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MICROSCOPIC TREE-FUNGI.*

SOME MINUTE PARASITES.

BY JAMES SCOTT

THE great hindrance to the study of the microscopic fungi is their objectionable character to the naked eye and their frequently obnoxious odors. A piece of rotting twig, cabbage stalk, or some comestible may carry immense quantities of exceptionally interesting fungi, but there is little persuasion toward studying them when it is found necessary to handle the disgusting stuff. Moreover, another disadvantage that tends to keep fungi in the background is that, owing to their universally delicate structure-a mere touch is often sufficient to demolish a symmetrical group-they cannot all be purchased as mounted specimens on microscopical slides.

The following examples of microscopic tree-fungi are grouped together because they were all obtained at the same time from the same pieces of twig, etc. In addition to picturing the fungi as nearly natural size as possible in the smaller circles, it may be advisable to regard the circles as enlarged pinholes, Nos. 3, 5, 6, and 8, representing those made with the point, and Nos. 1, 4, 9, 10, and 12 with the shaft of a 11/2-inch pin. In other words, the first circles are with a 11/4-

the number is three. The spores are jerked off, when ripe, by the corkscrewing of the stalks. To the naked eye this fungus appears as scattered white, glistening patches, each patch composing what, in reality, is a miniature thicket. This specimen is Trichothecium obovatum.

Another very different style of white fungus is the Volutella ciliata, in No. 4. To the unaided sight it might, on account of its mealy appearance, be mistaken for the last-mentioned example, though no experienced microscopist would be thus deceived. The whole dot is really a spore-case, and is strongly defended against the attacks of mites by numerous stiff bayonet-like projections pointing in all directions.

The group of which the present Torula pulveracea (No. 5) is a good example may be appropriately callednecklace fungi. The transparent spores are set end to end in tree-like tufts, as shown. Of course, each spore is capable of setting up a whole mycelium bed on its own account in a suitable nidus, and so it gains over many more elaborately contrived fungi in that it is practically all seed, so to speak.

older naturalists. No. 9 is an example having either dark brown or black stalks and fluffy, globular heads of a grayish or whitish tint. No. 11 depicts another specimen covered with a parasitic fungus allied to the Penicillium, or blue molds.

A Dendryphium is given in No. 10, in which the transparent spores are pale green when flattened between slips, but appear very dark previously. The particular style of the genus can be gathered by noting the method of growth and the positions of the divided spores, one of which is magnified to greater proportions at the side of the circle.

A rather curious Y-branched fungus is the Sporodinia dichotoma. The pearl-like spore-heads occupy the extreme tips of the rusty brown plant, as a rule, but frequently at the bases another form of reproduction, often to be encountered also in the Mucorini, or pinfungi, comes into operation. Two or more spore-cases meet together, and ultimately coalesce, the gametes, as they are then called, forming a single, strong sporecell. Sometimes one is apt to confound two or more species of fungi together when observing these stages,



FIG. 3. FIG. 4. FIG. 5. FIG. 6. FIG. 1. FIG. 2.



FIG. 7.

FIG 8

FIG 9.

FIG. 10

Botrytis Cinerea. The bunch spray fungus, magnified. Shown on a sixpense proportionately As all branch is more magnified in the right-hand space: while the upper left-hand circle shows a pin-hole proportion of the growth.
A common "Nectria," Coral pear fungus; each mass being about the size of a pin's head.
Trichothecium Obovatum. The frail bead fungus, magnified. About life size in the small circle, which proportionately represents a sixpence.
Fistillaria Puberula. The prickly-club fungus, magnified. Shown life size on a sixpence.
Species of Isaria. The tiny pin fungus, magnified. Compared also with a sixpence.
A species of Dendryphium. The divided gem fungus, magnified. Compared also with a sixpence.
Shown life size on a sixpence.
A species of Dendryphium. The divided gem fungus, magnified. Shown about life size on a sixpence.
Spordinia Dichotoma. The pear fungus, compared also with a sixpence.
Spordinia Dichotoma. The pear fungus, compared also with a sixpence.

inch objective, and the second ones with a 1/2-inch objective.

The genus, of which Botrytis cinerea is a good example, has several representatives that are parasitic on garden and farm vegetation. This particular specimen has simply branched, dark olive stalks, along which ashy, or gray, bunches of spores are arranged as shown in No. 1. The style of secondary branching by which the spores adhere to the stalks can be understood by referring to the right-hand space of the figure.

The coral spot fungi (No. 2) are great pests to the

The Pistillaria are club-shaped fungi, strikingly resembling the Clavaria. Indeed, the chief differences are those of size, the first being minute, and the second of much larger dimensions. Pistillaria puberula, which I picture in No. 6, has a powdery white sporophore, or club. One member of this genus, P. micaus, is a beautiful glossy, rose-colored object that is most charming under the microscope.

The specimens that I exhibit in No. 7 are so widely classed as fungi by naturalists and are so common that a few words should be given concerning them. They

as they twine together like the bushes and plants of a hedgerow.

Everyone of these examples came from trees, having grown chiefly on the thinner stems and twigs. Odd broken pieces of dead trees stood in water within large glass-covered jars and left undisturbed for some days will almost surely develop many of these fungi, but it may be necessary to hunt about for some species.

The mycelia, or hidden threads, send up aerial stalks, or hyphe, on which the varying characteristic fruits are carried.

fruit grower. They are, in themselves, very pretty objects, and dot the stems and trunks with bright red, densely scattered warts like small seeds. There is a great similarity between the various species, and the typical genus depicted in the figure may be regarded as representing them all. In their first stages they are bright colored, and discharge their spores irregularly; but in their second stages they become rather dull in tint, and the spores are arranged in pear-shaped perithecia clustered together. In reality, a nectria splits gradually into these perithecia. A hole in the summit of each of the latter allows for the liberation of the spores. The majority of forest trees are open to the attacks of these compact fungi.

One of the most delicate kinds of fungi is that displayed in No. 3. Fairly long, slender, unbranched stalks support at their summits either one, two, three, four, five, or six individually divided spores. Usually

* Knowledge and Scientific News.

appear like tiny collections of twisted faintly golden, or pale brown, hair emanating from scattered parts of the wood. When moistened, they wriggle about like a nest of serpents, and liberate dust which apparently consists of spores; yet Mr. W. B. Grove, a mycologist of much experience, tells me that they are simply outgrowths due to the attacks of mites.

The genus Isaria are minute prickly or mealy fungi, as can be seen by referring to No. 8. Rough projections get thickly covered with variously directed stiff, pin-like objects, the heads of which are the spores. Color is the chief distinguishing feature of this genus, and it is not necessary to go further into their usually simple structure.

The Myxomycetes are, by many of the advanced cryptogamists, considered as quite distinct from the true fungi. In the present instance, however, it will not be a very perfidious act if I regard them as belonging to the subject, in conformity with the opinions of

When I examine the fungi I merely hold the stem beneath the microscope and revolve it gradually so as to bring all its circumference into the field of view. Of course, this causes the outside to appear as a horizon, from which protrude the fungi in an undisturbed condition. Some species can be transferred, with a needle, to a slide, though this plan needs great carefulness. A drop of water on the slide, into which some specimens are dropped, will assist their definition.

The author of an article in the Frankfürt Vulkan deals with the industrial prospects opened up by the possibility of producing pig iron electrically in considerable quantities, as demonstrated by recent successes in Sweden, where, it is stated, various works are putting the Grönwall-Lindblad-Stalham process to practical use. According to the authority named, the cost of producing pig iron by electricity is 16 per cent less than that entailed by ordinary smelting methods.