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# CHLOROSPLENIUM AND ITS SEGREGATES. I. INTRODUCTION AND THE GENUS CHLOROSPLENIUM [1]

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*ABSTRACT*

Many green Inoperculate Discomycetes have been artificially assigned to the genus *Chlorosplenium* and later shown to belong elsewhere. Three genera are recognized for the remaining species in this monograph: *Chlorosplenium* sensu stricto, with two accepted species, *Chlorociboria* with four accepted species (one divided into two subspecies), and a new genus, *Chlorencoelia*, with two accepted species. A key to these genera and 14 additional genera of the Helotiales with one or more aeruginous species is provided.

In the monographic treatment of *Chlorosplenium*, one new combination in that genus is proposed: C. hypochlora. Forty-three epithets previously treated in *Chlorosplenium* are either excluded or placed in synonymy on the basis of type studies. New combinations proposed for some of these are Clausseno-myces salviicolor, Cyathicula fuegiana, C. strobilina, Dasyscyphus aeruginellus, and D. melatheja. Six epithets

1 Based on a thesis presented to the Graduate School of Cornell University in partial completion of the requirements for the degree of Doctor of Philosophy.

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remain doubtful and insufficiently known.

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## *INTRODUCTION*

Many species of Inoperculate Discomycetes are viridescent or aeruginous in coloration and most of these have at one time in their taxonomic histories been placed in the genus *Chlorosplenium* Fr. It has long been recognized by taxonomists that this assemblage of species, considered congeneric merely on the basis of their common coloration, was probably heterogeneous. Subsequently, some have been removed to other accepted genera. Seaver (1936) separated three common species which he felt were definitely not congeneric with the type of the genus, *Chlorosplenium chlora* (Schw.) Curtis in Sprague, into a new genus, *Chlorociboria* Seaver. There is no complete monographic study of either genus, though *Chlorociboria* has been accepted as a segregate by Kobayasi (1937, 1939), White (1941), Kanouse (1947), Buchwald (1949), Dennis (1956, 1958a, 1958b, 1960), Korf (1958, 1973), and Ramamurthi, Korf, and Batra (1958).

This work treats *Chlorosplenium* and *Chlorociboria* monographically and erects and points out the need for a new genus, *Chlorencoelia*. In addition, a key is provided to other inoperculate genera which contain one or more aeruginous species: *Bisporella* Sacc. [=*Calycella* (Fr.) Boud. sensu Boud.], *Catinella* Boud., *Chloroscypha* Seaver, *Ciboria* Fckl., *Claussenomyces* Kirschst., *Cordierites* Mont., *Cyathicula* de Not., *Dasyscyphus* (Nees) ex S. F. Gray, *Haglundia* Nannf., *Holwaya* Sacc., *Phaeohelotium* Kanouse, *Poculum* Vel., *Rutstroemia* Karst., and *Velutarina* Korf.

## *MATERIALS AND METHODS*

Though a number of species occurring in the northeastern, southeastern, and mid-western United States and the Caribbean have been repeatedly collected by the writer and studied in the fresh condition, many of the species are known to him only from herbarium specimens. Notes on cultural characters of those species successfully cultured on artificial media are recorded in the descriptions, though in no case have apothecia been produced in culture. The relationships of the various genera and species have been approached from an investigation of the apothecial tissues and of other microscopic and gross characters.

Attempts to locate nuclei by embedding in paraffin, by phase microscopy, and by flourescence microscopy failed.

Dried material was examined as follows: a portion of apothecium was wetted in an approximately 3% aqueous solution of Aerosol OT (Fischer Scientific Co. No. SO-A-292), soaked in water for 5 to 10 min, placed on the stage of a freezing microtome and oriented in a drop of 50% aqueous solution v/v of commercial mucilage (LePage's), frozen and sectioned at 15 to 25 µm. Sections were then removed tc a drop of water on a microscope slide and allowed to dry. The sections were rehydrated, stained with either Metzer's Reagent (Ainsworth, 1971) and/or Poirrier's Blue in lactophenol, then mounted in lactophenol and ringed with glyptal (General Electric No. 1201 Red Enamel) as outlined by Travis (1968).

Spore measurements were made only on spores floating free in the mounting media. Ascus measurements were taken only on those asci which contained fully-formed spores. Drawings were made using a camera lucida. Photographs were taken with a Zeiss WL microscope.

## *TERMINOLOGY*

The terminology used in the descriptions of zones of the apothecium and the apothecial types is that outlined by Korf (1952, 1958, 1973). The term "disc" is used to refer to the hymenium in gross view, and the term "hymenium" is restricted to the asci and paraphyses when viewed in section. The term "receptacle" is used to denote the flanks of the apothecium.

The term "gelatinized hyphae" is used here to describe hyphae with thick and refringent walls. The term "gel tissue" refers to the zones of the excipulum in which hyphae are embedded in mucilaginous material.

When the apical cylinder surrounding the ascus plug becomes blue in Melzer's Reagent, the standard Discomycete convention J+ is used; when such a blue reaction is absent, J− is used.

The term "tomentum hyphae" is used here to refer to any filamentous hyphal outgrowths of the ectal excipulum which are continuous with this tissue and are more or less relatively undifferentiated hair-like hyphal outgrowths. If these were more highly differentiated, they could be called hairs, and in some species they have been so termed in the literature.

Colors cited in the descriptions are those in conventional English usage when non-capitalized and when capitalized are those of Ridgway (1912).

The sign (!!) when used after a name in lists of synonyms indicates that type or isotype material has been examined; the sign (!), that syntype, paratype, or other authentic material has been examined.

The illustrations cited are those which definitely represent the species in question; doubtful or schematic ones have been omitted. Citations of particularly complete and accurate illustrations are indicated with an exclamation point.

The use of "per" and of ": Fr." is used here as outlined by Donk (1957, 1961).

Abbreviations used in the citation of references are those as set forth in G. H. M. Lawrence, *et al.* (1968), "Botanico-Periodicum-Huntianum." A few abbreviations to older mycological books were taken from Seaver (1942), "The North American Cup-fungi (Operculates)."

The herbarium abbreviations are those of Lanjouw and Stafleu (1964). The personal herbarium of Dr. Richard P. Korf is abbreviated R.P.K. In the citation of specimens examined, only accession numbers and herbaria have been listed, with the exception of type specimens and specimens considered critical by the author. Microscopic preparations of specimens which have been examined are deposited in the Plant Pathology Herbarium at Cornell University (CUP) and have been given Cornell accession numbers. These numbers

are also indicated on the annotation slips with the specimens that have been returned to the original herbaria.

## *KEY TO THE GENERA OF HELOTIALES CONTAINING AERUGINOUS SPECIES*

The following key will serve not only to identify the genera treated in this monograph, *Chlorosplenium*, *Chlorociboria*, and *Chlorencoelia*, but should aid in separating those genera which might easily be confused with tnem. The key is based in part on the generic concepts outlined by Korf (1973) and the author is indebted to Dr. Korf for his permission to reproduce parts here.

1. Apothecia arising from a stroma or sclerotium, or from stromatized patches of host tissue, usually brownish and stalked; ascus pore almost always blue in iodine. ..... SCLEROTINIACEAE ..... 2

1'. Apothecia not arising from a stroma or sclerotium, nor from stromatized patches of host tissue..... 4

2 (1). In section, apothecium with a strongly gelatinized layer in the ectal excipulum; outermost layer of the excipulum not composed of globose cells..... *Poculum* Vel. [If specimen keys here, cfr. *Chlorosplenium elatinum*, excluded species #15 under *Chlorosplenium*.]

2'(1). In section, apothecium with globose cells as the outermost layer of the ectal excipulum (rarely covered with a scurfy layer of hyphae running parallel to the surface), rarely a thin layer of gelatinized hyphae present as an inner layer of the ectal excipulum..... 3

3 (2'). Apothecia greenish, on cone scales of *Picea*, ascospores less than 10 µm long..... *Rutstroemia* Karst. [*R. bulgarioides* is now the only species in the genus, which provides a very different concept of the genus from that adopted by White (1941) and most recent authors. This species has also been placed in *Chlorosplenium* and *Chlorociboria*, and is the type of *Piceomphale*, a recent synonym. If specimen keys here, see excluded species #9 under *Chlorosplenium*.]

3'(2'). Apothecia not greenish, on cone scales of *Abies* spp., *Picea glauca*, and *Pseudotsuga taxifolia*, or

greenish and on catkins of *Alnus*, ascospores usually more than 10 µm long..... *Ciboria* Fckl. [If the specimen keys here, cfr. *Ciboria rufo-fusca*, excluded species #9a and *C. viridi-fusca (=Chlorosplenium amenticolum)*, excluded species #5 under *Chlorosplenium*.]

4 (1'). Apothecia sessile to subsessile. ectal excipulum of thin-walled to thick-walled textura angularis to textura globulosa, walls of these cells normally dark..... DERMATEACEAE ..... 5

4'(1'). Apothecia stipitate to substipitate (or if sessile then ectal excipulum *not* composed of thin-walled to thick-walled textura angularis to textura globulosa, and walls of ectal excipular cells hyaline or brown..... 7

5 (4). Ascospores one-celled, hyaline becoming brown, constricted in the middle, distinctly 1-seriate; apothecium strongly ionomidotic.... *Catinella* Boud. [*C. olivacea* (Batsch per Pers.) Boud. (= *C. nigro-olivacea* [Schw.] Durand) has a worldwide distribution, on wood, and may be the only species. While this species has never been placed in *Chlorosplenium* or *Chlorociboria*, due to its green coloration it is often mistakenly so identified.]

5'(4). Ascospores unicellular, rarely 1-septate, hyaline, never brown, never constricted in the middle, spores irregularly biseriate..... 6

6 (5'). Apothecia distinctly hairy, ascus pore not blue in iodine..... *Haglundia* Nannf. [*H. perelegans* Nannf. is the type species. Due to its hymenial color and macroscopic characters it is easily mistaken for a species of the genus *Chlorosplenium*.]

6'(5'). Apothecia glabrous, ascus pore blue in iodone.. ..... *Chlorosplenium* Fr. emend. Dixon

7 (4'). Apothecia almost always provided with distinct and evident hairs at the margin or covering the excipulum; paraphyses filiform to lanceolate; ectal excipulum composed of brick-shaped cells (textura prismatica), rarely of globose cells or elongated hyphae; no gelatinized hyphae formed..... ..... HYALOSCYPHACEAE ..... ..... *Dasyscyphus* (Nees) ex Gray [If specimen keys here, cfr. *D. aeruginellus*, excluded species #2, *D. melatheja*, excluded species #21, and *D. sericeus* (and its probable synonym, *Dasyscyphella aeruginosa*), excluded species #34, all

under *Chlorosplenium*. The author has also seen an apparently undescribed species collected in Mexico (CUP-ME 127) that stains the petioles and mid-veins of a *Quercus* sp. green, and is clearly a *Dasyscyphus* species with lanceolate paraphyses.]

7'(4'). Apothecia not provided with distinct and evident hairs (except in *Chlorociboria*); paraphyses filiform; ectal excipulum composed of elongate hyphae or angular to globose cells; gelatinized hyphae often formed..... LEOTIACEAE ..... 8

8 (7'). Apothecia some shade of yellow to orange or orange-brown, never green..... 9

8'(7'). Apothecia some shade of green, never yellow to orange (disc may be yellow, but never the entire apothecium)..... 11

9 (8). Hyphae or cells of the outermost layer with thickened, glassy walls (at fullest development the walls become a refractive gel in which the hyphal lumina are embedded)..... 10

9'(8). Outermost layer of the excipulum not composed of undulating glassy-walled hyphae, but instead composed of hyaline, thin-walled textura prismatica to textura angularis; ascospores becoming brown and 1- to 3-septate at maturity..... ..... *Phaeohelotium* Kanouse
[This genus is included in the key since *P. monticola* (Berk.) Dennis (= *P. flavum* Kanouse) may easily be mistaken in the field for a member of the genus *Chlorosplenium*.]

10 (9). Apothecia turbinate to substipitate, rarely stipitate, some shade of yellow to orange; outermost layer of the excipulum of undulating, glassy hyphae, the individual hyphae often difficult to follow; ascospores frequently 1-septate..... *Bisporella* Sacc.
[= *Calycella* (Boud.) Boud. sensu auct.]
[This genus is included in the key since *B. citrina* (Batsch per Fr.) Korf & Carp., a worldwide and very common species, is easily confused in the field with *Chlorosplenium chlora* or with *Phaeohelotium monticola;* see Korf and Carpenter (1974).]

10'(9). Apothecia stipitate, of various colors but rarely yellow; outermost layer of the excipulum of glassy, parallel, agglutinated hyphae forming a tough "skin" in squash mounts, the tissue strongly differentiated from the thin-walled

hyphae of the medullary excipulum; ascospores usually unicellular, rarely 1- to 3-septate; in some species the excipulum is prolonged at the margin to form long or short teeth..... ..... *Cyathicula* de Not. [If specimen keys here, cfr. *Cyathicula fuegiana* and *C. strobilina* (excluded species #19 and #9b under *Chlorosplenium*).]

11 (8'). Apothecia intensely green (viridescent to aeruginous) to olivaceous-green when fresh, drying to dark greenish-black, never brown or olivaceous-brown..... 12

11'(8'). Apothecia brown to olivaceous-brown when fresh (or if olivaceous green, then with the hyphae of the medullary tissues strongly granulated), drying dark brown to black..... 14

12 (11). Apothecia intensely green to olivaceous-green or nearly black; hyphae of the medullary and ectal excipulum embedded in a gel..... ..... *Claussenomyces* Kirschst. [This genus is usually called *Corynella*, an invalid name. The genus is in need of monographic work and due to the green coloration of several species and the ability of some species to stain wood green in very localized patches, specimens are often mistaken for members of the genus *Chlorociboria*. If specimen keys here, cfr. *Claussenomyces atrovirens* and *C. salviicolor*, excluded species #6 and #32 under *Chlorosplenium*.]

12'(11). Apothecia yellow-green to blackish green or aeruginous, hyphae of the medullary and ectal excipulum gelatinized but *not* embedded in a gel..... 13

13 (12'). Apothecia on foliage of conifers; never imparting a green stain to the substrate..... ..... *Chloroscypha* Seaver [If specimen keys here, cfr. *C. chromomela*, excluded species #12 under *Chlorosplenium*.]

13'(12'). Apothecia on decayed wood, never on foliage of conifers, always imparting a green stain to the substrate..... *Chlorociboria* Seaver emend. Dixon

14 (11'). Apothecia containing large (ca. 30 µm broad) vesicular cells filled with greenish-brown sap, ascospores eventually pale brown..... ..... *Velutarina* Korf [If specimen keys here, cfr. *V. rufo-olivacea*

(Alb. & Schw. per Fr.) Korf (*Lachnella aeruginosa* Sacc. & Speg. is a synonym based upon my study of the type specimen.)]

14'(11'). Apothecia not containing vesicular cells filled with greenish-brown sap, ascospores always hyaline..... 15

15 (14'). Ascospores filiform-clavate; paraphyses forming an obvious epithecium..... *Holwaya* Sacc. [Due to the green coloration and general morphology of some species of this genus, specimens are often mistaken for members of *Chlorencoelia*. If specimen keys here, cfr. *H. mucida* (Schulzer) Korf & Abawi (1971).]

15'(14'). Ascospores irregularly ellipsoid to allantoid, epithecium not present..... 16

16 (15'). Apothecia giving an ionomidotic reaction in KOH, ascus pore not blue in iodine..... ..... *Cordierites* Mont. [Some species of this genus are easily mistaken for species of *Chlorencoelia* due to the coloration of their apothecia and an ectal excipulum composed of angular cells usually retaining some hyphal orientation perpendicular to the outer surface. If specimen keys here, cfr. *Chlorosplenium atroviride*, excluded species #7 under *Chlorosplenium*.]

16'(15'). Apothecia not giving an ionomidotic reaction in KOH, ascus pore always blue in iodine..... ..... *Chlorencoelia* Dixon

## *HISTORY AND NOMENCLATURAL STATUS OF THE GENERIC NAMES CHLOROSPLENIUM FRIES AND CHLOROCIBORIA SEAVER*

The genus *Chlorosplenium* was erected by Fries (1849) with the generic diagnosis: "Discus ex ascis dehiscentibus sporas effudentibus viridi-pulverulentus; reliqua prior." The circumscription of the genus included three species: *Peziza chlora* Schw. (gratuitously renamed by Fries as *Chlorosplenium schweinitzii*), *P. chlorascens* Schw. (renamed by Fries as *C. repandum*), and *P. torta* Schw. (renamed by Fries as *C. subtortum*).

The genus was considered by later authors, i.e., de Notaris (1864), Nylander (1869), Ellis and Everhart (1893, 1895), Cooke (1892), etc. to be characterized predominantly

by the green coloration of the apothecia. On this basis de Notaris (1864) added to the genus *Peziza versiformis* Pers. and *P. aeruginosa* Pers., clearly stating: "Non ho esemplari di *Peziza chlora, chlorascens,* e *subtorta* Schweinz., dalle quali ebbe origine questo genere." It should be noted that both of these species were known to Fries, and he considered them (Fries, 1849) to be members of the genus *Helotium* and not congeneric with his genus *Chlorosplenium.* Clements and Shear (1931) designated *C. aeruginosum* (Oeder) Fr. as the type of the genus, but as Seaver (1936) pointed out, "so far as we know, Fries never treated this species as a *Chlorosplenium.*" Seaver also held that the species added by de Notaris in 1864 were in fact not congeneric with the type species of *Chlorosplenium, P. chlora,* and should be transferred to another genus. Seaver erected the genus *Chlorociboria,* feeling as Nannfeldt (1932) did that these species were more closely related to the genus *Ciboria.*

When Seaver (1936) erected the genus *Chlorociboria,* however, he failed to provide a Latin diagnosis, required for valid publication of new names after 1 Jan. 1935. Hence, while the genus was accepted by Kobayasi (1937, 1939), White (1941), Kanouse (1947), Buchwald (1949) and Dennis (1956), the genus itself and the combinations made in it by Kanouse and Dennis were not validly published according to the International Code of Botanical Nomenclature (Stafleu, 1972: Arts. 36, 43). This was pointed out by Ramamurthi, Korf and Batra (1958), and since they felt that the genus had taxonomic integrity, they supplied the Latin diagnosis and re-made the combinations in the names of the various authors who had first proposed them. In their circumscription, emended from that of Seaver (1936, 1951), they included *Peziza bulgarioides* Rabenh. [as had Seaver (1951), who had called it *Chlorociboria strobilina* (Alb. & Schw.) Seaver]. Svrček (October, 1957), some six months prior to the actual date of issue (March 28, 1958) for the Ramamurthi, Korf and Batra paper in Mycologia, published a new monotypic genus, *Piceomphale,* based upon *Peziza bulgarioides.* According to the present International Code of Botanical Nomenclature (Stafleu, 1972: Art. 63) the name *Chlorociboria* Seaver ex Ramam., *et al.* becomes *superfluous,* and the name is thus "illegitimate and must be rejected." Technically the name cannot be taken up again even if one excludes *P. bulgarioides* and considers only those species which are in an unquestionable congeneric relationship with the type, *Helvella aeruginosa* Oed. [designated by both Seaver (1936) and Ramamurthi, Korf and Batra (1958)]. Later, Korf (1959a, 1959b) abandoned the name *Chlorociboria,* having concluded that the

differences in tissue structure between the type species of *Chlorosplenium*, *C. chlora*, and the other species he and his students (Ramamurthi, Korf and Batra, 1958) had treated in *Chlorociboria* were not as taxonomically significant as they had first believed. He was followed in this decision by Dennis (1960, 1961, 1963, 1968, 1970, 1972).

Korf (1970) wrote: "The whole problem of superfluous names, and in particular of Article 63, has been submitted to committees of the International Botanical Congresses, who reported in 1964 at Edinburgh and in 1969 at Seattle. The problems remain unresolved, with final decisions now delayed until the next (Leningrad) Congress. Though the committee members appear to disagree on nearly all substantive issues, they show remarkable unanimity in agreeing the Article as written is wrong, and must be changed."

During the course of this study, Dr. Korf has again examined the problem of the status of *Chlorociboria* Seaver and is in agreement with my taxonomic conclusions that the genus *Chlorociboria* as I have emended it does have integrity. We feel that since the type of the genus *Chlorociboria* was clearly indicated by both Seaver (1936) and Ramamurthi, Korf and Batra (1958), that the name should be adopted for this circumscription. We also believe that Article 63 is destined to be changed, at least as it applies to fungal nomenclature, judging by the discussions in the nomenclature sessions at the First International Mycological Congress in Exeter, 1971. To be forced into the position of now burdening the literature with an added generic name when one is available but unusable due to its being superfluous *as now defined* seems an untenable position. Such a new name would itself become superfluous when the definition is changed. Hence, I propose to use the name *Chlorosplenium* Fr. for *C. chlora* and its allies and to use *Chlorociboria* Seaver ex Ramam., Korf & Batra for the aeruginous colored and wood-staining *C. aeruginosa* and its allies.

## *TAXONOMIC CONSIDERATIONS*

Attempts to define and delimit generic, specific, and infraspecific categories in the Inoperculate Discomycetes had been predominantly on the basis of similarities in gross morphology and characters of asci, ascospores, and paraphyses until Starbäck (1895) pointed out the importance of microanatomical characters of the apothecium in delimiting categories in this group. The use of these characters was re-emphasized by Nannfeldt (1932) in his "Studien über die

Morphologie und Systematik der nicht-lichenisierten inoperculaten Discomyceten."

In this study careful consideration has been given to the microanatomical features exhibited by the various collections in reaching descision on generic, specific, and infraspecific circumscriptions. In delimiting species in the genus *Chlorociboria*, Ramamurthi, Korf and Batra (1958) pointed out the importance of using the characters exhibited by the tomentum hyphae, and these characters have been utilized in this study in defining species within this genus.

I have attempted to delimit genera and species on the basis of my experience with character variation in those Inoperculate Discomycetes known to me. It is hoped that this use of microanatomical features of the apothecium has made possible the disposition of species and genera on a more natural basis. In most species treated in this monograph, it has not been necessary to recognize infraspecific categories. *Chlorosplenium brasiliense* is, however, in all respects similar to *Chlorociboria aeruginascens* subsp. *aeruginascens* except that it has smaller asci and ascospores; because it is geographically discontinuous, it is treated here at the subspecific rank.

Phylogenetic implications are essentially impossible to draw in this group of fungi. Attempts at such phylogenetic ranking have not been made, and genera and species are presented in the order in which they appear in the keys. The three accepted genera are assigned positions within tribes of the family Dermateaceae and the family Leotiaceae (= Helotiaceae).

## *THE GENUS CHLOROSPLENIUM FR. emend. DIXON*

The genus *Chlorosplenium* when erected by Fries (1849) was treated as a member of his "Series II" *Lachnea* and "Tribus" *Fibrina*. He was followed in this decision by Berkeley and Curtis (1869) and Berkeley (1875). With the addition of *C. aeruginosum* and *C. versiforme* by de Notaris (1864) the genus has almost exclusively been treated as a member of the Leotiaceae (= Helotiaceae) by later workers.

Cooke and Peck (1872) were evidently the first to note the similarities of *Peziza chlora* to *Mollisia*, when they referred to a Berkeley species as *"Peziza (Mollisia) crocitincta;"* that species is a synonym of *P. chlora*. Nannfeldt (1932) also questioned whether *C. chlora* should be considered congeneric with such species as *P. aeruginosa*, *P. aeruginascens*, and *P. versiformis*, which he felt were closer to

*Ciboria;* he pointed out a few differences in tissue structure, especially the fact that, "Der basale Teil der Apothecien baut sich nach aussen aus einem dichten Gewebe ungefähr isodiametrischer Zellen mit dunkel graubraunen Wänden auf,..." However, Nannfeldt did not give an opinion as to the taxonomic position of *Chlorosplenium* as typified by *C. chlora.*

My studies have shown that the members of this genus *(sensu meo)* are sessile, cupulate, fleshy, have an ectal excipulum composed of dark-walled textura globulosa in mature specimens, and produce from the ectal excipulum dark-walled, septate, basal hyphae similar to those found in the Mollisioideae. Hence, I conclude on the basis of these characters and an examination of species now treated in the Dermateaceae that this genus should be considered as a member of the family Dermateaceae, subfamily Mollisioideae, and tribe Mollisieae.

## *GENERIC DIAGNOSIS OF THE GENUS CHLOROSPLENIUM FR. emend. (HELOTIALES, DERMATEACEAE)*

CHLOROSPLENIUM Fr., Summa Veg. Scand. p. 356. 1849, emend. Dixon

≡ *Chrysosplenium* Fr. in Allescher, Ber. Bot. Vereines Landshut 15: 82. 1898. (Lapsus calami)

*NAME:* from Greek, "Chloris," the green one, and the Latin, "splenium," spleenwort; referring to the green coloration and the shape of the apothecium.

*LECTOTYPE:* *Peziza chlora* Schw., selected by Nannfeldt (1932 ut Pseudotypus) and by Seaver (1951).

*Apothecia:* < 3 mm in diam., sessile to sub-sessile.

*Disc:* cupulate to convex-expanded, varying widely in coloration from light yellow to yellowish green or grey-green.

*Receptacle:* glabrous, concolorous with disc to olive-brown to brownish-grey-black in fully mature specimens.

*Asci:* 8-spored, cylindric-clavate, J+, arising from repeating croziers.

*Ascospores:* fusiform to fusiform-elliptic, hyaline.

*Paraphyses:* hyaline, branching near the base, septate.

*Medullary Excipulum:* composed of hyaline to light brown, thin-walled, loose textura intricata.

*Ectal excipulum:* hyaline to dark brown-walled textura angularis to textura globulosa, giving rise at points to hyaline to dark brown-walled hyphae running parallel to the outer surface of the apothecium.

*Habitat:* on decorticated wood.

### *KEY TO THE SPECIES OF CHLOROSPLENIUM*

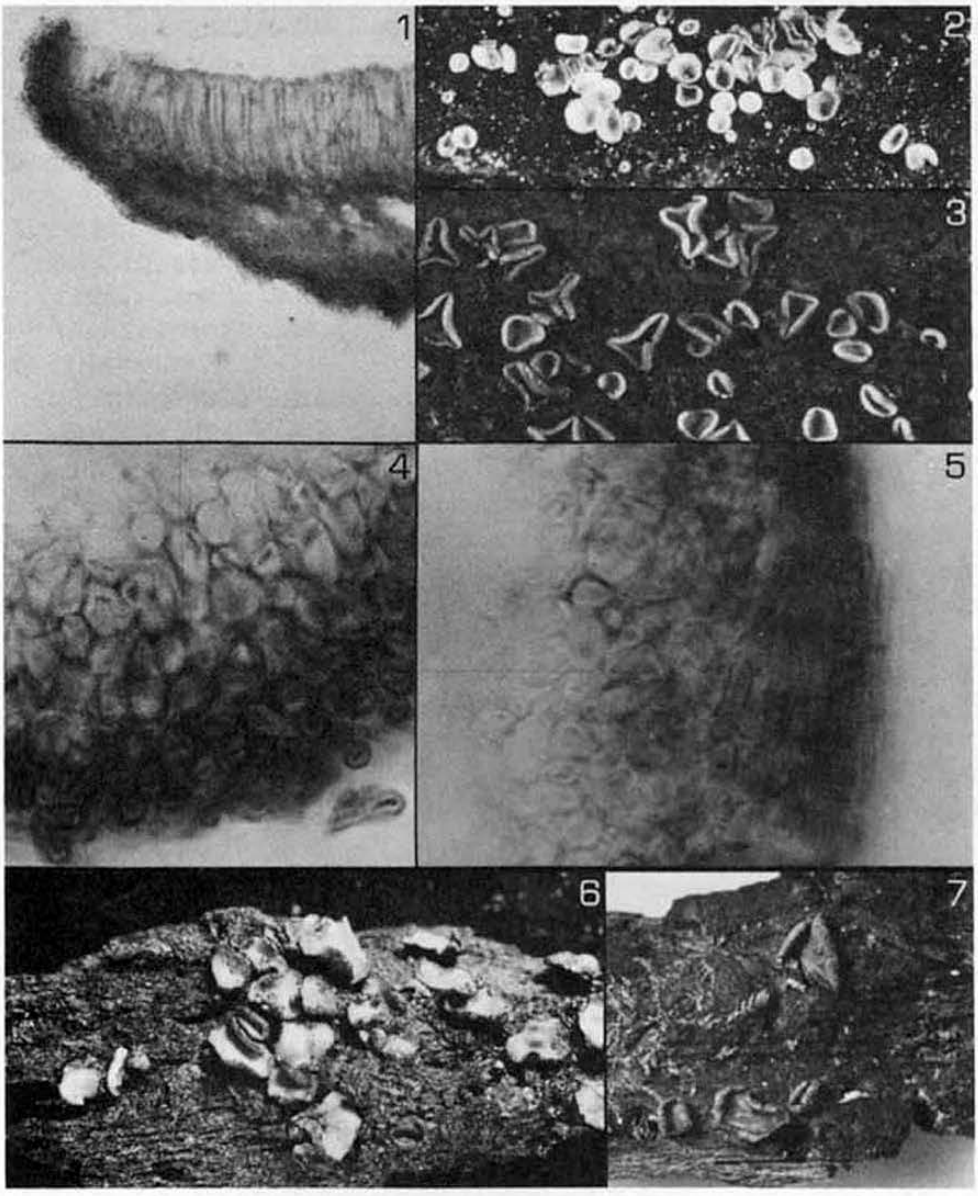
1. Ascospores (5-) 6-7 (-9) × 1.2-2 (-3) µm; asci (40-) 45-55 (-60) × (4-) 5-6 (-7) µm; hymenium and medullary tissues *not* separating easily from receptacle tissue in old and dried specimens..... 1. *C. chlora*

1'. Ascospores (8-) 9-14 (-15) × 2-4 µm; asci 70-95 × (5-) 6-8 (-9) µm; hymenium and medullary tissues easily separating from receptacle tissue in old and dried specimens..... 2. *C. hypochlora*

1. CHLOROSPLENIUM CHLORA (Schw. : Fr.) Curtis in Sprague, Proc. Boston Soc. Nat. Hist. 5: 330. 1856.
≡ *Peziza chlora* Schw., Schr. Naturf. Ges. Leipzig 1: 122. 1822 (!!), : Fries, Syst. Mycol. 2(1): 115. 1822.
≡ *Chlorosplenium schweinitzii* Fr., Summa Veg. Scand. p. 356 (in nota). 1849.
≡ *Helotium chlora* (Schw. : Fr.) Morgan, J. Mycol. 8: 184. 1902.
= *Peziza chlorascens* Schw., Trans. Amer. Philos. Soc. 4: 175. 1832 (!!).
≡ *Chlorosplenium repandum* Fr., Summa Veg. Scand. p. 356 (in nota). 1849.
≡ *Lachnella chlorascens* (Schw.) Morgan, J. Mycol. 8: 187. 1902.
= *Peziza crocitincta* Berk. & Curt., Grevillea 1: 6. 1872 (!!).
≡ *Pezizella crocitincta* (Berk. & Curt.) Sacc., Syll. Fung. 8: 286. 1889.
= *Chlorosplenium olivaceum* Seaver, N. Amer. Cup-Fungi (Inopercul.) p. 105. 1951 (!!) (non *C. olivaceum* Rick, Brotéria, Sér. Bot. 25: 98. 1931).

*(Figs. 1-5, 8)*

*Apothecia:* superficial, solitary to gregarious to caespitose, sessile to sub-sessile, circular to laterally compressed, at first globose and closed, expanding and be-




FIGS. 1-7. Photographs of *Chlorosplenium* spp. FIGS. 1-5. *C. chlora*. 1. Portion of a section of an apothecium, CUP 51658, × 575. 2. Freshly collected apothecia, CUP 51667, approx. × 1.5. 3. Apothecia after drying, CUP 51667, approx. × 3. 4. Section of part of ectal excipulum, CUP 51658, × 2100. 5. Section of part of ectal excipulum and external hyphae parallel to the flank of the apothecium, CUP 51658, × 2100. FIGS. 6-7. *C. hypochlora*, CUP 52724. 6. Rehydrated apothecia, approx. × 4. 7. Dried apothecia, approx. × 4.

coming cupulate to almost discoid, margins more or less persistently incurved, when dry margins enrolling to the point of often touching.

*Disc:* < 2 × 3 mm in diam., cupulate to convex-expanded, color varying widely from yellow through shades of olive-green, color often bleaching so disc appears whitish or cream-yellow, becoming black with age.

*Receptacle:* glabrous, yellow to olivaceous green to dark brown toward the base, often becoming ochraceous upon drying, especially on the flanks of the apothecium, lower portion often vertically ribbed or furrowed, especially upon drying.

*Hymenium:* 35-65 µm high, hyaline.

*Asci:* cylindric-clavate, tapering to a short stalk, (40-) 45-55 (-60) × (4-) 5-6 (-7) µm (mean of collections 50 × 5 µm), J+, 8-spored, apex rounded to sub-conic, wall at apex 0.5-1.0 µm thick, wall 0.25-0.5 µm thick along the sides of the ascus, maturing successively, arising from repeating croziers.

*Ascospores:* irregularly biseriate, fusiform-elliptic, hyaline, unicellular, biguttulate, smooth-walled, (5-) 6-7 (-9) × 1.5-2 (-3) µm (mean of collections 6.5 × 2.0 µm).

*Paraphyses:* filiform, hyaline, septate, blunt at the apex, branching near the base, 1.5-2 µm in diam., scarcely extending beyond asci.

*Subhymenium:* (5-) 10-20 (-40) µm thick, of hyaline to dark, thin-walled, tightly compacted textura intricata, hyphae 1-3 µm in diam.

*Medullary Excipulum:* of hyaline to light brown, thin-walled, loose textura intricata, hyphae 3-4 µm in diam.

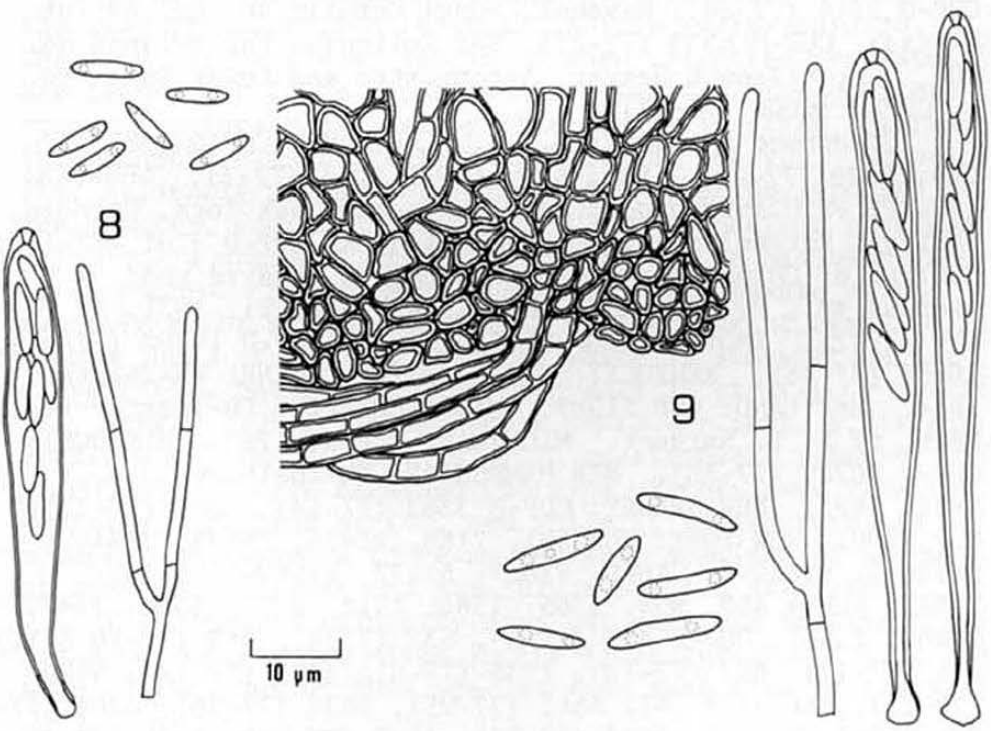
*Ectal Excipulum:* 25-105 µm thick, of one or two layers, innermost layer 20-40 µm thick, of thin-walled textura angularis, cells large, 3-10 × 5-18 µm, with light brown walls, often interspersed with small pockets of textura intricata with light brown walls; outer layer 10-40 µm thick, of dark, thick-walled textura angularis to textura globulosa, cells 3-10 × 3-7 µm, walls 0.25-1 µm thick, giving rise to hyaline to dark-walled hyphae running parallel to the outer surface of the apothecium (often numerous at the base of the apothecium) and here and there forming what appears to be an outer layer < 30 µm thick.

*Cultural Characters:* Very slow growing on potato dextrose agar (PDA), producing a greyish-black humped-up colony with tints of yellow. No conidia produced. Agar appearing black when viewed from underside. Hyphae 2-3 µm in diam., septate, branched, thick-walled, with hyaline to dark brown to brownish-black walls and contents. Colony very hard to

the touch, and often producing "stroma-like growths" which have a cortex of dark-walled textura globulosa and a medulla of hyaline to light brown-walled, loose textura intricata. Colonies also produce "synnema-like projections" which when squashed are seen to be formed of thick, dark-walled hyphae oriented parallel to each other. Culture on deposit with American Type Culture Collection as ATCC 24030 (= culture from Mary Elliott, Canada Dept. of Agriculture, Ottawa, Canada).

*Habitat:* on decorticated and decayed wood, collected on *Castanea, Quercus, Castanopsis, Abies, Tsuga,* and unidentified wood.

*Range and Seasons of Fructification:* North America, Australia, Indonesia, Japan, Jamaica, Union of Soviet Soci-




FIGS. 8-9. Camera lucida drawings of *Chlorosplenium* spp., × 1000. FIG. 8. *Chlorosplenium chlora.* Ascus, paraphysis, and six ascospores, CUP 51656. FIG. 9. *C. hypochlora.* Portion of ectal excipulum and hyphae parallel to the flank of the apothecium, paraphysis, two asci, and six ascospores, CUP 52724.

alist Republics; Spring, Summer, Autumn, and Winter (most collections from Spring to Autumn).

*Name:* from Greek, "Chloris," the green one; referring to the yellowish green nature of the apothecium.

*Type Locality:* Bethlehem, Pennsylvania.

*Presumed Type Specimen:* (substrate unknown), (locality unknown, ? Bethlehem, Pennsylvania), Schweinitz, (date unknown), PH-Schweinitz Syn. N. A. No. 872 (=CUP 51664); Isotype, CUP-D 3882 (77-17).

*Illustrations:* Cooke and Peck, Grevillea 1: pl. 1, fig. 5. 1872 [ut *Peziza (Mollisia) crocitincta*]; Dennis, Kew Bull. 13: 341. 1958; Korf, Bull. Natl. Sci. Mus. 4: 394. 1959.

*Exsiccati:* Ellis & Everhart, Fungi Columbiani No. 249 (ut *Chlorosplenium schweinitzii*), CUP-D 10291 (77-40), FH; Ellis & Everhart, North American Fungi No. 664 (ut *Peziza*), CUP-D 9244 (77-36); Ravenel, Fungi Caroliniani No. 39 (ut *Peziza*), CUP-D 6333 (77-27), FH; Reliquiae Farlowianae No. 107, CUP; Wilson & Seaver, Ascomycetes and Lower Fungi No. 1, CUP-D 10006 (77-37).

*Specimens Examined:* U.S.A. - ALABAMA: CUP-D 4087 (77-20), 5020 (77-21). DELAWARE: CUP-D 8046 (77-3). GEORGIA: ISOTYPE of *Peziza crocitincta*, on rotten oak logs, Catoosa Springs, Ravenel No. 1730, (no date), K, CUP-D 3761 (77-16); ISOTYPE of *Chlorosplenium olivaceum*, on decayed wood of *Quercus* sp., Princeton, J. H. Miller, Feb. 21, 1931, NY (= CUP 51722). INDIANA: CUP 51660, 51661, CUP-D 10593 (77-41), 10956 (77-48). KENTUCKY: R.P.K. 3276. MAINE: FH-Thaxter 3684. MARYLAND: CUP 51583. MASSACHUSETTS: FH-Thaxter s.n., Herb. of F. L. Sargent. MICHIGAN: R.P.K. 1288. MISSOURI: CUP-D 10280 (77-38). NEW HAMPSHIRE: FH-Thalhurve s.n., Sept. 1893. NEW JERSEY: CUP-D 3362 (77-14), 8047 (77-32), CUP 7200. NEW YORK: CUP 581, 2188, 21835, 25692, 28344, 51656-9, 51662-3, 51665, 51667, 51672, 51680-1, 51795, 51827, CUP-A 469, 994, 1365, 1386, 1818, 5271, 5556, 7467, 14868, 15547, CUP-D 453 (77-3), 532 (77-4), 568 (77-10 & 11), 651 (77-12), 692 (77-13), 1035 (77-8), 4071 (77-18), 5659 (77-23), 5660 (77-24), 5661 (77-25), 5684 (77-26), 6965 (77-28), 8049 (77-34), 9093 (77-35), 4522 (77-46), 4523 (77-47), R.P.K. 1693, 2737, 58-65, 58-69. NORTH CAROLINA: CUP 51666, CUP-A 12160, 12162, CUP-D 12160 (77-5), 12162 (77-7). OHIO: CUP-D 8048 (77-33), 10414 (77-39), 10748 (77-44), NY-Cooke 42094, R.P.K. 3968. PENNSYLVANIA: HOLOTYPE of *Peziza chlorascens*, (substrate unknown), Bethlehem, Schweinitz, (no date), PH-Schweinitz Syn. Fung. N. A. 873-130 (= CUP 51669), ISOTYPES, CUP-D 3883 (77-45), 9244 (77-36); CUP 51702, 51704, CUP-A 644. SOUTH CAROLINA: CUP-D 3364 (77-15), UPS-

Fries s.n., (substrate unknown), N. Am. South Carolina, (collector unknown), (date unknown), ut *Chlorosplenium schweinitzii* (=CUP 51736). VERMONT: FH-Linder 538. VIRGINIA: CUP 51703, 51783, CUP-D 5247 (77-22). WEST VIRGINIA: CUP-D 8405 (77-30). WISCONSIN: CUP-D 10721 (77-42), 10726 (77-43), R.P.K. 2781.

CANADA - ONTARIO: R.P.K. 2432, 2447, 3931.

INDONESIA - JAVA: R.P.K.(CUP-SA) 287, 345, 346.

JAMAICA: CUP-D 8044 (77-29).

JAPAN - HONSHU: CUP-JA 182, 185, 192, 224, 1677, 1874, 1875, 2671, 2810, 2958, 2963, 2973. KYUSHU: CUP-JA 423. OKINAWA: CUP-JA 3396, 3431. YAKU ISLAND: CUP-JA 1923, 2093, 2104, 2110.

UNION OF SOVIET SOCIALIST REPUBLICS - RUSSIA: TAA-Parmasto 15471 (=R.P.K. 3334).

*Notes:* This species is extremely variable and due to the span of coloration it exhibits from yellow through shades of olive-green, specimens when collected separately are likely not to be considered conspecific. The complete range of colors exhibited by this fungus is often observed in apothecia within the same collection, however. Schweinitz, evidently unaware of this color variation, erected a new species, *Peziza chlorascens*, to accommodate a specimen which had a somewhat different color than he had observed in *P. chlora*. Seaver must also have been unaware of the range in color since examination of the type of his *C. olivaceum* shows it to be a specimen which is somewhat darker olive-green, but in all other respects is clearly *C. chlora*.

Seaver (1951) listed *Peziza pomicolor* Berk. & Rav. in Berk., Grevillea 3: 157. 1875, in questionable synonymy with *C. chlora*. I have examined the type of this name from the Berkeley Herbarium at Kew, and while it is immature, it is erumpent and appears to be an immature specimen of a member of the Peziculoideae and possibly a species of *Pezicula*.

This species evidently does not occur in western Europe since no reports are cited in the literature and I have not seen collections of this species from that area of the world.

2. Chlorosplenium hypochlora (Berk. & Curt. ex Phill.) Dixon, *comb. nov.*

≡ *Encoelia hypochlora* Berk. & Curt. ex Phill., Grevillea 19: 107. 1891 (!!).

≡ *Cenangium hypochlorum* (Berk. & Curt. ex Phill.) Sacc., Syll. Fung. 10: 36. 1892.

*(Figs. 6-7, 9)*

*Apothecia:* superficial, solitary to gregarious to caespitose, sessile, circular to laterally compressed, at first globose and closed, expanding and becoming cupulate to almost discoid, margins more or less persistently incurved, when dry margins enrolling to the point of often touching.

*Disc:* < 2 mm in diam., cupulate to convex-expanded, color orange-yellow (Wax Yellow) when rehydrated, drying to a lighter yellow (Mustard Yellow), the disc and medullary tissues separating easily and often completely when old and dry, leaving only the receptacle.

*Receptacle:* glabrous, ochraceous-brown to olive-brown (Brownish Olive) when rehydrated, drying to brownish grey-black (Blackish Grey), lower portion often vertically ribbed or furrowed, especially upon drying.

*Hymenium:* 75-100 µm high, hyaline.

*Asci:* cylindric-clavate, tapering to a short stalk, 70-95 × (5-) 6-8 (-9) µm, J+, 8-spored, apex rounded to subconic, wall at apex 0.5-1.0 µm thick, wall 0.25-0.5 µm thick along the sides of the ascus, maturing successively, arising from repeating croziers.

*Ascospores:* irregularly biseriate, fusiform-elliptic, hyaline, unicellular, biguttulate, occasionally triguttulate, smooth-walled, (8-) 9-14 (-15) × 2-4 µm.

*Paraphyses:* filiform, hyaline, blunt at the apex, septate, branching near the base, 2-3 µm in diam., scarcely extending beyond asci.

*Subhymenium:* 10-20 µm thick, of thin-walled, septate, hyaline to light brown-walled, tight textura intricata, hyphae 1-3 µm in diam.

*Medullary Excipulum:* of hyaline, thin-walled, loose textura intricata, hyphae 2-3 µm in diam.

*Ectal Excipulum:* 30-80 µm thick, of dark brown, thick-walled textura angularis to textura globulosa, cells 3-10 × 3-7 µm, walls 0.25-1.0 µm thick, ectal tissue giving rise here and there to hyaline to dark brown, thick-walled hyphae running parallel to the outer surface of the apothecium.

*Habitat:* on decorticated wood.

*Range and Season of Fructification:* Cuba, Jamaica, and Mexico; Winter and Spring.

*Name:* from Greek, "Hypo," beneath, and "Chloris," the green one; referring to the apothecial color.

*Type Locality:* Lomo del Gaso, Cuba.

*Type Specimen:* Herb. Berkeley, *Peziza hypochlora* B. C., Cuba, C. Wright, (no date), annotated as Type Number 358, *Encoelia hypochlora* Phillips, K-Berkeley. ISOTYPE specimen: Wright 358, *Peziza hypochlora* Berk. & Curt., dead sticks, Fungi Cub. 690, Feb. 1857, FH (=CUP 52798). ISOTYPE speci-

men: C. Wright No. 358, *Peziza chlorascens* S., on dead sticks in thick woods, Lomo del Gaso, Fungi Cubenses Wrightiani 690, (no date), FH (=CUP 52725).

*Illustrations:* none.

*Exsiccati:* none.

*Specimens Examined:* CUBA: (substrate unknown), Cuba Orientali, C. Wright, 1856-7, Plantae Cubenses Wrightii s.n., FH (=CUP 52797) [perhaps also an isotype?].

JAMAICA: Korf, Dixon, et al., cut ends of slightly decayed log of *Eucalyptus*, Jan. 8, 1971, CUP-MJ 39; Korf, Dixon, et al., Jan. 17, 1971, CUP-MJ 582.

MEXICO: W.A. & Edna Murrill 422, 7000 ft., near Guernavaca, December 29, 1909, CUP 52724.

*Notes:* This species closely resembles *C. chlora* in the field, differing on drying and in ascus and spore characters.

## *EXCLUDED SPECIES AND SYNONYMS*

1. CHLOROSPLENIUM AERUGINASCENS (Nyl.) Karst. ≡ *Chlorociboria aeruginascens* (Nyl.) Kan. ex Ram., Korf & Bat., q.v.

2. CHLOROSPLENIUM AERUGINELLUM (Karst.) Karst., Bidrag Kännedom Finlands Natur Folk 19: 104. 1871.
   ≡ *Helotium aeruginellum* Karst., Not. Sällsk. Fauna Fl. Förh. 9: 329. 1868 (!!).
   ≡ *Peziza aeruginella* (Karst.) Nyl., Not. Sällsk. Fauna Fl. Fenn. Förh. 10: 40. 1869.
   ≡[*Chlorociboria aeruginella* (Karst.) Dennis, Mycol. Pap. 62: 48. 1956 (generic name not validly published).]
   ≡ *Chlorociboria aeruginella* (Karst.) Dennis ex Ram., Korf & Bat., Mycologia 49: 859. 1958.

*Notes:* Examination of specimens and the type of this species shows this fungus to have granulated tomentum hyphae plus an ectal excipulum composed of textura prismatica suggestive of the Hyaloscyphaceae. The correct name of this fungus should be D a s y s c y p h u s a e r u g i n e l l u s (Karst.) Korf & Dixon, *comb. nov.* It should be noted that the fungus is greenish in coloration and does stain the substrate green in localized areas.

*Specimens Examined:* ENGLAND: on *Filipendula ulmaria*, Sheepfort Farm, Malton, Yorkshire, W. G. Bramley, 5. 10. 1957, K (= CUP 52722); on *Spiraea ulmaria*, Poor's Marsh, Wheatfen Broad, Surlingham, Norfolk, E. A. Ellis, 5-10-1941, K (= R.P.K. 2937 = CUP 52721).

FINLAND: Holotype of *Helotium aeruginellum*, ad Spiraeam (= *Filipendula ulmaria*), Fennia, Tavastia australis, Tammela, Mustiala, P. A. Karsten, 14. X. 1867, H (= CUP 52633).

3. CHLOROSPLENIUM AERUGINEUM (Berk.) Sacc. = *Chlorociboria aeruginosa* (Pers. per Pers. : Fr.) Seaver ex Ram., Korf & Bat., q.v.

4a. CHLOROSPLENIUM AERUGINOSUM (Oed. per Purton) de Not. = *Chlorociboria aeruginascens* (Nyl.) Kan. ex Ram., Korf & Bat., q.v.

4b. CHLOROSPLENIUM AERUGINOSUM (Pers. per Pers. : Fr.) Auct. ≡ *Chlorociboria aeruginosa* (Pers. per Pers. : Fr.) Seaver ex Ram., Korf & Bat., q.v.

5. CHLOROSPLENIUM AMENTICOLUM Karst., Rev. Mycol. (Toulouse) 9: 11. 1887 (!!).
≡ *Ciboria amenticola* (Karst.) Boud., Hist. Class. Discom. d'Europe p. 106. 1907.
= *Peziza viridi-fusca* Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 309. 1870.
≡ *Phialea viridi-fusca* (Fckl.) Sacc., Syll. Fung. 8: 275. 1889.
≡ *Ciboria viridi-fusca* (Fckl.) v. Höhn., Mitt. Bot. Lab. TH Wien 3: 101. 1926.
= *Helotium amenti* (Batsch per Pers. : Fr.) f. *alni* Sacc., Michelia 2: 612. 1882 (!!).
= *Ombrophila baeumleri* Rehm (ut "Baümleri"), Ascom. Exs. No. 806. 1885; Hedwigia (ut "Bäumleri") 24: 228. 1885 (!!).
≡ *Helotium baeumleri* (Rehm) Syd., Mycotheca Marchica Exs. No. 4047. 1894.

*Notes:* Examination of Karsten's type specimen shows it to agree with specimens and the type of *Ombrophila baeumleri* Rehm. Dennis (1968) synonymizes this latter species with *Peziza viridi-fusca* Fckl., and although I have not examined the type of that species, I accept his synonymy, so that the correct name of the fungus would appear to be *Ciboria viridi-fusca* (Fckl.) v. Höhn.

*Specimens Examined:* FRANCE: Holotype of *Chlorosplenium amenticolum*, *Alnus glutinosus*, [prope Rouen], [Letendre], (date unknown), H-Karsten 898 (=CUP 52634); Holotype of *Helotium amenti* f. *alni*, *Alnus glutinosus*, [Rouen], [Letendre], (date unknown), PAD-Saccardo s.n. (=CUP 51742).

GERMANY: a faul. Fruchtzapfen v. *Alnus glut.*, gr. Winterberg, G. Wagner, Nov. 92, S; an den Fruchthallen von *Alnus glutinosa*, Lee bei Berlin, Sydow, 9. 1885, S; an *Alnus incana*, Berlin, Sydow, 10. 1893, S; Sydow, Mycotheca Marchica Exs. No. 972 (ut *Ombrophila baeumleri*), S; No. 1783 (ut *Helotium amenti*), S; No. 4047 (ut *Helotium baeumleri*), S, FH.

HUNGARY: Isotypes of *Ombrophila baeumleri*, an faulenden *Alnus*-Zapfen, bei Pressberg, Bäumler, M/1883/84, Rehm, Ascomyceten Exs. No. 806, S-Rehm (=CUP 51743), CUP-D 4935 (118-8).

6. [CHLOROSPLENIUM ATROVIRENS (Pers. per Pers. : Fr.) de Not. ex Karst. (ut "atro-virens"), Bidrag Kännedom Finlands Natur Folk 19: 93. 1871 (pro synon. sub *Ombrophila atrovirens* (Pers. per Pers. : Fr.) Karst.)]
≡[*Peziza atrovirens* Pers., Syn. Meth. Fung. p. 635. 1801.]
≡[*Ascobolus atrovirens* (Pers.) Nees, Das System der Pilze und Schwämme p. 269. 1816.]
≡ *Peziza atrovirens* Pers. per Pers. (ut "atro-virens"), Myc. Eur. 1: 306. 1822, : Fries, Syst. Mycol. 2(1): 141. 1822.
≡ *Calloria atrovirens* (Pers. per Pers. : Fr.) Fr., Summa Veg. Scand. p. 359. 1849.
≡ *Ombrophila atrovirens* (Pers. per Pers. : Fr.) Karst., Bidrag Kännedom Finlands Natur Folk 19: 92. 1871.
≡ *Mollisia atrovirens* (Pers. per Pers. : Fr.) Gill. (ut "atro-virens"), Champ. Fr. Disc. (Liv. 5), p. 126. 1882.
≡ *Tympanis atrovirens* (Pers. per Pers. : Fr.) Rehm, Hedwigia 20: 70. 1882.
≡ *Coryne atrovirens* (Pers. per Pers. : Fr.) Boud., Bull Soc. Mycol. France 1: 114. 1885.
≡ *Chlorospleniella atrovirens* (Pers. per Pers. : Fr.) Kuntze, Revis. Gen. Pl. 2: 848. 1891.
≡ *Corynella atrovirens* (Pers. per Pers. : Fr.) Boud., Hist. Class. Discom. d'Europe p. 99. 1907.
≡ *Claussenomyces atrovirens* (Pers. per Pers. : Fr.) Korf & Abawi, Canad. J. Bot. 49: 1882. 1971.
= *Coryne virescens* Tul. & Tul., Sel. Fung. Carpol. 3: 177. 1865.
≡[*Tremella virescens* Schum., Enum. Pl. Saell. 2: 439. 1803. (Stat. conid.)]
≡[*Dacrymyces virescens* (Schum.) per Fr., Syst. Mycol. 2(1): 229. 1822. (Stat. conid.)]
≡ *Chlorosplenium virescens* (Tul. & Tul.) Cooke, Bull. Buffalo Soc. Nat. Sci. 2: 299. 1875.

*Notes:* While I have not examined the type of this species, Korf and Abawi (1971) have recently treated it as a member of the genus *Claussenomyces*, and I accept their placement. Hence, the correct name of this fungus would appear to be *C. atrovirens* (Pers. per Pers. : Fr.) Korf & Abawi.

*Specimen Examined:* Petrak, Flora Bohemiae et Moraviae Exs. No. 234 (ut *Chlorosplenium aeruginosum*), BPI (=CUP 52707).

7. [CHLOROSPLENIUM ATROVIRIDE Bres. ex Rick (ut "atro-viride"), Ann. Mycol. 4: 311. 1906 (!!), nomen nudum.]
= *Bulgariella foliacea* Starb., Arch. Bot. (Leipzig) 2(5): 7. 1904.
≡ *Chlorosplenium foliaceum* (Starb.) Rick, Brotéria, Sér. Bot. 25: 98. 1931.

*Notes:* Examination of an "isotype" of Bresadola's *nomen nudum* shows it to have a strongly ionomidotic reaction in KOH, the pore to be J-, and the ectal excipulum to be that of a member of the Encoelioideae. It is surely a member of the genus *Cordierites* Mont. sensu Korf (1973). In 1931 Rick synonymized this *nomen nudum* with *Bulgariella foliacea*. I have not been able to locate the type of this latter species; its original description gives every indication of being a *Cordierites*, as do Starbäck's illustrations. Both the original description and the illustrations fit in many respects the "isotype" I have examined of *C. atroviride*. Transfer of Starbäck's epithet to *Cordierites* awaits monographic study of that genus.

*Specimens Examined:* BRASIL: "Isotype" of *Chlorosplenium atroviride*, Rick, Fungi Austro-Americani No. 64, in truncis socio *Hypoxlyo*, São Leopoldo, Rick, 1905, BPI (=CUP 51715); (substrate unknown), São Leopoldo, Brazil, Rick, 1929, BPI (=CUP 51717); Theissen, Decades Fungorum Brasiliensium No. 279, BPI (=CUP 51716); Torrend s.n., S. Leopoldo, Rick, 1908, CUP-D 9590 (76-80).

8. CHLOROSPLENIUM BRASILIENSE Berk. & Cooke ≡ *Chlorociboria aeruginascens* (Nyl.) Kan. ex Ram., Korf & Bat. subsp. *brasiliensis* (Berk. & Cooke) Dixon, q.v.

9. CHLOROSPLENIUM BULGARIOIDES (Rabenh.) Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 11: 233. 1870.
≡ *Peziza bulgarioides* Rabenh., Fungi Europaei Exs. No. 1008. 1866; Hedwigia 6: 45. 1867 (!!).
≡ *Rutstroemia bulgarioides* (Rabenh.) Karst., Bidrag

Kännedom Finlands Natur Folk 19: 105. 1871.
≡ *Humaria bulgarioides* (Rabenh.) Sacc., Syll. Fung. 8: 149. 1889.
≡ *Ciboria bulgarioides* (Rabenh.) Boud., Hist. Class. Discom. d'Europe p. 106. 1907.
≡ *Piceomphale bulgarioides* (Rabenh.) Svrček, Česká Mykol. 11: 240. 1957.
≡ *Chlorociboria bulgarioides* (Rabenh.) Ram., Korf & Bat., Mycologia 49: 860. 1958.
=[*Peziza abietis* ββ *strobilina* Alb. & Schw., Consp. Fung. p. 342. 1805.]
≡ [*Peziza strobilina* (Alb. & Schw.) DC., Fl. Fr. 6: 21. 1815.]
≡ *Cenangium ferruginosum* Fr. β *strobilina* (Alb. & Schw.) per Fr., Syst. Mycol. 2(1): 187. 1822.
≡ *Ciboria strobilina* (Alb. & Schw. per Fr.) Boud., Icon. Mycol. Explic. Planches, Sér. 4, p. 18. 1907, non *Ciboria strobilina* (Alb. & Schw.) Sacc. 1889.
≡ [*Chlorociboria strobilina* (Alb. & Schw. per Fr.) Seaver, Mycologia 28: 39. 1936 (genus not validly published).]
=[*Peziza versiformis* ββ *livida* Alb. & Schw., Consp. Fung. p. 314. 1805.]
≡[*Peziza versiformis* Pers. per Pers. var. β *livido-purpurascens* Pers., Myc. Eur. 1: 243. 1822 (gratuitous renaming).]
≡ *Peziza versiformis* Pers. per Pers. : Fr. var. β *livido-purpurascens* Pers. : Fr. (ut "A.S."), Syst. Mycol. 2(1): 131. 1822.
≡ *Helotium versiforme* (Pers. per Pers. : Fr.) Fr. var. *livido-purpurascens* (Pers. per Pers. : Fr.) Gill. (ut "A.S."), Champ. Fr., Disc. (Liv. 6) p. 158. 1883.
≡ *Chlorosplenium lividum* (Alb. & Schw.) per Karst., Acta Soc. Fauna Fl. Fenn. 2: 124. 1885.
≡ *Ciboria livida* (Alb. & Schw. per Karst.) Boud., Hist. Class. Discom. d'Europe p. 106. 1907.
≡ *Ombrophila livida* (Alb. & Schw. per Karst.) Lind, Danish Fung. p. 123. 1913.
= *Peziza versiformis* Pers. per Pers. : Fr. β *nigrescente-olivascens* Weinm., Hymeno. Gasterom. Imp. Ross. p. 467. 1836.
≡ *Chlorosplenium nigrescente-olivaceum* (Weinm.) Karst., Meddeland. Soc. Fauna Fl. Fenn. 9: 56. 1883.
= *Cenangium strobilinum* Sacc., Fungi ital. autogr. del., tab. 1306. 1883.
= *Ciboria strobilina* (Alb. & Schw. per Fr.) Boud. var. *bresadolae* Boud., Icon. Mycol. Explic. Planches, Sér 4, p.

18. 1907.

*Notes:* The nomenclature of this species is extremely confused in the literature due to the misapplication of the specific epithet "strobilina." There are at least three fungi that occur on the cones of *Picea* and while clearly distinct taxonomically, they have been confused nomenclaturally. This species is based on *Peziza bulgarioides* Rabenh., and seems to occur only on *Picea* cones. It appears to have been first described as a variety of *Peziza abietis* by Albertini and Schweinitz (1805), but was not raised to specific rank until 1907 by Boudier, long after Rabenhorst's establishment of *P. bulgarioides*. Karsten later (1871) made *P. bulgarioides* the first species in his genus *Rutstroemia*, and Honey (1928) typified *Rutstroemia* by this species. This fungus has asci (65-) 70-85 × 6.0-7.5 µm, ellipsoid spores 6-9 × 3-5 µm, and in section the apothecium has globose cells as the outermost layer of the ectal excipulum. Dr. Kent Dumont *(pers. comm.)* has found that this fungus has a stroma and should be included in the Sclerotiniaceae. The correct name for this species appears to be *Rutstroemia bulgarioides* (Rabenh.) Karst.

While I have not examined the type specimen of *Peziza versiformis* ββ *livida* Alb. & Schw., I follow Karsten (1869, 1885), Saccardo (1889), Rehm (1891), Lind (1913), and Seaver (1936, 1951) in placing this variety in synonymy with *P. bulgarioides*.

In 1805 Albertini and Schweinitz also established a second variety "strobilina," *Peziza tuberosa* ββ *strobilina*, and this fungus is synonymous with *Peziza rufo-fusca* Weberb. For synonymy, see excluded species #9a, below.

To add to the already very confused nomenclatural position of these two fungi, there is a third species which occurs on the cones of *Pinus* and *Picea* and is based on a Friesian species, *Peziza strobilina*. This species is clearly a *Cyathicula;* its synonymy is given under #9b, below.

*Specimens Examined:* U.S.A. - WASHINGTON: BPI-Cooke 26879.

CZECHOSLOVAKIA: Krypt. Exs. No. 204 (ut *Ombrophila strobilina*), CUP-D 4848 (118-47).

DENMARK: CP-Rostrup s.n., 25. 5. 1889.

FINLAND: in strobilis *Piceae excelsae*, 22. X. 1868, (collector and locality unknown) (ut *Chlorosplenium lividum*) (no apothecia found), H-Karsten 899; Karsten, Fungi Fenniae Exs. No. 631 (ut *Peziza bulgarioides*), FH; de Thümen, Mycotheca Universalis No. 1113 (ut *Chlorosplenium bulgarioides*), BPI.

GERMANY: Sydow, Mycotheca Germanica No. 332 (ut *Ombro-*

*phila strobilina*), CUP-D 9762 (118-50), BPI; FH-Plattner s. n., April 1899.

HUNGARY: Isotype of *Peziza bulgarioides*, Rabenhorst, Fungi Europaei No. 1008, strobilos *Pinorum*, Carpathis Hungariae, C. Kalchbrenner (no date), CUP; Rabenhorst, Fungi Europaei No. 1311 (ut *Peziza bulgarioides*), BPI; Linhart, Flora Hungarica Exs. No. 609 (ut *Ombrophila strobilina*), FH.

JAPAN - HOKKAIDO: CUP-JA 809, 882.

SWITZERLAND: Herbier Barbey-Boissier No. 1285 (ut *Coryne versiformis*), BPI, FH; de Thümen, Mycotheca Universalis No. 217 (ut *Helotium versiforme*) FH (=CUP 52693).

LOCALITY UNKNOWN: Rehm, Ascom. Exs. No. 1005 (ut *Ombrophila strobilina*), CUP-D 8536 (118-49); BPI-Sbarbaro 138.

9a. CIBORIA RUFO-FUSCA (Weberb.) Sacc., Syll. Fung. 8: 203. 1889.

≡ *Peziza rufo-fusca* Weberb., Pilze Nord-Deuts. 1: 7. 1873.

=[*Peziza tuberosa* Hedw. ββ *strobilina* Alb. & Schw., Consp. Fung. p. 313. 1805.]

≡ *Peziza tuberosa* Hedw. per Mérat : Fr. [var.] b. *strobilina* Alb. & Schw. per Fr., Syst. Mycol. 2(1): 58. 1822.

≡ *Phialea strobilina* (Alb. & Schw. per Fr.) Quél., Bull. Soc. Bot. France 25: 287. 1878, non *Phialea strobilina* (Fr.) Gill. 1881.

≡ *Ciboria strobilina* (Alb. & Schw. per Fr.) Sacc., Syll. Fung. 8: 203. 1889.

≡ *Ombrophila strobilina* (Alb. & Schw. per Fr.) Rehm, in Rabenhorst's Krypt-Fl. 1(3) (Lief. 35): 482. 1891, non *O. strobilina* (Fr.) Karst. 1871.

≡[*Chlorociboria strobilina* (Alb. & Schw. per Fr.) Seaver, Mycologia 28: 39. 1936 (genus not validly published, and the name misapplied).]

*Notes:* This fungus occurs on cones of *Picea*, *Abies*, and *Pseudotsuga*, has asci (55-) 65-85 (-95) × (4.5-) 5-6 (-7) µm, broadly ellipsoid spores 4-6 (-7) × 2-3.5 µm, is reddish brown in the fresh state (never green), and has an ectal excipulum of textura angularis to textura globulosa. I agree with Groves and Elliott (1969) that this is a *Ciboria* and the correct name appears to be *Ciboria rufo-fusca* (Weberb.) Sacc.

*Specimens Examined:* AUSTRIA: Rehm, Ascom. Exs. No. 1554 (ut *Ciboria rufo-fusca*), CUP-D 11893 (78-71).

GERMANY: Krieger, Fungi Saxonici No. 678 (ut *Ombrophila strobilina*), CUP.

JAPAN - HOKKAIDO: CUP-JA 864.

9b. PEZIZA STROBILINA Fr., Syst. Mycol. 2(1): 125. 1822.
≡ *Helotium strobilinum* (Fr.) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 313. 1870.
≡ *Ombrophila strobilina* (Fr.) Karst., Bidrag Kännedom Finlands Natur Folk 19: 92. 1871.
≡ *Phialea strobilina* (Fr.) Gill., Champ. Fr., Disc. (Liv. 4), p. 103. 1881, non *Phialea strobilina* (Alb. & Schw. per Fr.) Quél. 1878.
≡[*Phialea strobilina* (Fr.) Sacc. nec Gill., Syll. Fung. 8: 256. 1889 (attempted taxonomic correction).]
≡ *Phialea eustrobilina* Korf in Ram., Korf & Bat., Mycologia 49: 861. 1958.

*Notes:* While I have not examined the type of this species, the specimens I have seen occur on *Picea* and *Pinus*, have asci 45-55 × 4-5 µm, ellipsoid ascospores 8-10 (-12) × 1.5-2 µm, are brownish in the fresh state and have a cyathiculoid ectal excipulum. For an excellent description of this species see Dennis (1956). The fungus appears to be a member of the genus *Cyathicula* de Not. sensu Korf (1973). Hence, we propose the correct name of it to be Cyathicula strobilina (Fr.) Korf & Dixon, *comb. nov.*

*Specimens Examined:* FRANCE: Roumeguère, Fungi Gallici Exs. No. 2168 (ut *Ombrophila*), CUP-D 11463 (118-46).
GERMANY: Rehm, Ascom. Exs. No. 703 (ut *Ombrophila*), CUP-D 4963 (118-48).
NETHERLANDS: Rabenhorst, Fungi Europaei Exs. No. 624 (ut *Peziza*), CUP.
LOCALITY UNKNOWN: Rabenhorst, Fungi Europaei Exs. No. 222 (ut *Peziza*), CUP.

10. CHLOROSPLENIUM CAESIO-LUTEUM (Berk. & Br.) Dennis, Kew Bull. 17: 376. 1963.
≡ *Peziza caesio-lutea* Berk. & Br., J. Linn. Soc. Bot. 14: 106. 1873 (!!).
≡ *Trichopeziza caesio-lutea* (Berk. & Br.) Sacc., Syll. Fung. 8: 412. 1889.

*Notes:* Examination of the type of this species shows that it is closely related to *Lachnum viridulum* Massee & Morg. as concluded by Dennis (1963), to which reference is made under excluded species #41, below. The gelatinized ectal excipulum composed of textura prismatica and the presence of granular, roughened tomentum hyphae indicate that this species fits best in the Trichoscyphelloideae or Hyaloscyphoideae. I choose not to designate a generic position for it until further taxonomic work is completed.

*Specimen Examined:* CEYLON: Holotype of *Peziza caesio-*

*lutea*, (substrate unknown), Central Province, Thwaites 1053, Dec. 1868, K-Berkeley (=CUP 51756).

11. CHLOROSPLENIUM CANADENSE Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 41: 146. 1893 (!!).
= *Holwaya mucida* (Schulzer) Korf & Abawi, Canad. J. Bot. 49: 1880. 1971.

*Notes:* Korf & Abawi (1971) have recently treated this species as a synonym of *Holwaya mucida*. I agree after examination of an isotype specimen and other collections.

*Specimens Examined:* CANADA - ONTARIO: Isotypes of *C. canadense*, on bark of *Tilia*, London, Canada, Dearness 2032, Oct. 3, '92, CUP-D 4521 (109-188), 2063 (109-182); CUP-D 2064 (109-183), 2065 (109-184), 4524 (109-189).
U.S.A. - OHIO: Ellis & Everhart, Fungi Columbiani No. 1216 (ut *Dacryopsis ellisiana*), CUP.

12. CHLOROSPLENIUM CHLOROMELUM (Phill. & Hark.) Sacc., Syll. Fung. 8: 319. 1889.
≡ *Peziza chloromela* Phill. & Hark., Grevillea 13: 22. 1884 (!!).
≡ *Chloroscypha chloromela* (Phill. & Hark.) Seaver, Mycologia 23: 250. 1931.
≡ *Kriegeria chloromela* (Phill. & Hark.) Seaver, Mycologia 35: 493. 1943.

*Notes:* Examination of an isotype specimen shows clearly that Seaver (1931) was correct in considering this species as a member of the genus *Chloroscypha*.

*Specimen Examined:* CALIFORNIA: Isotype of *Peziza chloromela*, *Sequoia sempervirens*, Harkness 1951, (date unknown), CUP-D 3764 (77-49).

13. CHLOROSPLENIUM CHRYSOTRICHUM (Berk.) Dennis, Kew Bull. 15: 313. 1961.
≡ *Peziza chrysotricha* Berk. in J. D. Hooker's Bot. Ant. Voy. H. M. Disc. Erebus & Terror II: Fl. Nov.-Zelandiae 2: 201. 1855 (!!).
≡ *Trichopeziza chrysotricha* (Berk.) Sacc., Syll. Fung. 8: 411. 1889.

*Notes:* I have examined the type in the Berkeley herbarium and due to its very fragmentary condition decided not to section the only remaining apothecium. I did remove a small piece of the edge of the apothecium, and squashed it in 100% glycerine. From the shape of the spores and the presence of large, globulose cells I conclude this is a

possible member of the Encoelioideae, perhaps close to *Velutarina* Korf. I did not observe in this squash mount the granular, roughened hyphae protruding from the ectal excipulum as reported and illustrated by Dennis (1961). His illustrations remind one of the Hyaloscyphaceae.

The ascospores I have measured had a range of 14-17 × 4-5 µm, were pigmented yellow, and matched the shape reported by Dennis. The asci were thin-walled at the apex and ranged in size from 75-96 × 8-12 µm. The sporiferous portion of the ascus was 60-65 µm with the spores arranged in an irregularly biseriate condition. I would agree with Dr. Dennis when he wrote: "This beautiful species was fully described by Massee (in Journ. Linn. Soc., Bot. 31: 517 (1896)), but its systematic position still presents some difficulty." I am not certain as to the generic disposition of this species, but it is surely not a *Chlorosplenium*.

*Specimen Examined:* NEW ZEALAND: Holotype of *Peziza chrysotricha*, on twigs, shores of Waikare Lake, Colenso, 1843, K-Berkeley s.n. (=CUP 51755).

14. CHLOROSPLENIUM DISCOIDEUM Massee = *Chlorociboria aeruginosa* (Pers. per Pers. : Fr.) Seaver ex Ram., Korf & Bat., q.v.

15. CHLOROSPLENIUM ELATINUM (Alb. & Schw. per Pers. : Fr.) Sacc., Syll. Fung. 8: 318. 1889.
≡[*Peziza elatina* Alb. & Schw., Consp. Fung. p. 330. 1805.]
≡ *Peziza elatina* Alb. & Schw. per Pers., Myc. Eur. 1: 291. 1822, : Fr., Syst. Mycol. 2(1): 112. 1822.
≡ *Helotium elatinum* (Alb. & Schw. per Pers. : Fr.) Quél., Ench. Fung. p. 309. 1886.
≡ *Rutstroemia elatina* (Alb. & Schw. per Pers. : Fr.) Rehm, in Rabenh. Krypt.-Fl. 1(3) (Lief. 39): 767. 1893.
= *Ombrophila ? kriegeriana* Rabenh., Fungi Eur. Exs. No. 2315. 1878; Hedwigia 17: 31. 1878 (!!).
≡ *Kriegeria olivacea* Rabenh., Hedwigia 17: 32. 1878.
≡ *Ciboria kriegeriana* (Rabenh.) Rehm, Ascom. Exs. No. 660. 1883; Hedwigia 22: 36. 1883.
≡ *Chlorosplenium kriegerianum* (Rabenh.) Sacc., Syll. Fung. 8: 318. 1889.

*Notes:* While it has not been possible to examine the type of *Peziza elatina* Alb. & Schw., the illustration of Albertini and Schweinitz in their "Conspectus fungorum in Lusatiae" leaves no doubt that this is synonymous with *Ombrophila kriegeriana* Rabenh. Examination of an isotype spe-

cimen of this latter species leaves me no doubt that *O. kriegeriana* would today be considered as a member of the genus *Poculum* Vel. I choose not to make a new combination since Dr. Dumont *(pers. comm.)* is prepared to do so in a forthcoming publication.

*Specimens Examined:* FRANCE: Roumeguère, Fungi Gallici Exs. No. 3934 (ut *Ombrophila kriegeriana*), FH.

GERMANY: Isotype of *Ombrophila ? kriegeriana*, Rabenhorst, Fungi Europaei Exs. No. 2315, FH, CUP-D 8529 (78-53); Rabenhorst, Fungi Europaei Exs. No. 2315b (supplement) (ut *O. kriegeriana*), FH; Rehm, Ascom. Exs. No. 660 (ut *Ciboria kriegeriana*) FH (=CUP 52699), CUP-D 4546 (78-52); de Thümen, Mycotheca Universalis No. 2117 (ut *Ombrophila kriegeriana*), FH.

16. CHLOROSPLENIUM EPIMYCES Cooke, Bull. Buffalo Soc. Natl. Sci. 2: 299. 1875 (!!).
≡ *Ascobolus epimyces* (Cooke) Seaver, N. Amer. Cup-Fungi (Opercul.) p. 91. 1928.

*Notes:* I have examined the type of this species and concur with Seaver (1928) and van Brummelen (1967) that the correct name for this fungus is *Ascobolus epimyces* (Cooke) Seaver.

*Specimens Examined:* U.S.A. - NEW JERSEY: Lectotype of *C. epimyces*, on rotten wood covered with slime mould, Newfield, Ellis 1010, (date unknown: ? July 1874), NY-Ellis, designated lectotype by van Brummelen (1967); Isolectotype, CUP-D 4525 (77-51).

17. [CHLOROSPLENIUM FLAVOVIRENS Massee in Dennis, Kew Bull. 15: 306. 1961, *nomen nudum*, pro synon.] Cfr. notes under excluded species #19, below.

18. CHLOROSPLENIUM FOLIACEUM (Starb.) Rick = *? Cordierites* sp.; for complete synonymy, see excluded species #7, above.

19. CHLOROSPLENIUM FUEGIANUM Speg., Bol. Acad. Nac. Ci. (Córdoba) 11: 266. 1887 (!!).
≡ *Helotium magellanicum* Dennis, Kew Bull. 15: 305. 1961, non *Helotium fuegianum* Speg. 1887.

*Notes:* I have examined the type of this species and find that it has a distinctly toothed margin and a cyathiculoid exciple which would place it in the genus *Cyathicula*. Its correct name is Cyathicula fuegiana (Speg.) Korf & Dixon, *comb. nov.*

I have also examined a specimen from New Zealand ex Kew Herbarium (Colenso 396, =CUP 51748) labelled *Chlorosplenium flavovirens* Massee (a nomen nudum) and disagree with Dr. Dennis (1961) that this specimen is conspecific with *C. fuegianum* Speg. The Massee specimen has ascospores that are 10-12.5 × 3-5 µm and does not have a toothed margin, whereas the type of *C. fuegianum* has ascospores 12-15 × 5-6 µm and a toothed margin. I feel certain that the Massee specimen is also a *Cyathicula*, but to which species it should be referred I am not prepared to say.

*Specimens Examined:* ARGENTINA: Holotype of *Chlorosplenium fuegianum*, *Fagus betuloides*, Isla de los Estados, Port Vancouver, C. Spegazzini, III 1882, LPS (=CUP 52635); Isotype, BA (=CUP 51747).

19a. CHLOROSPLENIUM INDICUM Singh (ut "Dumont, Korf & Singh," *lapsus calami*), Trans. Brit. Mycol. Soc. 63: 293. 1974 = *Chlorociboria aeruginascens* (Nyl.) Kan. ex Ram., Korf & Bat. subsp. *aeruginascens*, q.v.

20. CHLOROSPLENIUM KRIEGERIANUM (Rabenh.) Sacc. = *? Poculum* sp.; for complete synonymy see excluded species #15, above.

21. CHLOROSPLENIUM LIVIDUM (Alb. & Schw.) per Karst. = *Rutstroemia bulgarioides* (Rabenh.) Karst.; for complete synonymy, see notes under excluded species #9a, above.

22. CHLOROSPLENIUM MELATHEJA (Fr.) Dennis, Kew Bull. 26: 476. 1972.
≡ *Peziza melaxantha* Fr., Syst. Mycol. 2(1): 97. 1822, non *P. melaxantha* Fr., Syst. Mycol. 2(1): 150. 1822.
≡ *Peziza melatheja* Fr., Syst. Mycol. 2(2): 611 (index) and corrigenda (unnumbered sheet). 1823.
≡ *Lachnella melaxantha* (Fr.) Phillips, Manual Brit. Discom. p. 266. 1887.
≡ *Trichopeziza melaxantha* (Fr.) Sacc., Syll. Fung. 8: 428. 1889.
≡ *Dasyscyphus melaxanthus* (Fr.) Massee (ut *Dasyscypha melaxantha*), Brit. Fungus-Fl. 4: 353. 1889.
≡ *Urceolella melaxantha* (Fr.) Boud., Hist. Class. Discom. d'Europe p. 130. 1907.

*Notes:* This species was recently treated by Dennis (1972) as a member of the genus *Chlorosplenium*. Neither Dennis nor I have been able to examine the type specimen. The illustration by Dennis of a specimen collected on the Isle of Mull does not suggest the affinities with *C. chlora*

that he proposed, which has an exciple composed of hyaline to brown-walled textura angularis to textura globulosa, never composed of textura prismatica as the illustration by Dennis clearly shows. I agree with Dennis that this species has several features in common with *Helotium aeruginellum* Karst., but examination of the type and other specimens of that species shows it to be a member of the genus *Dasyscyphus*, treated above as excluded species #2. Dennis also concluded that this species is closely related to *Lachnum viridulum*, but I find that species to have a highly gelatinized ectal excipulum and to show close affinities with the Trichoscyphelloideae (see comments under excluded species #41, below). Hence, on the basis of the original description and the description given by Dennis, it would appear Massee was correct in placing this species in the genus *Dasyscyphus*, and that the correct name should be Dasyscyphus melatheja (Fr.) Dixon, *comb. nov.*

23. CHLOROSPLENIUM MICROSPERMUM Henn. = *? Chlorociboria aeruginascens* (Nyl.) Kan. ex Ram., Korf & Bat. subsp. *brasiliensis* (Berk. & Cooke) Dixon, q.v.

24. CHLOROSPLENIUM NIGRESCENTE-OLIVACEUM (Weinm.) Karst. = *Rutstroemia bulgarioides* (Rabenh.) Karst.; for complete synonymy, see excluded species #9, above.

25. CHLOROSPLENIUM OLIVACEUM Rick, Brotéria, Sér. Bot. 25: 98. 1931 (!!), non *C. olivaceum* Seaver, 1951.

*Notes:* I have been able to examine the type specimen of this species through the courtesy of Father Sehnem in Brasil and find that it has a definite stroma and is without question a member of the Sclerotiniaceae, possibly a member of the genus *Poculum* Vel. Since the specimen is scanty and the species is clearly not a member of the genera *Chlorosplenium*, *Chlorociboria*, or *Chlorencoelia*, I did not section the only apparently well-preserved apothecium in the packet, preferring to leave this task to a specialist in the Sclerotiniaceae.

*Specimen Examined:* BRASIL: Holotype of *Chlorosplenium olivaceum*, in ligno frondoso, São Leopoldo, Braun, 1929, Rick Herbarium, Universidade do Vale do Rio dos Sinos, UNISINOS, São Leopoldo, Rio Grande do Sul, Brasil.

26. CHLOROSPLENIUM OLIVACEUM Seaver (non *C. olivaceum* Rick) = *Chlorosplenium chlora* (Schw. : Fr.) Curtis in Sprague, q.v.

27. CHLOROSPLENIUM OMNIVIRENS (Berk.) Cooke ≡ *Chlorociboria omnivirens* (Berk.) Dixon, q.v.

28. CHLOROSPLENIUM PUIGGARII Speg. = *Chlorociboria aeruginascens* (Nyl.) Kan. ex Ram., Korf & Bat. subsp. *brasiliensis* (Berk. & Cooke) Dixon, q.v.

29. CHLOROSPLENIUM REPANDUM Fr. = *Chlorosplenium chlora* (Schw. : Fr.) Curtis in Sprague, q.v.

30. CHLOROSPLENIUM RODWAYI Korf = *Chlorencoelia torta* (Schw.) Dixon, q.v.

31. CHLOROSPLENIUM RUGIPES (Peck) Korf = *Chlorencoelia torta* (Schw.) Dixon, q.v.

32. CHLOROSPLENIUM SALVIICOLOR Ellis & Everh., Proc. Acad. Sci. Philadelphia 45: 146. 1893 (!!).

*Notes:* Examination of the type specimen of this species shows it has a medullary excipulum composed of gelatinized hyphae and an ectal excipulum composed of parallel hyphae embedded in a gel running to the margins. I feel this species represents a member of the genus *Claussenomyces* Kirschst. despite the fact that the ascospores are unicellular, and hence propose the correct name of this fungus should be Claussenomyces salviicolor (Ellis & Everh.) Korf & Dixon, *comb. nov.* It should be noted that this species stains the substrate green in very localized areas at the bases of the apothecia. I have examined two other specimens which appear to be either conspecific with *C. salviicolor* or extremely close to it.

Seaver's (1951) description adds nothing to that of the original diagnosis, appearing to be little more than a paraphrase of it. He inexplicably credited the name to "Ellis & Dearness." I find the ascospores to be 3-4 × 1 µm, and the asci to be 35-40 × 3-4 µm.

*Specimens Examined:* U.S.A. - LOUISIANA: Holotype of *Chlorosplenium salviicolor*, on dead *Vitis*, Langlois 1679, (no date), NY (=CUP 51723); Isotypes, CUP-D 4527 (77-55), FH. NEW YORK: on *Carpinus caroliniana*, Hendershot Gulf, stage 28, Alpine, Schuyler Co., R. P. Korf and students, 20. V. 1963, R.P.K. 3231.

DOMINICA: (substrate unknown), Laynco Road, A. L. Welden 1876, (no date), CUP-DO 317.

33. CHLOROSPLENIUM SCHWEINITZII Fr. ≡ *Chlorosplenium chlora* (Schw. : Fr.) Curtis in Sprague, q.v.

34. CHLOROSPLENIUM SERICEUM (Alb. & Schw. per Pers. : Fr.) Boud., Hist. Class. Discom. d'Europe p. 110. 1907.
≡[*Peziza sericea* Alb. & Schw., Consp. Fung. p. 325. 1805.]
≡ *Peziza sericea* Alb. & Schw. per Pers., Myc. Eur. 1: 261. 1822, : Fr., Syst. Mycol. 2(1): 93. 1822 (!).
≡ *Erinella sericea* (Alb. & Schw. per Pers. : Fr.) Quél., Ench. Fung. p. 301. 1886.
≡ *Dasyscyphus sericeus* (Alb. & Schw. per Pers. : Fr.) Sacc. (ut *Dasyscypha sericea*), Syll. Fung. 8: 456. 1889.
= ? *Erinella aeruginosa* Henn., Hedwigia 45: 30. 1905 (!!).
≡ *Dasyscyphella aeruginosa* (Henn.) Jacz., in Kursanov, Opredel. nizschikh rast. 3, Griby: 386. 1954.

*Notes:* I have been unable to locate the type specimen of *Peziza sericea*, but I have examined a North American specimen from the Schweinitz Herbarium [PH-Schweinitz, Syn. #802 (=CUP 51741)] deposited under this name and find that it is a member of the genus *Dasyscyphus* S. F. Gray with ascospores 5-6 × 2 µm.

Through the courtesy of Dr. Raĭtviĭr, I was able to examine a specimen from Poland which fits the description and probable isotype specimen of *Erinella aeruginosa* Henn. This specimen has ascospores 39-43 × 3-4 µm. The similarities of the latter species with the description and illustration of *P. sericea* given by Albertini and Schweinitz (1805) is remarkable. I exclude *P. sericea* from the genus *Chlorosplenium* on the basis of the original description and illustration and the discussions of other authors who have handled this species, i.e., Persoon (1822), Fries (1822), Quélet (1886), Rehm (1893), and Boudier (1907). While I feel strongly that the fungi described by Hennings and by Albertini and Schweinitz are conspecific, I choose not to synonymize them until further work is done on the genus and/or the type of *P. sericea* is found or the species is neotypified. This species (which I refer to *Dasyscyphus*) stains the wood upon which it grows green in localized areas near the apothecia.

*Specimens Examined:* POLAND: on decaying wood, Augustow, D. A. Dura, 3. IX. 1966, TAA-Dura 60492 (=CUP 52629).

SWITZERLAND: on decorticated oak wood, Geneva, M. F. Steffen, 1967, R.P.K. 3581 (comm. R.W.G. Dennis).

UNION OF SOVIET SOCIALIST REPUBLICS - RUSSIA: Probable isotype of *Erinella aeruginosa*, auf *Quercus pedunculata*, Moskau Michailowskoe, Massolaff 677, 8. 1904, R.P.K. 1919 (ex S).

35. CHLOROSPLENIUM STEMMATUM (Karst.) Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 13: 232. 1873.
≡ *Peziza stemmata* Karst., Fungi Fenn. Exs. No. 548. 1866; Not. Sällsk. Fauna Fl. Fenn. Förh. 10: 154. 1869 (!) (!!).
≡ *Ombrophila stemmata* (Karst.) Karst., Bidrag Kännedom Finlands Natur Folk 19: 94. 1871.
≡ *Chlorospleniella stemmata* (Karst.) Karst., Acta Soc. Fauna Fl. Fenn. 2: 141. 1885.
≡ *Coryne stemmata* (Karst.) Sacc., Syll. Fung. 8: 645. 1889.
≡ *Corynella stemmata* (Karst.) Boud., Hist. Class. Discom. d'Europe p. 99. 1907.

*Notes:* I have examined two isotypes and an authentic specimen of this species and find them all to be a *Mollisia*. That genus is desperately in need of monographic work and I choose not to make any new combinations in it.

*Specimens Examined:* FINLAND: Isotype of *Peziza stemmata*, Karsten, Fungi Fenniae Exs. No. 548, H, FH (=CUP 52704); Authentic specimen, ad *Betulam*, Fennia, Regio aboënsis [Aboae = Turku], Lill-Heikkilä [= Vähä-Heikkilä], P. A. Karsten, 15. X. 1861, H (=CUP 52632).

36. CHLOROSPLENIUM STRIISPORUM Ellis & Dearn. in Ellis & Everh., Proc. Acad. Nat. Sci. Philadelphia 47: 429. 1895 (!!).
≡ *Ascobolus striisporus* (Ellis & Dearn.) Seaver, N. Amer. Cup-Fungi (Opercul.) p. 90. 1928.

*Notes:* Examination of an isotype specimen of this species clearly shows that Seaver (1928) was correct in placing it in *Ascobolus*. Van Brummelen (1967) has synonymized this species with *A. foliicola* Berk. & Br., J. Linn. Soc., Bot. 11: 109. 1871. This appears to be the correct name for this fungus and those interested in a more complete synonymy should see van Brummelen (1967).

*Specimen Examined:* CANADA - ONTARIO: Isotype of *Chlorosplenium striisporum*, on decaying leaves, London, Ont., J. Dearness 2281, July '95, CUP-D 4528 (77-57).

37. CHLOROSPLENIUM SUBTORTUM Fr. ≡ *Chlorencoelia torta* (Schw.) Dixon, q.v.

38. CHLOROSPLENIUM TORTUM (Schw.) Sacc. ≡ *Chlorencoelia torta* (Schw.) Dixon, q.v.

39. CHLOROSPLENIUM VERSIFORME (Pers. per Pers. : Fr.) de Not. ≡ *Chlorencoelia versiformis* (Pers. per Pers. : Fr.) Dixon, q.v.

40. CHLOROSPLENIUM VIRESCENS (Tul. & Tul.) Cooke = *Clausenomyces atrovirens* (Pers. per Pers. : Fr.) Korf & Abawi; for complete synonymy see excluded species #6, above.

41. CHLOROSPLENIUM VIRIDULUM (Massee & Morg.) Dennis, Kew Bull. 17: 376. 1963.
≡ *Lachnum viridulum* Massee & Morg., J. Mycol. 8: 187. 1902 (!!).
≡ *Dasyscyphus chlorellus* Seaver (ut *Dasyscypha chlorella*), Mycologia 3: 63. 1911, non *D. viridulus* (Schrad. per Fr.) Sacc. 1889.
≡[*Dasyscyphus morgani* Massee in Dennis (ut *Dasyscypha*), Kew Bull. 17: 376. 1963, nomen nudum, pro synon.]
= ? *Trichopeziza viridula* Grelet, Rev. Mycol. (Paris) 18: 35. 1953.

*Notes:* Examination of the type and isotype speciens of this species shows that it is closely related to *Peziza caesio-lutea* Berk. & Br. as concluded by Dennis (1963). The gelatinized ectal excipulum composed of textura prismatica and granularly roughened tomentum hyphae seem to indicate that this belongs to the Trichoscyphelloideae or Hyaloscyphoideae. I choose not to designate a generic position for it until further work is completed. It seems possible that *P. caesio-lutea* (excluded species #10, above) and *L. viridulum* might constitute the nucleus for a new genus.

*Specimens Examined:* U.S.A. - OHIO: Holotype of *Lachnum viridulum* (ut *Dasyscypha morgani*), on *Quercus alba*, Preston, A. P. Morgan 44, 1898, K; Isotypes: IA-Morgan 44 (=CUP 51724), CUP-D 2738 (92-142), NY-Massee s.n. (=CUP 51726); IA-Morgan 285 (=CUP 51725); CUP-D 2128 (92-141).

## *SPECIES IMPERFECTLY KNOWN*

The following species have all been referred to *Chlorosplenium* but are known to the writer only from description. In no case has the writer been able to locate type or authentic material for study and because of the limited nature of the descriptions a reliable generic disposition is impossible.

1. CHLOROSPLENIUM CHLOROPHANUM (Roussel ex de Not.) Boud., Hist. Class. Discom. d'Europe p. 110. 1907.
   ≡ *Peziza chlorophana* Roussel ex de Not., Comment. Soc. Critt. Ital. 1: 385. 1864.
   ≡ *Ciboria chlorophana* (Roussel ex de Not.) Sacc., Syll. Fung. 8: 206. 1889.

*Notes:* The description of this species by de Notaris (1864) was repeated by Saccardo (1889). De Notaris wrote that the species occurs "Su rami di *Thuja*," indicating to me that this species might be a *Chloroscypha*.

2. CHLOROSPLENIUM FENNICUM (Karst.) Karst., Meddeland. Soc. Fauna Fl. Fenn. 9: 232. 1873.
   ≡ *Peziza fennica* Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 10: 154. 1869.
   ≡ *Ombrophila fennica* (Karst.) Karst., Bidrag Kännedom Finlands Natur Folk 19: 94. 1871.
   ≡ *Chlorospleniella fennica* (Karst.) Karst., Acta Soc. Fauna Fl. Fenn. 2: 141. 1885.
   ≡ *Coryne fennica* (Karst.) Sacc., Syll. Fung. 8: 645. 1889.

*Notes:* Karsten himself must have been rather uncertain of the taxonomic position of this species since he first placed it in *Peziza* and later on different occasions transferred it to three other genera. Until a specimen of this species can be located, and none was found in the Karsten Herbarium at Helsinki, it appears the species must remain a *nomen dubium*. Saccardo was the only other person to treat this species and his description was merely a repetition of that given by Karsten.

3. CHLOROSPLENIUM LUTEOVIRENS (Fr.) Sacc. (ut "luteo-virens"), Syll. Fung. 8: 320. 1889.
   ≡ *Peziza luteovirens* Fr., Syst. Mycol. 2(1): 133. 1822.
   ≡ *Helotium luteovirens* (Fr.) Fr., Summa Veg. Scand. p. 356. 1849.

*Notes:* A search of the Friesian Herbarium at the Institute of Systematic Botany at Uppsala by Dr. Lundqvist failed to locate any specimen of this species. I have examined a North American specimen from the Schweinitz Herbarium (PH), but the specimen on deposit there was so fragmentary that it was of no value in trying to reach any taxonomic conclusions. The original description of this species and those of Schweinitz (1832) and of Bommer & Rousseau (1891) are so scanty that it is impossible to state even to which genus this might belong. Hence, until the type or an authentic specimen can be located or a neotype designated, this spe-

cies remains a *nomen dubium*.

4. CHLOROSPLENIUM TUBEROSUM Karst. & Har., Rev. Mycol. (Toulouse) 12: 170. 1890.

*Notes:* It is possible that Karsten had before him a specimen of *Whetzelinia* or *Botryotinia*. He wrote in the original description, "Apothecia e tubere communi erumpente, crasso (circa 2-3 mm), aerugino-atro, difformi enata, sessilia vel breviter stipitata. Cupulae concavae, obtuse marginatae, disco e cellulis filiformibus, simplicibus, raro ramosis, dilutissime ferrugineis (paraphysibus ?) composito." This species remains a *nomen dubium* since no specimen could be located in the Karsten Herbarium at Helsinki.

5. CHLOROSPLENIUM URBANIANUM Henn., Bot. Jahrb. Syst. 17: 525. 1893.

*Notes:* The type specimen of this species was apparently destroyed during World War II and the original description is too scanty to venture a taxonomic opinion.

6. CHLOROSPLENIUM VIRIDE (Schw.) Morgan, J. Mycol. 8: 185. 1902.
≡ *Cantharellus viridis* Schw., Trans. Amer. Philos. Soc. 4: 153. 1832.

*Notes:* Through the courtesy of Dr. Schuyler, the Schweinitz Herbarium has been examined thoroughly and he was unable to find any specimens deposited under this name. The personal notes of Elias J. Durand (on deposit, CUP) state that on Jan. 27, 1902, he examined a packet from the Schweinitz Herbarium marked *Cantharellus viridis* N.A. 301 and found the packet empty. The writer has examined a specimen collected by Morgan (ut *Cantharellus viridis*, Schw.) and found it to be unquestionably *Chlorociboria aeruginascens*. Morgan (1902) transferred *Cantharellus viridis* to *Chlorosplenium* and listed *Peziza aeruginascens* Nyl. in synonymy. Seaver (1951) considered the two species as synonyms of *Chlorociboria aeruginosa*. Schweinitz's name could provide an older epithet for *P. aeruginascens* if the type or authentic material could be located, but until such time the species is a *nomen dubium*.

*Specimen Examined:* U.S.A. - OHIO: (substrate unknown), Preston, A. P. & L. V. Morgan, Sept. 21, 1892, CUP-D 1231 (76-4).

*(to be continued)*

*(References for Part I will appear in the next issue of MYCOTAXON at the close of Part II.)*

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# NOTES ON SPECIES OF *PARMOTREMA* (LICHENES: PARMELIACEAE) CONTAINING YELLOW PIGMENTS

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*Summary*

Chemistry, nomenclature, and distribution of 14 species of *Parmotrema* containing yellow pigments in the medulla are discussed. Two new species, *P. conjunctum* and *P. flavomedullosum*, are described and two new combinations, *P. lyngeanum* (Zahlbr.) Hale and *P. ultralucens* (Krog) Hale, are made.

## *Introduction*

While the 14 species of *Parmotrema* with a yellow or yellow-orange medulla form a heterogeneous group, they are treated together here for practical purposes. The presence of these pigments is an important character in taxonomic keys. Full descriptions and synonymy of most of the species will be found in Hale's (1965) monograph of *Parmelia* subgenus *Amphigymnia*, now recognized as a distinct genus, *Parmotrema* (Hale, 1974), and will not be repeated here. The present notes are intended to update our knowledge of the species, especially their chemistry, which had not previously been studied with thin-layer chromatography. Two standard solvent systems were used: hexane-ether-formic acid and benzene-dioxane-acetic acid. The chemistry is based on testing of type materials unless otherwise noted.

## *List of Species*

1. *Parmotrema affluens* (Hale) Hale, Phytol. 28: 334. 1974

   *Parmelia affluens* Hale, Phytol. 22: 141. 1971.

Since publishing this species I identified the chemical constitutents more precisely as protocetraric and echinocarpic acids with several associated unknown compounds. The yellow color of the medulla, sometimes rather faint, is caused by entothein and unknown pigments. There is no satisfactory TLC separation for these pigments and while all the species treated in this paper (excepting *P. cornutum* and *P. sulphuratum*) appear to contain one or more pigments, chromatographic profiles show considerable variation and streaking. It is hoped that more satisfactory techniques will eventually resolve their identity.

*Parmotrema affluens* had previously been misidentified as *P. araucariarum* (Hale, 1971). It actually resembles *P. dilatatum* (Vainio) Hale, which has protocetraric and echinocarpic acids but lacks pigmentation. The species is known from South America and one locality in northern India. No nonsorediate parent species has been found.

2. *Parmotrema appendiculatum* (Fée) Hale, Phytol. 28: 334. 1974.

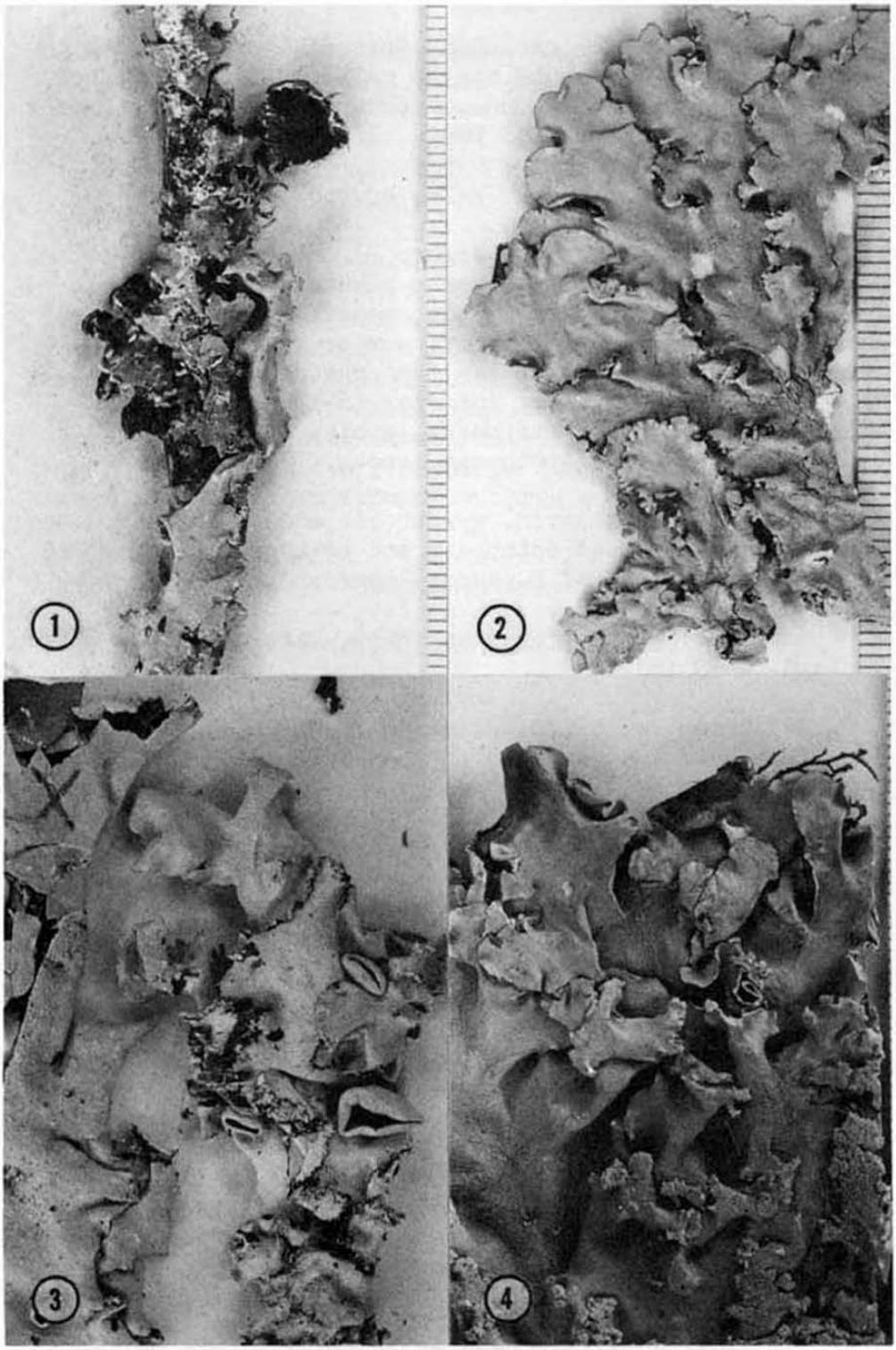
   *Parmelia appendiculata* Fée, Essai Crypt. Ecorce Suppl. 118. 1837.

The chemical constitutents of this rare species (Figure 1) are atranorin, barbatic acid, and pigments including entothein. The medulla is clearly pigmented, however, only near apothecia and in the medulla of the amphithecium. Specimens from South America that I identified as this species (Hale, 1965, p. 278) contain protocetraric acid and must be referred to *P. cristatum*. As so delimited, *P. appendiculatum* is known only from the type locality on Bourbon.

3. *Parmotrema araucariarum* (Zahlbr.) Hale, Phytol. 28: 334. 1974.

   *Parmelia araucariarum* Zahlbr. Denkschr. Akad. Wiss. Math. Naturw. Wien, 83: 179. 1909.

The chemistry of the type collection has been redetermined as atranorin, an unidentified fatty acid, and entothein and related unknown pigments, present in rather low amounts. Cilia may be very sparsely developed. Excepting the type, all specimens that I identified as this species




Figures 1-4. Species of *Parmotrema* with a yellow medulla: 1, *P. appendiculatum* (lectotype in G); 2, *P. conjunctum* (holotype in S); 3, *P. crocoides* (*Hale* 38832 in US); 4, *P. flavomedullosum* (holotype in US). Scale in mm.

(Hale, 1965, p. 238) (excluding *Grassi* 384 and 469, which are *P. conjunctum*) should now be called *P. affluens* (see above). As a result, *P. araucariarum* is known only from the type collection in São Paulo, Brazil.

4. *Parmotrema conjunctum* Hale, sp. nov.

Thallus laxe adnatus (Figure 2), usque ad 12 cm diametro, cinereo-albus, superne planus, nitidus, lobis 8-12 mm latis, apice rotundatis, margine sorediatis, soraliis distinctis, eciliatis; cortex superior 12-15µm crassus, stratum gonidiale 14-16µm crassum, medulla flava, 105-120µm crassa, cortex inferior 16-18µm crassus; subtus niger, modice rhizinosus, ambitu nudus atque castaneus, nitidus. Apothecia ignota.

Chemistry: Atranorin, gyrophoric acid, lichexanthone (in the medulla), and entothein and related pigments (TLC identical with that of *P. endosulphureum*).

Holotype: Rio Negro, Gran Chaco, Paraguay, *G.A. Malme*, 14 Sept. 1893 (S).

Additional specimens examined. Argentina. Salta: *Digilio-Grassi* 384, 469 (US).

This species superficially resembles both *P. affluens* and *P. araucariarum* because of the yellowish medulla, but the soralia are strictly marginal and more discrete than in either of those species. The occurrence of lichexanthone in the medulla is unusual; only *P. ultralucens* (Krog) Hale, comb. nov. (basionym: *Parmelia ultralucens* Krog, Bryol. 77: 253. 1974) and *P. diffractaicum* (Essl.) Hale (Esslinger, in litt.) also contain this normally cortical substance in the medulla. It is otherwise close in chemistry to *P. endosulphureum*. This species has been collected in temperate Paraguay and Argentina and should also occur in Uruguay.

5. *Parmotrema cornutum* (Lynge) Hale, Phytol. 28: 335. 1974.

*Parmelia cornuta* Lynge, Ark. Bot. 13 (13): 76. 1914.

The medulla of this species is bright lemon yellow as in other species with vulpinic acid. It is morphologically

close to *P. cristatum* (see below) except for chemistry. This rare lichen is still known only from the type collection.

6. *Parmotrema cristatum* (Nyl.) Hale, Phytol. 28: 335. 1974.

*Parmelia cristata* Nyl. Flora 52: 291. 1869.

Material of this South American species had been identified as *P. appendiculatum* (Hale, 1965, p. 278) because of the yellow medulla and conspicuously ciliate-laciniate apothecia. Chemically the two differ, however, *P. cristatum* producing atranorin, protocetraric acid, entothein, and unknown pigments. *Parmotrema cristatum* is a rare species known from only three collections.

Specimens examined. Venezuela. Barinas: *Steyermark* 102058 (US). Brazil. Tarapoto, Amazon, *Spruce* 118 (BM).

7. *Parmotrema crocoides* (Hale) Hale, Phytol. 28: 335. 1974.

*Parmelia crocoides* Hale, Contr. U.S. Nat. Herb. 36: 244. 1965.

I recently re-examined the type of *P. crocoides* and found that it contained gyrophoric acid and dull reddish pigments that could not be conclusively identified with entothein or any associated pigments. The presence of gyrophoric acid, however, immediately related it to a series of nonsorediate, nonisidiate specimens from Mexico and Central America (for example, *Wirth* 80 and *Cain* 27603, previously identified as *Parmelia myelochroa*), which have a distinct yellow to yellow-orange medulla. These specimens are indistinguishable externally with a shiny cortex, abundant pycnidia, and distinctive crenate margins on crowded central lobes (Figure 3). TLC profiles varied considerably in minor constituents. Most seemed to have entothein in addition to other unidentified spots not present, for example, in *P. endosulphureum*. It is possible that pigments in the *P. crocoides* type have been altered by preservation or other factors. In any event, it is probably better for the present to include all fertile species containing gyrophoric acid and pigments under the name *P. crocoides* until new collections prove whether or not the reddish color is a natural phenomenon.

One other collection previously identified as *Parmelia myelochroa* (*Mexia* 5239) and *Steyermark* 101845 differ in lacking gyrophoric acid although the yellow pigmentation is similar to that of specimens containing gyrophoric acid. I am provisionally considering these to represent an acid-deficient population.

Specimens examined. Mexico. Colima: *Wirth* 80 (US); Nayarit: *Cain* 27603 (TRT, US). Costa Rica. San José: *Standley & Valerio* 43405a (US). Panama. Chiriquí: *Hale* 38832, (US). Venezuela. Apure: *Standley* 101845 (US). Brazil. Minas Gerais: *Mexia* 5239 (US).

8. *Parmotrema endosulphureum* (Hillm.) Hale, Phytol. 28: 336. 1974.

*Parmelia tinctorum* var. *endosulphurea* Hillm. Repert. Sp. Nov. Fedde, 48: 8. 1940.

*P. endosulphurea* (Hillm.) Hale, Contr. U.S. Nat. Herb. 36: 251. 1965.

The chemistry of this pantropical species has been redetermined as atranorin, gyrophoric acid, and entothein and associated compounds. As the only densely isidiate species with a yellow medulla it could be mistaken for *P. tinctorum* (Nyl.) Hale if medullary color were not checked. It is by far most common in the Caribbean region.

9. *Parmotrema flavomedullosum* Hale, sp. nov.

Thallus laxe adnatus (Figure 4), expansus, usque ad 15 cm latus, cinereo-albus, nitidus, lobis ca 1 cm latis, apice rotundatis, planis vel aetate rugosis, cortice marginem versus friato, demum sorediascente, sorediis crassis, eciliatis vel raro sparse ciliatis; cortex superior 12-15µm crassus, stratum gonidiale 14-16µm crassum, medulla flava, 100-120µm crassa, cortex inferior 12µm crassus; subtus niger, modice rhizinosus, ambitu late nudus, castaneus. Apothecia ignota.

Chemistry: Atranorin, gyrophoric acid, entothein, and unidentified pigments.

Holotype: On rocks, Colonia Santa Catarina, Santa Catarina, Brazil, *Reitz & Klein* 15051, 9 August 1963 (US).

Additional specimens examined. Venezuela. Zulia: *Steyermark* 105633-A (US). Brazil. Minas Gerais: *Höhne* (US, W); Paraná: *Montes* 10137 pp. (MVM); Santa Catarina: *Reitz & Klein* 15507 (US). Paraguay. Asunción: *Malme* 1585 (BM, S). Argentina. Córdoba: *Stuckert* 20970 (US).

This species belongs to the *P. endosulphureum-P. conjunctum* complex. It has coarse, irregular, submarginal soralia and without careful examination might be misidentified as *P. affluens*, which reacts P+ red, C- (protocetraric acid). *Parmotrema conjunctum* has strictly marginal soralia and lichexanthone in the medulla in addition to gyrophoric acid.

10. *Parmotrema lyngeanum* (Zahlbr.) Hale, comb. nov.

*Parmelia lyngeana* Zahlbr. Cat. Lich. Univ. 6: 243. 1929.

*Parmelia merrillii* Lynge, Ark. Bot. 13(13): 78. 1914 (not *P. merrillii* Vainio ex anno 1909).

*P. cornuta* var. *crocea* Lynge, Ark. Bot. 13(13): 78. 1914.

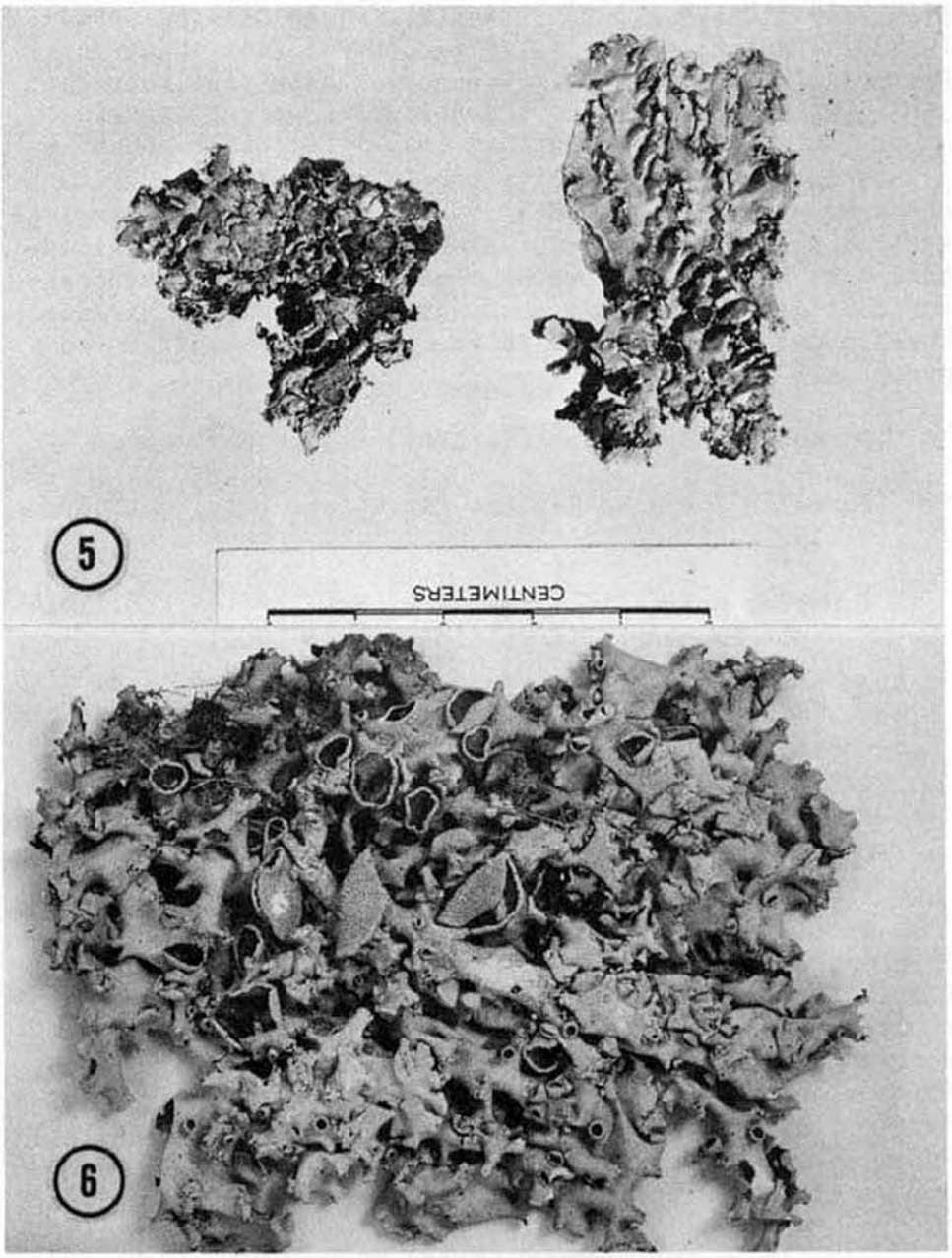
*P. crocea* (Lynge) Gyelnik, Repert. Sp. No. Fedde 29: 287. 1931 (not *P. crocea* (Ach.) Spreng. ex anno 1827).

This species (Figure 5) is externally very similar to *P. cornutum* but contains atranorin, apparently entothein, and in the lower part of the medulla the red anthraquinone rhodophyscin. TLC profiles of the types of *Parmelia merrillii* and *P. cornuta* var. *crocea* are identical. No further collections of this Brazilian species have been made. I had previously synonymized this species under *Parmelia appendiculata* (Hale, 1965, p. 278), which does not occur in the New World.

11. *Parmotrema myelochroum* (Hale) Hale, Phytol. 28: 337. 1974.

*Parmelia myelochroa* Hale, Contr. U.S. Nat. Herb. 36: 256. 1965.

No definite lichen substances were reported in the original description of this species (Figure 6), but




Figures 5, 6. Species of *Parmotrema* with a yellow medulla: 5, *P. lyngeanum* (lectotype in S); 6, *P. myelochroum* (holotype in US).

Dr. C. F. Culberson, using TLC, identified atranorin, barbatic acid, obtusatic acid (in high concentration), entothein, and unidentified pigments. Re-examination of specimens identified as *P. myelochroa* (Hale, 1965, p. 256), where available, showed that the species occurs only in one locality in Mexico and that those from other countries should be identified as *Parmotrema crocoides*.

12. *Parmotrema permutatum* (Stirton) Hale, Phytol. 28: 328. 1974.

    *Parmelia permutata* Stirton, Scot. Nat. 4: 252. 1877-78.

This species differs from others in this broad group in that the pigment occurs only in the lower half of the medulla. It has conspicuous cilia and distinct marginal soralia. It is pantropical on rocks and trees in dry areas, but we have too few specimens to judge the full range of morphological and chemical variation.

13. *Parmotrema subcoloratum* (Hale) Hale, Phytol. 28: 339. 1974.

    *Parmelia subcolorata* Hale, Contr. U.S. Nat. Herb. 36: 340. 1965.

This is the only species with a yellow medulla treated in this paper that occurs exclusively in Africa. Krog (in litt.) has identified gyrophoric acid in the medulla along with entothein. It differs significantly from other members of the group in having perforate apothecia and small spores as well as coarse cilia and strong white maculae.

14. *Parmotrema sulphuratum* (Nees & Flot.) Hale, Phytol. 28: 339. 1974.

    *Parmelia sulphurata* Nees & Flot. Linnaea 9: 501. 1835.

This species has a bright yellow medulla (vulpinic acid) and a TLC profile identical to that of *P. cornutum*. The cortex is often cracked, revealing the pigment. Marginal cilia and sparse isidia are always present. The species is pantropical at lower elevations and has often been confused with *P. endosulphureum*, which has dense

isidia, lacks cilia, and contains gyrophoric acid and entothein.

*Interrelationships of the Yellow-pigmented Species*

The unifying elements in this artifical group are the yellow to yellow-orange pigmented medulla, broad rotund lobes, and imperforate apothecia with large, thick-walled spores (except for *P. subcoloratum* which has perforate apothecia and small spores). Beyond this the species are chemically diverse and belong to several different phylogenetic lines. The following notes are provided to help in understanding the possible evolution of these species.

The most obviously natural group centers around *P. endosulphureum*, an eciliate, isidiate pantropical species. Other vegetative morphs, all containing gyrophoric acid, include sorediate *P. conjunctum* and *P. flavomedullosum*, the latter two restricted to temperate southern South America. The presumptive nonisidiate, nonsorediate parent is (or at least would be very similar to) entothein-containing *P. crocoides*, which occurs chiefly in Central America. *Parmotrema myelochroum* may have evolved within this group as a new chemical population (barbatic acid).

The cornute species, *P. appendiculatum*, *P. cornutum*, *P. cristatum*, and *P. lyngeanum*, appear to have a common origin but have diverged considerably in chemistry. They lack any obvious vegetative morphs, unless one considers *P. sulphuratum* to be related to *P. cornutum* because of the similar and unusual chemistry, vulpinic acid. They are all so rarely collected, however, that we are still not certain of the geographic distribution and total range of morphological and chemical variation.

*Parmotrema affluens* lacks cilia and falls close to unpigmented *P. dilatatum* (Vainio) Hale in chemistry, sharing protocetraric and echinocarpic acids. It has no obvious parent morph. The position of *P. araucariarum*, a morphologically similar species, is unclear at this time, but it is probably near *P. affluens*.

Pantropical *P. permutatum* is externally similar to *P. sancti-angelii*, which has gyrophoric acid but no yellow pigments. Both species, if correctly interpreted, would then fall within the large series of gyrophoric acid-

containing ciliate species, known chiefly from Africa, whose relationships have not yet been worked out.

Finally, *P. subcoloratum* represents an isolated African species apparently unrelated to any other species containing yellow pigments.

*Key to Species of* Parmotrema *Containing Yellow Pigments*

1. Thallus lacking soredia and isidia.
    2. Cilia lacking.
        3. Gyrophoric acid present (rarely lacking). *P. crocoides*
        3. Barbatic acid present. *P. myelochroum*
    2. Cilia present along lobe margins.
        4. Apothecia without marginal laciniae. *P. subcoloratum*
        4. Apothecia lobulate or laciniate.
            5. Vulpinic acid present. *P. cornutum*
            5. Entothein or unidentified yellow pigments present.
                6. Barbatic acid present. *P. appendiculatum*
                6. Barbatic acid lacking.
                    7. Medulla P+ red. *P. cristatum*
                    7. Medulla P-. *P. lyngeanum*
1. Thallus isidiate or sorediate.
    8. Thallus isidiate.
        9. Cilia present. *P. sulphuratum*
        9. Cilia absent. *P. endosulphureum*

8. Thallus sorediate.

10. Cilia present. *P. permutatum*

10. Cilia absent (very short and sparse in *P. araucariarum*).

11. Medulla P+ red (protocetraric acid). *P. affluens*

11. Medulla P-.

12. Gyrophoric acid lacking. *P. araucariarum*

12. Gyrophoric acid present.

13. Soredia marginal; lichexanthone present. *P. conjunctum*

13. Soredia submarginal to laminal, coarse; lichexanthone absent. *P. flavomedullosum*

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# NEW HYPHOMYCETES FROM GUADELOUPE, F.W.I. ALBOSYNNEMA FILICOLA, TETRACRIUM MUSICOLA, AND THOZETELLOPSIS CALICIOIDES

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While collecting discomycetes on the Island of Guadeloupe in the French West Indies as part of the Flora Neotropica project the author encountered a number of unusual synnematous and sporodochial hyphomycetes growing on decaying vegetable debris. Three of these were sufficiently distinctive to be unambiguously determined as new species and are described below.

*1: Tetracrium musicola* Sherwood sp. nov. (Fig. 1: a, b)

Conidia in sporodochiis minutis hyalinis superficialibus elata. Conidiophora ad unam cellulam tumidam 5-6 µm latam et subaeque longam redacta. Conidia hyalina, ramosa, 35-45 µm longa, 5-8-brachiata, brachiis 2-2.5 µm latis multiseptatis ad septa constrictis.

*Hab.* In foliis putrescentibus *Musae paradisicae* L.

*Holotypus:* D. Pfister, S. Carpenter & M. Sherwood *#931*, above town of Village along Crête de Village, at ±630 m, Guadeloupe, January 5, 1974. (FH).

Sporodochia minute, pulvinate, completely hyaline, consisting of a small cushion of hyaline, isodiametric cells and an outer, spore-bearing layer. Conidia are borne on specialized, thin-walled, inflated cells which rupture at maturity. Each of these cells bears a single, slightly enlarged basal cell which bears 2 or 3 primary branches. The primary branches may be unbranched or once or twice branched to form the arms of the conidium. The arms (5-8 in number) are 2.0 µm broad and the total length of the conidium (excluding the ruptured cell) is 35-45 µm.

G. W. Martin (1948) described a similar fungus (*T. incarnatum*) on *Opuntia* from the Galopagos Islands. *T. musicola* differs from *T. incarnatum* in the apparent lack of differentiated conidiophores and the narrower conidia. The other species of *Tetracrium* all have much larger conidia.

*2: Albosynnema filicola Sherwood sp. nov. (Fig. 1: c, d)*

Synnemata ad 2 mm longa, 0.1 mm lata, stipite ex hyphis tenuibus hyalinis composito, capite fructificante 150 x 400 µm, elongato et subacuto. Conidia in apicibus hypharum non specialum elata, obscure viridebrunnea, 4-cellulata, pyriformia, 26-32 x 10-11 µm.

*Hab: In petiolis mortuis Cyatheae arboreae (L.) Sm.*

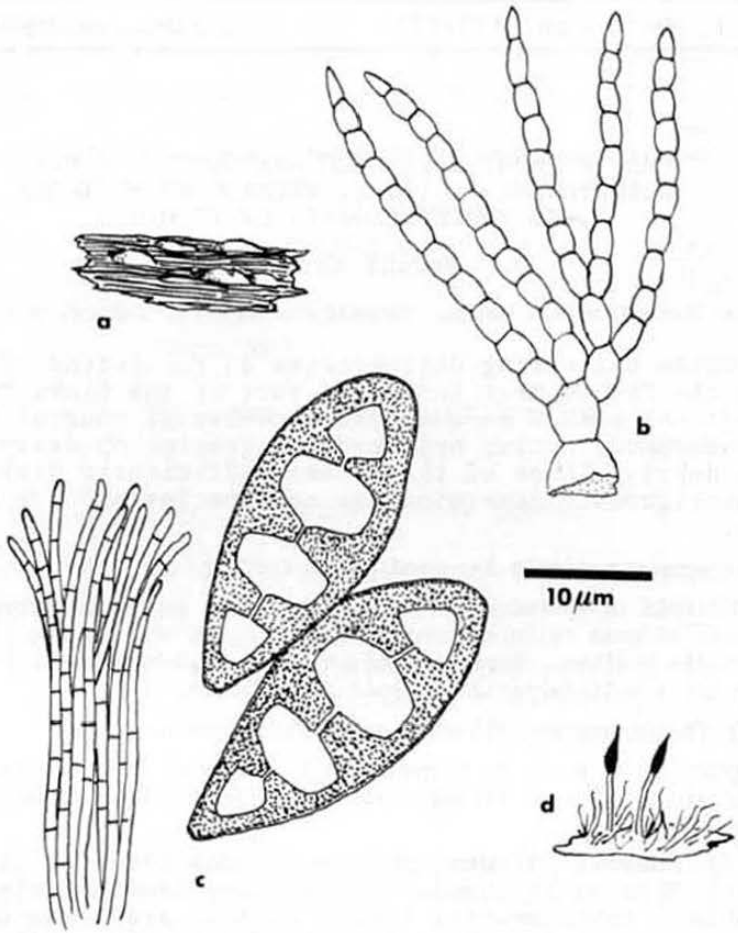


Figure 1: a. *Tetracrium musicola*, habit sketch. b. *Ibid.*, conidium. c. *Albosynnema filicola*, conidiophores and conidia. d. *Ibid.*, habit sketch.

*Holotypus:* D. Pfister, S. Carpenter & M. Sherwood #753, La Soufrière, Forêt des Bains Jaunes, ±1050-1155 m, Guadeloupe, January 3, 1974 (FH).

Synnemata up to 2.0 mm long, 0.1mm broad, composed of slender hyaline hyphae; fruiting head elongate, 150 x 400 µm, greenish-black, somewhat pointed apically. Conidia dark greenish brown, 4-celled, distoseptate, pyriform, 26-32 x 10-11 µm, borne on the tips of unspecialized hyphae.

The original description (Morris, 1967) of the genus *Albosynnema* does not illustrate spores with exceptionally thick walls; there is, however, no genus that would better accomodate the present fungus. The lack of specialized structures at the apices of the conidiophores and the slightly truncate bases of the conidia suggest that the conidia are blastic. The very long synnemata are possibly an adaptation to growth on a substrate covered with a dense felt of thorns

and matted hairs. The fungus appears to be gloeosporous as the spores are not easily dispersed in crush mounts.

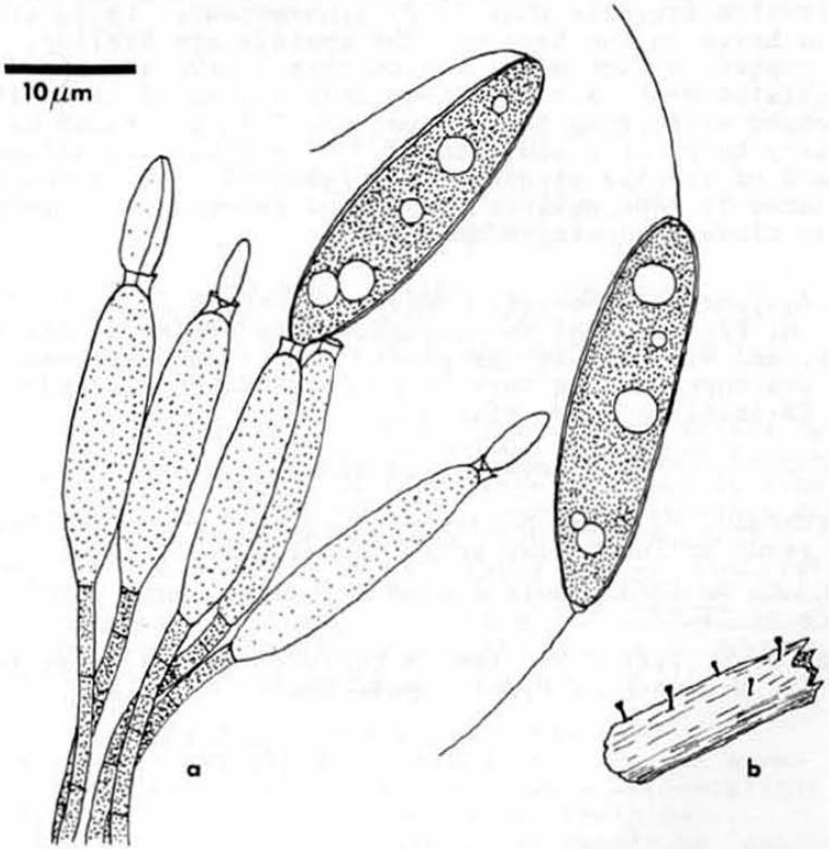


Figure 2: a. *Thozetellopsis calicioides*. Conidiophores and conidia. b. *Ibid.*, habit sketch.

*3: Thozetellopsis calicioides* Sherwood n. sp. (Fig. 2: a, b)

Synnemata obscure brunnea, 500 x 100 m, capite ad 250 μm latitudine accrescente. Stipes tenax, ex hyphis dense aggregatis 1.5 μm diam compositus. Conidia in phialidibus brunneis 20-22 x3.5-4.0 μm elata, 25-30 x 6-8 μm, unicellularia, brunnea, guttulata, setam hyalinum 10-15 μm longam in utraque extremitate gerentia.

*Hab.* In ramunculis corticatis specie indeterminatis.

*Holotypus:* D. Pfister, S. Carpenter & M. Sherwood *#987*. Grand Étang above Bananier, 400-416m, Guadeloupe, January 6, 1974 (FH).

Synnemata dark brown, 500x100 μm, with an abruptly enlarged head 250 μm across, growing on small corticate dead twigs. Stalk tough, composed of tightly packed parallel brown hyphae 1.5 μm in diameter. Sterile elements are absent from the head, which is composed of large cylindrical phialides 20-22 x 3.5-4.0 μm, with prominent collarettes. Conidia brown, 25-30 x 6-8 μm, with a hyaline seta 10-15 μm long at each end, the contents rather oily.

The genus *Thozetellopsis* Agnihothrudu (1958) is typified

by a fungus rather different from the one here described. The original description states that it is sporodochial but the illustration suggests that it is synnematous. There are sterile hairs in the head and the conidia are hyaline. Many fungi imperfect (including coelomycetes) have allantoid setose phialospores, and an ontogenetic system of classification might well group these together. I do not think it necessary to erect a new genus for *T. calicioides* although the lack of sterile elements, and pigmented conidia, would be considered by some authors to be good generic characters. It is also close to *Menisporiopsis*.

*Acknowledgements:* The author wishes to thank R. P. Korf (CUP) and D. H. Pfister (FH) for assistance in preparing the manuscript, and W. Dress for preparing the Latin diagnoses. The study was supported in part by National Science Foundation Grant GB-36162 to D. H. Pfister.

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# CAPNOBOTRYS DINGLEYAE N.SP.

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A species of sooty moulds found in New Zealand in 1963 on Dacrydium cupressinum, Phyllocladus trichomanoides, and Podocarpus spicatus is represented in DAOM by nine collections. According to collections preserved in Herb. K and Herb. IMI the same species occurs in England, Ireland and perhaps Scotland on Taxus baccata and possibly other coniferous hosts. Because the Capnobotrys state is more conspicuous and diagnostic than the accompanying Capnophialophora phialidic state the fungus is described in that form genus as Capnobotrys dingleyae.

Capnobotrys dingleyae sp. nov.

Subiculum variabile, olivaceo-brunneum vel atro-brunneum vel atrum, planum vel plerumque irregulariter incrassatum, 3-20mm crass., aliquando pustulis hemisphaericis 1-5mm lat., frequenter continuum, diffusum et truncos per pedes paucos tectans.

Mycelium superficiale, ex hyphis ramosis, subulatis, septatis, moniliformibus, pallide brunneis vel atro-brunneis, primo verrucosis dein laevibus vel paulo verrucosis, anastomosantibus, cellulis basalibus plerumque latioribus quam longis, ad 27µ lat., cellulis terminalibus angustioribus, 7-9µ lat., compositum.

Conidiophora hyphas simulantia sed apicem versus fertilia, 140-265µ long. Sympodioconidia 1-4 successive et in cellula terminalia conidiophorarum et in sympodula producta. Sympodulae 6.3-9.0µ orientes frequenter unilateraliter in cellulis 1-3 subterminalibus conidiophorarum, sessiles vel 1-3 in stipite breve (aseptata vel 1-septata), subglobosae, verrucosae.

Sympodioconidia pallide brunnea vel atrobrunnea, verrucosa, ovoidea vel late ellipsoidea vel obclavata, continua vel ad 6-septata, plerumque 2-3-septata, interdum 4-, raro 5- vel 6-septata, ad septas parum vel vix constricta, recta, sicca et facile secedentia. Sympodioconidia 10-11.7 X 7.2-8.0µ (0-septata), 10.5-20.0 X 8.6-11.0µ (1-sept.), 16-24(27) X 9.0-12.6µ (2-sept.), 23.5-33.5

X 10.8-12.6μ (3-sept.), 30.5-36 X 10.8-12.6μ (4-sept.), 42-45 X 12.6μ (duo tantum vidi 5-septata), 50 X 13μ (unum tantum vidi 6-septata).

Phialides (status Capnophialophora) apicem versus hypharum, singulares vel 2-4 botryosae, subsphaericae, pallide brunneae vel brunneae, parum asperatae vel verrucosae, 5.0-5.5μ lat., collum singulum (raro duo) cupulatum vel infundibuliforme, 3.2-3.6μ lat., 3.6μ profund., distaliter ferentes. Phialides frequenter in conidiis germinantibus productae. Phialospora sparsa, late ellipsoidea, hyalina, ca. 1.5 X 1.0μ.

Poroconidia non vidi.

Habitat in truncis vivis (raro emortuis) Podocarpi spicati, Phyllocladi trichomanoidis, Dacrydii cupressini in Nova Zelandia et Taxi baccatae in Anglia, Hibernia et ? Scotia.

Typus: in truncis vivis Podocarpi spicati, Nova Zelandia, "Banks Peninsula", 13.V.1963, PDD 21096 (DAOM 106368).

Dr. B. Boivin kindly corrected the Latin diagnosis. I am grateful to Drs. R.W.G. Dennis and M.B. Ellis for permission to examine collections in their keeping.

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# A NEW *PHANEROCHAETE* WITH A *CHRYSOSPORIUM* IMPERFECT STATE

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SUMMARY

A new species is proposed in the genus *Phanerochaete* for a wood decaying fungus that is extremely important in the destruction of wood chips in storage. The names *Chrysosporium pruinosum*, *C. lignorum*, *Sporotrichum pruinosum*, and *S. pulverulentum* have all been applied to this species in its imperfect state. Complete descriptions of basidiocarps and cultures are presented and the use of the species in wood decay studies is discussed.

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While collecting wood-rotting fungi in the Sonoran Desert, Arizona, in 1971, the senior author found an undescribed species of *Phanerochaete*. This species, which has a *Chrysosporium* imperfect state in culture, was represented at that time by this single Arizona collection. However, other specimens have since been encountered from New York and Maryland.

Earlier, a fungus identified as *Sporotrichum* sp. had been isolated from test wood chip storage piles in Georgia (Lindgren and Eslyn 1961) and Maine (Eslyn 1967). To conform to Carmichael's concept (1962), it was re-identified as *Chrysosporium* sp. When some of these isolates developed basidiocarps in culture they were sent to Dr. H. McKay, of the Forest Disease Laboratory, Laurel, Md. After examining the basidiocarps she designated the species "*Peniophora* G."

Comparisons of basidiocarps of the undescribed *Phanerochaete* species and those produced in culture by "*Peniophora* G" isolates showed them to be conspecific. In addition, the cultures derived from germinating spore prints of the *Phanerochaete* basidiocarps were almost identical in every way to the "*Peniophora* G" (*Chrysosporium* sp.) isolates from decay. The asexual state was identified as *Chrysosporium pruinosum* (Gilman et Abbott) Carmichael and this determination was subsequently confirmed by Dr. J. W. Carmichael, University of Alberta, Alberta, Canada.

Comparison of our cultures with Nilsson's wood chip pile isolate, which was first identified as *C. pruinosum* (Nilsson 1965) and later as *C. lignorum* Bergman et Nilsson (1966) *nomen nudum*, and Shields' (1969) isolate of *Ptychogaster* sp. from wood chips, showed all to be conspecific. Nilsson (Shields 1969) also considered his isolate to be identical to Shields' isolate as did Smith and Ofosu-Asiedu (1972), who noted that both isolates were probably *C. pruinosum*. Hofsten and Hofsten (1973) indicated that the Nilsson isolate is conspecific with *Sporotrichum pulverulentum* Novobranova.

In addition, Shields (1969) and Bergman and Nilsson (1971) believed their isolates to be the imperfect state of a basidiomycete, Shields indicating *Hyphodontia* and *Peniophora* as possible placements. The perfect state, however, has not been precisely identified to date. The present study has revealed the fungus to be a new species of *Phanerochaete* which is described herein.

*Phanerochaete chrysosporium* Burds., *sp. nov.* FIGS.1-12

Basidiocarpis late effusis, pallidoluteis vel luteobrunneis. Hyphis subiculis absque fibulatis. Cystidiis ab oriundis subhymenio aut subiculis, 60-150(-250) x 6.5-9 µm, cylindraceis, tenuibis parietibus, laevibus, obtusis apicibus. Basidiis 22-35 x 5-6 µm. Basidiosporis (5.5-) 6-7.5 (-9) x 3-4 µm, depressis ovoideis.

HOLOTYPE--U.S.A., Arizona: HHB 6251, on dead wood of *Platanus wrightii* S. Wats. (Arizona sycamore), Guadalupe Canyon, Peloncillo Mts., Cochise County, August 25, 1971 (CFMR). Isotype in BPI and ARIZ.

CON.STAT. --*Chrysosporium pruinosum* (Gilman et Abbott) Carmichael, Can. J. Bot. 40: 1166. 1962.

≡ *Sporotrichum pruinosum* Gilman et Abbott, Iowa State Coll. J. Sci. 1: 306. 1927.

= *Chrysosporium lignorum* Bergman et Nilsson (*nom. nud.*), Dept. Forest Prod., Roy. Coll. Forest., Stockholm, Res. Notes No. 53, p. 28. 1966.

=(?) *Sporotrichum pulverulentum* Novobranova, Akad. Nauk U.S.S.R., Botan. Inst. Nov. Sist. Niz. Rastenii 9: 180. 1972.

Basidiocarps broadly effused, (indeterminate), membranous, moist when fresh, yellowish-white (3A2)[1/] to light brown (5D5), up to 0.25 mm thick, loosely attached or separable in small pieces, smooth, continuous, not cracking; *margin* rather abrupt or up to 2 mm broad, sterile, very thin, powdery or finely granular, irregular in outline, white, non-rhizomorphic; *subiculum* byssoid, white. Hyphal system monomitic; *subiculum* a textura intricata, hyphae (Fig. 4) (3.5-)4.5-6(-7) µm diam, hyaline, thin walled or with walls up to 1 µm thick, lacking clamps, branched at nearly right angles, smooth near substrate to heavily encrusted with large hyaline crystals near subhymenium, sometimes with oval to spherical chlamydospore-like thick walled cells near substrate; *subhymenium* up to 75 µm thick, a compact textura intricata-porrecta, hyphae 2.5-4 µm diam, thin walled or with slight wall thickening, somewhat agglutinated; *hymenium* composed of cystidia (Fig. 1) and basidia (Fig. 2); *cystidia* (Fig. 1) arising at various levels of the subhymenium and subiculum, 60-150 (-250) x 6.5-9 µm, cylindrical, thin walled or with slight wall thickening, hyaline, smooth, obtuse at apex, septate only at base, lacking clamps, protruding up to 70 µm; *basidia* (Fig. 2) 22-35 x 5-6 µm, clavate, hyaline, thin walled, septate at base, lacking clamps, 4-sterigmate, sterigmata 4-5 µm long; *basidiospores* (Fig. 3) (5.5-) 6-7.5(-9) x 3-4 µm, depressed ovoid, hyaline, thin walled, smooth, not reacting with Melzer's reagent.

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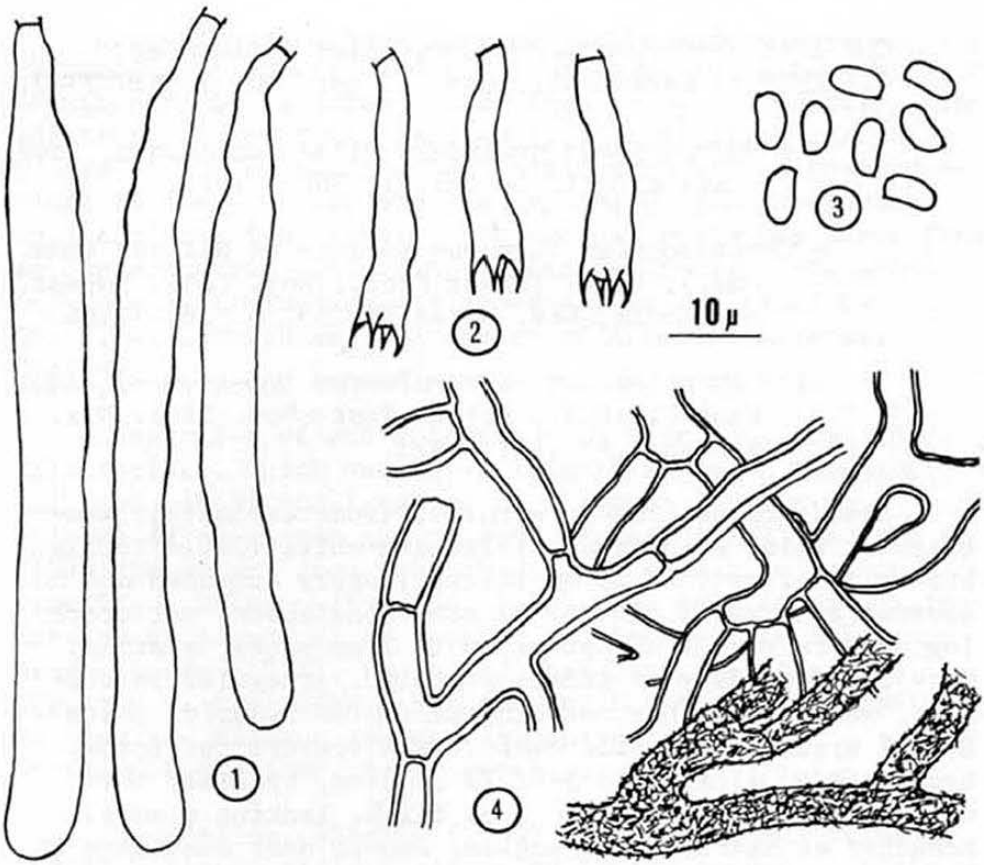
1/ Color notations are those of Kornerup and Wanscher (1967), indicating plate number, vertical column, and horizontal column, respectively.




Figs. 1-4. Zeiss drawing tube drawings of microscopic characters of *Phanerochaete chrysosporium*, HHB 6251. 1. cystidia. 2. basidia. 3. basidiospores. 4. subicular hyphae.

Etymology: from its *Chrysosporium* imperfect state.

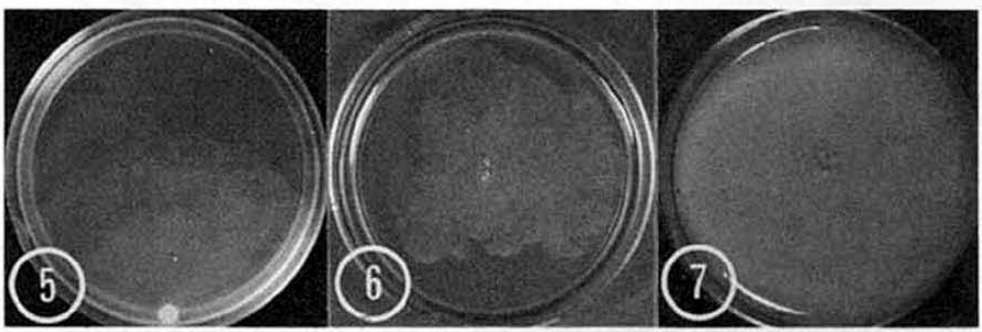
Additional Specimens Examined: U.S.A., New York - MJL 98, on dead wood of *Ulmus americana* L., Monroe County (?); Maryland-104297, on dead wood of *Liriodendron tulipifera* L., Montgomery County. Both in CFMR.

Remarks: *Phanerochaete chrysosporium* basidiocarps are distinguished by their long, broad, cylindrical, smooth cystidia and complete lack of clamp connections. They are similar to *P. arizonica* Burds. et Gilbertson, which possesses much smaller cystidia arising in the subhymenium

only and to *P. cremea* (Bres.) Parm. which also possesses smaller cystidia that are thick walled and usually encrusted. Neither of these is known to possess a *Chrysosporium* imperfect state.

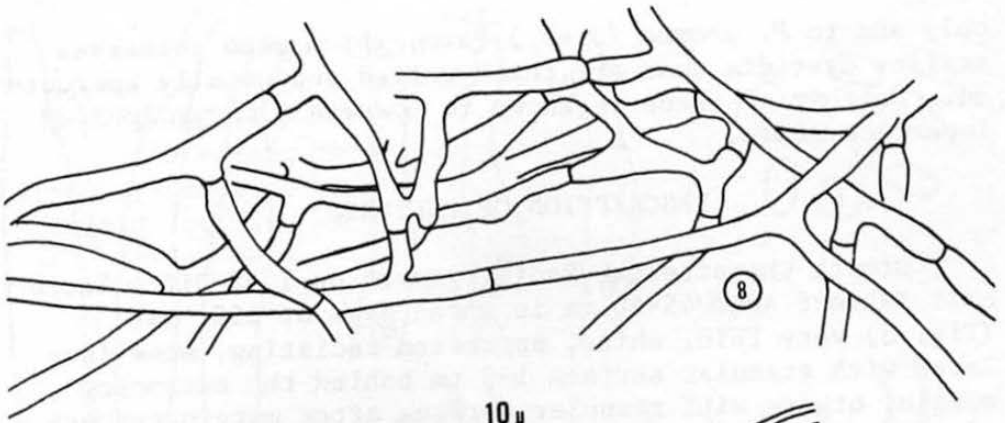
## DESCRIPTION OF CULTURES

Growth Characters: Radial growth on 1.5% Difco Bacto Malt Extract Agar 45-60 mm in three days at 25C; mat (Fig. 5) very thin, white, appressed radiating, some isolates with granular surface 1-2 cm behind the advancing margin, others with granular surface after margin reaches edge of plate, granular aspect spreading from inoculum until entire plate is covered; agar bleached below inoculum and often over whole plate; some isolates producing cream-colored, effused hymenial surface, usually in 18-28 days, forming all structures typical of fruiting in nature; other isolates never fruit. On gallic acid agar (Davidson, et al. 1938) growth 24-30 mm diam/week, mat thin-woolly, margin irregular, agar not stained (Fig. 6); on tannic acid agar (Davidson, et al. 1938) no growth or staining of agar (Fig. 7); tests with syringaldazine and gum guaiac (Harkin and Obst 1973) negative, indicating lack of laccase, peroxidase and tyrosinase.




Figs. 5-7. Cultures of *Phanerochaete chrysosporium* grown at 25C, HHB 6251. 5. on malt agar after three days growth. 6. on gallic acid agar after one week. 7. on tannic acid agar after one week.

Microscopic Characters: Hyphae of margin hyaline, thin walled, 3.5-7 µm diam, smooth, infrequently branched, densely stained in phloxine, first septum usually occurring more than 1 mm from tip, clamps lacking.

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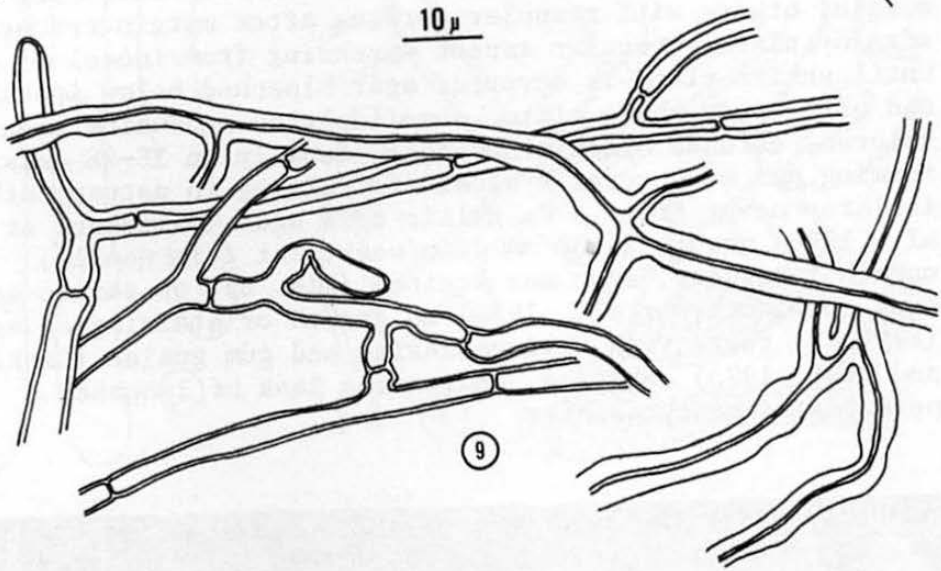


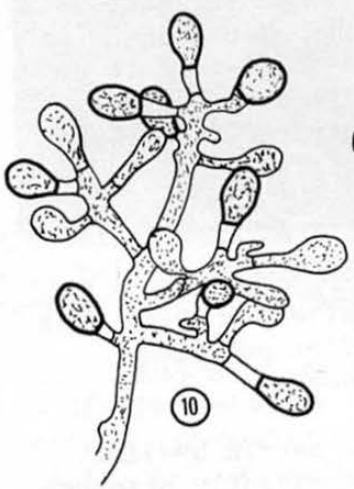


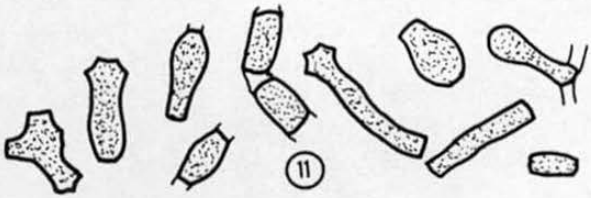


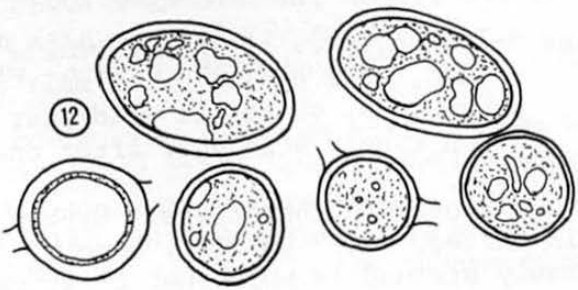


*Legend* ⟶

*Aerial hyphae* (Fig. 8) 2-4 µm diam, hyaline, thin walled, smooth or occasionally encrusted with long narrow crystals, septate, lacking clamps, branched frequently, these branches often developing as conidiophores; *submerged hyphae* (Fig. 9) (2.5-) 3.5-6 (-8) µm diam, mostly thick walled, occasionally thin walled in narrower hyphae, hyaline, smooth, septate, lacking clamps, frequently branched, usually at nearly right angles.

Conidia only on aerial hyphae; terminal persistent conidia (*aleuriospores* of Carmichael, 1962) (Fig. 10) 5-10 x 3-6 µm, ovate to elliptical, truncate at attachment to poorly differentiated conidiophore, smooth, hyaline, densely granular, sometimes guttulate, with slight wall thickening, not reacting with Melzer's reagent; arthric, retrogressive, fragmenting conidia (*arthrospores* of Carmichael, 1962) (Fig. 11) variable in size and shape (cylindrical, ovoid, clavate, branched, or fusoid), hyaline, densely granular, with slightly thickened walls, not reacting with Melzer's reagent; a third type of conidia (*chlamydospores* of Carmichael, 1962) (Fig. 12) terminal or intercalary, pyriform, spherical, to truncate-fusiform, hyaline, smooth, with densely granular contents and thick walls, up to 60 µm in longest dimension.

Temperature Relations: Average growth rates (mm radius/day) for the temperatures indicated are: 12C, 2-3 mm; 16C, 3-5 mm; 20C, 9-13 mm; 24C, 14-19 mm; 28C, 18-24 mm; 32C, 26-32 mm; 36C, 30-36 mm; 40C, 35-42 mm; 44C, 28-33 mm; 50C, 0-6 mm. According to the method of Davidson, et al. (1942) the key pattern would be A-0-F 2-3-4-10-14 or B-0-F 2-3-4-5-6-10-14-16. Using the method of Nobles (1965) the following species code is obtained: 1.6.14.24. 32.33.34.35.36.40.41.(48).54.55.

Cultures Examined: Polysporous isolates from basidiocarps: HHB 6251 (Holotype), MJL 98, and FP 104297. Isolates from decayed wood that have fruited in culture: ME-8 (from *Nyssa sylvatica* Marsh. [blackgum] wood chip, Brunswick, Ga.); ME-446 (from *Fagus grandifolia* Ehrh. [American beech] wood chip, Winslow, Me.); ME-450 (from

Figs. 8-12. Zeiss drawing tube drawings of microscopic characters of cultures of *Phanerochaete chrysosporium*, HHB 6251. 8. aerial hyphae. 9. submerged hyphae. 10. aleuriospores and conidiophores. 11. arthrospores. 12. chlamydospores.

mixed *F. grandifolia, Betula* sp. [birch], *Acer* sp. [maple] wood chips, Winslow, Me.); ME-461 (from *Pinus* sp. [pine] wood chip, Fargo, Ga.); ML-20, ML-21 and ML-26 (all from *Sequoia sempervirens* (D. Don) Endl. [redwood] cooling tower, Kan.); FPL-V 170G (Shields' isolate from mixed *Abies balsamea* (L.) Mill.-*Picea mariana* (Mill.) B.S.P. [balsam fir-black spruce] wood chips, New Brunswick, Canada); QM 9145 (Nilsson isolate P127-1, from *Pinus* sp. wood chips, Sweden).

Cultures exhibiting only the imperfect state: ME-PC-8 (from *Pinus* sp. wood chip, Fargo, Ga.); ME-GC-15 (from *N. sylvatica* wood chip, Brunswick, Ga.); ME-OC-11 (from *Quercus falcata* Michx. var. *falcata* [southern red oak] wood chip, Brunswick, Ga.); ME-BC-10 (from *F. grandifolia* wood chip, Winslow, Me.); ME-BIC-6 (from *Betula* sp. wood chip, Winslow, Me.); ME-MC-7 (from *Acer* sp. wood chip, Winslow, Me.).

Remarks: Culturally this species differs from other *Phanerochaete* species studied in culture because of its *Chrysosporium pruinosum* imperfect state, its rapid growth rate and its high optimum temperature for growth, ca 40C. It is unusual in that it produces a white rot of wood but tests negative for extracellular oxidases as indicated by the Bavendamm test and tests with syringaldazine and gum guaiac (Harkin and Obst 1973).

## DISCUSSION

The *Chrysosporium* state of this species has been repeatedly isolated from wood chip storage piles in North America, (as *Sporotrichum* sp. by Lindgren and Eslyn 1961; Saucier and Miller 1961; and Eslyn 1967; as *Ptychogaster* sp. by Shields and Unligil 1968, and Shields 1969; and as *C. pruinosum* by Smith and Ofosu-Asiedu 1972); in Sweden (as *C. pruinosum* by Nilsson 1965; and as *C. lignorum* by Bergman and Nilsson 1966, 1967, 1968, and 1971; Bergman, et al. 1970; Assarsson, et al. 1970); and in Poland (as *C. lignorum* by Zielinski 1973). In Sweden (Nilsson 1973) *C. lignorum* was noted to be the most common white rot fungus in all types of chip piles studied. Zielinski (1973) reported it to be one of the most frequently found fungi in two birch piles studied in Poland. The perfect state has been reported also (as "*Peniophora mollis* (Bres.) Bourd. et Galz.?") from redwood in cooling towers (Duncan nd Lombard 1965).

Because of its frequency of occurrence in wood chip storage piles and affirmative results of laboratory decay appraisals (Eslyn 1969), the species has been utilized extensively as a wood-rot test organism. Research by members of this laboratory based on the use of the isolates designated *Peniophora* "G" (ME-461) and *Chrysosporium* sp. (ME-PC-8) included: evaluation of chemicals for controlling biodeterioration in wood chip storage piles (Eslyn 1973a, b, and Springer, et al. 1969); determination of decay resistance of alkaline-treated wood (Highley 1973a, b); investigation of the chemistry of wood decay (Highley 1973c, and Kirk and Highley 1973); and evaluation of two methods of determining wood loss after fungal attack (Feist, et al. 1971).

## ACKNOWLEDGEMENTS

Thanks are extended to Drs. R. S. Smith and E. G. Simmons for furnishing some of the cultures used in this study and to Dr. R. L. Gilbertson, University of Arizona, Tucson, for furnishing laboratory facilities for summer collecting. Confirmation of the identity of the imperfect state by Dr. J. W. Carmichael is acknowledged, with great appreciation. Critical comments on the manuscript by Mrs. F. F. Lombard and Mrs. F. G. Pollack as well as those by Drs. Carmichael and Gilbertson were extremely helpful. The preparation of the Latin diagnosis by Dr. M. J. Larsen is also acknowledged.

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# PEZIZA FLAVOVIRENS, AN OLDER NAME FOR VIBRISSEA PEZIZOIDES

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During the course of Dixon's (1972) monographic studies of *Chlorosplenium*, we had the joint opportunity to examine a specimen from the Fries Herbarium (UPS) labelled "*Peziza flavo-virens* Pers. - Myc. europ. p. 323. France, Mougeot." This is doubtless one of the specimens referred to by Fries (1822), "*In ligno putrido locis udis prostrato in Vogesia* (Mougeot) *& Smolandia cum praeced. Vere.* (v. v.)" It is very possibly part of the same material reported by Persoon (1822), "Hab. in Vogesia in ligno mucido prope rivulos." The specimen is in a fine state of preservation, and clearly provides an older name for the species described by Sánchez (1967) as *Vibrissea pezizoides* Lib. ex Phill. All authors subsequent to Persoon and Fries have merely repeated the brief diagnoses given by these authors, except Rehm (1896: p. 1262) who amplified his earlier description from a specimen (Rehm, Ascom. Exs. No. 1109) which is surely some other fungus. We provide the necessary new combination here:

V i b r i s s e a  f l a v o v i r e n s (Pers. : Fr.) Korf & Dixon, *comb. nov.*

≡ *Peziza flavovirens* Pers. (ut "flavo-virens"), Myc. Eur. 1: 323. 1822, : Fries, Syst. Mycol. 2(1): 139. 1822.

≡ *Helotium flavovirens* (Pers. : Fr.) Fr., Summa Veg. Scand., sect. post., p. 355. 1849.

≡ *Coryne flavo-virens* (Pers. : Fr.) Rehm, in Rabenh., Krypt.-Fl. II 1(3) (Lief. 35): 488. 1891.

≡ *Pachydisca flavo-virens* (Pers. : Fr.) Boud., Hist. Classif. Disc. d'Europe p. 93. 1907.

= *Vibrissea pezizoides* Lib. ex Phill., Trans. Linn. Soc. London II 2: 8. 1881.

= *Apostemidium torrenticola* Graddon, Trans. Brit. Mycol. Soc. 48: 643. 1965.

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# POLYPORUS SQUAMOSUS IN UTAH

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Polyporus squamosus Micheli ex Fries, of common occurrence in Europe, is found less frequently in the United States even though it has now been collected in twenty-six states—twenty-three of which are cited by Overholts(1953). Distribution is primarily in the northeastern and midwestern United States. Shope (1931) found this species in the plains area of Colorado, then its westernmost station. Graff (1936) extended its range to western Montana, while Lowe and Gilbertson (1961) added Washington and Idaho. The present report adds Utah as a new record of distribution for the southwestern United States.

From the beginning of May to the first week of June 1974, P. squamosus was found growing on a living trunk of a wounded Acer negundo L. and on an adjacent stump close to Mill Creek in Mueller Park (Davis County) at an elevation of 5,400 feet. Three specimens had short lateral stipes 1.5-2.0 cm long, while two others had excentric stipes 3-5 cm long. The pilei ranged from 6-24 cm broad and were covered with dark brown scales, some of which were raised. The smooth hyaline spores measured 15.3 X 6.0µ. When specimens were picked, a watery exudate was noticed at the point of severance. Overholts (1953) states that the fungus is watery when young, but in none of the recorded descriptions is this watery exudate mentioned.

In addition to A. negundo, P. squamosus has been found on the following hosts listed by Graff (1936): Acer glabrum Torr., Aesculus octandra Marsh, Populus trichocarpa J. & G., Salix nigra Marsh, Ulmus americana L., Acer, Populus and Salix species. Overholts (1953) adds Betula, Celtis, Liriodendron, Tilia and Umbellularia. According to Smith and Smith (1973) P. squamosus is found frequently on elms.

Graff (1936) discusses the taxonomic history of the fungus. Lowe and Gilbertson (1961) add Polyporus McMurphyi Murr. as a synonym whereas Overholts (1953) accepts P. McMurphyi as a valid species.

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# SOME COMMENTS ON PULCHROMYCES FIMICOLA FROM THE AMERICAS AS NOTED BY W. H. WESTON

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In the fall of 1972, while sorting the files of Prof. W. H. Weston, housed at the Farlow Herbarium and Library of Cryptogamic Botany, Gennaro Cacavio discovered a manuscript, several photographs, negatives, and specimens of a fungus which Prof. Weston had believed to be a new genus and species of Hyphomycetes. The manuscript, dated 1933, was never published. This material was inserted in the general mycological herbarium of the Farlow Herbarium where it was later found by Glenda Winn while she was performing some routine curatorial tasks. It was then brought to the attention of the senior author.

Study of Weston's illustrations and slides brought to mind a paper by Hennebert (1973) in which *Botrytis*-like genera were discussed. The generic identity of Weston's fungus was soon discovered. His manuscript, which anticipated publication of Hennebert's paper by 40 years and Dring's (1959) description of *Phymatotrichum fimicola* by 26, described fully *Pulchromyces fimicola* (Dring) Hennebert from American material. We have studied the type collection of *Phymatotrichum fimicola* kindly lent by the Curator of the Commonwealth Mycological Institute and find all our specimens to be unquestionably referrable to this single species.

One draft of Weston's manuscript was subtitled "An example of Dr. Thaxter's disconcertingly comprehensive

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knowledge of fungi." The following quote, from Weston's manuscript provides an historical note on this species. "Having found this striking and distinctive Hyphomycete on bat dung in the Panama Canal Zone in 1929, the writer, after a year's study of its structure and development, and careful examination of the literature, became convinced it was a rare new tropical genus. When, however, material was finally shown to Dr. Thaxter, he merely glanced at it, remarked drily 'imagine *that* turning up in Panama!' and from his collections brought out material collected in New Haven in 1888-89, Burbank, Tennessee and Cranberry, North Carolina, 1896, and Intervale, New Hampshire, 1901, already labelled [a new genus and species] though not published."

The collections mentioned above, deposited in the Farlow Herbarium general mycological collection, were found on mouse dung, otter dung, and bat dung (Weston's Panamanian collection from Barro Colorado). Weston collected the bat dung from a hollow tree inhabited by fruit bats. Reference was made to this fungus by Weston in Stanley's flora of Barro Colorado (Stanley, 1933). Weston stated that "a few specimens of greater interest which were collected will be described elsewhere, a new species of *Rhinotrichum* by D. H. Linder [and] a new genus, *Aglaocephalum*, by Weston." *Aglaocephalum* Weston is a *nomen nudum* since no Latin description was provided in the Stanley publication or elsewhere. However, this was the first reference, in print, to this fungus.

The American collections studied by us agree with the type specimen (on mouse dung from Africa, IMI 73530) in conidial size, conidial ornamentation, and pigmentation of the conidial heads. We take one slight exception to Hennebert's description of the conidia as being reticulate at maturity. The reticulum, at best, is incomplete. Weston aptly described the conidial ornamentation as composed of "irregular whorls and loops like the patterns of finger prints." The ornamentation is also denser in collections we studied than shown by Hennebert (1973) in his figure 7.

Weston provided some information on conidium germination not previously reported. He found that the spores germinated within 2 to 8 hours in dung decoction, however,

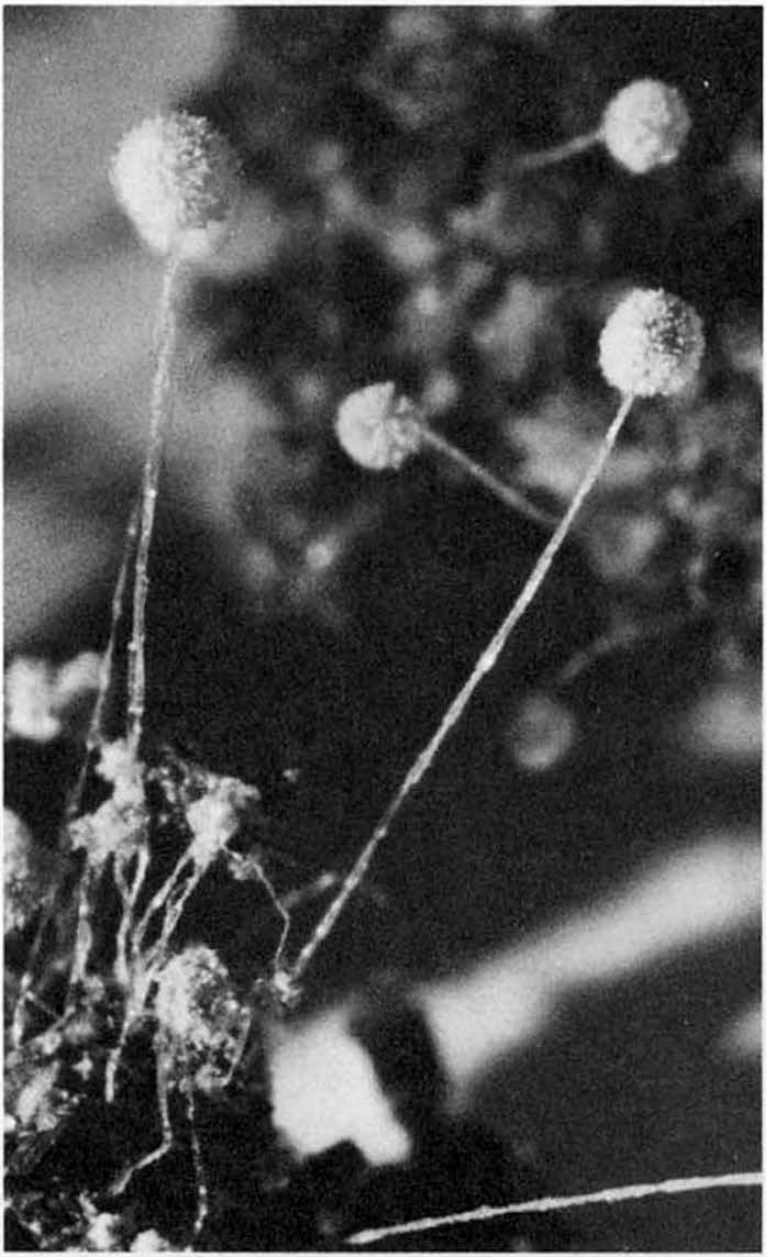
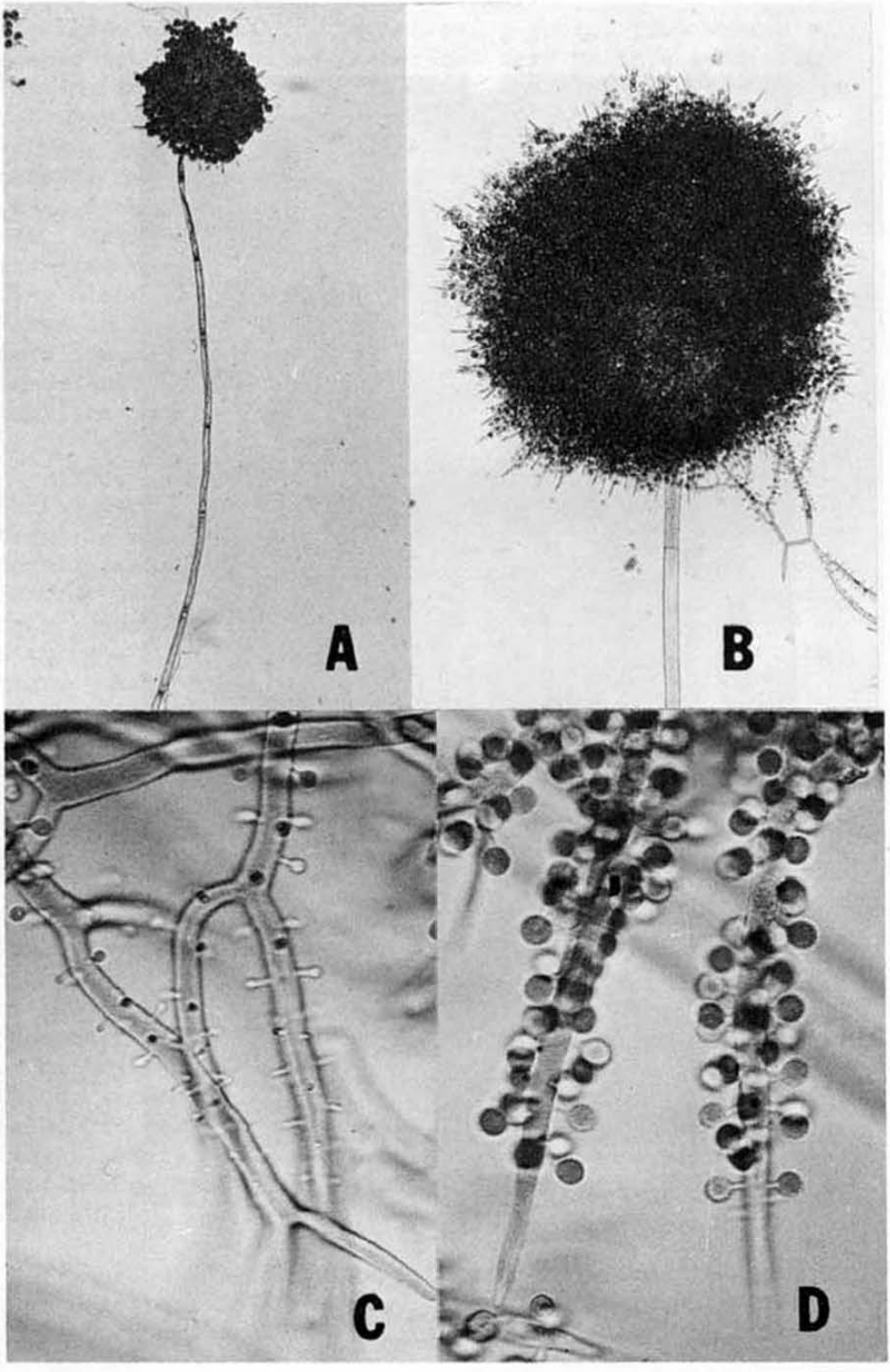


Fig. 1. *P. fimicola*. Habit photograph 15 x, from Weston's Panamanian collection.


A
B
C
D

there was no germination in pure water. The spores initially swelled, then produced stout germ tubes which ruptured the heavy outer wall. Growth continued on dung decoction but ceased immediately when the germlings were transferred to pure water. Cultures were established on cornmeal agar and potato dextrose agar to which rat dung had been added. Weston, like Hennebert and Dring, observed no perfect stage.

We have reproduced here as figures 1-2, Weston's excellent photographs of *Pulchromyces fimicola*. No photographs of this fungus have been published previously.

Our indebtedness to Prof. Weston is obvious; we thank him for sharing with us his enthusiasm and for granting us permission to quote from his manuscript as well as to use the photographs he prepared to accompany his original manuscript.

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Fig. 2. *P. fimicola*. (A) Young conidial head, approx. 13 x, from Weston's Panamanian collection. (B) Conidial head, approx. 44 x, from Thaxter's slide. (C) Developing conidia, approx. 396 x. (D) Mature conidia, appox. 396 x, from Thaxter's slide.

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# I. M. A. NOMENCLATURE NOTICE

## A STUDY IS TO BE MADE ON THE TYPIFICATION OF GENERIC NAMES WITH ALLEDGEDLY MISAPPLIED TYPE-SPECIES NAMES

An invitation to join in discussion is extended to all taxonomists who have wrestled with the problem of the typification of a generic name when the name of the type species is judged to have been misapplied, *i.e.*, when the species referred to as the type or sole species is alleged to be different from the material studied by the author of the generic name. A committee to study this problem is being set up under the auspices of the International Mycological Association's Nomenclature Secretariat, as their Subcommittee F. But because this is a problem not confined to fungus names, the participation of botanists interested or expert in the area would be very welcome. The purpose of the Subcommittee is to make specific proposals for changes in the Botanical Code that bear upon this matter. Persons desirous of participating in the work of the Subcommittee, which will be conducted by mail, should indicate their willingness in a letter addressed to the IMA Nomenclature Secretariat, Plant Pathology Herbarium, Cornell University, Ithaca, N.Y. 14850, USA. Five other Subcommittees are already at work (see notices in TAXON 22(2-3): 321-322. 1973, and in MYCOLOGIA 65(4): 984. 1973).

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# NEW RECORDS AND DISTRIBUTIONS FOR SEVERAL LICHENS IN THE SOUTHEASTERN UNITED STATES

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ABSTRACT

Cladonia merochlorophaea is reported for the first time in the Southern Appalachian Mountains. Sticta limbata, also collected in the Southern Appalachians, is new to eastern North America. Heterodermia corallophora, previously known in North America from a single collection in Tennessee, has been collected at several localities in Florida and North Carolina. The previous report of Heterodermia microphylla in North America was based on a misidentified specimen.

## 1. The occurrence of Cladonia merochlorophaea Asah. in the Southern Appalachian Mountains.

The North American distributions of the four commonest chemically defined species of the Cladonia chlorophaea group were recently mapped by Bowler (1972). For one of these species, C. merochlorophaea, which produces merochlorophaeic and 4-O-methylcryptochlorophaeic acids, the southernmost locality in eastern North America was in western Pennsylvania. Similarly neither Kristinsson (1971) nor Skorepa (1972) reported C. merochlorophaea in either North Carolina or Tennessee respectively. However, in extensive collecting in the high-mountain areas in the Southern Appalachians in 1972 and 1973 I found that C. merochlorophaea is quite common there. Approximately 23% of the specimens belonging to the C. chlorophaea group were C. merochlorophaea while 43% were C. grayi Merr., 27% were C. chlorophaea (Flörke) Spreng., and 7% were C. cryptochlorophaea Asah.

Specimens of C. merochlorophaea examined (all collected by Dey and deposited in DUKE unless otherwise noted):

MOUNT ROGERS. --VIRGINIA. Smyth Co.-Grayson Co.: 5633, 5638.

ROAN MOUNTAIN. --NORTH CAROLINA. Mitchell Co.: Roan High Bluff, 2054, 5782, 5791; Laurel Ridge, 2059.

--TENNESSEE. Carter Co.: Roan High Knob, 2134; Carvers Gap, 2194; Jane Bald, 2257.

BLACK MOUNTAINS. --NORTH CAROLINA. Yancey Co.: Halfback Mtn., 6006, 6031, 6039; Mt. Mitchell, 730; Horse Rock, 5912, 5913, 5916; Celo Knob, 5902.

BALSAM MOUNTAINS. --NORTH CAROLINA. Jackson Co.-Haywood Co.: Richland Balsam, 4756.

PLOTT BALSAM MOUNTAINS. --NORTH CAROLINA. Jackson Co.-Haywood Co.: Waterrock Knob, 6334.

GREAT SMOKY MOUNTAINS. --NORTH CAROLINA. Haywood Co.: Spruce Mtn., 3431A. Swain Co.: Andrews Bald, 2775. --NORTH CAROLINA (Swain Co.)-TENNESSEE (Sevier Co.): Mt. Buckley, 2451; Eagle Rocks, 6476. --TENNESSEE. Sevier Co.: Mt. Sequoyah, 6516; Mt. Guyot, 6614.

2. Sticta limbata (Sm.) Ach., new to eastern North America.

Four collections of Sticta limbata from western North Carolina are the first known localities for this species in eastern North America. Previously S. limbata was known in North America only along the Pacific Coast. The presence of soredia in marginal soralia readily distinguish this species from the other eastern Sticta species. Nephroma parile Ach. and Erioderma mollissimum (Samp.) Du Rietz, two other local superficially similar sorediate lichens, are readily distinguished from S. limbata by the lack of cyphellae on their lower surfaces.

Specimens examined:

BLUE RIDGE MOUNTAINS. --NORTH CAROLINA. Burke Co.: Linville Falls, 7495 (HERB. DEY), 7516 (HERB. DEY, DUKE).

GREAT SMOKY MOUNTAINS. --NORTH CAROLINA. Haywood Co.: Big Cataloochie, 3628, 3630.

3. The distribution of Heterodermia corallophora (Tayl.) Skorepa in North America.

Degelius (1941) made the only report of Heterodermia corallophora (as Anaptychia corallophora) from North America based on a single specimen from rock at Cherokee Orchard, Great Smoky Mountains National Park, Tennessee. In his monograph Kurokawa (1962) cited no specimens of this species from North America and indicated that this species seemed to be restricted to Central and South America and the West Indies. The additional collections of this rare species cited below extend the known range in the United States from Tennessee to North Carolina and south to Florida. Heterodermia granulifera (Ach.) W. Culb., the only other local isidiate Heterodermia, produces salazinic acid and has a corticate lower surface, which distinguish it from H. corallophora. The latter species lacks salazinic acid and has an ecorticate lower surface pigmented yellow-orange (K+ red-purple).

Specimens examined:

FLORIDA. Columbia Co.: O'Leno State Park, 7636 (HERB. DEY, DUKE). Citrus Co.: 4 mi. S. of Inverness, 8189 (HERB. DEY). --NORTH CAROLINA. Brunswick Co.: Smith Island, Culberson 7957. Transylvania Co.: Thompson River Gorge, Moore 1613.

4. Heterodermia microphylla (Kurok.) Skorepa misreported from North America.

Yoshimura and Sharp (1968) made the only report of Heterodermia microphylla (as Anaptychia microphylla) from North America based on a single collection (Moore 618, TENN) from Mt. LeConte, Great Smoky Mountains National Park, Tennessee. Recently I examined this specimen and discovered that it has a corticate lower surface and sparse soredia in labriform soralia. This specimen is H. tremulans (Müll. Arg.) W. Culb., not H. microphylla. Thus Kurokawa (1972) was correct in doubting the occurrence of H. microphylla in North America. Heterodermia microphylla, an endemic of Japan, has an ecorticate lower surface, lacks soredia, but has marginal squamules.

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# ON THE TYPIFICATION OF SCLEROTINIA

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Publication of the generic name *Whetzelinia* Korf & Dumont (1972) for a common plant pathogen, *Sclerotinia sclerotiorum* (Lib.) dBy., and for one or a few additional species previously assigned to *Sclerotinia* led (a) to a proposal for conservation of *Sclerotinia* with *S. sclerotiorum* as its type species (Buchwald and Neergard, 1973), and (b) to a conclusion that *Whetzelinia* is a superfluous name (Dennis, 1974).

Dr. Dumont and I had come to these conclusions:
(1) Honey (1928) had effectively designated *S. candolleana* (Lév.) Fckl. as the type species of *Sclerotinia* Fckl. 1870;
(2) in our opinion, *S. candolleana* and *S. sclerotiorum* belong in different genera;
(3) the only way *Sclerotinia* could continue to be used as a generic name for *S. sclerotiorum* simultaneously excluding *S. candolleana* from the genus would be to conserve *Sclerotinia* with *S. sclerotiorum* or *S. tuberosa* as its type species;
(4) since there are at most a few species involved, proposing conservation for such a small genus might be considered foolish, even though one species is a common and economically important plant pathogen;
(5) proposal of a new generic name *(Whetzelinia)* would accomplish our ends more simply than would a formal conservation proposal processed through the Botanical Congresses.

Buchwald and Neergard (1973) are in apparent agreement with points (1), (2), and (3), above, but hold that there is sufficient literature using the name *S. sclerotiorum* to merit conserving *Sclerotinia* for it. They propose not to conserve *Sclerotinia* against any earlier, competing generic name, but rather to conserve a type species for that generic name. Precedence for just such a peculiar procedure already exists: three generic names of fungi, *Agaricus* Fr., *Boletus* Fr., and *Sordaria* Ces. & de Not. were so conserved merely to fix permanently a type species for each of these generic names.

How many plant pathologists would support such a conservation of *Sclerotinia* is difficult to judge. At a "*Sclerotinia* Workshop-Conference" held Oct. 30 - Nov. 1, 1974, at Beltsville, Maryland, and attended by over 30 of the U.S. and Canadian workers most actively studying *S. sclerotiorum*, I had the opportunity of presenting the arguments both in favor

of and opposed to conservation. They were later polled, and were divided in their opinion, nearly 2/3 favoring typification of *Sclerotinia* by *S. sclerotiorum*, over 1/3 favoring typification by *S. candolleana*.

Dennis (1974) specifically denies point (1) of the Korf and Dumont rationale. He holds that since Honey (1928) had applied principles of the American Code of Nomenclature, specifically the "first species rule," Honey's typification was thereby arbitrary, and we are not obliged to accept it. If so, Clements and Shear's (1931) designation of *S. sclerotiorum* as the lectotype can be accepted; then, necessarily, *Whetzelinia*, based upon the same species, will fall in synonymy. He also champions designation of *S. sclerotiorum* as the conserved type species for *Sclerotinia*, "thus rendering *Whetzelinia* Korf & Dumont superfluous."

Lectotypification is an exceptionally important act in nomenclature, and the Code (Art. 8) insists that the author who *first* proposes such a lectotype "must be followed, but his choice is superseded ... if it can be shown that the choice ... was made arbitrarily." Korf and Dumont (1972) were well aware that the "first species rule" of the American Code was at least partly, perhaps even predominantly, the basis for Honey's (1928) statement, "Type species for these four genera have been designated following the principle of types as outlined in the American code of botanical nomenclature." They were also aware that *other considerations* had crossed Honey's mind and were weighed by him in arriving at his typifications. In the same paper Honey (1928) wrote of another genus: "Fuckel did not designate a type species; yet, because it is the first binomial listed under the genus *Ciboria*, and because this is further supported by citations to illustrations, *C. Caucus* (Reb.) Fuckel is chosen as the type species for the genus *Ciboria* Fuckel." Dennis (1974) seems in error in assuming that Honey "did not make a choice, he thought one was imposed on him by the First Species rule of the American Code of Nomenclature."

Is Honey's designation of *S. candolleana* as the type of *Sclerotinia* truly arbitrary, as Dennis (1974) contends, or is it of sufficient weight that it cannot simply be overthrown by those like Whetzel (1945) who prefer another lectotype, as Dumont and Korf (1971) and Korf and Dumont (1972) held? It is now my belief that there is no clear way to resolve this dilemma short of action by the International Botanical Congress to designate a lectotype species for *Sclerotinia*.

One such proposal (Buchwald and Neergard, 1973), and a restatement of it (Dennis, 1974), to designate *S. sclerotiorum* as the lectotype is already before the Special Committee for Fungi and Lichens of the International Association of Plant Taxonomists. An alternative proposal, which would be preferred by at least some of the *Sclerotinia* workers, is formally proposed here for consideration by that Special Committee. It has the virtue of supporting the first known typification of the genus, rather than of overturning it.

ALTERNATIVE PROPOSAL: To designate *Peziza candolleana* Lév. as the conserved lectotype species of *Sclerotinia* Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 330. 1870.

COMMENT: Those authors who have a broad generic concept for *Sclerotinia* which includes both *S. candolleana* and *S. sclerotiorum* need express no preference for a lectotype species, since designation of either species will allow the continued use of *Sclerotinia sclerotiorum* as a correct name for the plant pathogen of economic importance.

REASONS AGAINST THIS PROPOSAL: Those authors who wish to adopt a narrow generic concept for the common plant pathogen, *S. sclerotiorum*, would be forced to select either *Myriosclerotinia* Buchw. 1947 for it (if they consider *S. scirpicola* Rehm, generitype of that name, to be congeneric), or *Whetzelinia* Korf & Dumont 1972 for it (if they consider *S. scirpicola* to be a member of another genus). The literature on *S. sclerotiorum* is so vast that such a change in names would be confusing. *S. candolleana* and its allies already have an available generic name, *Ciborinia* Whetz. 1945.

REASONS FOR THIS PROPOSAL: Within perhaps a decade much of the recent literature on *S. sclerotiorum* and its very few close relatives could be retrieved under the unambiguous name *Whetzelinia* rather than being diffused under *Sclerotinia*. Nearly all of the more than 275 epithets combined under *Sclerotinia* are no longer considered congeneric with *S. sclerotiorum* by modern taxonomists. *Sclerotinia*, even in the recent literature, is a genus of widely varying limits according to the author consulted. (In parts of Europe it continues to be used in a very wide sense: Dennis's (1968) arrangement places in synonymy with it *Botryotinia*, *Ciborinia*, and *Myriosclerotinia*; Dennis's (1958) treatment synonymizes not only these three genera, but also *Ovulinia* and *Stromatinia*.)

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