The Structure and Affinity of *Sphæria pocula*, Schweinitz.

By M. C. COOKE, A.L.S.

[Read January 17, 1884.]

(PLATE XLVII.)

It has always been to me a greater pleasure to clear from obscurities, and illustrate by new observations, the dubious or little-known species of old authors, than to propose new species or new genera, although circumstances so often compel me to the latter course. The special instance which I desire now to place before this Society is a species described by Schweinitz, and endorsed by Fries, of which the fructification has been hitherto unknown or disregarded, and called by him *Sphæria pocula*. The earliest record I find is the description by Schweinitz himself in the 'Journal of the Academy of Natural Sciences of Philadelphia' for 1825 (vol. v. p. 7), in the following words:—" *Sphæria (Poronia) pocula*, L. v. S. Resembling an inverted *Peziza*, bursting fasciculately from beneath the epidermis, showing 2-4 pedicellate, pendulous cupulas in a bunch, the margin of the cupula bent in and thick, the disk flat and pruinose; colour of the whole fungus white, tinged with brown; size of each cupula about one or two lines. The perithecia are small, oblong, lutescent, crowded in a single tier (monosticha), totally immersed in the pulverulently pruinose disk, with black and scarcely prominent ostiola; substance internally suberose, albescent; externally, the cupulæ and proportionably thick stipes into which each is contracted are somewhat squamose or furfuraceous (plate ii. fig. 6). A most remarkable species communicated to me by Dr. Torrey, bursting from beneath the epidermis of *Fraxinus*. It is strictly of this section, and the only one, besides the European *Poronia*, which I consider genuine."

Subsequently, that is in 1828, Fries published a brief diagnosis of this same species in his 'Elenchus' (vol. ii. p. 60) under the name of *Sphæria (Poronia) pocula*, Torrey, without quoting the above, which probably he had never seen, and citing Torrey, not Schweinitz, as the authority. The brief description was probably drawn up by himself from specimens communicated to him, perhaps by Dr. Torrey.

In the 'Synopsis Fungorum,' published by Schweinitz in 1834 (p. 189), the following and more detailed description is given:—

- "Suberosa-coriacea, stipitata; stipitibus fasciculatim ex epidermide prorumpentibus, incurvis, sensim dilatatis in cupulas obverse pendulas, extus ex albido-fuliginosis, demum subfurfuraceis; stipites semper crassi sunt. Cupulis excavatis, disco planiusculo, margine crasso, obtusato, inflexo-pulverulento. Peritheciis immersis disco, minutis, monostichis lutescentibus, ostiolis nigris, vix prominentibus. Substantia cupularis intus ex albo-fuliginea aut badia, suberosa. Altitudo cæspitis et singularium cupularum 4-5 lineas, diameter disci 2-5 linearis. Ætate proveciori, stipites fusco nigrescunt."

In all these instances the species was classed with the Sphæriacei, under what was then considered the subgenus *Poronia*, as an ally of the widely-diffused *Poronia punctata*. More recently it has been transferred by some authors to *Hypocrea*; and in this view I believe the Rev. M. J. Berkeley concurred. Fries, in his *Summa Veg. Scan.* (1846), placed it in the *Dichænacei*, in a genus almost especially designed for its reception, under the name of *Enslinia* (p. 399), which he characterized as analogous to *Poronia*. Wherever it was placed it was taken for granted that it was ascomycetous, although evidently its structure was never properly investigated. With a single specimen to operate upon, derived directly from Schweinitz himself, and undoubtedly authentic, I have arrived at a different conclusion.

As already indicated, the entire fungus consists of a furfuraceous cup-shaped brownish receptacle, about one or two lines in diameter, with a rather thick stem, bursting through the back of *Fraxinus*, either singly or in clusters, after the manner of a species of *Peziza* or *Cenangium*, but with this peculiarity, that the punctate disk was turned from the light by the pendulous habit, which is characterized as universal. Schweinitz says, "Cupulas obverse pendulas," and again, "semper cupulis universis pendentibus." This habit will be referred to again hereafter, although apparently of slight importance here.

The disk is flattened and whitish, surrounded by the elevated margin of the cup, the surface sprinkled with apparently blackish points or dots, described, both by Fries and Schweinitz, as black ostiolæ of the supposed immersed perithecia. In the genus *Poronia*, as is well known, the perithecia are immersed in the substance of the disk, and only the black ostiolæ are seen on the surface; from analogy, and a superficial examination with a pocket lens, the dots on the disk of the *Pocula* were assumed to be of the same character,

whereas the microscope shows this to have been an error, the supposed ostiolæ being nothing more than pores, or openings in the disk, with no alteration of colour. By soaking in water for an hour or two my specimen became quite fleshy in its character, and sections were readily cut through the disk, so thin as to reveal the entire structure. This may be briefly described:—The pores which are visible on the surface penetrate the disk in parallel channels, at short distances apart, and are cylindrical, several times longer than broad, with no perithecia (as supposed by Schweinitz and Fries), but lined throughout with a layer of elongated elliptical cells, closely packed side by side, and in no way differing from the basidia which line the tubes of a *Polyporus*. In some instances these basidia were still crowned by delicate spicules, seen only when stained by aniline. The tubes contained numerous hyaline spherical spores, about .004 millim. diameter, and these seem to have been the cause of the white pulverulent appearance of the disk. Between the parallel tubes the substance was continuous, consisting of interlacing fibres proceeding from the base of the basidia inwards and downwards, in the direction of the stem. Hence the structure of the cup was a delicate fibrous tissue, perforated by parallel pores, opening in the disk; the whole internal surface of such pores being hymenial, lined with closely-packed basidia, originally having delicate spicules at their apices, bearing globose hyaline spores.

Such a structure is undoubtedly Hymenomycetal, and no insinuation of Ascomycetal; in fact, it is nothing else than the structure of *Polyporus* or *Porothelium*, with a preference for the former; and the species should in future be designated as *Polyporus* (*Mesopus*) *Pocula* (Schwein.), allied perhaps in habit to *Polyporus pendulus*, but in substance to *Polyporus Rhypidium*. The objections to this view cannot be formidable, if the structure above described is accurate. The substance is no more fleshy than that of many Polyporei. The size is often scarcely exceeded in *Polyporus Rhypidium*, and hence dimensions would be no obstacle. The cup-shape is almost the same in *Polyporus pendulus*, although not so remarkably Pezizæform. In fact all the essential characters of *Polyporus* are present; and although shaped so much like a *Peziza*, we have the authority of Schweinitz for urging that the disk is not permanently and by preference exposed to the light, as in *Peziza* and *Poronia*, but turned from the light, by the cups always becoming pendulous, as is the habit in *Polyporus* and other Hymenomycetes.

M.C. Cooke del.

POLYPORUS (MESOPUS) POCULA, (Schrz.)

J.N. Fitch lith.

Because Fries and Schweinitz were misled by external resemblance to refer this plant to Sphæriacei (since they give no indication of having observed its structure under the microscope), it cannot be contended that this is not the species of Schweinitz. When it is remembered that the free globose spores are identical in size and form with the spore-joints in many species of *Hypocrea*, some excuse may be made for the supposition that it might be a species of *Hypocrea*. I do not know that any except the original specimens have ever been found; and it is not surprising that the fortunate possessors of a single cup or two should have hesitated to cut in pieces and examine its structure as I have ventured to do, in the hope of setting the question at rest as to what is the *Sphæria pocula* of Schweinitz.

DESCRIPTION OF PLATE XLVII.

- Fig. 1. Cups *in situ*, natural size; 2, 3. Magnified bunches;
 4. Magnified section. All after Schweinitz.
 5. Section of cupule, magnified 12 times.
 6. Section of hymenium, further magnified.
 7. Section of tubes, showing basidia lining them.
 8. Arrangement of basidia forming walls of tubes.
 9. Separate basidia, with spicules.
 10. Spores. Figs. 8, 9, & 10 $\times 500$ diameters.

NOTE.—Since the above was in type I have discovered that Berkeley and Curtis, in the fourth volume of the ‘Proceedings of the American Academy of Arts and Sciences’ (1860), describe this species anew as *Polyporus Pocula*, Berk. & Curt., but the description appears always since to have been neglected, and even to have passed from the memory of the Rev. M. J. Berkeley himself.

On the Life-history of *Æcidium bellidis*, DC. By CHARLES B. PLÓWRIGHT, M.R.C.S. (Communicated by W. T. THISELTON DYER, C.M.G., F.L.S.)

[Read March 20, 1884.]

THE *Æcidium* upon the common Daisy (*Bellis perennis*, L.) has hitherto, both by British and continental botanists, been regarded as a mere variety of *Æcidium compositarum*, Mart. During the past four months this fungus has been made the subject of experimental culture, by which it has been demonstrated that this view