Steccherinum Septentrionale (Fr.) Banker in Indiana.

By Howard J. Banker.

The fungus here considered is perhaps better known as *Hydnum septentrionale* (Fr.). Although a large and conspicuous plant it appears to have attracted very little attention if we are to judge by the references to it in literature. In the entire series of Just's Botanischer Jahrsbericht covering a period of more than twenty years I did not find a single reference to this species. As to size it possesses the unique distinction of being by far the largest representative of the family of the Hydnaceæ, if not indeed being able to lay claim to the first place in this respect in the entire fungal world. A specimen that recently came under the writer's observation and which is the occasion of this paper, after being damaged and a portion of it lost, weighed 35 lbs. The whole mass measured 30 cm. long, or in its projection from the substratum, 58. cm. wide, and 40. cm high. I should not be surprised if specimens were to be found considerably exceeding this in size.

The formation of the sporophore is somewhat peculiar. The mycelium emerges from the main trunk of the tree through some small opening such as the hole formed by a dead limb. In the case of the plant here shown it emerged under the base of the tree in a crevice formed by the divergence of buttress-like roots and where there was a small opening apparently into the heart of the tree. In every case that I have observed, the opening has not been over ten centimeters in diameter and is out of all proportion to the size of the sporophore. On emerging from the hole the mycelium apparently grows radially, spreading in close adhesion to the substratum and forming outwardly a series of overlapping or imbricate pilei. The first impression is that the mass is thoroughly rooted in the tree at all points and can be removed only by breaking it in pieces or by cutting out a portion of the tree. However, it will be found that no stronger implements than one's fingers are sufficient to remove the specimen intact, for its attachment to the bark is very slight and the fingers can easily be forced between the fungus and the tree, pushing it off until the small cord of mycelium which forms the real point of attachment is broken.

Steccherinum septentrionale, growing from crevice near base of living beech at Greencastle, Ind. Photograph by Paul Collins, magnified one-fifth.

For weeks after the removal of the fungus the spot on the tree where it had been can be detected by its lighter color, looking as if it had been cleaned. There are, however, no other external marks of the effect of the fungus and the tree appears to suffer little vital injury. Some six years ago a fine specimen was found growing on a beech at a height of 12 or 15 feet from the ground in the dooryard of Dr. Edwin Post in Greencastle. The tree is still living and apparently thriving. The top of the tree has been cut off or broken out, apparently many years ago and certainly prior to infection by the fungus. The plant does not seem to kill the tree, but such a fungal mass could hardly be produced without considerable injury. The fungus has been observed only on large trees a foot or more in diameter. The writer has not been able to examine the wood of a tree attacked by the fungus, but it seems probable that the mycelium may be confined to the heart wood, which would account for the little injury done to the growing tree, as well as the fact of its confinement to old trees.

It seems probable also that the sporophores are produced from small openings, because these offer a suitable path of exit through the sap-wood. It may appear, therefore, strange to speak of the plant as a parasite; but while its mycelium may be confined in its vegetative state to the non-living heart-wood, it is also true that the fungus appears to be confined to living trees and is never found on dead trunks, whether standing or fallen.

The plant seems to prefer the beech as its host. It has been reported as growing on maple and perhaps hickory in the East, where beech is not very abundant. I have never seen the plant *in situ* on the latter hosts, and illustrations suggest the possibility of the plant's being more or less distinct in character from the one found on beech. The original description and figure by Fries was from specimens found on beech in Sweden. These are in every respect typical of specimens found here in Indiana. I have seen no entire specimens of the European form on beech. At Upsala there is in the herbarium an entire specimen of extraordinary size that was found growing on Linden in the Botanical Garden of the University. Although the specimen is dried, it is evident at sight that the plant presents some striking differences from our Indiana plants. The pilei are much smaller, thinner, more numerous and more distinct, the color cinereous rather than creameus, and the teeth somewhat shorter. It is only after closer examination that one hesitates to pronounce it a distinct species. Fries makes mention of the plant's being found on elm in the same Bo-

tanical Garden, and names a variety, *hortense*, found on the latter host. So far as I know, the plant has never been observed in this country either on linden or elm. It is possible that the influence of the host may affect somewhat the growth of the plant, if these are all one species. This is a point that needs further investigation.

The immense sporophore is a single season's growth and it seems probable is produced very rapidly in the course of a few weeks in August and September, reaching maturity about the first of October. The form found on maple in the east has been observed to fruit several years in succession, and Fries speaks of the plant as growing annually on elm at Upsala. The beech in Dr. Post's yard two years later produced a small fungal growth, but too high up to be sure of its character, since which time no further growth has been observed. The tree on which the present growth was found gave no indications of any previous growths. Other observations lead me to believe that it is not usual for the beech fungus to fruit annually for a series of years. How long the mycelium lives in the tree is unknown.

The spores are produced in enormous numbers, but seemingly for only a few days. On my first visit to this plant, October 17, no spore fall was observed, but the matter was not especially tested. Two days later, on visiting the place, spores were observed rising from the mass in small clouds. These frequently streamed out from parts of the fungus like a puff of smoke for 10 or 15 seconds, then ceased and after two or three minutes began again. Such streams were emitted from different parts of the plant irregularly, so that from some part spores were escaping almost constantly. The day was pleasant and the air very quiet, yet occasionally a light puff of air passed over the plant. The streaming of the spores, however, appeared to be no more marked when the air stirred than when it was perfectly quiet. The plant was carefully removed from the tree, but being found too heavy to carry was left propped against the base where it had grown. Five days later the fungus was brought to the laboratory and found to be in good condition, but the outer edges of the pilei were beginning to darken and curl. Faint spore prints were obtained, but such as to indicate that spore discharge was practically over. Whether the removal of the plant from the tree shortened the time of spore discharge is not certain, but it is doubtful if the plant gives off its spores naturally for a period of more than a week or ten days.

According to Buller, visible spore-discharge in the hymenomycetes is a rare phenomenon, and he cites the observations of Hoffman, Hammer, and von Schrenk. My own observation on *Steccherinum septentrionale* conform to Von Schrenk's description of the spore-discharge in *Polyporus schweinitzii*. Buller accounts for the intermittent clouds by tiny irregular air currents, and thinks the spores were in reality "falling continuously and regularly by their own weight." In the case of his own observation on *Polyporus squamosus* this view appears to be confirmed, and he likens the appearance to the steam arising from a cup of tea in irregular eddies or the curling of tobacco smoke from the bowl of a pipe. Had he observed the discharge in *Steccherinum septentrionale* I believe he would not have felt so confident of his explanation. The cloud-like discharge was more as the curling smoke of the tobacco when one breathes at intervals through the pipe. I doubt if the discharge is due to any propelling force as hinted by Von Schrenk, but it seems to me probable that over certain restricted areas there is a simultaneous liberation of great quantities of spores followed by a period of rest. That such intermittent spore release occurs in all hymenomycetes is improbable, but it seems to account for the phenomenon as observed in *Steccherinum septentrionale* and *Polyporus schweinitzii*.

Whether the present fungus is to be regarded as an edible species can not be stated. No one appears to have tested its qualities. It would probably be found somewhat tough, especially when mature, but not more so than many forms that are recommended. In drying it gives off a very strong odor which would lead one to expect it to have a pronounced flavor. The taste of the raw plant is not inviting, and yet not particularly offensive. If any preparation of it would make it really comestible, a single plant is sufficient to furnish an abundant feast.

The plant is not rare and yet cannot be said to be common. It appears to be most abundant in Indiana and Ohio, perhaps because of the prevalence of the beech in this region. When the writer came to Indiana six years ago, he had not been in the State more than a couple of weeks when his attention was called by one of his students to the specimen previously mentioned in Dr. Post's yard. As there were three or four dried specimens observed lying about the laboratory, the impression was given that specimens could probably be readily obtained almost any time in season. Being at the time unusually busy organizing a new work, the opportunity for study of the plant was allowed to pass with a casual ex-

amination and the securing of the specimen. From that time until this fall, however, no more were seen except one or two old and badly weathered specimens. The plant is, therefore, not so abundant as was thought. Press of other work has again made it impossible to conduct as thorough an investigation of the problems suggested by this plant as one would like, but it has appeared worth while to call attention to this seemingly little noticed fungus.

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