

4-1938

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Recommended Citation

Sylvia, S. (1938). Some Higher Fungi In The Vicinity Of Winona. *Journal of the Minnesota Academy of Science*, Vol. 6 No. 1, 30-36.

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All leaves were cut from hollyhock (*Althaea rosea*) seedlings, and the crowns were immersed in .1, .2, .3, .4, and .5 per cent colchicine for 1, 2, 3, 4, 5, 6, 7, 8, and 24 hours. A few days after treatment the 8 and 24-hour treated plants looked wilted, and two weeks later the 24-hour treated plants had not grown any new leaves. The other plants had each put out one new leaf, which was largest in the water-immersed check plants in every case. In many of the colchicine-treated plants the new leaf was rough, indicating possible chromosome doubling in part of the tissue.

Alyssum, *Centaurea*, *Dianthus*, *Digitalis*, *Gaillardia*, *Iris*, *Delphinium*, *Matthiola*, *Nasturtium*, *Nigella*, *Petunia*, *Portulaca*, *Salpiglossis*, *Scabiosa*, and *Tagetes* also were treated, but too little time has elapsed since treatment for results to show, although in almost every case the type of growth indicates possible chromosome doubling in at least some of the treated plants.

Summary

Horticultural plants belonging to a number of different families were treated with colchicine. Of the vegetables treated, asparagus gave the most definite and the quickest reactions, and it is probable that several plants with larger cells and doubled chromosome number were obtained. Abnormal growth indicated possible chromosome doubling in some of the treated plants in beans, onions, peas, potatoes, and rhubarb.

A number of annual and perennial flowers were treated. Amaryllis flowers were deformed and proved to be sterile. Exceptionally large, vigorous shoots arising from some of the treated plants of flax indicate possible chromosome doubling and larger cell size from colchicine treatment. Rough growth indicating possible chromosome doubling in part of the tissues was found in a number of the plants.

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SOME HIGHER FUNGI IN THE VICINITY OF WINONA

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The flora of the State of Minnesota composed as it is of two distinct vegetation regions—forest and prairie, with their diversities of climate, altitude and soil, is proportionally large. In fact, of the quarter of a million classified plants in existence, it is roughly estimated that five per cent may be found within the confines of the state. This proportion does not seem so evident to the inhabitants of the state since, as a result of the geographic, atmospheric,

and physical conditions, the number of cryptogamous species far exceeds that of flowering plants.

This fact is especially true of the particular locality involved in this paper, the City of Winona, and its environs within a radius of a few miles. As an instructor in Biological science at the College of Saint Teresa for the past nine years, the author has availed herself of the splendid opportunity the region affords for the study of fungi.

The average person, not excluding the college student, knows more about the giant redwoods of California or the lotus flower of Japan than he knows about the flora of his own neighborhood. He believes he must go away, far away, to find interesting plants, when in reality there are many equally as wonderful to be seen right at home at a saving of time and expense.

It is also greatly to be regretted that our young people are abandoning nature hobbies, such as collecting of flowers, cones, moths, and stones, which took them abroad into Nature's haunts and tended to form habits which made life fuller and happier ever afterward. Today they collect stamps, antiques, autographs, photographs of movie stars; and there are reports of a young man who traveled about a great deal, making a collection of hair pins which he picked up in various places. Each one was carefully mounted and labeled with place and date of finding.

In this paper, an attempt is made to show the abundance of material often found very close at hand. For the writer's class-work, the college campus and the immediate neighborhood has become a vast storehouse where, by reason of its proximity, it was possible without inconvenience or loss of time not only to seek the specimens to be studied under the microscope in the laboratory, but also to observe their stages of development for successive weeks and even months.

The city of Winona, ranking fourth in size in the state, is situated in the southeastern part of the state in the rich sequestered valley of the Mississippi River. Nestling in a turn of that great river, the city proper is practically surrounded by water on three sides, having the river on the north and east and Lake Winona on the south. The latter is simply a portion of the wide alluvial area of the Mississippi River and is subject to flooding at a high stage of that river, although its waters are in all probability sustained by the many springs which ooze from the base of the rugged line of bluffs on the Minnesota side.

The bluffs which range at Winona from 400 to 600 feet in height are covered with a dense growth of deciduous trees, principally white and red oak with patches of white birch. Bold perpendicular ledges of rock jut out here and there from the summit and sides. This is more true of the bluffs on the Wisconsin side which rise more steep from the north and east banks of the river and because of erosion, are only sparsely clothed with verdure.

To the west of the city there is a vast stretch of open valley extending past Minnesota City five miles to the west and Rollingstone five miles farther on.

The soil is varied. Beginning from the ridges or summit tablelands of the bluffs is a clay loam varying from one foot to twenty feet in depth which is well suited to farming; on the sides and base of the bluffs there is more lime and sand from decomposed rock mixed with a rich humus of the forest floor; and lastly, there are the alluvial areas of the lake and river shores.

Such physical conditions are favorable to a large and varied growth of fungi.

Observations and collecting were begun on the campus. Later investigations extended to the bluffs, to the lake and river shores, and some specimens were found as far out as Rollingstone.

The actual number of *Ascomycetes* and *Basidiomycetes* collected is 126.

Among the *Basidiomycetes* are 47 species of Mushrooms, the most outstanding of which are the *Amanitas* and the *Russulas*.

In the autumn of 1936 at the very summit of a bluff were discovered six mushrooms bright rose in color, fading to blood-red—sometimes faded to white in patches. This species, *Russula emetica* Fr., is said to be poisonous and to act as an emetic. It should not be confused with the edible Beef Tongue Mushroom, *Fistulina Hepatica*. At the base of the bluff were three *Amanitas*, all deadly poisonous but easily identified by the presence of a volva. The most beautiful of these is that which resembles Carrara marble, "the destroying angel," *A. verna*, Fr., so-called because of the small amount required to cause the death of a human being. Its convex expanded pileus differentiates it from *A. verosa*, Fr., which has a conical pileus. The third, the fly-mushroom, *A. muscaria*, Fr., which is a beautiful yellow when fresh has an expanded pileus.

In the springtime many of the large, graceful elms have, at their bases clusters of Glistening Coprinus—*Coprinus micaceus*, Fr.

An instructor is often confronted with the question: How can one distinguish the Shaggy Mane, *Coprinus comatus*, Fr., from the Inky Cap, *Coprinus atramentarius*, Fr., and the Glistening Coprinus from these two? All are black spored species, the Inky Cap and Glistening Coprinus are smoky brown, the latter has mica-like particles on its surface. The Shaggy Mane is far more beautiful, having a white cylindrical pileus, the cuticle of which becomes torn into pale ochre scales. Although both are used for the table the latter is considered the more desirable. The Shaggy Mane is not plentiful in the Winona locality. It was found but once in the course of many trips. It grew on the lake shore under some spreading willows.

Of the mushrooms with a depressed pileus the most conspicu-

ous were *Lacterius rimosellus*, Pk., and *Lacterius hygrophoroides*, B&C; the former has a brownish cap and a tomentose or hairy stipe; the latter a tawny yellow cap with a non-hairy stipe. Both grew on the floor of the dense woods on the side of the bluff: the former in the moist earth close to a spring, and the latter in a dry spot.

Two rather uncommon forms were *Lentinus ursinus*, Fr., having a sessile pale rufous brown pileus noted on a decayed conifer branch in Woodlawn Cemetery and *Crepidotus haerens*, Pk., which is another sessile form.

At the base of a white pine in the cemetery was the Jack-O'-Lantern, *Clitocybe illudens*, Schw., a phosphorescent form and one specimen of the Golden Chantrelle, *Cantharellus cibarius*, Fr. One of *C. tubaeformis*, Fr., was found at a higher elevation on the bluff in company with *Pluteus salicimus*, Fr., a pink spored variety.

Very common on wood the year around is *Panus stipticus* Bull. The specimens were all curled up on a branch but expanded when put into water in the laboratory.

Three edible forms of *Collybias* were interesting. They differ in many respects, noticeably in the color of the pileus. That of *C. confluens*, Fr., is grayish flesh colored, of *C. dryophila*, Fr., tan, shading to red and yellow, with a bay-brown disc, while, *C. radi-cata*, Fr., is a smoky brown. The first two were found on leaves, the latter on the ground.

Several interesting species of puffballs were found in open, grassy plots. Among these the cup-shaped variety, *Calvatia cyathiforme*, was most numerous. The peridium of this genus does not open by a definite mouth to expose its spores as do the peridia of the *top-shaped* and *pear-shaped* varieties of the *Lycoperdon* genus. Another genus of the *Lycoperdaceae* is the earth star, *Geaster saccatus*, the outer skin of which splits radially, giving it a flower-like form.

Closely related to the puffballs are the bird-nest fungi, *Nidulariaceae*. A patch of these, 21 in number, were discovered on a decaying branch near the summit of a bluff. Each of these consists of a cone-shaped, nest-like cup. The color is a pale buff at first, but changes to dark-brown when mature. They vary in actual height from one to two centimeters, the cups measuring nine to fourteen millimeters across. Inside the cup are found white egg-like structures, the peridioles, in which the spores are produced, each egg being comparable to a tiny puff ball.

Stink horns or dead men's fingers, *Phallus impudicus*, L., grew in several places on the campus. The eggs of those on loamy soil under the arbor vitae were reddish-purple while those under the elms in more sandy soil were flesh colored.

One specimen was found of a cylindrical variety which has pink sporophores shading off into white, *Mutinus caninus*.

Among the coral fungi were two of great interest, in that the

tips of the branches of one are cup-shaped, *Clavaria pyxidata* Pers. (Schw.), and those of the other, *C. stricta*, Pers. are pointed.

Very common on decaying stumps and old trees on the Minnesota bluffs are the pore fungi of which the most numerous and showy are the bracket fungi, *Fomes applanatus* Wallr., Fr., *Fomes igniarius* and *Polyporus sulphureus* (Bull.) Fr. There were more of these sporophores on birch trees than on oak, but those on oak were larger measuring 20 centimeters across. Several pore fungi were found on the ground. Among these were *Boletus luteus*, Linn., growing on sandy soil at the edge of Woodlawn cemetery. As these were slimy, it was impossible to secure a preserved specimen. The pileus is dull or yellowish brown in contrast to the orange-red pileus of *Boletus scaber*; the latter were plentiful on the grassy terrace leading up to the bluffs.

The most beautiful of all the pore fungi was *Polystictus pergamenus*, Fr., which literally covered a decaying birch on the bluffs. The orchid to violet-purple tubes of the sporophore formed a showy contrast to the white birch-bark beneath. A branch four inches in diameter and about a yard in length was taken to the laboratory. When the branch was cut it was noted that the upper parts of the caps were pubescent. After one month the hairs disappeared. The tubes retained their showy color but began to resemble teeth, in which state they might be mistaken for tooth fungi.

The writer also encountered *Polystictus versicolor*, L., which is easily recognized by its gray-green shelf-like pileus and *P. hirsutus*, a much thicker growth, and *P. pubescens*, grayish-white and hairy.

Another welcome addition to the collection were the corky pore fungi of the genus *Trametes*, T. Pini, a brown rot of conifers covering a decaying branch of pine. Also collected were specimens of two other species of this genus: one a rose-colored sporophore, *T. subrosea*, which grew on a decaying balsam branch on our campus and one with a deep cinnamon-red sporophore, *T. cinnabarinus*, which grew on dead leaves on the floor of a wooded bluff.

Among the tooth fungi (*Hydnaceae*) were *Urpea tulipifera*, a white, corky and membranous growth on the bark of a dead limb probably a poplar, clumps of which are not infrequent in the moist spots of the valleys between the bluffs. The ridges of this fungus are tooth-like, fusing in old age. The material collected was very young and this anastomosing had not occurred. Another member of this same genus, but having cinnamon-brown fruiting bodies instead of white like the former, *U. cinnamoni*, was found in the woods above the terrace. Anastomosing was evident on some of this material. From the moist, loamy earth half way up the bluffs grew the tooth fungus, *Hydnum repandum*.

Of the *Stereums*, a group of leathery fungi belonging to the *Thelephoraceae*, were collected from bark near the summit of the bluff, *S. frustulosum*, with a brownish fruiting body, *S. hirsutum*, ivory colored with a warm-buff hymenium, the intermediate layer

bordered by a golden zone, *S. sericum*, Schw., thin and papery, whitish on the upper side, and *S. styracifluum*, having tan to smoky brown sporophores. *Peniphora cenera*, a crustaceous lavender mass, was discovered on a decayed limb lower down.

Only one rust was studied, *Puccinia malvacearum*. From time to time examinations were made of a border of old-fashioned holly-

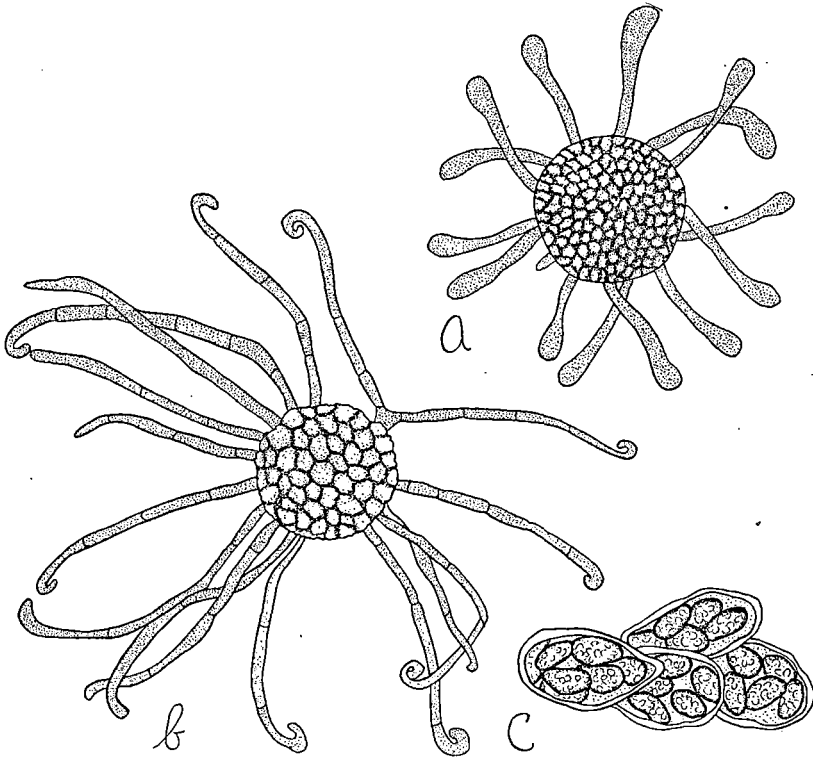


FIG. 1. PERITHECIA OF *Uncinula* ON VIRGINIA CREEPER—(a) IMMATURE PERITHECIUM; (b) MATURE PERITHECIUM; (c) ASCI CONTAINING SPORES; (x 100).

hocks near one of the buildings. About the middle of last October some leaves exhibited the desired teliospore stage.

The Witches Broom (*Melampsorella elactina*), which has affected most of the white spruce and the species attacking hackberry trees in Winona vicinity form an immense tangled mass of branchlets which someone compared to a great crow's nest in which animals and birds often conceal their dwelling places.

Among the *Ascomycetes* or sac fungi some interesting operculate and inoperculate *Discomycetes* were *Rhytisma Acerinum* (Pers.) Fr., forming a crust on the surfaces of soft maple leaves

and the morel, *Morchella conica*, growing under a hawthorne. Just above the terrace on the bluffs was *Sarcoscypha coccinea* on a partially buried stick. *Geoglossum*, a black, clavate, fleshy, leathery fruiting body was anchored on decaying fern vegetation and *Bulgaria polymorpha*, a gelatinous fruiting body grew on a decaying branch.

Also found was the much-sought lichen, *Xanthoria*, the upper surface of which is a pale orange shading to a tawny color. It is whitish on the under side. A specimen, the ascocarps of which were mature when collected, was found in an old cemetery at Rollingstone. Almost every granite tombstone had numerous patches of this growth adhering to its surface. Sharp knives were required to loosen it from the granite as it was brittle when dry, but became soft and pliable when soaked in water.

Powdery mildews were common, particularly the *Uncinula*, on the Virginia Creeper, ragweed and pigeon grass. Of these, the mildew on the Virginia Creeper, a species of *Parthenocissus*, was found most interesting. This vine runs over the fence around the South Campus of the College. It was examined for mature perithecia for several successive weeks during September and October last year, before a specimen was located in the last week of October.

There is much literature on the grapevine mildew, *Uncinula necator* (Schw.) Burr, but the present form differs from the powdery mildew of the grape, according to the writer's calculations, in perithecia, asci, and spore measurements. The grayish white mycelium is present on the upper or lower surface of the leaf, never on both sides of the same leaf.

On close examination, one can see chocolate-colored dot-like structures, probably .5 mm. in diameter. Under the microscope these prove to be beautiful deep chocolate to reddish brown spherical perithecia, 85-270 μ . in diameter, (this was after they were soaked in water for about an hour) provided with uncinulate appendages 12-30 in number.

In the literature available to the writer, there was found no mention of the fact that when these appendages are immature, they have paddle-like or spatulate expansions at the ends, and as they mature, these expanded appendages become straight or flexuous, often constricted and septate, probably with age. Their color is orange or reddish-brown nearest the ascocarp, shading off into hyaline tips reaching 13 μ . in diameter and 300 μ . in length. There are usually 4-8 hyaline, heavy walled asci, ovoid, constricted into a tube at the base, 75-40 \times 26-56 μ ., each ascus bearing 3-8, ordinarily 5, irregularly globose to ovoid spores 32-8 \times 6-14 μ .