

TAXONOMIC NOTES ON ASCOMYCETES.

BY

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V. On *Sphaeria parmeliarum* Phill. & Plowr. and the Genus *Cucurbitodithis* Petr.

In connection with my studies on the genus *Leptosphaeria* I made acquaintance with a fungus, listed in the *Sylloge Fungorum* as *Leptosphaeria Parmeliarum* (PHILL. et PLOWR.) SACC., a name based on *Sphaeria parmeliarum* PHILLIPS & PLOWRIGHT 1876, p. 124. The specific epithet suggests that it is a lichen parasite and in the original description the type material was said to be "growing parasitically upon *Parmelia saxatilis* on a living spruce fir tree, Dolgelly North Wales. June 22., 1875 (Rev. W. A. Leighton)". This is the only find ever reported of this species, which may seem rather remarkable bearing in mind that much interest has been devoted to the lichen parasites by subsequent investigators. It has been mentioned by several authors, however, and endowed with various names. Thus it was referred to *Psilosphaeria* by COOKE and PLOWRIGHT (1879, p. 84), to *Melanomma* by COOKE (1887, p. 53) and by MASSEE (1888, p. 118), and to *Heptameria* by COOKE (1889, p. 33). VOUAUX considered it a *Phaeospora* in his well-known monograph on the lichen parasites (1913, p. 75), and so did KEISSLER (1930, p. 430). Most of those scientists probably did not know the fungus by autopsy, this being certainly true of KEISSLER and VOUAUX whose descriptions are mere translations of the original. Besides the original authors, BERLESE is, as far as I know, the only student who examined type material; in his *Icones Fungorum* I, he gave a short description and also a drawing (tab. 47, fig. 4). However, neither BERLESE nor anybody else has realized that this fungus is no lichen parasite at all.

The type material of *Sphaeria Parmeliarum* was distributed as no. 52 in PLOWRIGHT's *exsiccata Sphaeriacei Britannici*, part III. I have had the opportunity of studying the material in the copies at

Kew and Uppsala. *Parmelia saxatilis* is present, that is true, but perfectly healthy and without any trace of a parasite. However, intermixed with the *Parmelia* there is a remarkable pyrenomycete with a large crustlike stroma looking much like a lichen thallus, when seen from below. This is apparently what PHILLIPS and PLOWRIGHT described as *Sphaeria Parmeliarum*—actually it is *Cucurbitodhis pithyophila* (FR.) PETR. The taxonomy and true systematic position of this peculiar fungus is a matter of controversy and will be the subject of this paper.

Sphaeria pithyophila was first described by SCHMIDT and KUNZE (1817, p. 3) in the text to their exsiccata Deutschlands Schwämme, and the type material was distributed there as no. 133. These authors justly pointed out the existence of a "hypothallus crustiformis". The first description taking account of microscopic characters, and furthermore illustrated, was given by DE NOTARIS (1863, p. 60) who transferred the species to *Cucurbitaria*—a somewhat amazing action of his, as the material studied by him (Erbar. Crittog. Ital. no. 989) is phragmosporous. Most subsequent authors, however, have kept the species as a *Cucurbitaria*, because it is generally dictyosporous.

This spore variation presents a minor taxonomic problem which was touched upon by REHM (1881, p. 38) who described a phragmosporous collection as *Cucurbitaria pithyophila* var. *Cembrae* (type: Austria, Kùhteil, on *Pinus Cembra*; REHM, Asc. no. 147). I am inclined to ascribe to this variety a certain taxonomic value. I have studied 20 collections of *Cucurbitodhis pithyophila* in all, and this material can apparently be divided into a phragmosporous and a dictyosporous group, no truly transitional material being encountered. The first-mentioned group which can thus be denoted var. *Cembrae* is represented by five collections (+ the type of *Sphaeria Parmeliarum*, vide *infra*). Apparently this form is by no means restricted to *Pinus cembra*. It is strictly phragmosporous, the spores measuring $18-23 \mu \times 5-7 \mu$, and being pale brown, fusiform, and almost invariably 3-septate (fig. 1 a, b; Pl. II a, b). On the whole this variety looks very uniform, in contrast to the dictyosporous group which is remarkably variable in septation, a variation met with even in one and the same ascocarp. The spores are somewhat larger in this group, $18-25 \mu \times 6-8 \mu$, the ratio breadth: length being also somewhat greater. The number of transverse septa is generally 4 or 5, but 3- and 6-septate spores occur. The median "segments" are usually divided by one or two longitudinal septa, but these are some-

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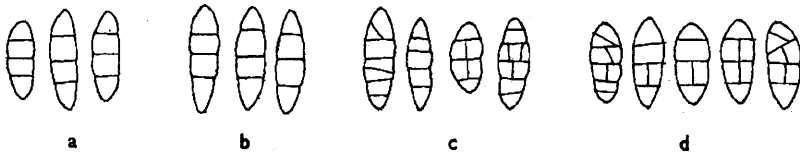


Fig. 1. Ascospores of *Cucurbitodiths pithyophila*. a. var. *Cembrae* (type coll.). b. var. *Cembrae* (type coll. of *Sphaeria Parmeliarum*). c. var. *pithyophila* (РВН., F. eur. 1337). d. var. *pithyophila* (Sweden, leg. VLEUGEL, ep. p. 454). — c. $\times 650$.

times lacking even in apparently mature spores (see fig. 1 c, Pl. II c).

PETRAK who has treated this species at length (cf. below) also noticed the spore variation but did not pay much attention to it: "Dass die Sporen von *C. pithyophila* bei manchen Kollektionen nur Querwände haben, bei anderen zuweilen auch noch mit einer unvollständigen Längswand versehen sind, ist von untergeordneter Bedeutung" (1963, p. 379). The word "zuweilen" (at times) must be considered an understatement as regards this generally dictyosporous fungus.

The above-mentioned material of SCHMIDT and KUNZE belongs to the dictyosporous form which should thus be considered the type variety. It may be questioned whether the var. *Cembrae* ought not to be assigned specific rank but I hesitate to do so in view of the pronounced spore variation of the other form. Moreover there seem to be no differences in vegetative characters. *Sphaeria Parmeliarum* should, I think, be referred to the var. *Cembrae*, as it is strictly phragmosporous, with generally 3-septate spores. Certainly several 4- and even 5-septate spores, attaining up to 30μ in length, are encountered in the type material, but to all appearances those spores are anomalous and overripe.

But even if *Sphaeria Parmeliarum* is thus identified as a well known pyrenomycete its general taxonomic position remains a problem. As will be shown it has been a matter of dispute. Our fungus is unique among the Pleosporaceae on account of its remarkable "hypostroma" (cf. Pl. I). "Inter maxime insignes certe numeranda", as FRIES aptly wrote (1828, p. 86). The stroma is erumpent through the periderm and widely effused, attaining at least $3-4 \text{ cm}^2$, crustlike and irregularly crumpled, and densely set with ascocarps. It is about 0.3 mm thick, black on the upper side, but white below as well as in crosssection, and strongly reminiscent

of a lichen thallus. The stroma, including the ascocarp walls, is mainly composed of a hyaline scleropectenchyma, made up of almost isodiametric cells, c. 10–15 μ (Pl. 1c). The bottom layer is a loose prosenchyma.

An imperfect state is sometimes met with. I have encountered it in four collections, viz. in the type material of var. *Cembrae* and in three gatherings of the main variety, from Sweden (leg. VLEUGEL), Italy (leg. CARESTIA) and the USA (leg. SPRAGUE) cp. p. 454. The pycnidia are found among the ascocarps and look just like them, but are filled with conidia of the *Coniothyrium* type, attaining $7\mu \times 5\mu$. As far as I know VON HÖHNEL was the first one to notice this state; he published a detailed description, naming it *Microsporella pithyophila* (1918, pp. 146–147). Another full account has been given by PETRAK and SYDOW who created the new combination *Coniothyrium pithyophilum* (1927, p. 391). The need for a particular denomination of this state does not seem very urgent. Still another imperfect fungus has been attributed to our species, viz. *Phragmotrichum Chailletii* (e.g. by FÜCKEL 1870, p. 172) but this is certainly wrong, cf. KUJALA 1950, p. 54.

The North American collection referred to above deserves a mention. It is type material of *Melogramma Spraguei* BERK. et CURT. (= *Thyridium Spraguei* SACC.). The latter species is thus identical with *Cucurbitodhis pithyophila*—and has of course nothing to do either with *Melogramma* or with *Thyridium*. The synonymy has already been presumed by PETRAK (1962, p. 210): “*Thyridium Spraguei* ... Ist nach dem in den Reliquiæ Farlowianæ unter Nr. 634 ausgegebenen, von R. Thaxter auf *Pinus strobus* gesammelten Exemplar, ein junges Stadium von *Cucurbitodhis pithyophila* (Fr.) Petr. ...” Examination of original material at UPS has verified this supposition of PETRAK’s. The material at hand consists of the imperfect state only; hence it could be questioned whether it represents the var. *Cembrae* or the var. *pithyophila*. The original description, however, indicates that it is the type variety: “sporidia ... with three horizontal and a few vertical septa” (BERKELEY 1876, p. 99). By the way, it is a funny coincidence that *Sphaeria Parmeliarum* and *Melogramma Spraguei* were published in the same number of *Grevillea*! But let us leave those needless names and return to the problem of the taxonomic position of our fungus.

The genus *Cucurbitodhis* was established by PETRAK (1921, p. 201) in order to accommodate this species which ever since DE NOTARIS *Sv. Bot. Tidskr.*, 61 (1967): 4

had been referred to *Cucurbitaria*. PETRAK (l.c.) supplied a very detailed description based on North American material (WEIR No. 10893, which moreover appears to have been the var. *Cembrae*). He justly recognized the stromatic nature of the ascocarps which in the first place made PETRAK erect the new genus since at that time he erroneously considered *Cucurbitaria* to be "sphaerial". Later on he realized his mistake, and in 1963 he approached the subject anew (1963, pp. 377-380). In this latter paper PETRAK holds the view that the two genera are closely related but ought to be kept apart due to the stroma characters. "Diese beiden Gattungen können aber durch den Bau des Grundstromas leicht und sicher unterschieden werden. Dieses Gewebe ist bei *Cucurbitoidhis* stets mehr oder weniger kräftig entwickelt, krustenförmig, besteht aus einem hyalinen oder nur sehr hell gelblich gefärbten Mark von sehr dickwandigen, englumigen Zellen und einer schwarzbraunen Aussenkruste" (p. 379).

I fully agree with PETRAK that *Cucurbitoidhis* should be considered generically distinct from *Cucurbitaria*, and moreover, in my opinion the two genera are not very closely related. Indeed, the resemblance is superficial only and restricted to the trivial fact that both are stromatic and dictyosporous. The peridial anatomy is quite different. The well-developed scleroplechtenchyma of *Cucurbitoidhis* is not present in *Cucurbitaria*, as far as I know, but reminds one strongly of the true *Leptosphaeriae*. In my opinion *Cucurbitoidhis* is obviously related to the latter genus, and the phragmosporous var. *Cembrae* is sporologically a connecting link.

The taxonomic position of *Cucurbitoidhis* has also been dealt with by VON ARX (1954, p. 90) who likewise expressed the view that our fungus is not related to *Cucurbitaria* but should instead be included in *Gibberidea*: "Die Gattung *Cucurbitoidhis* ist tatsächlich mit *Cucurbitaria* nicht näher verwandt, lässt sich aber neben *Gibberidea* FUCK. (1869) nicht aufrecht erhalten". Much evidence in favour of this view was not presented by VON ARX and the alleged affinity to *Gibberidea* seems doubtful to me. The type of that genus, *Gibberidea Visci* FUCK., is certainly stromatic, but the stroma is rather of the *Cucurbitaria*-type, composed of a pigmented pseudoparenchyma, not reminiscent of the peculiar *Cucurbitoidhis*-stroma. I thus refuse to synonymize *Cucurbitoidhis* with *Gibberidea*. The latter genus will moreover be fully treated in a forthcoming paper.

So far only two species have been referred to *Cucurbitoidhis*: be-

sides the type also *C. conjuncta* PETR. According to VON ARX (l.c.) this fungus is a *Gibberidea*, too. In fact it is misplaced in either of those genera but is closely related to *Melanomma*. It will be discussed in connection with my treatment of *Gibberidea*.

I will conclude the above with some formal notes on synonymy with lists of exsiccata and other material examined:

Cucurbitodithis pithyophila (SCHMIDT et KUNZE ex FR.) PETR. in Ann. Myc. 19, p. 201 (1921), var. ***pithyophila***.

Sphaeria pithyophila SCHMIDT et KUNZE ex. FR. in Syst. Myc. 2, p. 425 (1823). — *Cucurbitaria pithyophila* DE NOT., Sfer. ital., p. 60 (1863). — *Gibberidea pithyophila* VON ARX in Acta Bot. Neerl. 3, p. 90 (1954). — Coll. orig.: GERMANY, Lausitz, »Ad corticem truncorum et ramorum adhuc vigentium *Pini sylvestris*» (=SCHMIDT & KUNZE, Deutschl. Schwämme 133) (UPS!).

Melogramma Spraguei BERK. et CURT. ap. BERK. in Grevillea 4, p. 99 (1876). — *Thyridium Spraguei* SACC., Syll. Fung. 2, p. 325 (1883). — Coll. orig.: USA, Mass., *Pinus strobus*, leg. C. J. SPRAGUE (UPS!).

Matrix: The species is apparently restricted to conifers; I have seen material on *Abies*, *Picea* and *Pinus*, always on bark.

Exs.: [FR., Sci. suec. 343, *vide infra*.] — FUCK., F. rhen. 1814. — JAAP, F. sei. 133. — RBH., F. eur. 645, 1337. — SCHMIDT & KUNZE, Deutschl. Schwämme 133. — (ROUMBG., F. gall. 1581).

Besides the above-mentioned 5 exsiccata, from Czechoslovakia, Germany and Italy, I have seen further 9 collections of the type variety, viz.: SWEDEN, Småland, Femsjö, *Pinus silvestris*, leg. et det. E. FRIES (UPS!). — It is possible that part of this collection was distributed as Sci. suec. n. 343, cf. FRIES 1828, p. 86; 1849, p. 391. This number is, however, lacking in the Uppsala copy of the Scleromyceti. — Södermanland, Oxelösund, *Pinus silvestris*, VII. 1900, leg. et det. J. VLEUGEL (UPS, S.). — GERMANY, Bavaria, Oberammergau, *Pin. silv.*, VIII. 1894, SCHNABL (S); Triglitz in der Prignitz, *Pin. silv.*, 29. III. 1907, leg. JAAP, det. REHM (S). — AUSTRIA, Tyrol, pr. Brenner, *Picea Abies*, VIII. 1907, leg. et det. REHM (S). — HUNGARY, Kaposvár, 1872, leg. LOJKA, det. REHM (S). — ITALY: Piemonte, Alagna-Valsina, "sulla corteccia d'un *Pinus Abies* presso la cascata dell'Otro", 5. V. 1863, leg. CARESTIA (S.). — USA. Mass., *Pinus strobus*, leg. SPRAGUE (UPS); Col., Huerfano Co, *Abies concolor*, 17. VIII. 1955, S. SHUSHAN (UPS).

Cucurbitodithis pithyophila (FR.) PETR. var. ***Cembrae*** (REHM) L. HOLM n. comb.

Cucurbitaria pithyophila (FR.) DE NOT. var. ***Cembrae*** REHM in Ber. Naturhist. Ver. Augsburg 26, p. 38 (1881). — Coll. orig.: AUSTRIA, Kühtei, *Pinus cembra*, cortex (=REHM, Asc. 147) (S! UPS!).

Sphaeria parmeliarum PHILL et PLOWR. in Grevillea 4, p. 124 (1876). — *Leptosphaeria Parmeliarum* SACC., Syll. Fung. 2, p. 83 (1883). — Coll. orig.: Wales, Dolgelly, *Picea Abies* (=PLOWR., Sph. Brit. III: 52) (K! UPS!).

Matrix: I have seen this variety on bark of *Abies alba*, *Picea Abies*, *Pinus cembra*, and *Pinus silvestris*.

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Exs.: Erb. Critt. Ital. 989. — PLOWR., Spher. Brit. III: 52 (as *Sph. parmel.*). — REHM, Asc. 147. — VGR., Micr. 1143.

Besides those exsiccata (from Austria, Great Britain, Italy and Switzerland) I have seen two further collections viz.: AUSTRIA, Tyrol, Oetz, "An lebenden Föhren-Ästchen", VIII. 1874, leg. REHM (S). — ITALY, Vallombrosa, *Abies alba*, 30. VIII. 1897, leg. CAVARA (S).

It is a pleasure for the author to acknowledge the valuable advice of Dr. ROLF SANTESSON.

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Explanation of the Plates.**Plate I.**

Cucurbitodhis pithyophila, sections.

- a. Stroma with pycnidium (at the arrow) and ascocarp (type coll. of var. *Cembrae*).
— c. $\times 35$.
- b. Stroma with ascocarp (type coll. of *Sphaeria Parmeliarum*). — c. $\times 80$.
- c. Detail of b, stromatic scleroplectenchyma. — c. $\times 210$.

Plate II.

Cucurbitodhis pithyophila, ascospores.

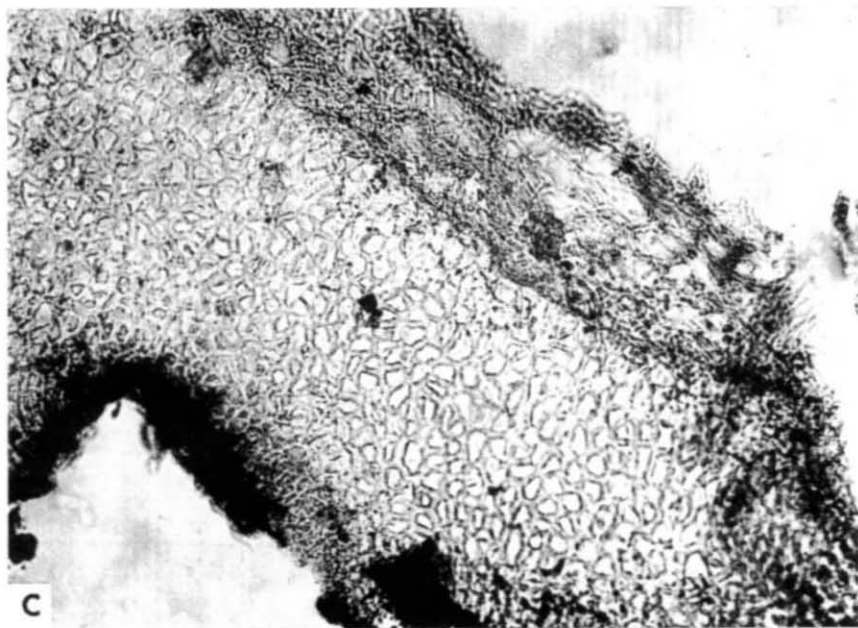
- a. var. *Cembrae* (type coll. of *Sphaeria Parmeliarum*). — c. $\times 530$.
- b. var. *Cembrae* (type coll.). — c. $\times 530$.
- c. var. *pithyophila* (Hungary, Kaposvar, leg. Лолка, sp. p. 454). — c. $\times 530$.



a



b



c

