to the fact that they offer much more numerous opportunities for observation than do the rarer forms. For it is by no means to be understood, that there are many plants which are always and invariably poisonous. So far as can be learned there are no plants, except perhaps the urticaceous forms, which are injurious to every one handling them. Probably the most virulent of the class of plants referred to, are the species of *Rhus;* yet many persons can handle them without danger at all times, and others are only injured by plants in a certain stage of growth. On the other hand, many of the plants in this category are injurious only to a very small percentage of the persons touching them, so that their irritating qualities might remain undiscovered altogether unless tested by a large number. As an example, it may be cited that the hop plant, in the limited handling it receives in the domestic garden, is ordinarily regarded as innocuous; yet in extensive hop gardens of California, among the thousands of pickers in the fields, are many who are severely irritated by it.

1. A preliminary notice was read before the Indiana Academy of Science, December, 1893.

The poisoning may be due to mechanical injury, as the piercing of the skin by stiff hairs of special poison organs, such as the glandular hairs of the nettles, or to a volatile substance, such as the toxicodendric acid of the poison ivy. The following list includes some native plants of Minnesota, which have been definitely ascertained to be more or less poisonous, in the manner indicated.[2]

Rhus vernix LINN. Poison ivy.
Rhus radicans LINN. Poison oak.
Spathyema foetida (LINN.) RAF. Skunk cabbage.
Bidens frondosa LINN. Beggar's ticks.
Erigeron canadense LINN. Fleabane.
Xanthium canadense MILL. Cockleburr.
Polygonum hydropiper LINN. Smartweed.
Polygonum acre HBK. Water pepper.
Actaea spicata alba (LINN.) MILL. Baneberry.
Anemone quinquefolia LINN. Wind flower.
Anemone hirsutissima (PURSH) MACM. Pasque flower.
Euphorbia corollata LINN. Spurge.
Euphorbia marginata PURSH. "Snow on the mountain."
Ranunculus septentrionalis POIR. Crowfoot.
Ranunculus sceleratus LINN. Cursed crowfoot.
Urtica gracilis AIT. Nettle.
Laportea canadensis (LINN.) GAUDICH. Wood nettle.

The above list includes only the plants of the state which are known to be poisonous to the touch, and is not inclusive of a large number which are more or less suspected of being so. The present article contemplates the addition of two species of *Cypripedium* to the list.

On many different occasions, and from widely separated localities, unconfirmed reports have been made of the poisonous effects of *Cypripedium spectabile* and *C. pubescens.*

In the *Bulletin of the Torrey Botanical Club* for February, 1875, is found the following note.[3]

"Prof. H. H. Babcock, in a communication to *The Pharmacist*, Chicago, January, 1875, states that, being especially susceptible to poisoning by *Rhus Toxicodendron*, he for several years took every precaution against it. He not only was careful to avoid contact with the plants, but would not collect specimens of other plants growing near the *Rhus*, and went so far as to avoid handling fresh specimens gathered by others for fear these had been in contact with it. Notwithstanding all this, he found that late in May or early in June of each of several successive years he was so severely poisoned as to be confined to his room for several days, his face presenting the appearance usual in poisoning by *Rhus*. Upon referring to

2 **White**: *Dermatitis Venenata*. Boston. 1887.
Cornevin: *Des Plantes Vénéneuses*. Paris. 1887.
3. vol. 6, p. 15. 1875.

his field notes, he found that each season the poison manifested itself the day after he had collected either *Cypripedium spectabile* or *C. pubescens*, and feels quite convinced that in his case the unpleasant effects were due to these heretofore unsuspected plants. Prof. B. asks for experiment to determine if his view is correct. Have any of the readers of the Bulletin any observations bearing upon the matter?—*G. T.*"

In the succeeding number of the same journal is the following note to the contrary.[4]

"None of our *Cypripediums* are poisonous plants, applied either externally or internally. They are much employed by eclectic physicians of this country, and though tons of these plants are annually brought to this market to be manufactured into extract, tincture, or 'Cypripedin,' I have yet to be informed of the first case of poisoning, the result of handling the fresh plant or otherwise.

I am very susceptible to the effects of *Rhus*, even from contact of the stems in winter or when quite dry. Others are liable to be poisoned from the emanations of the plant at long distances without coming into contact with it. Some others still have a periodical return of the symptoms of such poisoning recurring for a number of years thereafter.—*R. E. Kunze, M. D.*

[We have, ourselves, known cases of the periodical return of the *Rhus* irritation in persons who had handled the plant when brought into the city, but who avoided doing so a second time, and were not likely to go where it grew.—*Eds.*]"

In the editorial columns of the *Botanical Gazette*[5] is found the following comment upon the matter:

"The most unexpected and harmless plants may be brought into this catagory (of poisonous plants). An instance within the writer's knowledge was that of a clear-minded lady of a botany class, who found the large white lady's slipper (*Cypripedium spectabile*), a plant to be avoided; and the absurdity of the notion, in the opinion of the other members of the class, did not in the least change her assertion of its poisonous qualities. * * * The subject has considerable of the indefiniteness and evasiveness of the ghost, haunted house, and mesmeric questions now being investigated by the society for psychical research, etc. * * * Even a knowledge of the extent of the subject would be of value."

Contemporaneously with this notice there appeared the manuals, "*Des Plantes Vénéneuses*" — containing descriptions of nearly two hundred and fifty, and "*Dermatitis Venenata*" — of more than a hundred plants, poisonous in various ways. In the latter work the supposition of Prof. Babcock concerning the poisonous qualities of *Cypripedium pubescens* is credited in the following paragraph.[6]

* * * and was greatly surprised to be informed by Prof. J. Nevins Hyde, of Chicago, that his friend, the late Prof. H. H. Babcock, * * * found the *C. pubescens*, which grows from Canada to Georgia, nearly as

4. vol. 6, p. 22. 1875.
5. vol. 12, p. 275. 1887.
6. l. c., p. 113. 1887.

irritating to him as *Rhus toxicodendron.* * * * * * * * * * * * Other but more indefinite reports sustain the character of this plant."

Prof. H. G. Jesup reviews the statements, brought together in the *Bulletin of the Torrey Club,* and offers the following circumstantial evidence on the subject.[7]

"A lady near whose home grew a fine clump of *Cypripedium spectabile* had been in the habit of gathering it when in bloom. * * * At such times for four or five successive seasons she suffered from symptoms of *Rhus* poisoning, but on careful examination no *Rhus* could be found where the *Cypripedium* grew. These symptoms invariably appeared whenever the *Cypripedium* was in the house and disappeared with its removal, and on her removal to another part of the country never reappeared. In fact, when she ceased collecting the plant she escaped entirely.

* * * * One of my own students had been in the habit of handling *Rhus* with impunity, and had done so for years. Not long since he was severely poisoned immediately after having gathered and handled a large quantity of *C. spectabile*, and, in view of the above facts, very naturally attributes his trouble to this plant."

The latter article was brought to the author's attention when he and other members of the botanical staff of the University of Minnesota were themselves objects in circumstantial evidence, and it was determined to secure some positive evidence on the matter. The author, while in the field at Twin lakes, near Minneapolis, September 7th, 1893, met with several well grown plants of *C. spectabile*, with newly formed seed pods. A robust specimen was broken off near the base of the stem, and the leaves were brushed lightly across the biceps muscle of the bared left arm. A slight tingling sensation was felt at the time, and fourteen hours later the arm was greatly swollen from the shoulder to the finger tips. The portion touched by the plant—covering an area of 50 sq. cm.—was violently inflamed and covered with macules, accompanied by the usual symptoms of dermatitis, and constitutional disturbances. By treatment of the most approved kind the arm was reduced to its normal size in ten days, but the effects were perceptible a month later. The severity of the test has prevented its repetition. The facts obtained are certainly conclusive as to the poisonous qualities of this plant. They are, at least so far as the author is concerned, who would have been satisfied with a much less pronounced result.

An examination of the two species reveals the presence of two forms of hairs in great abundance. (*See Plate III.*)

One is a curved-pointed septate hair, the apical cell of which has hard, brittle walls, and is easily detachable from the basal

7. *Botanical Gazette.* **18**: 142. April, 1893.

portion of the organ. The other form is a septate glandular-tipped hair. The glandular cell is filled with a light brown substance, of which the chemical nature remains unknown. The contents of both hairs show a decided acid reaction, but were not observed to exert any harmful influence on infusoria placed under the cover glass with them. Both are invested by a filamentous fungus, apparently one of the Dematieae, which sends its hyphae into all the cells, but ramifies most abundantly in the glandular tip.

The hairs of *C. spectabile* are .5—2mm, and those of *C. pubescens* are from .5—1.5mm in length.

The poisonous effects may be due to the piercing of the skin by the pointed hair and the consequent action of the acid contents, or to the surface irritation by the contents of the glandular hairs, or it is remotely possible that they are due in some way to the presence of the fungus.

The demonstration of the poisonous effect of *C. spectabile* is conclusive, and since *C. pubescens* is furnished with similar apparatus, together with the large amount of evidence brought together, there is every reason to believe that it is equally injurious.

Whether the plants of these species are poisonous to many persons or not — and the author suspects that they may be handled by the majority without danger — yet it is easily apparent that these species, as well as others of the genus, are protected in a manner that renders them unpleasant to grazing animals. It has been repeatedly noticed that large numbers of these plants growing in woodland pastures have been found intact, while the surrounding herbage would be very closely cropped.

The poisonous action of *C. pubescens* should not in any way affect the value of the extract as a medicine, since this substance is derived from the roots, which have no connection with the effects described.

Neither should anything presented in this paper detract in the least from the use of these plants for ornamental or decorative purposes, although it might be well for susceptible persons to handle mature plants with some care.

The subject derives additional interest at this place — the University of Minnesota — since the two species are widely distributed in the state, and the *Cypripedium pubescens* (the Moccasin Flower) has been formally adopted as the "state flower" of Minnesota.

Descriptions of Plates.

Plate I.—*Polygonum rigidulum* Sheld.

1. Emergent part of plant.
2. Submerged part of plant.

Plate II.—*Aster longulus* Sheld.

1. General aspect.
2. Flower.
3. Achene.
4. Hairs from stem.

Plate III.—*Hairs of Cypripedium.*

1. Glandular tipped hair of C. spectabile.
2. Pointed hair of C. spectabile.
3. Glandular hair of C. pubescens.
4. Pointed hair of C. pubescens.

PLATE I.

PLATE II.

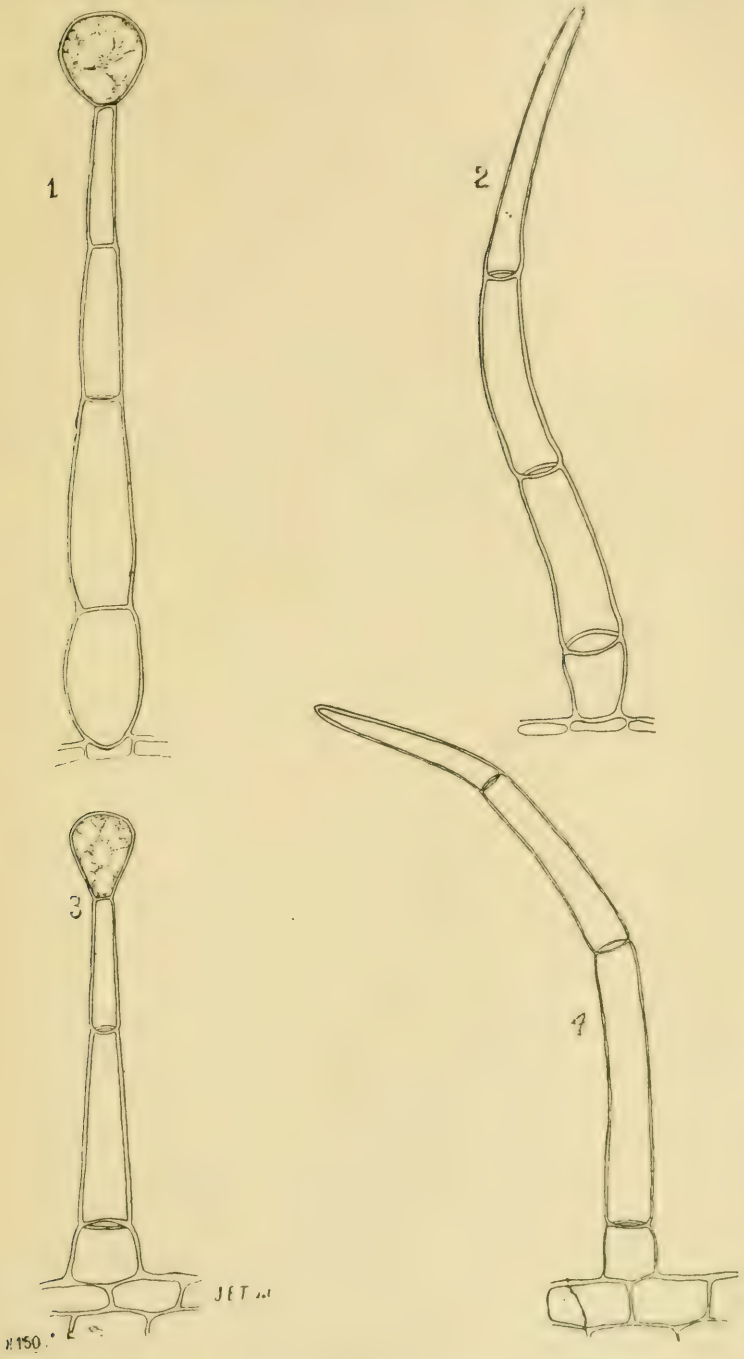

PLATE III.