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THE OSTROPALEAN FUNGI[1]

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I. Introduction

The evolution of a scheme of classification for Ascomycetes whose asci are borne in open, more or less cup-shaped fruting structures has proceeded by a series of approximations. Each of these has gained currency for a time and then gradually fallen into disuse, leaving behind a legacy of generic names which are either incorporated into the succeeding system, ignored, or abandoned.

This paper traces the nomenclatoral and taxonomic history of the Stictidaceae, and outlines a set of characters by which genera formerly assigned to that family may be redisposed in a manner compatible with current standards of classification. An emended concept of the order Ostropales, to which many of the genera belong, is presented, and the relationships of the order discussed.

The proposed system of classification is morphological, and is, where possible, based on principles of predictive value and utility. Attempts have been made to make generic delimitations in the Stictidaceae compatible with those in other groups by stressing those characters considered important elsewhere in the Ascomycetes.

II. Historical Background

The small, saprophytic fungi which comprise the Stictidaceae attracted little attention before the beginning of the nineteenth century. *Stictis radiata* may have been formally described by Linnaeus, although the identity of *Lycoperdon radiatum* L. is questionable. Official recognition of the group came in 1799, when Persoon erected the genus *Stictis*, with three species, two of which were immersed discomycetes. The third was considered atypical and was soon transferred to *Agyrium*. Persoon (1801) submerged *Stictis* in *Peziza*. It appeared again as a distinct genus in Gray's (1821) Natural Arrangement of British Plants, and was treated in an expanded form by Persoon (1822) and Fries (1822).

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Fries (l.c.) assigned *Stictis* to the Helvellacei (Cupulatae) ** Dermeae, along with *Ditiola*, *Tympanis*, and *Cenangium*, genera not subsequently associated with the Stictidaceae. *Stictis* was there divided into three subgenera: *Stictis* (or *Corticiae*), *Propolis*, and *Xylographa*, based on such macroscopic characters as fruitbody shape and texture.

There is no evidence that Persoon or Fries examined *Stictis* microscopically. Early attempts to resolve the cylindrical asci and filiform spores of *Stictis* must inevitably have met with failure, given the quality of the microscopes available. Schweinitz (1832) attempted to illustrate the hymenium of *S. sphaeroboloidea*, but mistook the brown tips of the paraphyses for conidia and was unable to distinguish the asci. Fries's (1822) statement that the Dermeae are ascigerous is simply an expression of the then-current belief that all hymenomycetes had asci. In the absence of microscopic observations, the connection between *Stictis*, *Ostropa*, described as a pyrenomycete, and *Schizoxylon*, described as a lichen, was not recognized.

The history of the taxonomy and nomenclature of the Stictidaceae is intimately connected to that of certain groups of lichens. Historically and nomenclatorally, the taxonomy of lichens has an earlier starting point than that of non-lichenized Ascomycetes; many of the conspicuous species were described before 1800. The tradition of separating lichenological and mycological taxonomy antedates recognition of the symbiotic nature of the lichen association. Even when the significance of the term "lichen" was well established, there remained a persistent tendency for mycologists to describe lichens as fungi, overlooking the presence of symbiotic algae.

Once a taxon has been assigned to the wrong group, only luck, or a systematic investigation of dubious names, will extricate it. Despite a growing movement to merge the arrangement of lichenized and non-lichenized fungi, all existing comprehensive keys employ lichenized/non-lichenized as a major dichotomy. Santesson (1952) lists 22 genera and 85 species of foliicolous lichens described as fungi, and indicates that numerous fungi are described as foliicolous lichens. A similar, if numerically less impressive result encountered in the Stictidaceae provides an additional argument for the construction of a system of Ascomycetes which subordinates the presence or absence of a lichen thallus to ascocarp morphology. The importance of lichenological training to mycological taxonomists, and vice versa, cannot be overemphasized.

Fries's (1821-1832) outline classification of microfungi bears little resemblance to that used today. The advent of achromatic lenses and consequent improvement of microscopes in the 1830's permitted mycologists to examine details of hymenial configuration and propose the division (now almost universally accepted) of higher fungi into Ascomycetes, Basidiomycetes, and Fungi Imperfecti.

To the existing criteria of ecological niche, fruitbody shape, size, color, and nature of the spore-bearing apparatus, Corda (1838) added those of spore color and pattern of septation. Both had been used sporadically in earlier works but could not be systematically applied since only large-spored or profusely sporulating species could be investigated. Corda assigned immersed, non-stromatic discomycetes to four genera: *Stictis*, with unicellular, colorless, ovoid spores; *Propolis*, with acicular, colorless, non-septate spores; *Cryptodiscus*, with transversely septate, colorless, ovoid spores; and *Melittosporium*, with brown muriform spores. The habit of classifying small fungi by gross fruitbody characteristics and spore morphology, perpetuated by Saccardo, proved exceedingly persistent. The criteria for assigning species to genera and creating new genera in the Stictidaceae remained virtually unchanged from 1838 to 1932.

The details of Corda's generic delimitations disappeared almost immediately. Fries (1849) listed seven genera of immersed discomycetes and erected the family Stictidaceae to accomodate them. A comparison of the generic concepts of Fries (1822, 1849), Corda (1838) and accepted modern viewpoints (Dennis, 1968; Poelt, 1969) reveals that they have little in common. For reasons discussed in section 9, none is completely tenable nomenclatorally.

TABLE 1

GENERA OF STICTIDACEAE

Fries, 1822	Corda, 1838	Fries, 1849	Modern
Cryptomyces (Stict?)	_____	*Cryptomyces* (Stict.)	*Cryptomyces* (Phacid.)
Stictis subgen. *Propolis* p.p.	*Stictis* p.p.	*Propolis* (Stict.)	*Propolis* (Helot.)
Stictis subgen. *Xylographa*	*Stictis* p.p.	*Xylographa* (Stict.)	*Xylographa* (lichen)
Stictis p.p.	_____	*Schmitzomia* (Helot.)	*Stictis* (Stict.)
_____	_____	*Naevia* (Stict.)	?
Stictis subgen. *Propolis* p.p.	*Propolis*	*Propolis* *b. epiphylla* (Stict.)	*Naemacyclus* (Phacid.)

_____ = not handled
Stict. = Stictidaceae
Helot. = Helotiales
Phacid. = Phacidiales

The modern concept of these genera is little altered from that of Rehm (1887-96), and evolved as follows.

Propolis (Fr.) Fr., although nomenclatorally invalid, was adopted by all subsequent authors except Montagne (1856). Corda's use of the name *Stictis* for immersed species with ovoid unicellular spores is untenable, since it implies exclusion of all of Persoon's original species. *Xylographa* retains its original circumscription, but must be regarded as a genus of lichens.

Fries (1849), ignoring Corda's arrangement of the genera and again delimiting his taxa on macroscopic characters, chose *Stictis pallida* as the type of *Stictis* and proposed the name *Schmitzomia* for *Stictis radiata* and three other species.

Fuckel (1870) characterized *Stictis* as a genus of filiform-spored Ascomycetes. This was also the position taken by Durieu and Léveillé (Bory & Durieu, 1850), although their taxonomic judgements are difficult to assess since no text accompanies the illustrations. Fuckel described *Stictis pallida* (now *Cryptodiscus pallidus*) as having "Schläuche und Sporen wie bei *Stictis radiata*, nur kleiner", and concluded, on this basis, that *S. radiata* should not be excluded from *Stictis*. It is probable that his specimen of *S. pallida* was misidentified. *Schmitzomia* continued for a time to be used for *S. radiata* and its allies (Karsten, 1871; Phillips, 1887), but was gradually replaced by *Stictis*. In the meantime *Schizoxylon* had been removed from the lichens and redescribed (Bory & Durieu, 1850; Tulasne & Tulasne, 1865), and was transferred to the Stictidaceae by Fuckel, who added several additional species to the genus.

Rehm (1887-96) removed *Ostropa* and *Robergea* from the pyrenomycetes and placed them in a separate family, the Ostropaceae, believed to be closely related to the Stictidaceae, a decision approved by von Höhnel (1917c), who also (1911a) suggested that *Vibrissea* and *Apostemidium* were related to *Schizoxylon*.

The period 1850 - 1920 saw the addition of many genera and species to the Stictidaceae. Some are admirably described and unambiguously typified. Most are not. The problems of lost or fragmentary type specimens, species defined on host or geographical range, or described without any clue as to how the differed from other species of the genus, genera based on misapplied specific names, inaccurate published descriptions, or arbitrary criteria, and occult or ill-conceived designation of lectotypes, are familiar to any taxonomist and are discussed under the generic headings to which they apply in section 9.

Following the suggestion of von Höhnel (1911a, 1917c), Nannfeldt (1932) transferred *Vibrissea, Apostemidium, Stictis*, and *Schizoxylon* to the Ostropaceae, rejecting the older family, the Stictidaceae, as one which was highly heterogeneous and unnatural. The species which he examined, a minute fraction of the total, all have cylindrical asci with a prominent apical thickening and long, filiform spores. Nannfeldt recognized a separate order, the Ostropales, for the family, whose ascus morphology paralleled that of the Clavicipitales among the pyrenomycetes.

A division of the Ascomycetes into three major groups, the Plectascales, Ascoloculares, and Ascohymeniales, was proposed. The Plectascales need not concern us here. Briefly, the Ascoloculares (Loculoascomycetes of American authors) were characterized by fruitbodies which develop as naked locules in a stroma and lack true paraphyses. Bitunicate asci and muriform brown spores were cited as correlated characters. In contrast, the Ascohymeniales were characterized by ascocarps derived at least in part from carpocentral elements, and the possession, in most groups, of true paraphyses.

Luttrell's (1951) observations on ascus dehiscence, reemphasizing the fact that key genera of the Loculoascomycetes have functionally bitunicate, jack-in-the-box asci, a character not found in typical non-lichenized Ascohymeniales, underlined the profound distinction between the two groups. Bitunicate asci, being easier to observe than the original developmental distinctions, soon became the major criterion for inclusion in the Loculoascomycetes (Luttrell, 1973).

Careful examination of ascus morphology and arrangment of excipular tissue led Nannfeldt (1932) to follow von Höhnel's lead in removing many former Stictidaceae to the Dermateaceae, where they were included in the Peziculoideae and Naevioideae. Other genera were mentioned, but could not be satisfactorily accomodated in the classification as presented in 1932. Many genera of the former Stictidaceae were ignored entirely.

Few of these have been revived by subsequent authors. Of the genera treated here, fifteen do not appear in The Fungi, volume IV-A (Korf, 1973; Luttrell, 1973) and cannot reasonably be considered synonyms of genera which appear there, are not mentioned by Nannfeldt (1932), and do not seem to have been picked up elsewhere in the post-1932 literature, yet may represent acceptable taxa of non-lichenized fungi.

Two additional post-1932 developments deserve mention. In contrast to the black-and-white distinction between Loculoascomycetes with bitunicate asci and Euascomycetes with unitunicate asci proposed by Nannfeldt and Luttrell, Chadefaud and his colleagues stress morphology and development of asci and ascocarps at a much finer level of resolution and have proposed a system of terminology not obviously compatible with the one favored in this country. Details of their accounts of the Ostropales are discussed in section 3.

Recent attempts to integrate lichenological and mycological taxonomy have earmarked the Ostropales as a group closely related to certain groups of lichens. Vězda (1966) suggests that *Ramonia* (and, by analogy, other genera he proposes to remove from the Gyalectaceae and combine with the Thelotremataceae) may be related to *Stictis*. Hale and Culberson (1970), Poelt (1973) and Henssen and Jahns (1974) all assign the Thelotremataceae to the Ostropales. Gilenstam (1974) considers *Conotrema* to belong to the Ostropaceae.

Unresolved taxonomic problems in the Ostropales include the validity of the order as defined by Nannfeldt, the apparent contradiction between Bellemère's account of development in *Stictis* and the statement that the genus is ascohymenial, the relationship of *Conotrema* and the Thelotremataceae to the non-lichenized Ostropales, the relationship of the Ostropales to other orders of Ascomycetes, and the disposition of unassigned genera and species of the Stictidaceae. These are addressed in the following sections.

III. Materials and Methods

I base my conclusions almost exclusively on field work and on the examination of dried specimens obtained from herbaria. The Stictidaceae, which are subject to alternate wetting and drying in their natural habitat, are unusually amenable to preservation by drying. A properly preserved specimen cannot be distinguished macroscopically or microscopically from one freshly collected in the field.

If a taxonomic judgement is somehow tied to the type of a taxon, the value of the judgement is greatly enhanced. This becomes critical if the taxon is poorly known or if conflicting opinions concerning its nature appear in the literature.

The type of a genus is a species and the type of a species a specimen. For those genera not adequately covered in the literature I have sought to discover the type species and examine its type specimen. When this has proven impossible or impractical, I have relied on authentic material identified by the original author, published exsiccati, and other reliably identified specimens such as material from the herbarium of an author who published a revision of the genus.

For routine examination, individual apothecia were dissected from the specimen in blocks of substrate, rehydrated in 2% aqueous aerosol detergent solution, and sectioned in dilute commercial mucilage at 15µm on a freezing microtome. Intact apothecia of *Stictis* are strikingly hydrophobic and cannot be rehydrated in water in a reasonable length of time. Crush mounts and hand sections were made to isolate individual asci for examination, and also proved useful for rapid identification of some species. Melzer's reagent proved to be the most satisfactory mounting medium; rehydrated sections were mounted and examined immediately. Later, the slides were infiltrated with glycerine and sealed for permanent storage. No changes in dimensions were observed in old slides, but the J+ blue reaction, as well as the dilute amber stain localized in the cytoplasm, faded rapidly in storage. I employed india ink to demonstrate gelatinous sheaths on spores. After failing to demonstrate that rehydrating sections in KOH altered the hymenial iodine reaction in *Stictis radiata* and *Cryptodiscus pallidus*, both species in which the reaction is variable, I abandoned this technique.

Miscroscopic observations were made using an Olympus microscope with ocular micrometer. The illustrations are free-hand renditions of individual specimens, except where noted in the caption.

Measurements given in the text are standardized as follows: Apothecial diameters include the thickness of the margin, and are measured at the surface of the substrate. Obviously immature specimens are exluded. The breadth of the margin is measured to the nearest 5μm at the broadest point, usually at or a little above the tips of the paraphyses. The length of the paraphyses is taken as the depth of the hymenium. In stating the dimensions of asci, I have listed the lengths of asci containing septate spores and the breadth of the ascus at the base of the cap. If a second number appears in parenthesis it is the breadth of the broadest part of a saccate ascus. Spores of filiform-spored species were measured while still in the ascus, since they could not readily be separated from it and their length tends to be quite variable. Breadth of spores was measured at the broadest point, whether apical, median, or submedian. Numbers in parentheses indicate extreme values. Abnormal, unusually large spores are frequently encountered in the Ostropales.

The only species examined in a fresh condition during the course of this study were *Stictis radiata, S. ostropoides, Schizoxylon buriticai,* and *Robergea albicedrae.* Specimens in a desiccated but unprocessed condition were allowed to equilibrate in a moist chamber for 4 - 6 hours before being suspended over a plain agar surface. Moist specimens were allowed to discharge their specimens immediately. Both the number of apothecia and the number of asci discharging spores were low. Cultures obtained from mass ascospore isolates were incubated at 15 and 21° C on potato dextrose agar for one month before being transferred to tubes. No fruiting structures or spores were observed, and the attempt to culture further specimens was abandoned. Cultures identical to those from mass ascospore isolates of *S. radiata* were obtained from portions of excised hymenium from the same collection.

IV. Morphology

A. Vegetative and Imperfect Stages

The vegetative thallus of an Ostropalean fungus consists of intramatrical, narrow (usually less than 2.5 μm), septate, crystalliferous hyphae. In natural collections it is rarely possible to identify elements of the thallus with certainty, except in the immediate vicinity of the ascocarp, since the substrate is normally invaded by other fungi. Abundant production of crystals by the vegetative hyphae of some species, notably *Robergea albicedrae,* gives the substrate a whitish, mealy appearance. This whitening is almost certainly influenced by host pigmentation and other environmental variables, and so is unlikely to be of taxonomic significance. It is useful in locating Ostropales in the field.

Nannfeldt (1932) considered the lack of reported imperfect stages to be a significant characteristic of the order. Tulasne and Tulasne (1865) reported pycnidia containing small, unicellular, colorless spores in a collection of *Schizoxylon sepincola.* Similar pycnidia were reported by Davidson and Lorenz (1938) in *Sch. microsporum*, Bellemère (1967) for *Stictis radiata*, and Gilenstam (1974) for *Conotrema urceolatum*. I have been unable to confirm the association of pycnidia with *S. radiata*. Pycnidia in the other three species are small, erumpent, and more or less spherical, with a wall consisting of a few layers of brown hyphae similar to those of the wall of the perfect stage. This is lined with a compact palisade layer of simple conidiogenous cells. In *Schizoxylon sepincola* these are phialidic. The condiogenous cells of *Sch. microsporum* and *C. urceolatum* are exceedingly small, and I am unable to resolve their structure with a light microscope. Symmetrical conidia suggest that they, too, are phialidic.

Davidson and Lorenz (1938) obtained mycelial cultures from mass pycnidiospore isolates of *Sch. microsporum* and were later able to reinfect the host with these cultures, obtaining pycnidia in artificially induced lesions. This species, then, is at least potentially able to reproduce asexually, which agrees with the authors' statement that the pycnidial stage was more common in nature. The function of pycnidiospores in other Ostropales is unknown.

Distinctive imperfect stages, when known, have proven useful in clarifying the taxonomy of Ascomycetes. Pycnidia such as those described above are found in many groups of Ascomycetes and hence are not a useful character in delimiting the order. Given the difficulty in ascertaining whether a pycnidium is genetically associated with an Ostropalean fungus in nature, any attempt to use conidial stages to delimit species must await production of the conidial stage in culture. Gary Samuels (personal communication) reports pycnidia in a species of *Stictis* in culture, so there is reason to believe that pycnidial characters may one day be incorporated into the classification.

B. The Perfect Stage

General Considerations

Most recent systems of classification divide apothecial Ascomycetes into two groups - Ascohymeniales or Euascomycetes, and Ascoloculares or Loculoascomycetes. The former are characterized by true paraphyses and marginal tissues derived at least in part from carpocentral elements, the latter by pseudoparaphyses (or no paraphyses at all) and marginal tissues derived from stromatic elements. Controversy surrounds the placement of groups with a stromatic margin and true paraphyses, but, in general, those forms (for example, the Coronophorales) with unitunicate asci are considered ascohymenial even if the marginal tissues are stromatic in origin.

Before discussing the anomalous nature of the Ostropalean ascocarp, it would be useful to review the structure of a typical apothecium.

In *Cyathicula coronata* (Bull.) de Not. (Figure 1a), as in most members of the Leotiaceae, the apothecia are complex, highly-developed fruitbodies characterized by a parathecium

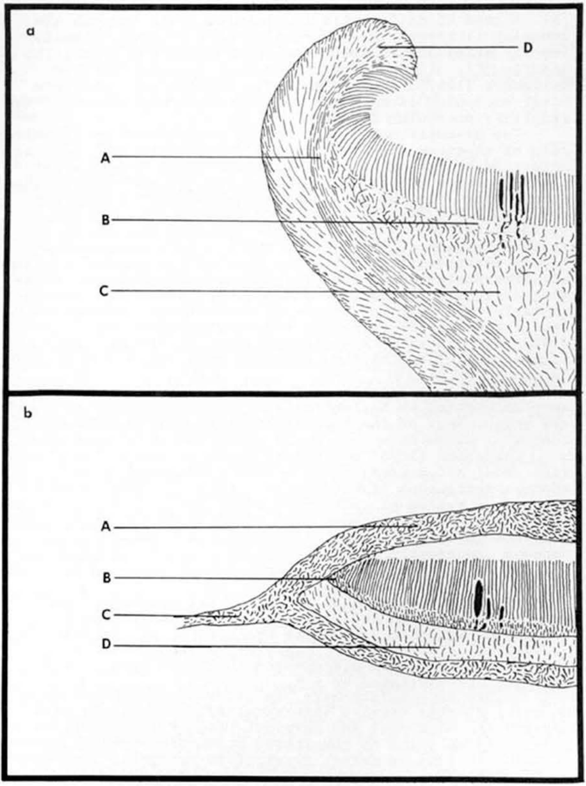

FIGURE 1. a. *Cyathicula coronata*. A = Parathecium. B = Subhymenium. C = Medulla. D = Amphithecium. b. *Rhytisma acerinum*. A = Roof of conceptacle. B = Annular margin. C = Stroma. D = Internal region of conceptacle. Adapted from Bellemère (1967).

(A), a zone of hyphae which arises from the parathecial muff surrounding the carpocenter and gives rise to the amphithecium

(D). A zone of differentially staining cells beneath the hymenium is termed the subhymenium (B); tissues, usually loosely organized, beneath the subhymenium are termed the medulla (C). Figures and terminology are adapted from Bellemère (1967). In Korf's (1973) terminology, the term ectal excipulum is used for parathecium + amphithecium, and medullary excipulum for medulla.

The discostromatic apothecium, exemplified by the ascocarp of *Rhytisma acerinum* (Pers.) Fr. (Figure 1b), is characterized by having an annular margin (also termed a pericentral plexus by Letrouit-Galinou [1968]) surrounding the carpocenter. At the margin of a discostromatic ascocarp there is a region containing both basally-attached and apically-attached filaments. The ascocarp expands by lateral expansion of the plexus, which I have consequently termed meristematic. The inner face of the plexus is a zone of differentiation of the paraphysogenous apparatus. Bellemère designates A and D by the neutral terms "toit du conceptacle" and "partie interne du conceptacle" respectively. Powell (1974), following the interpretation of Nannfeldt (1932) and others of a Rhytismataceous fruitbody, calls (A) stroma and (D) apothecium, implying that the former is vegetative in origin.

Numerous variations on these two basic apothecial types were documented by Bellemère (1967). The descriptive terms are independent of the Loculoascomycete-Euascomycete dichotomy. Bitunicate asci occur in apothecia of both types.

Chadefaud (1973) recognized three principal types of asci among Ascomycetes which actively discharge their spores: nassaceous (functionally bitunicate, with a nasse apicale or system of rods surrounding the apical pore of the endoascus), annelascaceous (functionally unitunicate, with a distinct amyloid or inamyloid apical ring) and archaeascaceous (apparently bitunicate, with rostrate or bilabiate dehiscence). Operculate asci were viewed as a modification of the annelascaceous ascus.

The interrelationship of apothecial morphology and ascus dehiscence in defining orders of discomycetes is summarized in table 2. Orders are entered as circumscribed by Luttrell (1973:L), Korf (1973:K), and Poelt (1973:P). Groups containing non-discomycetous (in the broad sense) elements are indicated by p.p.

Modern mycologists have, in general, considered paraphyses and other sterile interascal filaments to be less significant than asci and marginal tissues in delimiting orders. In addition to compressed stromatic remnants found in many Loculoascomycetes, mycologists recognize two classes of sterile threads: paraphyses, which grow upward from the base of the centrum and have free ends, and pseudoparaphyses, which grow downward from the roof of the centrum and are ultimately attatched both apically and basally. In some lichens and Sarcosomateae the interascal filaments branch and anastomose to form a complex network. Apical filaments arising from a true perithecial wall occur in the Hypocreales. Sterile interascal threads are completely absent in some groups. Mycologists have widely assumed that pseudoparaphyses occur only in the Loculoascomycetes, and

TABLE 2

ORDERS OF DISCOMYCETES

ASCUS DEHISCENCE AND APOTHECIAL MORPHOLOGY

	Nassaceous	Annelascaceous	Archaeascaceous
Lenticular Disco-stromatic	Hysteriales (L) Microthryiales pp (L) Arthoniales (P) Graphidales (P) (Melaspileaceae)	Phacidiales (K) Graphidales (P)	
Parathecial	Hysteriales (Patellariaceae) (L)	Helotiales (K) Pezizales (K) Ostropales *(Vibrissea)* (K)	Lecanorales (P)
Other	Myriangiales (L) Microthyriales pp (L) Dothideales pp (L)	Ostropales (K) Medeolariales (K)	Lecanorales (P)

and that true paraphyses are never associated with bitunicate asci. Both hypotheses deserve further investigation. According to Bellemère (1967), paraphysoids (= pseudoparaphyses) occur in *Therrya fuckelii* and *Propolis faginea;* Janex-Favre (1964) and Letrouit-Galinou (1968) report both paraphysoids and paraphyses in species of *Graphis*. None of these genera has bitunicate asci. Poelt (1973) includes both genera with true paraphyses and genera with netlike anastomosing paraphyses in the Lecanorales.

The use of ascospore characters to delimit taxa above the rank of genus has fallen into disrepute in recent years. Nonetheless, one cannot help but be impressed by the near-constant association between certain ascospore characteristics and such unquestioned criteria as ascus dehiscence and fruitbody morphology. The characters discussed below seem to segregate along family lines.

The Pezizales, Tuberales, Medeolariales, and Cyttariales, as well as most Basidiomycetes, are characterized, without exception, by unicellular spores. The remaining orders of discomycetes are characterized by unicellular or septate spores. From this I conclude that the loss of septa in an originally septate spore is a matter of common occurrence, but that septa do not normally arise *de novo* in a group which does not already have septate ascospores.

The occurrence of muriform spores in the Helotiales and Phacidiales is questionable. Customarily, mycologists consider muriform spores as characteristic of the Loculoascomycetes. They also occur in the Lecanorales, Graphidales, Thelotremataceae, and Ostropaceae. It would appear, empirically, that the ability or lack thereof to form longitudinal septa in an ascospore has significance at the ordinal level, although it is not immediately obvious why this should be the case.

Color and ornamentation serve to define several distinct families (e.g. Ascobolaceae, Buelliaceae), but have little

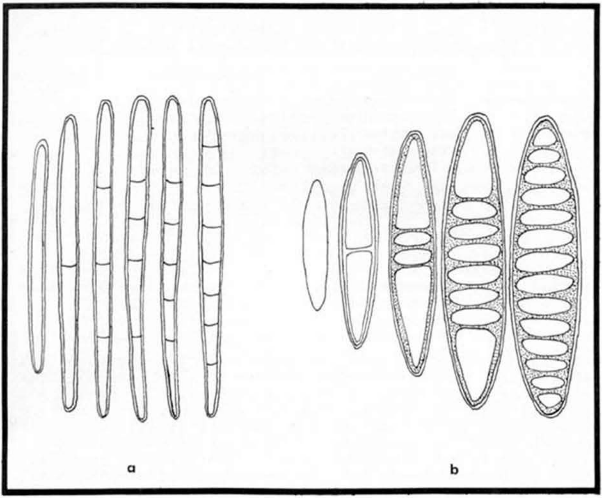

FIGURE 2. a. Normal sequence of ascospore septation in *Stictis friabilis*. b. Graphidean ascospore septation in *Ocellularia* sp. (Diagrammatic).

significance at the ordinal level. Loculoascomycetes tend to be brown-spored, inoperculate discomycetes hyaline-spored.

The normal number of ascospores per ascus is 8. Deviations from this number occur in most groups, and are considered, at most, of generic significance. Polysporous asci may arise in one of three ways: by initial formation of more than 8 spores, by budding of primary ascospores within the ascus, or by disarticulation of initially septate spores. The ontogenetic history of polysporous asci may be of considerable taxonomic significance. Initially polysporous asci are characteristic of the Pezizales, disarticulating spores of the Hypocreales.

Asci with fewer than 8 spores arise either by the initial delimitation of fewer than 8 spores or by abortion. Abortion of ascospores to leave asci with a variable number of spores is characteristic of the Graphidales and Thelotremataceae.

A striking feature, and one which has been little emphasized in the classification of Ascomycetes, is the sequence of spore septation. Unless the mature ascospore has cells of unequal sizes, the first septum in a maturing ascospore is normally median. Subsequent septa may be laid down in one of two ways. In most inoperculate discomycetes septation proceeds as in *Stictis friabilis* (Figure 2a); each successive septum divides an existing cell into approximately equal pieces. Many lichens, on the other hand, have spores such as those of *Ocellularia* (Figure 2b), in which septation proceeds distally toward the poles and immature spores have cells of markedly unequal sizes. Spores of this second type have unequally thickened walls and a lens-shaped lumen; the wall is obviously laminate when viewed with a light microscope and in most instances the inner wall stains red or purple at some stage in development. The peculiar morphology, development, and histochemistry of this spore have long been known (Nannfeldt, 1932; Janex-Favre, 1964; Henssen & Jahns, 1974), but no systematic attempt has been made to erect taxa above the rank of family using it as a primary character. Spores of this type occur in genera with unitunicate and bitunicate asci, and in both pyrenomycetes and discomycetes. Endascosporic cells have been demonstrated in a few taxa (Morgan-Jones, 1973).

The conidia of some species of *Helminthosporium* have an apparently similar structure and also become septate in an unusual manner. The first septum is eccentric and close to the point of attatchment to the conidiophore; septation proceeds toward the apex. Luttrell (1963), who investigated the phenomenon, termed the sequence of septation acrosporous and the spore distoseptate. The spores of *Helminthosporium* do not turn red in iodine solutions and the perfect stage *(Cochliobolus)* has thin-walled, normally septate spores.

To apply Luttrell's terms to the ascospores of lichens would imply some sort of phylogenetic relationship between the two structures. I prefer to use a separate term, GRAPHIDEAN (from *Graphis*, a genus with this type of spore) for the lichen ascospore.

For purposes of the discussion which follows, stroma is defined as a layer of dark-colored, morphologically differentiated vegetative cells. This is the morphological, rather than the ontogenetic, definition. An apothecium may be discostromatic in Bellemère's, or ascolocular in Nannfeldt's system, and yet lack a stroma as defined here.

Marginal Tissues of Ostropales

The complexity and small size of Ostropalean marginal tissues have prevented their being used to delimit taxa in the group. With the current emphasis on marginal tissues as a taxonomic criterion in other families of discomycetes it becomes necessary to examine the Ostropalean margin in greater detail.

Before discussing recent attempts to characterize Ostropalean marginal tissues, some mention should be made of their use in older classifications. Marginal color, an easily observable character, was often used for delimiting species and was the basis for segregating *Cyclostoma* from *Stictis*.

Fries (1849) considered a hymenium which separated from the margin when dry to be significant and used this character to separate *Schmitzomia* from *Stictis*. Nannfeldt

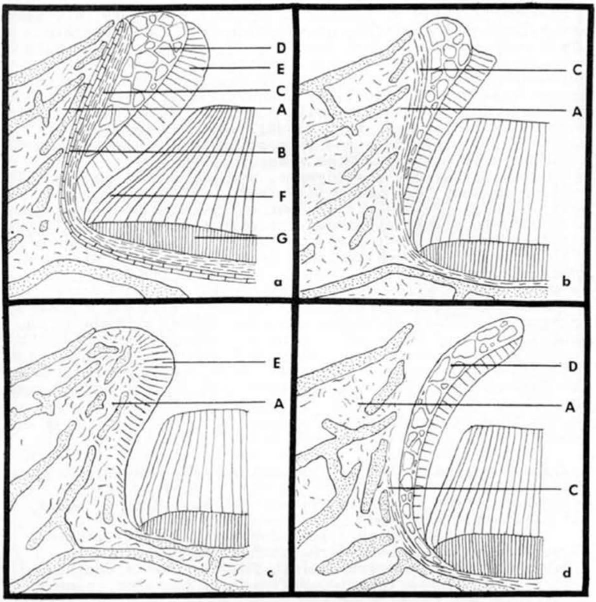

FIGURE 3. a. *Stictis bicolor*, cross section of apothecium. b. *S. radiata*. c. *S. graminicola*. d. *S. sphaeroboloidea*. (Diagrammatic). A = Thalline margin. B = Stroma. C = Wall. D = Crystalline layer. E = Periphysoids. F = Hymenium. G = Subhymenium.

(1932) distinguished between the hyphal excipular structure of *Stictis* and *Schizoxylon* and the pseudoparenchymatous structure of *Vibrissea*. Christiansen (1954) used the presence of periphysis-like hyphae in the margin to separate *Stictis* and *Schizoxylon*.

I have chosen to regard the complex, multilayered margin of species such as *Stictis bicolor* (Figure 3a) as a representative type from which the others can be derived by reduction. The small, deeply urceolate fruitbodies are immersed in wood which has become permeated with the vegetative hyphae of the fungus. In the neighborhood of the apothecium disintegrating wood and hyphae may become compacted to form a spurious THALLINE MARGIN.

In some species of *Stictis* there is a well-defined STROMA surrounding the apothecium; it may or may not enclose host tissue.

The WALL of the ascocarp is a compact layer of thin-walled, colorless or brown, non-carbonized hyphae lying between the stroma and the CRYSTALLINE LAYER.

The inner face of the margin of *Stictis* is lined with a layer of simple to branched filaments oriented more or less perpendicularly to the wall. By analogy with similar structures in lichens, these are termed PERIPHYSOIDS. Between the periphysoids and the wall there is a prominent layer of crystalline material. In the literature this is presumed to be calcium oxalate (cfr. Christiansen, 1954), but I can find no evidence that this has been investigated chemically. Variability in the color reaction produced with KOH in species of *Schizoxylon* suggests that other substances may be present.

The stroma and wall may be complete, or the SUBHYMENIUM, a cushion-shaped pad of small, angular, thin-walled cells, may rest directly on the substrate. When dry, the HYMENIUM separates from the margin.

Numerous, well-developed, persistent paraphyses are characteristic of all Ostropalean fungi. In most species all of the paraphyses are identical, but in a few the outermost ring of paraphyses is agglutinated and differentially pigmented. These are termed MARGINAL PARAPHYSES.

The terminology I have given is a synthesis of several attempts to describe the structure of *Stictis* or closely related genera. Davidson and Lorenz (1938) provided a detailed drawing of *Schizoxylon microsporum*, but referred to the margin simply as a "black upper covering layer". Christiansen (1954) illustrated the margin of *Stictis radiata* and compared it with the margin of his new genus *Nanostictis*. In a monograph of *Conotrema*, Gilenstam (1974) employed a terminology which I have adopted with some modifications. None of the species of *Conotrema* has a prominent crystalline layer, and the terms he used for stroma and wall are cumbersome, albeit descriptive.

The term thalline margin, as used by Gilenstam, means lichen thallus. Lichenologists include under the term thalline margin any marginal tissue containing algae. Gilenstam's account of its origin in *Conotrema* suggests that it is a pre-existing vegetative structure. I consider it homologous to the disintegrating host tissue invaded by vegetative hyphae which constitutes the thalline margin in *Stictis*. Letrouit-Galinou (1968) has shown that the thalline margin of *Lecanora subfuscata* is an outgrowth of the parathecium and hence analogous to the proper margin of *Bacidia* and other Lecanorales rather than to the thalline margin of *Conotrema*.

Table 3 summarizes the terms employed by various authors.

The apothecia of *Stictis*, *Ostropa*, *Robergea*, *Acarosporina*, *Conotrema*, and *Propoliopsis* all conform to the general pattern outlined above. Reduction in, or loss of, one or more of the marginal layers accounts for much of the

TABLE 3
TERMINOLOGY OF ASCOCARP TISSUES

Christiansen (1954)	Bellemère (1967)	Gilenstam (1974)	Sherwood
Host tissue	_____	Thalline margin	Thalline margin
_____	_____	Scleroplechtenchymatous wall	Stroma
Hyphae covering outside of excipulum	Fourreau formé par le couche moyenne du conceptacle	Paraplechtenchymatous wall	Wall
Crystals	Toit du conceptacle	_____	Crystalline layer
Periphysis-like hyphae	Filaments descendents	Periphysoids	Periphysoids
Paraphysogenous complex	Plancher du conceptacle	Hypothecium	Subhymenium
_____	_____	Marginal paraphyses	Marginal paraphyses

A blank (_____) indicates that the structure was not present in the species investigated.

intergeneric variation and some of the intrageneric variation in the group. A few general trends are discussed below.

The thalline margin is frequently indistinguishable, but in some cases layers of compressed wood or crystalliferous or gelatinous hyphae are present and conspicuous. The thalline margin is not included in measurements of the margin proper. The stroma varies in thickness and degree of development, and is included in measurements of the margin; it may be complete, incomplete, or absent as in *Stictis radiata* (Figure 3b) and its allies.

Features of the wall used in delimiting species include its thickness, the color, size, and shape of the cells, and whether or not gel is present. It is normally composed of tightly packed textura intricata, or more loosely packed hyphae distributed in a gelatinous matrix, but may approach a pseudoparenchymatous texture. In some species, for example *Stictis graminicola* (Figure 3c), both wall and crystalline layers are absent, and the periphysoids are borne directly on a thalline margin.

The dimensions of the crystalline layer tend to vary within a single collection, increasing with age. Some species have a consistently narrow margin, and others lack an organized crystalline layer altogether. The crystals are colorless in transmitted light but may appear yellow or brown in mass. Most species produce crystals of variable size, but some produce only small (under 10μm) crystals. Usually the crystals are irregular in shape, but sometimes they are narrowly rhomboidal and form rosettes. In addition to the crystalline layer, there may be crystals scattered in

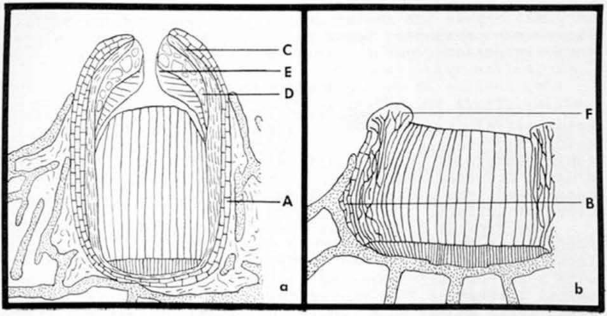

FIGURE 4. a. *Ostropa cinerea*. Cross section of apothecium. b. *Schizoxylon berkeleyanum*. (Diagrammatic). A = Thalline margin. B = Stroma. C = Wall. A = Crystalline layer. E = Periphysoids. F = Margin of *Schizoxylon*.

the wall or deposited externally. Occasionally the subhymenium or paraphysis tips are crystalliferous. *Stictis* sect. *Lichenopsis* (Figure 3d) is distinguished by having a crystalliferous wall which separates from the substrate.

Periphysoids are present in all species of *Stictis*, and are the most important diagnostic character for the genus. Within fairly broad limits, their length, color, branching pattern, and the presence or absence of gel are useful species characters. In *Ostropa* (Figure 4a) periphysoids occur only above the level of the hymenium, which consequently does not separate from the margin when dry. *Robergea* is similar, but has greatly elongated ascocarps.

Ramonia, *Gloeolecta*, and *Odontotrema* differ from the preceding genera in lacking both a stroma and crystalline inclusions in the margin. In addition, the periphysoidal . layer is highly modified, consisting, not of distinct filaments, but of a compact, fleshy, pseudoparenchymatous matrix in which the cells are oriented perpendicularly to the surface of the ascocarp. In dry specimens the margin separates from the hymenium, but this is difficult to determine when the margin is inrolled and covers the disc.

The apothecial stucture of *Schizoxylon* (Figure 4b) is quite distinct from that of *Stictis*. According to Bellemère (1967) the fruitbody develops initially within a pre-existing matrix of vegetative hyphae which may be visible on the flanks of the mature apothecium. In cross section the hymenium is not sharply delimited from the margin by a parathecium or circular fissure, and there are no periphysoids. In species which have apically branched, brown paraphyses, the hyphae of the margin are also apically branched and brown. Marginal hyphae appear to anastomose frequently. I interpret the margin as being paraphysoidal in origin. The marginal hyphae are reminiscent of the branched and netlike interwoven paraphyses found in some lichens. Crystals are commonly present, but do not form a compact layer.

The Hymenium

Chadefaud (1973) describes the Ostropalean ascus as being cylindrical, with thin lateral walls and a massive apical cap pierced by a narrow pore. Even when only indubitable members of the genera traditionally assigned to the order - *Stictis, Schizoxylon, Ostropa,* and *Robergea* - are considered, the picture of ascus morphology is far from clear or uniform.

The typical Ostropalean ascus, as exemplified by *Stictis radiata,* is initially uniformly thin-walled. At a somewhat later stage in development it appears very thick-walled, with a narrow cell lumen and distinct, but undifferentiated apical thickening. As the spores are delimited, the lateral walls again appear thin, while the apical cap assumes its final characteristic appearance, which Chadefaud interprets as an apical ring. The structure is no more refractive than the remainder of the inner wall and does not stain differentially in iodine or cotton blue. It persists in discharged asci.

The ascus cap is prominent in truly filiform-spored species, but scarcely distinguishable in species with shorter, broader spores. Mature asci are cylindrical only if the diameter of the fascicle of spores does not exceed the diameter of the ascus at the base of the cap. The asci of all species of *Stictis, Ostropa,* and *Robergea* that I have examined are functionally unitunicate.

The asci of *Schizoxylon berkeleyanum* resemble those of a typical *Stictis.* Those of other species, notably *Schizoxylon occidentale* and its allies, lack all trace of an apical cap and tend to remain uniformly thick-walled. I have searched many specimens of *Schizoxylon* without finding discharged asci and am uncertain whether the asci are functionally unitunicate. The same is true of *Propoliopsis arengae.*

Operculate asci, asci with prominent amyloid or refractive rings, uniformly thin-walled asci with a distinctly pointed apex, and typical, non-cylindrical, functionally bitunicate asci do not occur in the Ostropales.

All Stictidaceous fungi which I have investigated have paraphyses (some, for example *Schizoxylon,* may also have pseudoparaphyses). These probably serve a protective function in species with a massive epithecium and long-lived fruiting bodies. The most common apical configuration is exemplified by the paraphyses of *Stictis radiata,* which are colorless, slightly swollen at the tip, and occasionally branch. Paraphyses which branch repeatedly near the apex, but are neither swollen nor pigmented, are here termed PROPOLOID (from *Propolis,* a genus characterized by this type of paraphysis). The paraphyses of *Schizoxylon* are characteristically branched, apically swollen, and brown at the tip.

Frequently the gel in which the paraphyses are cemented turns blue in iodine solutions, particularly near the apices. The older literature implies that the ascus membrane is J+, but this is true only of *Acarosporina*.

Ascospore morphology is extremely diverse even among indubitable members of the order. The typical spore is long-cylindrical or filiform, colorless, thin-walled, and transversely multiseptate. It may have an obvious gelatinous sheath, coil when mounted in KOH, or disarticulate at the septa to form simple or septate part-spores.

Muriform spores occur occasionally in the order. In addition to the examples previously reported (Sherwood, 1976a) they occur as sporadic abnormalities in a number of species.

Brown spores are of doubtful occurrence. I have been unable to confirm their presence in *Stictophacidium*, a genus whose affinities are by no means certainly Ostropalean. Unicellular spores (as opposed to part-spores) occur only in *Stictophacidium*, *Ramonia*, and *Thelopsis*. Wall ornamentation at the level of resolution of the light microscope is unknown.

V. DEVELOPMENT

Available information about development in the Ostropales indicates that the general pattern is initial differentiation of a vegetative (or stromatic, in the developmental sense) mass, usually immersed in the substrate or lichen thallus. This is followed by appearance of ascogonia, elaboration of ascogenous hyphae and true paraphyses, further differentiation of vegetative accessory structures, and rupture of the overlying substrate to expose the hymenium.

According to Gilenstam (1974), the ascocarp of *Conotrema urceolatum* develops from a primordium whose outer layer is composed of dark, interwoven hyphae and whose inner part consists of inward-pointing, colorless hyphae. The outer layer expands basally and the hyphae in the interior of the primordium elongate. Ascogonia appear only after the primordium has undergone considerable differentiation. Paraphyses are presumed to arise from the supporting cells of the ascogonia, since bundles of paraphyses, separated by sterile vegetative hyphae, were found in ascocarps with multiple ascogonia.

Bellemère (1967) has a somewhat different interpretation of ascocarp development in *Stictis radiata*. The earliest stage which he illustrates is one in which paraphyses are already present within a 3-layered conceptacle. The innermost layer gives rise to periphysoids after paraphyses have been produced; the outermost layer disappears, and the middle layer becomes the wall. I disagree with this interpretation of ascocarp structure, which implies that the crystalline layer is derived from an internal layer present at a very early stage in development, and that the hyphae of the crystalline layer are continuous with the hyphae at the base of the ascocarp.

I interpret the development of *Stictis radiata* as follows. The intial stage (Figure 5a, adapted from Gilenstam [1974]) consists of an aggregation of hyphae and disinte-

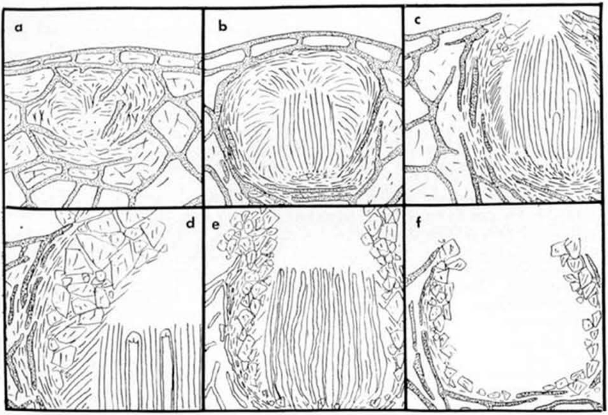

FIGURE 5. Development in *Stictis* sp. a.The apothecial primordium. b. Elongating paraphyses pushing the ascocarp deep into the substrate. c. Young apothecium. d. Periphysoids producing the crystalline layer. e. Old apothecium. f. Empty crystalline cup. (Diagrammatic).

grating host tissue, with a core of inward-projecting hyphae. I have been unable to observe this stage in this species, whose ascocarps originate beneath the surface of the substrate, and so am uncertain whether ascogonia are produced. As the ascocarp enlarges by continued growth of the inward-pointing periphysoidal hyphae and elongation of the paraphyses, the surrounding substrate becomes compacted to form a thalline margin. Paraphyses which elongate before the surface of the host ruptures push the apothecium deep into the substrate (5b). The fruitbody opens by a pore (5c) at about the same time asci are produced.

The crystalline layer is produced by the periphysoids (5,d,e). As these elongate, their bases become crystalliferous. Eventually the periphysoids disintegrate, leaving an almost entirely crystalline margin in old apothecia (5e). Eventually the hymenium falls out, leaving an empty hole in the wood (5f).

The developmental sequence presented here accounts for several observations not explained by Bellemère's account. Usually the apical portion of the margin is more highly developed than the basal portion; in a few species the subhymenium and paraphyses appear quite unconnected with the margin. This suggests that the paraphyses elongate rapidly after the margin has differentiated, pushing the apothecium proper, which consists only of subhymenium, asci, and paraphyses, deeper into the substrate, leaving the remains of the marginal tissues as a collar around the opening. As the ascocarps of *Stictis* grow, the crystalline layer becomes increasingly prominent, while the periphysoids tend to disappear. In most species there is no distinct layer of hyphae between the periphysoids and the wall at any stage in development. In some cases the wall, or loosely consolidated hyphae transitional between the wall and the periphysoids, may be crystalliferous.

In most species of *Schizoxylon* the fruitbody becomes erumpent at a somewhat earlier stage of development than does *Stictis*, and the stromatic origin of the margin is more evident. Observations on *Schizoxylon sepincola* have led me to suspect that this species possesses both true paraphyses and pseudoparaphyses. Immature stromata have a nucleus of vertically-oriented hyphae which do not seem to be associated with fertilization phenomena. In species such as *Sch. juniperinum*, which lack a prominent stromatic margin, the outermost paraphyses branch and anastomose. I suspect that the structure which Bellemère (1967) terms a parathecioid muff (manchon parathécioïde) in *Ostropa* is actually remnants of pseudoparaphyses. Ascocarps containing both paraphyses and pseudoparaphyses have been reported elsewhere in the literature (Bellemère, 1967; Letrouit-Galinou, 1968).

In a review of ascocarp development in a number of lichen genera, Henssen (1976) has proposed that development in the Verrucariaceae, Porinaceae, Gyalectaceae, and Thelotremataceae follows a common pattern which is quite different from that of the majority of lichenized discomycetes and tends to produce modified fruitbodies. In this developmental type, the primordium of the ascocarp consists of an outer cortical layer and an inner cavity filled with inward-projecting hyphae which grow from all sides. Those at the apex of the cavity become periphysoids in discomycetes and periphyses in pyrenomycetes. In the Gyalectaceae the periphysoidal hyphae elongate and are indistinguishable in mature fruitbodies.

This is precisely the type of development which Gilenstam (1974) found in *Conotrema*. The immersed saprophytic Ostropales appear to differ only in the inclusion of host tissue in the outer layers of the developing primordium.

The exact taxonomic significance of this developmental type is unclear. Certainly the Verrucariaceae, with thin-walled, J- spores and bitunicate asci, have never been associated with the Thelotremataceae in lichenological classifications.

VI. Ecology and Distribution

The Ostropales are predominantly saprophytic on long-dead, weathered plant debris in warm climates. *Biostictis*, *Acarosporina*, and *Robergea albicedrae* are capable of attacking living plants.

Although specific evidence is lacking, indirect evidence supports the contention that the fruitbodies of *Stictis* and *Schizoxylon* are long-lived. *Stictis radiata* may be collected throughout the rainy season from September until April on the west coast of North America. Except at the very end of the rainy season, most of the apothecia in any collection will be fertile and contain both mature asci and asci in early stages of development. The fruitbodies persist in the summer as effete crystalline cups. In collections from high latitudes and dry alpine areas, where the decay rate of wood is slow, collections which contain mature fruitbodies often contain effete, weathered fructifications which have lost all trace of hymenium, probably remnants of last year's fruiting. I interpret these observations to mean that individual fruitbodies persist for several months in a cool climate.

Ascospores of *Stictis*, *Schizoxylon*, and *Robergea* germinate immediately by multiple germ tubes following discharge onto agar. Nothing in their structure suggests that they serve as resting structures in nature. Presumably it is the persistent vegetative mycelium which permits survival under unfavorable environmental conditions.

The majority of Ostropalean fungi are filiform-spored. *Robergea cubicularis*, an extreme example, has spores 2 mm long and 2 µm broad. Spores of some species coil when released from the ascus. The general picture is that of an aquatic spore (terminology follows Gregory [1952]), but there is no evidence that any of these fungi occupy an aquatic habitat. The production of a filiform impaction spore may be an adaptation for colonizing small-diameter standing dead plant parts. This may explain why species with disarticulating spores are less common than species whose spores are discharged as a unit. The part spores of *Schizoxylon* are penetration spores poorly adapted for colonizing small twigs. Filiform spores also have a large surface to volume ratio, which increases their buoyancy.

Calcium oxalate is produced by many fungi as a by-product of metabolism. Its presence in the margin of Ostropales may simply be a reflection of the need for an immersed fungus to dispose of its waste products.

Fruitbodies of *Robergea albicedrae* which were stored in an air-dry condition for two weeks revived and discharged their spores normally when rehydrated in our laboratory. Like many Ostropalean fungi, this species occurs on bark and twigs in a rather dry climate, where the fruitbodies would presumably be desiccated for weeks at a time. In general, the Stictidaceae seem well able to live in habitats too dry for many fungi. They are also abundant in tropical cloud forests and foggy maritime areas. Areas which are favorable for lichens tend to be favorable for Stictidaceae. Perhaps, like lichens, they are sensitive to alternate wetting and drying. Their slow growth rate, as demonstrated in culture, would make them poor competitors under conditions favorable for other fungi.

The host specificity of frequently-collected species varies greatly. *Robergea albicedrae*, as far as is known, occurs only on *Juniperus*, and *Stictis ostropoides* may be specific to *Lonicera involucrata*. Most species occur on several unrelated hosts, having, at most, some preference for texture. *S. radiata*, an extreme example, occurs on stems and wood of pteridophytes, gymnosperms, monocots, and dicots, and also on rope, conifer needles, and old leather. *S. pustulata* occurs on a wide variety of herbaceous material, but never on hard wood. Some species of plants are good hosts for Ostropales. It is unclear why this should be the case; good hosts are not necessarily taxonomically related.

Extreme caution should be exercized in using host as a criterion for identifying a fungus in this group. Nearly all substrates which will support any member of the group will also support *S. radiata,* and the host range of infrequently collected species is probably badly distorted.

As far as is known, *Biostictis* and *Lillicoa* are restricted to tropical America. *Ostropa, Ramonia, Conotrema* and *Robergea* occur in North America, Europe, Africa, and Asia. Individual species tend to exhibit wide geographical ranges, although some of these distribution patterns may be spurious and based on too broad a species concept. *Stictis radiata, S. stellata,* and *S. carnea* are worldwide in their distribution. *Schizoxylon berkeleyanum* occurs in Europe, North Africa, North America, and the Middle East. *St. polycocca,* a common European species, also occurs in British Columbia, and Gilenstam (1974) reports *S. schizoxyloides,* a distinctive North American species, from Sweden. I am still uncertain whether the only two collections I have seen of *S. pusilla,* one from Tierra del Fuego and one from Great Britain, really represent the same species. They are certainly indistinguishable morphologically. Among species with more restricted distributions are *S. sphaeroboloidea* (eastern North America), and *S. serpentaria* and *S. chrysopsis* (western North America). Clearly, extensive collecting is needed before a true picture of the distribution on non-European species will emerge.

VII. The Relationships of the Ostropales to other Groups of Ascomycetes

The Ostropales, is general, represent a taxonomically isolated group, and one whose potential relatives are poorly known. Rather than propose a phylogenetic scheme of classification, I prefer to comment on those groups of fungi which have in the past been considered related to the Ostropales, examining the characters they share with the order.

Many orders of Ascomycetes are clearly not closely related to the Stictidaceae. Recent systems of classification suggest the Clavicipitaceae and Thelotremataceae as potential relatives. For the sake of completeness, those families which now include the excluded genera of the Stictidaceae - the Dermateaceae, Phacidiaceae, Patellariaceae, and Hysteriaceae - should be investigated, if only because the current delimitation of these families includes morphological features once thought diagnostic for the Stictidaceae. Finally, some comments should be made concerning the Gyalectaceae, which are often associated with the Thelotremataceae in systems of lichenological classification.

Clavicipitaceae

The Clavicipitaceae comprise a group of pyrenomycetes with long cylindrical capitate asci and filiform ascospores. The similarity to Ostropalean asci is striking and has led several authors to suggest that the two groups are related. Gäumann (1964) and Kreisel (1969) included the Ostropaceae in the Clavicipitales, without, however, providing a detailed explanation of their reasons for doing so. Neither Nannfeldt (1932) nor Dennis (1968) indicates the level (if any) at which the two groups should be considered related.

Filiform ascospores are found in many families of Ascomycetes. Where they are found, they tend to be associated with cylindrical asci with a thickened apex. *Acrospermum* and *Vibrissea* are examples of two apparently unrelated genera whose asci resemble those of *Stictis*. Likewise, the asci of *Leptospora* (Pleosporaceae), although bitunicate, appear Ostropalean.

The Clavicipitaceae have fruitbodies, usually interpreted as perithecia (Doguet, 1960; Rogerson, 1970) but occasionally considered to be ascolocular (Nannfeldt, 1932), which are either superficial or imbedded in a true stroma. Ecologically they are specialized parasites of insects, grasses, and other fungi. Fruitbodies lack paraphyses, except at a very early stage in development. The hymenial gel does not turn blue in iodine. Muriform spores are unknown in the order, and, with the possible exception of *Thelocarpon*, none is known to be lichenized. Conidial stages tend to play an important role in the life cycle and to be hyphomycetous, although pycnidia are produced by some genera.

Developmental criteria are critical in evaluating whether the Clavicipitales and Ostropales are related. If the Clavicipitales indeed possess true perithecia, then the evidence is against relationship. Doguet's (1960) account of perithecial formation in *Epichloe typhina* (Pers.) Tul. & Tul. leaves some doubt as to whether development is ascohymenial or ascolocular. The perithecial wall in this fungus appears at a rather late stage in development, after the asci have begun to differentiate, and is composed of hyphae much like those of the surrounding stroma. More information is needed on the development of other, non-stromatic Clavicipitales. If the fruitbody is viewed as a naked fascicle of asci lying within a vegetative stroma, the case for a relationship between the Clavicipitales and the Ostropales is fairly convincing.

Thelotremataceae

Modern lichenologists (Vežda, 1966; Hale & Culberson, 1970; Henssen & Jahns, 1974; Gilenstam, 1974) are unanimous in assigning the Thelotremataceae to the Ostropales. Some would also include the Graphidaceae, with lirellaform ascocarps, in this order; other assign them to a separate order, the Graphidales. The Graphidaceae will be omitted from this discussion since the arguments which apply to the Thelotremataceae also apply to the Graphidaceae, which have hysterothecial ascocarps and hence are less likely to be related to the Stictidaceae.

The Thelotremataceae is a large, distinctive family of predominantly corticolous, predominantly tropical, crustose lichens, characterized by immersed, orbicular fruitbodies with abundant true paraphyses, cylindrical, capitate, inamyloid unitunicate asci, periphysoids, and thick-walled graphidean spores. The apothecia resemble those of Stictidaceous fungi. Species with inconspicuous thalli have been described in *Stictis*, *Cryptodiscus*, and other fungal genera. Ascospores may be filiform, but are typically ovoid or fusiform. They are frequently muriform, and are not known to disarticulate at the septa.

The decision as to whether to include the Thelotremataceae in the Ostropales rests on the significance accorded the graphidean spore, since other fruitbody characters are obviously very similar and a lichenized habit is, at most, a useful generic character in the Ostropales. It might be argued that graphidean spores, which also occur in the Trypetheliaceae, a family of loculoascomycetous lichens with bitunicate asci, are an adaptation and examples of convergent evolution. If so, it is difficult to see why a thickened, laminate inner wall, peculiar sequence of septation, and J+ purple ascospores should invariably be correlated.

I chose to accept the Graphidales as a distinct order and to include the Thelotremataceae among them. *Ramonia* and *Gloeolecta*, which were transferred by Vězda (1966) from the Gyalectaceae to the Thelotremataceae, have thin-walled non-graphidean spores and should be retained in the Ostropales. These two genera are discussed briefly in section 9. It is distinctly possible that the Graphidales are more closely related to the Ostropales than either is to other orders of discomycetes.

Dermateaceae

If the Ostropales are viewed as inoperculate discomycetes, it is logical to compare them with the Helotiales and Phacidiales, the other two orders of inoperculate discomycetes. Among the Helotiales, the majority of immersed forms formerly assigned to the Stictidaceae are now accomodated in the Dermateaceae.

Immersed Dermateaceous fungi, notably members of the Pyrenopezizeae, such as *Hysteropezizella*, were long included in the Stictidaceae. There is little evidence that the two groups are closely related. Dermateaceous Ascomycetes are characterized by a fleshy parathecial excipulum of rather large, pseudoparenchymatous cells and asci which may be somewhat capitate, but, if capitate, are generally J+ blue at the apex. Filiform spores are rare. The hymenial gel is inamyloid. None are known to be lichenized.

A few genera accepted as Dermateaceous by Dennis (1968) or Korf (1973), which might be interpreted as intermediates, have probably been assigned to the wrong family. *Cryptodiscus* is quite remote from the Naevioideae and seems rather to be a member of the Ostropales related to lichens formerly included in the Gyalectaceae. *Propolis* (Fr.) Fr. may be more closely related to the Phacidiales. These two genera are discussed in greater detail in section 9.

Phacidiaceae

The Phacidiales, as currently delimited, contain two well-characterized families, the Hypodermataceae (or Rhytismataceae) and Cryptomycetaceae, and one poorly-defined dumping ground, the Phacidiaceae (Dennis, 1968). The taxonomy of immersed Ascomycetes which occur as saprophytes on decaying plant remains is extremely confused. *Phacidium abietinum*, the ultimate type of the Phacidiaceae, is a parasitic species with pointed J+ asci, and does not seem to be closely related to the Ostropales. On the other hand, *Propolidium* and *Delpontia*, with lenticular fruitbodies whose construction recalls that of *Phacidium*, have cylindrical, capitate, inamyloid asci. The muriform spores of *Delpontia* are also quite out of place in the Phacidiales as currently circumscribed. Available evidence suggests that there remains in the Phacidiales a residue of fungi whose affinities are with the Ostropales, rather than with *Phacidium* or *Hypoderma*. A systematic search for them is beyond the scope of this study.

The typical member of the Phacidiales may be distinguished from any member of the Ostropales by the thin-walled, pointed asci, which are quite distinct from the cylindrical, slightly thick-walled asci found in the few Ostropalean species which lack a prominent ascus cap. In addition, most immersed, stromatic Ascomycetes whose fruitbodies open by splitting the overlying substrate into distinct teeth are Phacidealean, rather than Ostropalean.

Patellariaceae and other Bitunicates

Several authors (Tilak & Kale, 1969; Malloch, *personal communication*) have suggested that the asci of Ostropalean fungi appear bitunicate. They are undeniably thick-walled in many species. In view of this, it would be useful to compare the Ostropales, particularly *Schizoxylon*, with bitunicate discomycetes which occur as saprophytes on dead wood - the Patellariaceae and Hysteriaceae.

According to Bellemère (1967), the apothecia of *Patellaria* possess both true paraphyses and a well-defined parathecium. The same seems to be true of *Buellia* and *Karschia*. The archaeascaceous ascus found in the Lecanorales contains the elements of a bitunicate ascus and it would seem reasonable to assume that the Patellariaceae are closely allied to the Lecanorales, with which they share such features as tough, persistent fruitbodies and an intensely amyloid hymenium. The apothecia of *Schizoxylon sepincola* appear superficially similar to those of *Karschia*, but lack a parathecium.

In many species of *Schizoxylon* the asci do not conform to the Ostropalean model, but begin development as uniformly thick-walled structures and lack a well-defined cap at maturity. Although I have seen many discharged asci of *Stictis*, and am convinced that this genus is functionally unitunicate, I am less sure of *Schizoxylon*.

The asci of Ostropales contain little epiplasm; it is difficult to imagine how imbibition of water by this epiplasm could provide the force necessary to expel the ascospores. An alternative hypothesis is to postulate that the thickened endoascus imbibes water and functions in spore discharge in much the same way that the endoascus of a bitunicate Ascomycete does, but that the two wall layers do not separate. In this case a connection to the Patellariaceae might be defended.

Members of the Hysteriales lack a parathecium and are discostromatic, hence they are more likely to be confused with members of the Ostropales than are the Patellariaceae. Bitunicate asci are difficult to demonstrate in specimens of filiform-spored fungi. In this connection it is useful to remember that Ostropalean ascocarps, although sometimes hysterothecial in face view, are orbicular in cross section and contain abundant true paraphyses.

Gyalectaceae

Few of the genera included by Zahlbruckner when he erected the Gyalectaceae are now considered to be closely related to *Gyalecta*. *Gloeolecta* and *Ramonia* differ little from typical members of the Stictidaceae and are included in part 9 as accepted members of the Ostropales.

Gyalecta is characterized by initially immersed apothecia which have a prominent, rather gelatinous, radiating paraplechtenchymatous margin. According to Letrouit-Galinou (1974) development is parathecial and approaches the Lecanoralean pattern. Numerous true paraphyses are present, and the asci are uniformly thin-walled, without obvious apical structures. Ascospores are thin-walled and may be transversely septate or muriform. *Gyalecta* has little in common with the Ostropales.

Coenogonium, sometimes set apart in a separate family, the Coenogoniaceae, has superficial, sessile apothecia which have a pseudoparenchymatous margin of large globose cells. Development has not been studied, but the complex nature of the margin suggests that it is parathecial. The asci are surrounded by true paraphyses imbedded in a matrix which turns faintly blue in iodine, and are thin-walled, with a prominent J+ apical ring. *Coenogonium* has many characters in common with the Helotiales but appears to be totally unrelated to the Ostropales. *Dimerella*, with a complex, sessile apothecium and inamyloid asci, seems likewise to have little in common with any of the Stictidaceae. *Absconditella* is strikingly similar to *Cryptodiscus* and is accepted as Ostropalean in section 9.

VIII. Key to the Genera of Ostropales and to Genera likely to be Confused with them

To assist the reader in identifying fungi which superficially resemble Stictidaceae, but which belong to unrelated groups, excluded genera have been incorporated in the key. Only Ascomycetes are treated. It should be emphasized that treatment of groups other than the Ostropales is fragmentary and that generic identifications in the Loculoascomycetes, Graphidales, Helotiales, and Phacidiales should be checked against references treating the group concerned.

1. Pseudoparaphyses and functionally bitunicate asci present. Loculoascomycetes (2)

1'. Interascal tissue consisting of true paraphyses, anastomosing netlike paraphysoids, or a non-filamentous matrix; asci not functionally bitunicate, although sometimes thick-walled (5)

  2 (1). Fruitbodies opening by a slit, or by irregularly tearing a covering stroma (3)

  2' (1). Fruitbodies opening by a broad, orbicular pore (4)

3 (2). Ascospores muriform, brown. *Melittosporium*

3' (2). Ascospores transversely septate. Various fungi in the Lophiaceae and Lophiostomataceae. See Goree (1974) for species of *Glyphium* incorrectly referred to *Acrospermum*, and the comments on *Ostropella* under *Ostropa* in section 9.

  4 (2'). Ascospores tranversely septate, colorless. *Xylopezia*

  4' (2'). Ascospores muriform. *Mycoglaena*

5 (1'). Fruitbodies perithecia, superficial or immersed in a true stroma. *Acrospermum*, Clavicipitaceae, and other fungi not considered related to the Ostropales.

5' (1'). Fruitbodies apothecia, or, if perithecioid, then immersed in pseudostroma, non-stromatized substrate, or lichen thallus (6)

  6 (5'). Fruitbodies true apothecia, with a well-defined parathecium; periphysoids absent. Helotiales, Lecanorales (7)

  6' (5'). Fruitbodies apothecioid or perithecioid, lacking a parathecium, usually initially immersed; periphysoids present or absent. Phacidiales, Ostropales (13)

7 (6'). Apothecia typically ephemeral. Asci thin-walled, usually with a well-defined apical apparatus. Hymenium J- or J+, but never firmly cemented in an intensely J+ blue gelatinous matrix. Helotiales (8)

7' (6'). Apothecia though, long-lived, usually associated with a lichen thallus. Asci thick-walled, without a defined apical apparatus, or appearing bitunicate; hymenial gel intensely J+ blue, rarely J-. Lecanorales (12)

8 (7). Ectal excipulum pseudoparenchymatous, or globose to angular, isodiametric cells; granulate septate hairs absent. (9)

8' (7). Ectal excipulum paraplechtenchymatous, with or without granulate hairs (10)

9 (8). Ascospores filiform; apothecia superficial, sessile or stalked, fleshy, aquatic. *Vibrissea*

9' (8). Ascospores usually ovoid, at most long-cylindrical, immersed in plant debris, not aquatic. Immersed members of the Dermateaceae. *Diplonaevia, Eupropolella, Habrostictis, Hysteropezizella, Hysterostegiella, Karstenia, Naevala (*see *Naevia), Ocellaria, Phragmonaevia, Ploettnera, Trochila.*

10 (8'). With granulate septate hairs. Hyaloscyphaceae. *Stegopeziza*

10' (8'). Without granulate septate hairs (11)

11 (10'). Immersed in dead wood, not obviously associated with a lichen thallus. (Members of the Leotiaceae, most of which are unlikely to be confused with Ostropales, will key out here). *Xylogramma*

11' (10'). Sessile on a crustose lichen thallus. (Some members of the Gyalectaceae will key out here).

12 (7'). Fruitbodies orbicular, superficial. (Scolecosporous members of the Lecidiaceae will key out here). *Phaneromyces? Agyrium*

12' (7'). Fruitbodies immersed in wood, lirellaform. *Xylographa*

13 (6'). Ascospores graphidean, with a lenticular cell lumen and unequally thickened, multilayered (light microscope) cell wall, J+ red or purple (difficult to see in brown-spored species). Graphidales (14)

13' (6'). Ascospores not graphidean, the cell lumen cylindrical, the wall thin or uniformly thickened, J- (15)

14 (13). Periphysoids present. Apothecia orbicular. Thelotremataceae.

14' (13). Periphysoids absent. Apothecia usually lirellaform. Graphidaceae.

15 (13'). Fruitbodies lenticular in cross section, with a meristematic pericentral plexus, opening by a slit or teeth along preformed lines of dehiscence; asci cylindrical, thin-walled, pointed at the apex, J+ or J-, never with a massive apical thickening. Phacidiales* (16)

15' (13'). Fruitbodies orbicular, cylindric, or lageniform in cross section, rarely broader than tall, without a meristematic pericentral plexus, opening by a pore or slit, or by splitting the substrate irregularly; asci cylindrical, J+ or J-, thick-walled when young, with a distinct J- apical thickening (except in some species of *Schizoxylon*); true paraphyses always present (24)

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* An artifical key based on spore characters is used in order to incorporate several genera whose affinities at the family level are unknown.

16 (15). Ascospores cylindrical, acicular, or filiform. (17)

16' (15). Ascospores ovoid, allantoid, or fusiform (22)

17 (16). Apothecia lirellaform, opening by a longitudinal slit (18)

17' (16). Apothecia orbicular or irregular in outline, opening by teeth (19)

18 (17). Ascospores ciliate. *Irydyonia*

18' (17). Ascospores non-ciliate. *Naemacyclus*

19 (17'). Paraphyses swollen at the tip, forming a brown epithecium. *Moutoniella*

19' (17'). Paraphyses not swollen at the tip, colorless (20)

20 (19'). Ascus apex J+ blue. *Lasiostictis*

20' (19'). Ascus apex J- (21)

21 (20'). Covering layer thick, brown, non-crystalliferous. On bark. *Cerion*

21' (20'). Covering layer reduced, crystalliferous. On leaves. *Propolis*

22 (16'). Asci polysporous. *Propolina, Carestiella?*

22' (16'). Asci 8-spored (23)

23 (22'). Fruitbodies small, with a dark margin. *Laquearia*

23' (22'). Fruitbodies large, effuse, with a reduced, colorless margin. *Propolomyces*

24 (15'). Fruitbodies true perithecia, without prominent crystalline layers in the wall. (Immersed Sphaeriales will key out here). *Lindauella*

24' (15'). Fruitbodies apothecioid, or, if perithecioid, then with crystalline inclusions in the walls and filiform spores (25)

25 (24'). Ascospores long-cylindrical to filiform; margin containing obvious crystalline inclusions. Ostropales sensu stricto (26)

25' (24'). Ascospores ovoid, or margin without crystalline inclusions. Residual Stictidaceae and residual Gyalectaceae (38)

26 (25). Periphysoids present, at least in the upper part of the margin (27)

26' (25). Periphysoids absent. (37)

27 (26). Apothecia opening by a transverse slit (28)

27' (26). Apothecia opening by a pore, or by splitting irregularly (30)

28 (27). Periphysoids extending the entire length of the margin; hymenium readily separating from the margin when dry. *Stictis* sect. *Lichenopsis*

28' (27). Periphysoids in the upper part of the margin only; hymenium not readily separating from the margin when dry (29)

29 (28'). Apothecia vertical, orbicular in cross section, erumpent. *Ostropa*

29' (28'). Apothecia oblique, cylindrical or lageniform in cross section, immersed. *Robergea* p.p.

30 (27'). Periphysoids present only in the upper part of the margin; apothecia lageniform. *Robergea* p.p.

30' (27'). Periphysoids extending the entire length of the margin; apothecia orbicular in cross section (31)

31 (30'). Marginal hyphae with pigmented walls (32)

31' (30'). Marginal hyphae with colorless walls (pigmented host tissue may be incorporated in the margin) (34)

32 (31). Obvious lichen thallus present. *Conotrema*

32' (31). Lichen thallus absent (33)

33 (32'). Asci J-. Ascospores not regularly disarticulating. *Stictis* sect. *Cyclostoma*

33' (32'). Asci J+ blue. Spores regularly disarticulating into minute part-spores. *Acarosporina*

34 (31'). Apothecia opening by splitting the overlying epidermis into lobes; spores disarticulating (A few species of *Stictis* sect. *Stictis*, below, have irregularly disarticulating spores; these open by a pore). *Propoliopsis*

34' (31'). Apothecia not opening by splitting the overlying substrate into lobes, either obviously poricidal or with non-disarticulating spores (35)

35 (34'). Margin annulate, remaining for a long time closed, finally opening irregularly. *Stictis* sect. *Lichenopsis*

35' (34'). Margin not annulate, soon opening by a pore (36)

36 (35'). Parasitic on living leaves. *Biostictis*

36' (35'). On woody or herbaceous material, never on living leaves, predominantly (perhaps exclusively) saprophytic. *Stictis* sect. *Stictis*

37 (26'). Ascocarps superficial on living leaves, minute, colorless. *Lillicoa*

37' (26'). Ascocarps immersed or erumpent on wood, bark, or herbaceous stems, larger, usually brown (if the ascocarps are minute and entirely non-crystalline, go to 45, below). *Schizoxylon*

38 (25'). Obvious lichen thallus present. Residual Gyalectaceae (39)

38' (25'). Lichen thallus absent. Residual Stictidaceae (41)

39 (38). Periphysoids or homologous structures present; hymenium splitting away from the margin when dry (40)

39' (38). Periphysoids absent; margin not splitting away from the hymenium when dry, algal host protococcoid. *Absconditella*

40 (39). On bark. Algal host Trentepohlia. *Ramonia*, *Thelopsis*

40' (39). On soil and mosses; algal host *Gloeocystis*. *Gloeolecta*

41 (38'). Periphysoids present (42)

41' (38'). Periphysoids absent (45)

42 (41'). Margin containing abundant crystals (43)

42' (41'). Margin not containing crystals. *Melittosporiella* and de-lichenized *Ramonia*

43 (42). Spores septate (44)

43' (42). Spores unicellular. *Stictophacidium*

44 (43). Spores transversely septate. *Propolidium*

44' (43). Spores muriform. *"Platysticta"*

45 (41'). Margin present. Spores transversely septate (46)

45' (41'). Margin not differentiated. Spores muriform. *Delpontia*

46 (45). Ascocarps deeply immersed, colorless or pale

brown (47)

46' (45). Ascocarps erumpent. Margin dark brown; paraphyses not knoblike. *Odontotrema*

47 (46). On lichen thalli. Ascospores filiform. *Nanostictis*

47' (46). On wood. Ascospores commonly ovoid, rarely filiform; paraphyses knoblike. *Cryptodiscus*

IX. Included and Excluded Genera

The genera included in the Stictidaceae by Clements and Shear (1931), as well as genera assigned to either the Stictidaceae or Ostropales by other authors, or claimed to be synonyms of genera of the Stictidaceae or Ostropales, are listed below in alphabetical order. Genera excluded from the Ostropales are enclosed in parentheses. Following the generic name, the place and date of publication, holotype or lectotype species, nomenclatural synonyms, taxonomic synonyms, and a discussion of the taxonomy of the genus appear. Detailed treatments of individual species in the accepted genera *Stictis*, *Schizoxylon*, *Robergea*, and *Cryptodiscus* appear at the end of the alphabetical list; individual species in other accepted genera appear under the generic headings.

For purposes of priority a starting point date of 1 May 1753 is assumed. I believe that there is no other reasonable way to deal with the nomenclature of a group which contains both lichenized and non-lichenized members than to assume a uniform starting point date for both. For the convenience of readers, validating authors for pre-1821 genera are included. In no case does the assumption of a 1753 starting point date result in the adoption of a generic name other than the one considered correct under the current International Code of Botanical Nomenclature (Stafleu et al., 1972). In several cases genera are based on misidentified specimens or descriptions which do not agree with the type specimen of the species. I have assumed that the type of the genus and the application of the name are determined by the original type specimen, and not by the misidentified material examined by the author of the generic name.

(1). *ABSCONDITELLA* Vežda, Preslia 37: 238 (1965)

Holotype species: *Absconditella sphagnorum* Vežda & Poelt, *ibid.*: 242 (1965) (Figure 6)

Apothecia at first immersed in substrate and lichen thallus, erumpent or remaining immersed, the margin narrow, colorless, entire, the disc deeply immersed, not splitting away from the margin when dry. Margin non-crystalline, paraplechtenchymatous, of colorless, narrow-diameter hyphae, not notably gelatinous. Distinct periphysoidal hyphae are absent, although long hyphae on the inner face of the margin may represent periphysoids which have elongated and function as paraphyses, as in *Gyalecta*. Substrate tissue may be included in the margin. Hymenium entirely J-. Paraphyses numerous, filiform, with a knoblike apex. Asci small, cylindrical, with thin lateral walls and a distinct apical cap, apparently not bitunicate. Spores 8/ascus, uniseriate, ovoid, transversely septate, non-graphidean.

Forming lichen associations with protococcoid algae on wood and mosses in cool humid climates. *Absconditella* differs from *Cryptodiscus* only in possessing a distinct lichen thallus. *A. trivialis* is scarcely distinguishable from *C. pallidus* and might conceivably represent the same species. The two genera should perhaps be merged.

SPECIMENS EXAMINED: EUROPE: Sweden (Herb. Sherwood, Vězda, Lichenes selecti exs. 352, on *Sphagnum*, authentic specimen of *A. sphagnorum*). NORTH AMERICA: USA (Herb. Sherwood 306, on wood, Washington state, det. Vězda as *A. trivialis*).

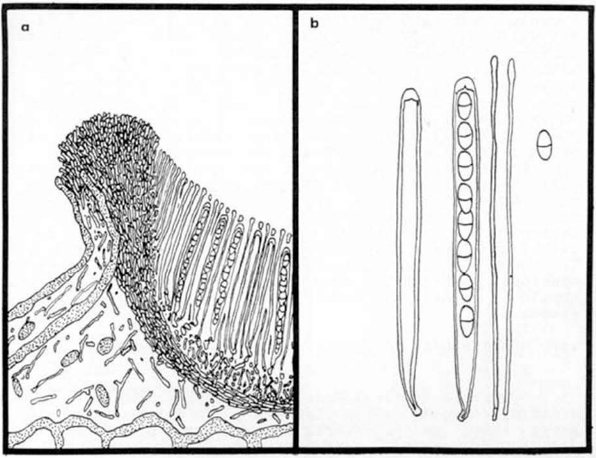

FIGURE 6. *Absconditella sphagnorum*. a. Cross section of margin, x375. b. Asci, paraphyses, and spores, x750. Drawn from A. Vězda, Lichenes selecti exs. 352

(2). ACAROSPORINA Sherwood, gen. nov.

Holotype species: *Schizoxylon moniliferum* Ell. & Ev., Bull. Torrey Bot. Club 11: 42 (1884)

Ascocarpi primum immersi, erumpescentes, profunde cupulati, margine integro, nigro, disco pallide ochraceo vel brunneo.

Margo strato crystallino prominente atque paraphysoideis praeditis, siccus ab hymenio se abrumpens. Asci cylindrici, apice incrassatae. Sporae filiformes, multiseptatae, ad septa se disjungentes et articulos minutos innumeros formantes.

HOLOTYPUS: *Schizoxylon moniliferum* Ell. & Ev.

Etymology: From *Acarospora*, (Greek: mite-spored), a genus of lichens with polysporous asci and minute spores.

Apothecia at first immersed, becoming erumpent, fairly large for Ostropalean ascocarps, the margin entire, brown or black, the disc deeply immersed, pale ochraceous or dark, splitting away from the margin when dry. Margin in cross section distinctly 3-layered, with a thick, dark wall, distinct crystalline layer, and abundant periphysoids. Subhymenium resting on host substrate or on a continuation of the wall, of small, colorless, angular cells. Paraphyses numerous, filiform, usually branched. Asci cylindrical, with a distinct apical cap, the membrane J+ blue. Ascospores at first filiform and transversely multiseptate, soon disarticulating into minute unicellular part-spores which elongate after disarticulation, so that the asci are eventually filled with innumerable minute unicellular part-spores, more than 8-seriate in the ascus.

On bark and bark cankers, apparently parasitic. Disarticulating spores alone are not enough to separate the genus from *Stictis* sect. *Cyclostoma*. Blueing of the ascus membrane in iodine, extremely minute part-spores, and the apparently parasitic habit of the species also serve to isolate *Acarosporina* taxonomically from *Stictis* and *Schizoxylon*. The three species are separated primarily on part-spore dimensions. Saprophytic specimens with much larger part-spores should be referred to *Stictis* sect. *Cyclostoma*; cfr. *Stictis stigma*.

(1). ACAROSPORINA MONILIFERA (Ell. & Ev.) Sherwood, comb. nov.

Figure 7

Apothecia at first immersed, later opening by a pore and becoming erumpent, often clustered, 1.0-1.5 mm diam., the margin thick, entire, black, somewhat grey-pruinose, the disc deeply immersed, dark brown, splitting away from the margin when dry.

Accessory thalline margin prominent. Wall 50-75 µm thick, of interwoven hyphae 3.0 µm diam.; crystalline layer distinct, but rather narrow. Periphysoids 70 x 2.0 µm, branched, forming a compact layer. Subhymenium c. 50 µm thick, of dark wall tissue. Paraphyses numerous, filiform, branched and circinate apically, barely enlarged, strongly J+ blue. Asci 250-300 x 6-8 µm, the cap 3.0 µm thick, diffusely J+ blue near the apex. Ascospores 8, somewhat shorter than the asci, at first very closely multiseptate, soon breaking up into innumerable globose part-spores 1.5 µm

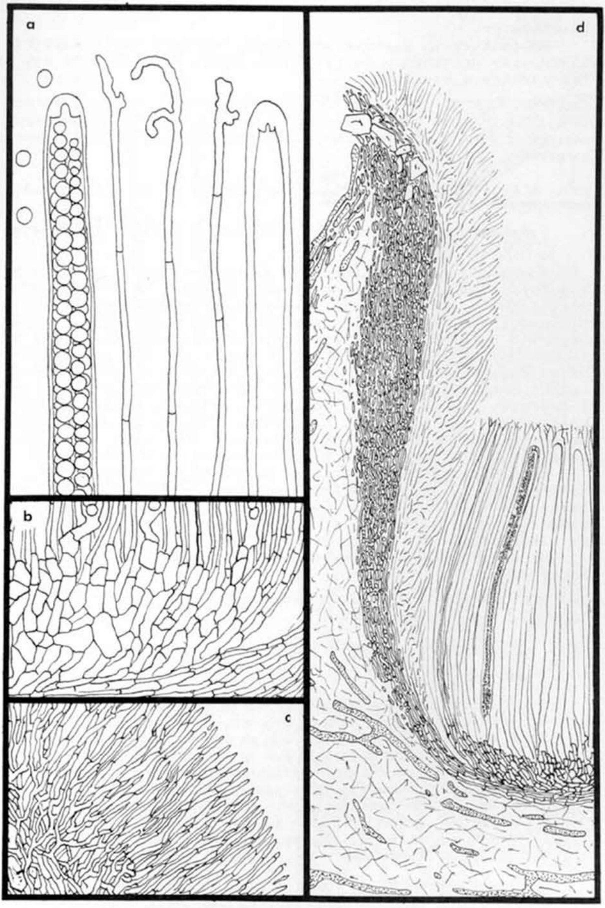

FIGURE 7. *Acarosporina monilifera.* a. Detail of asci and paraphyses, x 1500. Drawn from NY-Haines 2686. b. Junction of margin and subhymenium, x750. c. Periphysoids, x375. d. Cross section of margin, x150. b-d drawn from NY-Ellis 20.I.1882.

in diameter.

On cankers of *Quercus* and *Fagus*, eastern North America. Apparently uncommon. No pycnidial stage was found in any of the specimens examined.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Fagus*, New York, Haines 2686, 10.X.1973; on *Quercus*, Newfield N.J., 4.I.1880, Ellis, lectotype, designated here, of *Schizoxylon moniliferum;* Ellis 20.I.1882, presumed paratype).

(2). ACAROSPORINA MICROSPORA (Davidson & Lorenz) Sherwood, comb. nov.

≡ *Schizoxylon microsporum* Davidson & Lorenz, Phytopathology 28: 743 (1938)

Apothecia at first immersed in wood or bark, opening by a pore, becoming somewhat erumpent, 0.7-1.0 mm diam., the margin thick, dark, entire, externally somewhat white-pruinose, the disc deeply cupulate, pale ochraceous. Margin in cross section essentially indistinguishable from that of *A. monilifera*. Asci 170-200 x 7-8(-12) µm, the ascus membrane diffusely J+ blue, the cap 2.5-3.0 µm thick. Part-spores simple (or rarely septate and then longer), more than 8-seriate, 2-3 x 1.0 µm. Paraphyses simple, filiform, not enlarged at the apex, not circinate. If, as Davidson and Lorenz (1938) maintain, the spores are initially filiform, then the part-spores must elongate after disarticulation.

Pycnidia numerous, at first immersed, then erumpent, dark-walled, without a defined opening, white-pruinose, containing a single cavity. Conidiophores in a single layer, simple, probably phialidic. Conidia colorless, cylindrical or slightly curved, 2.5 x 1.0 µm.

On bark cankers of maple, eastern North America. Apparently rare.

SPECIMEN EXAMINED: NORTH AMERICA: USA (NY-Ellis 210, Newfield, N.J., labelled *S. ohiense* Ell. [ined.]).

(3). ACAROSPORINA BERBERIDIS Sherwood, spec. nov.

Figure 8

Ascocarpi primum immersi, profunde cupulati, 0.4 usque ad 0.6 mm diam., margine integro, brunneo, disco pallide ochraceo. Margo in sectione transversali 100 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., brunneo. Stratum crystallinum 20 µm crassum. Periphysoidea 50-60 x 2.0 µm, ramosa, brunnea. Paraphyses filiformes, simplices, 150 x 1.0 µm, achromae, in iodo caerulescentes. Asci 135-150 x 5-6 µm, apice 1.0 µm crassi, 8-spori. Sporae 125-140 x 1.2 µm, cellulis 1.0 µm longis, ad septa se disjungentibus et articulos simplices 1.2 µm longos foramtibus.

HOLOTYPUS: CUP-55527 (= Fungi of West Pakistan 16544), on a dead branch of *Berberis ceratophylla*, Loon Bagla, Muzaffarabad, 23.VII.1963.

Apothecia deeply immersed, raising the bark into small

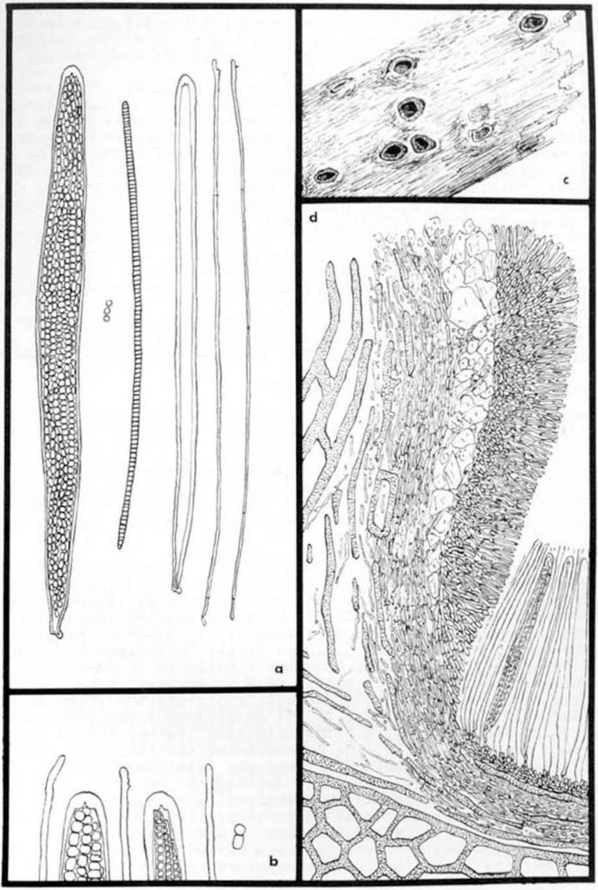

FIGURE 8. *Acarosporina berberidis*. a. Asci, paraphyses, ascospores, and part-spores, x750. b. Detail of apices of paraphyses and asci, x1500. c. Habit sketch, x7.5. d. Cross section of margin, x300. Drawn from the holotype.

pustules, becoming somewhat erumpent, 0.4 - 0.6 mm diam., the margin entire, brown, barely pruinose, the disc deeply immersed, pale ochraceous, splitting away from the margin when dry.

Accessory thalline margin fairly prominent. Stroma none. Margin in cross section c. 100 µm thick, the wall 20 µm thick, of pale brown, non-carbonized hyphae 2.0 µm diam.. Crystalline layer c. 20 µm thick, distinct but not prominent. Periphysoids 50-60 x 2.0 µm, colorless in the part adjoining the hymenium, brown above, branched near the base, forming a compact layer. Subhymenium colorless, 15-20 µm thick, resting directly on host tissue. Paraphyses simple, filiform, colorless, barely enlarged above, J+. Asci 135-150 x 5-6 µm, the cap 2.5 µm thick, the membrane blueing diffusely in iodine near the apex. Ascospores 8, 125-140 x 1.2 µm, at first very closely septate, the cells not over 1.0 µm long, soon falling apart into innumerable globose part-spores 1.2 µm diam.

On branches of *Berberis*, Pakistan. Distinguished from *A. monilifera* by non-circinate paraphyses, smaller part-spores, and lack of a dark wall layer beneath the subhymenium.

SPECIMENS EXAMINED: See holotype, above.

(3). *(ACROSPERMUM)* Tode, Fungi Meckl. 1: 8 (1790)

Validated: Fries, Syst. Mycol. 2(1): 244 (1822)
Lectotype species: *Acrospermum compressum* Tode, l.c., designated by Clements and Shear (1931)
= *Xyloglossum* Pers., Traité champ. comest. 144 (1818)
≡ *Scleroglossum* Pers. apud Mougeot & Nestler, Stirp. Crypt. Vogeso-Rhen. 671 (1820)

The affinities of *Acrospermum* have long been a subject of debate. The mature fruitbody consists of a solitary, fleshy, flattened perithecium, opening by a pore, soon erumpent and seated on a stalklike base. Unbranched paraphyses and cylindrical J- asci containing filiform spores constitute the hymenium. Although included in the Ostropales by Dennis (1968), this disposition has been questioned by subsequent authors. In the Fungi, Volume IV-A it appears in both the Clavicipitaceae (Müller & von Arx, 1973) and the Stictidaceae (Korf, 1973). O. Eriksson (1967) considered *Acrospermum* to be a Loculoascomycete with bitunicate asci. Fuckel (1870) erected a separate family, the Acrospermataceae (incorrectly ascribed to Rehm by Cooke & Hawksworth, 1970) for *Acrospermum*.

Brandriff (1936) studied development of *A. compressum*, which she interpreted as Dothidealean (*i.e.* ascolocular). The ascocarp originates as an undifferentiated stromatic body in which the internal hyphae elongate vertically. These disintegrate and are replaced by a pad of ascogenous hyphae giving rise to the asci and paraphyses. In the mature ascocarp the wall consists of an outer, dark-colored layer 1-2 cells thick (stroma), a fleshy, colorless, hyphal layer, and an inner layer of compacted colorless hyphae. Brandriff states that this is not true perithecial wall, but compacted stroma..

If correct, this developmental sequence suggests that of *Epichloë typhina*, as interpreted by Doguet (1960). I am unconvinced that the asci of *Acrospermum* are functionally bitunicate. The thickened inner wall remains firmly attached to the outer wall when the ascus is broken. Free ends of the interascal filaments suggest that they are true paraphyses. I am inclined to agree with Müller and von Arx that *Acrospermum* is related to the Clavicipitaceae. In any case, it is remote from *Stictis* and *Ostropa*.

SPECIMENS EXAMINED: NORTH AMERICA: USA (Herb. Sherwood 359, *A. graminum*, on *Lolium*, Oregon, 2.III.1972; 1211, on grass, Oregon, 17.VI.1973).

(4). *AGYRIELLA* Ell. & Ev., Bull. Torrey Bot. Club 24: 470 (1897)

Holotype species: *Agyriella bethelii* Ell. & Ev., l.c.
≡ *Agyriopsis* Sacc. & Sydow
≡ *Bisbyella* Boedijn
= *Schizoxylon* Pers.

Agyriella Ell. & Ev. is a later homonym of *Agyriella* Sacc. (Hyphomycetes). *A. bethelii* is discussed below, under *Agyriopsis* and *Schizoxylon*.

(5). *AGYRIOPSIS* Sacc. & Sydow, Syll. Fung. 14: 805 (1899)
Holotype species: *Agyriella bethelii* Ell. & Ev.
≡ *Agyriella* Ell. & Ev.
≡ *Bisbyella* Boedijn
= *Schizoxylon* Pers.

Agyriopsis is an avowed substitute for *Agyriella* Ell. & Ev. Cash (1943) transferred the type species to *Schizoxylon*. The somewhat atypical fleshy margin and sparingly branched paraphyses are inadequate justification for segregation into a separate genus. *A. bethelii* is redescribed below as *Schizoxylon ligustri*.

(6). *(AGYRIUM)* Fr., Syst. mycol. 2(1): 231 (1822)
Lectotype species: *Stictis rufa* Pers., Obs. mycol. 2: 73 (1799), selected by Clements and Shear (1931), but see discussion below.

Although the type species was included by Persoon in his original concept of *Stictis*, *Agyrium* has never subsequently been included in the Stictidaceae. It became the basis for a separate family, Agyriaceae Corda (1838). Poelt (1973) revived the family name Agyriaceae, using it in a restricted sense for *Agyrium* and *Xylographa*. Both may be related to the Lecideaceae, which is where Dennis (1968) classified *Agyrium*.

The fruitbodies of *A. rufum* are small, superficial, gelatinous, reviving apothecia with a reduced excipulum and a hymenium which blues diffusely in iodine. The asci are thick-walled, lack an obvious apical mechanism, and contain

8 unicellular colorless ovoid ascospores.

The name *Agyrium* is invalidly published as a nomen nudum on page LV of the first volume of Fries's Systema mycologicum. In a footnote on this page, Fries declares the type of *Agyrium* to be *Tremella cinnabarina* Bulliard. *T. cinnabarina* appears as a questionable species in volume 2 of Systema mycologicum and is not transferred to *Agyrium*. Since there is no reference in volume 2 to the typification in volume 1, this typification should be treated as invalid.

SPECIMENS EXAMINED: See *Stictis rufa.*

(7). (*APOSTEMIDIUM)* Karst., Bidrag. Kännedom Finlands Natur Folk 19: 15, 186 (1871)

Holotype species: *Peziza fiscella* Karst., Not. Sällsk. Fauna Flora Fenn. Forh. 10: 104 (1869)
≡ *Peziza* sect. *Apostemium* Karst., *Ibid.:* 104 (1869)
≡ *Vibrissea* sect. *Apostemium* (Karst.) Sánchez & Korf, Mycologia 58: 734 (1966)

The taxonomic position of *Apostemidium* is discussed under under *Vibrissea*, below. For complete generic synonymy, see Sánchez and Korf (1966).

(8). *(ASTERONAEVIA)* Petr., Ann. Mycol. 27: 408 (1929)

Holotype species: *Asteronaevia trichophori* Petr., l.c.
= *Hysteropezizella* Höhn.

According to Nannfeldt (1932), *Asteronaevia trichophori* is a synonym of *Hysteropezizella subsessilis* (Rehm) Nannf.

(9). *BIOSTICTIS* Petr., Sydowia 4: 357 (1950)

Holotype species: *Stictis rubiacearum* Pat., Bull. Soc. Mycol. France 11: 220 (1895).

Apothecia subepidermal, at first completely immersed, opening by a pore and enlarging gradually, the margin white, entire to crenulate but not distinctly toothed, pruinose, the disc moderately deeply immersed, splitting away from the margin when dry. Margin in cross section 3-layered, with a wall, crystalline layer, and sparse periphysoids, colorless or brown. Subhymenium resting directly on host tissue. Paraphyses numerous, filiform, simple or branched, J-. Asci cylindrical, with a distinct apical cap, J-. Ascospores filiform, colorless, transversely multiseptate.

On living leaves of Rubiaceae, tropical America. The genus differs from *Stictis* principally in its parasitic habit on living leaves. The two species recognized here are separated on marginal color and the shape of the ascospores.

(1). BIOSTICTIS PSYCHOTRIAE (Montagne) Sherwood, comb. nov.

≡ *Stictis psychotriae* Mont., Ann. Sci. Nat. Bot. sér. 2, 18: 246 (1842)
≡ *Propolis psychotriae* (Mont.) Mont., Syll. Gen. Spec. 246 (1856)

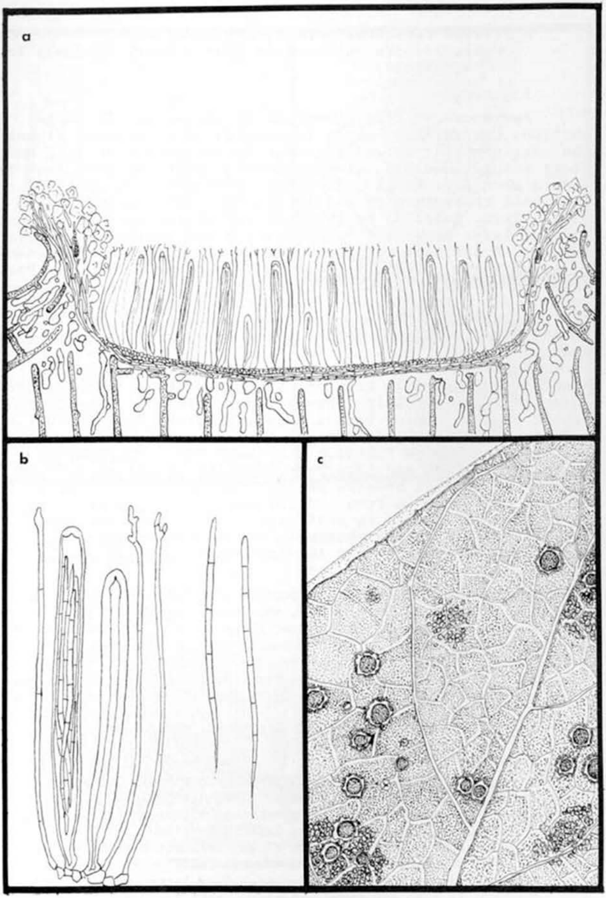

FIGURE 9. *Biostictis psychotriae.* a. Cross section of apothecium, x225. b. Asci, paraphyses, and spores, x750. c. Habit sketch, x7.5. Drawn from the type of *Stictis rubiacearum.*

= *Stictis rubiacearum* Pat., l.c.
≡ *Biostictis rubiacearum* (Pat.) Petr., Sydowia 4: 358 (1950)

Figure 9

Apothecia at first immersed in the mesophyll, hypophyllous, gregarious, often surrounded by discolored tissue, the margin white, entire to minutely lacerate, the disc moderately deeply immersed, flesh-colored, splitting away from the margin when dry. Margin, in cross section, 40-50 µm thick, that wall consisting of 4-5 layers of colorless hyphae 1.5 µm diam., lying parallel to the ruptured epidermis, the crystalline layer prominent, containing a few scattered colorless hyphae. A definite periphysoidal layer is absent. Subhymenium c. 10 µm thick, of small, colorless, angular cells, J-. Paraphyses numerous, filiform, 1.0 µm thick, 1-2x branched apically, J-. Asci 75-90 x 6-8 µm, thick-walled when young, the cap 2.5 µm thick, pierced by a narrow pore. Ascospores 8, 65-75 x 1.5(-2) µm, tapering below, usually 5-septate, not sheathed.

On leaves of *Psychotria* and unidentified Rubiaceous plants, widespread in tropical South America. In the field, infected leaves exhibit large yellow lesions with brown necrotic centers; dried leaves appear reddish. Both Patouillard and Lagerheim (1895) and Petrak (1950b) considered the imperfect stage to be *Fusidium violaceum* Pat. The fungus which Patouillard and Lagerheim describe is not present in Montagne's type of *Stictis psychotriae* or in the material which I collected in Peru and Colombia. In Lagerheim's collection it appears in scattered, superficial patches. I suspect that it is a hyphomycete which invaded the leaf during storage rather than the imperfect stage of *B. rubiacearum*.

SPECIMENS EXAMINED: SOUTH AMERICA: Surinam (PC, Splitgerber 1315, holotype of *S. psychotriae*). Ecuador (FH, San Jorge, Lagerheim, Juil 1892, holotype of *S. rubiacearum*) (NY, Sydow, Fungi Exotici 1215, on *Palicourea* sp., Tungurahina, Sydow 9.I.1938). Colombia (NY, on Rubiaceae, Dto. Antioquia, K.P. Dumont, S.E. Carpenter, M.A. Sherwood, 12.VIII 1976). Peru (NY-Pe-261, on Rubiaceae, Prov. Junín, K.P. Dumont, P. Buriticá, S.E. Carpenter, M.A. Sherwood, 28.VI.1976).

(2). BIOSTICTIS PUERTORICENSIS Sherwood, Spec. Nov.

Figure 10

Ascocarpi primum immersi, profunde cupulati, 0.3 usque ad 0.7 mm diam., margine integro, albo, disco nigro. Margo in sectione transversali 30 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5-2.0 µm diam., pallide brunneo. Stratum crystallinum 25 µm crassum. Periphysoidea 10.0 x 1.5 µm, non ramosa. Paraphyses filiformes, simplices vel ramosae, 60 x 1.0 µm, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 50-60 x 6.0 µm, apice 3-4 µm crassi, 8-spori. Sporae 40-50 x 2.0 µm, cellulis 2.5-3.5 µm longis.

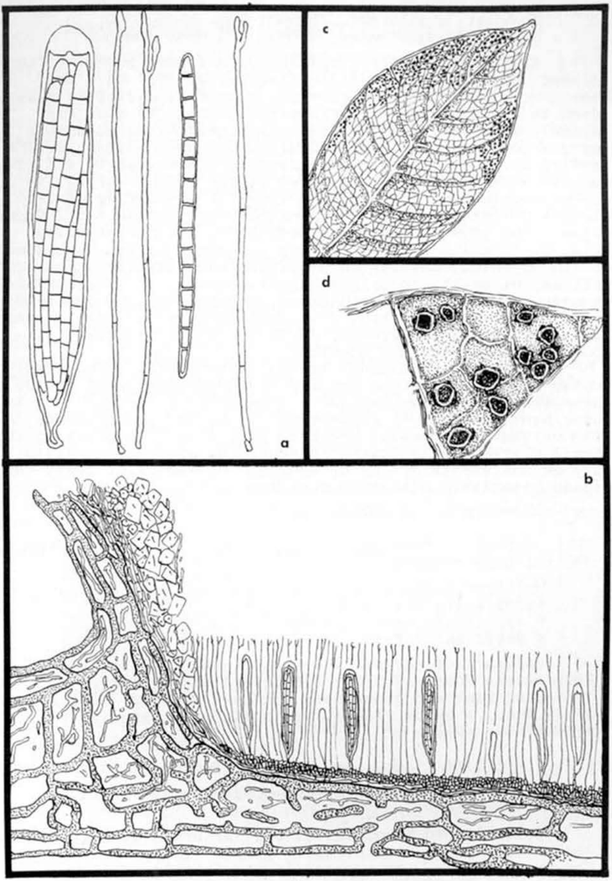

FIGURE 10. *Biostictis puertoricensis*. a. Ascus, paraphyses, and spores, x1500. b. Cross section of apothecium, x300. c. Habit sketch, x0.75. d. Habit sketch, x7.5. Drawn from the holotype.

HOLOTYPUS: CUP-PR-4251, On *Lasianthus moralesii* (Griesb.) C. Wright, Loquillo Mts., Chardon, Sept. 13-15, 1930, Puerto Rico, West Indies. ISOTYPI: NY, Herb. Sherwood.

Apothecia densely gregarious, sometimes becoming confluent, hypophyllous on living leaves, 0.3-0.7 mm diam., the disc black, moderately deeply cupulate, splitting away from the margin when dry, the margin entire to minutely crenulate, white, crystalline, surrounded by an accessory margin formed by the torn and blackened host epidermis. The entire apothecium is deeply sunken in the mesophyll and occupies most of the cross section of the leaf. Margin, in cross section, c. 30 μm thick, the wall consisting of 2-5 layers of interwoven non-carbonized brown hyphae 1.5-2.0 μm diam., the crystalline layer prominent, the periphysoids few, c. 10 x 1.5 μm, not forming a compact layer. Subhymenium c. 10 μm thick, resting on blackened and disintegrating host tissue, of small, colorless, angular cells, J-. Paraphyses numerous, filiform, 1.0 μm broad, enlarged to 1.5 μm at the apex, sometimes branched, J-. Asci 50-60 x 6-9 μm, the cap 3-4 μm thick. Ascospores 8, 40-50 x 2.0 μm, the cells 2.5-3.5 μm long, obscurely sheathed.

On living Rubiaceous leaves, Puerto Rico. The black color of the apothecium results from blackened host tissue beneath a colorless hymenium. *Biostictis puertoricensis* is distinguished from *B. rubiacearum* by having brown hyphae in the margin and somewhat broader, more closely septate spores. Small whitish tufts scattered among the apothecia contain hyphae and crystals, but no spores. No imperfect stage was found associated with this specimen.

SPECIMENS EXAMINED: See holotype, above.

(10). *BISBYELLA* Boedijn, Sydowia 5: 211 (1951) (an intentional name change).

Holotype species: *Agyriella bethelii* Ell. & Ev.
≡ *Agyriella* Ell. & Ev.
≡ *Agyriopsis* Sacc. & Sydow
= *Schizoxylon* Pers.

Peziza sect. *Agyriopsis* Karst., Not. Säll͏sk. Fauna Flora Fenn. Förh. 10: 104, 155 (1869) was published at a different rank and hence does not have priority over *Agyriopsis* Sacc. & Sydow (1889). *Bisbyella* is consequently a superfluous name.

(11). *(BRIARDIA)* Sacc., Rev. Mycol. (Toulouse) 7: 159 (1885)

Holotype species: *Briardia compta* Sacc., l.c.
= *Duebenia* Fr.

According to Nannfeldt (1929), *Briardia* is a synonym of *Duebenia*, a genus considered by Dennis (1968) to belong to the Dermateaceae. It appears in the Leotiaceae in Korf's (1973) keys to Discomycetes and Tuberales. Hein (1976) discusses the genus, whose affinities within the Dermateaceae are unclear.

(12). *CARESTIELLA* Bresadola,.Malpighia 11: 274 (1897)

Holotype species: *Carestiella socia* Bres., l.c.

Carestiella, with immersed immarginate ascocarps and polysporous J+ asci containing multiseptate, cylindrical spores, was considered Stictidaceous by Bresadola. According to Nannfeldt (1932) the type contained three apothecia and could not be examined; he did not believe that it was Ostropalean. It is remotely possible that a species of *Schizoxylon* with multiseptate part-spores, such as *S. microstomum*, might have generated the description given by Bresadola. It would be desirable to have additional material in hand before dissecting such a scant type specimen. For a description of *Schizoxylon microstomum*, see *Schizoxylon*, below.

(13). *(CERION)* Massee & Rodway, Bull. Misc. Inform. 1901: 159 (1901).

Holotype species: *Cerion coccineum* Mass. & Rodway, l.c.

Clements and Shear (1931) synonymized *Cerion* with *Stictis*. According to Dennis (1958), "in its asci, paraphyses, ascospores, excipular structure, iodine reaction and colouring, *Cerion* is totally unlike *Stictis*, to which Ainsworth and Bisby unaccountably refer it." He considered it related to *Colpoma* (Phacidiales: Rhytismataceae), but separable on paraphysis characters. My own observations confirm this. Originally described from Tasmania, *Cerion coccineum* also occurs in tropical America.

SPECIMENS EXAMINED: AUSTRALASIA (K, on wood, Tasmania, Rodway, holotype of *Cerion coccineum*) (NY, Isotype). NORTH AMERICA: Costa Rica (NY, on wood, Prov. San José).

(14). *(CHAILLETIA)* Karst., Bidrag. Kännedom Finlands Natur Folk 19: 21 (1871)

Holotype species: *Propolis sorbina* Karst., Fungi Fennici 839 (1869)
≡ *Karstenia* Fr.

Chailletia Karst. is a leter homonym of *Chailletia* DC (1811: Dichapetalaceae). The taxonomy of the genus is discussed under *Karstenia*, below.

(15). *(COCCOPEZIZA)* Hariot & Karsten, Rev. Mycol. (Toulouse) 12: 128 (1890)

Holotype species: *Coccopeziza ootheca* Har. & Karst., l.c

The authors stated that *Coccopeziza* resembled *Propolidium*, from which it was distinguished by lacking paraphyses. I have seen no examples of this fungus, which is probably not Ostropalean.

(16). *CONOTREMA* Tuck., Proc. Am. Acad. Arts. Sci. 1: 278 (1848)

Holotype species: *Lecidea urceolata* Ach., Lich. Univ. 671 (1810)

≡ *Conotremomyces* Cif. & Tom., Atti Ist. Bot. Lab. Critt. Univ. Pavia ser. 5, 10: 63 (1953), nom. illegit.

Apothecia at first immersed, opening by a pore and finally becoming somewhat erumpent, with a thick, black, entire margin and deeply urceolate disc which splits away from the margin when dry. Margin in cross section 3-layered, with a distinct external carbonized stroma, non-carbonized wall, and distinct layer of periphysoids; crystalline layer indistinct or lacking. Subhymenium resting on an extension of the wall or on lichen thallus and fragments of disintegrating bark. Paraphyses numerous, filiform, J+ or J-, frequently pigmented. Asci long-cylindrical, J-, with a distinct apical cap. Ascospores filiform and transversely multiseptate, or short-cylindrical to ovoid, muriform in one species, frequently sheathed. Lichen thallus corticolous or saxicolous, crustose, superficial or partly immersed, homiomerous.

In his comprehensive treatment of the genus, Gilenstam (1974) states that *Stictis* and *Conotrema* are congeneric, but hesitates to unite them because of uncertainty in the circumscription of *Stictis*. The apothecia of *Conotrema* are indeed very similar to those of *Stictis* sect. *Cyclostoma*, such as *S. mollis*.

Stictis, as treated here, while no longer the obviously polyphyletic and poorly circumscribed genus that it was when Gilenstam monographed *Conotrema*, still encompasses far more variability than many established genera of the Helotiales and Phacidiales. It may ultimately prove desirable to break it up into a number of smaller genera. A massive dark excipulum lacking an obvious crystalline layer, sheathed spores, and marginal paraphyses, as well as symbiotic association with algae to form a lichen thallus, are characters of possible generic value separating *C. urceolatum* from *S. radiata*, the type of *Stictis*. Since *Conotrema* (1848) is one of the oldest available generic names in the Stictidaceae, it is nearly inevitable that splitting *Stictis* would result in reviving *Conotrema*. I have therefore declined to submerge it here, and accept it as a generic name for lichenized species otherwise referrable to *Stictis* sect. *Cyclostoma*.

SPECIMENS EXAMINED: AFRICA: Canary Islands (CUP-MM-506, *C. harmandii* (Pitard) Gilenstam, Tenerife, R.P. Korf, W.C. Denison, L.M. Kohn & M.A. Sherwood, 11.I.1976). NORTH AMERICA: USA (Herb. Sherwood 1856, *C. urceolatum* (Ach.) Tuck., West Virginia, Goree 3546)

(17). *CRYPTODISCUS* Corda

A detailed description of *Cryptodiscus*, and redescriptions of representative species, appear on page 88 following the list of included and excluded genera.

(18). *CYANOSPORA* Heald & Wolf, Mycologia 2: 209 (1910)

Holotype species: *Cyanospora albicedrae* Heald & Wolf, l.c.
= *Robergea* Desm.

Saccardo and Traverso (1911) synonymized *Cyanospora* with *Robergea*, a decision accepted by most subsequent authors and confirmed by my own investigations. A redescription of the type species appears under *Robergea*.

(19). *CYCLEDIUM* Wallr., Fl. Crypt. Germ. 2: 510 (1833)

≡ *Schizoxylon* Pers.

One of Wallroth's original species was *Cycledium sepincola* (Pers.) Wallr., the holotype species of *Schizoxylon*. *Cycledium* is a superfluous name, automatically typified by *Schizoxylon sepincola* under article 7 of the International Code of Botanical Nomenclature.

(20). *CYCLOSTOMA* Crouan & Crouan, Fl. Finist. 30 (1867)

Lectotype species (designated here): *Stictis arundinacea* Pers., Myc. Eur. 1: 336 (1822)
≡ STICTIS sect. CYCLOSTOMA (Crouan & Crouan) Sherwood, comb. nov.
?= *Cylindrina* Pat.

Cyclostoma is usually treated as a synonym of *Schizoxylon* (Fuckel, 1870; Nannfeldt, 1932), but apparently has never been typified. I have designated *C. arundinacea* (Pers.) Crouan & Crouan as the lectotype species, since the two species described as new by Crouan and Crouan are imperfectly characterized, and their types cannot be borrowed; the fourth included species was *Schizoxylon berkeleyanum*. In the treatment of *Stictis*, below, I have recognized section *Cyclostoma* for species with a wall layer of darkly pigmented hyphae.

(21). *CYLINDRINA* Pat., Bull. Soc. Bot. Fr. 33: 155 (1886)

Holotype species: *Cylindrina delevayi* Pat., l.c.

?= *Stictis* Pers.

The type specimen of *C. delevayi* contains one apothecium. Patouillard described the asci and spores as being like those of *Acrospermum*. The fruitbody is black, erumpent, 0.8 mm broad, 1.0 mm high, opens by a pore, lacks an obvious crystalline layer, has a hymenium which splits away from the margin when dry, and occurs on leaves of *Liparis* (Orchidaceae). The evidence suggests that this is a species of *Stictis* allied to *Stictis arundinacea*.

SPECIMEN EXAMINED: ASIA: China (FH-Patouillard, feuilles de *Liparis liliiflora* Reich, Yunnan, Abbé Delevay, holotype of *Cylindrina delevayi*)

(22). *DELPONTIA* Penzig & Saccardo, Malphighia 15: 220 (1901)

Holotype species: *Delpontia pulchella* Penz. & Sacc., l.c.

Apothecia immersed, irregular in outline, opening partially by a pore and partially by splitting the overlying substrate, colorless, the margin very reduced, consisting of a covering layer of a few colorless crystalliferous hyphae, devoid of differentiation into layers. True paraphyses numerous, filiform, J+. Asci cylindrical, somewhat thick-walled when young, with an indistinct J- cap. Ascospores colorless, ovoid, muriform. *D. pulchella* is the only species which certainly belongs in *Delpontia*, although *Stictis pteridina* (q.v.) may possibly belong here.

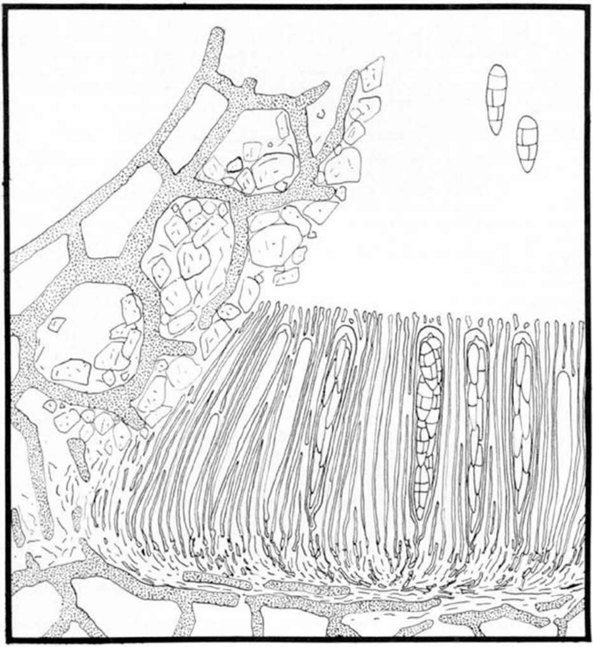

FIGURE 11. *Delpontia pulchella*. Cross section of apothecium, x750. Drawn from the holotype.

(1). DELPONTIA PULCHELLA Penz. & Sacc.

Figure 11

Apothecia at first completely immersed, opening partly by dissolving a pore in the substrate and partly by splitting the overlying host tissue into lobes which are at first reflexed and then deciduous, abundantly crystalliferous, with a few colorless hyphae 1.0 µm diam. adnate to the host tissue.

Subhymenium colorless, 5 µm thick, resting directly on host tissue. Paraphyses numerous, filiform, 1.0 µm broad, slightly enlarged at the tip, J+ blue. Asci cylindrical, 60-65 x 8 µm, the cap 2 µm thick, J-. Ascospores 8, obovate, with 3-4 transverse septa and 1 longitudinal septum, 13-18 x 4-5 µm.

On fern stalks, Java. *D. pulchella* is clearly not a lichen. It may be related to *Propolidium* or *Karstenia.*

SPECIMEN EXAMINED: ASIA: Java (BO, in petiolis emarcidis Filicis arboreae, Tijbodas, 2.III.1897, holotype of *Delpontia pulchella* [no material remains at GEN]).

(23). *(DIDYMASCINA)* Höhn., Ann. Mycol. 3: 331 (1905)

Lectotype species: *Amphisphaeria salicicola* Allesch., Ber. Bayer. Bot. Gesellsch. 1897: 13 (1897), designated by von Höhnel (1929)
= *Didymosphaeria* Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 140 (1870)

According to von Höhnel (1909, 1929), *Didymascina* differs from typical *Didymosphaeria* (Pleosporales) only in having a poorly developed peridium.

(24). *DIPLOCRYPTIS* Clem., Gen Fungi 63, 174 (1909).

Holotype species: *Stictis foveolaris* Rehm., Ber. Naturh. Vereins Augsburg 26: 33 (1881)
= *Cryptodiscus* Corda

1-septate, rather than 3-septate spores is scarcely sufficient reason for founding a separate genus on *Stictis foveolaris,* which is a typical *Cryptodiscus.*

(25). *(DIPLONAEVIA)* Sacc., Syll. Fung. 8: 666 (1889)

Holotype species: *Diplonaevia caricum* (Auerswald ex Sacc.) Sacc., l.c.

According to B. Hein (personal communication) *Diplonaevia caricum* is a synonym of *Merostictis seriata* (Lib.) Défago. *Diplonaevia* may be an older name for *Merostictis,* which is considered (Défago, 1967; Korf, 1973) to be a member of the Pyrenopezizeae (Dermateaceae).

(26). *(DURELLA)* Tulasne & Tulasne, Sel. Fung. Carp. 3: 177 (1865)

Holotype species: *Peziza compressa* Pers., Disp. Meth. Fung. 34 (1797)
= *Xylogramma* Wallr.

The taxonomic disposition of *Durella* is complicated by confusion concerning the application of the name. The genus as treated by Dennis (1956) seems heterogeneous even when *Patinellaria* Karst. is recognized as separate. *D. commutata* Fckl. is a superficial, stalked fungus, not reported to have a *Cystotricha* imperfect stage.

As Dennis (l.c.) points out, Tulasne and Tulasne's concept of *D. compressa* (Pers.) Tul. & Tul. is based on two or possibly three different fungi. I can find no record of critical examination of material identified by Persoon as this species.

D. atrocyanea (Fr.) Höhn., which is perhaps identical with one of the fungi included in the protologue of *Durella*, is characterized by erumpent, sessile fruitbodies with a reduced margin of olive-brown hyphae widely spaced in a gel. The somewhat thick-walled asci lack an obvious apical apparatus, do not blue in iodine solutions, and are surrounded by numerous paraphyses which branch repeatedly near the apex to form an olivaceous epithecium. This common Ascomycete is perhaps out of place in the Leotiaceae (Helotiaceae), where it is currently classified, but does not seem to be Ostropalean.

Both Nannfeldt (1932) and Dennis (1956) suggest that *Durella* should be conserved against the earlier generic name *Xylogramma*, but this proposal has never been acted on by a botanical congress. In view of uncertainties concerning the type species of *Durella*, any action on such proposals would be premature. Considering the confused concept of *Durella* in the literature, I personally favor retention of *Xylogramma*.

SPECIMENS EXAMINED: EUROPE: Sweden (FH, Fries, Scleromycetes Sueciae 278, isotype of *Stictis atrocyanea* Fr.). NORTH AMERICA: USA (Herb. Sherwood 1982, New York).

(27). *(EUPROPOLELLA)* Höhn., Ann. Mycol. 15: 311 (1917)

Holotype species: *Sphaeropezia vaccinii* Rehm, Hedwigia 2: 114 (1882)
= *Naeviella* (Rehm) Clements

The taxonomy of *Eupropolella* has been reviewed by Müller (1957) and Défago (1967). Korf (1973) assigns the genus to the Naevioideae (Dermateaceae); the genus is certainly not Stictidaceous in the modern sense. *Naeviella* (q.v.) may be an older name for the genus.

(28). *(EUPROPOLIS)* de Not., Comment. Soc. Crittog. Ital. 1: 364 (1864).

Holotype species: *Eupropolis guthnickiana* de Not., l.c.
= *Phaeotrema* Müll. Arg., Mém. Soc. Phys. Hist. Nat. Genève 29: 10 (1887)
= *Janseella* P. Henn. & Nym.

I have received no answers to my inquiries for the type specimen and have been unable to locate any reliably identified material of *E. guthnickiana*, which occurred on bark in Puerto Rico and was described as having 3-septate brown spores, usually fewer than 8/ascus, and fruitbodies which resembled those of *Propolis* (Fr.) Fr. The description strongly suggests that this is a lichen in the genus *Phaeotrema* (Thelotremataceae), as was indirectly suggested by von Höhnel (see notes under *Janseella*, below). If examination of the type specimen proves this to be true, this becomes an older name for *Phaeotrema*, which, although conserved against *Asteristion* Leighton (1870) is not conserved against *Eupropolis*.

(29). *(FLAMINIA)* Sacc. & Sydow, Syll. Fung. 16: 777 (1902)

Holotype species: *Lindauella amylospora* Rehm, Hedwigia 11: 212 (1900)

The type specimen of *L. amylospora* contains several fungi. The one most closely fitting Rehm's description is hypophyllous in effuse, discolored spots occupying approximately half the leaf surface. The spots are dotted with regular depressions which are not present on healthy portions of the leaves. The depressions are approximately 200 µm broad. Most appear empty, but some contain a white powdery substance consisting of thin-walled, colorless, minutely punctulate spores with 5 indistinct pores in cross section, enclosed in a rather delicate, fugaceous peridium of angular cells, these also with punctulate markings. Host cells beneath the depressions contain numerous J+ purplish globules of the dimensions ascribed to the spores by Rehm. The fruitbodies seem to be the aecia of Uredinales.

SPECIMENS EXAMINED: SOUTH AMERICA: Brazil (S, Pijaca, on *Xanthoxylon*, Rio de Janero, Ule 2259, 1/1896, holotype of *Lindauella amylospora*).

(30). *(HABROSTICTIS)* Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24: 249 (1870)

Holotype species: *Habrostictis rubra* Fckl., l.c.

Habrostictis is assigned, with some reservations, to the Peziculoideae (Dermateaceae) by Dennis (1968).

(31). *(HYSTEROPEZIZELLA)* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., Abt. 1, 126: 311 (1917)

Holotype species: *Micropeziza subvelata* Rehm, Ber. Naturh. Vereins Augsberg 26: 102 (1881)

Hysteropezizella was correctly assumed to be Dermateaceous by von Höhnel (l.c.).

(32). *(HYSTEROSTEGIELLA)* Höhn., l.c.: 313

Holotype species: *Stictis fenestrata* Desm., Ann. Sci. Nat. Bot. sér. 3, 16: 321 (1851)

Hysterostegiella was included by Clements and Shear (1931) in the Stictidaceae as a synonym of *Stegia*. Von Höhnel correctly assigned the genus (which is not a synonym of *Stegia*, q.v.) to the Dermateaceae. It is discussed by Défago (1967).

(33). *(IRYDYONIA)* Raciborski, Par. Alg. Pilze Java's 3: 20 (1900)

Holotype species: *Irydyonia filicis* Raciborski, l.c.

The type species is an immersed fungus which opens by a longitudinal slit, has fusoid spores with 1-2 basal cilia, and causes leaf spots on ferns. Raciborski considered the genus to be closely related to *Sphaeropezia*. It is unlikely that the fungus is Ostropalean, but only examination of the type specimen will reveal the true relationships of the genus.

(34). *(JANSEELLA)* P. Henn. & E. Nym., Monsunia 1: 171 (1900)

Holotype species: *Eupropolis asteriscus* P. Henn. & E. Nym., l.c. p. 29.
= *Eupropolis* de Not.
= *Phaeotrema* Müll. Arg.

Von Höhnel (1911) synonymized *Janseella* and *Eupropolis*, which he regarded as Stictidaceous. He had not seen any specimens of *Eupropolis*. The isotype of *Janseella asteriscus* (P. Henn. & Nym.) P. Henn. & Nym. is a corticolous lichen in the genus *Phaeotrema* (Thelotremataceae).

Hennings and Nyman (l.c., p. 29) mention *'Jansella'* in connection with *E. asteriscus*, but do not accept the genus there. The orthography of the name preferred in the literature is the one accompanying the first valid publication. Hennings and Nyman give no etymology, but it seems probable that the name derives from Janse-ella, after J. M. Janse, author of a contemporary work on tropical phytopathology.

SPECIMEN EXAMINED: ASIA: Java (FH-Höhnel 4629, on *Flacourtia*, Buitenzorg, II.1898, Nyman, isotype of *Eupropolis asteriscus*).

(35). *(KARSTENIA)* Fr. in Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 166 (1885)

Holotype species: *Propolis sorbina* Karst., Fungi Fennici 839 (1869)
≡ *Chailletia* Karst.

Apothecia at first immersed, intracortical, more or less lenticular in cross section, raising the substrate into small pustules and finally rupturing it to form a margin of irregular teeth, not becoming erumpent, colorless, fleshy. Covering layer well-developed, non-crystalliferous, consisting of short-celled, vertically-oriented hyphae ending in a fringe of hairlike projections; covering layer continuous with the base of the conceptacle, which is also colorless and distinct from the subhymenium. Paraphyses numerous, filiform, J+ or J-. Asci short-stalked, clavate, uniformly thin-walled, lacking any defined apical apparatus. Ascospores colorless, thin-walled, transversely multiseptate.

On bark, fern rachides, and coarse monocotyledonous leaves; originally described from Europe but apparently more common in the tropics. The taxonomic position of *Karstenia* is questionable. In its fleshy texture, the construction of the upper part of the covering layer, and its growth habit it resembles immersed members of the Pyrenopezizeae, but the asci and diffuse blueing of the hymenial gel are quite out of place in that group. The margin is most easily interpreted as a lenticular discostromatic structure characteristic of the Phacidiales. Although remote from *Phacidium* and *Hypoderma*, *Karstenia* may be related to *Melittosporiella* or *Propolidium*, genera which seem to share characteristics with both the Phacidiales and Ostropales.

The concept of *Phragmonaevia*, which is a possible synonym of *Karstenia* and a more familiar name, is too confused to warrant proposing conservation of *Phragmonaevia* over *Karstenia*.

The four species discussed below are characteristic of the genus. In addition to *Karstenia corticoides*, there are several apparently undescribed species which occur in tropical America.

(1). *KARSTENIA SORBINA* (Karst.) Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 166 (1885)

≡ *Propolis sorbina* Karst.
≡ *Chailletia sorbina* (Karst.) Karst., Bidrag Kännedom Finlands Natur Folk 9: 241 (1871).

Figure 12, a, b

Apothecia at first immersed, raising the substrate into small pustules and then opening irregularly by teeth, 0.5-1.0 mm diam., colorless. Covering layer adnate to the ruptured substrate, 75-100 µm thick, of vertically-oriented short-celled hyphae 1.5-3.5 µm diam., ending in a fringe of cells 15 x 1.5 µm. Lip cells absent. Subhymenium colorless, c. 20 µm thick, distinguished from the underlying conceptacle by its smaller cells and darker staining reaction in cotton blue. Asci uniformly thin-walled, short-stalked, lacking a defined apical apparatus, J-, 80-100 x 10-13 µm, 8-spored. Ascospores 38-62 x 3-4 µm, cylindrical with obtuse ends, barely tapered below, transversely multiseptate, the cells 3-4 µm long. Paraphyses colorless, filiform, 1.0 µm thick, not enlarged above.

On *Sorbus*, Finland. Apparently known only from the type specimen.

SPECIMEN EXAMINED: EUROPE: Finland (FH, Fungi Fennici 839, on *Sorbus*, isotype of *Propolis sorbina*).

(2). KARSTENIA IDAEI (Fuckel) Sherwood, comb. nov.

≡ *Schizoxylon idaei* Fuckel, Jahrb. Nassauischen Vereins Naturk. 23-24: 251 (1870).

Figure 12, c, d

Apothecia immersed, 0.3-0.5 mm diam., raising the substrate into small pustules and then splitting it irregularly, forming several teeth which are reflexed when the apothecium is rehydrated. The covering layer, which is colorless, adnate to the substrate, c. 60 µm thick, composed of vertically-oriented, short-celled hyphae 2.5-3 (-4) µm diam., and ends in a fringe of cells 10 x 2.5 µm, continues beneath the subhymenium as a layer c. 20 µm thick. Subhymenium separated from the lower conceptacle by a band of disintegrating host tissue. Paraphyses numerous, filiform, J-, 1.0 µm diam., not apically enlarged or branched. Asci short-stalked, uniformly thin-walled, lacking a defined apical apparatus, J-, 80-100 x 10-14 µm, 8-spored. Ascospores 40-60 x 3-4 µm, cylindrical, barely tapered basally, transversely multiseptate, the cells 4-5 µm long.

On canes of *Rubus idaeus*. This species is obviously no *Schizoxylon*, and differs from *K. sorbina* chiefly in having a thinner covering layer with larger cells.

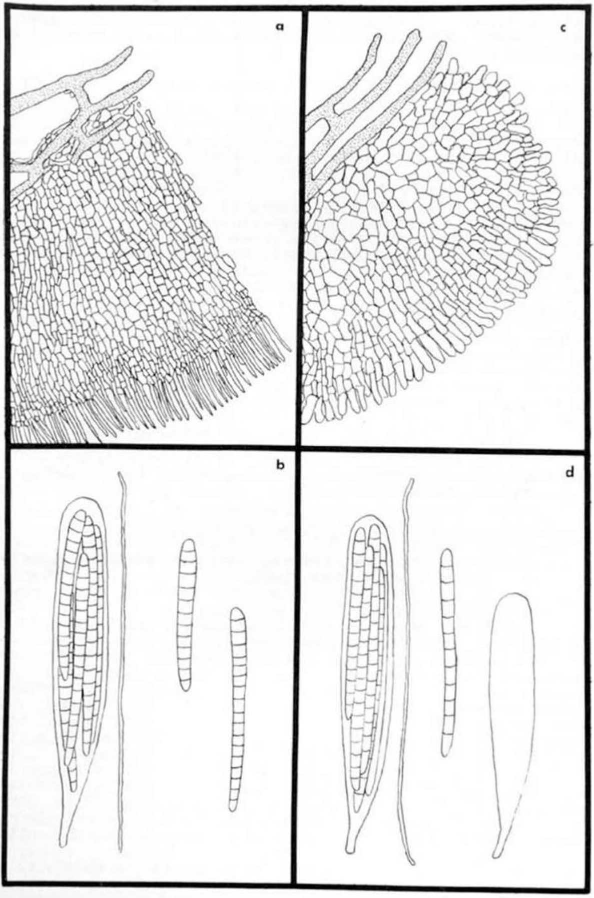

FIGURE 12. a-b. *Karstenia sorbina*. a. Detail of covering layer, x750. b. Ascus, paraphysis, and spores, x750. Drawn from FH-Fungi Fennici 839. c-d. *Karstenia idaei*. c. Detail of covering layer, x750. d. Asci, paraphysis, and spores, x750. Drawn from the holotype.

SPECIMEN EXAMINED: EUROPE: Austria? (G, sine coll., ex herb. Fuckel, presumed holotype of *Schizoxylon idaei*).

(3). KARSTENIA CORTICOIDES (Pat.) Sherwood, comb. nov.

≡ *Stictis corticoides* Pat., Bull. Soc. Mycol. France 11: 220 (1895)

Apothecia immersed, opening by splitting the substrate irregularly to expose the ochraceous disc, 2-6 mm diam. Covering layer colorless, 20-30 µm thick, of vertically-oriented hyphae 2-4 µm diam. prolonged into a distinct basal fringe. Asci 125-150 x 10 µm, uniformly thin-walled, J-, lacking an obvious apical apparatus, 8-spored. Spores 115-125 x 2.5 µm, cylindric-filiform, barely tapered, septate, the cells 3-5 µm long. Paraphyses numerous, filiform, apically enlarged to a spathulate tip 2.5 µm broad, but not regularly bifurcate as was implied by Patouillard.

On wood and bark, tropical America.

SPECIMENS EXAMINED: NORTH AMERICA: Mexico (CUP-ME-30, Michoacan). SOUTH AMERICA: Ecuador (FH, Lagerheim, Juillet 1892, holotype of *Stictis corticoides*) .

(4). KARSTENIA LONICERAE (Velenovský) Sherwood, comb. nov.

≡ *Propolidium lonicerae* Velenovský, Monogr. Discom. Bohem. 1: 50 (1934); 2: pl. 2, f. 20 (1934).

Figure 13

Apothecia at first immersed, raising the substrate into small pusules and then splitting the overlying substrate into irregular teeth, 0.3-0.7 mm broad, the disc pale ochraceous. Covering layer 50 µm thick at the broadest point, adnate to the ruptured substrate, of vertically-oriented colorless hyphae 2-3 µm diam., these prolonged below into a fringe of hyphae 1.5 x 5-7 µm. Asci broadly clavate, short-stalked, J-, 70-95 x 8-9 µm, thin-walled, lacking any defined apical apparatus, 8-spored. Paraphyses filiform, 1 µm thick, enlarged to 1.5-2 µm above, not branched, J-, forming an indistinct epithecium. Spores 25-35 x 3-4.5 µm, minutely punctate, basally attenuate, (3-)5-9 septate.

On *Lonicera* and *Cornus*, Bohemia.

SPECIMEN EXAMINED: EUROPE: Czechoslovakia (PRM 152901, on *Lonicera*, Mnihovice, isotype of *Propolidium lonicerae*).

(5). *(KARSTENIA SUBLILACINA)* Ell. & Ev., Bull. Lab. Nat. Hist. Iowa State Univ. 4: 69 (1896)

≡ *Ocellularia sublilacina* (Ell. & Ev.) Zahlbr., Cat. Lich. Univ. 2: 601 (1924)

Judging from a portion of the type (CUP-D-7588) which I examined, Zahlbruckner's transfer to *Ocellularia* is correct.

(36). *(LAQUEARIA)* Fries, Summa Veg. Scand., sect. post. 366 (1849)

Holotype species: *Stictis sphaeralis* Fr., Syst. mycol. 2: 194 (1822)

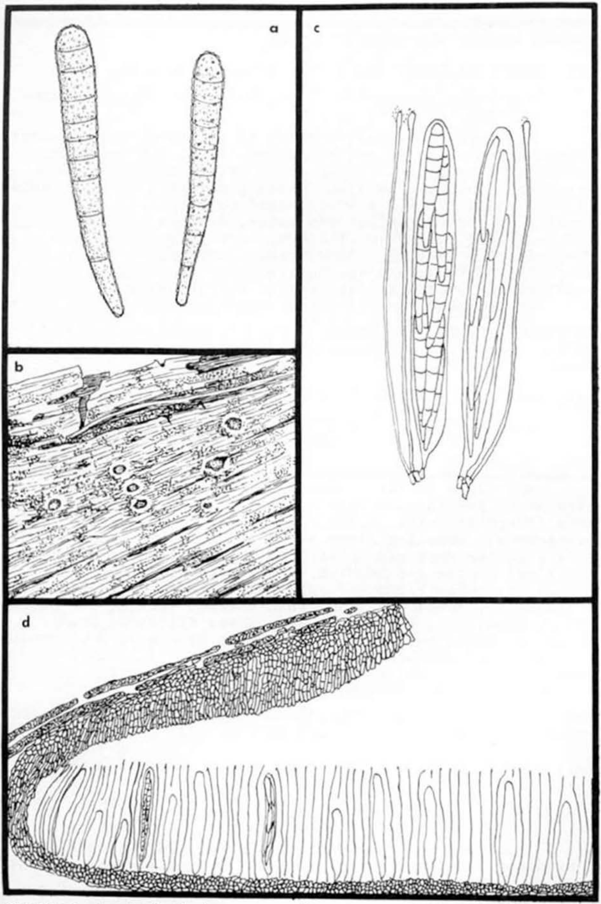

FIGURE 13. *Karstenia lonicerae*. a. Ascospores, x1500. b. Habit sketch, x 7.5. c. Asci, paraphyses, and ascospores, x750. d. Cross section of apothecium, x300. Drawn from PRM 152901.

Laquearia appears as one of three genera in the Ostropaceae as conceived by Rehm (1887-96), but is assigned to the Phacidiaceae by Dennis (1968). According to Massee (manuscript notes with the specimen from Fungi Rhenani at NY) and Dennis (1968), *L. sphaeralis* has asci without a prominent apical apparatus, and 8 unicellular colorless spores. Both base their descriptions on Fuckel's Fungi Rhenani 2066; I could find no asci or spores in the specimen at NY. The species occurs immersed in branches of *Fraxinus* and opens by a black punctiform ostiole in a crystalline disc. Fuckel's material may well be Pyrenomycetous. It does not seem to belong in either the Phacidiaceae or the Ostropales.

(37). *(LASIOSTICTIS)* (Sacc. & Berlese) Sacc., Syll. Fung. 8: 696 (1889).

Holotype species: *Stictis (Lasiostictis) conigena* Sacc. & Berl., Atti Reale Ist. Veneto Sci., Lett., Arti VI 3: 734 (1885).

Lasiostictis is a typical member of the Phacidiaceae. For a discussion of the genus, see Sherwood (1974).

(38). *(LEPTOCREA)* Sydow, Ann. Mycol. 14: 87 (1916)

Holotype species: *Leptocrea orbiculata* Sydow, l.c.
= *Polystigma* DC, Fl. Franc. 5: 164 (1815)

Von Arx and Müller (1954) transfer the type species to *Polystigma* (Sphaeriales). *Leptocrea* appears as a questionable genus of Stictidaceae in Clements and Shear (1931).

(39). *LICHENOPSIS* Schw., Trans. Amer. Philos. Soc. n.s. 4: 308 (1832).

Holotype species: *Lichenopsis sphaeroboloidea* Schw., l.c.
≡ STICTIS sect. LICHENOPSIS (Schw.) Sherwood, comb. nov.

The characters of the section, and of *Stictis sphaeroboloidea* and its allies, are discussed under *Stictis*, below.

(40). LILLICOA Sherwood, gen. nov.

Apothecia hypophylla, sessilia, parva, cylindrica vel turbinata. Subhymenium achromum, ex cellulis parvis, angularibus, parietibus macris praeditis constans. Margo achromus, ex hyphis gracilibus, septatis, laxe intertextis, cum crystallis abundantibus mixtis constans, siccus ab hymenio se non abrumpens. Paraphyses numerosae, graciles, achromae, simplices vel ramosae. Asci cylindrici, apice incrassati, poro in iodo non caerulescente. Ascosporae filiformes, transversae septatae.

Holotypus: *Ophionectria palicoureae* Seaver & Whetzel.

Etymology: After Sandra White, née Lillico, friend and botanist.

Apothecia hypophyllous, small, sessile, cylindrical to turbinate, with a white-pruinose margin and deeply urceolate

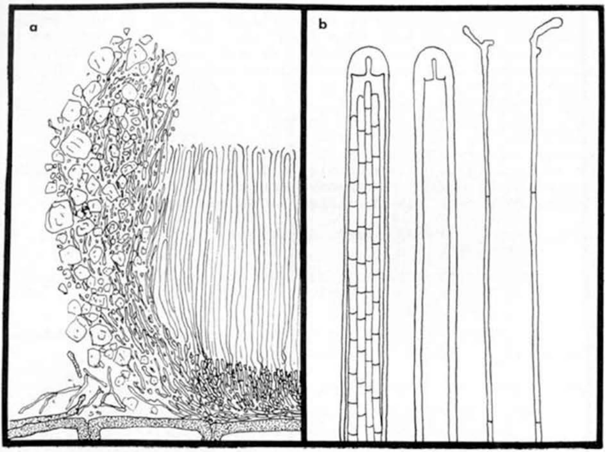

FIGURE 14. *Lillicoa palicoureae*. a. Cross section of apothecium, x375. b. Detail of ascus and paraphysis apices, x1500. Drawn from CUP 14743.

disc. Subhymenium colorless, of small, angular, thin-walled cells. Margin devoid of differentiation into layers, not splitting away from the hymenium when dry, of slender, colorless interwoven hyphae intermingled with numerous crystals. Paraphyses numerous, filiform, simple or branched, J-. Ascospores colorless, filiform, transversely multiseptate. Asci cylindrical, with thin lateral walls and a distinct apical cap.

Superficial on living leaves, tropical America. *Lillicoa* differs from *Stictis* in its completely superficial habit and lack of periphysoids, and from *Schizoxylon* in being a much tinier, superficial fungus occurring on living leaves, and in having spores which do not disarticulate at the septa.

Dennis (1954), in a discussion of tropical discomycetes, illustrates *Erinella bicolor* Pat.& Lagerheim, which is almost certainly congeneric and possibly conspecific. At the time Dennis thought that *E. bicolor* belonged to an as yet undescribed genus of Ostropales, but declined to found a genus on Patouillard's scanty type specimen. While admitting that *E. bicolor* may be an older name for *O. palicoureae,* I choose the latter as my type species, since it is represented by abundant material in the CUP herbarium. Rossman (1975) synonymizes the two species, without, however, examining the type of *E. bicolor*.

(1). LILLICOA PALICOUREAE (Seaver & Whetzel) Sherwood, comb. nov.

≡ *Ophionectria palicoureae* Seaver & Whetzel, Sci. Survey Porto Rico and Virgin Islands 8(1): 45 (1926)

Figure 14

Apothecia hypophyllous, scattered on and adjacent to the midrib of leaves of *Palicourea?* sp. (Rubiaceae), sessile, superficial or at most initially subcuticular (early stages not seen), cylindrical, 0.2-0.3 mm diam., 0.2-0.3 mm tall, cylindrical, with a white-pruinose margin and deeply urceolate pale orange disc. Subhymenium c. 75 µm thick, of closely septate colorless hyphae 1.0 µm diam., J-. Margin c. 70 µm thick, obscurely 2-layered, the outer layer predominantly crystalline, the inner layer of interwoven colorless hyphae 1.0-1.5 µm diam., vertically-oriented, not markedly gelatinous. Periphysoids absent. Paraphyses numerous, filiform, 1.0 µm broad, sometimes forked near the tip and weakly circinate, J-. Asci 110-120 x 5(-6) µm, the cap 3.0 µm thick, pierced by a narrow pore. Ascospores 8, 90-100 x 1.0-1.5 µm, septate, the cells 4-6 µm long.

On living leaves, Puerto Rico, West Indies. Dennis (1954) states that the ascospores of *Erinella bicolor* measure 80 x 1.0-1.5 µm, draws the paraphyses as being forked near the middle, and illustrates turbinate, rather than cylindrical ascocarps. The two species may possibly be distinct.

Leaves colonized by *Lillicoa palicoureae* show no evidence of being diseased and the fungus seems neither to be associated with other fungi nor to be growing on a lichen thallus. Its relationship to the host plant remains a mystery.

SPECIMENS EXAMINED: NORTH AMERICA: Puerto Rico (CUP-14743, on *Palicourea?* sp., woods, Guaynabo, H.H. Whetzel, R.A. Toro, F.D. Kern, 25.VI.1924, isotype of *Ophionectria palicoureae;* CUP-PR-2682, *ibid.*)

(41). *(LINDAUELLA)* Rehm, Hedwigia 39: 82 (1900)

Holotype species: *Lindauella pyrenocarpoidea* Rehm, l.c.

L. pyrenocarpoidea, which was originally described as having fruitbodies which were initially closed, but opened by a broad pore to expose the disc, is a pyrenomycete in the Polystigmataceae. The solitary perithecia are completely immersed and occupy the entire thickness of the leaf. There does not appear to be any stroma present. The perithecial wall is approximately 20 µm thick, brown on the outside and colorless within, and opens by an indistinct pore. The cylindrical, apparently unitunicate asci are J- and lack an obvious apical apparatus. The ascospores are spherical, colorless, unornamented, and uniseriate. Numerous true paraphyses are present.

On living leaves of grasses. *Lindauella* seems near *Glomerella*, but differs in having spherical spores. It may be an acceptable genus of the Polystigmataceae.

SPECIMEN EXAMINED: SOUTH AMERICA: Brazil (S, auf Gras *Ophiodotis*, Prov.

Santa Catharina, São Francisco, Ule, April 1884, holotype of *Lindauella pyrenocarpoidea*)

(42). *(MELANOSTROMA)* Corda in Sturm, Flora Deutschlands 3(2): 129 (1829)

Holotype species: *Melanostroma fusarioides* Corda, l.c.

Corda (1837) assigned *M. fusarioides* to the Caeomaceae (Coniomycetes)(a mixture of Coelomycetes and Uredinales), listing *Stictis pupula* Fr. as a synonym. The original description and accompanying plate show an immersed, dark-colored fungus with a broad white margin. Von Höhnel (1923) interpreted it as Stictidaceous.

The only specimen of *M. fusarioides* in Corda's herbar-u ium was collected at Reichenberg and does not seem to be the type. It contains a pycnidial fungus consisting of groups of 3-5 pycnidia immersed in a predominantly hyphal, colorless stroma. The pycnidia become confluent at the neck and collectively erumpent through the bark of the host. Individual pycnidia are 0.2-0.3 mm diam., with a wall of closely-packed hyphae which are colorless at the base and brown near the apex. The cavity is lined with a layer of closely-packed, sessile phialides 8.0 x 1.5 µm, with a minute collarette. The colorless, non-septate phialoconidia measure 11-14 x 1.5-2.0 µm. These become heaped up around the pycnidial opening, forming the white border which mimics the crystalline layer of *Stictis*.

According to Nag Raj *(personal communication)* the spores spores have a basal gelatinous appendage, and *Melanostroma* falls into synonymy with *Ceuthospora* Greville (1827).

SPECIMEN EXAMINED: EUROPE: Czechoslovakia (PRM 155577, Reichenberg, authentic collection of *Melanostroma fusarioides*).

(43). *MELITTOSPORIELLA* Höhn., Ann. Mycol. 16: 211 (1918)

Holotype species: *Melittosporiella pulchella* Höhn., l.c.

Apothecia at first completely immersed, opening by splitting the overlying substrate irregularly into teeth, orbicular to somewhat irregular in outline, middle-sized. Margin well-developed, of vertically-oriented, non-carbonized hyphae ending in a fringe of hairlike projections. Paraphyses numerous, filiform, J-. Asci cylindrical, somewhat thick-walled when young, with an obscure apical cap. Ascospores colorless, thin-walled, transversely septate.

According to von Höhnel, *Melittosporiella* resembled *Melittosporium* but differed in having transversely septate spores. *Melittosporium* (q.v.), however, lacks true paraphyses and is ascolocular; *Melittosporiella* appears to have true paraphyses and to be more closely related to *Karstenia* and *Propolidium*. The genus is accepted as Ostropalean with some reservations, because of a possible connection to *Cryptodiscus*.

(1). MELITTOSPORIELLA PULCHELLA Höhn., Ann. Mycol. 16: 211 (1918)

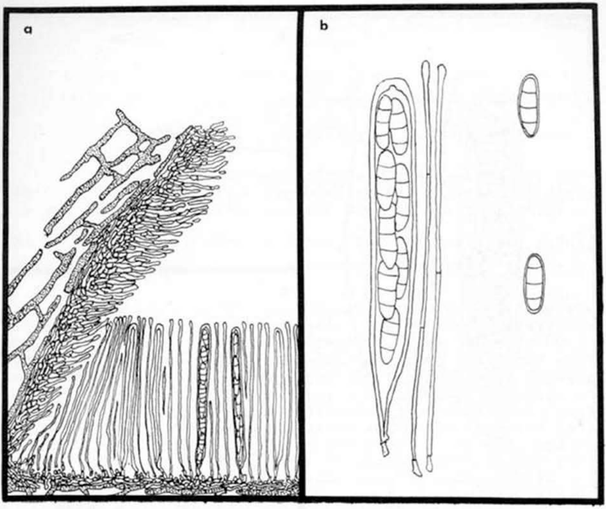

FIGURE 15. *Melittosporiella pulchella*. a. Cross section of margin, x375. b. Ascus, paraphyses, and spores, x750. Drawn from Rehm, Ascomyceten 1976 (CUP-D-12032).

Figure 15

Apothecia at first immersed in decorticate wood, opening by splitting the overlying wood into lobes, 1-2 mm broad, irregular in outline, with the aspect of a dark green *Propolomyces*. Margin splitting away from the hymenium when dry, non-crystalline, pale brown, 20 µm thick, of interwoven hyphae 2.0 µm diam., the inner face a compact layer of periphysoids 8-10 x 2.0 µm, cemented in a gel. True paraphyses numerous, imbedded in a J- gelatinous matrix, 1.0 µm broad below, enlarged to 2.0 µm at the tip which is imbedded in an olivaceous amorphous material. Subhymenium J-, 10 µm thick, of short-celled colorless hyphae 2.0 µm diam. Asci 75-80 x 12 µm, cylindrical, thick-walled, appearing bitunicate but apparently without a separable inner wall, 8-spored. Spores irregularly biseriate, thin-walled, colorless, 3-septate, not constricted at the septa, cylindric-fusiform to suballantoid, 15-18 x 4.5-5.0 µm.

On wood, Tirol.

SPECIMEN EXAMINED: EUROPE: Austria (CUP-D-12032 [Rehm Ascomyceten 1976], on *Olea*, S. Tirol, 5.1912, Dittrich-Walkhoff, originally distributed as *Cryptodiscus atrovirens*, isotype of *Melittosporiella pulchella*).

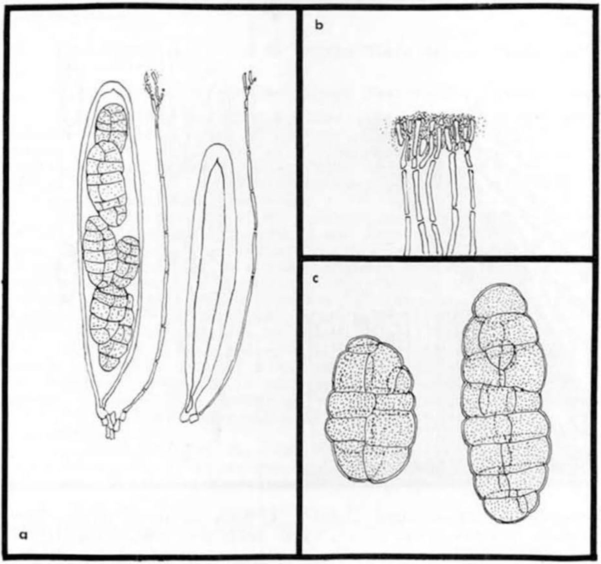

FIGURE 16. *Melittosporium versicolor*. a. Asci, Paraphyses, and spores, x 750. b. Detail of paraphysis apices, x1500. c. Ascospores, x1500. Drawn from FH-Fries, Scleromycetes Sueciae 276.

(44). *(MELITTOSPORIUM)* Corda, Icones Fungorum 2: 23 (1838)
Holotype species: *Stictis versicolor "c"* Fr., Syst. Mycol. 2(1): 198 (1822)
= *Pleiostictis* Rehm

(1). *MELITTOSPORIUM VERSICOLOR* (Fr.) Corda, l.c.
≡ *Stictis versicolor "c"* Fr., l.c.
≡ *Propolis versicolor* (Fr.) Fr., Summa veg. scand. sect. post. 372 (1849)

Figure 16

M. versicolor is characterized by immersed, emarginate, hysterothecial green fruitbodies, dark brown muriform spores, bitunicate asci, and pseudoparaphyses which branch and anastomose at the apex to form a thick epithecium. *Melittosporium* would appear to be a good genus, but should be transferred to the Hysteriales. For reasons discussed in a separate paper (Sherwood, 1977), this is the correct application of the name *Stictis versicolor*.

SPECIMEN EXAMINED: EUROPE: Sweden (FH-Höhnel, slides of Fries Sclerom. Sueciae 276, isotype of *Stictis versicolor "c"*)

(45). *(MEROSTICTIS)* Clements, Gen. Fungi 64, 174 (1909)

Holotype species: *Stictis emergens* Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 11: 254 (1871)
= *Diplonaevia* Sacc., according to B. Hein *(personal communication)*

Assigned to the Pyrenopezizeae (Dermateaceae) by Nannfeldt (1932), a position approved by the majority of discosystematists, *Merostictis* was reviewed by Défago (1967).

(46). *(MOUTONIELLA)* Penz. & Sacc., Malpighia 15: 221 (1901)

Holotype species: *Mountoniella polita* Penz. & Sacc., l.c.

Von Hohnel's (1912) assignment of *Mountoniella* to the Phacidiales appears to be correct. The orbicular fruitbodies occur on leaves of *Eletteria* (Zingiberaceae) and open by splitting the non-stromatized epidermis into 3-4 lobes which are soon deciduous. In cross section the fruitbody consists of a well-developed basal stroma, a hymenium of pointed, uniformly thin-walled, J- asci containing 8, cylindrical, multiseptate spores, numerous paraphyses which are inflated at the tip and imbedded in a brown amorphous J- matrix, and a reduced excipulum of 3-4 layers of agglutinated hyphae resembling the paraphyses. The same type of excipulum is found in *Naemacyclus niveus*. As generic limits are currently conceived in the Phacidiales, *Moutoniella* should be considered a distinct genus of the Phacidiales, allied to *Naemacyclus* but differing in having inflated paraphyses. Petrak (1950b) separated *Neophacidium* from *Phacidium* on the same character.

SPECIMEN EXAMINED: ASIA: Java (FH-Höhnel 7879, labelled *Moutoniella* sp., Tijbodas, 1908 [not type material])

(47). *(MYCOGLAENA)* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 118: 1211 (1909)

Holotype species: *Verrucaria subcoerulescens* Nyl., Flora 55: 362 (1872)
= *Polyblastiopsis* Zahlbr. in Engler & Prantl., Natürlichen Pflanzenfamilien 1(1): 65 (1907)

Poelt (1969) considers *Polyblastiopsis* to be dubiously lichenized, and the specimens I have seen would certainly confirm this. *V. subcoerulescens* is a pyrenomycete with obvious bitunicate asci. Von Höhnel (l.c.) assigned the genus to the Ostropaceae. Harris (1973) considers *Mycoglaena* to be distinct from *Polyblastiopsis*.

SPECIMENS EXAMINED: NORTH AMERICA: USA (Herb. Sherwood 14, Oregon, 22.VI. 1970; 202, Oregon, VII.1971)

(48). *(NAEMACYCLUS)* Fckl., Jahrb. Nassauischen Vereins Naturk. 27-28: 49 (1873)

Holotype species: *Propolis pinastri* Lacroix in Desm., Pl. Crypt. Exs. 2: 791 (1851) (= *Naemacyclus niveus* [Pers.] Sacc.)

The ascocarps of *N. niveus* are at first immersed, later opening by rupturing the host epidermis into two flaps which are soon deciduous. The apothecia have a reduced excipulum consisting of 2-3 layers of brown agglutinated hyphae not exceeding the apices of the paraphyses in length. The pointed, uniformly thin-walled, J- asci are surrounded by numerous paraphyses which branch near the apex, giving the hymenium a pruinose appearance. Nannfeldt (1932) dismissed the possibility that *Naemacyclus* was Ostropalean, but was uncertain of its relationships, other than it might be related to *Propolis* (Fr.) Fr. *Naemacyclus* was included by Korf (1962) in the Hemiphacidiaceae, a family of needle cast pathogens of conifers. I am unfamiliar with *Hemiphacidium*. The asci of *Naemacyclus* more closely resemble those of *Lophodermium* than they do those of *Rhabdocline* Sydow or *Fabrella* Kirschst., two representative genera of the Hemiphacidiaceae. The genus is closely allied to *Propolis* (Fr.) Corda (non *Propolis* [Fr.] Fr.), which is discussed in a separate paper (Sherwood, 1977).

SPECIMENS EXAMINED: AFRICA: Canary Islands (CUP-MM-124, 127, 146, 153, 487, all on needles of *Pinus*, Tenerife; MM-743, on *Pinus*, La Palma)

(49). *(NAEVIA)* Fr., Summa veg. scand., sect. post. 373 (1849)

Lectotype species: *Leptostroma scripta* Fr., Syst. mycol. 2(2): 598 (1823), designated by von Höhnel (1917a)
Neotype species: *Phacidium minutissimum* Auersw. in Rabenh., F. Eur. II: 228 (1860), designated by Nannfeldt (1932)

According to von Höhnel (1917a), *Naevia* Fr. 1849 is a later homonym of *Naevia* Fr., Lich. Exs. Sueciae 4 (1824) (= *Arthonia*). Von Höhnel considered *N. scripta* (Fr.) Fr. to be "verschollen" (utterly lost); he concluded that the name *Naevia* Fr. 1849 should be abandoned. Nannfeldt (1932) rejected Fries's concept of the genus and chose a neotype species from among Rehm's (1887-1896) taxa, none of which were included in the genus by Fries. Hein (1976) concluded that the generic name should be abandoned and proposed *Naevala* for *Naevia* sensu Rehm, a genus of immersed members of the Dermateaceae.

(50). *(NAEVIELLA)* (Rehm) Clements, Gen. Fungi 63, 174 (1909)

Lectotype species: *Naevia paradoxa* Rehm, Hedwigia 21: 58 (1882), selected by Clements, l.c.
≡ *Phragmonaevia* [sect.?] II. *Naeviella* Rehm in Rabenh., Krypt.-fl. ed. 2, 1(3): 164 (1888)
= *Eupropolella* Höhn.

The lectotype species is treated as either *Hysteropezizella paradoxa* (Rehm) Nannf. (1932) or *Eupropolella paradoxa* (Rehm) Défago (1967) in modern classifications. *Naeviella* is an older generic name than either *Hysteropezizella* or *Eupropolella*. There seems to be little doubt that the type species of *Naeviella* is Dermateaceous. Clements and Shear (1931) declare the type to be *Naeviella fuckelii* (Rehm) Clements & Shear, another species Rehm included in his subgenus.

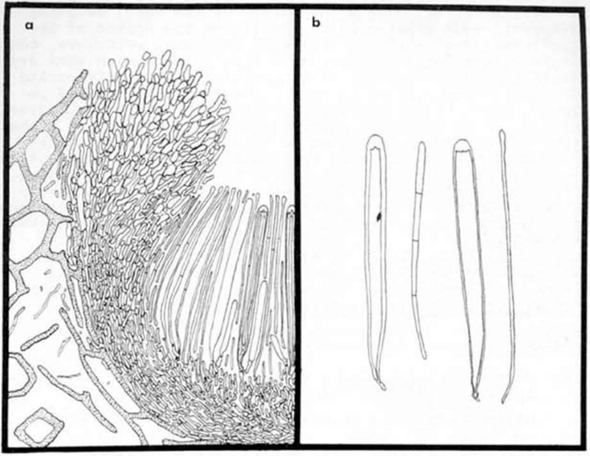

FIGURE 17. *Nanostictis peltigerae.* a. Cross section of apothecium, x375. b. Asci, paraphysis, and spore, x750. Drawn from prepared slides of the holotype made by M.S. Christiansen.

(51). *NANOSTICTIS* M. S. Christiansen, Bot. Tidskr. 51: 59 (1954)

Holotype species: *Nanostictis peltigerae* M. S. Christiansen, l.c.

Figure 17

Apothecia at first immersed, opening by a pore, not becoming erumpent, minute, colorless, with an entire, non-crystalline margin and a deeply-immersed disc which does not split away from the margin when dry. Margin devoid of differentiation into layers, consisting throughout of interwoven colorless hyphae. Paraphyses numerous, filiform, J-. Asci cylindrical, with thin lateral walls and a distinct apical cap, J-. Ascospores colorless, filiform, transversely multiseptate.

On lichens. *Nanostictis* is, as Christiansen (1954) demonstrated, easily distinguished from *Stictis* by marginal characters. The genus is less sharply delimited from *Cryptodiscus;* the two genera should perhaps be merged.

(1). *NANOSTICTIS PELTIGERAE* M. S. Christiansen

Figure 17

Apothecia epithallic or hypothallic; when epithallic, at first immersed beneath the cortex of the host, becoming erumpent; when hypothecllic, sessile on the hyphae of the ecorticate lower surface, 0.16-0.32 mm diam., colorless, the margin entire, not splitting away from the hymenium when dry. Margin, in cross section, 40-50 µm thick, of tightly-packed colorless hyphae 1.0 µm in diam., these inflated to 2-3 µm above. Crystals and periphysoids absent. Subhymenium colorless, J-, 5 µm thick, of narrow-diameter, short-celled hyphae, these resting on an extension of the margin 5-10 µm thick, Hymenium entirely J-. Asci thick-walled when young, 50-64 x 4.0-4.8 µm, the cap 2.5 µm thick, with an indistinct pore. Paraphyses numerous, filiform, simple, 1.0 µm thick, barely thickened at the apex, not forming an epithecium. Ascospores 8, 40-60 x 1-1.3 µm, tapering below, 3-septate, not sheathed or coiling.

On decaying thalli of *Peltigera polydactyla*, Denmark. The figure was drawn from one of Christiansen's prepared slides. The structure of the margin is somewhat more hyphal than was indicated in the original description.

SPECIMEN EXAMINED: EUROPE: Denmark (C, M. S. Christiansen 5400, on *Peltigera*, holotype of *Nanostictis peltigerae*)

(52). *(OCELLARIA)* (Tulasne & Tulasne) Karst., Bidrag. Kännedom Finlands Natur Folk 19: 21 (1871)

Holotype species: *Peziza ocellata* Pers., Syn. Meth. Fung. 667 (1801)
≡ *Stictis* subgen. *Ocellaria* Tulasne & Tulasne, Sel. Fung. Carp. 3: 129 (1865)

Ocellaria ocellata (Pers.) Schroet. was placed in the Peziculoideae (Dermateaceae) by Nannfeldt (1932), Dennis (1968), and Korf (1973).

(53). *ODONTOTREMA* Nyl., Not. Sällsk. Fauna Fl. Fenn. Förh. 8: 249, tab. 1 (1861)

Holotype species: *Odontotrema minus* Nyl., l.c.

Apothecia at first immersed, opening by a pore and at length becoming somewhat erumpent, the margin thick, black, inrolled when dry, entire, the disc deeply immersed, not splitting away from the margin when dry. Subhymenium thick, black. Margin, in cross section, devoid of differentiation into layers, of coarse, brown, interwoven hyphae lying parallel to the surface of the ascocarp. Paraphyses numerous, filiform, embedded in a J+ gelatinous matrix. Asci cylindrical, thick-walled when young, with a prominent apical cap, J-. Spores colorless, transversely septate.

On wood. Considered, albeit dubiously, to be a lichen by Nylander, *Odontotrema* was assigned to the Phacidiales by von Höhnel (1917b), to the Stictidaceae by Saccardo (1889), to the Tryblidiaceae by Clements and Shear (1931), and to the

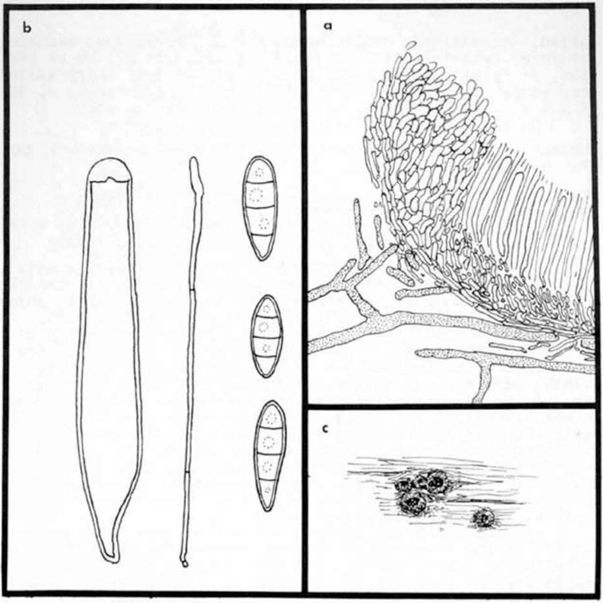

FIGURE 18. *Odontotrema minus*. a. Ascus, paraphysis, and spores, x1500. b. Cross section of margin, x375. c. Habit sketch, x10. Drawn from Rabenhorst, Fungi Europaei 2647 (CUP-D-7164)

Helotiales (family uncertain) by Nannfeldt (1932). The immersed habit, simple structure of the margin, capitate asci, and J+ reaction of the hymenial gel all suggest a relationship with *Cryptodiscus*.

(1). ODONTOTREMA MINUS Nyl.

Figure 18

Apothecia at first immersed in weathered decorticated wood, opening by a pore, becoming erumpent and at length appearing nearly superficial, 0.3-0.5 mm diam., the margin black, rough, striate, inrolled when dry, the disc deeply immersed, black, not splitting away from the margin.

Margin, in cross section, c. 60-75 μm thick, pseudoparenchymatous below, brown, becoming hyphal toward the margin, the cells 2.0-2.5 μm diam., the outermost layer thick-walled, stromatized. Subhymenium brown. Paraphyses numerous, filiform, colorless, 1.0 µm broad, enlarged to 1.5 µm at the apex, J+ faintly blue. Asci 45-50 x 6(-10) µm, thick-walled when young, the apical cap 2-2.5 µm thick. Ascospores 8, 10-14 x 4-4.5 µm, 3-septate, not constricted at the septa.

On bleached wood, Finland.

SPECIMEN EXAMINED: EUROPE: Finland (CUP-D-7164, Rabenhorst-Winter F. Eur. 2647, Mustiala, Karsten X.1881).

(54). *OSTROPA* Fr., Syst. Orbis Vegetabilis 109 (1825)

Lectotype species: *Hysterium cinereum* Pers., Syn. Meth. Fung. 99 (1801), designated by Saccardo (1883)

Fruitbodies at first immersed in plant tissue, consisting of a dark pseudostromatic mass with numerous crystalline inclusions, soon becoming erumpent by elongation of the paraphyses. Fruitbodies orbicular in cross section, erumpent, tough, long-persistent, closed when dry, opening by a prominent transverse slit. Wall of interwoven, closely-packed hyphae, much thickened above to form two massive lips containing numerous crystalline inclusions and lined on their inner faces by sparse periphysoids. Since the periphysoids do not extend the entire length of the inner face of the wall, the hymenium does not split away from the margin when dry. Hymenium perfectly vertical with respect to the surface of the substrate. True paraphyses numerous, filiform. Asci very long-cylindrical, with a prominent apical cap, 8-spored. Ascospores filiform, colorless, transversely multiseptate, not disarticulating

On wood and bark, Europe. *Ostropa* differs from *Robergea* in having vertically-oriented fruitbodies which are orbicular in cross section, and from *Stictis* sect. *Lichenopsis* in lacking parietal periphysoids.

Fries considered his genus to belong to the pyrenomycetes, a position accepted by many subsequent authors. *Ostropa* was assigned to the Hysteriaceae by Duby (1861) and Saccardo (1883), and to the Acrospermaceae by Fuckel (1870). Rehm (1887-96) was apparently the first to recognize the connection between *Ostropa*, *Stictis*, and *Robergea*.

Most recent authors have considered *Ostropa* to be monotypic. I am unable at present to characterize several of the older species. Of those I have examined, only *O. cinerea*, with two varieties, is accepted.

(1). *(OSTROPA ALBO-CINCTA* Berk. & Curt., J. Linn. Soc. Bot. 10: 372 (1868)

≡ *Ostropella albo-cincta* (Berk. & Curt.) Höhn., Ann. Mycol. 16: 144 (1918)

According to Müller and von Arx (1962), the species is a member of the Lophiostomataceae (Loculoascomycetes).

(2). *OSTROPA BARBARA* (Fr.) Nannf.

= *Ostropa cinerea* (Pers.) Fr., q.v.

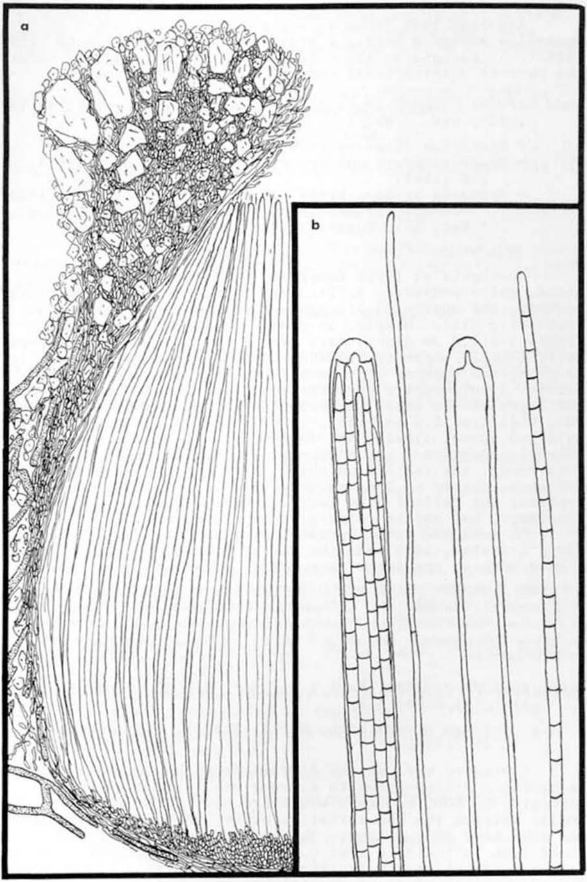

FIGURE 19. *Ostropa cinerea*. a. Cross section of margin, x300. b. Detail of apices of asci, paraphyses, and spores, x1500. Drawn from CUP-Rabenhorst F. Eur. 634.

Assuming that *Sphaeria barbara* Fr. is a synonym of *Hysterium cinereum* Pers., a position questioned by Rehm (1887-1896), *O. barbara* is the correct name for the species under the current International Code of Botanical Nomenclature.

(4a). *OSTROPA CINEREA* (Pers.) Fr., Syst. Orbis Vegetabilis 109 (1825) var. *CINEREA*

≡ *Hysterium cinereum* Pers., l.c.
= *Tuberculostoma sphaerocephalum* Sollm., Hedwigia 3: 116 (1864)
= *Sphaeria barbara* Fries, Syst. mycol. 2(2): 468 (1823)
  ≡ *Ostropa barbara* (Fr.) Nannf., Nova Acta Regiae Soc. Sci. Upsal IV, 8(2): 78 (1932)

Figure 19

Apothecia at first immersed, soon becoming erumpent, black, white-pruinose, 0.75-1.2 mm broad, orbicular in cross section, the upper 1/3-1/2 exposed, opening by a prominent transverse slit. Margin, in cross section, of interwoven hyphae 1.5-2.0 µm diam., dark brown, 20 µm thick in the lower half, greatly expanded (to 200 µm) above to form the two lips flanking the opening slit, with numerous crystalline inclusions. A rudimentary periphysoidal layer is present above the level of the asci. Subhymenium brown. Paraphyses numerous, filiform, 1.0 µm broad, colorless throughout, scarcely enlarged above, simple, not forming an epithecium. Asci 400-450(-500) x 6-7 µm, strictly cylindrical, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore. Spores 8, nearly as long as the asci, 1.75-2.0 µm broad, septate, the cells 4-5 µm long. The hymenium is J- in most specimens, but may be faintly J+ in old material.

On wood and bark, Europe. Also reported from Algeria (Bory & Durieu, 1850) and the Canary Islands (Urries, 1957); I have seen no specimens from either of these localities.

SPECIMENS EXAMINED: EUROPE: Italy (CUP-Rabenhorst, Fungi Europaei 634, on *Cupressus*). Finland (UPS, Karsten 10.I.1870, on *Syringa*). Norway (O, on *Populus*, Sommerfeldt, as *Sphaeria rimalis*; Christiana, n.d.; Rostrup, on *Pyrus*, Abbediengen). Switzerland (BERN, on *Fagus*, labelled *O. cinerea* forma *vulgaris*).

(4b). *OSTROPA CINEREA* (Pers.) Fr. var. VIRENS (Otth) Sherwood, stat. et comb. nov.

≡ *Ostropa virens* Otth, Mitth. Naturf. Ges. Bern 1868: 55 (1868)

O cinerea var. *virens* differs from the typical variety in having a yellow-green to olive-green, pruinose margin, darkening in KOH, and asci which are 600-700 µm long. Intergrades between the two varieties occur; these are brownish and have asci 600 µm long. The slender evidence at hand would seem to indicate that *O. cinerea* is a variable species, and that variations in fruitbody color and ascus length are not expressions of developmental stages. Extremes of the two varieties do not occur in a single collection.

SPECIMENS EXAMINED: EUROPE: Switzerland (BERN, Steffisberg, on *Prunus spinosa*, lectotype, designated here; auf Kirschbaumzweigen, Bern, lectoparatype; on *Prunus padus*, lectoparatype, Bern; on *Crataegus* [brown form with asci of intermediate length], labelled *O. cinerea*)

(5). OSTROPA CINEREA (Pers.) Fr. var. *SINGULARIS* Duby in Rehm, pro synon. (not validly published)

≡ *Robergea singularis* (Duby) Rehm, q.v.

(6). (OSTROPA FUSCA)(Schw.) Fr., Syst. Orbis Vegetabilis 109 (1825)

≡ *Sphaeria fusca* Schw., Schriften Naturf. Ges. Leipzig 1: 43 (1822)

I have seen no material of this species, and the published descriptions give no indication of its correct placement.

(7). (OSTROPA INDICA) Tilak & Kale, Sydowia 24: 83 "1970" (1971)

I received no response to requests for type specimens from the above authors. The illustration of *O. indica*, alleged to open circularly or by a slit and have an exposed hymenium, suggest that the species is a *Schizoxylon*.

(8). (OSTROPA MELLEA) Dearness & House

≡ *Schizoxylon melleum* (Dearn. & House) Sherwood, q.v.

(9). (OSTROPA OCULATA) (Fr. & Mont.) Sacc., Sylloge fung. 2: 805 (1883)

≡ *Sphaeria oculata* Fr. & Mont., Ann. Sci. Nat. Bot. sér. 2, 1: 342 (1836)

Described as having orbicular, didimate, dark grey perithecia surmounted by a white pruinose disc marked by a black papilla, and long-cylindrical, polysporous asci, this can hardly be an *Ostropa*, but may be a *Schizoxylon*.

(10). (OSTROPA RUGULOSA) Schw., Trans. Amer. Philos. Soc. n.s. 4: 227 (1832)

The type specimen consists of an irregularly weathered stromatic crust, containing no recognizable fruitbodies.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, in trunco Juglandis, Erie tract, holotype of *O. rugulosa*)

(11). (OSTROPA SPHAEROIDES) Schw., l.c.

The type specimen is an overmature pyrenomycete. No asci or spores were found.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, New England, Dr. Torrey, holotype of *O. sphaeroides*)

(12). (OSTROPA TRUNCATA) (Pers.) Fr., Summa Veg. Scand. sect. post. 401 (1849)

≡ *Hysterium truncatum* Pers., Syn. Meth. Fung. 98 (1801)
≡ *Sphaeria truncatum* (Pers.) Fr., Syst. Mycol. 2(2): 468 (1823), non *S. truncatum* Schw., Schrift. Naturf. Ges. Leipzig 1: (1822)
≡ *Sphaeria truncatulum* Fr., Syst. Mycol. 2(2): 619 (1823)

The substitution of *S. truncatulum* for *S. truncatum* in the index of the second volume of Systema Mycologicum appears to be a deliberate attempt to avoid conflict with *S. truncatum* Schw. I have seen no material of this species.

(13). *OSTROPA VIRENS* Otth
≡ *Ostropa cinerea* (Pers.) Fr. var. *virens* (Otth) Sherwood (4b, above)

(55). *PHAEOBOLUS* Fr.

Ainsworth et al. (1971) list this name as "= *Stictis* (Phacid.) fide Berkeley." I have searched Fries's publications for this name without success.

(56). *(PHANEROMYCES)* Speg. & Har., Rev. Mycol. (Toulouse) 11: 93 (1889)

Holotype species: "*Niptera macrospora* Boudier, Fung. C. Horn no. 96" (? unpublished name from herbarium label) = *Phaneromyces macrosporus* Speg. & Har., l.c.

According to the original description, *P. macrosporus* occurred on rotten wood and had apothecia which were superficial except for the base which was inserted in the substrate. The thick margin was involute and white-furfuraceous, the disc olive black. The large (150-160 x 20-22 μm), thick-walled asci contained four or fewer, elongate-ellipsoid, inequilateral, 4-5-loculate or pseudoseptate ascospores, and were surrounded by branched paraphyses. Spegazzini cited lack of hymenial iodine reactions and gonidia as indications that *Phaneromyces* was not a lichen. He considered it intermediate between *Stictis* and *Patellaria*. It is unlikely that the species is Ostropalean, but it would be desirable to examine the type to discover what the exact taxonomic position of the genus is. It may be a member of the Patellariaceae.

(57). *(PHRAGMONAEVIA)* Rehm in Rabenh., Krypt.-fl. ed. 2, 1(3): 160 (1888)

Lectotype species: *Cryptodiscus libertianus* Sacc. & Roum., Atti Reale Ist. Veneto Sci., Lett., Arti VI 2: 444 (1884), designated by Clements and Shear (1931)

Saccardo's type specimen no longer contains any mature apothecia. *Cryptodiscus libertianus* occurs immersed underneath the bark of small twigs (? *Salix*, according to Saccardo). The apothecia raise the bark into small, brown, transluscent pustules which eventually open by splitting the overlying substrate into 3-4 teeth. The marginal tissue is brown, scanty, and composed of hyphae lying parallel to the surface of the substrate. Immature asci are globose, long-stalked, and lack an iodine reaction; according to the original description the mature asci were short-stalked, thick-walled, and had a J+ blue pore. The ascospores were described as being biseriate, obtuse, 3-sepate, and colorless, measuring 20-25 x 5-6 µm. Rehm compared the species to *Cryptodiscus angulosus* Karst.

I am unable to characterize the lectotype of *Phragmonaevia* on the basis of the material that I have seen; it seems to be neither closely related to *Stictis* nor to be a member of the Naevioideae. Nine of Rehm's original included species are treated in *Hysteropezizella* or *Merostictis* by Nannfeldt (1932) or Défago (1967); the remaining three are of doubtful taxonomic position.

SPECIMEN EXAMINED: EUROPE: Belgium (PAD, on *Salix*, Malmédy, Libert 844, holotype of *Cryptodiscus libertianus*)

(58). *(PLATYGRAPHA)* Berk. & Br., J. Linn. Soc., Bot. 11: 110 (1870) non *Platygrapha* Nyl., Mém. Soc. Sci. Nat. Cherbourg 3: 149 (1855)

Lectotype species: Apparently never typified. Since the name is illegitimate and I have seen only one of the included species, *P. magnifica* Berk. & Br., I have not designated a lectotype here. Judging from the protologue and the one species I have examined (Sherwood, 1976), the synonymy with *Cryptodiscus* proposed by Saccardo (1889) is incorrect, and the other species will prove to be lichens in the Thelotremataceae.

(59). *PLATYSTICTA* Cke. & Mass., Grevillea 17: 95 (1889)

Lectotype species: *Platysticta simulans* Cke. & Mass., designated by Saccardo (1889)
= *Lichenopsis* Schw.

According to Sherwood (1976), *P. simulans* is an abnormal, muriform-spored variant of *Stictis (Lichenopsis) sphaeroboloidea*, q.v.

(60). *(PLEIOSTICTIS)* Rehm, Ascom. Lojk. 24 (1883)

Holotype species: *Pleiostictis propolidoides* Rehm, l.c.
= *Melittosporium* Corda

Rehm (1887-1896) transferred *P. propolidoides* to *Melittosporium.* It had intially been considered distinct because the asci were 1-spored. My own investigations confirm that the two genera differ only in the number of spores per ascus. Both are Hysterialean, rather than Ostropalean.

SPECIMENS EXAMINED: EUROPE: (S, on *Pinus,* sine loc., probable holotype of *Pleiostictis propolidoides*). NORTH AMERICA: Canada (FH, on *Abies,* LaClair, IX.1888, det. Rehm)

(61). *(PLOETTNERA)* P. Henn., Verh. Bot. Vereins Prov. Brandenberg 41: 94 (1889)

Holotype species: *Cryptodiscus coeruleo-viridis* Rehm in Brefeld, Mycol..Untersuch. 10: 250 (1891)

According to Nannfeldt (1932), *Ploettnera* may be related to *Ocellaria*. He was unable to find good material on which to base a redescription. The genus is considered by Hein (1976) to belong to the Naevioideae, by Korf (1973) to the Peziculoideae.

(62). *PROPOLIDIUM* Sacc., Botan. Centralbl. 18: 250 (1884)

Holotype species: *Propolis glauca* Ell., Bull. Torrey Bot. Club 8: 65 (1881)

Apothecia at first immersed, opening by splitting the overlying substrate irregularly but not becoming erumpent, small to middle-sized, orbicular to irregular or somewhat elongate in outline, the margin entire or lacerate, consisting predominantly of host tissue, the disc immersed but not deeply urceolate, splitting away from the margin when dry.

Basal stroma present or absent. Margin in cross section more or less 3-layered, consisting of a non-carbonized wall, irregular crystalline layer, and inward-projecting periphysoids. Paraphyses numerous, filiform, somewhat enlarged at the tip and forming a rudimentary epithecium, J+ or J-. Asci cylindrical, with thin lateral walls and a thickened apex pierced by a J- pore. Ascospores 8, colorless, ovoid, few-septate with thin cross-walls, prominently sheathed.

On bark. *Propolidium glaucum* is apparently restricted to North America. A second African species is described below.

In Saccardo's original treatment, *Propolidium* was proposed for *Propolis* spp. with 2-celled spores. It is doubtful that he examined the type species critically, for in 1889 he transferred *Stictis foveolaris*, a typical *Cryptodiscus*, to *Propolidium* on the strength of the 1-septate spores. Rehm (1887-1896) expanded the generic concept to include species with multiseptate spores, but according to von Höhnel (1918a) the species he included properly belong in *Xylogramma* or *Durella*. Von Höhnel assigned *Propolidium* to the Cryptomycetaceae. Nannfeldt (1932) examined the type, which he considered to be neither Phacidealean nor Ostropalean, but could not place it.

P. glaucum is far from being a typical Ostropalean fungus, but shares cylindrical, capitate, J- asci and a margin lined with periphysoids with more typical members of the order. *P. pruinosum*, a second species, may be transitional between *P. glaucum* and species of *Stictis* with few-celled spores. *Propolidium* may also be related to *Melittosporiella* and *Karstenia*.

(1). PROPOLIDIUM GLAUCUM (Ell.) Sacc., Botan. Centralbl. 18: 250 (1884).

≡ *Propolis glauca* Ell.

Figure 20

Apothecia at first immersed, opening by tearing the overlying substrate irregularly but not becoming erumpent,

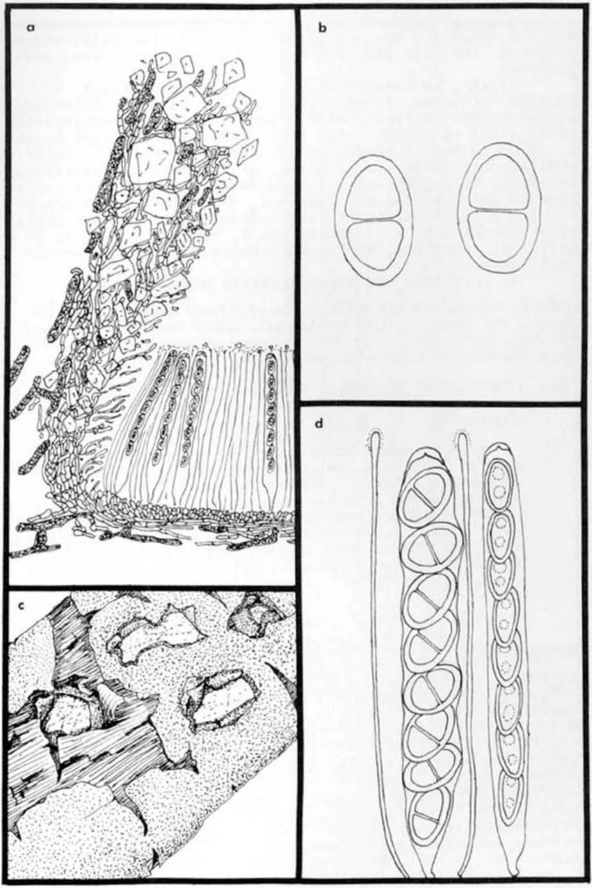

FIGURE 20. *Propolidium glaucum*. a. Cross section of apothecium, x300. b. Ascospores, x1500. c. Habit sketch, x7.5. d. Asci, paraphyses, and spores. x750. Drawn from CUP-Ell. & Ev., Fungi Columbiani 815.

1.5-2.0 x 1.0-1.5 mm, the margin reflexed, lacerate, white-pruinose, the disc immersed but not deeply urceolate, grey-pruinose.

Margin, in cross section, c. 100-120 µm thick, of loosely interwoven brown hyphae 1.5-2.0 µm diam. intermingled with numerous crystals, with a layer of sparse periphysoids 10-15 x 1.5 µm on the inner face. Basal stroma dark brown, c. 10 µm thick. Subhymenium 10 µm thick, of small, colorless isodiametric cells 1.5 µm diam., J-. Paraphyses numerous, filiform, enlarged to 1.5-2.0 µm at the tip which is crystaliferous and imbedded in brown gel, J-. Asci cylindrical, 100-115 x 12-15 µm, thick-walled when young, with an indistinct apical cap, J-. Ascospores 8, broadly ovoid, 15-18 x 10-12 µm, 1-septate, with a very thick wall and spherical cell lumen, J-.

On corticate oak twigs, Eastern North America.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-Fungi Columbiani 815, on *Quercus*, New Jersey, VI.1895 [authentic]; Ellis, North American Fungi 454; Rehm, Ascom. 465, on *Quercus*, Westchester Pennsylvania, IX.1879) (Herb. Sherwood 2283, New York, 23.X.1976)

(2). PROPOLIDIUM PRUINOSUM Sherwood, spec. nov.

Figure 21

Ascocarpi primum immersi, non profunde cupulati, 0.3 usque ad 0.4 mm diam., margine integro vel lacerato, albo, disco griseo. Margo in sectione transversali 20 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., achromo. Stratum crystallinum 10 µm crassum. Periphysoidea 10.0 x 1.5-2.0 µm, non ramosa. Paraphyses filiformes, simplices, 80 x 1.0 µm, apice ad 2.0 µm incrassatae, achromae, in iodo caerulescentes. Asci 75-80 x 5(-6) µm, apice 2.0 µm crassi, 8-spori. Sporae 10-12.5 x 3-4 µm, cellulis 2.5-3 µm longis.

HOLOTYPUS: IMI 57347b, on dead stems of *Uvaria charae*, Njala (Keri), Sierra Leone, Compton, 30.VII.1954.

Apothecia densely gregarious (50 or more per cm^2), frequently confluent, 0.3-0.4 mm diam., angular in outline, immersed, but not deeply so, opening by a combination of dissolving and splitting the overlying substrate. Margin white-pruinose, narrow, entire or sometimes lacerate but not consisting of thick reflexed lobes of host tissue. Disc clear grey, waxy with a faint bloom, splitting away from the margin when dry. Margin 20 µm thick at the broadest point, colorless, pseudoparenchymatous and formed of cells 2.0 µm diam. in the part adjoining the overlying substrate. Crystalline layer incomplete, consisting of a few large crystals imbedded in the periphysoidal layer. Periphysoids 10.0 x 1.5-2.0 µm, unbranched. Subhymenium 5-10 µm thick, of small, colorless, angular cells resting directly on host tissue. Stroma none. Paraphyses 80 x 1.0 µm, enlarged gradually to 2.0 µm at the tip, J+. Asci 75-80 x 5(-6) µm, strictly cylindrical, not markedly thick-walled when young, the apical cap 2.0 µm thick, pierced by a narrow pore. Asco-

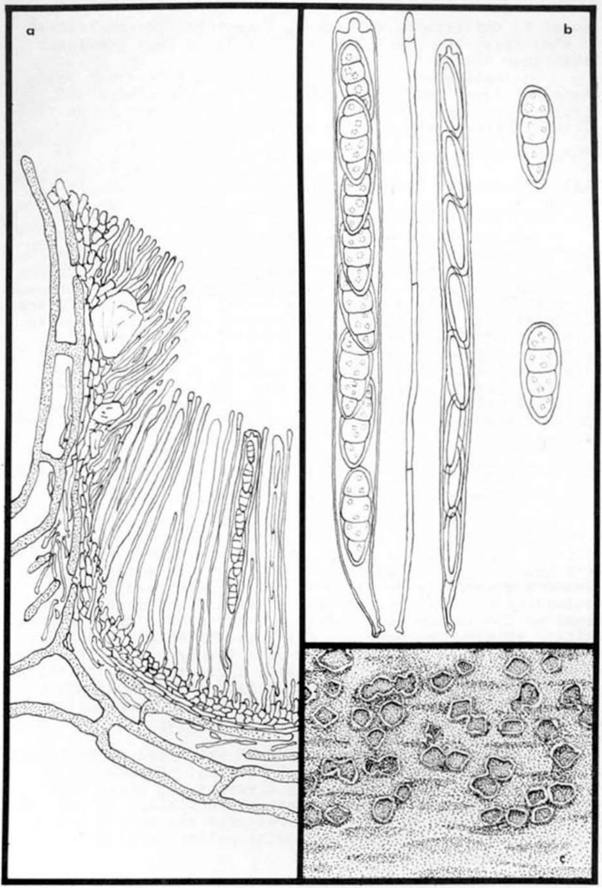

FIGURE 21. *Propolidium pruinosum*. a. Cross section of margin, x750. b. Asci, paraphysis, and spores, x1500. c. Habit sketch, x 7.5. Drawn from the holotype.

spores 8, uniseriate, colorless, 3-septate and constricted at the septa, 10-12.5 x 3-4 µm, surrounded by a prominent gelatinous sheath.

On small woody stems, Sierra Leone. A distinct periphysoidal layer containing imbedded crystals excludes this species from *Cryptodiscus*. The species appears to be transitional between *Propolidium* and *Stictis*.

SPECIMEN EXAMINED: See holotype, above.

(63). *(PROPOLINA)* Sacc., Botan. Centralbl. 18: 250 (1884)

Holotype species: *Propolina cervina* Sacc., l.c.

Saccardo based his genus on the description and figures provided by Tulasne and Tulasne (1865: p. 127; pl. XVI: 4-8) of a fungus similar to *Stictis cinerascens (=Propolomyces farinosus)*, but with polysporous asci. No specimen is definitely associated with the description. Tulasne and Tulasne thought that the dehiscence of the many-spored form (but not the usual form) resembled that of the Pleosporae, for example *Sphaeria* (now *Pleospora*) *herbarum*. If this is correct, then *Propolina* belongs in the Loculoascomycetes. Boudier (1907) stated that *P. cervina* was often collected with *Propolis faginea (=Propolomyces farinosus)* and was frequently regarded as a simple polysporous form of it.

(64). *PROPOLIOPSIS* Rehm, Leafl. Phillip. Bot. 6: 2279 (1914)

Holotype species: *Propoliopsis arengae* Rehm, l.c.

Apothecia at first immersed, opening by splitting the overlying host tissue into 3 or more lobes which become reflexed to expose the disc. Disc immersed, but not deeply urceolate, pruinose, splitting away from the margin when dry. Margin, in cross section, poorly-developed, predominantly crystalline, adnate to stromatized host tissue, lined on the inside with sparse periphysoids. Basal stroma thick. Paraphyses numerous, filiform, branched repeatedly near their apices, intensely J+ blue throughout their entire lenth, forming an epithecium. Asci cylindrical, very thick-walled when young, appearing bitunicate but without a distinctly separable inner wall, J-. Ascospores long-cylindrical, colorless, transversely multiseptate, showing some tendency to disarticulate at the septa.

On leaves and inflorescences of palms and on herbaceous debris, Phillippines and tropical America. Unaccountably synonymized with *Cryptodiscus* by Clements and Shear (1931), *Propoliopsis* has an apothecial structure similar to that of *Propolidium*. Long-cylindrical ascospores and a J+ hymenium suggest *Stictis*. The asci are quite unlike anything found elsewhere in the Ostropales.

(1). PROPOLIOPSIS ARENGAE Rehm

Figure 22

Apothecia at first immersed, opening by splitting the overlying substrate into several irregular lobes, 0.5-1.2 mm

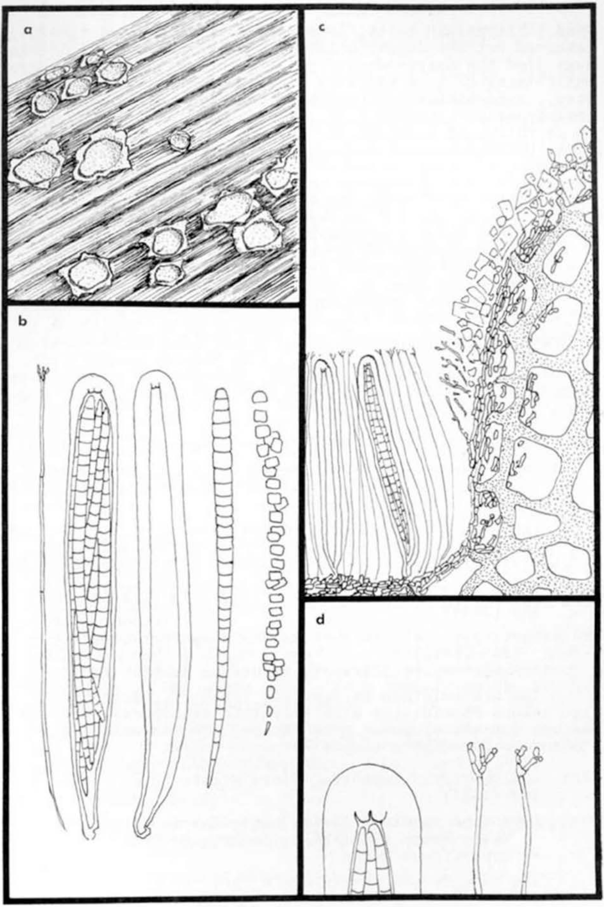

FIGURE 22. *Propoliopsis arengae*. a. Habit sketch, x7.5. b. Asci, paraphysis, and spores, x750. c, Cross section of apothecium, x375. d. Detail of ascus apex, x1500. Drawn from CUP-SA 1758.

diam., the margin thick, lacerate, white-pruinose, the disc immersed but not deeply urceolate, white-pruinose, splitting away from the margin when dry. Margin consisting of a stromatic layer c. 5 μm thick of dark brown hyphae 1.5-2.0 μm diam., a prominent crystalline layer, and sparse branched periphysoids c. 10 x 1.5 μm. Subhymenium pale brown, 15-20 μm thick, of isodiametric cells 2.0 μm diam., resting on a thick black base of stromatized substrate. Paraphyses numerous, filiform, branched near the apex and crystalliferous, J+ blue throughout their entire length. Asci very thick-walled when young, at length moderately thick-walled, with an apical cap 4.0 μm thick, appearing bitunicate but apparently without a separable inner wall, 80-100 x 10-12 (-25) μm. Ascospores 8, 60-80 x 4.0 μm, tapering below, transversely multiseptate, disarticulating in some specimens, the cells 3-4 μm long.

On leaves of Palmae and herbaceous debris, Phillippines and tropical America.

SPECIMENS EXAMINED: ASIA: Phillippines (S, Los Baños, S.A. Reyes IV.1913, C.F. Baker 2545a, on *Arenga*, holotype of *Propoliopsis arengae*). (CUP-SA-1758, on coconut inflorescence, Batan, Dumont, Pancho & Espinosa, 26. IX.1966). NORTH AMERICA: Panama (NY-Pa 1077, Prov. San Blas, K.P. Dumont, S.E. & S.M. Carpenter, 23.VII.1975)

(65). *(PROPOLIS)* (Fr.) Corda, Icones Fungorum 2: 38 (1838)

Lectotype species: *Stictis phacidioides* Fr., Syst. Mycol. 2(1): 197 (1822), designated by Corda (1838)
≡ *Stictis* subgen. *Propolis* Fr., l.c.

The taxonomy and nomenclatoral history of *Propolis* (Fr.) Corda, a genus of foliicolous Phacidiales with acicular ascospores, are discussed in a separate paper (Sherwood, 1977).

(66). *(PROPOLIS)* (Fr.) Fr., Summa Veg. Scand., sect. post. 372 (1849)

Lectotype species: *Stictis farinosa* Pers., Myc. Eur. 1: 339 (1822)
≡ *Propolomyces* Sherwood, Mycotaxon 5: 321 (1977)

The nomenclature of *Propolis* (Fr.) Fr., a genus of lignicolous Phacidiales with allantoid ascospores, and the reasons for the proposed name change, are discussed in a separate paper (Sherwood, 1977).

(67). *PSEUDOSTICTIS* Lambotte, Flore Mycol. Belg. suppl. 1: 260 (1887)

Lectotype species: *Peziza punctiformis* Pers., Syn. Meth. Fung. 674 (1801), designated here.
= *Cryptodiscus* Corda

The name *Peziza punctiformis* Pers. is an avowed substitute for *Stictis pallida* Pers., the epithet *pallida* being preoccupied in *Peziza*. I have designated *Peziza punctiformis (≡ Cryptodiscus pallidus)* as the lectotype of *Pseudostictis*, since it is unclear from the International Code of Botanical Nomenclature (Stafleu et al., 1972) whether the inclusion of a lectotype species automatically invalidates a generic name, particularly since *Cryptodiscus* was lectotypified after *Pseudostictis* was published.

(68). *(PYRENOTROCHILA)* Höhn., Ann. Mycol. 15: 332 (1917)

Lectotype species: *Phacidium laurocerasi* Desm., Pl. Crypt. France 1: 188, designated by Clements and Shear (1931)
= *Trochila* Fr., according to Clements and Shear (1931) and Dennis (1968).

(69). *RAMONIA* Stizenb., Ber. Thätigk. St. Gallischen Naturwiss. Ges. 1862: 168 (1862)

Holotype species: *Parmelia valenzueliana* Mont. in de la Sagra, Hist. Nat. Cuba 9: 205 (1845)

Apothecia at first immersed in lichen thallus, or in a combination of lichen thallus and plant substrate, opening by a pore but not becoming erumpent, the margin entire, fleshy, light-colored, the disc deeply immersed, splitting away from the margin when dry. Margin in cross section 2-layered, the wall of short-celled hyphae, more or less pseudoparenchymatous, the inner face lined with a compact layer of periphysoids. Hymenial iodine reactions absent. Paraphyses numerous, filiform, often knoblike at the tip. Asci cylindrical, with thin lateral walls and a J- apical cap. Ascospores 8 or more per ascus, colorless, thin-walled, non-graphidean, simple or transversely septate

Forming crustose lichen thalli; widespread but uncommon.

The systematics of *Ramonia* were reviewed by Vežda (1966), who proposed that the genus be removed from the Gyalectaceae and transferred to the Thelotremataceae. Thin-walled, J- spores place *Ramonia* closer to *Stictis* than to *Thelotrema*. The ontogeny of polysporous asci in *Ramonia* is unknown. One species (*Ramonia chrysophaea* [Pers.] Vežda) has long multiseptate spores.

Propolidium, and a few species of *Stictis*, agree with *Ramonia* in having discocarpous fructifications with periphysoidal margins, cylindrical, capitate,,annelascaceous inamyloid asci, and ovate or fusiform septate apores which do not turn purple in iodine solutions.

SPECIMENS EXAMINED: AFRICA: Kenya (Herb. Vežda, Maas Geesteranus 22.VII. 1949, isotype of *Ramonia micrococca* Vežda). NORTH AMERICA: USA (FH-Tuckerman, *Ramonia valenzueliana* (Mont.) Stiz., Florida, 1878)

(70). *ROBERGEA* Desm.

A detailed redescription of *Robergea*, and descriptions of accepted species, appears on page 96, below.

(71). *(SARCOTROCHILA)* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl. Abt. 1, 126: 309 (1917)

Holotype species: *Stegia alpina* Fckl., Jahrb. Nassauischen Vereins Naturk. 29-30: 27 (1875)

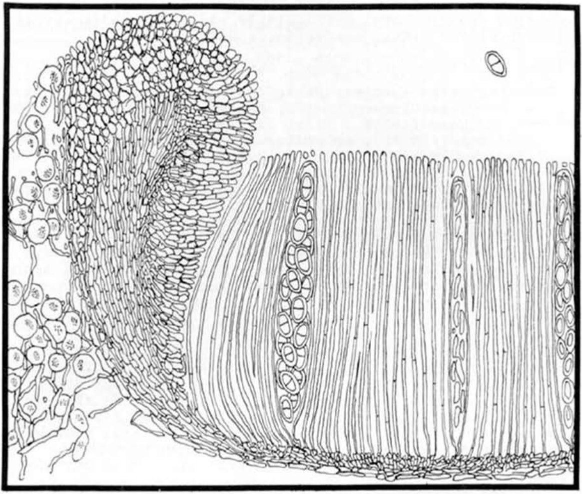

FIGURE 23. *Ramonia valenzueliana*. Cross section of apothecium, x750. Drawn from FH-Tuckerman, Austin 1878.

= *Stegopezizella* Sydow

According to Korf (1962), this is a genus of the Hemiphacidiaceae (Helotiales).

(72). *SCHIZOXYLON* Pers.

A detailed description of the genus, and a revision of the North American species, appears on page 108, below.

(73). *SCHMITZOMIA* Fr., Summa Veg. Scand., pars. post. 363 (1849)

Lecotype species (designated here): *Stictis radiata* Pers., Obs. Mycol. 2: 73 (1799)

= *Stictis* Pers.
= *Lichenopsis* Schw.
= *Cyclostoma* Crouan & Crouan

Assuming that the treatment in Rabenhorst (1844) (see the discussion of the lectotype of *Stictis*, below) constitutes lectotypification of *Stictis*, *Schmitzomia* falls into synonymy with *Stictis*. It should be noted, however, that Fries (1849) explicitly typified *Stictis* with *S. pallida*. If, as some authors argue, all of the species included by Fries (1822) must be considered as eligible as lectotype species, or if segregation out of the type subgenus does not constitute rejection of a species for purposes of implicit typification, then *Schmitzomia* becomes an available name for a genus typified by *Stictis radiata*.

(74). *SPHAEROLINA* Fuckel, Jahrb. Nassauischen Vereins Naturk. 15: 77 (1860)

Lectotype species: *Sphaerolina xantholeuca* Fckl., l.c. (designated here)
= *Schizoxylon* Pers.

Both Nannfeldt (1932) and Ainsworth et al. (1971) imply that *Sphaerolina xantholeuca (= Schizoxylon berkeleyanum)* is the type of the genus, but I can find no formal proposal for lectotypification of *Sphaerolina*. The other species have since been transferred to *Ophiobolus*.

(75). *(STEGIA)* FR., Obs. Mycol. 2: 352 (1818)

Holotype species: *Stegia discolor* Fr., l.c.
≡ *Eustegia* Fr., Syst. Mycol. 2(2): 352 (1823)

According to Sutton and Pirozynski (1963), *Stegia* Fr. is a later homonym of *Stegia* DC (Malvaceae), and *Eustegia* Fr. is a later homonym of *Eustegia* R. Br. (Asclepiadaceae). They could locate no original material, and regarded *Stegia* Fr. and its nomenclatoral synonyms as nomina dubia.

(76). *(STEGOPEZIZA)* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 126: 308 (1917)

Holotype species: *Naevia lauri* Caldesi, Erb. Crittog. Ital. ser. 1: 491 (1863)

Sutton and Pirozynski (1963) discussed this species, which they felt to be allied to *Hysteropezizella*. Korf (1973) included it in the Hyaloscyphaceae.

(77). *(STEGOPEZIZELLA)* Sydow, Ann. Mycol. 22: 392 (1924)

Holotype species: *Phacidium balsameae* Davis, Trans. Wisconsin Acad. Sci. 20: 424 (1922)
= *Sarcotrochila* Hohn.

According to Korf (1962), this is a member of the Hemiphacidiaceae.

(78). *STICTIS* Pers.

A detailed redescription of *Stictis*, and descriptions of accepted species, appear on page 142, below.

(79). *STICTOPHACIDIUM* Rehm, Hedwigia 27: 367 (1888)

Holotype species: *Stictophacidium carniolicum* Rehm, l.c.

Apothecia at first immersed, irregular in outline, opening by splitting the overlying substrate irregularly, medium-sized. Margin well-developed, with a crystalliferous wall which splits away from surrounding host tissue and a compact inner layer of periphysoids. Hymenial iodine reactions absent. Paraphyses numerous, filiform. Asci some-

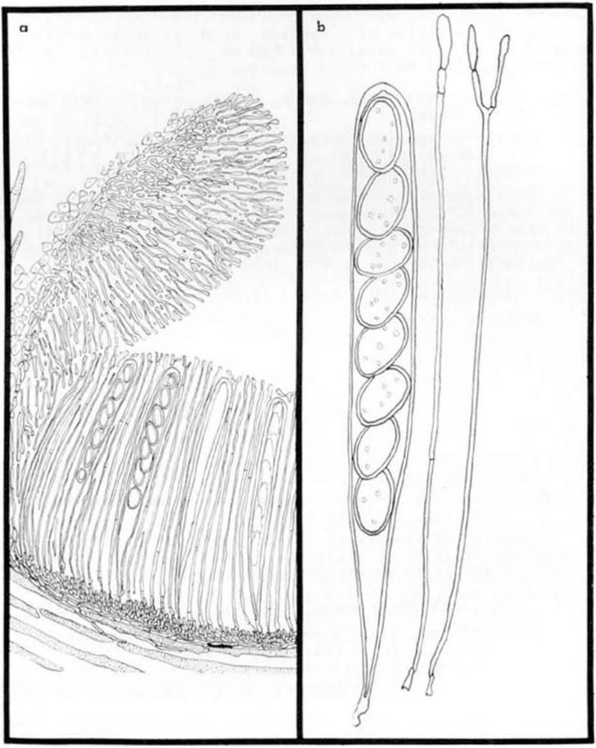

FIGURE 24. *Stictophacidium carniolicum*. a. Cross section of margin, x300. b. Ascus, paraphyses, and spores, x750. Drawn from NY-Krypt. Exs. Mus. Hist. Nat. Vindobon. 2731.

what thick-walled, not capitate, lacking a defined apical apparatus. Ascospores unicellular.

On bark, Europe. *S. carniolicum* is the only species which has been included in the genus. *Stictophacidium*,, with unicellular spores and non-capitate asci, is doubtfully Ostropalean. It is included here because it shares some features with *Propolidium* and cannot be accomodated in the

Phacidiaceae.

(1). *STICTOPHACIDIUM CARNIOLICUM* Rehm.

Figure 24

Apothecia at first immersed, opening by splitting the overlying bark irregularly, 0.5-3.0 x 0.5-1.5 mm, the margin thick, yellow-pruinose, splitting away from the surrounding host substrate, the disc deeply immersed, brown, splitting away from the margin when dry. Margin c. 100 µm thick at the broadest point, 2-layered, , the wall c. 30 µm thick, of vertically-oriented, short-celled, colorless hyphae 2-3 µm diam., with gelatinizing walls, the inner layer of abundantly branched periphysoids 40-60 x 1.5 µm, with knoblike tips, immersed in a gel. Subhymenium colorless, resting directly on host tissue. At the junction of the subhymenium and margin there is a ring of brown, thick-walled cells which may represent rudimentary stroma. Paraphyses numerous, filiform, 1.0 µm broad below, enlarged to 3 µm apically, often branched, immersed in a gel, J-. Asci 130-160 x 13-15 µm, cylindrical, short-stalked, somewhat thick walled, without a defined apical apparatus. Ascospores 8, unicellular, somewhat thick-walled, 13-22 x 9-10 µm.

On bark, Europe. According to Rehm, the spores were brown. They were colorless in the material which I examined. This was labelled "specim. orig.", but, according to Rehm, the type was collected in November, whereas the material from NY was collected in December.

SPECIMEN EXAMINED: EUROPE: Yugoslavia (NY-Krypt. Exs. Mus. Hist. Nat. Vindobon 2731, on *Cornus*, Ulrichsberg., m. Dec., S. Robič, possibly an isotype of *Stictophacidium carniolicum*)

(80). *(STICTOSTROMA)* Höhn., Ann. Mycol. 15: 322 (1917)

Holotype species: *Cryptomyces leopoldinus* Rehm, Ann. Mycol. 3: 227 (1905)
?= *Placuntium* Ehrenb., Sylv. Mycol. Berol. 17 (1818)

Clements and Shear (1931) synonymized *Stictostroma* with *Naevia*, a position which seems to have no justification. Our specimen of Rehm's Ascomyceten 1584 (CUP) is conidial, but strongly suggests that *Stictostroma* is allied to *Rhytisma*, from which von Höhnel separated it on the grounds that the entire cross section of the leaf was stromatized. Without examining ascigerous material I am uncertain about the placement of *Stictostroma*, but it may fall into synonymy with *Placuntium*, which also differs from *Rhytisma* in having a stroma which occupied the entire cross section of the leaf.

SPECIMEN EXAMINED: SOUTH AMERICA: Brazil (CUP-D-11905, on leaves, 10/1904, Dr. Rick, isotype of *Cryptomyces leopoldinus*)

(81). *THELOPSIS* Nyl., Mém. Soc. Sci. Nat. Cherbourg 3: 194 (1855)

Holotype species: *Thelopsis rubella* Nyl., l.c.

According to Vežda (1968), *Thelopsis*, which is characterized by unitunicate, J- asci, true paraphyses, periphyses, and polysporous asci containing J- spores, is isolated taxonomically from the majority of pyrenolichens and is closely allied to *Ramonia*. This opinion was evidently shared by Poelt (1973), who assigned *Thelopsis* to the Thelotremataceae, where it is out of place because of the non-graphidean spores. Possible objections to the inclusion of *Thelopsis* in the Ostropales include the uniformly thin-walled, non-capitate asci and a polysporous condition which, at least in *T. isiaca* Stiz., arises by initial delimitation of more than 8 spores.

(82). *(TROCHILA)* Fr., Summa Veg. Scand., sect. post. 387 (1849)

Holotype species: *Sphaeria craterium* DC., Flore franc. 2: 298 (1805)

Trochila is accepted as a genus of the Dermateaceae by Dennis (1968) and Hein (1976).

(83). *TUBERCULOSTOMA* Sollm., Hedwigia 3: 113 (1864)

Lectotype species: *Sphaeria lagenaeforme* Sollm., Bot. Zeitung (Berlin) 20: 380 (1862), designated by de Notaris (1867)
= *Robergea* Desm.

According to de Notaris (1867) and Fuckel (1870), *Tuberculostoma lagenaeforme* (Sollm.) Sollm. is a synonym of *Robergea cubicularis*.

(84). *(VIBRISSEA)* Fr., Syst. Mycol. 2(1): 31 (1822)

Lectotype species: *Leotia truncorum* Alb. & Schw., Consp. Fung. 297 (1805), designated by Clements and Shear (1931)
= *Leptosporium* Bonorden, Bot. Zeitung (Berlin) 15: 211 (1857)
= *Apostemidium* Karst.
≡ *Peziza* sect. *Apostemium* Karst.
= *Ophiogloea* Clem., Bull. Torrey Bot. Club 30: 806 (1903)

The taxonomy of *Vibrissea* has been reviewed by Sánchez and Korf (1966) and Sánchez (1967). *Vibrissea* is utterly unlike *Stictis* and its allies. The genus includes superficial, stalked or sessile, fleshy aquatic discomycetes which have an ectal excipulum of inflated cells with their long axes perpendicular to the suface of the excipulum, and a medullary excipulum of thin textura intricata. The structure which Sánchez and Korf (1966) termed a perihymenial zone is perhaps homologous to what Letrouit-Galinou (1968) called a parathecial apparatus. Bellemère (1959, 1967) outlined a sequence of development quite different from that of *Ostropa*, and analogous to that of typical genera of the Helotiales such as *Pyrenopeziza* and *Arachnopeziza*. He concluded that *Vibrissea* should be removed from the Ostropales.

The asci of *Vibrissea*, although long-cylindrical and somewhat thickened at the apex, have a J+ pore. Filiform, sometimes disarticulating spores are the main point of similarity between *Vibrissea* and core genera of the Ostropales. In the case of *Vibrissea* these are true aquatic spores.

I have no doubt that *Vibrissea* belongs in the Helotiales, although it cannot be comfortably accomodated in any of the existing families, as their limits are now conceived.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-47394, *V. decolorans* (Saut.) Sánchez & Korf, New York, 29.IV.1963; 48098, *V. filisporia* (Bon.) Korf & Sánchez, New York, 30.V.1964; 45436 *V. truncorum*, (Alb. & Schw.) Fr., New York, 9.VI.1961).

(85). *(XYLOGLYPHIS)* Clem., Gen. Fungi 64, 174 (1909)

Holotype species: *Hysterium striola* Fr., Elench. Fung. 2: 145 (1828)

Clements (L.c.) presumably based his genus on a description by Karsten (1871), adopted by Rehm (1887-96) of *Glonium striola* (Fr.) Karst., and Ascomycete with linear fruitbodies, spherical to ovoid asci, and spores constricted at the septa. I have not seen Karstens material, but judging from the description it is probably a hysterothecial Loculoascomycete. Fries's material (UPS: no collection data) is a pycnidial fungus in the Leptostromataceae. The pycnidia are subcuticular on herbaceous stems, open by a broad irregular pore, and are lined top and bottom with monophialides producing simple, cylindrical, guttulate spores 8.0 x 2.5 μm. I consider *Xyloglyphis* Clem. to be tied to the pycnidial type.

(86). *(XYLOGRAMMA)* Wallr., Fl. Crypt. Germ. 2: 509 (1833)

Lectotype species: *Stictis atrocyanea* Fr., Syst. Mycol. 2(1): 199 (1822) (designated here)
= *Durella* Tulasne & Tulasne

It is clear from Wallroth's (1833) protologue that *Xylogramma* was a substitute for Fries's two subgenera, *Stictis (Xylographa)* and *Stictis (Propolis)*. Neither of the two Friesian species explicitly included by Wallroth is a good choice of lectotype, since *S. versicolor* is now the type of *Melittosporium* and *S. sticticа* has never been adequately characterized. *S. atrocyanea* is a well-characterized species (cfr. Dennis, 1956) and one of the original species in *Stictis (Propolis)*; I designate it as the lectotype in order to preserve the currently accepted concept of *Xylogramma* = *Durella* (Korf, 1973).

SPECIMENS EXAMINED: See *Stictis atrocyanea*, below.

(87). *(XYLOGRAPHA)* (Fr.) Fr., Summa Veg. Scand., sect. post. 372 (1849)

Lectotype species: *Lichen parallelus* Ach., Lich. Suec. Prodrom. 23 (1798), designated by Saccardo (1889)
≡ *Stictis* subgen. *Xylographa* Fr., Syst. Mycol. 2(1): 192 (1822)

Included by Fries (1849) in the Stictidaceae, *Xylographa* is now considered to be a lichen. The genus is characterized by immersed, elongate fruitbodies, a reduced, non-carbonized margin devoid of crystals and periphysoids, a J- hymenium, thick-walled asci lacking a defined apical apparatus, and unicellular, colorless, J- ascospores. Poelt (1973) placed *Xylographa* in the Agyriaceae, and suggested that its affinities were with the Lecideaceae, rather than with the Graphidaceae, where *Xylographa* was traditionally classified. On the basis of the material that I have seem this disposition seems to be reasonable.

SPECIMENS EXAMINED: NORTH AMERICA: USA (Herb. Sherwood 1065, *X. hians* Tuck., Oregon, 4.VI.1973; 1066, *X. abietina* [Pers.] Zahlbr. [= *Lichen parallelus* Ach.], Oregon, 4.VI.1973)

(88). *(XYLOPEZIA)* Höhn., Ann. Mycol. 15: 308 (1917)

Holotype species: *Stictis hemisphaerica* Fr., Syst. Mycol. 2(1): 196 (1822)

The only specimen of *Stictis hemisphaerica* in Fries's herbarium (UPS) has no collection data associated with it. It agrees with the protologue and may reasonably be assumed to be one of the specimens Fries had in hand when he described the species. This same fungus, or at any rate one scarcely distinct from it, is common in western North America; it was distributed (as *Odontotrema majusculum* Rehm) as California Fungi 1287. The black, oblong stromata are erumpent from well-rotted conifer wood. The single locule opens by a broad, orbicular pore, so that the fungus appears more Stictidaceous than Pleosporaceous. Pseudoparaphyses, attached at the top of the locule, and obviously bitunicate asci exclude *Xylopezia* from the Ostropales. Fries's specimen has colorless 3-septate ascospores, not constricted at the septa, 22 x 10 µm. The species which Rehm (1887-1896) and von Höhnel (1917b) identify as *S. hemisphaerica* has spores half as large and is probably misidentified. *Xylopezia* will not key in von Arx and Müller (1975) or Luttrell (1973), and may be an acceptable genus of Loculoascomycetes.

SPECIMENS EXAMINED: EUROPE? (UPS, herb. Fries, sine coll., presumed holotype of *Stictis hemisphaerica*). NORTH AMERICA (CUP-California Fungi 1287, on *Abies*)(Herb. Sherwood 1068, on *Pseudotsuga*, Oregon)

X. Special Part

CRYPTODISCUS, *ROBERGEA*, *SCHIZOXYLON* and *STICTIS*

(17). *CRYPTODISCUS* Cda., Icones Fungorum 2: 37 (1838)

Lectotype species: *Stictis pallida* Pers., Obs. Mycol. 2: 74 (1799), designated by Rehm (1887-96)
= *Pseudostictis* Lambotte
= *Diplocryptis* Clements

Apothecia at first completely immersed, opening by dissolving a pore in the substrate, not becoming erumpent, small, usually colorless, sometimes with a pale brown margin, the margin narrow, entire, non-crystalliferous, the disc deeply urceolate, not splitting away from the hymenium when dry.

Margin in cross section lacking differentiation into distinct layers, composed throughout of loosely interwoven hyphae, fleshy or gelatinous. Paraphyses numerous, filiform, J+ or J-, often with an abruptly enlarged tip. Asci cylindrical, with thin lateral walls and a distinct apical cap, J-. Ascospores colorless, thin-walled, transversely septate, usually ovate to short-cylindrical and few-celled.

Cryptodiscus is distinguished from *Stictis* by the complete absence of periphysoids and crystals, and from *Schizoxylon* by its smaller size, permanently immersed habit, and few-celled spores.

On bare wood, leaves of monocots and dicots, herbaceous stems, and woody fungi, throughout the humid parts of the world. The apothecia are so inconspicuous as to be almost invisible without the aid of a lens, and are infrequently collected.

C. pallidus and its allies were assigned to the Stictidaceae by Fries (1849), Fuckel (1870), Rehm (1887-1896), and Saccardo (1889), among others. Modern workers (Nannfeldt, 1932; Dennis, 1968; Korf, 1973) have preferred to refer *Cryptodiscus* to the Dermateaceae, where it occupies a position intermediate between the Peziculoideae and Naevioideae, allied to *Ocellaria*. As Nannfeldt (1932) pointed out, the reduced nature of the excipulum makes determination of family affinities difficult.

From my investigations of *Cryptodiscus* and *Stictis* I have concluded that the more recent interpretation is incorrect, and that the two genera are closely related. Apically thickened, unitunicate, J- asci, an immersed ascocarp opening by a pore, a hymenium which blues in iodine, lack of a true excipulum, and a tendency to grow on dry, weathered wood are all characters suggesting affinity. The two genera cannot be separated on spore characters, since a few species of *Stictis* have short-cylindrical, 3-septate or few-septate spores, and *C. speratus* , an otherwise typical *Cryptodiscus*, has long, multiseptate spores. The species described as *Propolidium pruinosum* (q.v., above) has characters in common with *Cryptodiscus*, *Propolidium*, and *Stictis*.

Cryptodiscus also exhibits some similarities to members of the lichen family Gyalectaceae, characterized by Vězda (1975) by immersed to erumpent apothecia with a paraplechtenchymatous margin, knoblike paraphyses, asci which blue diffusely in iodine and lack a tholus, and thin-walled spores with angular cells. *Dimerella* and *Gyalecta* (Gyalectaceae sensu stricto) differ in having uniformly thin-walled asci and massive, erumpent, complex apothecia. The ascus structure of *Cryptodiscus* more closely resembles that of *Stictis*.

The six species accepted below are representative of the genus. Saccardo's (1889) uncritical transfer of all *Stictis* species reported to have 3-septate spores to *Cryptodiscus* led to the inclusion of a variety of unrelated lichenized and non-lichenized fungi in the genus.

(1). CRYPTODISCUS PALLIDUS (Pers.) Cda., Icones Fungorum 2: 37 (1838)
≡ *Stictis pallida* Pers.
≡ *Peziza (Stictis) punctiformis* Pers., Syn. Meth. Fung. 674 (1801)
≡ *Stictis punctiformis* (Pers.) Phill., Brit. Discom. 386 (1887), excl. specim. et descr.

≡ *Pseudostictis punctiformis* (Pers.) Lambotte, Flore Mycol. Belg. Suppl. 1: 26 (1887)
≡ *Ocellaria punctiformis* (Pers.) Sacc., Syll. Fung. 8: 657 (1889)
= *Stictis patellea* Cke., Grevillea 7: 14 (1878)
≡ *Cryptodiscus patelleus* (Cke) Sacc., Syll. Fung. 8: 673 (1889)

Figure 25

Apothecia at first completely immersed, opening by a pore (sometimes appearing to split the substrate lengthwise in wood that has a coarse grain), 0.2-0.3 mm diam., the margin thin, entire, colorless, the disc deeply immersed, pale ochraceous. Margin, in cross section, 20-25 µm thick, of colorless interwoven hyphae 1.5-2.0 µm diam., fleshy and slightly gelatinous when rehydrated, lacking differentiation into layers. Subhymenium c. 10 µm thick, colorless, resting directly on disintegrating host tissue. Paraphyses numerous, filiform, enlarged to 1.5 µm at the distinctly knoblike apex, J+ or J-. Asci cylindrical, 55-65 x 5-6(-8) µm, the cap 2.5 µm thick, with an indistinct pore. Ascospores 8, 12-16 x 3.5-5 µm, 3-septate, usually somewhat constricted at the septa, the second cell largest.

On fairly sound decorticate wood in temperate localities, infrequently collected but probably not rare.

Stictis patellea is based on a specimen, collected in New York, with an unusually shallowly cupulate disc and a margin which is dark because of included host material. In the Ithaca area this form is common on weathered, scarcely decayed twigs of American chestnut. I suspect the distinctive appearance of the fungus is due to the peculiar substrate; the trees have been dead for 30 years and nothing else seems to have colonized the twigs.

Persoon's name *Peziza (Stictis) punctiformis* is an avowed substitute for *Stictis pallida*, the epithet *pallida* being preoccupied in *Peziza*. Phillips used the name *Stictis punctiformis* for a very similar species *(S. foveolaris)*, a specimen of which was allegedly annotated as *S. punctiformis* by Persoon.

Persoon's herbarium contains one specimen (910.264-843) lablled *Stictis pallida*. It is correctly identified, well-preserved material, and is designated here as the type of the species, probably a neotype, since there is no collection data and it is doubtful that the type of the 1799 description was preserved. Specimen number 910.264-864, labelled *Stictis punctiformis*, is less abundant. It may well be correctly identified; I did not examine it microscopically.

SPECIMENS EXAMINED: EUROPE: locality unknown (L, Herb. Persoon 910.264-843, neotype of *Stictis pallida*). AFRICA: Canary Islands (CUP-MM 8, on wood, Tenerife). NORTH AMERICA: USA (K, on wood, New York, Gerard 212, holotype of *Stictis patellea*)(Herb. Sherwood 1906, on *Acer*; 1902, on *Castanea*; 2279, on wood; 2270, on wood; all from New York)

(2). CRYPTODISCUS FOVEOLARIS (Rehm) Rehm in Rabenh., Krypt. -Fl. Ed. 2, 1(3): 158 (1888)

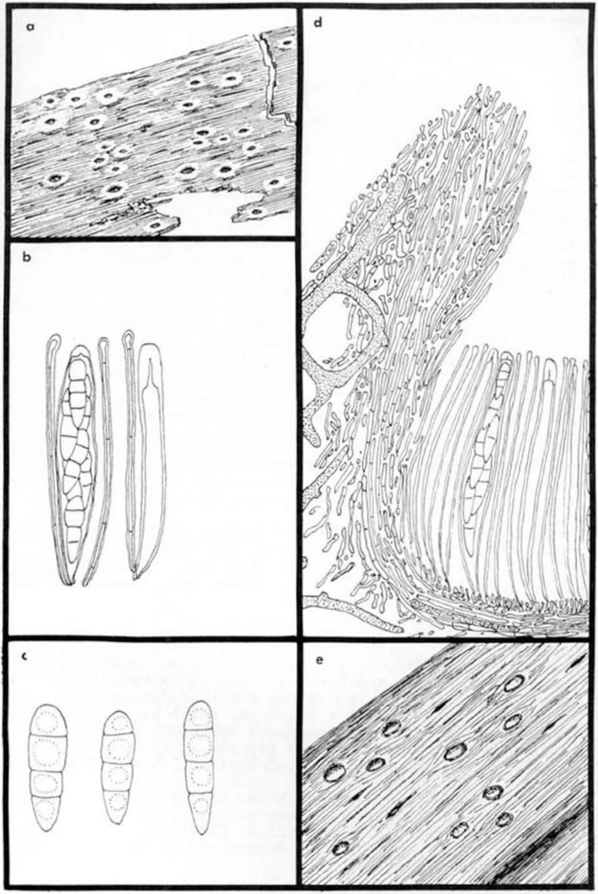

FIGURE 25. *Cryptodiscus pallidus*. a. Habit sketch, x7.5. b, Asci, paraphyses, and spores, x750. c. Ascospores, x1500. d. Cross section of apothecium, x750. e. Habit sketch, x7.5. a and c drawn from the neotype. b, d, and e drawn from Herb. Sherwood 1902.

≡ *Stictis foveolaris* Rehm, Ber. Naturhist. Vereins Augsberg 26: 33 (1881)
≡ *Propolidium foveolare* (Rehm) Sacc., Syll. Fung. 8: 668 (1888)
≡ *Diplocryptis foveolaris* (Rehm) Clements, Gen. Fungi 174 (1909)
= *Stictis fagicola* Phil., Brit. Discom. 385 (1887)
  ≡ *Stictis pallida* forma *fagicola* Phil., Elvellacei Britanici 200 (nom. nud.)

Apothecia immersed, opening by a pore, 0.2-0.3 mm diam., the margin colorless, narrow, entire, the disc deeply immersed, pale ochraceous. Margin, in cross section, c. 25 μm thick, of colorless interwoven hyphae 2.0 μm diam., lacking differentiation into layers. Asci 50-65 x 4-5 μm, thick-walled when young, the cap 2.5 μm thick. Paraphyses numerous, filiform, 1.0 m broad, enlarged to 1.5 μm at the knoblike apex, J- (J+ according to Rehm). Spores 6-9 x 2.5-3 μm.

On fairly sound wood, Europe and North America. Probably fairly common, but rarely collected; distinguished from *C. pallidus* only by the smaller, 1-septate spores. No specimen identified as *Stictis fagicola* could be located in Phillips' herbarium at K. Elvellacei Britanici 200 may well be an isotype.

SPECIMENS EXAMINED: EUROPE: Belgium (PD, in herb. Sacc., labelled '*S. punctiformis*). France (CUP-D-105-12, Rehm Ascom. 121, on *Quercus*, isotype of *Stictis foveolaris*). Britain (CUP-D-11201, Elvellacei Britanici 200, *Stictis pallida* forma *fagicola*, presumed isotype of *Stictis fagicola*). NORTH AMERICA: USA (Herb. Sherwood 1905, on *Castanea*, New York; 1972, on *Populus*, *ibid.*: 2191, on *Quercus*, *ibid.*)

(3). *CRYPTODISCUS MICROSTOMUS* (Carmichael apud Berk. in Hooker) Sacc., Syll. Fung. 8: 672 (1889)
≡ *Stictis microstoma* Carm. apud Berk. in Hooker, Engl. Fl. 5: 213 (1836) (ut '*sicrostoma*', lapsus calami)

Figure 26, a-b

Apothecia immersed in decorticated wood, 0.5 mm diam., the margin thin, dark brown, entire, the disc deeply urceolate, pale ochraceous. Margin c. 40-50 μm thick, of loosely interwoven non-carbonized brown hyphae 1.5 μm diam., not crystalliferous, showing no differentiation into layers. Asci cylindrical, c. 90 x 7.5-8 μm, thick-walled when young, the cap 1.5 μm thick. Paraphyses numerous, filiform, J-, 1.0 μm thick, forked near the tip and scarcely enlarged. Spores 8, 14-16 x (3-)4-5 μm, 3-septate, constricted at the septa.

The type specimen contains few apothecia and may be slightly immature. I have seen no other collections which might be referred to this species, which is distinguished from *C. pallidus* by the dark margin and absence of knoblike tips on the paraphyses.

SPECIMEN EXAMINED: EUROPE: Great Britain (K, presumed holotype specimen, no collection data)

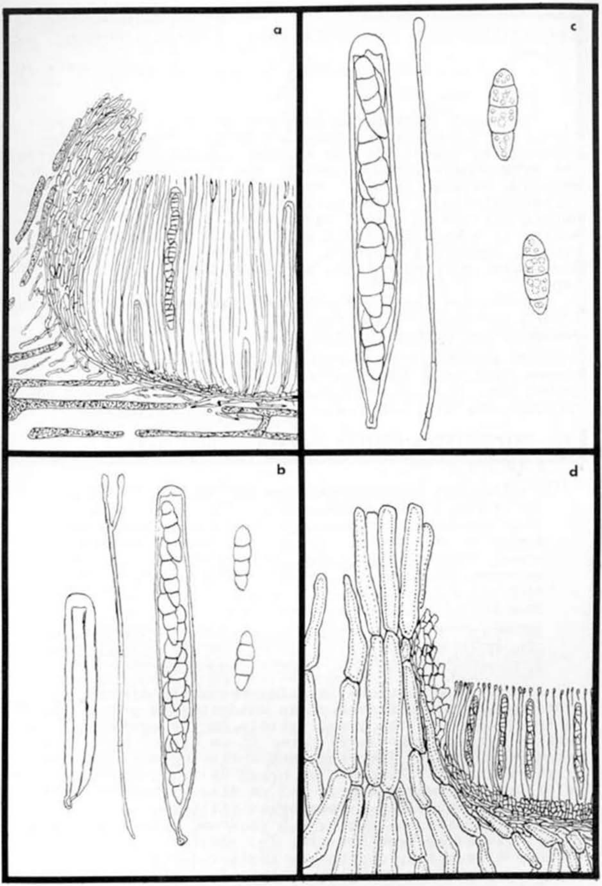

FIGURE 26. a-b. *Cryptodiscus microstomus*. a. Cross section of margin, x375. b. Asci, paraphysis, and spores, x750. Drawn from the holotype. c-d. *Cryptodiscus stereicola*. c. Ascus, paraphysis, and spores, x750. d. Cross section of margin, x375. Drawn from CUP-Fairman 194.

(4). CRYPTODISCUS STEREICOLA (Berk. & Curt.) Sherwood, comb. nov.

≡ *Stictis stereicola* Berk. & Curt., Grevillea 4: 7 (1875)

Figure 26, c-d

Apothecia immersed in host basidiocarp, opening by a pore, 0.2-0.3 mm broad, the disc deeply immersed, brown (brown host tissue showing through a colorless hymenium), the margin pale cinnamon color, the visible part consisting entirely of host hyphae. Margin, in cross section, 15 µm thick, colorless, pseudoparenchymatous, of roughly isodiametric cells 3 µm diam. Paraphyses filiform, 1.0 µm broad, ending in a knoblike tip 1.5 µm diam., J-. Asci 48-52 x 5.0 µm, the cap 3 µm thick. Ascospores 8, 9-13 x 3-3.5 µm, 3-septate, multiguttulate, slightly constricted at the septa.

On *Stereum* spp., eastern North America; distinguished from *C. pallidus* by the smaller spores, host range, and pseudoparenchymatous margin.

SPECIMENS EXAMINED: NORTH AMERICA: USA (K, Michener in Ravenel, 2289, on *Stereum frustulosum*, Pennsylvania, holotype of *Stictis stereicola*) (FH, Ravenel 2289, isotype)(CUP-Fairman 194, New York, on *Stereum*; D-7968, Kellerman 302, Ohio; D-7567, Florida, on *Stereum subpileatum*).

(5). CRYPTODISCUS PUMILUS Sherwood, spec. nov.

Figure 27

Ascocarpi primum immersi, profunde cupulati, 25 usque ad 100 µm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 5.0 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis achromis constans. Paraphyses filiformes, 70 x 0.5 µm, apice ad 1.0-1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 65-70 x 4.5-5.5 µm, apice 4 µm crassi, 8-spori. Sporae 18-25 x 4.5-5.5 µm, cellulis 4-5 µm longis.

HOLOTYPUS: FH-Fungi of Guadeloupe, F.W.I. 874b, on decaying palm frond, Parc Tropicale, D.H. Pfister, S.E. Carpenter & M. A. Sherwood, Jan. 4, 1974. ISOTYPUS: CUP-Gu-51

Apothecia gregarious in pale, obscurely discolored spots on long-dead leaves of an unidentified palm, 100-150 µm in diameter at the base, visible on the surface of the host as minute, unbordered pores 25 µm diam., Disc pale ochraceous, deeply immersed, not splitting away from the margin when dry. Margin 5 µm broad or less, consisting of colorless interwoven hyphae 2-3 µm diam., closely adnate to the leaf epidermis. Paraphyses filiform, barely exceeding the asci in length, 0.5 µm broad below, enlarged to 1.5 µm at the knoblike tip, J-. Asci 65-70 x 5(-7) µm, the cap 4 µm thick, Spores 8, 18-25 x 4.5-5.5 µm, 5-septate, guttulate, slightly constricted at the septa.

This does not correspond to the description of any known species of *Cryptodiscus*. The minute, colorless, immersed apothecia are invisible even at 10x magnification, and I discovered them quite by accident while sorting a collection of a *Dasyscyphus* under a binocular dissecting microscope.

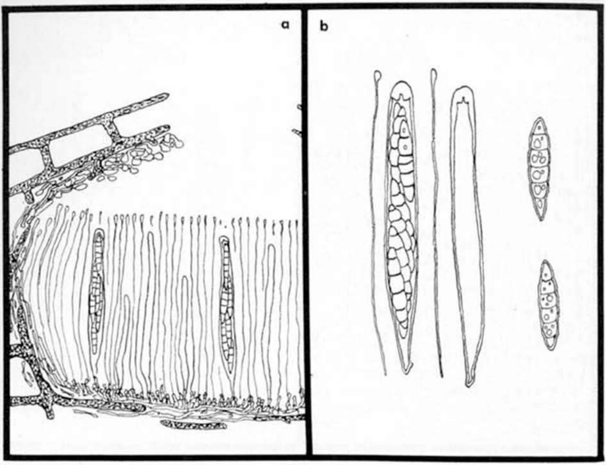

FIGURE 27. *Cryptodiscus pumilus*. a. Cross section of apothecium, x375. b. Asci, paraphyses, and spores, x750. Drawn from the holotype.

SPECIMEN EXAMINED: See holotype, above.

(6). CRYPTODISCUS SPERATUS Sherwood, spec. nov.

Figure 28

Ascocarpi primum immersi, profunde cupulati, 0.15-0.3 mm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 20 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis achromis constans. Paraphyses filiformes, simplices vel ramosae, 80 x 1.0 µm, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 70-80 x 5-6 µm, apice 1.5 µm crassi, 8-spori. Sporae 58-70 x 2.0 µm, cellulis 3.5-4.5 µm longis.

HOLOTYPUS: CUP-55526, on wood, Ringwood preserve, Tompkins Co. N.Y., USA, Sherwood, Sept. 16, 1976. ISOTYPUS: Herb. Sherwood 2267.

Apothecia immersed, 0.15-0.3 mm broad, the margin thin, entire, colorless, the disc deeply immersed, pale ochraceous. Margin, in cross section, c. 20 µm thick, undifferentiated, of colorless, tightly-packed hyphae 2.5 µm diam., directed inward (but not periphysoidal) above the level of the asci, not splitting away from the hymenium when dry. Subhymenium 8-10 m thick, of small, colorless, angular cells resting directly on host tissue, J-. Paraphyses filiform, 1.0 µm thick, enlarged to 1.5 µm at the knoblike tips, often

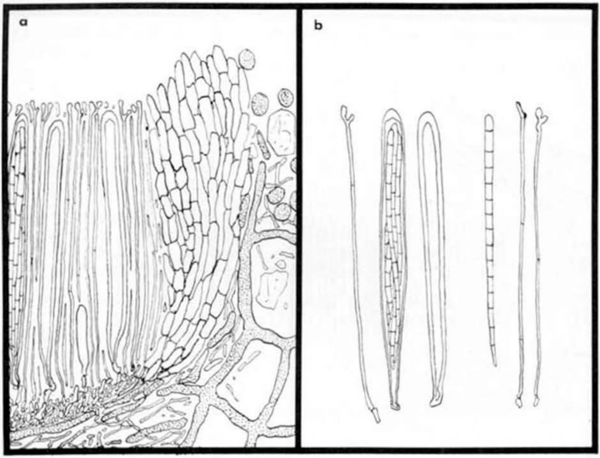

FIGURE 28: *Cryptodiscus speratus*. a. Cross section of margin, x750. b. Asci, paraphyses, and spores, x750. Drawn from the holotype.

branched. Asci 70-80 x 5-6 μm, thick-walled when young, the cap 1.5 μm thick. Spores 8, 58-70 x 2.0 μm, tapering evenly to an acuminate base, transversely multiseptate, the cells 3.5-4.5 μm long.

On dead wood, New York. The structure of this species is clearly that of a *Cryptodiscus*, despite the filiform spores. I chose the epithet *speratus* (expected) because an earlier version of this manuscript stated that filiform spores were unknown in *Cryptodiscus*, but might be expected to occur there.

SPECIMEN EXAMINED: See holotype, above.

(70). *ROBERGEA* Desm., Ann. Sci. Nat. Bot., sér. 3, 8: 177 (1847)

Holotype species: *Robergea unica* Desm., l.c.
= *Tuberculostoma* Sollm.
= *Cyanospora* Heald & Wolf
= *Scoliocarpon* Nyl., Mém. Soc. Acad. Maine Loire 4: 81 (1858)

Apothecia immersed, not becoming erumpent although sometimes exposed in elevated pseudostromatic warts by erosion of the surrounding substrate, taller than broad, lying at a definite angle to the surface of the host, opening by a pore or transverse slit. Margin poorly differentiated except in the region of the pore, of dark, interwoven hyphae, lined with scant, poorly-differentiated periphysoids. Crystalline layer present, or margin containing scattered crystalline inclusions. Hymenium splitting away from the margin when dry. Paraphyses numerous, filiform, usually simple, not forming an epithecium. Asci very long-cylindrical, with a distinct apical cap, J-. Ascospores filiform, colorless, transversely multiseptate.

On wood and bark, Europe, North America, Africa, India? With the exception of *R. albicedrae*, the species are rare and inconspicuous, and little is known of their distribution. The geometry of the fruitbody is best appreciated by reference to the illustrations.

The distinction between *Robergea* and *Ostropa* on the one hand and *Stictis* on the other is far from clearcut if species other than the type are considered. *Stictis dicksoniae*, with deeply-immersed, elongate, vertical ascocarps, and *R. canariense* are both transitional between typical *Stictis* and typical *Robergea*. *Robergea obliqua*, with barely elongate ascocarps lying at a high angle to the substrate and opening by a slit subtended by thick, black lips, is transitional to *Ostropa*. As with *Conotrema*, we are dealing with a very old generic name typified by a species with many distinctive characters; it would seem pointless to submerge *Robergea* in *Ostropa* or *Stictis*, only to have the name revived in an emended sense.

The species are listed below in alphabetical order.

(1). ROBERGEA ALBICEDRAE (Heald & Wolf) Sacc. & Trav., Syll. Fung. 20: 695 (1911)
≡ *Cyanospora albicedrae* Heald & Wolf, Mycologia 2: 209 (1910)

Figure 29

Apothecia immersed in bark and decorticated wood, at first visible as a minute, white-rimmed pore or slit in the surface of the substrate, but later, as uncolonized substrate erodes, immersed in protruding tubercles of partially stromatized wood. The tubercles are 2-3 mm long and may contain more than one apothecium. Apothecia 1.5 mm long, 0.5 mm broad, lying parallel to the surface of the substrate, with a short bent neck at one end. Margin, in the lower part, 15-20 µm thick, of brown interwoven hyphae 2.0 µm diam., the upper third lined with scant, colorless, matted periphysoids 30 x 1.5 µm, these forming a definite layer in the region of the ostiole. The margin surrounding the ostiole is c. 60 µm thick, of tightly-packed brown hyphae 2.0 µm diam., with multiple layers of abundant crystals, gradually merging with the surrounding stromatized and crystal-packed wood. Paraphyses numerous, filiform, 1.0 µm thick, sometimes branched near the apex, J-. Asci 650-1000 x 7-8(-10) µm, the cap 8 µm thick, pierced by a narrow pore. Spores 8, 600-800 x 2.0 µm, the cells 3-5 µm long.

On wood and bark of *Juniperus ashei*, Texas and Mexico. Common. According to Heald and Wolf (l.c.), the common name of the host, mountain white cedar, is the result of whitening of the bark by the activities of this fungus.

In this and other species of *Robergea* the length of asci

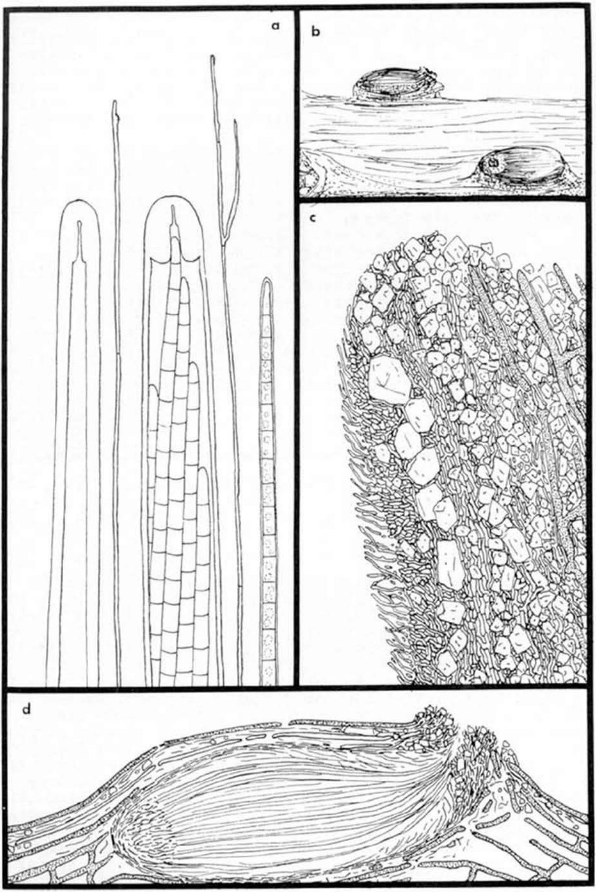

FIGURE 29. *Robergea albicedrae*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Detail of margin at the ostiole, x375. d. Cross section of apothecium, x37.5. Drawn from CUP-53527.

containing septate spores is extremely variable. The spores coil when actively discharged from the asci, but do not seem to do so in microscopic preparations from dried material. The generic name *Cyanospora* was based on Heald and Wolf's claim that the spores were green, apparently an error.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP 3861, on *Juniperus ashei (as J. sabinoides)*, Texas, Heald & Wolf, 17.VI.1909 [isotype? No specimen is mentioned in the original description; 53527, *ibid.*, R. T. Jackson, 4.XII.1974) (Herb. Sherwood 2024, on *Juniperus*, Texas, T. Jurik, VI.1975)

(2). ROBERGEA ALBIFRONS Tulasne & Tulasne, Sel. Carp. Fung. 2: 256 (1863)

Fruitbodies immersed in blackened stromatized areas on bleached and decorticated wood of *Salix*, 1-2 mm long, less than 0.5 mm broad, lying parallel to the surface of the substrate, with a short neck at one end, opening by a transverse slit. Asci a little shorter than the fruitbody, less than 10 µm broad. Ascospores 8, nearly as long as the asci, 3.5 µm broad. Pycnidia or spermagonia small, dark-walled, with a globose or sinuous cavity containing colorless rod-shaped spores 2-4 x 1.0 µm, occurring in the stromatized areas along with the ascigerous stage.

The above description is taken from Tulasne and Tulasne (l.c.). I received no answer to my inquiry to PC for the type specimen. *R. albifrons* may well be distinct from *R. cubicularis*, which has narrower spores and does not seem to have an associated pycnidial stage.

(3). ROBERGEA CANARIENSE Sherwood, Spec. Nov.

Figure 30

Ascocarpi immersi, insuperficie hospitis velut discus griseus rima transversali dehiscens visibiles, 0.25-0.4 mm lati, 0.6 mm longi, ad angulam 60° prae superficie substrati positi. Margo in sectione transversali 100 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., brunneo. Stratum crystallinum 60 µm crassum. Periphysoidea 20 x 1.0 µm, ramosa. Paraphyses filiformes, ramosae, 550 x 1.0 m, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 500-525 x 7(-9) µm, apice 9 µm crassi, 8-spori. Sporae 500 x 2.0 µm, cellulis 4-5 µm longis.

HOLOTYPUS: CUP-MM 637, Canary Islands, La Palma, Los Tilos, R. P. Korf, W.C. Denison, L.M. Kohn & M.A. Sherwood, 14.I.1976.

Apothecia entirely immersed in small decorticate twigs, not becoming erumpent, visible on the surface of the host as a grey-pruinose disc 0.3-0.4 mm diam., typically opening by a transverse slit, sometimes by a pore, 0.6 mm tall, lying at an angle of 60° to the surface of the substrate, the wall dark, continuing beneath the hymenium, c. 15 µm thick in the lower part, of dark, non-carbonized hyphae 1.5 µm diam.; Margin in the region of the ostiole c. 100 µm thick. Crystalline layer distinct. Periphysoids colorless, branched, 20 x 1.0 µm, forming a distinct layer in the

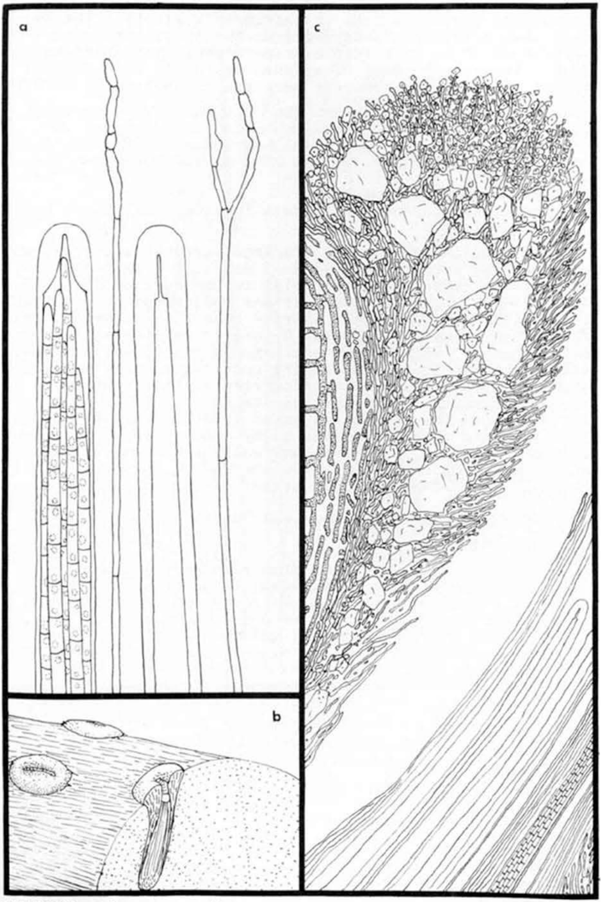

FIGURE 30. *Robergea canariense*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch and cross section of apothecium, x37.5. c. Cross section of margin in the region of the ostiole, x375. Drawn from the holotype.

upper part of the margin. Paraphyses numerous, filiform, 1.0 µm diam., enlarged to 1.5-2.0 µm at the apex, often branched, J-, colorless. Asci 500-525 x 7(-9) µm, the cap 9 µm thick, pierced by a broad, conical pore. Ascospores 8, nearly as long as the asci, 2.0 µm broad, tapering somewhat below, colorless, the cells 4-5 µm long.

On dead twigs of *Myrica* and undetermined decorticated wood, Canary Islands. This species is transitional to *Stictis* sect. *Cyclostoma*.

SPECIMENS EXAMINED (see also holotype, above): AFRICA: Canary Islands (CUP-MM 631; 633 [both from La Palma]; MM-1105, Tenerife)

(4). *ROBERGEA CUBICULARIS* (Fr.) Rehm, Ber. Bayer. Bot. Ges. 13: 163 (1912)
≡ *Sphaeria cubicularis* Fr., Syst. Mycol. 2(2): 477 (1823)
= *Robergea unica* Desm., Ann. Sci. Nat. Bot., sér. 3, 8: 177 (1847)
= *Sphaeria lagenaeforme* Sollm., Bot. Zeitung (Berlin) 20: 380 (1862)
≡ *Tuberculostoma lagenaeforme* (Sollm.) Sollm., Hedwigia 3: 116 (1864)
= *Stictis compressa* Ell. & Ev., J. Mycol. 7: 131 (1892)
Figure 31

Apothecia immersed in wood beneath the bark of corticate twigs, not associated with a stromatic tubercle or shield, 2.0-2.5 mm long, c. 300 µm broad, lying parallel to the surface of the substrate, with a short neck at one end protruding through the bark, visible on the surface of the bark as a white-pruinose disc 0.25 mm diam., with a black center, opening by a transverse slit.

Wall, in the lower part of the fruitbody, 15-20 µm thick, of closely-packed, non-carbonized hyphae 1.5 µm diam., becoming 120 µm thick and 3-layered in the region of the ostiole, with a prominent crystalline layer and numerous long, matted, colorless periphysoids 1.0 µm diam. Paraphyses numerous, filiform, 1.0 µm broad, not inflated or branched, colorless, J-. Asci 1300-2000 x 8(-10) µm, the cap 4.0 µm thick, pierced by a broad pore. Ascospores 8, nearly as long as the asci, 1.5(-2) µm broad, the cells 4-6 µm long.

On small, corticate twigs, Europe and North America. Apparently rare. Rehm (1887-96), and Dennis (1968) state that the spores are 600 µm long; all of the specimens I examined had much longer spores. Ellis and Everhart (l.c.) misinterpreted the geometry of the species they described as *Stictis compressa*.

SPECIMENS EXAMINED: EUROPE: Germany (CUP-Herbier Barbey-Boissier 969, on *Fraxinus* and *Syringa*, Nassau, Fuckel). Belgium? (FH-Patouillard, on *Ptelea*, 9.II.1846, isotype of *Robergea unica*). NORTH AMERICA: Canada (CUP-D-2087, on *Carpinus*, Ontario, Dearness; D-2449, Dearness 627, Ontario; D-7605, Dearness, on *Carpinus*, Ontario, 1891, isotype of *Stictis compressa;* D-7607, on *Ostrya*, Ontario, Dearness; D-9360, Ellis & Everhart, North American Fungi 2913, on *Ostrya*, Ontario)

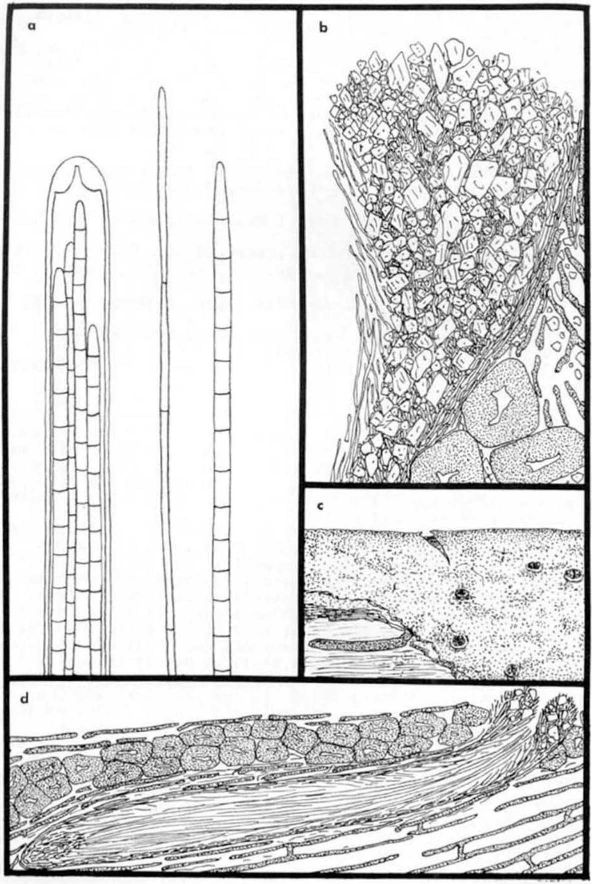

FIGURE 31. *Robergea cubicularis*. a. Detail of apices of ascus, paraphysis, and spores, x1500. b. Detail of margin in the region of the ostiole, x375. c. Habit sketch, x7.5. d. Cross section of ascocarp, x37.5. Drawn from Ell. & Ev., North American Fungi 2913 (CUP).

(5). (ROBERGEA INDICA) Tilak & Kale, Sydowia 24: 85 "1970" (1971)

According to the description this species has apothecia 225-300 µm high and 300-375 µm broad, with a flat hymenium and asci which measure 180-190 x 5-7 µm. Neither the description nor the illustration suggests that this is a *Robergea;* it may be a *Stictis* with a dark margin. No place of deposition is indicated for the type specimen and the authors have not answered my inquiries concerning it.

(6). (ROBERGEA MARATHWADENSIS) Tilak & Srinivasulu, Sydowia 24: 99 "1970" (1971)

I have seen no examples of this species, and the original description will not serve to characterize it.

(7). ROBERGEA NIGRA Sherwood, spec. nov.

Figure 32

Ascocarpi immersi, in superficie hospitis velut discus griseus poro dehiscens visibiles, 0.15 mm lati, 1.2-1.5 mm longi, ad angulam 15° superficie substrati positi. Margo in sectione transversali 50 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0-2.5 µm diam., brunneo. Stratum crystallinum abest. Paraphyses filiformes, simplices, 1200 x 1.0 µm, in iodo non caerulescentes. Asci 500-1000 x 6-7 µm, apice 6 µm crassi, 8-spori. Sporae 500-1000 x 1.5 µm, cellulis 4-7 µm longis.

HOLOTYPUS: CUP-53110, on *Lonicera involucrata,* Devil's Punchbowl State Park, Lincoln Co., Oregon, USA, M. A. Sherwood, 10.VI.1973. ISOTYPI: OSC. Herb. Sherwood 1008.

Ascocarps immersed in bleached and decorticate twigs, visible on the surface of the substrate as ovate stromatized patches whose long axis is parallel to the grain of the wood, lying at approximately a 15° angle to the surface of the substrate, with a short neck at one end, opening by a black disc c. 120 µm broad. Wall 15 µm thick in the lower part, of interwoven hyphae 2.0-2.5 µm diam., Margin surrounding the ostiole c. 50 µm thick, lined with long, matted, colorless periphysoids 1.0 µm diam., lacking a distinct crystalline layer, but with a few imbedded crystals. Paraphyses simple, colorless, filiform, 1.0 µm diam., barely enlarged above, J-. Asci 500-1000 x 6-7 µm, the cap 6.0 µm thick, pierced by a narrow pore. Ascospores 8, nearly as long as the asci, 1.5 µm broad, the cells 4-7 µm long.

On *Lonicera*, on the west coast of North America. *R. nigra* is distinguished from *R. cubicularis* by the absence of a well-defined crystalline layer, the presence of a distinct stromatic clypeus surrounding the ostiole, shorter asci, and rather broader wall hyphae.

SPECIMENS EXAMINED (see also holotype, above): NORTH AMERICA: USA (Herb. Sherwood 2010, on *Lonicera,* Oregon, 21.VIII.1975)

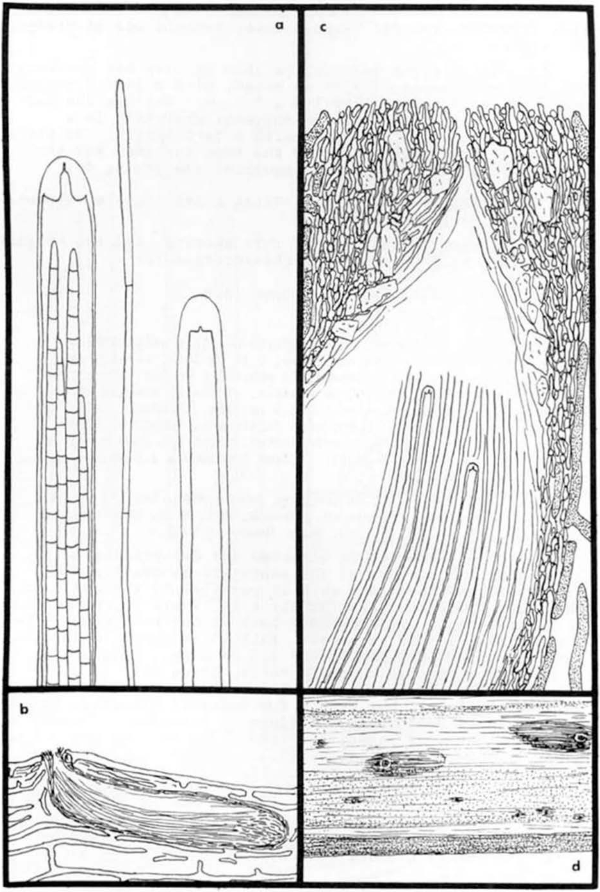

FIGURE 32. *Robergea nigra*. a. Detail of apices of asci, paraphysis, and spores, x1500. b. Cross section of ascocarp, x37.5. c. Detail of margin in the region of the ostiole, x375. d. Habit sketch, x7.5. Drawn from the holotype.

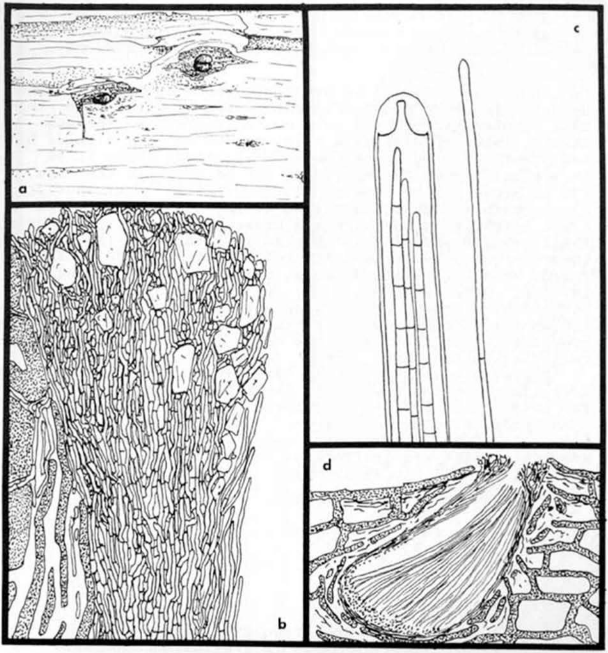

FIGURE 33. *Robergea obliqua*. a. Habit sketch, x7.5. b. Cross section of margin in the region of the ostiole, x375. c. Detail of apices of ascus, paraphysis, and spores, x1500. d. Cross section of apothecium, x75. Drawn from the holotype.

(8). ROBERGEA OBLIQUA Sherwood, spec. nov.

Figure 33

Ascocarpi immersi, in superficie hospitis velut discus niger rima transversali dehiscens visibiles, 0.2 mm lati, 0.5-0.6 mm longi, ad angulam 45° prae superficie substrati positi. Margo in sectione transversali 120 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0-2.5 µm diam., brunneo. Stratum crystallinum abest. Paraphyses filiformes, simplices, 550 x 1.0 µm, in iodo non caerulescentes. Asci 500-550 x 7 (-8) µm, apice 5 µm crassi, 8-spori. Sporae 500 x 1.5-2.0 µm, cellulis 5-7 µm longis.

HOLOTYPUS: CUP-Fairman 619 (18-55), "on dead stems of *Pentstemon cordifolia*", Avalon Canyon, Santa Catalina Island, California, USA. L. W. Nuttall, 18.VII.1920. ISOTYPUS: CUP-Fairman 619 (18-56)

Apothecia immersed in ovoid blackened spots on whitened decorticated wood and herbaceous stems, at first appearing as a minute white-rimmed pore on the surface of the substrate, later opening by a slit c. 200 µm long flanked by two stout, shining black lobes, lying at an angle of 45° to the surface of the host, 300-400 µm broad at the base, 200 µm broad at the summit, 550-650 µm tall. Margin thick, black, carbonized in the region of the ostiole, c. 25 µm thick below, of closely-packed brown hyphae 2.0-2.5 µm diam., the lobes 120 µm thick, of hyphae like those of the wall interspersed with a few scattered crystals, lined on the inside by scanty, matted, long, colorless periphysoids 2.0 µm diam. Asci 500-550 x 7(-8) µm, the cap 5 µm thick, pierced by a broad pore. Paraphyses numerous, filiform, 1.0 µm thick, colorless, not branched or inflated, J-. Ascospores 8, about as long as the asci, 1.5-2.0 µm broad, the cells 5-7 µm long.

Pentstemon cordifolia, an herbaceous vine, is the only host listed on the label, but the packet clearly contains two hosts, both bearing *R. obliqua*. The second is wood of a Gymnosperm, probably *Juniperus*. *Robergea obliqua* is transitional between *Robergea* and *Ostropa*. Fairman's report of *Acerbia bacillifera* in Flora of Santa Catalina Island (Millspaugh & Nuttall, 1923) is based on this specimen.

SPECIMENS EXAMINED: see holotype, above.

(9). *ROBERGEA PUPULA* (Nyl.) R. C. Harris, Contr. Univ. Mich. Herb. 11(2): 95 (1975)
≡ *Scoliocarpon pupula* Nyl., Mém. Soc. Acad. Maine Loire 4: 81 (1858)

Figure 34

Apothecia scattered in irregular bleached spots on the bark of living trees, immersed in grey pseudostromatic warts, 0.5-0.6 mm long, 0.25 mm diam., lying at an angle of 20-30° to the surface of the substrate and opening at one end by a short neck, visible on the surface as a white-pruinose disc 0.2 mm diam., opening by a transverse slit. Margin, in cross section, c. 40 µm thick except in the region of the ostiole, where it is c. 70 µm thick, of interwoven, closely-packed hyphae 2.0 µm diam., the outer 2-3 rows of cells dark brown, the remainder colorless, lined in the upper third with a compact layer of periphysoids 30-40 x 2.0 µm. Crystalline layer distinct, narrow. Asci 350-380 x 8 (-13) µm, the cap 9 µm thick, pierced by a narrow pore. Paraphyses numerous, filiform, colorless, 1 µm thick, not inflated or branched, J-. Ascospores 8, 170-315 µm, shorter than the asci and somewhat irregularly 4-seriate, 3.0-3.5 µm broad, the cells 2.5-5.0 µm long; ascospores readily breaking up at pre-formed constrictions into 3 or 4 multiseptate part-spores.

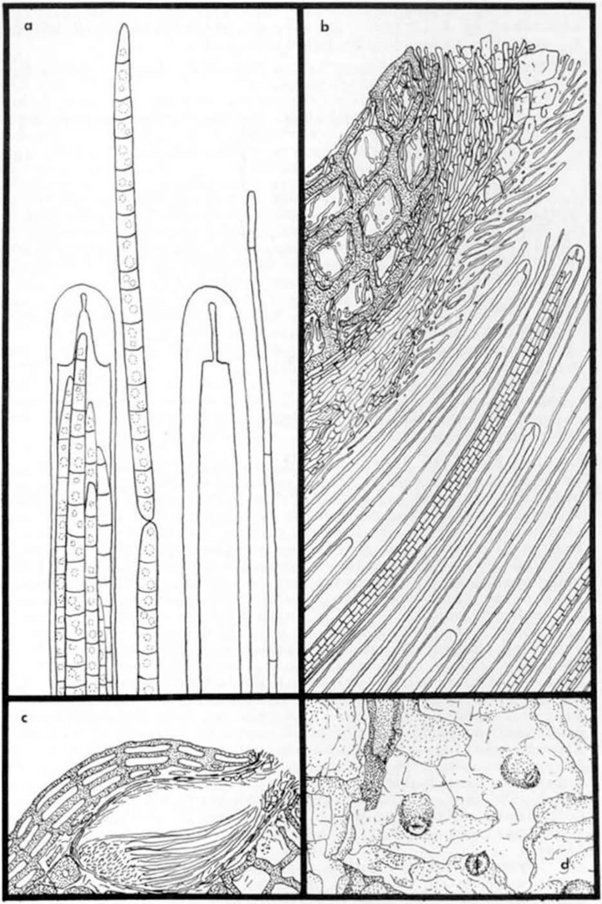

FIGURE 34. *Robergea pupula.* a. Detail of apices of asci, paraphysis, and spores, x1500. b. Cross section of margin in the region of the ostiole, x375. c. Cross section of apothecium, x75. d. Habit sketch, x7.5. Drawn from CUP 54843.

On bark of living trees, southeastern USA. Originally described as a lichen. Details of distribution and additional synonyms are given by Harris (l.c.)

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP 54843, Kentucky, W. R. Buck B35, 15.V.1975, ex herb. R. C. Harris)

(10). *ROBERGEA SINGULARIS* (Duby ex Rehm) Rehm, Hedwigia 25: 140 (1886)
≡ *Ostropa cinerea* (Pers.) Fr. var. *singularis* Duby in herb.

Described by Rehm as having linear apothecia 1-2 mm long, gregarious in grey elevations on decorticated wood of *Rhus typhina*, with an inconspicuous ostiole and asci 600-700 x 7-8 µm, *Robergea singularis* may well be a *Robergea*. No material of this species is deposited in Rehm's herbarium (S) (R. Santesson, *personal communication*).

(72). *SCHIZOXYLON* Pers., Ann. Wetterauischen Ges. Gesammte Naturk. 2: 11 (1810)

Holotype species: *Schizoxylon sepincola* Pers., l.c.
≡ *Cycledium* Wallr.
= *Sphaerolina* Fckl.
= *Agyriella* Ell. & Ev.
  ≡ *Agyriopsis* Sacc. & Sydow
  ≡ *Bisbyella* Boedijn

Apothecia at first immersed in decaying wood or herbaceous plant material, consisting of a pseudostromatic mass in which the products of fertilization and the hyphae accessory to them give rise to an immersed to erumpent, apothecioid fruitbody consisting of asci, paraphyses, and a margin of matted and interwoven marginal paraphyses surrounded by undifferentiated remnants of pseudostroma. Fruitbody tough, woody, carbonaceous, or fleshy-cartilaginous, long-persistent, containing asci which mature over a period of weeks or months. Periphysoids absent. Hymenial disc shallowly cupulate, plane, or somewhat raised above the level of the margin, not splitting away from the margin when dry. Asci long-cylindrical, sometimes becoming saccate when mature, very thick-walled when young, J-, with a thickened apex pierced by a broad pore, or without any distinct apical apparatus. Ascospores 4 or 8, cylindrical or filiform, transversely multiseptate, colorless, often disarticulating into unicellular or septate part-spores. Paraphyses numerous, variously ramified and pigmented, often 1-2-times branched near the apex, apically thickened, and brown, J+ or J-. The margin may be pruinose or epruinose, colorless, yellow, or brown, but is never pseudoparenchymatous, periphysogenous, or traversed by distinct crystalline layers.

Persoon (1810) erected *Schizoxylon*, which he considered to be a genus of crustose lichens, included one species, *S. sepincola*, occurring on bleached fir timbers in a fence and characterized by erumpent, urceolate, emarginate, coriaceous fruitbodies, and suggested that the affinities of the genus were with *Calicium* Pers. (presumably sessile forms now referred to *Cyphelium* Ach.) and *Verrucaria* Scop.

The first validating author was apparently Chevallier, who included one species, *S. sepincola.* Fries (1822) did not discuss this allegedly lichenized genus, but provided (1825) a generic diagnosis, without mentioning any species. Schweinitz (1832) described a second species, *S. tuberculatum,* from North America.

None of the above authors included microscopic observations in their treatments. Durieu and Léveillé (Bory & Durieu, 1850) were apparently the first to illustrate the cylindical asci and filiform disarticulating spores of *Schizoxylon;* these characters were included by Montagne (1856) in an emended description of the genus. Tulasne and Tulasne (1865) examined specimens in Mérat's herbarium and provided a detailed description of both the pycnidial and ascigerous fructifications of *S. sepincola. S. sepincola* was issued by Mougeot and Nestler as Stirpes Cryptogamae Vogeso-Rhenani #174 in 1815.

Early authors who examined *S. sepincola* seem to have agreed that they were dealing with an Ascomycete with filiform, disarticulating spores. The sole specimen filed under this name in Persoon's herbarium (L) is a crustose lichen with obovate, brown, 3-5-septate spores and bitunicate asci, collected in Guadeloupe and annotated in handwriting other than Persoon's. This cannot be the holotype, which was collected near Paris, and would make a poor choice of neotype. A specimen in the Liège herbarium (LG), sine coll., annotated *Schizoxylon sepincola* in Persoon's handwriting, is in poor condition and contains no spores, but seems to conform to current usage of the name and may well be type material. Two specimens from "herb. Richard" now included with Patouillard's collections at FH may conceivably represent type material. One is labelled "*Schizoxylon sepincola* Pers. ad ligna fabrefacta abietina ad sepes destinata", and is correctly identified. The other, which is also *S. sepincola*, but has unusually large apothecia, is labelled "*Schizoxylon majusculum* Richard", and is accompanied by a handwritten description of "*Schizoxylon* Richard", with a protologue corresponding roughly to that of *Schizoxylon* Pers., and references to the mycological writings of Tode and Hedwig (but not Persoon). The relationship between the manuscript name and the published name is a mystery.

As treated here, *Schizoxylon* is distinguished from *Stictis* primarily by the lack of periphysoids. Nannfeldt (1932) considered the distinction between the two genera to be hazy, which is indeed the case if disarticulating spores (Saccardo, 1889; Nannfeldt, 1932), a brown margin (Korf, 1973), superficial growth habit (Dennis, 1963?: no other explanation for the transfer of *Stictis friabilis*, with a colorless margin and non-disarticulating spores, to *Schizoxylon* is given), or branched paraphyses (Rehm, 1887-96) are used as generic characters. Periphysoids give a much more reliable separation Specimens are frequently encountered which on the basis of their erumpent habit, non-periphysoidal margin, and thick epithecium of branched paraphyses, should be placed in *Schizoxylon,* but whose spores do not disarticulate. Immaturity is the most obvious explanation, but I have seen no specimen of *S. albo-atrum*, a common species, in which the spores showed any tendency to fall apart at the septa.

Of necessity I have limited the scope of the present study to the species of *Schizoxylon* reported to occur in North America. In addition, several key European species, the species originally included in *Stictis*, and a few extralimital taxa which were sent to me for identification, and seem from comparison with the literature to be unambiguously new, are described or redescribed here and included in the key.

At present, *Schizoxylon* is poorly represented in major herbaria, perhaps because the species are genuinely rare, perhaps because most are inconspicuous and seldom collected, or because lack of a satisfactory delimitation of the genus has led to misidentification of specimens at the generic level. It would be desirable to have more representative, and better-sorted collections before attempting a worldwide treatment of the genus. A partial treatment is provided here in order to assist in the identification of some of the commoner species and to clarify the characters of the genus.

Key to North American

and Selected Extralimital Species of *Schizoxylon*

1. Part-spores 4-seriate or less than 4-seriate in the mature ascus (immature asci 4-spored or spores much shorter than the ascus (2)
1'. Ascospores and part-spores more than 4-seriate in the ascus (Asci 8-spored; spores nearly as long as the asci) (5)
    2(1). Part-spores globose, 3.5-5 µm diam. *(Schizoxylon juniperinum)**
    2'(1). Part-spores cylindrical (3)
3(2'). Part-spores 5-7 µm broad. *(S. crassisporum)*
3'(2'). Part-spores 3-3.5 µm broad (4)
    4(3'). Marginal hyphae brown. Margin not exceeding 75 µm in thickness. *S. compositum*
    4'(3'). Marginal hyphae colorless. Margin 200-300 µm broad. *(S. crassum)*
5(1'). Ascospores not disarticulating; asci more than 250 µm long, with a distinct apical cap. (6)
5'(1'). Ascospores regularly disarticulating into simple or septate part spores; asci usually less than 200 µm long, the apical cap distinct or not. (11)
6(5). Marginal hyphae brown (7)
6'(5). Marginal hyphae colorless (9)
    7(6). Apothecia white-pruinose or yellow-pruinose. Asci over 300 µm long. (8)
    7'(6). Apothecia black, shining, not pruinose. Asci 250-300 µm long. *(S. lantanae)*
8(7). Ascospores 450-500 x 1.0-1.2 µm. Margin bright yellow. *(S. sulfurinum)*

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* Species enclosed in parentheses are not known to occur in North America

8'(7). Ascospores 350-400 x 1.5-2.0 µm; margin white or grey (if ascospores are 250 x 4-5 µm, go to 11, below) *Schizoxylon albo-atrum*

9(6'). Paraphyses tips brown, J+ or J-. *(S. cordobensis)*

9'(6'). Paraphyses tips colorless, J- (10)

10(9'). Ascospores 300-500 x 2.0 µm, the disc pruinose, plane. *S. melleum*

10'(9'). Ascospores 300-350 x 1.75 µm, the disc epruinose, concave. *(S. bellum)*

11(5'). Asci more than 300 µm long (12)

11'(5'). Asci less than 300 µm long (13)

12(11). Asci 500 µm long; margin black, carbonized. *(S. involutum)*

12'(11). Asci 300 µm long; margin reduced, colorless. *(S. pruiniferum)*

13(11'). Part-spores septate (14)

13'(11'). Part-spores unicellular (16)

14(13). Part-spores 1-septate. *S. berkeleyanum*

14'(13). Part-spores multiseptate (15)

15(14'). Part-spores 3-5-septate. *S. microstomum*

15'(14'). Part-spores 10 or more septate *(S. buriticae)*

16(13'). Asci 15-18 µm broad. Part-spores more than 8-seriate. *(S. nigrellum)*

16'(13'). Asci 6-11 µm broad; part-spores 8-seriate (17)

17(16'). Epithecium intensely J+ blue. *S. berkeleyanum* var?

17'(16'). Epithecium J- (18)

18(17'). Part-spores 3-3.5 µm broad; ascosarps fleshy when moist. *S. ligustri*

18'(17'). Part-spores 2.5 µm broad; ascocarps carbonized, not fleshy. *(S. sepincola)*.

Descriptions of Species of Schizoxylon

Species reported from North America, and selected extralimital taxa, are listed below in alphabetical order. Excluded species are enclosed in parentheses.

(1). (SCHIZOXYLON ADUNCUM) Feltg.
= *Stictis polycocca* (Karst.) Karst., q.v.

(2). SCHIZOXYLON ALBO-ATRUM Rehm, Ber. Naturhist. Vereins Augsberg 26: 116 (1881)
= *Stictis hypodermia* Bres., Rev. Mycol. (Toulouse) 13: 21 (1891)

Figure 35

Apothecia at first immersed, becoming erumpent and finally nearly superficial, 0.5-1.0 mm diam., about as tall as broad, gregarious, orbicular in cross section, the margin grey-pruinose, KOH-, the disc shallowly cupulate to plane, black and shining. Margin containing scattered non-rosettiform crystalline inclusions, composed throughout of tightly-interwoven hyphae which are colorless and 1.0 µm in diameter near the base of the apothecium, becoming 1.5 µm

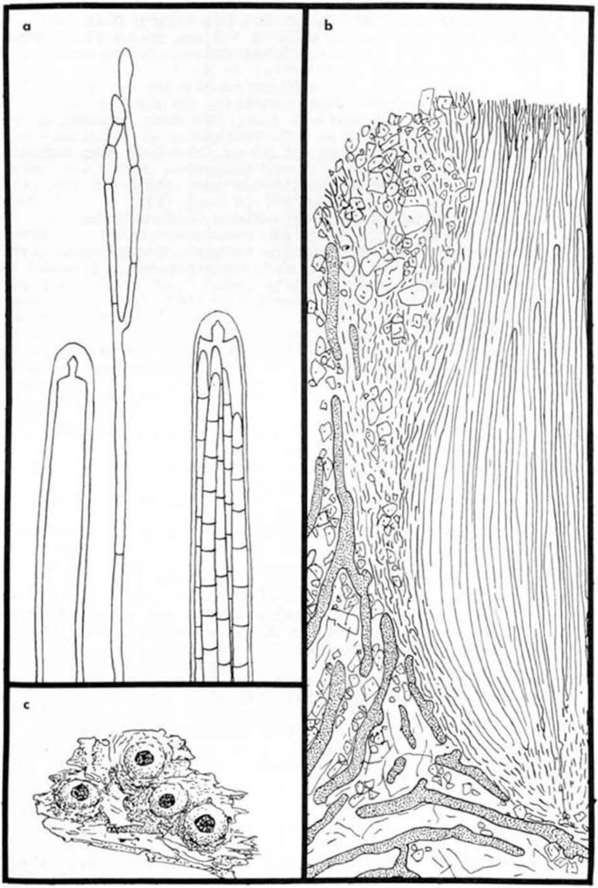

FIGURE 35. *Schizoxylon albo-atrum*. a. Detail of apices of asci, paraphysis, and spores, x1500. b. Cross section of margin, x225. c. Habit sketch, x7.5. Drawn from O-Sommerfeldt 4.1823.

broad and pale brown near the summit, not carbonized. Paraphyses filiform, 1.0 µm broad below, 1-2 times branched and inflated to 2.0 µm at the tip, brown, J- or faintly J+ blue, exceeding the asci by 80 µm and forming a compact epithecium. Asci cylindrical, 350-400 x 7-8 µm, thick-walled when young, with an apical cap 4.0 µm thick pierced by a broad angular pore, J-. Ascospores 8, nearly as long as the asci, colorless, transversely multiseptate, not disarticulating at maturity, the cells 4-5 x 2.0 µm.

On decorticated wood, rarely on bark, Europe and North America. Apparently common. Early authors failed to distinguish between this species and *Stictis mollis*, which often occurs with it. The two fungi are rather similar externally and old specimens of *Sch. albo-atrum* may appear deeply urceolate if the hymenium has disintegrated. Sommerfelt's manuscript name *Sphaeria venusta*, cited by Fries (1828) in his synonymy of *Stictis pupula*, is based on a specimen of *Sch. albo-atrum*.

The specimen from Oregon (Kelmholz 96) has an intensely J+ blue epithecium and a white-pruinose disc; it may well represent a distinct variety.

SPECIMENS EXAMINED: EUROPE: Germany (CUP,NY, on *Tilia*, Rehm, Ascomyceten 478, isotypes of *Schizoxylon albo-atrum*). Norway (O, on *Sorbus*, Sommerfelt; on *Populus*, 4.1823). France (ZT, on *Euonymus*, Müller 3.V.1959). Roumania (NY, on *Pyrus*, Barth, 19.XII.1874). NORTH AMERICA: USA (NY, on *Salix?*, New Jersey, Ellis, 11.I.1892; Ohio, Morgan 1014; Oregon, on *Pyrus*, Kelmholz 96, 3.XII.1932)(CUP-D-10367, Missouri, Durand, 13.III.1913)

(3). SCHIZOXYLON BELLUM (Cooke & Kalchbrenner) Sherwood, comb. nov.

≡ *Stictis bella* Cke. & Kalchbr., Grevillea 9: 25 (1880)

Figure 36

Apothecia at first immersed, becoming erumpent, 0.5 mm broad, 1.0 mm long, the margin thick, white, entire, KOH-, the disc shallowly cupulate, pale ochraceous, not splitting away from the margin when dry. Margin in cross section 300 µm thick, of loosely interwoven hyphae 1.0 µm diam., imbedded in a gelatinous matrix, colorless. Crystalline inclusions non-rosettiform, numerous in the upper part of the margin. Paraphyses filiform, 1.0 µm diam. below, enlarged to 2.5-3.0 µm above, 1-2 times branched, colorless, J-, forming a distinct epithecium 40 µm thick. Asci 300-350 x 6.0 µm, moderately thick-walled when young, the cap 4.0 - 5.0 µm thick, pierced by a slender pore. Ascospores 8, 300-350 x 1.75 µm, colorless, multiseptate, not disarticulating at the septa, the cells 4-5 µm long.

On branches, south Africa. Known only from the type specimen, which contains four apothecia. The fragmentary material leaves some doubt as to whether the spores remain permanently intact, or whether scattered brown hyphae 4-5 µm diam. which appear in the outer part of the margin are a parasite, remnants of another fungus growing on the same substrate, or rudimentary stromatic margin.

SPECIMEN SEEN: AFRICA: Union of South Africa (K, Kalchbrenner 1288a, Cape, holotype of *Stictis bella*)

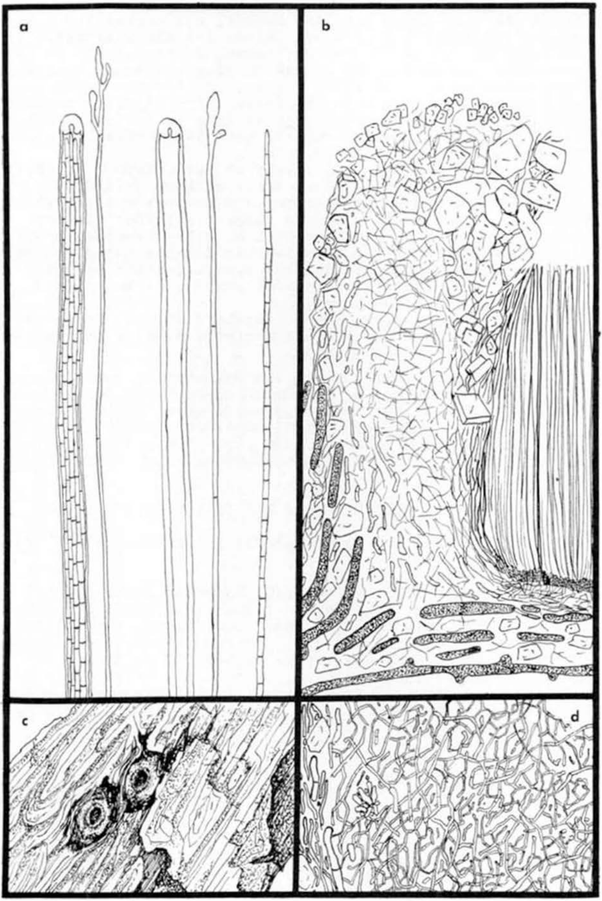

FIGURE 36. *Schizoxylon bellum.* a. Detail of apices of asci, paraphyses, and spores, x750. b. Cross section of margin, x150. c. Habit sketch, x7.5. d. Detail of marginal hyphae, x750. Drawn from the holotype.

(4). *SCHIZOXYLON BERKELEYANUM* (Dur. & Lév.) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 257 (1870)
≡ *Stictis berkeleyana* Dur. & Lév., Expl. Scientif. Algérie, Atlas t. 89 f. 8 (1850)
≡ *Propolis berkeleyana* (Dur. & Lév.) Desm., Pl. Crypt. Fr. ed. 2, 14 (1853)
≡ *Schmitzomia berkeleyana* (Dur. & Lév.) Phil., Brit. Discom. 379 (1887)
≡ *Cyclostoma berkeleyana* (Dur. & Lév.) Crouan & Crouan, Fl. Finist. 30 (1867)
= *?Sphaerolina xantholeuca* (Fr.) Fckl., Jahrb. Vereins Naturk. Herzogth. Nassau 15: 77 (1860)
≡ *Sphaeria xantholeuca* Fr., Syst. Mycol. 2(2): 503 (1823)
= *Rhaphidospora oenotherae* Ausersw. in Rabenh., Fungi Europaei # 823 (1865), nom. nud.
= *Schmitzomia decipiens* Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 11: 253 (1870)
≡ *Stictis decipiens* (Karst.) Cke. & Harkn., Grevillea 9: 8 (1880)
≡ *Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl. subsp. *decipiens* (Karst.) Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 165 (1885)
≡ *Schizoxylon decipiens* (Karst.) Sacc., Syll. Fung. 8: 697 (1889)
= *Schizoxylon occidentale* Ell. & Ev., J. Mycol. 1: 90 (1885)

Figure 37

Apothecia at first immersed, becoming erumpent and finally nearly superficial, 0.5-1.2 mm diam., varying in shape from discoid to conical, the margin thick, dark, covered with a grey or yellow pruina, KOH+ yellow, the disc dark brown to black, not pruinose. Margin in cross section 80-100 µm thick, of tightly interwoven hyphae 1.5 µm diam., without internal crystalline inclusions but prominently crystalliferous on the outer face. Subhymenium colorless, J-, of small, angular cells, c. 40-50 µm thick. Paraphyses numerous, filiform, 1.0 µm thick below, enlarged to 1.5 µm at the tip which is 1-2 times branched and olivaceous brown. J+ blue, forming an epithecium 30 µm thick. Asci 240-280 x 7-9 µm, thick-walled when young, with an apical cap 2.5 µm thick, pierced by a broad pore, J-. Ascospores 8, 180-200 x 1.5-2.5 µm, soon breaking apart into 1-septate part-spores 5-8 x 1.5-2.5 µm.

On herbaceous plants, rarely on woody plant parts, Europe, North Africa, Pakistan, and North America. In its typical form, a brilliant sulfurous yellow cone surmounted by a small black non-urceolate disc, this species is unmistakeable. This common species is, however, quite variable in external appearance, ranging in color from grey to yellow, and in form from a conical structure resembling a perithecium to an open, discoid fructification. It is easily recognized on microscopic examination by the narrow, 1-septate part-spores.

The source of color variability is unclear; it does not seem to be host mediated, since both forms occur on *Oenothera*. The name *Schizoxylon berkeleyanum* subsp. *decipiens* is available if one wishes to distinguish smaller, more

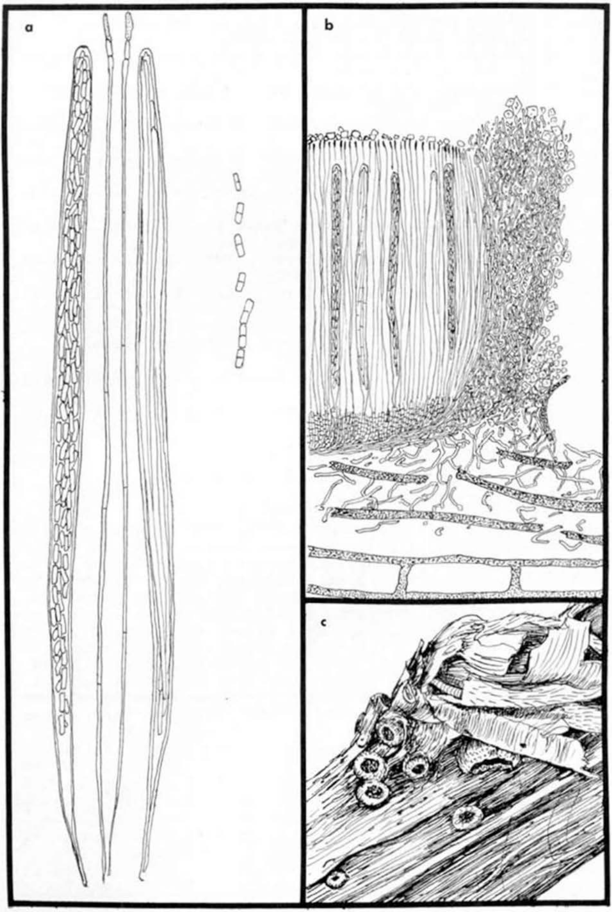

FIGURE 37. *Schizoxylon berkeleyanum*. a. Asci, paraphyses, and part-spores, x750. b. Cross section of apothecium, x225. c. Habit sketch, x7.5. Drawn from Fl. Exs. Austro-Hungarica 3566.

immersed grey forms. The type of *S. decipiens* has septate part-spores. It is apparently rare in North America.

Specimens collected by Brenckle (Fungi Dakotensis 261, 264, and 536) in North Dakota and distributed as *Schizoxylon decipiens* resemble the grey form but have unicellular part-spores. I have seen one European specimen (Mycotheca Marchica 2367) which has unicellular part-spores; it may merely be immature. The grey form is involved in the identity of *Stictis pupula* (q.v.). In the original description of *Schizoxylon occidentale*, Ellis and Everhart state that the spores were 2.5-3.5 µm broad. I could find no spores broader than 2.5 µm broad in the material I examined. The species is otherwise identical to *S. berkeleyanum* subsp. *decipiens*, and has septate part-spores.

SPECIMENS EXAMINED: EUROPE: Austria (CUP, Fl. Exs. Austro-Hungarica 3566, on *Oenothera;* Herb. Barbey-Boissier 1096). Switzerland (NY, on *Oenothera,* Krieger, IV.1880; on *Galium,* Krieger, 1880). Germany (CUP, Rabenh. Fungi Europaei 823, on *Oenothera,* isotype of *Rhaphidospora oenotherae*)(NY, Sydow, Mycotheca Marchica 2367, on *Solidago*). France (NY, Roumeguère, F. Sel. Exs. 5415, on *Epilobium*). Sweden (S, on *Poterium*, Eliasson 66; on *Galium,* Kugelberg, VII.1891)(H, on *Tanacetum*, Karsten 1266)(UPS, Småland, Fries; Östergotland 6/11/1861). Finland (H, on *Corylus*, Karsten 1274; Karsten 1257, sine coll.; Karsten 1256, on *Artemesia,* holotype of *Schmitzomia decipiens*). AFRICA: Algeria (FH-Patouillard 5011, ex herb Durieu, isotype of *Stictis berkeleyana*). ASIA: West Pakistan (ZT 14382). NORTH AMERICA: USA (NY-Brenckle, Fungi Dakotensis 261, 264, 536, all from North Dakota)(CUP-D-7745, Harkness 104, Utah, V.1885, isotype of *Schizoxylon occidentale*)

(5). SCHIZOXYLON BETHELI (Ell. & Ev.) Cash

= *Schizoxylon ligustri* (Schw.) Sherwood, q.v.

(6). (SCHIZOXYLON BICOLOR) Ell. & Ev.

= *Stictis bicolor* (Ell. & Ev.) Starbäck , q.v.

(7). SCHIZOXYLON BURITICAE Sherwood, spec. nov.

Figure 38

Ascocarpi primum immersi, erumpescentes, non profunde cupulati, 0.8-2.0 mm diam., margine integro, griseo, disco griseo. Margo in sectione transversali 200 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis brunneis constans. Paraphyses filiformes, 300 x 1.0 µm, apice non incrassatae, ramosae, pallide brunneae, in iodo caerulescentes. Asci 250-300 x 10 µm, apice 5 µm crassi, 8-spori. Spori 250 x 4.5 - 5.0 µm, cellulis 4-5 µm longis, ad septa se disjungentibus et articulos 7-15 septatis formantibus.

HOLOTYPUS: NY-Ec 10, on unidentified twig, ca. 11 km SW of Chillogallo, on the old road from Quito to Santo Domingo, Prov. Pichincha. Elev. ca. 11000'. K. P. Dumont, S.E. Carpenter, & P. Buriticá, 16.VII.1975.

Etymology: Named after one of the collectors.

Ascocarps at first immersed, becoming erumpent, 0.8-2.0 mm diam., orbicular, fleshy when wet, the margin thick, entire, grey-pruinose, the disc shallowly cupulate, grey-

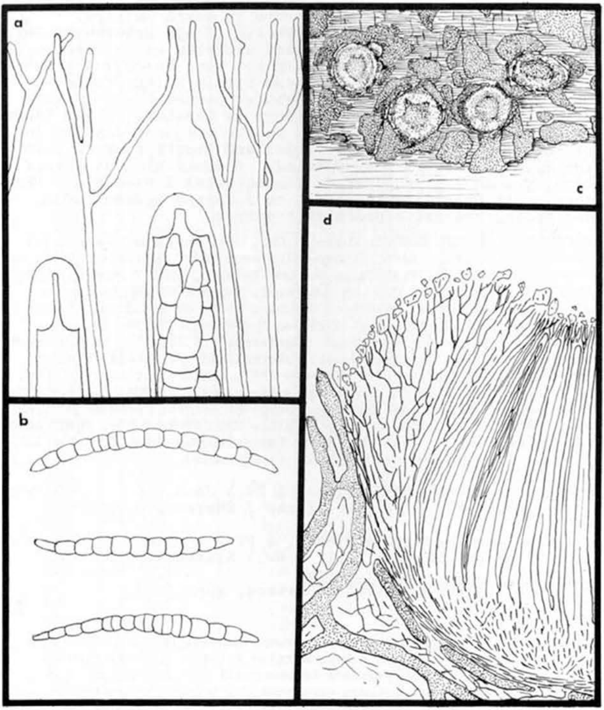

FIGURE 38. *Schizoxylon buriticae*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Part-spores, x750. c. Habit sketch, x7.5. d. Cross section of margin, x225. Drawn from the holotype.

pruinose, a little darker than the margin, not splitting away from the margin when dry. Margin, in cross section, c. 200 µm broad, composed principally of widely-spaced, interwoven, colorless hyphae 1.5 µm diam., immersed in a gel, the outer face pale brown and crystalliferous. Subhymenium c. 100 µm thick, J-, of small, colorless, angular cells. Paraphyses numerous, filiform, 1.0 µm broad below, apically branched and pale brown, J+ blue, 1.5 µm broad at the apex, exceeding the asci by 10-15 µm, forming an epithecium. Asci 250-300 x 10(-14) µm, the cap 5 µm thick when mature, much thicker when young, J-. Ascospores 8, c. 250 x 4.5-5 µm, with three prominent constrictions, appearing to break up into 4 multiseptate, slightly curved part-spores when mounted for microscopic observation but apparently discharged as a unit in nature, the cells 3-5 µm long.

On small twigs at high elevations, Colombia and Ecuador. The characters of *S. buriticai* do not agree with those of any described species of Schizoxylon. The thick, very gelatinous excipulum and broad, multiseptate part-spores are diagnostic.

SPECIMENS EXAMINED (see also holotype, above): SOUTH AMERICA: Colombia (COL-Co 4369, on twig, Dto. Boyacá, K. P. Dumont, S. E. Carpenter, M.A. Sherwood, L. A. Molina, 10.VI.1976)(NY-Co 5417, on twig, Dto. Cundinamarca, K.P. Dumont, S.E. Carpenter, M.A. Sherwood, A. Gentry, 31.VII.76)

(8). SCHIZOXYLON COMPOSITUM Ell. & Ev., Proc. Acad. Nat. Sci. Philadelphia 10: 353 (1894)
= *Schizoxylon dermateoides* Rehm, Ann. Mycol. 4: 353 (1906)

Figure 39, 44c

Apothecia scattered to gregarious, at first immersed, then erumpent, broadly discoid, 0.8-2.5(-3) mm broad, orbicular to irregular in outline, the disc simple or occasionally divided by sterile bands of crystalliferous paraphyses which give the impression of a compound disc, plane or shallowly cupulate, the margin grey, yellow, or greenish-pruinose, KOH+ yellow-orange, the disc also pruinose, a little darker than the margin, grey, yellow, or olive green. Margin in cross section c. 30 µm thick, of densely-packed, non-gelatinizing pale brown hyphae 1.5-2 µm diam., crystalliferous only on the outer face. Subhymenium c. 30 µm thick, of small colorless cells 2.0 µm diam., faintly brownish below. Paraphysis apices and marginal paraphyses J+ blue. Paraphyses filiform, 1.0 µm diam., 2-3 times branched near the apex which is inflated to 2.5 µm and dark brown, crystalliferous, forming an epithecium 60 µm thick. Asci cylindrical, 200-215 x 10-11 µm, thick-walled when young, without an apical cap, J-, 8-spored. Ascospores 4-seriate and much shorter than the asci, soon falling apart into simple or 1-septate part spores 4-7 x 3.5-4.5 µm.

On wood and bark, North America. Apparently fairly common. This species seems to occur in a bewildering number of forms. Some specimens are distinctly yellow-green and have been identified in herbaria as *Schizoxylon aeruginosum* Fckl. (= *S, ligustri*); others are yellowish-grey or grey, with or without a KOH+ yellowish reaction. Young apothecia have a minute disc and broad margin, and appear nearly pyrenomycetous; as they mature, the disc expands. Specimens with all 0-septate spores 3-3.5 µm broad, or all 1-septate spores 4-4.5 µm broad, have been observed, but both conditions may occur within a single apothecium. Compound apothecia were considered by Ellis (l.c.) and Rehm (in a letter to Ellis) to be an important feature of *S. compositum*. Compound apothecia are found in many Ostropales. They are more common in *S. compositum* than in some species, but may be completely absent in some specimens which are otherwise typical *S. compositum*.

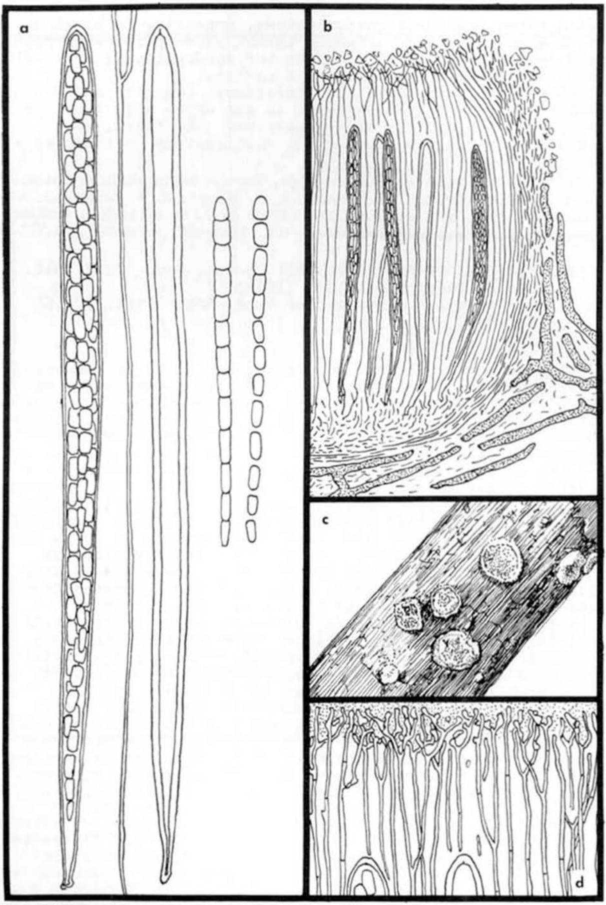

FIGURE 39. *Schizoxylon compositum*. a. Asci, paraphysis, spores, and part-spores, x750. b. Cross section of margin, x225. c. Habit sketch, x7.5. d. Detail of epithecium, x750. Drawn from NY-Bartholomew 1366.

SPECIMENS EXAMINED: NORTH AMERICA: USA (BPI, Underwood & Cooke 552, New York)(NY, on *Symphoricarpus*, Kansas, Bartholomew 1366, lectotype [Designated here] of *Schizoxylon compositum*; New Jersey, Ellis 16.IX.1892, lectoparatype; on *Symphoricarpus*, Kansas, 29.I.1894; North American Fungi 3234, on *Fraxinus*, Kansas; Flora Ludoviciana 2331, on *Boussingaultia*, Louisiana)(CUP-Fairman 1968, New York, isotype of *Schizoxylon dermateoides*; Fairman-3528, on *Carya*, New York; Atkinson, on *Symphoricarpus*, Kansas, 20.III.1894; Atkinson, on *Cornus*, Kansas, 13.XI.1896; Atkinson, on *Populus*, Kansas, 10.IV.1896; Atkinson, on *Salix*, Kansas, 27.III.1896; D-1764, on *Carya*, New York; D-2379, on *Hickoria*, New York; D-10861, Nebraska, III.1893; D-7748, on *Acer*, New York; D-2380, on *Populus*, New York). Canada (CUP-D-7730, on *Crataegus*, Ontario, Dearness 1258; D-7729, on *Salix*, Ontario, Dearness 1258b; D-2465, on *Fraxinus*, Dearness 1488)

(9). SCHIZOXYLON CORDOBENSIS (Spegazzini) Sherwood, comb. nov.

≡ *Stictis cordobensis* Speg., Bol. Acad. Nac. Ci. 29: 162 (1926)

Figure 40

Apothecia at first immersed, opening to expose the broad flat disc but not becoming erumpent, 0.8-1.0 mm broad, with a thick, pale brown, scarcely pruinose margin and darker brown, shallowly cupulate, epruinose disc. Margin in cross section composed throughout of colorless hyphae 1.0-1.5 µm diam., with a few scattered crystalline inclusions, 100 µm or more thick, not splitting away from the hymenium when dry. Paraphyses numerous, filiform, 1.0 µm diam. below, enlarged to 2-3.5 µm at the brown tip, simple or once-branched, exceeding the asci by 10 µm, J+ or J-. Subhymenium colorless, J+ or J-. Asci cylindrical, 400 x 6-8 µm, thick-walled when young, with an apical cap 3.0 µm thick, pierced by a broad pore, J-. Ascospores 8, nearly as long as the asci, 1.75 µm broad, the cells 5-7 µm long, not falling apart at the septa.

On wood, South America. The characters of this species do not correspond to any of Spegazzini's descriptions of *Schizoxylon*. Spegazzini gives the dimensions of the asci as "225-259 x 8 ". I suspect this reflects an error in recording rather than variation within the collection. Measurements of the asci of *Stictis atrata (=Schizoxylon involutum)*, described in the same paper, are also far too short. The Colombian specimens lack the J+ hymenial reaction found in the type and have a grey disc; otherwise they agree with Spegazzini's specimen.

SPECIMENS EXAMINED: SOUTH AMERICA: Argentina (LPS 28235, Córdoba, Bruch 124, holotype of *Stictis cordobensis*). Colombia (CUP-Co-409, Chardon) (NY-Co-4842, Dto. Boyacá, K.P. Dumont, S.E. Carpenter, M.A. Sherwood &L.A. Molina, 11.VI.1976)

(10). SCHIZOXYLON CRASSISPORUM (Spegazzini) Sherwood, comb. nov.

≡ *Stictis crassispora* Speg., Annales Mus. Nac. Hist. Nat. Buenos Aires 23: 102 (1912)

Figure 41

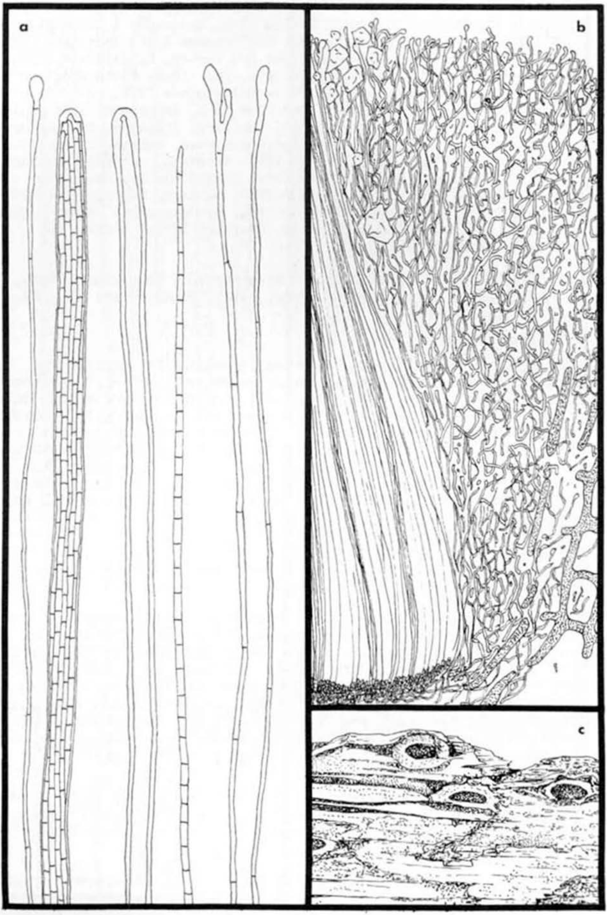

FIGURE 40. *Schizoxylon cordobensis*. a. Detail of apices of asci, paraphyses, and spores, x750. b. Cross section of margin, x300. c. Habit sketch, x7.5. Drawn from the holotype.

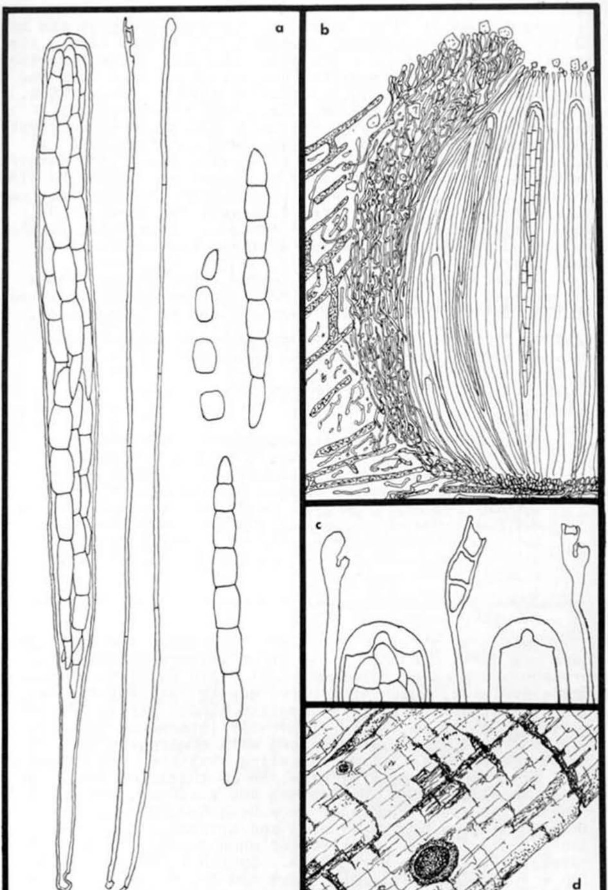

FIGURE 41. *Schizoxylon crassisporum*. a. Ascus, paraphyses, and spores, x750. b. Cross section of margin, x300. c. Detail of apices of asci and paraphyses, x1500. d. Habit sketch, x7.5. Drawn from the holotype.

Apothecia at first immersed, opening to expose the broad flat disc but not becoming erumpent, 0.5-1.2 mm diam., the margin dark brown, white-pruinose, the disc black, greyish pruinose, shallowly cupulate, not splitting away from the margin when dry. Margin in cross section c. 50 µm thick, of interwoven hyphae 1.5 µm diam., dark brown without, hyaline within, containing scattered non-rosettiform crystalline inclusions. Paraphyses numerous, filiform, 1.0 µm diam., inflated to 4.0 µm at the septate brown tip, mostly unbranched, exceeding the asci by 10 µm, J-. Asci 200-215 x 10-12 µm, thick-walled when young, with an indistinct cap 1.5 µm thick, J-. Ascospores 8, 4-seriate, 65-80 (-100, fide Spegazzini) x 5-7 µm, 7-9-septate, constricted at the septa and eventually breaking up into short-cylindrical part-spores.

On decorticated wood, Argentina. Known only from a fragmentary type collection. This species does not correspond to any of Spegazzini's descriptions of *Schizoxylon*.

SPECIMENS EXAMINED: SOUTH AMERICA: Argentina (LPS 38231, on *Tricycla spinosa*, Mendoza, holotype of *Stictis crassispora*)

(11). SCHIZOXYLON CRASSUM Sherwood, spec. nov.

Figure 42

Ascocarpi primum immersi, erumpescentes, non profunde cupulati, 1.5-3.0 mm diam., margine integro, albo, disco brunneo. Margo in sectione transversali 200-300 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis achromis constans. Paraphyses filiformes, simplices, 600 x 1.0 µm, apice non incrassatae, achromae vel pallide brunneae, in iodo caerulescentes. Asci 200-220 x 5.5-7 µm, apice 3.0 µm crassi- 8-spori. Sporae 100-120 x 3-3.5 µm, cellulis 3-4 µm longis.

HOLOTYPUS: IMI 81239, on bark of *Quercus*, Murree hills, West Pakistan, August, 1955.

Apothecia at first immersed, dissolving the overlying bark and often opening by a slit or triangular fissure, erumpent, orbicular to elongate, 1.5-3.0 mm diam. Margin white-pruinose, thick, involute, nearly covering the pale brown, pruinose, shallowly cupulate disc. Margin in cross section 200-300 µm thick, of loosely interwoven colorless hyphae 1.5 µm diam. interspersed with numerous colorless rosettiform crystals, not splitting away from the hymenium when dry. Subhymenium J+ blue, 50 µm thick, of small, colorless, angular cells. Paraphyses 600 x 1.0 µm, greatly exceeding the asci, simple or once-branched, not enlarged above, the apex brown, J+ blue and crystalliferous. Asci 200-220 x 5.5-7 µm, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore. Spores 8, 4-seriate, 100-120 x 3.0-3.5 µm, tapering above and below, septate, the cells 3-4 µm long, not disarticulating at the septa.

On bark, Pakistan. This does not fit the description of any known species of *Schizoxylon*, and has no name in *Stictis*. In broken asci the inner wall and outer wall appear separable, although the asci cannot be induced to "jack in

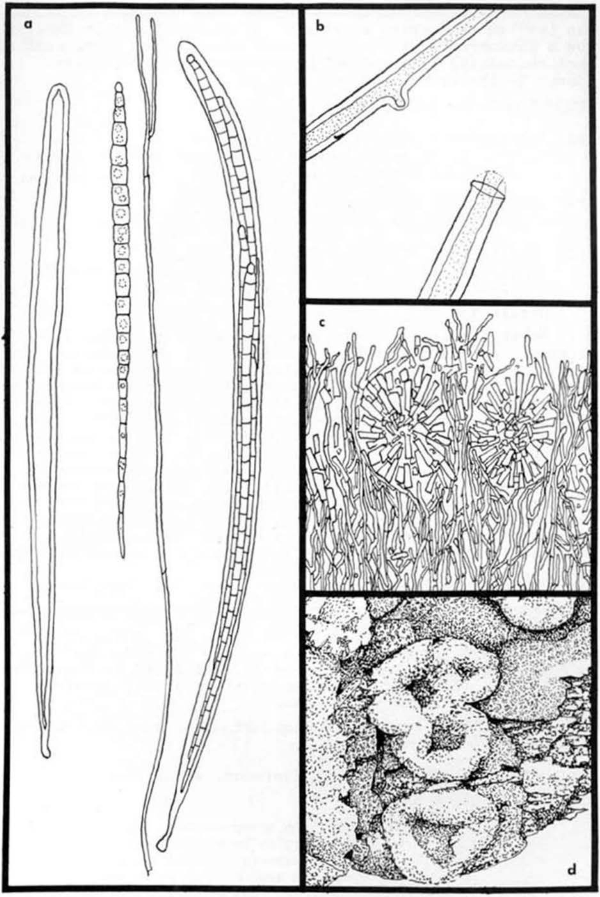

FIGURE 42. *Schizoxylon crassum.* a. Asci, paraphysis, and spores, x750. b. Detail of broken asci, x750. c. Marginal hyphae and rosettiform crystals, x750. d. Habit sketch, x7.5. Drawn from the holotype.

the box" in this dried material. It is difficult to imagine how a discomycete with a massive epithecium and short-stalked asci containing little epiplasm manages to discharge its spores if the asci are not bitunicate.

SPECIMEN SEEN: See holotype, above.

(12). *SCHIZOXYLON DECIPIENS* (Karst.) Sacc.
≡ *Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl. subsp. *decipiens* (Karst.) Karst., q.v.

(13). *SCHIZOXYLON DERMATEOIDES* Rehm
= *Schizoxylon compositum* Ellis & Everh., q.v.

(14). SCHIZOXYLON INVOLUTUM Sherwood, nom. nov.
≡ *Stictis atrata* Speg., Bol. Acad. Nac. Ci. 29: 162 (1926) non *S. atrata* Desm. (1845)

Figure 43

Apothecia at first immersed, becoming erumpent, 1.0-1.5 mm diam., the margin thick, shining black, and involute, the disc shallowly cupulate, also black. Margin in cross section 150 µm thick, the outer third of tightly-packed, irregularly nodulose brown hyphae 2-3.5 µm diam., the inner two thirds of loosely interwoven, gelatinizing, colorless hyphae 1.5-2.0 µm diam., with a few inconspicuous crystalline inclusions The quantity of host tissue imbedded in the margin indicates that the early stages are immersed, although the apothecia in the type are all nearly superficial. Paraphyses numerous, filiform, 750 µm long, 1.0 µm diam. below, enlarged to 2-2.5 µm above, J- (J+ according to Spegazzini), once-branched, brown at the tip. Asci 650-700 x 8-9 µm, cylindrical, not thick-walled and without an obvious cap. Ascospores 8, nearly as long as the asci, 1.75 µm broad.

On wood, Argentina. Known only from the type, which contains four apparently immature apothecia. Spegazzini reports the asci as being 220-250 µm long, surely an error. His measurements of spore cells (3-4 µm) and report of J+ asci (probably paraphyses) would seem to indicate that the type once contained mature apothecia. It would be desirable to recollect this species, whose massive, black, involute margin is reminiscent of *Ostropa*.

SPECIMEN SEEN: SOUTH AMERICA: Argentina (LPS 28236, Bruch 130, Córdoba, holotype of *Stictis atrata* Speg.)

(15). SCHIZOXYLON JUNIPERINUM Sherwood, spec. nov.

Figure 44, a-b

Ascocarpi primum immersi, non erumpescentes, non profunde cupulati, 0.3-0.5 mm diam., margine integro, nigro, disco griseo. Margo in sectione transversali 70 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis brunneis constans. Paraphyses filiformes, ramosae, 250 x 1.0 µm, apice ad 2.0-2.5 µm incrassatae, brunneae, in iodo caerulescentes. Asci 200-220 x 10-11(-20) µm, apice 1.5 µm crassi, 4-spori. Sporae 125 x 3.5-5.0 µm, cellulis 3.5-5.0 µm longis,

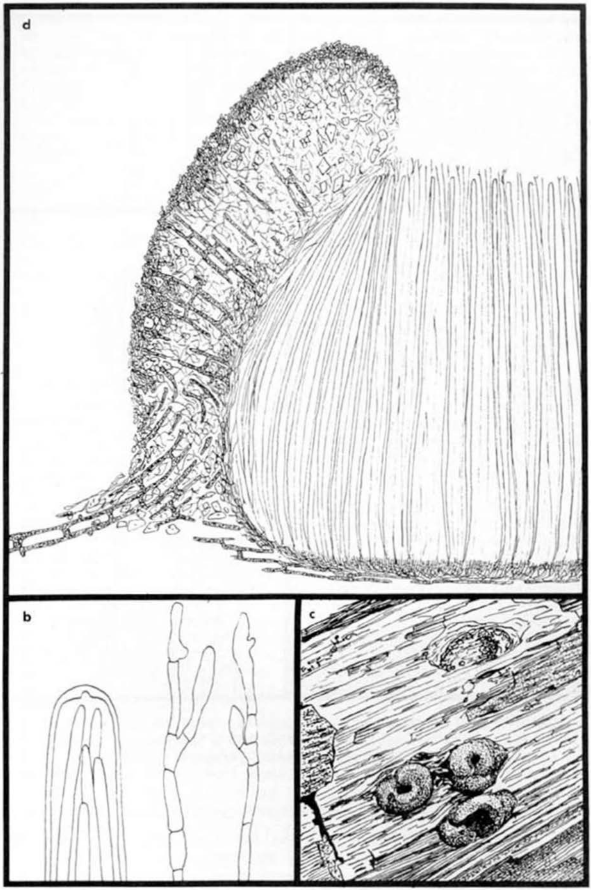

FIGURE 43. *Schizoxylon involutum.* a. Cross section of apothecium, x112.5 b. Apices of ascus and paraphyses, x1500. c. Habit sketch, x7.5. Drawn from the holotype.

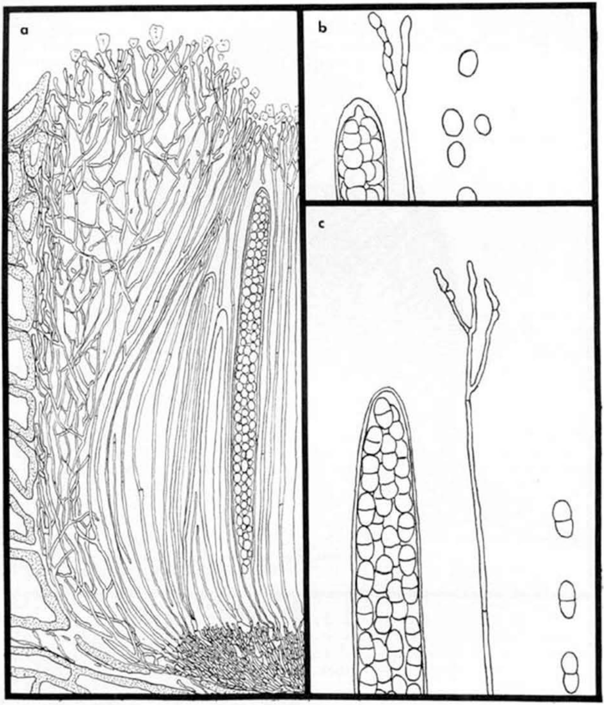

FIGURE 44. a-b. *Schizoxylon juniperinum*. a. Cross section of ascocarp, x375. b. Detail of apices of an ascus and a paraphysis; part-spores, x750. c. *Schizoxylon compositum*. Ascus, paraphysis, and spores of the form with septate part-spores. a-b drawn from the holotype. c drawn from NY-Fairman 110.

ad septa se disjungentibus et articulos simplices formantibus.

HOLOTYPUS: ZT, Fungi of West Pakistan 15622, on dead branches of of juniper, Ziarat, 26.VI.1962, S. Ahmad.

Apothecia immersed in bleached spots on decorticated wood, 0.3-0.5 mm diam., not becoming erumpent, surrounded by a patch of stromatized wood c. 1mm broad, the margin thin, black, the disc dark grey pruinose. Hypothecium colorless, J-, of cells 1 µm diam. Paraphyses 230 x 1.0 µm, 1-2 times branched, enlarged to 2.0-2.5 µm at the tip, brown, J+ blue. Margin in cross section 70 µm thick, of very loosely interwoven marginal paraphyses 1.0-1.5 µm diam., brown on the exterior face. Paraphyses tips and outer face of the margin slightly crystalliferous. Asci 4-spored (? by abortion), 200-220 x 10-11 µm, becoming saccate and up to 20 µm broad when mature, the cap 1.5 µm thick, indistinct. Ascospores c. 125 x 3.5-5.0 µm, soon breaking up into globose part-spores .

On wood, Pakistan. The broad, globose part-spores are very distinctive and would surely have been mentioned in a description if this species had been described at all recently.

SPECIMEN EXAMINED: See holotype, above.

(16). SCHIZOXYLON LANTANAE (Tilak & Nanir) Sherwood, comb. nov.

≡ *Stictis lantanae* Tilak & Nanir, Rev. Mycol. 39: 119 (1975)
= *Stictis indica* Tilak & Nanir, Rev. Mycol. 39: 120 (1975)

Figure 45

Apothecia at first immersed, opening broadly but not becoming erumpent, 0.5-1.0 mm broad, the disc shallowly cupulate, black, shining, not pruinose, the margin thick, black, shining, somewhat white-pruinose in the part adjoining the hymenium. Immature stages may appear to open by a slit.

Margin, in cross section, 100 µm thick, of widely-spaced hyphae immersed in a gel, these colorless and less than 1.0 µm broad below, branched, somewhat thickened, and brown above. Periphysoids absent; margin not splitting away from the hymenium when dry. Scattered crystalline inclusions are present at the interface between the hymenium and the margin.

Paraphyses numerous, filiform, 1.0 µm broad and colorless below, 1-2 times branched and inflated to 2.0 µm at the tip which is brown and J+ blue, exceeding the asci by 10 µm, forming an epithecium. Spores 8, nearly as long as the asci, 1.5-2.0 µm broad, septate, the cells 3-5 µm long. Asci cylindrical, 250-300 x 7-8 µm, the cap 4.5 µm thick.

On woody plants, India. I have chosen to retain the epithet *lantanae*, rather than the simultaneously published *indica*, because *S. indica* is typified by a specimen in poor condition.

SPECIMENS EXAMINED: ASIA: India (Personal herbarium of S. R. Nanir, on *Lantana*, Aurangabad, May, 1972, holotype of *S. lantanae*; on *Acasia*, Aurangabad, May 1972, holotype of *S. indica*)

(17). SCHIZOXYLON LIGUSTRI (Schweinitz) Sherwood. comb. nov.

≡ *Stictis ligustri* Schw., Trans. Amer. Philos. Soc. n.s. 4: 308 (1832)
= *Schizoxylon aeruginosum* Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 251 (1870)

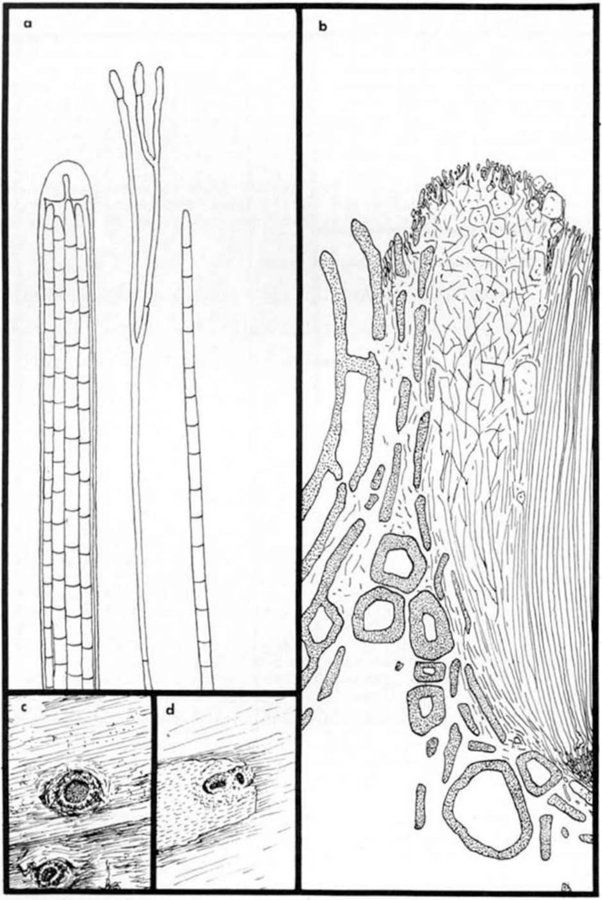

FIGURE 45. *Schizoxylon lantanae*. a. Apices of an ascus, paraphysis, and spores, x1500. b. Cross section of margin, x375. c. Habit sketch of mature apothecia, x7.5. d. Habit sketch of immature apothecia, x7.5. Drawn from the holotype of *S. lantanae*.

= *Stictis glaucoma* Berk. & Curt., Grevillea 4: 7 (1875)
= *Agyriella bethelii* Ell. & Everh., Bull. Torrey Bot. Club 24: 470 (1897)
≡ *Agyriopsis bethelii* (Ell. & Everh.) Sacc. & Sydow, Syll. Fung. 14: 805 (1899)
≡ *Schizoxylon bethelii* (Ell. & Everh.) Cash, Mycologia 35: 600 (1943)

Figure 46

Apothecia at first immersed, opening by a pore, becoming erumpent and at length nearly superficial, with a plane or reflexed margin, more closely resembling a Dermateaceaous than a Stictidaceous fungus to the casual observer, 0.7-1.0 mm broad, fleshy when wet, with a grey disc and white-pruinose margin. Margin in cross section 50 µm thick, of pale brown hyphae 2.0-2.5 µm diam., externally pruinose but without internal crystalline inclusions, not splitting away from the hymenium when dry. Paraphyses numerous, filiform, 1.0 µm diam. below, 1.5-2.0 µm diam. above, brown, usually once-branched, J-, exceeding the asci by 5-10 µm, the epithecium poorly developed compared to most species of *Schizoxylon*. Asci 140-170 x 9-11 µm, very thick-walled when young, the cap 3 µm thick, pierced by a broad pore. Ascospores 8, 100-125 x 2.5-3.5 µm, soon breaking up into short-cylindrical part-spores 3-5 µm long.

On small twigs of a variety of woody plants, Europe and North America. Schweinitz described his species as having yellow or grey apothecia. The yellow apothecia in his type have no hymenium and the naked wood beneath them is responsible for the color. *Schizoxylon aeruginosum* is identical microscopically.

SPECIMENS EXAMINED: EUROPE: Austria (G, on *Rubus caesius*, holotype of *Schizoxylon aeruginosum*). NORTH AMERICA: USA (K, Curtis 105, on *Rosa rubiginosa*, lectotype [designated here] of *Stictis glaucoma*; on *Viburnum*, 2282, South Carolina, lectoparatype of *S. glaucoma*)(PHIL, on *Ligustrum*, Pennsylvania, holotype of *Stictis ligustri*)(NY, on *Bigelovia*, Colorado, Bethel, holotype of *Agyriella bethelii*; on *Abrus*, Shear 77, Florida)(FH, on *Bigelovia*, Colorado, Bethel, isotype of *Agyriella bethelii*)

(18). SCHIZOXYLON MELLEUM (Dearness & House) Sherwood, comb. nov.
≡ *Ostropa mellea* Dearn. & House, New York State Mus. Bull. 266: 67 (1925)

Figure 47

Apothecia at first immersed, becoming partially erumpent, 0.5-0.8 mm diam., with a white-pruinose margin and plane, pale ochraceous disc. Margin in cross section c. 100 µm thick, of loosely interwoven colorless hyphae 1.0-1.5 µm diam., externally with many scattered colorless non-rosettiform crystalline inclusions, internally forming a compact, colorless layer, not splitting away from the hymenium when dry. The margin appears dark because of included host tissue, and was so described by Dearness and House. Paraphyses numerous, filiform, 1.0 µm diam. below, 1-2 times branched above but scarcely enlarged, colorless throughout,

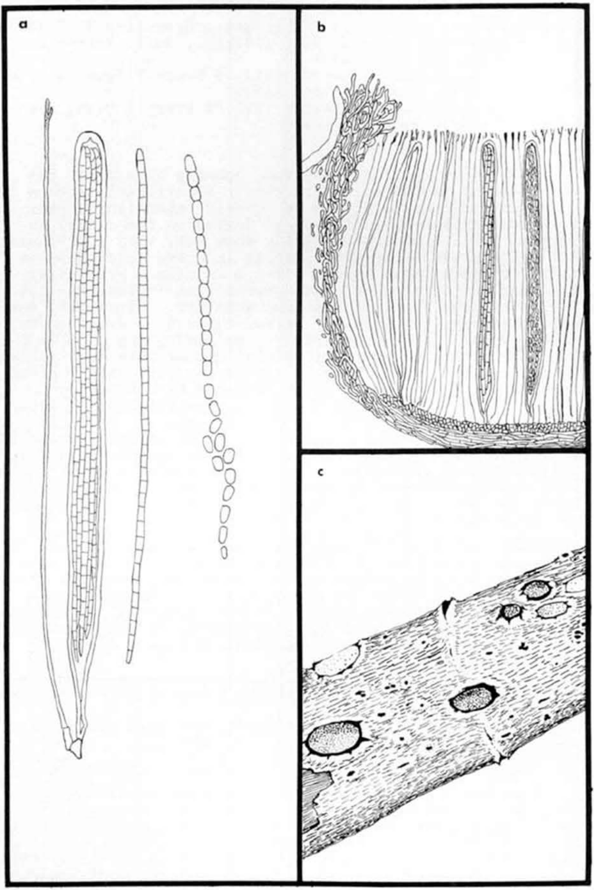

FIGURE 46. *Schizoxylon ligustri*. a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x425. c. Habit sketch, x7.5. Drawn from the holotype of *S. ligustri*.

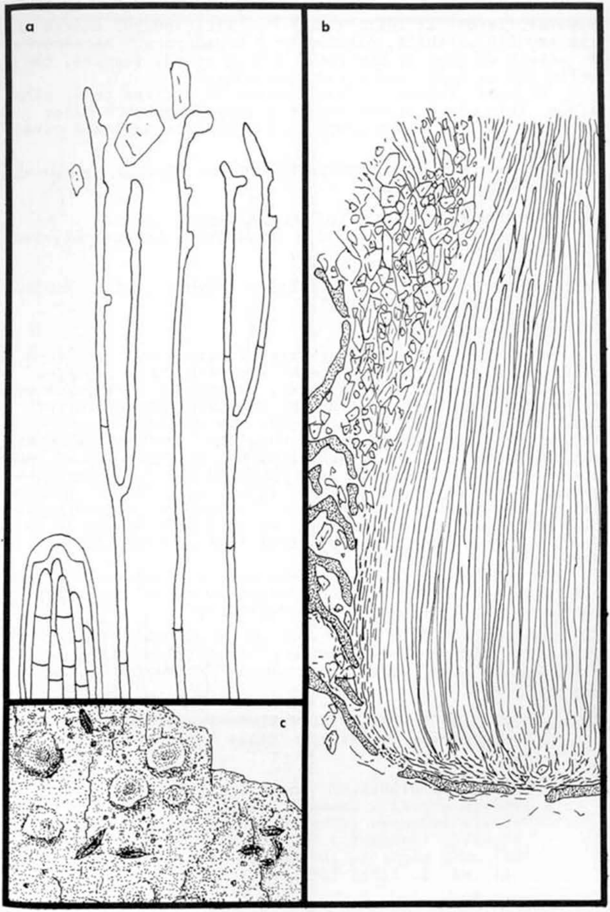

FIGURE 47. *Schizoxylon melleum*. a. Apices of an ascus, paraphyses, and spores, x1500. b. Cross section of apothecium, x150. c. Habit sketch, x7.5. Drawn from the holotype.

crystalliferous at their tips, J-. Asci 300-500 x 9-10 µm, the cap 3.0 µm thick, pierced by a broad pore. Ascospores 8, nearly as long as the asci, 2.0 µm broad, septate, the cells 5-7 µm long, not disarticulating.

On wood, Vermont. This species is similar to *S. alboatrum*, from which it differs in having somewhat broader asci and spores, and a completely colorless wall and paraphyses tips.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NYS, on ?*Platanus*, Pringle 490, holotype of *Ostropa mellea*)

(19). (SCHIZOXYLON MICROSPORUM) Davidson & Lorenz
≡ *Acarosporina microspora* (Davidson & Lorenz) Sherwood, q.v.

(20). SCHIZOXYLON MICROSTOMUM Ellis & Everh., Bull. Torrey Bot. Club 24: 136 (1897)

Figure 48

Apothecia scattered, at first immersed and appearing as black pustules on the surface of the stem, then erumpent through the cortex, 0.5 mm diam., surrounded by a patch of stromatized wood which makes the fruitbody appear larger than it really is, the disc black, the margin dark grey. Margin in cross section nearly obsolete. Paraphyses numerous, filiform, 1.0 m thick below, not enlarged above, once-branched, brown at the tip and imbedded in brown amorphous matter, J+ blue. Asci 250 x 12-16 µm, thin-walled, without any defined apical apparatus, J-. Ascospores 8, nearly as long as the asci, soon breaking up into part-spores 12-20 (-30) x 4.0-4.5 µm, these at first simple, becoming 3(-5) septate before discharge.

On *Andromeda ligustrina*, New Jersey. Fungi Columbiani 1313 may be a duplicate of the type, in which case the species is known from only one collection.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Andromeda*, New Jersey, 20.IV.1896, holotype of *S. microstomum*; Fungi Columbiani 1313, on *Andromeda*, New Jersey, April, 1896 [isotype?])(CUP-Atkinson, Fungi Columbiani 1313)

(21). (SCHIZOXYLON MONILIFERUM) Ellis & Everh.
≡ *Acarosporina monilifera* (Ellis & Everh.) Sherwood, q. v.

(22). **SCHIZOXYLON NIGRELLUM** (Sommerfelt) Sherwood, comb. nov.
≡ *Stictis nigrella* Sommerf., Suppl. Fl. Lapp. 303 (1826)
≡ *Stictis lecanora* (Schm. & Kunze) Fr. b. [var.?] *nigrella* (Sommerf.) Fr., Elench. Fung. 2: 24 (1828)
≡ *Ocellaria nigrella* (Sommerf.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 136 (1888)

Figure 49

Apothecia at first immersed, then erumpent, splitting the epidermis into 3 or 4 irregular lobes, 0.5-0.8 mm diam., orbicular, the disc black, shallowly cupulate, smooth and shining, the margin pale grey, pruinose, involute when dry.

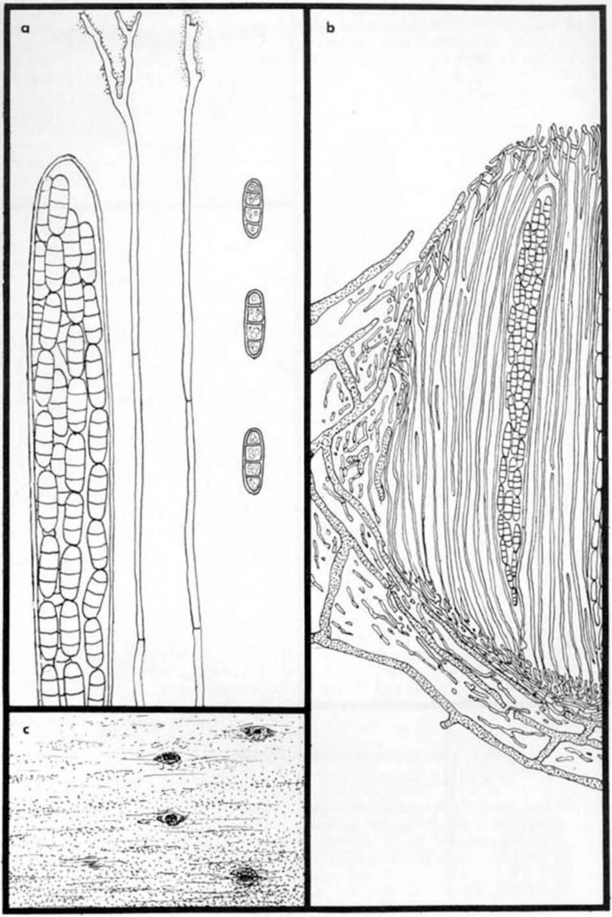

FIGURE 48. *Schizoxylon microstomum*. a. Detail of apices of an ascus, paraphyses, and part-spores, x750. b. Cross section of apothecium, x375. c. Habit sketch, x7.5. Drawn from the holotype.

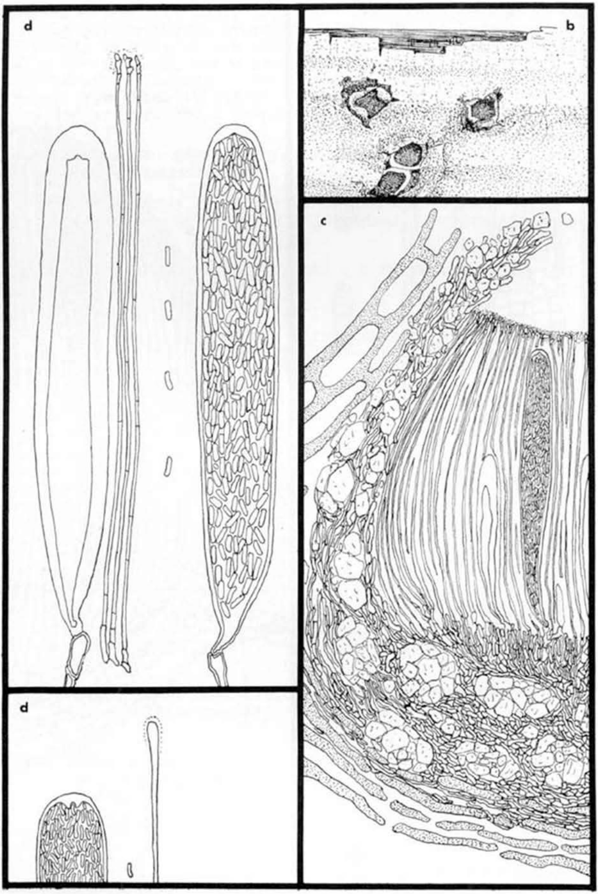

FIGURE 49. a-c. *Schizoxylon nigrellum*. a. Asci, part-spores, and paraphyses, x750. b. Habit sketch, x7.5. c. Cross section of apothecium, x375. Drawn from the holotype. d. Detail of the ascus of *Tympanis saligna*, drawn from CUP-Krieger Fungi Saxonici 2230.

Margin in cross section well-developed, somewhat fleshy, of brown hyphae 1.5 (-3.0) μm diam. intermingled with numerous colorless crystals, continuing below the hymenium as a basal layer c. 100 μm thick of angular brown cells and large, non-rosettiform crystalline inclusions. The structure of the margin is reminiscent of *Therrya*. Paraphyses numerous, exceeding the asci by 25 μm, 1.0 μm diam. below, the tip enlarged to 2-2.5 μm, brown, agglutinated and perhaps anastomosing with adjoining hyphae, indistinguishable from pseudoparaphyses of Hysteriaceous fungi, J-. Part-spores innumerable, more than 8-seriate, 3-5 x 1.5(-2) μm. Asci 130-150 x 15-18 μm, very thick-walled when young, without a distinct apical cap, J-.

On bark of *Salix*, Lappland. This is not *Tympanis saligna* Tode (cfr. Groves, 1952) which is shown for comparison in figure 49d. I could discern no immature spores in the material I examined and am unsure whether the spores arise from disarticulating of filiform spores in asci which are more than 8-spored, elongation of part-spores from 8-spored asci, or budding of primary ascospores. Fries's synonymy with *Stictis lecanora* was made without reference to microscopic characters. Rehm could not have seen Sommerfelt's type; the species is no *Ocellaria*. It is also quite out of place in *Tympanis*. It may ultimately prove to be Patellariaceous.

SPECIMEN EXAMINED: EUROPE: Norway (O, on *Salix*, 1.[18]24, Sommerfelt, holotype of *Stictis nigrella*)

(23). *SCHIZOXYLON OCCIDENTALE* Ellis & Everh.
= *Schizoxylon berkeleyanum* (Dur. & Lév.)Fckl. subsp. *decipiens* (Karst.) Karst., q.v.

(24). *SCHIZOXYLON PERSOONII* Schw., Trans. Amer. Philos. Soc. n.s. 4: 249 (1832)
≡ *Schizoxylon sepincola* Pers.

Schweinitz attributes the name to "Fries Syst. Veg. p. 121." which is not a specific diagnosis, but a redescription of "*Schizoxylon* Pers." Fries mentioned no species in his description, but since the genus was then monotypic, the description is ultimately tied to *S. sepincola*. For nomenclatoral purposes I believe the name is validly published, but superfluous.

(25). SCHIZOXYLON PRUINIFERUM Sherwood, spec. nov.

Figure 50

Ascocarpi primum immersi, non erumpescentes, non profunde cupulati, 0.5-0.8 mm diam., margine integro, albo, disco albo. Margo in sectione transversali 10 μm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis achromis constans. Paraphyses filiformes, ramosae, 350-450 x 1.0 μm, apice non incrassatae, achromae, in iodo non caerulescentes. Asci 200 x 8.0 μm, apice 2.5-3.0 μm crassi, 8-spori. Spori 200 x 2.0 μm, cellulis 4.5-5.0 μm longis ad septa se disjungentibus et articulos simplices formantibus.

HOLOTYPUS: IMI 56454, on dead twigs of tangerine (*Citrus nobilis*), Njala (Keri), Sierra Leone, Compton 13.II.1954.

Apothecia gregarious on small decorticated twigs, immersed, not becoming erumpent, the disc 0.5-0.8 mm broad, orbicular, white-pruinose; definite margin absent. A few layers of more densely agglutinated, colorless hyphae, not obviously differentiated from the paraphyses, form a spurious wall 10 µm thick surrounding the ascocarp. Paraphyses 350-450 x 1.0 µm, septate, colorless, 1-2 times branched near the apex but not enlarged, colorless, abundantly crystalliferous, J-. Asci 300 x 8 µm, very thick-walled when young, the cap 2.5-3.0 µm thick. Spores 8, filiform, 200 x 2.0 µm, soon breaking up into cylindrical part-spores 4.5-5.0 µm long.

On wood, Sierra Leone, Africa. This unusual species was identified in the field as *Stictis*, to whose immature fruitbodies its apothecia bear some resemblance.

SPECIMEN EXAMINED: See holotype, above.

(26). SCHIZOXYLON SEPINCOLA Pers., Ann. Wetterauischen Ges. Gesammte Naturk. 2: 11 (1810)

Figure 51

Apothecia at first immersed in bleached areas on wood, becoming erumpent, 0.5-0.8 mm diam., orbicular, with a raised shining black margin and shallowly cupulate disc, resembling *Karschia* in external appearance. Margin in cross section 150 µm thick, non-crystalliferous, the inner layer of loosely interwoven hyphae 1.5 µm diam., the outermost layer of brown hyphae 2.0-2.5 µm diam., short-celled and tightly-packed. Subhymenium colorless, J-. Paraphyses 150 x 1.0 µm, enlarged to 2.0 µm at the tip, which is 1-2 times branched, brown, and imbedded in brown amorphous material, J-. Asci 120-140 x 7-9 µm, thick-walled when young, the cap 1.5 µm thick, J-. Spores 8, 80-100 x 2.5 µm, soon disarticulating into unicellular cubical or short-cylindrical part-spores 3-3.5 µm long.

Pycnidia 0.2-0.3 mm diam., black, shining, the wall resembling that of the ascigerous stage, without a distinct ostiole, containing a single simple cavity lined with phialides 3.0 x 5-6 µm, monophialidic, without a prominent collarette, producing numerous unicellular, colorless, ovoid uniguttulate conidia 3-5 x 1.5-2 µm.

On decorticated conifer wood, Europe. Early authors stated that the species was common, but it does not seem to have been collected in recent years. It should be sought in western North America.

SPECIMENS EXAMINED: EUROPE: France (FH, NY, Stirpes Cryptogamae Vogeso-Rhenanae 174, on *Abies*). Locality unknown (LG, sine coll., possible holotype of *Schizoxylon sepincola*)(FH, Herb. Richard, on *Abies*; "*Schizoxylon majusculum* Richard")

(27). SCHIZOXYLON SULFURINUM Sherwood, spec. nov.

Figure 52

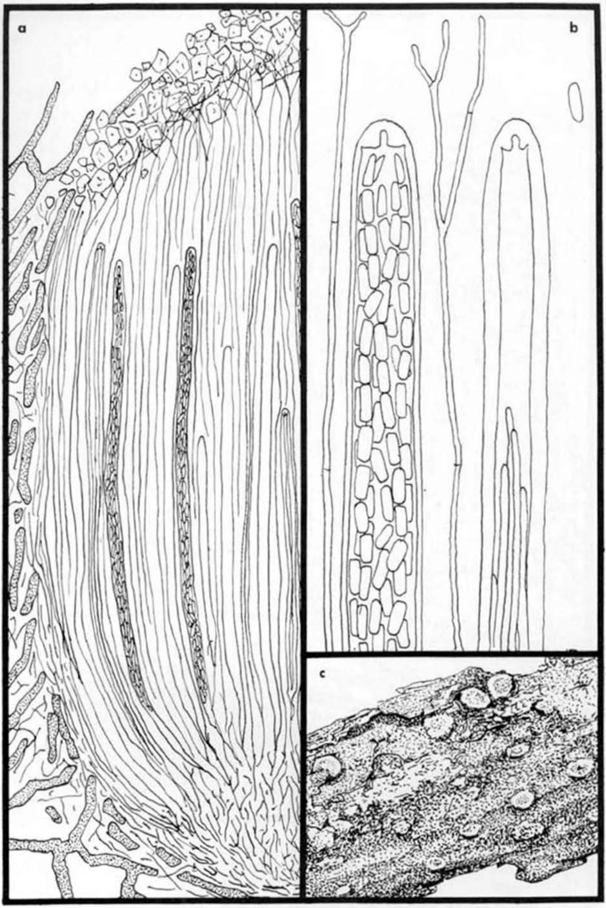

FIGURE 50. *Schizoxylon pruiniferum*. a. Cross section of margin, x300. b. Asci, part-spores, and paraphyses, x1500. c. Habit sketch, x7.5. Drawn from the holotype.

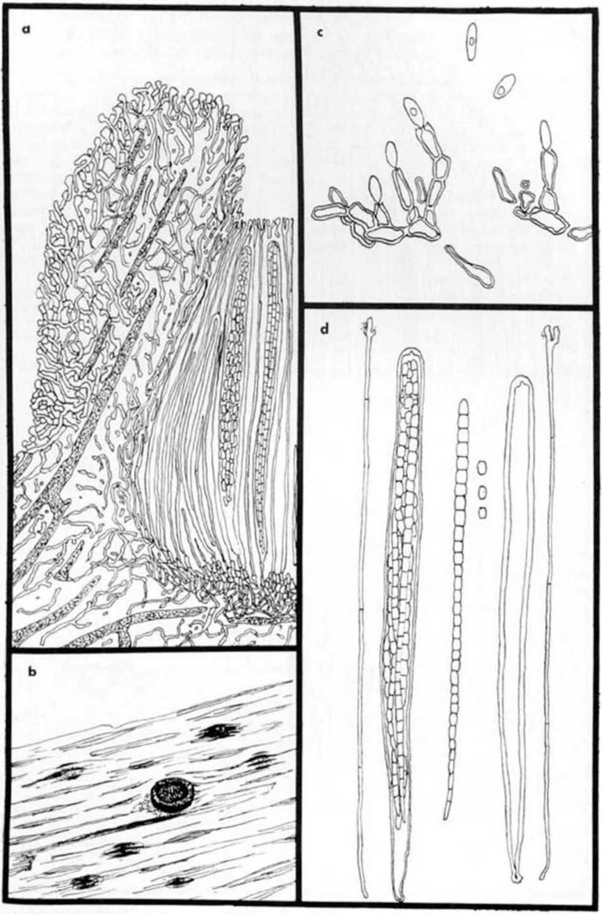

FIGURE 51. *Schizoxylon sepincola*. a. Cross section of margin, x375. b. Habit sketch, x7.5. c. Conidiophores and pycnidiospores, x1500. d. Asci, paraphyses, spores, and part-spores, x750. a,b & d drawn from FH-Stirpes Crypt. Vogeso-Rhenanae 174. c drawn from FH-*"S. majusculum"*.

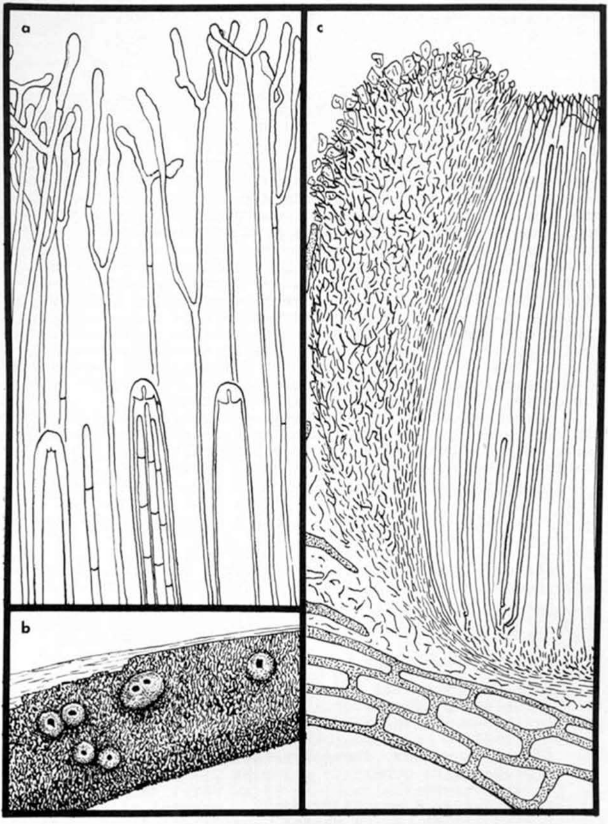

FIGURE 52. *Schizoxylon sulfurinum*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x10. c. Cross section of apothecium, x187.5. Drawn from the holotype.

Ascocarpi primum immersi, erumpescentes, non profunde cupulati, 0.7-1.2 mm diam., margine integro, sulphureo, disco nigro. Margo in sectione transversali 100 µm crassus, siccus ab hymenio se non abrumpens, ex hyphis intertextis brunneis constans. Paraphyses filiformes, ramosae, 550-580 x 1.0 µm, apice ad 2.5 µm incrassatae, brunneae, in iodo non caerulescentes. Asci 500 x 4.5 µm, apice ad 3.0 µm crassi, 8-spori. Sporae 500 x 1.0-1.2 µm, cellulis 8-10 µm longis. HOLOTYPUS: COL [Dumont] 5042, along Sogamoso-Aguazul rd. at a point ca. 11km from intersection with Sogamoso-Aquitania rd., Dpto. Boyacá. Dumont, Capenter, Sherwood, Molina, 13.VI. 1976. Elev. va. 11,200'. ISOTYPUS: NY

Apothecia at first immersed, becoming erumpent and at length appearing nearly superficial, 0.7-1.2 mm diam., orbicular in cross section, rarely 2-confluent, bright yellow-pruinose, with a small, black, glabrous, punctiform disc, appearing pyrenomycetous. Margin in cross section 100 µm thick, the inner part of interwoven, colorless, somewhat gelatinous hyphae 1.0 µm diam., the outer part of brown crystalliferous hyphae 1.5 µm diam. Subhymenium 45 µm thick, colorless, J-, of isodiametric cells 2-4 µm diam., resting on 35 µm of faintly brownish hyphae 1.5 µm diam. Paraphyses numerous, filiform, 1.0 µm broad below, inflated to 2.5 µm apically, brown, J-, forming an epithecium 80 µm thick. Asci 500 x 4.5 µm, the cap 3.0 µm thick, 8-spored. Spores nearly as long as the asci, 1.0-1.2 µm diam., septate, the cells 8-10 µm long, not disarticulating.

On herbaceous stems, Colombia. Superficially it appears similar to *S. berkeleyanum*, but the asci and spores are quite unlike those of that species. *S. albo-atrum* has shorter, broader spores, and is never yellow.

SPECIMEN EXAMINED: See holotype, above.

(28). (SCHIZOXYLON TUBERCULATUM) Schw., Trans. Amer. Philos. Soc. n.s. 4: 249 (1832)

The holotype is a pycnidial fungus, ?*Cellulosporium* Peck, according to S. J. Hughes (note with specimen).

SPECIMEN SEEN: NORTH AMERICA: USA (PHIL, Schweinitz, Bethlehem, Pennsylvania, holotype of *Schizoxylon tuberculatum*).

(78). *STICTIS* Pers., Obs. Mycol. 2: 73 (1799)

Lectotype species: *Stictis radiata* Pers., l.c., designated by Rabenhorst (1844).
≡ *Stictis* subgen. *Stictis* Fr., Syst. Mycol. 2: 195 (1822)
≡ *Stictis* subgen. *Corticiae* Fr., *ibid.*: 193 (1822)
= *Lichenopsis* Schw.
= *Schmitzomia* Fr.
= *Cyclostoma* Crouan & Crouan
= *Platysticta* Cke. & Massee
= *Cylindrina* Pat.

Apothecia at first immersed, opening by a pore, sometimes becoming erumpent or splitting the overlying substrate irregularly, 0.05-3.0 mm broad, the margin entire to lacerate, typically with a prominent white-pruinose rim, tough or somewhat gelatinous, white, flesh-colored, yellowish, brown, or black , the disc moderately-deeply to very-deeply immersed, pale ochraceous to flesh-colored, brown, or black, sometimes pruinose, splitting away from the margin when dry. Margin in cross section typically 3-layered, with or without a spurious thalline margin of compressed host tissue invaded by vegetative hyphae, sometimes with a complete or incomplete stromatic layer between the thalline margin and the wall hyphae. Wall paraplechtenchymatous, of interwoven, narrow-diameter hyphae, colorless or some shade of brown, gelatinous in some species. A distinct crystalline layer separates the wall from the periphysoids in most species. Periphysoids distinct, usually filamentous, rarely pseudoparenchymatous, simple or branched, colorless or some shade of brown. Subhymenium small-celled, J+ or J-, resting on host tissue or an extension of the wall. Paraphyses numerous, filiform, sometimes apically branched or enlarged, colorless or some shade of brown, often imbedded in a J+ gelatinous matrix. Asci cylindrical, somewhat thick-walled when young, functionally unitunicate, with a more or less prominent apical non-refractive cap pierced by a J- apical pore. Ascospores 4 or 8/ascus, colorless, transversely septate, sometimes sheathed, sometimes coiling when freed from the ascus, typically long-cylindrical to filiform.

On wood, bark, herbaceous stems, grass culms, and fern rachides, less commonly on leaves, predominantly (perhaps exclusively) saprophytic, worldwide in distribution but commonest in maritime areas and tropical cloud forests. Terminology and arrangement of ascocarp tissues are discussed in section IV, above.

Rabenhorst (1844) accepted five infrageneric taxa in *Stictis: Propolis* Fr.; *Melittosporium* (Cda.) Rabenh.; *Cryptodiscus* (Cda.) Rabenh., *Xylographa* Fr., and *Stictes verae* Rabenh. (= *Corticiae* Fr.). Since *Propolis* and *Xylographa* were treated by Fries (1822) as subgenera, it is reasonable to assume that they represent subgenera in Rabenhorst's (1844) treatment. Of the three original Persoonian species of *Stictis*, *Stictis rufa* is included under *Agyrium*, and *S. pallida* is listed as *S. (Cryptodiscus) pallida*, leaving only *S. radiata* in *Stictes verae*. Assuming that the exclusion of all but one of the original species from the type subgenus is equivalent to excluding all of the original species but one from the genus, this constitutes implicit typification, sensu Korf and Rogers (1967), provided that only the species included by the original author are eligible as lectotypes. The International Code of Botanical Nomenclature is unclear on this point, and some authors, for example Powell (1974), maintain that only those species accompanying the first valid publication of the name are eligible as lectotypes. If the three species included in the genus by the validating author (S. F. Gray, 1821) or the 20 species included by the sanctioning author (Fries, 1822) are eligible as lectotypes, then the first proposal for lectotypification of *Stictis* is Fries's (1849) explicit typification of *Stictis* with *S. pallida*. Acceptance of this lectotype (which is now considered to be the lectotype of *Cryptodiscus*) would greatly disrupt all recent concepts of *Stictis* and *Cryptodiscus*. A third alternative would be to propose conservation of *Stictis* with *S. radiata* as its type.

The basionym of *Stictis radiata* is widely cited as being *Lycoperdon radiatum* L. There is no evidence that Persoon saw Linnaean material of *Lycoperdon radiatum*. In his protologue, Persoon lists *L. radiatum* as a questionable synonym and discusses the points of difference between his material and Linnaeus's description of a fungus about the size of a coriander seed (about 3 mm, or twice the maximum size of *Stictis radiata*) which opened by splitting nearly to the base into 12 equal lobes. As Rehm (1887-96) pointed out, this description does not fit *S. radiata* at all.

According to Savage (1945), there is authentic material of *L. radiatum* in the Linnaean herbarium. This cannot be borrowed. In view of Persoon's expressed doubts concerning the identity of the two species, I consider it advisable to treat *Stictis radiata* Pers. as a Persoonian name, typified by the material in Persoon's herbarium. The epithet *radiata* is the one sanctioned by Fries. It is possible that one of the earlier names *Lycoperdon oxycanthae* Schrank, *Sphaerobolus rosaceus* Tode, *Lichen excavatus* Hoffm., or *Peziza marginata* Sow. is synonymous, and would provide the correct epithet assuming a 1753 starting point date for the nomenclature of Ascomycetes.

The critical features separating *Stictis* from allied genera are a more or less orbicular fruiting body which opens by a pore and has a margin lined with periphysoids which extend the whole length of the margin, a vertical hymenium which splits away from the margin when dry, and a non-parasitic niche. In most species the asci have an obvious apical cap, and, except in *S. monilifera* and *S. stigma*, the spores show no tendency to disarticulate at the septa in fully-mature, properly-preserved specimens, although they may disintegrate in overmature or poorly-preserved material. The filiform spores of *S. radiata* are discharged as a unit and coil irregularly on the substrate.

The spores of *Stictis* are extremely variable from species to species. The variation is not correlated with the characters used to delimit the three sections accepted below. The filiform, multiseptate, unsheathed spores of *S. radiata* are typical. In species where the spores are truly threadlike (length:width ratio > 100:1), their breadth does not vary perceptibly from top to bottom. In species with shorter ascospores, the spores may be either largest at the apex, tapering basally to an acuminate tip, or largest a little below the apex, tapering both apically and basally. Some species have spores which are constricted at the septa. The number of septa ranges from 3 to 300 or more. I have expressed septation in terms of length of cells and length of spore, rather than in terms of the number of septa, which are tedious to count in filiform-spored species. Many species have spores with a definite sheath, which may be so prominent in immature spores that they resemble "ghosts" with a nearly invisible, threadlike lumen. Long cylindrical ascospores with occasional longitudinal septa, such as occur in *Conotrema harmandii*, are unreported. I would consider ovate muriform spores which did not seem to be an abnormality to be sufficient reason for exclusion from the genus.

Marginal characters serve to divide *Stictis* into three somewhat intergrading sections.

In section *Stictis*, the margin is entirely colorless, although included host tissue may make it appear dark. Normally, there is a distinct crystalline layer, although this is reduced in a few species. Periphysoids are abundant and form a distinct layer. The wall layer may be absent, but it is never notably crystalliferous and does not split away from the substrate.

The apothecia of section *Lichenopsis* have a wall layer which is decidedly crystalliferous, and which splits away from the surrounding host tissue before the apothecia open, so that immature ascocarps are enclosed by a crystalline peridium and mature ascocarps have a distinctly annulate margin, which may be colorless or brown. In some species, for example *Stictis ostropoides*, the ascocarp ultimately opens by a longitudinal slit; in others, such as *S. sphaeroboloidea*, dehiscence is irregular.

In section *Cyclostoma*, the wall layer, which may or may not be surrounded by a distinct and differentiated stroma, is composed of brown hyphae. Occasionally the periphysoids, paraphyses, or hyphae of the crystalline layer may be pigmented as well. A distinct crystalline layer is lacking in many species.

A comparison of *Stictis dicksoniae* with *Robergea canariense*, or *Stictis quadrinucleata* and *S. minor* with *Propolidium pruinosum*, will serve to demonstrate that the three genera intergrade.

A key to accepted species below is followed by an alphabetical list of included and excluded species.

Key to Included Species of Stictis

1. Hymenium remaining covered by a peridium after rupture of the covering host tissue, eventually opening by a slit or tearing irregularly; margin annulate. sect. *Lichenopsis* (2)
1'. Hymenium soon opening by a pore; margin not annulate (except in *S. polycocca*) (5)
  2(1). Paraphyses with a prominent, brown, inflated tip. *Stictis sphaeroboloidea*
  2'(1). Paraphyses colorless, not inflated at the tip. (3)
3(2'). Ascospore cells averaging more than 4.0 μm long. (4)
3'(2'). Ascospore cells 2.5 - 3.5 μm long. *S. ostropoides*
  4(3). Spores 2 μm broad; margin brown. *S. chrysopsis*
  4'(3). Spores 3 μm broad. Margin colorless. *S. virginea*
5(1'). Marginal hyphae pigmented. sect. *Cyclostoma* (6)
5'(1'). Marginal hyphae colorless. sect. *Stictis* (24)
  6(5). Paraphyses brown, at least apically. (7)
  6'(5). Paraphyses colorless (13)
7(6). Ascospores more than 3.0 μm broad (8)
7'(6). Ascospores less than or = 3.0 μm broad. (10)
  8(7). Marginal paraphyses present, brown. *S. lumbricus*
  8'(7). Brown marginal paraphyses absent (9)
9(8'). Ascospores 250-325 x 4.5-5.0 μm (Europe).

S. pachyspora
9'(8'). Ascospores 350-450 x 4-5 (-6) µm (North America) *S. serpentaria*
10(7'). Brown marginal paraphyses present. *S. oculiformis*
10'(7'). Brown marginal paraphyses absent (11)
11(10'). Periphysoids up to 100 µm long, branched, forming a conspicuous layer. *S. korfii*
11'(10'). Paraphyses much shorter, simple (12)
12(11'). Ascospores 400-475 µm long. *S. dicksoniae*
12'(11'). Ascospores 85-100 µm long. *S. lanugicincta*
13(6'). Ascospores over 250 µm long (14)
13'(6'). Ascospores under 250 µm long (rarely over 200 µm long (16)
14(13). Hymenium J+ blue. *S. viticola*
14'(13). Hymenium entirely J- (15)
15(14'). Ascospores 2-3 µm broad. Periphysoids numerous, branched, forming a conspicuous layer. *S. bicolor*
15'(14'). Ascospores 1.5 µm broad. Periphysoids simple. *S. gigantea*
16(13'). Ascospores under 100 µm long (17)
16'(13'). Ascospores all, or nearly all, over 100 µm long (18)
17(16). Ascospores 50-90 x 2.0 µm, the cells 2.5-3.5 µm long. Hymenium J-. *S. caballeroi*
17'(16). Ascospores 50-60 x 2.0-2.5 µm, the cells 6-7 µm long. Hymenium J+. *S. schizoxyloides*
18(16'). Ascospores all less than 1.5 µm broad (19)
18'(16'). Ascospores 1.5-2.5 µm broad (21)
19(18). Paraphyses simple (20)
19'(18). Paraphyses apically branched. *S. polycocca*
20(19). Paraphyses apically enlarged, not circinate. *S. fuscella*
20'(19). Paraphyses unenlarged, circinate. *S. pustulata*
21(18'). Periphysoids filamentous (22)
21'(18'). Periphysoids pseudoparenchymatous. *S. elevata*
22(21). Chiefly graminicolous. Internal crystalline layer well-developed. *S. arundinacea*
22'(21). Corticolous and lignicolous. Internal crystalline layer poorly defined. (23)
23(22'). Margin fleshy and somewhat gelatinous when wet (Europe). *S. mollis*
23'(22'). Margin carbonized. (North America). *S. fusca*
24(5'). Spores more than 3 µm broad (25)
24'(5'). Spores less than or = 3 µm broad (33)
25(24). Paraphyses circinate or propoloid (26)
25'(24). Paraphyses more or less simple, not circinate or propoloid (29)
26(25). Ascospores more than 300 µm long, conspicuously sheathed. *S. xenospora*
26'(25). Ascospores under 100 µm long (27)
27(26'). Fruitbodies strongly erumpent, with a thick, yellow margin, fleshy when wet. *S. friabilis*
27'(26'). Fruitbodies immersed, the margin white, not fleshy (28)
28(27'). Ascospores 3-septate. *S. quadrinucleata*

28'(27'). Ascospores 10 or more septate. *S. dumontii*

29(25'). Spores less than 100 μm long (30)

29'(25'). Spores more than 100 μm long (32)

30(29). Spores coiling strongly when released from the ascus. *S. sagaretiae*

30'(29). Spores not coiling when released from the ascus (31)

31(30'). Spores 45-60 x 3.0-3.5 μm; hymenium J-. *S. lupini*

31'(30'). Spores 65-90 x 3.5-4.0 μm; hymenium J+. *S. brachyspora*

32(29'). Spores 3.0-3.5 μm broad, tapered basally, the cells 2.5-2.5 μm long (see also *S. radiata*) *S. carnea*

32'(29'). Spores 3.5-4.5 μm broad. *S. hawaiiensis*

33(24'). Paraphyses circinate or propoloid (34)

33'(24'). Paraphyses not circinate or propoloid (39)

34(33). Paraphyses circinate (35)

34'(33'). Paraphyses propoloid (37)

35(34). Ascospores 250-300 x 1.75-2.25 μm, the cells 3-4 μm long. *S. prominens*

35'(34). Ascospores 1.5 - 1.75 μm broad, the cells over 5 μm long (36)

36(35'). Margin fleshy-gelatinous when rehydrated; periphysoids branched. North America. *S. hydrangeae*

36'(35'). Margin not fleshy-gelatinous when rehydrated; periphysoids mostly simple. South America. *S. ramuligera*

37(34'). Ascospores under 75 μm long. *S. javanica*

37'(34'). Ascospores 100 μm long or more (38)

38(37'). Apothecia 0.5-0.8 mm diam., the margin 175 μm thick, with a very thick gelatinous wall. Europe. *S. sarothamni*

38'(37'). Apothecia 0.2-0.5 mm diam., the margin 75 μm thick; wall narrow. South America. *S. carpenteriana*

39(33'). Ascospores 3-septate, short-cylindrical. *S. minor*

39'(33'). Ascospores long-cylindrical or filiform (40)

40(39'). Ascospores 1.5 μm broad or less (41)

40'(39'). Ascospores over 1.5 μm broad (44)

41(40). Periphysoidal layer pseudoparenchymatous. *S. graminicola*

41'(40). Periphysoidal layer filamentous (? very reduced in *S. lichenoides*) (42)

42(41'). Paraphyses with an abrubt, knoblike tip. *S. pusilla*

42'(41'). Paraphyses not inflated at the tip (43)

43(42'). Ascospores sheathed and coiling. *S. helicospora*

43'(42'). Ascospores not sheathed or coiling. *S. lichenoides*

44(40'). Ascus cap 5 μm or more thick (asci containing septate spores) (45)

44'(40'). Ascus cap less than 5 μm thick. (46)

45(44). Ascus cap 5-6 μm thick. Uppermost periphysoids moniliform, gelatinous, 3-4 μm broad. *S. bacciformis*

45'(44). Ascus cap 8 μm thick. Periphysoids all filamentous, 1 μm broad. *S. dennisii*

46(44'). Ascospores moniliform, constricted at the septa and showing some tendency to disarticulate (47)

46'(44'). Ascospores not moniliform, not disarticulating (48)

47(46). Ascospores 2.0 μm broad; apothecia remaining immersed. *S. monilifera*

47'(46). Ascospores 2.5 μm broad; apothecia erumpent. *S. stigma*

48(46'). Spore cells 2.5-4.0 μm long; crystalline layer absent or nearly so. *S. epruinosa*

48'(46'). Spore cells 4-6 μm long; crystalline layer prominent. (49)

49(48'). Periphysoids unbranched, 10-20 x 1.5-2.0 μm. Hymenium usually J-. Ascus cap 2.5-3.0 μm thick. *S. stellata*

49'(48'). Periphysoids branched, 15-30 x 1.0-1.5 μm. Hymenium usually J+. Ascus cap 3.5 μm thick. *S. radiata*

Included and Excluded Species of Stictis

(1). (STICTIS ABIETINA) (Pers.) Farlow in Thaxter, Reliquiae Farlowianae 147 (1922)
≡ *Hysterium abietinum* Pers., Obs. Mycol. 1: 31 (1796)
≡ *Xylographa abietina* (Pers.) Zahlbr., Cat. Lich. Univ. 2: 151 (1924)
= *Lichen parallelus* Ach., Lich. Suec. Prodrom. 23 (1798)
  ≡ *Stictis parallela* (Ach.) Fr., Syst. Mycol. 2: 197 (1822)
  ≡ *Xylographa parallela* (Ach.) Fr., Summa Veg. Scand. sect. post. 372 (1849)

Additional synonyms are given by Rehm (1887-96). Under the name *X. parallela*, this species has long been considered a lichen unrelated to *Stictis*. The CUP specimen of Reliquiae Farlowianae 147 is misidentified and contains *Melittosporium hysterinum*.

(2). STICTIS ADUNCA (Feltg.) Höhn.
= *Stictis polycocca* (Karst.) Karst., q.v.

(3). (STICTIS AECIDIFORMIS) Speg., Michelia 1: 471 (1879)

I could find no fruitbodies in the holotype specimen. According to Spegazzini (l.c.) the species had biseriate to triseriate spores 30-35 x 4-4.5 μm, 10-septate. The description suggests that this is probably not a *Stictis*, but I am unable to place it.

SPECIMEN EXAMINED: EUROPE: Italy (LPS 28242, on *Mahonia*, Lindquist, 7.IV.1879, holotype of *Stictis aecidiformis*)

(4). STICTIS AECIDIOIDES (Nees) S. F. Gray
≡ *Stictis radiata* Pers., q.v.

(5). (STICTIS AERUGINOSA) Pers., Myc. Eur. 1: 338 (1822)
Melittosporium aeruginosum (Pers.) Rehm in Rabenh., Krypt.-Fl. ed 2, 1(3): 173 (1888)
= *Stictis versicolor "c"* Fr., Syst. Mycol. 2(1): 198 (1822)
≡ *Melittosporium versicolor* (Fr.) Corda, Icon. Fung. 2: 38 (1838)
≡ *Propolis versicolor* (Fr.) Fr., Summa Veg. Scand. sect. post. 372 (1849)
= ? *Hysterium viride* Fr., Obs. Myc. 1: 195 (1815)

I have not seen Persoon's original material, but the name *S. aeruginosa* has been cited by Fries (1822) and others as a synonym of *Stictis versicolor*, a muriform-spored Hysteriaceous species discussed briefly under *Melittosporium versicolor*, above. If any material of *Hysterium viride*, the earliest name cited in Fries synonymy of the species, remains in Fries's herbarium, it is not listed under *Stictis*.

(6). (STICTIS ALBA) (DC.) Fr., Elenchus Fung. 2: 27 (1828)
≡ *Sclerotium album* DC., Flore Franc. 5: 112 (1815)
≡ *Xylogramma alba* (DC.) Wallr., Flora Crypt. Germ. 2 510 (1833)
≡ *Propolis alba* (DC.) Fr., Summa Veg. Scand. Sect. Post. 372 (1849)
= *Propolomyces farinosus* (Pers.) Sherwood, Mycotaxon 5: 321 (1977)

The species is usually treated as a synonym of *Propolis faginea* (= *Propolomyces farinosus*). I have not seen De Candolle's original material, but his description would fit that species.

(7). (STICTIS ALBESCENS) Roumeguère, Fungi Gallici Exs. 2079 (1882)

Apothecia at first immersed, opening by a pore, remaining covered by the epidermis of the host, 0.25-0.5 mm diam., colorless. Excipulum colorless, fleshy, pseudoparenchymatous, prolonged to form a covering layer of vertically-oiented tissue, as in some species of *Diplonaevia*. Asci uniformly thin-walled, J-, without a definite apical pore, 60 x 10-15 µm, surrounded by numerous, filiform, colorless paraphyses. Ascospores 8, 45-55 x 2.5 µm, tapered below, transversely multiseptate. Subhymenium faintly J+ blue.

The ascospore dimensions are given by Roumeguère as "80-90 x 3-4"; our material contains no spores this long.

In its morphology, this species more closely resembles *Karstenia* than *Stictis*. It should also be compared with de-lichenized species of *Ramonia*. The J+ reaction of the subhymenium and lack of distinct lateral flanks to the excipulum are out of place in the Dermateaceae.

SPECIMEN SEEN: EUROPE: Belgium (CUP-D-11278, Fungi Gallici Exs. 2079, on *Scirpus*, isotype of *Stictis albescens*)

(8). (STICTIS ANAEXA) Spegazzini
= *Stictis phacidioides* Fr., q.v.

(9). *STICTIS ANNULATA* Cooke & Phillips
= *Stictis radiata* Pers., q.v.

(10). *STICTIS ALBOMARGINATA* Ou, Sinensia 7: 668 (1936)

"Apothecia scattered to gregarious, cupulate, sunken in the substratum, except the elevated margin, 1-1.5 mm in diameter and height, externally brownish black, the margin white, pruinose-tomentose, often containing irregularly angular or cubical, hyaline crystal-like substance; hymenium yellowish to honey-colored; asci cylindric, shortly stipitate, 480-530 µ long, 8-9 µ thick; spores multiseriate, hyaline, often twisted at the middle; paraphyses filiform, hyaline, about 1 µ thick," according to Ou, l.c., who compares the species to *Stictis hypodermia* Bres. (= *Schizoxylon albo-atrum*). The type of *Stictis albomarginata* has apparently been lost, and I have seen no satisfactory material on which to base a neotype. It is not clear from the description whether this is a *Stictis* or a *Schizoxylon*.

(11). *STICTIS ARAUCARIAE* Phil. & Harkn.
= *Stictis monilifera* Phil. & Harkn., q.v.

(12). (*STICTIS ARCTOSTAPHYLI*) Ferdinandsen & Winge
= *Stictis phacidioides* Fr., q.v.

(13). *STICTIS ARUNDINACEA* Pers., Myc. Eur. 1: 336 (1822)
≡ *Cyclostoma arundinacea* (Pers.) Crouan & Crouan, Fl. Finist. 30 (1867)
≡ *Schmitzomia arundinacea* (Pers.) Karst., Bidr. Kännedom Finlands Natur Folk 9: 239 (1871)
= *Stictis sesleriae* Libert, Pl. Crypt. Ard. II, 132 (1832)
  ≡ *Stictis arundinacea* Pers. forma *sesleriae* (Lib.) Rabenh., Fungi Europaei 1317 (1870)
= *Stictis luzulae* Lib., Pl. Crypt. Ard. II: 133 (1832)
  ≡ *Schmitzomia luzulae* (Lib.) de Not., Comment. Crittog. Soc. Ital. 1: 365 (1864)
  ≡ *Stictis graminum* Desm., Ann. Sci. Nat. Bot. sér. 2; 13: 85 (1840)
  ≡ *Schmitzomia graminum* (Desm.) Karst., Not. Sällsk. Fauna Fl. Fenn. Förh. 11: 253 (1870)

Figure 52

Apothecia scattered, at first immersed, later opening broadly and somewhat erumpent, 0.5-1.0 mm diam., the disc black, deeply urceolate, the margin dark colored, more or less white-pruinose. Margin, in cross section, 100-150 µm thick, the wall dark brown but not carbonized, of interwoven hyphae 2.0 µm broad. Crystalline layer distinct, of uniformly small (10 µm or less) crystals, very variable in degree of development. Periphysoids numerous, unbranched, nongelatinous, J-, 15-30 x 1.5 µm. The dark wall layer continues beneath the subhymenium. Subhymenium 10 µm thick, of small, colorless, angular cells. Paraphyses numerous, filiform, colorless, scarcely enlarged above, 1.0 µm thick, J-, not circinate. Asci 150-200 x 5-6 µm, the apex 2.5 µm

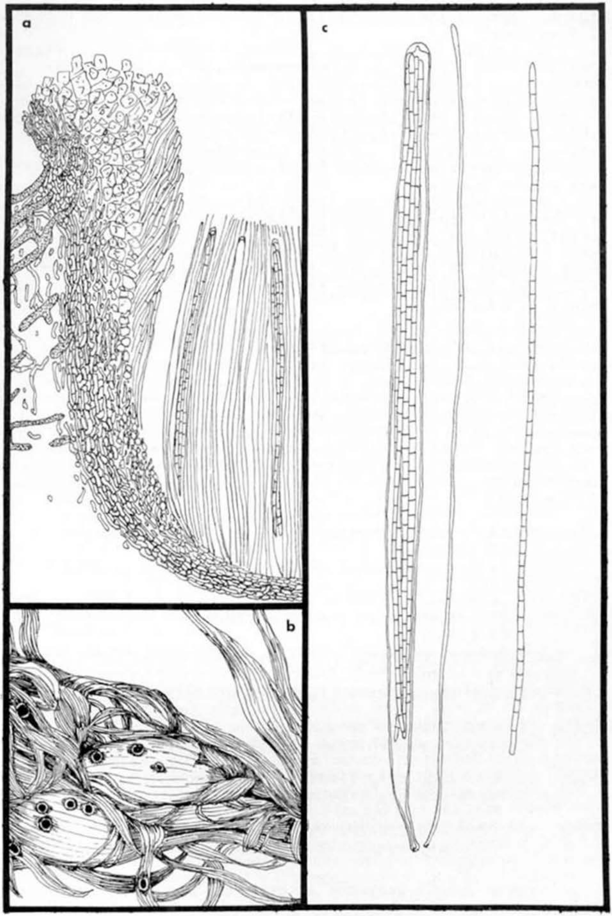

FIGURE 53. *Stictis arundinacea*. a. Cross section of margin, x300. b. Habit sketch, x7.5. c. Ascus, paraphysis, and spores, x750. Drawn from CUP-Rabenh., F. Eur. 1317.

thick. Spores 150-180 x 1.5(-2.0) µm, septate, the cells 5-6 µm long.

On leaves and culms of grasses; occasionally on other hosts. When growing on non-monocotyledonous hosts this species may be distinguished from *S. mollis* by the narrower, more distantly-septate spores. In North America *S. arundinacea* should be critically distinguished from *S. pustulata*, which has circinate paraphyses. Several other species of *Stictis*, including *S. radiata*, occurring on grasses, are sometimes misidentified as *S. arundinacea*. None of these has a dark margin.

Desmazières (l.c.) regarded Libert's epithet *luzulae* as too restricted and substituted *graminum*. Specimens labelled *S. sesleriae* are larger and more darkly pigmented than typical *S. arundinacea*. The microscopic appearance of both species is identical. The name *S. aruninacea* forma *sesleriae* is available for this taxon if one wishes to consider it distinct.

SPECIMENS EXAMINED: EUROPE: France (L, Chaillet in herb. Persoon, probable holotype of *S. arundinacea*)(NY, Herb. Barbey-Boiss. 1088, on *Deschampsia*, as *S. graminicola*; Fautrey, Herb. Crypt. Cote d'or 64, as *Schizoxylon berkeleyanum*, on *Lythrum*). Germany (CUP-D-11778, Rehm, Ascomyceten 469b, on grass; Rabenh. F. Eur. 1317, Arnstadt, on *Sesleria*) Belgium (BR, Libert, Pl. Crypt. Ard 132, on *Sesleria*, isotype of *Stictis sesleriae*; Libert, Fl. Pl. Crypt. Ard. 133, on *Luzula*, isotype of *Stictis luzulae*). Great Britain (CUP-Rabenh. F. Eur. 1141, on *Carex*). Finland (H, on *Rubus*, Karsten 1258). NORTH AMERICA: USA (CUP-D-2215, on *Andropogon*, Mississippi; D-1321, Ravenel, F. Car. 1:42, on *Andropogon*, S. Carolina).

(14). (STICTIS ATRATA) Desm., Ann. Sci. Nat. Bot. sér. 3, 3: 368 (1845)
≡ *Pseudopeziza atrata* (Desm.) Sacc., Syll. Fung. 8: 727 8(1889)
≡ *Hysteropeziza atrata* (Desm.) Höhn., Sitzungber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl. Abt. 1, 127: 365 (1918)
≡ *Pyrenopeziza aceris* Nannf., Symb. Bot. Upsal. IV, 8(2): 141 (1932) non *P. atrata* (Pers.) Fckl.

I accept Nannfeldt's placement of this species.

(15). (STICTIS ATRATA) Speg.
≡ *Schizoxylon involutum* Sherwood, q.v.

(16). STICTIS ATRO-ALBA (Phil. & Plowright) Sacc.
= *Stictis elevata* (Karst.) Karst., q.v.

(17). (STICTIS ATROCYANEA) Fr., Syst. Mycol. 2(1): 199 (1822)
≡ *Durella atrocyanea* (Fr.) Höhn., Ann. Mycol. 16: 210 (1918)

Dennis (1956) provides a complete list of synonyms for this species, which he regards as a member of the Helotiaceae (=Leotiaceae). It is discussed briefly under *Durella*, above.

(18). (STICTIS ATROVIRENS) Fr., Sclerom. Suec. 278, nom. nud.
= *Stictis atrocyanea* Fr.

According to von Höhnel (1918), and Dennis (1956), *Stictis atrocyanea* and *S. atrovirens* were based on the same fungus. Fries left no type specimen labelled *S. atrocyanea.* The epithet *atrovirens* was validly published as *Cryptodiscus atrovirens* by Corda in Icones Fungorum 2: 37 (1838).

(19). (STICTIS AURANTIACA) Hazslinski, Mat. Természettud. Közlem. 21: 181 (1881)

According to Gonczöl (*personal communication*), Hazslinski's herbarium was destroyed in World War II. In the original description, the species was characterized by 2 mm broad, orange apothecia with a black margin, circinate paraphyses, and stalked, lanceolate asci containing acicular, multiseptate spores. It may be a species of *Colpoma* or *Coccomyces* (Rhytismataceae).

(20). STICTIS BACCIFORMIS Sherwood, spec. nov.
Figure 54

Ascocarpi primum immersi, erumpescentes, profunde cupulati, 0.8-1.7 mm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 200 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., achromo. Stratum crystallinum abest. Periphysoidea 60 x 1.5 µm, ramosa, et 50 x 3-4 µm, non ramosa. Paraphyses filiformes, simplices, 275 x 1.0 µm, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 250-275 x 5.5-6(-9) µm, apice 6-7 µm crassi, 8-spori. Sporae 250-260 x 2.0-2.5 µm, cellulis 4-6 µm longis.

HOLOTYPUS: NY, Fungi of Colorado, on a stick, vicinity of Tolland, F.J. Seaver & E. Bethel, August 24-26, 1910.

Etymology: "berry-shaped", because the apothecia resemble berries.

Apothecia at first immersed, becoming erumpent and finally nearly superficial, 0.8-1.7 mm diam., the margin white-pruinose, the disc deeply urceolate, pale ochraceous, splitting away from the margin when dry. Margin in cross section 200 µm thick, surrounded by an outer thalline margin of loosely interwoven hyphae 1.5 µm thick, with thick gelatinous walls, colorless, with sparse included host tissue. Wall c. 50 µm thick, of colorless hyphae 2.0 µm diam., with thick gelatinous walls. The external thalline margin is crystalliferous. Periphysoids dimorphic. In the lower part of the margin, up to the level of the paraphyses apices, they are 60 x 1.5 µm, richly branched, and imbedded in a gel; toward the upper edge of the margin they grade into a matrix of cells oriented perpendicularly to the thalline margin but not forming distinct filaments, the cells 2.5 - 4.5 µm broad, with very thick gelatinous walls. Subhymenium 30 µm thick, of colorless angular cells, J-. Paraphyses numerous, filiform, exceeding the asci by c. 10 µm, 1.0 µm thick below, enlarged to 1.5 µm at the apex, simple, J-.

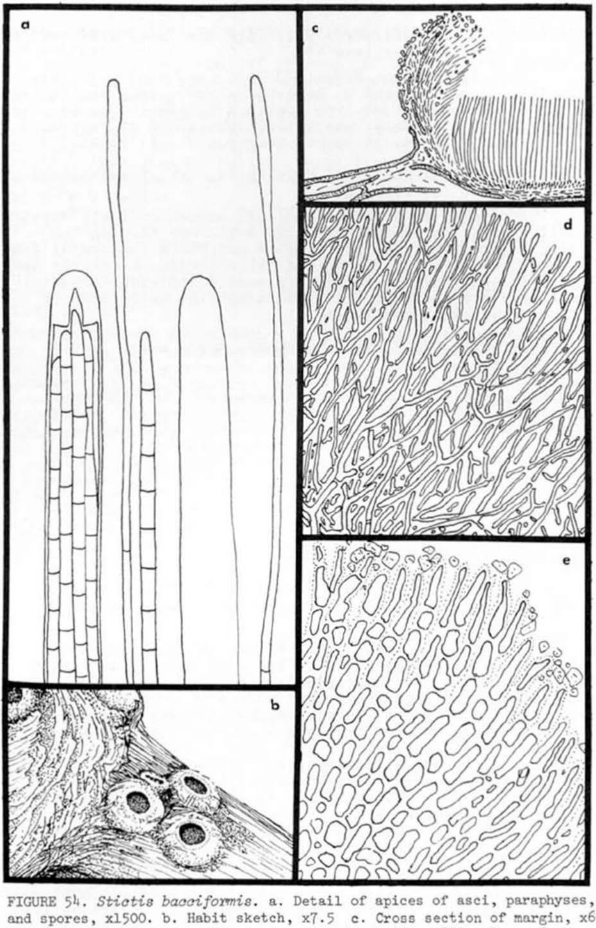

FIGURE 54. *Stictis bacciformis.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5 c. Cross section of margin, x60. d. Lower periphysoids, x750. e. Upper periphysoids, x750. Drawn from the holotype.

Asci 250-275 x 5-6(-9) µm, the cap 5-6 µm thick, pierced by a narrow pore. Ascospores 8, 250-260 x 2.0-2.5 µm, the cells 4-6 µm long.

On bark and decorticated wood, Colorado. The large, colorless, gelatinous cells in the upper part of the margin and unusual macroscopic appearance of the fruitbodies readily separate this from any other species of *Stictis*.

SPECIMEN EXAMINED: See holotype, above.

(21). *STICTIS BAMBUSELLA* Höhn.
= *?Stictis radiata* Pers., q.v.

(22). *(STICTIS BELLA)* Kalchbr. & Cooke
≡ *Schizoxylon bellum* (Kalchbr. & Cooke) Sherwood, q.v.

(23). *STICTIS BENGALENSIS* Singh & Pavgi
= *Stictis radiata* Pers., q.v.

(24). *(STICTIS BERKELEYANA)* Dur. & Lév.
≡ *Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl., l.c.

(25). *(STICTIS BETULI)* (Alb. & Schw.) Fr., Syst. Mycol. 2(1): 193 (1822)
≡ *Peziza betuli* Alb. & Schw., Consp. Fung. 309 (1805)
= *Pezicula carpinea* (Pers.) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 279 (1870)

The species is synonymized with *P. carpinea* by Seaver (1951). Fries's (1822) description suggests *Pezicula* rather than *Stictis*. I have seen no original material of this species.

(26). *STICTIS BICOLOR* (Ellis & Everh.) Starbäck, Bih. Kongl. Svenska Vetensk.-Akad. Handl. 25(14): 15 (1899)
≡ *Schizoxylon bicolor* Ell. & Everh., Bull. Torrey Bot. Club 24: 469 (1897)

Figure 55

Apothecia at first immersed in corticate twigs, opening by a pore, erumpent, the disc exposed at maturity, pale orange, splitting away from the margin when dry. Margin entire, dark grey, slightly pruinose; disc deeply urceolate, splitting away from the margin when dry. Margin in cross section 300 µm thick, with a distinct stromatic border of carbonized cells lying between the wall and the thalline margin and continuing beneath the subhymenium. Thalline margin prominent. The wall and crystalline layers are not sharply delimited from one another and consist of loosely-interwoven brown hyphae 3-5 µm diam., interspersed with scattered rosettiform crystals and amorphous brown material. Periphysoids numerous, richly branched and immersed in a J- gel, up to 85 µm long, 2.0 µm broad at the base, inflated to 3.0 µm at the tip. Iodine reactions none. Paraphyses numerous, filiform, 1.0 µm broad below, barely enlarged above, colorless, unbranched, not forming an epithecium. Asci 275-300 x 6-8 µm, the cap 4.5 µm thick, pierced by a broad pore. Spores 8, nearly as long as the asci, 2.0-3.0

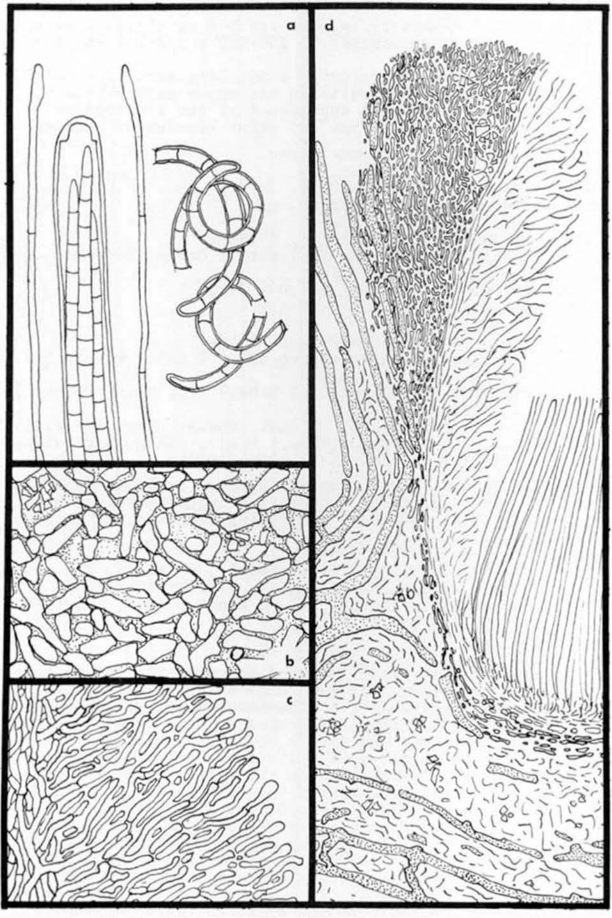

FIGURE 55. *Stictis bicolor*. a. Detail of apices of ascus, paraphyses, and spores, and coiled spore fragments, x1500. b. Wall hyphae, x750. c. Periphysoids, x750. d. Cross section of margin, x150. Drawn from the lectotype.

µm broad, somewhat tapered basally, septate, the cells 4-5 µm long. In addition to spores remaining within the ascus, the type specimen contains what appear to be broken, coiled fragments of discharged spores. Ellis and Everhart interpreted these as part-spores, but the ragged ends suggest that they are not produced by regular disarticulation at the septa. The structural details of the margin show this species to be a *Stictis* rather than a *Schizoxylon*.

Old apothecia which no longer contain hymenium are yellow rather than orange; hence the epithet *bicolor*. The species was also reported from Brazil by Starbäck (l.c.), but his description does not fit Bethel's specimens.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Salix*, Bethel 285, lectotype, designated here, of *Schizoxylon bicolor;* on Cottonwood [*Populus*], Colorado, Bethel 260, lectoparatype)

(27). *STICTIS BRACHYSPORA* Sacc. & Berlese, Rev. Mycol. (Toulouse) 7: 92 (1885)

≡ *Stictis radiata* subsp. *brachyspora* (Sacc. & Berl.) Sacc., Sylloge Fung. 8: 683 (1889)

Figure 56

Apothecia at first immersed, opening broadly but not becoming erumpent, 0.5-0.8 mm diam., the disc deeply immersed, pale ochraceous, splitting away from the margin when dry, the margin prominent, white-pruinose, usually entire. Margin in cross section lacking a stroma, colorless throughout, without a differentiated wall but with a prominent thalline margin, c. 40 µm thick, predominantly crystalline, lined on the inside with matted, mostly unbranched periphysoids 15 x 1.0 µm. Asci 90-120 x 6-7 (-9) µm, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore, not prominent. Paraphyses filiform, 1.0 µm thick below, scarcely enlarged above, sometimes once-branched, J+ blue at the tip. Ascospores 8, 65-90 x 3.5-4.5 µm, obscurely sheathed, septate, the cells 2-3 µm long.

The sole specimen of this species in Saccardo's herbarium does not contain any apothecia. The specimen (211) in Patouillard's herbarium deposited under this name agrees with the original description and should make a suitable neotype. *S. brachyspora* is a widespread but uncommon tropical member of the *S. radiata* complex. It is distinguished from *S. carnea* by having shorter, broader spores with shorter cells, and from *S. hawaiiensis* by the shorter spores and strong iodine reaction of the hymenium. Cultural studies, or a systematic approach to the relationship between geographical and morphological variation in this group, may ultimately provide a better species concept than the one proposed here.

SPECIMENS EXAMINED: AUSTRALASIA: New Zealand (PDD 32649, on *Lupinus*, North Island; 32651, on *Rhopadostylis*, *ibid*). ASIA: Viet Nam (FH-Patouillard, Duport 211, Hanoi, neotype, designated here, of *S. brachyspora;* Duport 193). AFRICA (MPU, North Africa, Maire 6792, on *Cytisus*, country unknown). SOUTH AMERICA. Venezuela (NY-Ve 741, Dumont et al, Dto. Federal)

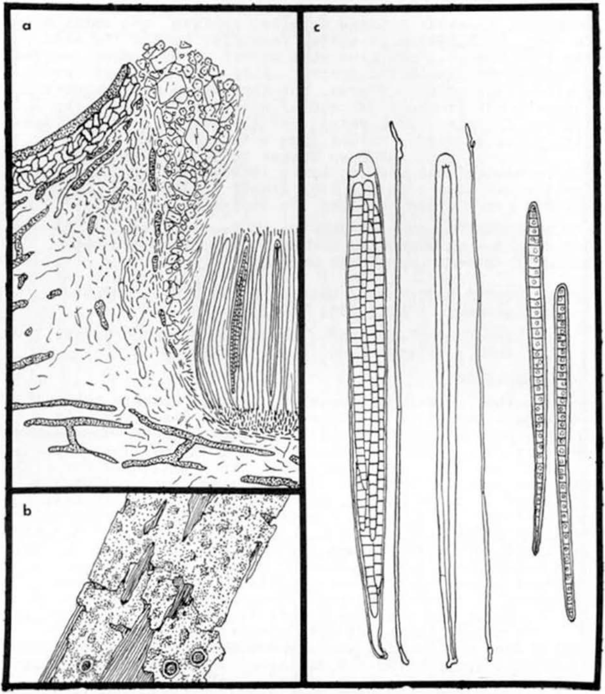

FIGURE 56. *Stictis brachyspora*. a. Cross section of margin, x300. b. Habit sketch, x7.5. c. Asci, paraphyses, and spores, x750. Drawn from the neotype.

(28). STICTIS BROMELIAE Starbäck
= *Stictis radiata* Pers., q.v.

(29). (STICTIS BULLATA) Pers., Myc. Eur. 1: 339 (1822)

This species is based on the lenticels of *Castanea vesca*. With the exception of a specimen on *Salix* (910.263-1221), which is *Propolomyces farinosus*, all of the specimens in Persoon's herbarium are lenticels.

SPECIMENS EXAMINED: EUROPE (country uncertain)(L, 910.264-885, sine coll; 910.264-839, on *Castanea vesca*, presumed holotype of *Stictis bullata;* 910.264-826, on *Fraxinus;* 910.264-836, on *Quercus*)

(30). *STICTIS CABALLEROI* Bausá Alcalde, Ann. Jardin Bot. Madrid 10: 233 (1952)

Figure 57

Apothecia at first immersed, 0.4-0.7 mm diam., opening broadly and sometimes appearing nearly superficial owing to scaling away of the surrounding epidermis, the disc dark brown, deeply urceolate, the margin grey-pruinose. Margin in cross section 80-100 µm thick, dark brown without but not stromatized, the cells of the wall closely packed, 1.5-2.0 µm diam. Crystalline layer prominent, the hyphae within it colorless and inconspicuous. Periphysoids 15 x 1.5 µm, colorless, unbranched, J-. Asci 90-120 x 7(-11) µm, the cap 1.5 µm thick, scarcely differentiated. Ascospores 8, 50-90 x 2.0 µm, septate, the cells 2.5-3.5 µm long. Paraphyses numerous, filiform, 1.0 µm thick, barely enlarged above, unbranched, colorless, J-.

On *Pithecolobium*, Spain. I have seen no material which might be referred to this species other than the type specimen. *S. lanugicincta* is similar, but has paraphyses which are brown at the tip and a less developed crystalline layer.

SPECIMEN EXAMINED: EUROPE: Spain (MA, on *Pithecolobium*, Caballero 12832, holotype of *S. caballeroi*)

(31). *STICTIS CALCERA* Phillips
= *Stictis chrysopsis* Ell. & Everh., q.v.

(32). *STICTIS CARESTIAE* (De Not.) Rehm
= *Stictis radiata* Pers, q.v.

(33). *(STICTIS CARICUM)* Auersw. in Fckl., Fungi Rhenani 1833 (nom. nud.) & Jahrb. Nassauischen Vereins Naturk. 23-24: 249 (1870) pro synon.
= *Merostictis seriata* (Libert) Défago, Sydowia 21: 49 (1967)

For complete synonymy, see Défago (1967). The species is considered to be a member of the Dermateaceae.

(34). *STICTIS CARNEA* Seaver & Waterston, Mycologia 33: 311 (1941)

Figure 58

Apothecia gregarious, 0.5-0.7 mm diam., at first immersed, opening by a pore but not becoming erumpent, the margin white-pruinose, fairly narrow, entire, the disc pale flesh-colored, deeply immersed, splitting away from the margin when dry. Margin, in cross section c. 100 µm thick, fleshy, 3-layered, the wall c. 30 µm thick, of loosely interwoven colorless hyphae 1.5 µm diam. embedded in a gelatinous matrix. Crystalline layer prominent. Periphysoids 15-30 x 1.5-2.0 µm, usually unbranched, forming a compact layer. Asci 180-220 x 5-6 µm, the cap 3 µm thick, pierced by a broad pore. Paraphyses numerous, filiform, unbranched, slightly enlarged above, J+ blue. Ascospores 8, irregularly 4-seriate, 100-120 x 3.0-3.5 µm, septate, the cells 3-4 µm

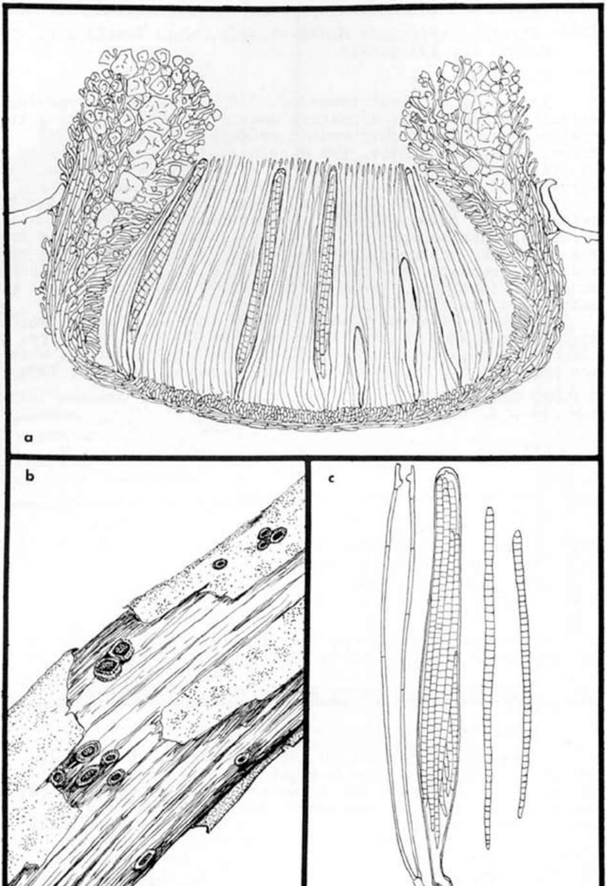

FIGURE 57. *Stictis caballeroi*. a. Cross section of apothecium, x375. b. Habit sketch, x7.5. c. Ascus, paraphyses, and spores, x750. Drawn from the holotype.

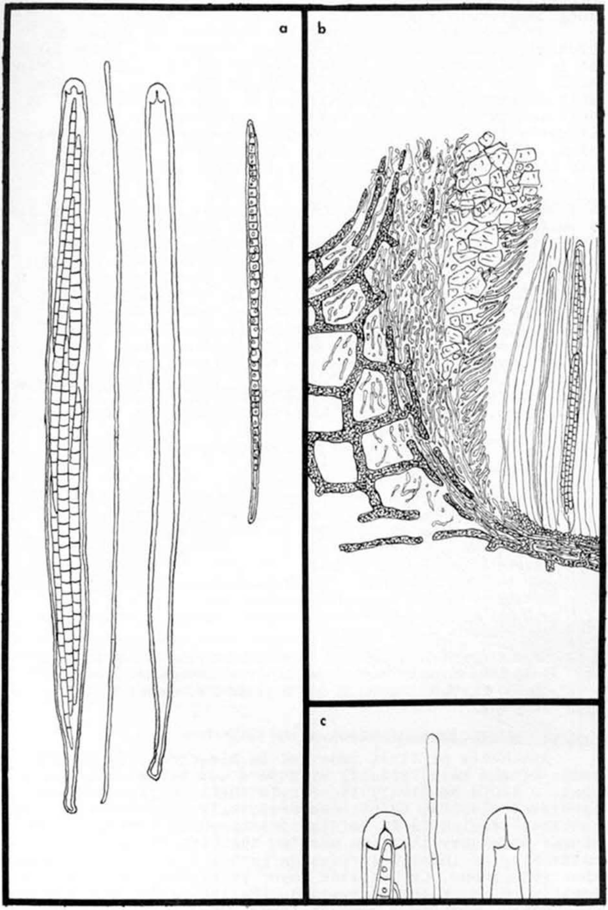

FIGURE 58. *Stictis carnea*. a. Asci, paraphysis, and spores, x750. b. Cross section of margin, x300. c. Detail of apices of asci and paraphysis, x1500. Drawn from holotype.

long, obscurely sheathed and strongly guttulate.

On dead wood, throughout the tropics. *S. carnea* is closely allied to *S. radiata* subsp. *intermedia*, from which it is distinguished by having shorter spores with a distinct basal taper, irregularly 4-seriate in the ascus, and somewhat shorter spore cells. Typical *S. radiata* differs from both in having narrower, branched periphysoids. In Seaver's type the wood surrounding the apothecia is stained pink. This color reaction was not observed in several of the other specimens, and occurs in other species as well. It may be host-mediated.

SPECIMENS EXAMINED: ASIA: Ceylon (K, Berkeley 318, on *Citrus*). Philippines (CUP-Sa-2369, Luzon). AFRICA: Union of South Africa (K, Doidge 36835, Natal; on *Citrus*, Doidge 20311, Transvaal; on *Citrus*, Wagner 33766, Natal). North Africa (country uncertain)(MPU, Maire 4040, on *Laurus*). NORTH AMERICA: Bermuda (NY, Seaver & Whetzel 5, holotype of *Stictis carnea* [an isotype at CUP contains no apothecia]). SOUTH AMERICA: Ecuador (NY-Ec 1041, Prov. Cotapaxi, Dumont, Carpenter & Buriticá, 18.VII.1975). Venezuela (NY-Ve 741, Dto. Federal, Dumont, Haines, Manara, 25.VII.1971; Ve-2534, Edo. Merida, Dumont, Haines, Samuels, Revas, 18.VII.1971; Ve-3573, Edo. Miranda, Dumont, Samuels & Manara, 2.VII.1972). Colombia (NY-Co 2022, Dpto. Antioquia, Dumont et al.; Co-118, Dto. Cundinamarca, Dumont et al.; Co-4041, Dto. Cundinamarca, Dumont et al.; Co-4048, Dto. Cundinamarca, Dumont et al.)

(35). STICTIS CARPENTERIANA Sherwood, spec. nov.

Figure 59

Ascocarpi primum immersi, profunde cupulati, 0.3-0.5 mm diam., margine lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 75-80 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 μm diam., achromo. Stratum crystallinum 30-40 μm crassum. Periphysoidea 30 x 1.5 μm, non ramosa. Paraphyses filiformes, ramosae, 200 x 1.0 μm, achromae, in iodo non caerulescentes. Asci 175-200 x 3.5-4.0 μm, apice 3.0 μm crassi, 8-spori. Sporae 175-200 x 1.0 μm, cellulis 4-6 μm longis.

HOLOTYPUS: NY-Ec 17, Ca. 11 km SW of Chillogallo, on the old road from Quito to Santo Domingo, Prov. Pichincha. Elev. ca. 11,000 ft. K.P. Dumont, S. E. Carpenter, P. Buriticá, 16 July 1975.

Etymology: Named after one of the collectors.

Apothecia at first immersed in bleached, discolored areas of the host, opening by a pore but not becoming erumpent, 0.3-0.5 mm diam., the margin thick, white-pruinose, lacerate, the disc deeply immersed, pale ochraceous. Margin in cross section 75-80 μm diam., 3-layered, without a prominent accessory thalline margin, the wall 15 μm thick, colorless, of loosely interwoven hyphae 1.5 μm diam., somewhat gelatinous. Crystalline layer prominent, of rather small (mostly 10 μm or less) crystals. Periphysoids 30 x 1.5 μm, unbranched, forming a compact layer. Subhymenium 10 μm thick, of small, angular, colorless cells, J-. Paraphyses numerous, filiform, 1.0 μm broad below, branched and propoloid above, not enlarged, J-. Asci 175-200 x 3.5-4.0 μm,

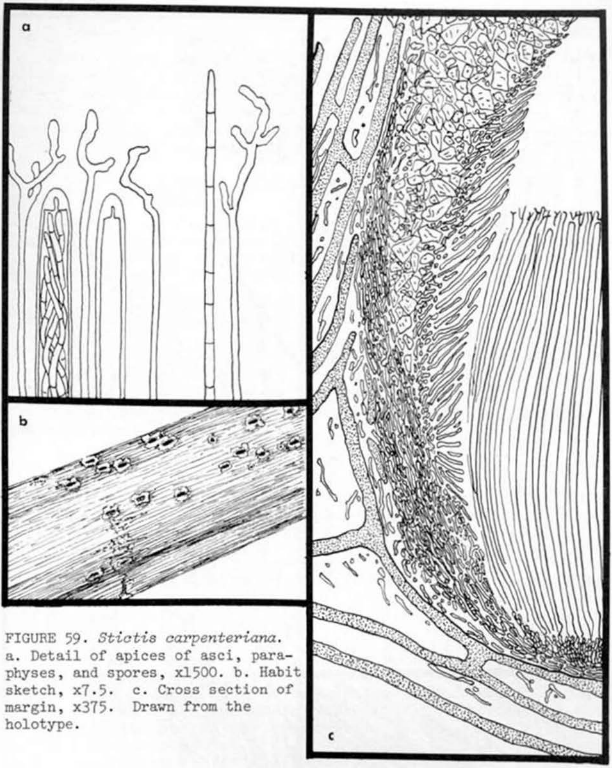

FIGURE 59. *Stictis carpenteriana.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x375. Drawn from the holotype.

the cap 3.0 μm thick. Ascospores 8, nearly as long as the asci, 1.0 μm broad, septate, the cells 4-6 μm long.

On an herbaceous stem. Ecuador. The dimensions of hymenial elements of *S. sarothamni* are similar, but *S. sarothamni* has a much broader margin.

SPECIMEN EXAMINED: See holotype, above.

(36). STICTIS CAULINCOLA Schw., Trans. Amer. Philos. Soc. n.s. 4: 179 (1832)
≡ *Phragmonaevia caulincola* (Schw.) Sacc., Sylloge Fung. 8: 676 (1889)

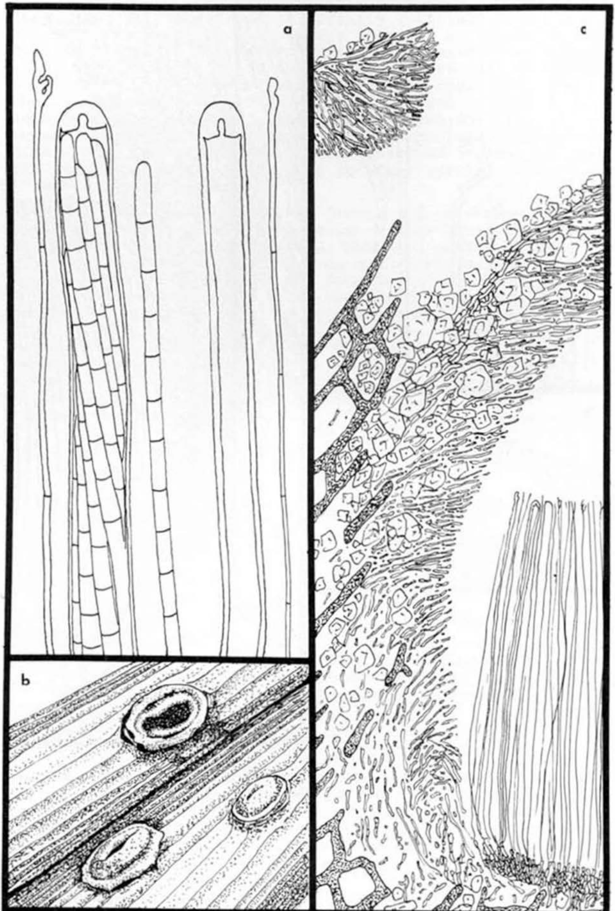

FIGURE 60. *Stictis chrysopsis*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x225. Drawn from CUP-D-7604.

≡ Leptosphaeria caulincola (Schw.) Sherwood, comb. nov.

The type is a minute, immersed *Leptosphaeria* with thin-walled, ostiolate pseudothecia 250 µm in diameter and 3-septate, brown ascospores 18-20 x 3-4 µm, the second cell from the top largest.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, holotype of *Stictis caulincola* ex herb. Schweinitz, sine coll.)

(37). (STICTIS CERACEA) Schw., Trans. Amer. Philos. Soc. n. s. 4: 180 (1832)

The type is a pycnidial fungus, immersed, opening by a minute white-bordered pore 100 µm diam., with a single cavity, the wall colorless, lined with simple conidiophores and hyaline, 3-septate conidia 40 x 2.0 µm.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, sine coll., holotype of *Stictis ceracea* ex herb. Schweinitz)

(38). (STICTIS CHILENSIS) Speg., Contrib. Estud. Hongos Chilensis 129 (1910)
= *Propolis quadrifida* (Lév.) Mont.

For a discussion of this species, a member of the Phacidiales, see Sherwood (1977).

(39). (STICTIS CHRYSOPHAEA) (Pers.) Pers., Myc. Eur. 1: 335 (1822)
≡ *Peziza chrysophaea* Pers., Syn. Meth. Fung. 649 (1801)
≡ *Schmitzomia chrysophaea* (Pers.) Fr., Summa Veg. Scand. sect. post. 363 (1849)
≡ *Ocellaria chrysophaea* (Pers.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 135 (1888)
≡ *Propolis chrysophaea* (Pers.) Phil., Brit. Discom. 376 (1887)
≡ *Ramonia chrysophaea* (Pers.) Vežda, Folia Geobot. Phytotax. 2: 166 (1966)

Additional synonyms are given by Vežda (1966). No material of this species remains in either Persoon's or Fries's herbarium. Vežda (l.c.) neotypified *Stictis chrysophaea* with a specimen in Nylander's herbarium, and on this basis transferred the species to *Ramonia*. This neotype contains four apothecia; I did not examine it microscopically. Neither its external appearance nor the description furnished by Vežda suggest that this is a *Stictis*.

The fungus illustrated by Persoon (1803-1806) more closely resembles *Stictis friabilis* (q.v.) than *Ramonia chrysophaea*, but, in the absence of conclusive evidence as to the identity of the species, I chose to accept Vežda's neotypification. Rehm (1887-96) and Phillips (1887) provide two additional interpretations of the species.

(40). *STICTIS CHRYSOPSIS* Ell. & Everh., Proc. Acad. Nat. Sci. Philadelphia 46: 353 (1894)
= *Stictis calcarea* Phil., in herb.
= *Stictis calcera* Phil. in Harkness & Moore, Cat. Pacific Fungi 39 (1880), nom. nud. (lapsus calami

for *calcarea?*)

Figure 60

Apothecia at first immersed, remaining for a long time closed and covered by a dome-shaped white-pruinose peridium which separates from the surrounding wood, finally opening by a longitudinal slit (rarely by a pore), 1.5-2.5 mm diam., with an annulate margin and dark ochraceous disc. Margin in cross section consisting of slender periphysoids 50 x 1.5 µm, branched, imbedded in a gelatinous matrix. There is no defined wall, and the crystalline layer separates from the surrounding wood before the apothecia mature. The hyphae of the crystalline layer are pale brown.

Subhymenium colorless, 10-15 µm thick, of small, colorless , angular cells, J-. Paraphyses numerous, filiform, 1.0 µm thick below, enlarged to 2.0 µm at the apex, often branched. Asci 300 x 6-7 µm, the cap 3.0 µm thick. Ascospores 8, 250-275 x 2.0 µm, septate, the cells 5-7 µm long.

On a variety of woody plants, western North America. Apparently characteristic of dry interior regions; I have seen no material from the coastal fog belt.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Ceanothus*, Suksdorf 309, holotype of *Stictis chrysopsis*, Washington state; On *Corylus*, Washington state, Piper 9.XI.1892) (K, on Willow or Osier, Phillips 945, sine loc., labelled *S. calcarea*)(CUP-D-7604, Suksdorf 309, isotype; D-7602, on willow, Tehatchepi, California, Harkness 3503, labelled *S. calcera*)(Herb. Sherwood 2013, on *Corylus*, Oregon; 2012, on *Rosa*, Oregon)(Herb. W.B. Cooke 50394, on *Arctostaphylos*, California)

(41). (STICTIS CINERASCENS) Pers., Myc. Eur. 1: 339 (1822)
= *Propolomyces farinosus* (Pers.) Sherwood

The above synonymy is taken from the literature (cfr. Rehm, 1887-96). For a discussion of the species, see Sherwood (1977).

(42). (STICTIS CIRCINATA) Libert, Plant. Crypt. Ard. 232 (1833)
≡ *Merostictis circinata* (Libert) Défago, Sydowia 21: 54 (1967)

Additional synonyms, and a description of the species, a member of the Dermateaceae, are provided by Défago (1967).

(43). (STICTIS CLADONIAE) (Rehm) Sacc., Sylloge fung. 8: 692 (1889)
≡ *Schmitzomia cladoniae* Rehm, Hedwigia 21: 116 (1882)

Figure 61

Stictis cladoniae , with a thick, fleshy, pseudoparenchymatous margin which is completely free from the substrate, and asci which appear bitunicate rather than Ostropalean, cannot readily be assigned to any existing genus (R. Santesson, *personal communication*). It does not seem to be Ostropalean.

SPECIMEN EXAMINED: EUROPE: Austria (S, on *Cladonia*, Rehm, holotype of *S. cladoniae*).

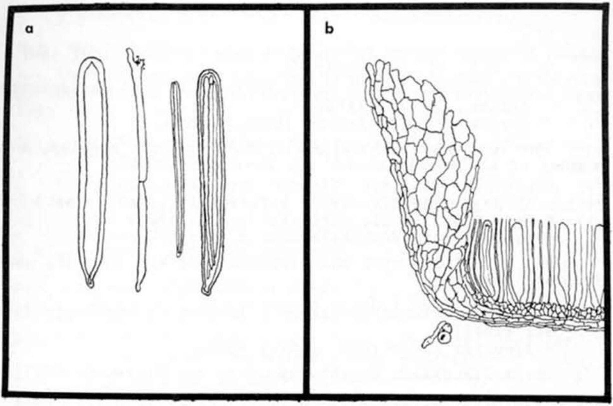

FIGURE 61. *Stictis cladoniae*. a. Asci, paraphysis, and spores, x750. b. Cross section of margin, x375. Drawn from the holotype.

(44). (STICTIS COCCINEA) Fr., Elenchus Fung. 2: 24 (1828)
≡ *Ocellaria coccinea* (Fr.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 136 (1888)

The holotype specimen in Fries's herbarium is immature Hypocrealean stroma. Nannfeldt (1929) suggests that this is *Nectria* cfr. *verrucosa* (Schw.) Sacc.

SPECIMEN EXAMINED: EUROPE (UPS, on *Morus*, Chaillet in herb. Fries, holotype of *Stictis coccinea*)

(45). (STICTIS COCCOLOBI) Seaver & Waterston, Mycologia 38: 399 (1941)
= *Propolis quadrifida* (Lév.) Mont.

This species is discussed by Sherwood (1977).

(46). STICTIS COFFEICOLA Averna-Saccá, Segundo Contrib. Estudo Molestias Crypt. Cafeeiro 31 (1925)

I was unable to locate any material, type or otherwise, which had been identified as this species. The original description is phytopathological in orientation and includes little morphological detail. *S. coffeicola* was described as having an olivaceous, white-pruinose margin and ascospores 81-135 x 2.0 µm. The illustrations suggests that this is indeed a *Stictis* and is not *S. radiata*. I am unable to characterize it further.

(47). (STICTIS COMPRESSA) Ell. & Everh.
= *Robergea cubicularis* (Fr.) Rehm, q.v.

(48). (STICTIS CONICOLA) (Hazsl.) Hazsl., Verh. Zool.-Bot. Ges. Wien 37: 152 (1887)
≡ *Stictis stellata* β *conicola* Hazsl., Mat. Természettud. Közlem. 21: 181 (1881)
= *Lasiostictis fimbriata* (Schw.) Bäuml.

For full synonymy and a discussion of the species, a member of the Phacidiaceae, see Sherwood (1974).

(49). (STICTIS CONIGENA) Sacc. & Berl., Atti Reale Ist. Veneto Sci., Lett., Arti vi, 3: 734 (1885)
= *Lasiostictis fimbriata* (Schw.) Bäuml.

For a full synonymy and discussion of the species, see Sherwood (1974).

(50). (STICTIS CONOCARPI) Seaver & Waterston, Mycologia 33: 311 (1941)
= *Propolis quadrifida* (Lév.) Mont.

For a discussion of this species, see Sherwood (1977)

(51). (STICTIS CONVALLARIAE) Mont. & Cesati in Mont., Syll. Gen. Sp. Crypt. 197 (1856)
≡ *Phragmonaevia convallariae* (Mont. & Ces.) Sacc., Sylloge Fung. 8: 676 (1889)

No type material of this species could be located at PC or FH. The original description suggests to me that this is probably a species of *Pyrenopeziza*, but will not serve to characterize it fully. Roumeguère's specimen, cited below, is a poorly-preserved specimen of a *Pyrenopeziza*.

SPECIMEN EXAMINED: EUROPE: France (CUP-D-11691, Roumeguère, Fungi Gallici Exs. 6693, on *Polygonatum*)

(52). (STICTIS CORDOBENSIS) Speg.
≡ *Schizoxylon cordobensis* (Speg.) Sherwood, q.v.

(53). STICTIS CORII (Schw.) Sacc.
= *Stictis radiata* Pers., q.v.

(54). (STICTIS CORRUGATA) Speg., Bol. Acad. Nac. Ci. 24: 163 (1926)

I requested the type from LPS but did not receive it. According to the original description, the specimen had a fleshy, white margin, shallowly cupulate olivaceous disc, scarcely thickened asci, and spores about 150 x 1.5-2.0 µm. The ascus membrane was said to blue in iodine and the spores to disarticulate at the septa. This is probably a *Schizoxylon* rather than a *Stictis*. As indicated in the notes under *Schizoxylon cordobensis*, above, ascospore measurements of other *Stictis* spp. described in the same publication where *S. corrugata* appeared are incorrect.

(55). STICTIS CORTICOIDES Pat.

≡ *Karstenia corticoides* (Pat.) Sherwood, q.v.

(56). STICTIS CORYLI Crouan & Crouan, Fl. Finist. 42 (1867)

The type of this species, if extant, cannot be borrowed, and the original description will not characterize the species.

(57). (STICTIS CORYNESPORA) Mont., Ann. Sci. Nat. Bot. sér. 3, 5: 372 (1856)

I requested the type from PC, but they were anable to locate it. According to the original description *S. corynespora* had long clavate spores containing 24-36 "nucleolos" or "sporules" and grew on a sterile lichen thallus. This is almost certainly an *Ocellularia*.

(58). (STICTIS CRASSISPORA) Speg.
≡ *Schizoxylon crassisporum* (Speg.) Sherwood, q.v.

(59). (STICTIS CRATERIUM) Mont., Ann. Sci. Nat. Bot. sér. 2, 11: 42 (1849) pro synon., nom. superfl?
≡ *Sphaeria hederae* Sowerby, Engl. Fungi t. 371, f. 5 (1802)

Montagne (l.c.), in a discussion of Castagne's species of *Sphaeria*, synonymizes *"Sphaeria hederae* Cast." with "*Stictis craterium* Mont. hb." and *Peziza insidiosa* Desm. It is unclear whether the name is based on *Sphaeria craterium* DC., with which *Peziza insidiosa* has been synonymized. *Sphaeria hederae* is not, however, a Castagne species, but was first published by Sowerby and was ascribed to him by Castagne (1845). Sowerby's illustration and description are ambiguous; without reference to an original collection it is impossible to tell whether *Sphaeria hederae* is an older name for *Sphaeria craterium*.

(60). (STICTIS CRUENTATA) Mont., Ann. Sci. Nat. Bot. sér. 4, 3: 96 (1855)
≡ *Melittosporium cruentatum* (Mont.) Sacc., Sylloge
≡ Fung. 8: 704 (1889)
≡ Tryblidium cruentatum (Mont.) Sherwood, comb. nov.

Figure 62

Apothecia gregarious, immersed in a lichen thallus on smooth bark, 1.0-1.5 mm diam., orbicular, the thick, conspicuously reddish-pruinose margin splitting into lobes and splitting away from the substrate. Margin in cross section brown, of hyphae with a distinct inward orientation, interspersed with a few crystals but without a definite crystalline layer. Paraphyses numerous, simple, J-, with free ends. Asci 80-100 x 12(-20) µm, thick-walled when young, possibly bitunicate, J-. Ascospores 8 or fewer, 30 x 10 µm, muriform, with a rounded cell lumen, J-, with a distinct sheath.

If one accepts that the apothecia belong with the lichen thallus, then the species will key to *Thelotrema*, but the apothecia seem to originate deeper in the substrate.

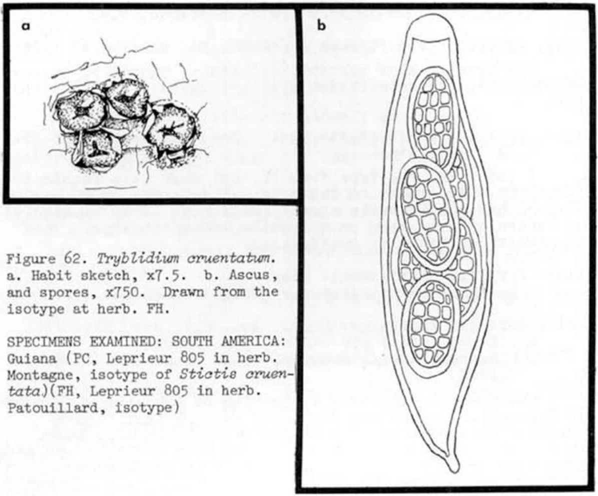

Figure 62. *Tryblidium cruentatum.* a. Habit sketch, x7.5. b. Ascus, and spores, x750. Drawn from the isotype at herb. FH.

SPECIMENS EXAMINED: SOUTH AMERICA: Guiana (PC, Leprieur 805 in herb. Montagne, isotype of *Stictis cruentata*)(FH, Leprieur 805 in herb. Patouillard, isotype)

(61). STICTIS CRUSTACEA (Schw.) Sacc.
= *Stictis sphaeroboloidea* (Schw.) Berk., q.v.

(62). STICTIS CURTISPORA Dearness
= *Stictis schizoxyloides* Ell. & Ev., q.v.

(63). (STICTIS CYDONIAE) Schulzer von Müggenberg, Verh. K. K. Zool.-Bot. Ges. Wien 21: 1250 (1871)

The type specimen could not be located at either WU or BP. Schulzer (l.c.) could find no asci or spores in this species. It cannot be characterized from the original description.

(64). (STICTIS DECIDUA) Ell. & Everh., Bull. Torrey Bot. Club 10: 76 (1883)
≡ *Propolis decidua* (Ell. & Everh.) Sacc., Sylloge Fung. 8: 653 (1889)

The apothecia which I sectioned no longer contained any intact asci or spores. The general aspect of the species is that of a *Xylogramma*, rather than a *Stictis* or a *Propolomyces*.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D-76?9, on *Pinus*, New Jersey, isotype of *Stictis decidua*)

(65). (STICTIS DECIPIENS) (Karst.) Karst.

= = *Schizoxylon berkeleyanum* (Dur. & Lév.) Fckl. subsp. *decipiens* (Karst.) Karst., q.v.

(66). STICTIS DENNISII Sherwood, spec. nov.

Figure 63

Ascocarpi primum immersi, profunde cupulati, 0.5-1.0 mm diam., margine lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 200 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.0 µm diam., achromo vel pallide brunneo. Stratum crystallinum 150 µm crassum. Periphysoidea 25-30 x 1.0 µm, ramosa. Paraphyses filiformes, simplices, 400 x 1.0 µm, apice ad 1.5 µm incrassatae, achromae, in iodo non caerulescentes. Asci 350-400 x 7.5-8.0 (-10) µm, apice 8 m crassi, 8-spori. Sporae 300-350 x 3.0 µm, vagina gelatinosa involutae, cellulis 3-4 µm longis.

HOLOTYPUS: K, Venezuela Fungi 1656, Caracas, R. W. G. Dennis 14.VI.1956)

Etymology: Named after the collector.

Apothecia immersed, not becoming erumpent, opening by a pore, the margin thick, white-pruinose, lacerate, the disc deeply urceolate, pale ochraceous, splitting away from the margin when dry. Ascocarps 0.5-1.0 mm diam. Margin in cross section 200 µm thick. Wall colorless or very pale brown, 10 µm thick, of hyphae 1.0 µm diam. Crystalline layer occupying most of the breadth of the margin, of coarse, irregular crystals. Periphysoids 25-30 x 1.0 µm, branched, imbedded in a gelatinous matrix, J-. Paraphyses numerous, simple, 1.0 µm diam. below, enlarged to 1.5 µm at the apex, J-. Asci 350-400 x 7.5-8.0 (-10) µm, very thick-walled when young, the cap 8.0 µm thick. Ascospores 8, 300-350 x 3.0 µm, sheathed, coiling when free from the ascus, septate, the cells 3-4 µm long.

On small twigs and herbaceous stems, Venezuela and Panama. The long ascospores and very thick ascus cap distinguish this species from any member of the *S. radiata* complex.

SPECIMENS EXAMINED: (see also holotype, above) NORTH AMERICA: Panama (NY-Pa 1403, Prov. Panamá, K.P. Dumont, S.E. & S.M. Carpenter, 29.VI. 1975; Pa-1374, *ibid.*; Pa-1398, *ibid.;* Pa-1079, Prov. San Blas, K.P. Dumont, S.E. & S.M. Carpenter, 23.VI.1975)

(67). STICTIS DICKSONIAE Sherwood, spec. nov.

Figure 64

Ascocarpi primum immersi, profunde cupulati, 0.2-0.5 mm diam., margine integro vel lacerato, albo, disco brunneo. Margo in sectione transversali 40 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., brunneo. Stratum crystallinum 30 µm crassum. Periphysoidea 5 x 1.5 µm, non ramosa. Paraphyses filiformes, simplices, 475 x 1.0 µm, pallide brunneae, in iodo non caerulescentes. Asci 400-475 x 5-6 µm, apice 6-7 µm crassi, 8-spori. Sporae 375-450 x 2.0 µm, cellulis 2.5-4 µm longis.

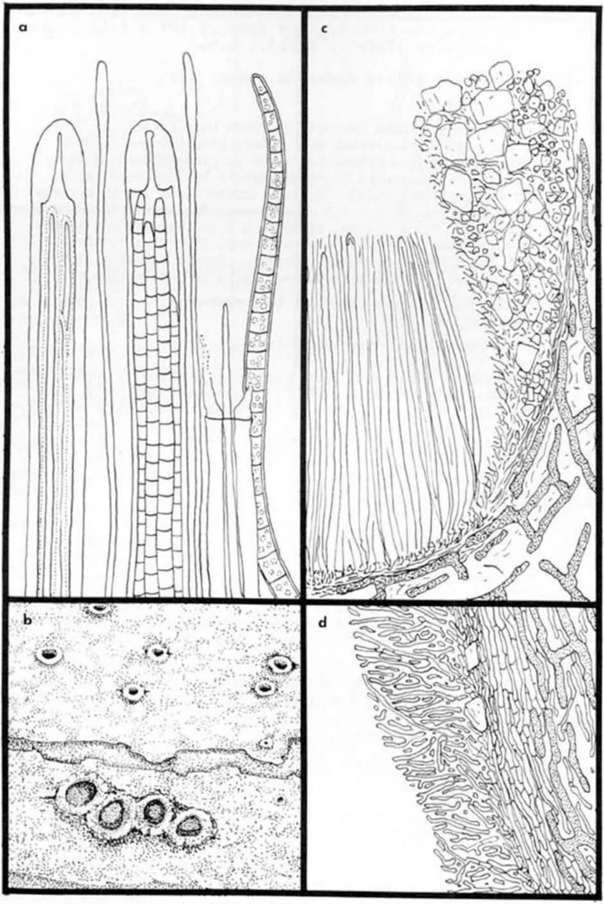

FIGURE 63. *Stictis dennisii.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x150. d. Wall and periphysoids, x750. Drawn from the holotype.

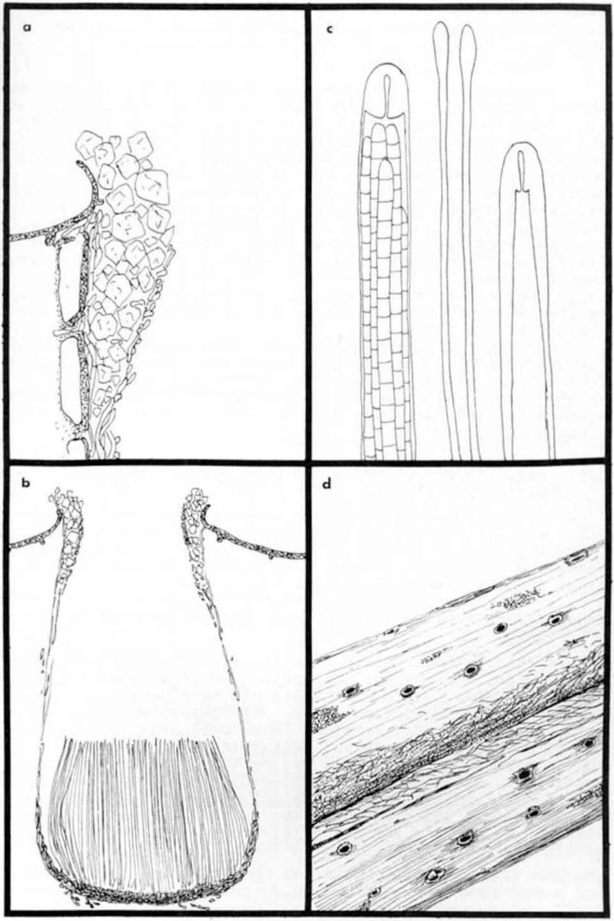

FIGURE 64. *Stictis dicksoniae*. a. Cross section of margin near the summit, x750. b. Cross section of apothecium, x75. c. Detail of apices of asci, paraphyses, and spores, x1500. d. Habit sketch, x7.5. Drawn from the holotype.

HOLOTYPUS: PDD 32648, on stipes of *Dicksonia squarrosa* near track, Horseshoe Bay, Stewart Island, New Zealand, J. M. Dingley, 17 Feb. 1954.

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.2-0.5 mm diam., somewhat elongate in outline, with a narrow, entire to stellate, whitish-grey border and very deeply urceolate brown disc. Margin, in cross section 40 μm thick at the broadest point, nearly obsolete below, the wall consisting of 4-5 layers of interwoven brown hyphae 1.5 μm diam., the crystalline layer moderately prominent, the periphysoids 5 x 1.5 μm, unbranched, sparse. Subhymenium 5-10 μm thick, J-, of small angular cells resting on a continuation of the brown wall. Paraphyses numerous, filiform, 1.0 μm thick below, enlarged to 1.5-2.0 μm above, faintly brown, J-. Asci 400-475 x 5-6 μm, the cap 6-7 μm thick, pierced by a narrow pore. Ascospores nearly as long as the asci, strictly filiform, 2.0 μm broad, septate, the cells 2.5-4 μm long.

On a fern stalk, New Zealand. This species is distinctive because it is taller than broad and seems transitional to *Robergea*. It differs from *R. canariense* in having a strictly vertical orientation, opening by a pore, and having brown paraphyses and more closely-septate spores.

SPECIMEN EXAMINED: See holotype, above.

(68). (STICTIS DISPAR) Pers. in Gaudichaud, Voyage d l' Uranie 178 (1826)

I was unable to locate any material, original or otherwise, of this species, which occurred on trunks of trees and had elongate to irregular, cinereous grey, pruinose fruitbodies. The species cannot be characterized from the original description. It may have been a lichen.

(69). (STICTIS DRYOPHILA) Cooke & Ellis, Grevillea 5: 33 (1876)

Apothecia immersed in discolored patches on bark of small twigs, not obviously associated with a lichen thallus, 1.0-1.5 mm diam., with a lacerate pruinose margin and shallowly cupulate, ochraceous disc. Paraphyses numerous, filiform, with free ends, J+ blue. Asci cylindrical, capitate, not bitunicate, 200 x 20 μm, containing 8 or fewer, long-fusiform ascospores 180 x 12 μm, septate, the cell lumen lenticular, the inner wall turning blue (not red) in iodine.

Known from two fragmentary collections. Goree (*personal communication*) found muriform spores in the type. *S. dryophila* is no *Stictis* and may merely represent fragmentary and poorly-preserved apothecia of a Thelotremataceous lichen.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, Ellis herb., on oak limbs, New Jersey, 2346, holotype of *Stictis dryophila*)(CUP-D-7611, isotype; D-7612, on oak, Newfield, New Jersey, Ellis [immature])

(70). STICTIS DUMONTII Sherwood, spec. nov.

Fig. 65

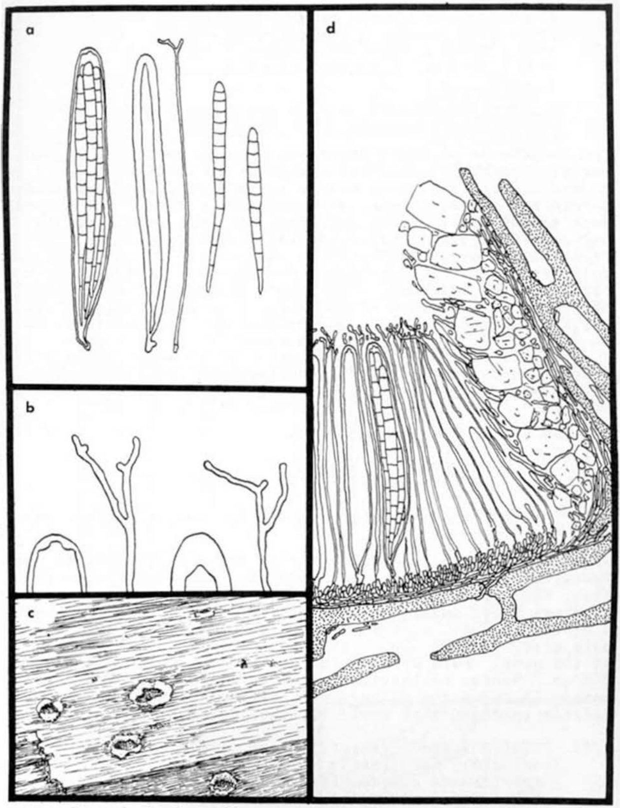

FIGURE 65. *Stictis dumontii*. a. Asci, paraphysis, and spores, x750. b. Detail of apices of asci and paraphyses, x1500. c. Habit sketch, x7.5. d. Cross section of margin, x750. Drawn from the holotype.

Ascocarpi primum immersi, profunde cupulati, 0.3-0.6 mm diam., margine integro vel lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 40 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., achromo. Stratum crystallinum 10 µm crassum. Periphysoidea

10 x 2.0 µm, non ramosa. Paraphyses filiformes, ramosae, 65 x 1.0 µm, achromo, in iodo non caerulescentes. Asci 65-70 x 7(-10) m, apice 2.0 m crassi, 4-spori. Sporae 55-65 x 3-3.5 µm, vagina gelatinosa involutae, cellulis 3-5 µm longis.

HOLOTYPUS: CUP-Vz-4387, on giant fern rachides, Rancho Grande, Aragua, Venezuela, K. P. Dumont, June 15, 1968.

Apothecia at first immersed, opening by a pore but not becoming erumpent, somewhat irregular in outline, 0.3-0.6 mm diam., with a narrow, entire to lacerate, white-pruinose margin and deeply sunken, pale ochraceous disc. The hymenium does not obviously split away from the margin because the asci are so short. Margin in cross section 40 µm thick, crystalline nearly to the base, the wall 10 µm thick, of colorless hyphae 1.5 µm diam. Periphysoids 10 x 2.0 µm, unbranched, not numerous. Paraphyses filiform, 1.0 µm thick, branched and propoloid at the apex, J-. Asci 65-70 x 7(-10) µm, the cap 2.0 µm thick, not prominent. Ascospores 4, 55-65 x 3-3.5 µm, the cells 3-5 µm long.

On stipes of a fern, Venezuela. *S. dumontii* differs from *S. javanica*, the most morphologically similar species, in having 4-spored asci, broader spores, and larger fruitbodies.

SPECIMEN EXAMINED: See holotype, above.

(71). *STICTIS EDWINIAE* Clements
= *Stictis schizoxyloides* Ell. & Everh., q.v.

(72). *STICTIS ELEGANS* Grelet, Bull. Soc. Mycol. France 13: 206 (1926)

I was unable to locate type or reliably identified material under this name. According to the original description, the apothecia were gregarious to scattered, emergent, grey, at first subglobose and closed, then opening by teeth, 0.3-0.6 mm broad, with a white margin and waxy, white to pale disc. Asci 75-100 x 10-12 µm, terete-fusoid, blueing at the apex. Paraphyses numerous, enlarged at the apex to 2-3 µm. Spores cylindrical, 20-70 x 2.5-4.0 µm, 8-16 septate. On *Pinus* and *Calycotomes*, France. I have seen no *Stictis* specimen that would fit this description.

(73). *STICTIS ELEVATA* (Karst.) Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 166 (1885)
≡ *Schmitzomia elevata* Karst., Fungi Fennici 932 (1870)
= *Schmitzomia atro-alba* Phill. & Plowright in Phil., Brit. Discom. 379 (1887)
  ≡ *Stictis atro-alba* (Phil. & Plowr.) Sacc., Sylloge Fung. 8: 684 (1889)
= *Stictis radiata* subsp. *minuscula* Karst., Meddel. Soc. Fauna Flora Fenn. 11: 138 (1884)

Figure 66

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.3-0.5 mm diam., the margin grey, inconspicuous and not obviously pruinose, the disc brown, deeply

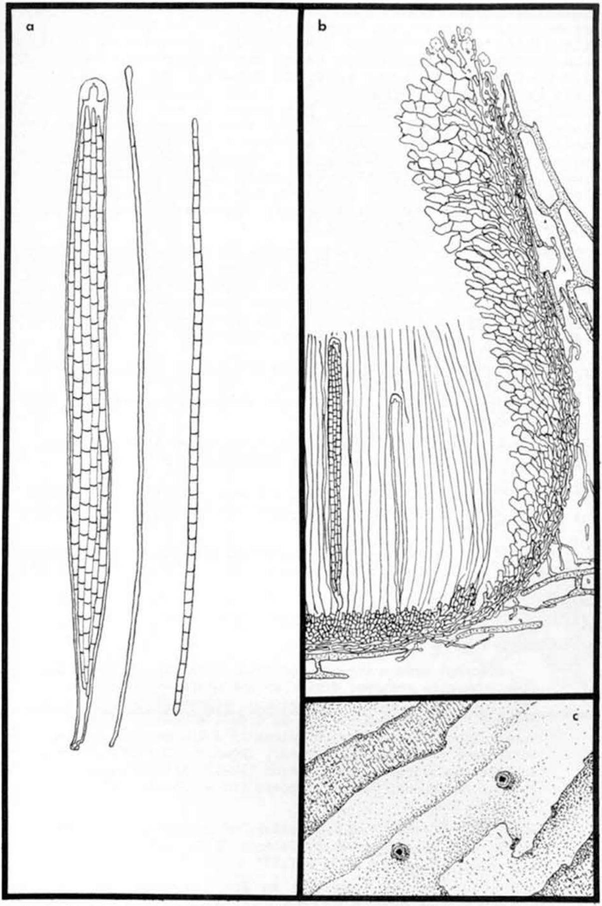

FIGURE 66. *Stictis elevata.* a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x300. c. Habit sketch, x7.5. Drawn from H-Karsten 1260.

urceolate. Margin, in cross section, 65 µm broad, containing little or no included host tissue, the wall 15 µm thick and composed of interwoven brown non-carbonized hyphae 1.5-2.0 µm diam., the inner layer of inward-pointing, large, pale brown cells 3-5 x 5-8 µm. A few crystals are present near the top of the margin, but these do not form a definite layer. Subhymenium brown, J-, of small angular cells. Hymenium J- throughout. Asci 150-180 x 7(-9) µm, the cap 5 µm thick, pierced by a broad pore. Paraphyses 1.0 µm thick below, enlarged to 1.5 µm at the apex, simple, colorless. Spores 8, 150 x 2.0 µm, septate, the cells 3-4 µm long.

On bark an herbaceous debris, Europe. Inconspicuous and probably uncommon.

SPECIMENS EXAMINED: EUROPE: Great Britain (K, on *Clematis*, Herfordshire, Plowright, holotype of *S. atro-alba*). Finland (H, Karsten, Fungi Fennici Exs. 932, on *Symphoricarpus*, isotype of *Stictis elevata*; Karsten 1259, on *Abies*, Kyrkslät, Wainio, lectoparatype [designated here] of *S. radiata* subsp. *minuscula*; Karsten 1260, on *Abies*, Wainio, 1882, lectotype [designated here] of *S. radiata* subsp. *minuscula*)

(74). (STICTIS EMARGINATA) Cooke & Massee, Grevillea 18: 7 (1889)
≡ *Propolis emarginata* (Cooke & Massee) Sherwood, Mycotaxon 5: 323 (1977)

For a discussion and redescription of this species, a member of the Phacidiales, see Sherwood (1977)

(75). (STICTIS EMERGENS) Karst., Fungi Fennici 756 (1868)
≡ *Merostictis emergens* (Karst.) Clements, Gen. Fungi 64 (1909)

Complete synonymy, and a redescription of the species, are given by Défago,(1967), who accepts the species in *Merostictis*.

(76). STICTIS EPRUINOSA Sherwood, spec. nov.

Figure 67

Ascocarpi primum immersi, profunde cupulati, 0.15-0.3 mm diam., margine integro, disco pallide ochraceo. Margo in sectione transversali 30 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., achromo. Stratum crystallinum abest. Periphysoidea 15 x 2.0 µm, non ramosa. Paraphyses filiformes, simplices, 110-120 x 0.5 µm, achromae, in iodo non caerulescentes. Asci 110-120 x 5(-10) µm, apice 2.5-3.0 µm crassi, 8-spori. Sporae 110 x 3.0 µm, cellulis 2.5-4 µm longis.

HOLOTYPUS: CUP-MM-57, Las Mercedes, on unidentified decorticated twig, Tenerife, Canary Islands, R.P. Korf, W.C. Denison, L.M. Kohn & M.A. Sherwood, 4.I.1976

Apothecia deeply immersed in decorticated wood, 0.15-0.3 mm diam., the margin narrow, entire, visible on the surface of the substrate as a faint transluscent line between hymenium and wood, non-pruinose to obscurely pruinose, not raised above the level of the substrate. Hymenium pale

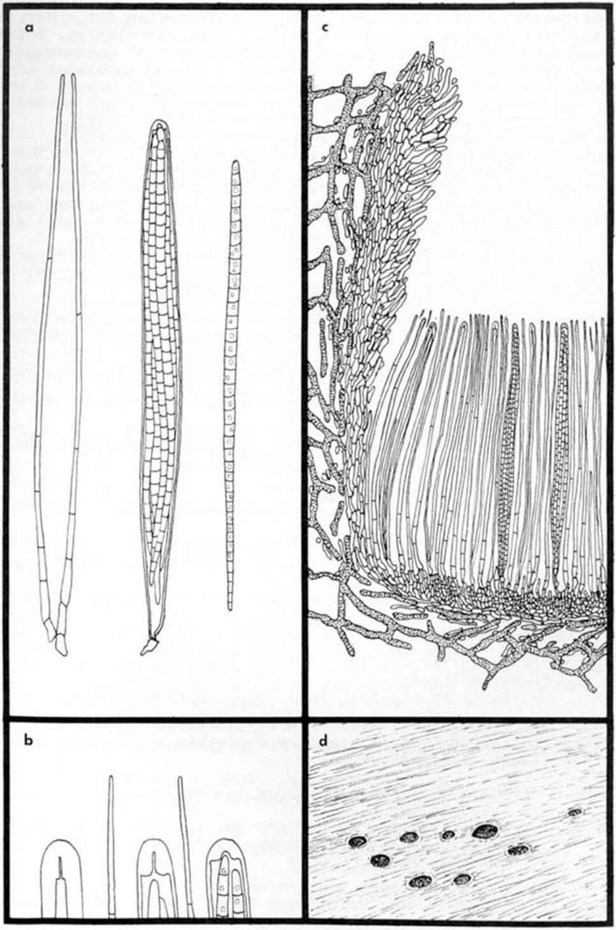

FIGURE 67. *Stictis epruinosa.* a. Ascus, paraphyses, and spores, x750. b. Detail of apices of asci, paraphyses, and spores, x1500. c. Cross section of margin, x375. d. Habit sketch, x15. Drawn from the holotype.

ochraceous, splitting away from the margin when dry. Margin in cross section 30 µm thick, with a wall of colorless interwoven hyphae 2.0 µm diam. and an inner layer of unbranched, non-gelatinous periphysoids 8-15 x 2.0 µm. Crystalline layer absent or nearly so. Paraphyses numerous, filiform, 2.0 µm broad below, tapering evenly to a 1.0 µm apex, unbranched, J- or very weakly J+. Asci 110-120 x 5(-10) µm, thick-walled when young, with an apical cap 2.5-3.0 µm thick, pierced by a broad, conical pore. Ascospores 8, 110 x 3.0 µm, not sheathed, tapering below, the cells 2.5-4 µm long.

On decorticated wood and herbaceous debris, Tenerife, Canary Islands. The specimens appear to be fully mature and do not seem to be a developmental form of either *S. stellata* or *S. radiata*, both of which occur in the same area. *S. epruinosa* is distinguished from *S. radiata* subsp. *intermedia*, which also has short spore cells, by its small size, poor crystal production, and uninflated paraphyses.

SPECIMENS EXAMINED (see also holotype, above): AFRICA: Canary Islands (CUP-MM 376, on *Ficus*, Tenerife; MM-386, on herbaceous stem, Tenerife)

(77). (STICTIS EXIGUA) Desm., Ann. Sci. Nat. Bot. sér. 3, 8: 183 (1847)
≡ *Merostictis exigua* (Desm.) Défago, Sydowia 21: 46 (1967)

A complete list of synonyms, and redescription of the species, are provided by Défago (1967).

(78). (STICTIS FAGICOLA) Phil.
= *Cryptodiscus foveolaris* (Rehm) Rehm, q.v.

(79). (STICTIS FARINOSA) Pers., Myc. Eur. 1: 339 (1822)
≡ *Propolis farinosa* (Pers.) Fr., Summa Veg. Scand. sect. post. 372 (1849)
≡ *Propolomyces farinosus* (Pers.) Sherwood, Mycotaxon 5: 321 (1977)

For a discussion of this species, see Sherwood (1977).

(80). (STICTIS FASCICULATA) (Pers.) Dietrich, Deutschlands Flora 35 (1848)
≡ *Solenia fasciculata* Pers., Myc. Eur. 1: 335 (1822)

The combination is incorrectly ascribed to Persoon by Dietrich (l.c.). It is probably a mistake rather than an intentional transfer.

(81). (STICTIS FENESTRATA) Roberge in Desm., Ann. Sci. Nat. Bot. sér. 3, 16: 321 (1851)
≡ *Hysterostegiella fenestrata* (Desm.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 126: 313 (1917)

Additional synonyms are provided by von Höhnel (l.c.) and Défago (1967), who provides a redescription of the species under *Hysterostegiella*.

(82). STICTIS FILICICOLA Seaver & Waterston

= *Stictis radiata* Pers., q.v.

(83). (STICTIS FILICINA) Niessl, Bot. Jahresber. (Just) 1: 284 (1874) non *S. filicina* Peck (1878)
≡ *Xylogramma filicina* (Niessl.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 171 (1888)

Rehm (1888) was unable to find asci or spores in the examples he examined; I could find none in a specimen from the Farlow Herbarium, and am uncertain whether the fruit-bodies are apothecia or pycnidia.

SPECIMEN EXAMINED: EUROPE: Austria (FH, Rabenhorst, Fungi Europaei 1709, on *Pteridium*, isotype of *Stictis filicina* Niessl.)

(84). (STICTIS FILICINA) Peck., Annual Rep. New York State Mus. 29: 56 (1878), non *S. filicina* Niessl (1874)

The species is a *Karstenia*. Since the epithet *filicina* is illegitimate, and since I do not know whether the species has a legitimate name elsewhere in the literature, I consider it premature to provide a new name for it here.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D-6288, on *Osmunda*, New York, isotype of *Stictis filicina* Peck)

(85). (STICTIS FIMBRIATA) Schw., Trans. Amer. Philos. Soc. n.s. 4: 179 (1832)
≡ *Lasiostictis fimbriata* (Schw.) Bäuml.

For a discussion of this species and a complete list of synonyms, see Sherwood (1974).

(86). (STICTIS FIMENTARIA) Streinz, Nomenclatur Fungorum 588 (1862)

Streinz ascribes the species to Fries, Elech. 2: 27 (1828), apparently referring to a paragraph in which Fries speaks deprecatingly of insect eggs on dung which were sent to him as a *Stictis*. The name may well come from a third source, but I have been unable to locate any.

(87). (STICTIS FOLIICOLA) Berkeley & Curtis, J. Linn. Soc. (Bot.) 10: 371 (1868)
= *Propolis quadrifida* (Lév.) Mont.

For a discussion of this species, see Sherwood (1977).

(88). (STICTIS FOVEOLARIS) Rehm
≡ *Cryptodiscus foveolaris* (Rehm) Rehm

(89) *STICTIS FRIABILIS* (Phil. & Plowright) Sacc. & Trav. in Sacc., Sylloge Fung. 20: 898 (1911)
≡ *Peziza (Dasyscypha) friabilis* Phil. & Plowr., Grevillea 4: 121 (1876)
≡ *Schizoxylon friabilis* (Phil. & Plowr.) Dennis, Kew Bull. 17: 345 (1963)
= *Stictis sulphurea* Rehm in Rabenh., Krypt.-Fl. ed 2, 1 (3): 177 (1888)
= *Belonidium albo-rubrum* Grelet, Amateur Champignons 8: 43 (1922)

Figure 68

Apothecia at first immersed, becoming erumpent and at length nearly superficial, 0.3-0.6 mm diam., the margin thick, yellow-pruinose, deeply fissured and involute, the disc deeply urceolate, distinctly reddish, splitting away from the margin when dry. Margin in cross section c. 75 µm thick, 2-layered, containing little or no included host tissue, the wall of colorless interwoven hyphae 2.0 µm diam., these forming a compact layer adjoining the periphysoids in the lower and inner portions of the margin, becoming more loosely interwoven in the upper and outer portions, abundantly crystalliferous on the exterior, the crystals small and uniform, yellowish. Periphysoidal layer pseudoparenchymatous, of more or less isodiametric cells 2.0 µm diam., the innermost row elongate, with free ends. Subhymenium 40 µm thick, colorless, of small angular cells. Paraphyses numerous, filiform, 1.0 µm diam., colorless, 1-2 times branched and propoloid apically, J-. Asci 100-120 x 7-8 (-9) µm, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore. Ascospores 8, 55-70 x 2.5-3.5 µm, attenuate-clavate, septate, the cells 3-5 µm long.

On wood, bark, and woody fungi, Europe, and at high elevations in South America, fairly common. As the synonymy above indicates, the species somewhat resembles a *Dasyscyphus* in the field. I have seen no North American collections of this distinctive species. The superficial habit, yellow, fleshy margin, and propoloid paraphyses will immediately distinguish *S. friabilis* from any other species of *Stictis*. I have not seen the type of *Belonidium albo-rubrum*, but have little doubt that it is the same species.

SPECIMENS EXAMINED: EUROPE: Great Britain (K, on *Rubus*, Isle of Hull, 30.VII.1968; on *Quercus*, Wales, holotype of *Stictis friabilis*). France (Herb. Korf, Candousseau 4301, on *Pinus*, Pyrenees)(S, herb. Rehm, 1869, probable holotype of *S. sulphurea*; on *Carpinus*, Rehm, Besançon). Switzerland (S, herb. Rehm, on *Prunus*, 10.XII.1893). Italy (S, on *Abies*, Carelonte, Bresadola). Locality uncertain (S, on *Polyporus*). SOUTH AMERICA: Colombia (NY-Co 4878, Dto. Boyacá, K.P. Dumont, S.E. Carpenter, M.A. Sherwood & L.A. Molina; Co-6312, Dto. Antioquia, K.P. Dumont, S. E. Carpenter & M.A. Sherwood; Co-6381, *ibid.*). Peru (Ny-Pe 301, Prov. Junín, K.P. Dumont, S.E. Carpenter, P. Buriticá & M.A. Sherwood)

(90). STICTIS FULVA Peck
= *Stictis rhodoleuca* Sommerf., q.v.

(91). (STICTIS FURFURELLA) Cesati in Rabenh., Bot. Zeitung (Berlin) 13: 284 (1855)

I could find no asci or spores in either of the two specimens I examined, and unable to characterize the species. Saccardo's (1889) synonymy with *Schizoxylon aeruginosum* Fckl. cannot be verified on the basis of the material I have seen. The species is questionably Stictidaceous.

SPECIMENS EXAMINED: EUROPE: Italy (FH-Höhnel 4653, Rabenhorst Herb. Myc. 1929, Vercelli, on *Spartinus*, isotype of *Stictis furfurella*). Austria (FH-Höhnel, Schwartzbach, Salzburg 1908)

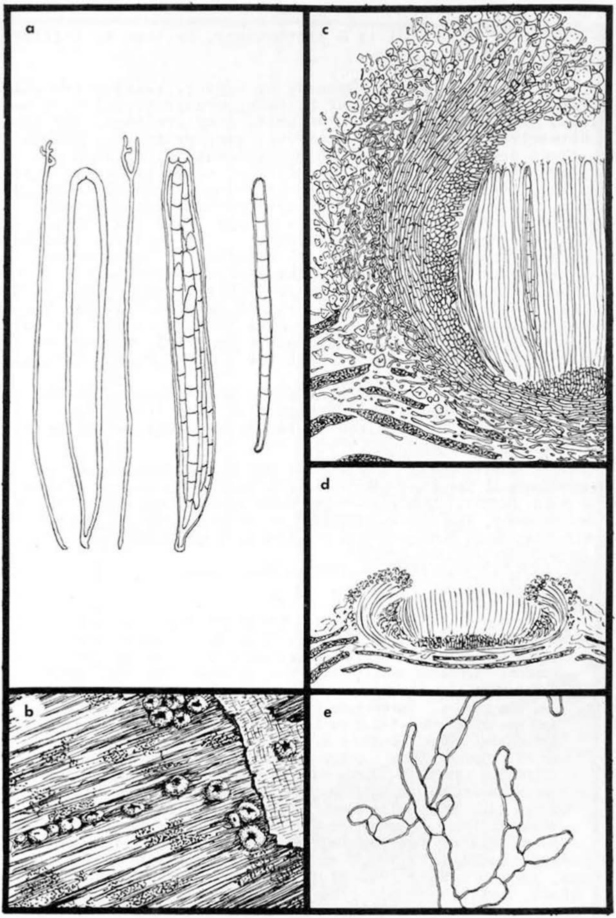

FIGURE 68. *Stictis friabilis*. a. Asci, paraphyses, and spores, x750. b. Habit sketch, x7.5. c. Cross section of margin, x375. d. Cross section of apothecium, x37.5. e. Marginal hyphae, x750. Drawn from the presumed holotype of *Stictis sulphurea*.

(92). STICTIS FUSCA Ellis & Bartholomew, Erythea 4: 3 (1896)

Figure 69

Apothecia immersed, opening by a pore, raising the substrate into pustules but not becoming erumpent, 0.5-0.75 mm diam., the margin entire, prominent, grey-pruinose, the disc moderately deeply urceolate, brown, grey-pruinose. Margin in cross section 80-100 µm thick, without a prominent accessory thalline margin, the outermost layer stromatic, carbonized, continuing beneath the hymenium, c. 50 µm thick, of large, closely-packed, more or less pseudoparenchymatous cells 5 x 2.5 µm, cystalliferous on the upper and outer faces. Crystalline layer indistinct. Periphysoids numerous, filiform, branched, 30 x 1.0 µm, colorless. Subhymenium colorless, of small angular cells resting on stromatic tissue. Paraphyses filiform, 1.0 µm broad, enlarged to 1.5-2.0 µm at the apex, colorless, simple or once-branched but not propoloid, faintly J+ blue. Asci 180-200 x 5-6 (-8) µm, thick-walled when young, the cap 3.0 µm thick, pierced by a broad pore. Ascospores 8, 175-190 x 1.5-2.0 µm, septate, the cells 3-5 µm long.

On dead twigs of *Symphoricarpus* and *Viburnum*, North America. The species is distinguished from *S. mollis* by the narrower spores, and by larger, carbonized cells in the margin.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-D-2040, Bartholomew, on *Symphoricarpus*, Kansas; D-2041, *ibid.;* D-7624, *ibid.;* isotype of *Stictis fusca*; D-9363, Ellis & Everhart, North American Fungi 3133, on *Symphoricarpus*, Kansas). Canada? (MAC, on *Viburnum*, Bisby 6.II.1926 [collection data, "LMAC", probably refers to Winnipeg campus])

(93). STICTIS FUSCELLA Sherwood, spec. nov.

Figure 70

Ascocarpi primum immersi, profunde cupulati, 0.1-0.3 mm diam., margine integro, brunneo, disco nigro. Margo in sectione transversali 70 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5(-3-4) µm diam., brunneo. Stratum crystallinum 15-20 µm crassum. Periphysoidea 25 x 1.5 m, non ramosa. Paraphyses filiformes, non ramosae, 220 x 1.0 µm, apice ad 1.5-2.0 µm incrassatae, in iodo non caerulescentes. Asci 200-220 x 3.5 µm, apice 3.0 µm crassi, 8-spori. Sporae 200 x 1.0-1.2 µm, cellulis 8-10 µm longis. HOLOTYPUS: NY-Pe 28, on herbaceous stem, along the San Ramon-La Oroya rd. ca. 60 km from intersection of La-Oroya Tingo Maria rd., Dpto Junín. Elev. 2500 m. Dumont, Carpenter, Sherwood, Buriticá, Guzmán, Reynolds, 26 June 1976.

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.1-0.3 mm diam., the margin entire, dark brown, grey-pruinose, the disc deeply immersed, dark brown to black, splitting away from the margin when dry. Margin in cross section 70 µm thick, 3-layered, the wall 30 µm thick, of interwoven brown hyphae 1.5 µm diam., not carbonized, the hyphae irregularly inflated to 3-4 µm near the summit of the margin. Crystalline layer well-developed. Periphysoids colorless, simple to sparingly branched, 25 x

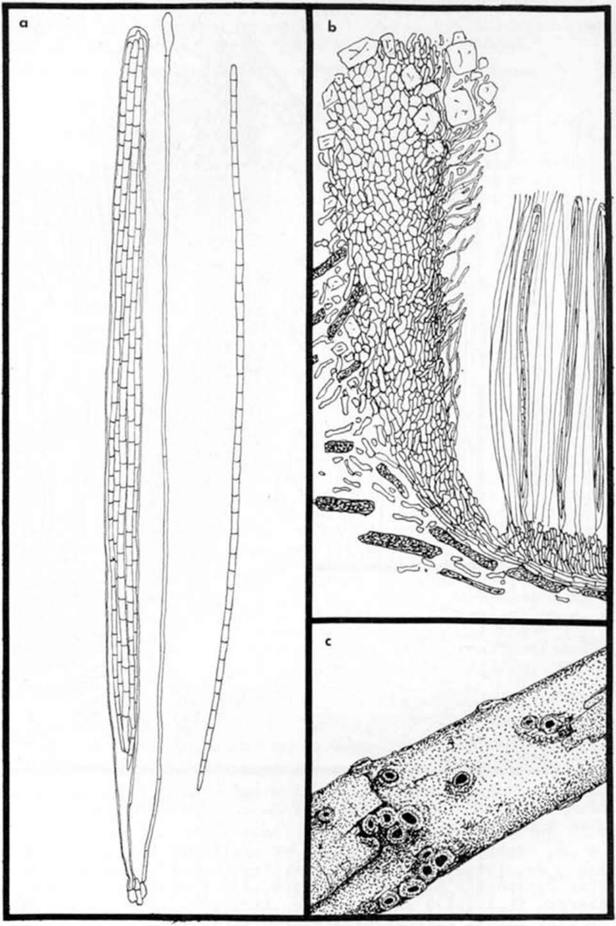

FIGURE 69. *Stictis fusca.* a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x300. c. Habit sketch, x7.5. Drawn from Ellis & Everhart, North American Fungi 3133 (CUP-D)

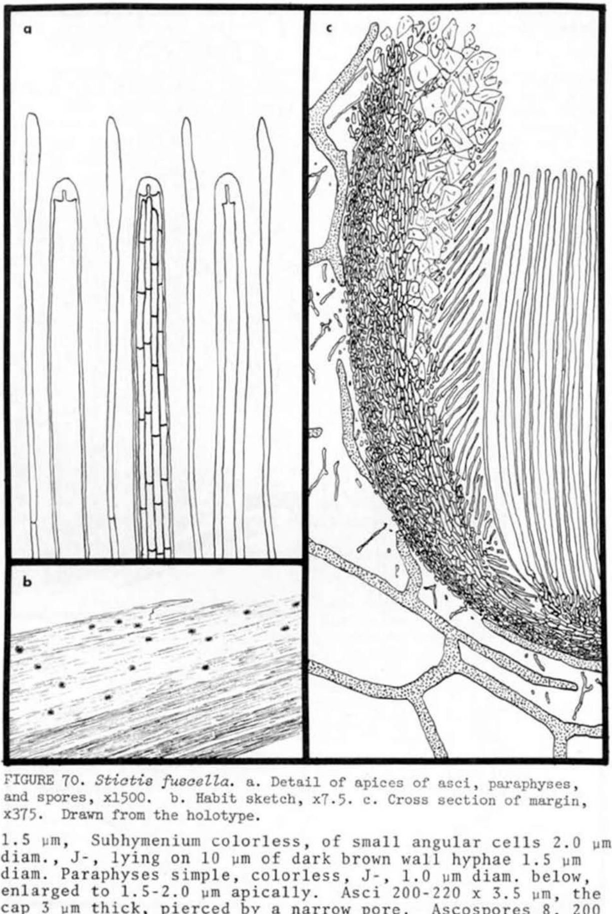

FIGURE 70. *Stictis fuscella.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x375. Drawn from the holotype.

1.5 µm, Subhymenium colorless, of small angular cells 2.0 µm diam., J-, lying on 10 µm of dark brown wall hyphae 1.5 µm diam. Paraphyses simple, colorless, J-, 1.0 µm diam. below, enlarged to 1.5-2.0 µm apically. Asci 200-220 x 3.5 µm, the cap 3 µm thick, pierced by a narrow pore. Ascospores 8, 200 x 1.0-1.2 µm, the cells 8-10 µm long.

On an "herbaceous stem" (probably a grass), Peru.

Stictis polycocca and *S. pustulata* lack a well-defined crystalline layer and are erumpent. *S. fusca* has a larger-celled excipulum, shorter asci, and branched periphysoids.

SPECIMEN EXAMINED: See holotype, above.

(94). STICTIS GIGANTEA Sherwood, spec. nov.

Figure 71

Ascocarpi primum immersi, erumpescentes, profunde cupulati, 1.2-2.0 mm diam., margine integro, nigro, disco brunneo. Margo in sectione transversali 200 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., brunneo. Stratum crystallinum abest. Periphysoidea 50-75 x 1.5 µm, non ramosa vel ramosa. Paraphyses filiformes, simplices vel ramosae, 350 x 1.0 µm, achromae, in iodo non caerulescentes. Asci 300-350 x 5(-6) µm, apice 5-6 µm crassi, 8-spori. Sporae 300-325 x 1.5 µm, cellulis 4-5 µm longis.

HOLOTYPUS: K, on *Costus afer*, Kyuianga Forest, Uganda, Maitland 500.

Etymology: This species has some of the largest apothecia known in *Stictis*.

Apothecia gregarious, at first immersed, raising the substrate into prominent pustules, at length becoming nearly superficial following scaling away of the substrate. Margin dark grey, entire, not pruinose, minutely whitish-tomentose; disc deeply urceolate, brown, splitting away from the margin when dry. Margin in cross section 200 µm thick, without a prominent accessory thalline margin, composed of dark brown, non-carbonized interwoven hyphae 2.0 µm broad, not markedly gelatinous. Periphysoids sparse, matted, 50-75 x 1.5 µm, occasionally branched. Crystalline layer nearly obsolete, consisting of a few large crystals imbedded among the periphysoids in the upper part of the margin. Subhymenium 60 µm thick, of small, colorless, angular cells, resting on 40 µm of dark wall tissue. Paraphyses numerous, filiform, J-, 1.0 µm broad, not enlarged apically, occasionally branched but not propoloid. Ascospores 8, 300-325 x 1.5 µm, the cells 4-5 µm long.

On *Costus* and unidentified herbs, East Africa. This is the only large black *Stictis* with a tomentose margin.

SPECIMENS EXAMINED (see also holotype, above): AFRICA: Rwanda (LG, Lambignon 74/602, Rutsiro)

(95). *(STICTIS GILVA)* Fr., Sclerom. Sueciae 436 (1834), nom. nud.

≡ *Propolis gilva* (Fr.) de Not., Comment. Crittog. Ital. 5: 364 (1863)

The species is also cited by Fries (1849) and Saccardo (1889), but none of these authors provide a description of *S. gilva*. I have been unable to borrow a specimen of Scleromycetes Sueciae 436. In any case, the name does not seem to have been validly published.

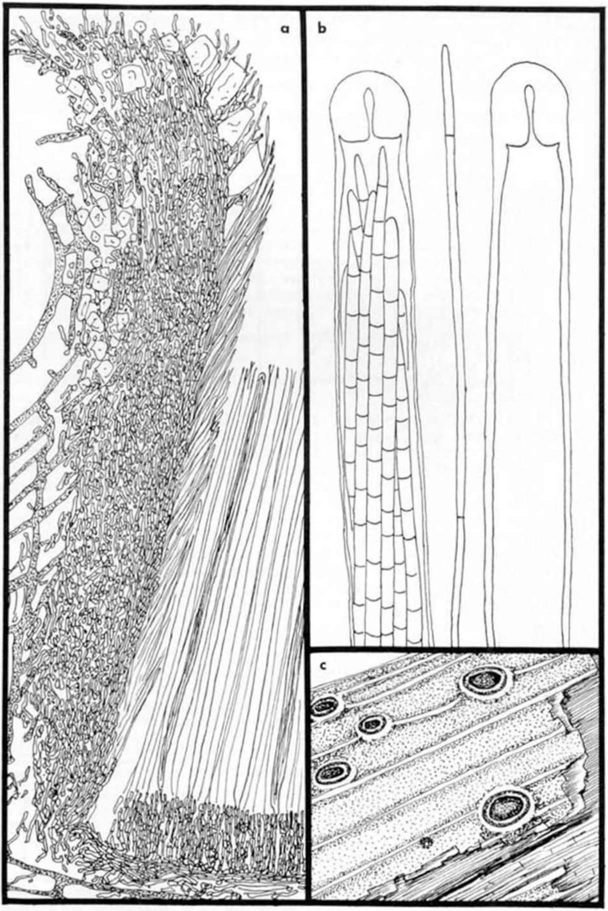

FIGURE 71. *Stictis gigantea*. a. Cross section of margin, x225. B. Detail of apices of asci, paraphysis, and spores, x1500. c. Habit sketch, x 7.5. Drawn from the holotype.

(96). (STICTIS GLAUCOMA) Berk. & Curt.
= *Schizoxylon ligustri* (Schw.) Sherwood, q.v.

(97). STICTIS GRAMINICOLA Lasch in Rabenh., Herb. Myc. ed. 2, 713 (1858)
= *Schmitzomia luzulae* (Lib.) de Not. subsp. *junci* Karst., Fungi Fennici 931 (1870)
≡ *Stictis junci* (Karst.) Velenovský, Monogr. Discom. Bohem. 1: 54 (1934)

Figure 72

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.3-0.5 mm diam., the margin white, inconspicuous, entire, the disc deeply urceolate, pale ochraceous. Margin in cross section c. 50 µm thick, colorless, pseudoparenchymatous, lacking an accessory thalline margin or crystalline layer, the wall of slender interwoven colorless hyphae 1.0-1.5 m diam., the periphysoidal layer composed of isodiametric, 2.0-2.5 µm diam. cells, hyphal only on the inner face. Subhymenium c. 10 µm thick, of small, angular, isodiametric cells, J-. Paraphyses numerous, filiform, 1.0 m thick, not enlarged above, sometimes once-branched but not propoloid, J-. Asci 130 x 5(-5.5) µm, the cap 1.0 µm thick, not distinct. Ascospores 8, 100 x .75-1.0 µm, septate, the cells 5-8 µm long.

On grasses and grasslike monocots, Europe. Apparently rare. A pseudoparenchymatous margin distinguishes this species from *S. pusilla*; smaller size and narrower spores will separate it from graminicolous specimens of *S. stellata*. Very long-cylindrical asci and a hymenium which splits away from the margin when dry distinguish this species from immersed Dermateaceae (e.g. *Hysteropezizella*) on similar substrates.

SPECIMENS EXAMINED: EUROPE: Germany (FH, Rabenhorst Herb. Myc. ed. 2, 713, on *Deschampsia*, isotype of *Stictis graminicola*). Norway? (O, Sommerfelt, on *Acorus*, sine loc.). Finland (H, Karsten, Fungi Fennici Exs. 931, on *Juncus*, isotype of *Schmitzomia luzulae * junci*)

(98). STICTIS GRAMINUM Desm.
= *Stictis arundinacea* Pers., q.v.

(99). (STICTIS GRAPHIDEA) Pers. in Gaudichaud, Voyage d l' Uranie 178 (1826)

No material remains in Persoon's herbarium. The species was described as having linear, flexuous fruitbodies, opening by a slit, with a white-pruinose margin, growing on bark in Rawak. The description would fit *Graphis afzelii* Ach., and probably pertains to a similar species.

(100). STICTIS HAWAIIENSIS Cash, Mycologia 30: 98 (1938)

Figure 73

Apothecia immersed, not becoming erumpent, 0.3-0.6 mm diam., the margin moderately thick, entire to lacerate, white-pruinose, the disc deeply urceolate, pale ochraceous,

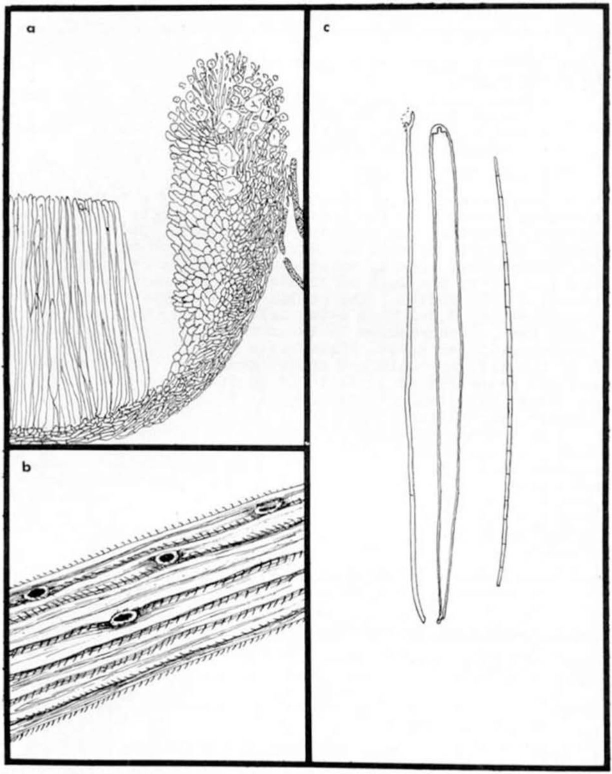

FIGURE 72. *Stictis graminicola*. a. Cross section of margin, x300. b. Habit sketch, x7.5. c. Ascus, paraphysis, and spore, x750. Drawn from FH-Rabenh., Herb. Myc. ed. 2, 931.

splitting away from the margin when dry. Margin in cross section variable in thickeness, 50-100 µm thick, without a prominent accessory thalline margin, colorless, the wall composed of slender, interwoven hyphae 1.5 µm diam., the periphysoids unbranched to sparingly-branched, 15-20 x 1.5 µm, forming a compact layer. Subhymenium 20 µm thick, of small, colorless, isodiametric cells, J-. Paraphyses numer-

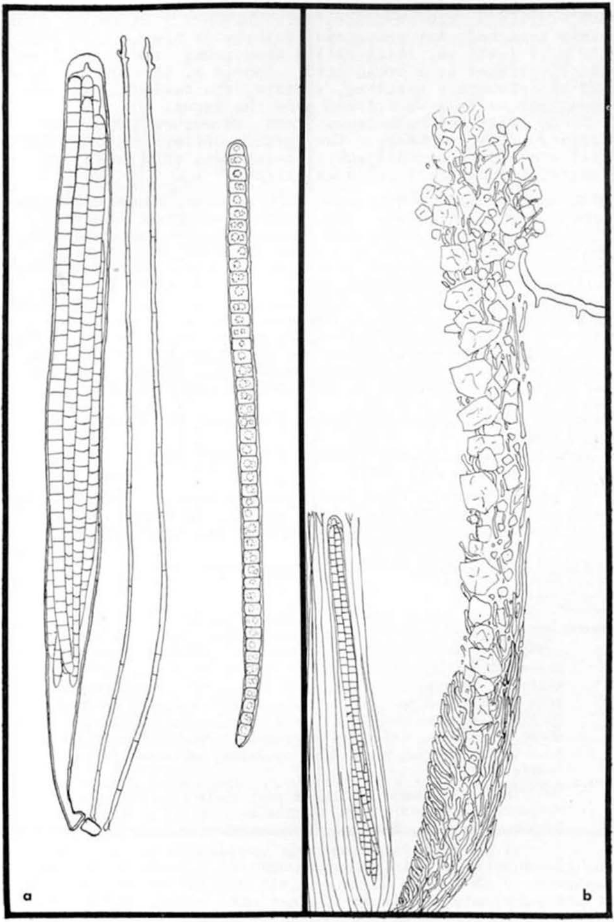

FIGURE 73. *Stictis hawaiiensis*. a. Ascus, paraphyses, and spores, x750. b. Cross section of margin, x375. Drawn from the holotype.

ous, filiform, 1.0 µm thick, enlarged to 1.5 µm above, sometimes branched, not propoloid, faintly J+ blue. Asci 175-250 x 12 (-15) µm, thick-walled when young, the cap 4-6 µm thick, pierced by a broad pore. Spores 8, 150-200 x 3.5-4.5 µm, obscurely sheathed, septate, the cells 2.5-3.5 µm long, not coiling when freed from the ascus.

On twigs and herbaceous stems, throughout the humid tropics. Fairly common. The species differs from *Stictis stellata* and *S. radiata* subsp. *intermedia* only in having longer, broader asci and ascospores.

SPECIMENS EXAMINED: OCEANIA: Hawaii (BPI, on *Rubus*, Degener 3776, holotype of *Stictis hawaiiensis*). ASIA: Philippines (CUP-Sa 1413, Luzon, K.P. Dumont). Ceylon (CUP-Sa 3244b, Central Province, Dumont & Peter; Sa-3238, *ibid.*). South America: Ecuador (NY-Ec 448, Prov. Pichincha, Dumont, Carpenter & Buriticá, 18.VII.1975). Colombia (NY-Co 1725, Dto. Antioquia, Dumont et al., 20.VII.1974; Co-6446, Dumont et al., Dto. Antioquia; Co-7232, Dumont et al.). Peru (Ny-Pe 66, Prov. Junín, Dumont et al.; Pe-448, Dumont et al.). Venezuela (NY-Ve 4025, Edo. Sucre, Dumont et al.; 6.VII.1972; Ve-5345, Edo Monagas, Dumont et al., 18.VII. 1972; Ve-259a, Edo. Miranda, Dumont et al., 19.VI.1971; Ve-2025, Edo. Aragua, Dumont et al., 12.VII.1971; Ve-6082, Edo. Monagas, Dumont et al, 18.VII.1972). Argentina (K, Prov. Salta, Singer T-1441)

(102). (STICTIS HEDERAE) Crouan & Crouan, Fl. Finist. 41 (1867)
≡ *Propolis hederae* (Crouan & Crouan) Sacc., Sylloge Fung. 8: 652 (1889)

It is probable that this species, with a white disc 2-3 mm broad and unicellular fusoid spores, is a species of *Propolomyces*. I was unable to borrow the type specimen.

(103). STICTIS HELICOSPORA Sherwood, spec. nov.

Figure 74

Ascocarpi primum immersi, profunde cupulati, 0.05-0.1 mm diam., margine integro vel lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 25 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum 10 µm crassum. Periphysoidea 10 x 1.5 µm, non ramosa. Paraphyses filiformes, non ramosae, 90 x 1.0 µm, achromae, in iodo non caerulescentes. Asci 80-90 x 3.5-4 µm, apice 2.5 µm crassi, 8-spori. Sporae 35-50 x 1.5 µm, vagina gelatinosa involutae, cellulis 11-15 µm longis.

HOLOTYPUS: COL [Dumont] 4203, km post 16-17 from Mosquera on Mosquera-La Mesa rd., Dpto. Cundinamarca. Elev. c. 9300'. Dumont, Carpenter, Sherwood, 5 June 1976. ISOTYPUS: NY

Ascocarps at first immersed, opening by a pore, raising the substrate into obscure pustules but not becoming erumpent, 0.05-0.1 mm diam., barely visible on the surface of the substrate as minute white-rimmed pores, the margin entire to lacerate, narrow, the disc deeply-immersed, pale ochraceous. Margin in cross section c. 25 µm thick, consisting of a wall of 2-4 layers of interwoven colorless hyphae 1.5 µm diam., lined on the inside with unbranched

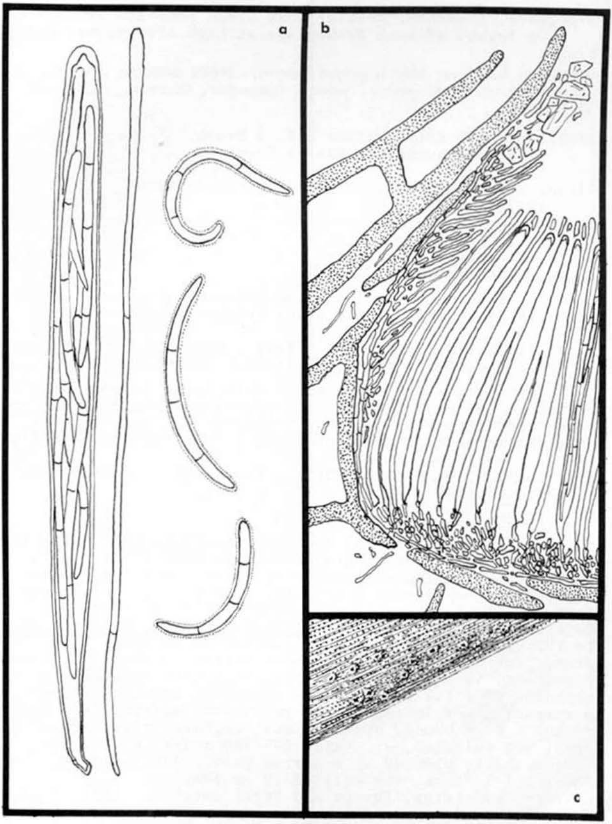

FIGURE 74. *Stictis helicospora*. a. Ascus, paraphysis, and spores, x1500. b. Cross section of margin, x750. c. Habit sketch, x7.5. Drawn from NY-Co 4203.

periphysoids 10 x 1.5 µm. Crystalline layer poorly-developed, 10 µm thick. Paraphyses filiform, 1.0 µm broad below, enlarged to 1.5 m at the apex, simple, J-, colorless. Asci 80-90 x 3.5-4 µm, the apex 2.5 µm thick, pierced by a broad pore. Ascospores 8, irregularly 4-seriate, 35-50 x 1.5 µm, 3-septate, sheathed, coiling when freed from the ascus.

On leaves of tank Bromeliads at high elevations, Colombia.

SPECIMENS SEEN (see also holotype, above): SOUTH AMERICA: Colombia (NY-Co 4400, Dpto. Cundinamarca, Dumont, Carpenter, Sherwood, Molina, 9.VI.1976)

(104). STICTIS HELICOTRICHA Ell. & Everh.
= *Stictis pustulata* Ell. & Everh.

(105). (STICTIS HEMISPHAERICA) Fr., Syst. Mycol. 2(1): 196 (1822)
≡ *Odontotrema hemisphaerica* (Fr.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 205 (1888)
≡ *Xylopezia hemisphaerica* (Fr.) Höhn., Ann. Mycol. 15: 308 (1917)

The species, which is a Loculoascomycete with bitunicate asci, is discussed briefly under *Xylopezia*, above.

(106). (STICTIS HIPPOCASTANI) Pers., Myc. Eur. 1: 336 (1822)
= *Propolomyces farinosus* (Pers.) Sherwood

The species was synonymized with *Hysterium fagineum* Schrad. by Streinz (1862). The protologue suggests that it is a *Propolomyces* rather than a *Stictis*. I have seen no original material of *S. hippocastani*. See Sherwood (1977).

(107). STICTIS HYDRANGEAE Schw., Trans. Amer. Philos. Soc. n.s. 4: 179 (1832)

Figure 75

Apothecia scattered, at first immersed, then partially erumpent, opening by a pore 0.7-1.0 mm diam., the margin thick, white-pruinose, usually splitting into lobes, the disc moderately deeply urceolate, pinkish, splitting away from the margin at maturity. Margin in cross section 3-layered, lacking a stroma or thalline margin, the wall up to 100 µm thick, of interwoven colorless hyphae 1.0-1.5 µm diam., surrounded by a gelatinous matrix; crystalline layer prominent, 50 µm thick, of large, colorless crystals. Periphysoids 40 x 1.5 µm, septate, sometimes branched, forming a compact layer imbedded in a gelatinous matrix, J-. Paraphyses 1.0 µm broad, branched and elegantly circinate at the apex, not enlarged, J-. Asci 275-300 x 5-6 µm, the cap 5.0 µm thick, pierced by a narrow pore. Ascospores 8, 250-300 x 1.5-1.75 µm, the cells 8-10 µm long.

On dead twigs, Europe and North America. This conspicuous species is apparently quite rare. *S. ramuligera*, a similar tropical species, differs in having a non-gelatinous margin and short, unbranched periphysoids.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-D-3902, sine coll., part of type of *S. hydrangeae* ex PH; 50884, on *Hydrangea*, Indiana, Rogerson; D-12248, on *Hydrangea*, North Carolina). Canada (NY, Ontario, Dearness 7/9/1889). EUROPE: Italy? (ZT, Arcegnoe, Raschle, 20.VII.1974)

(108). (STICTIS HYPODERMIA) Bres.

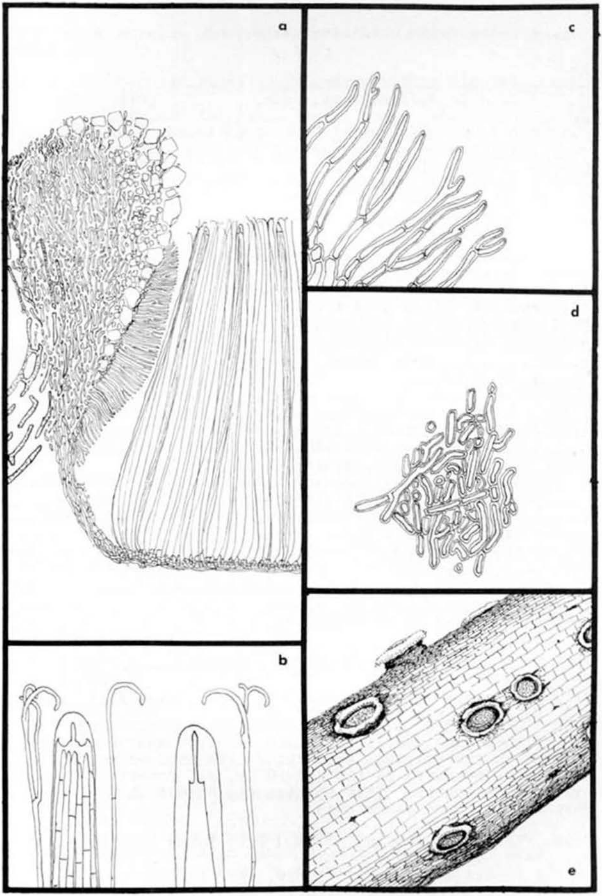

FIGURE 75. *Stictis hydrangeae*. a. Cross section of margin, x225. b. Detail of apices of asci, paraphyses, and spores, x1500. c. Periphysoids, x750. d. Wall hyphae, x750. e. Habit sketch, x7.5. Drawn from CUP-D 50884.

= *Schizoxylon albo-atrum* Rehm, q.v.

(109). *STICTIS HYSSOPI* Schw.
= *Stictis radiata* Pers., q.v.

(110). *(STICTIS HYSTERINA)* Fr., Syst. Mycol. 2(1): 199 (1822)
≡ *Melittosporium hysterinum* (Fr.) Gillet, Discom. 187 (1886)
≡ *Xylogramma hysterinum* (Fr.) Rehm in Rabenh., Krypt.-Fl. 2, 1(3): 171 (1888)
= *Hysterium stictoideum* Cke. & Ell., Grevillea 7: 7 (1878)

A note with Ellis and Everhart's North American Fungi 1281a says "Dr. Th. M. Fries has compared this spec. to *S. hysterina* in his father's herbarium and considers it to be that species." This is a typical *Melittosporium* with brown muriform spores and bitunicate asci. Additional synonyms are given by Rehm (1887-96).

Specimen examined: NORTH AMERICA: USA (OSC, Ellis & Everhart, North American Fungi 1281a)

(111). *(STICTIS HYSTERIOIDES)* Desm., Ann. Sci. Nat. Bot. sér. 2, 19: 365 (1843)
≡ *Propolis hysterioides* (Desm,) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 255 (1870)
≡ *Naemacyclus hysterioides* (Desm.) Fckl., Jahrb. Nassauischen Vereins Naturk. 27-28: 50 (1873)
≡ *Phragmonaevia hysterioides* (Desm.) Rehm in Rabenh., Krypt.-Fl. 2, 1(3): 162 (1888)
≡ *Hysteropezizella hysterioides* (Desm.) Nannf., Nova Acta Regiae Soc. Sci. Upsal. ser. 4, 8: 118 (1932)

Rehm's Ascomyceten 1954, which Nannfeldt examined, is indeed a *Hysteropezizella*, or closely allied. I have seen no type material of this species, but it is unlikely that it is Ostropalean.

SPECIMEN EXAMINED: EUROPE: (CUP-D-12025, Rehm, Ascomyceten 1954)

(112). *(STICTIS ILLICINA)* Grelet & de Crozals, Bull. Soc. Mycol. France 44: 337 (1928)

I have been unable to locate the type specimen. According to the original description the asci were conic-attenuate, measured 90-110 x 9-10 µm, and contained long-cylindrical spores. This species may be a member of the Phacidiales, such as *Colpoma*.

(113). *(STICTIS INCLUSA)* (Pers.) Fr., Summa Veg. Scand. sect. post. 373 (1849)
≡ *Peziza inclusa* Pers., Myc. Eur. 1: 307 (1822)
≡ *Patellaria inclusa* (Pers.) Karst., Bidrag. Kännedom Finlands Natur Folk 19: 236 (1871)
≡ *Odontotrema inclusa* (Pers.) Karst., Acta Soc. Fauna Fl. Fenn. 2(6): 146 (1885)

On wood. From the published descriptions, this is probably a species of *Xylogramma*. I have seen no original material.

(114). STICTIS INCARNATA (Quélet) Sacc., Sylloge Fung. 8: 684 (1889)
≡ *Schmitzomia incarnata* Quél., Compt. Rend. Assoc. Franc. Avancem. Sci. (La Rochelle, 1882) 11: 408 (1883)

I have been unable to locate a specimen of *S. incarnata*. The original description suggests that it is indeed a *Stictis*, but will not serve to characterize it further. It may be a form of *S. radiata*.

(115). (STICTIS INDICA) Tilak & Nanir
= *Schizoxylon lantanae* (Tilak & Nanir) Sherwood, q.v.

(116). STICTIS INSCULPTA Wallr., Fl. Crypt. Germ. 2: 442 (1833)

No material of this species remains in Wallroth's herbarium (STR). The original description will not serve to characterize it.

(112). SCHMITZOMIA INSIGNIS de Not., Comment. Soc. Crittog. Ital. 2: 316 (1867)
≡ *Schizoxylon insigne* (de Not.) Rehm in Rabenh., Krypt. -Fl. 2, 1(3): 1253 (1896)

I was unable to obtain type material from Rome. The specimen in Saccardo's herbarium is authentic and agrees with the original description; it is, however, overmature, and will not serve to characterize the species. It consists of orbicular fruitbodies with a margin of dark brown hyphae and crystalline material, without periphysoids. The hymenium is J- and lacks asci and spores. This may be *Stictis mollis* or *Schizoxylon albo-atrum*.

SPECIMEN EXAMINED: EUROPE: Italy (PAD, Erbar. Crittogam. Ital. ser. 2, 587, on *Salix*, Carestia)

(118). STICTIS INTERMEDIA Speg.
≡ *Stictis radiata* Pers. subsp. *intermedia* (Speg.) Sacc., q.v.

(119). (STICTIS JANGAE) "Farlow" in Gola, Atti Acad. Sci. Veneto Trent. Istriana 21: suppl. 1, 139 (1930), lapsus calami for *S. tsugae* Farlow, q.v.

(120). STICTIS JAVANICA Sherwood, spec. nov.

Figure 76

Ascocarpi primum immersi, profunde cupulati, 0.2-0.4 mm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 50 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum 25-30 µm crassum. Periphysoidea 10 x 1.5 µm, non ramosa. Paraphyses filiformes, ramosae, 65-70 x 1.0 µm, in iodo non caerulescentes. Asci 60-65 x 10 µm, apice 5.0 µm crassi, 8-spori. Sporae 42-50 x 2.5 (-3) µm, cellulis 6-7 µm longis.

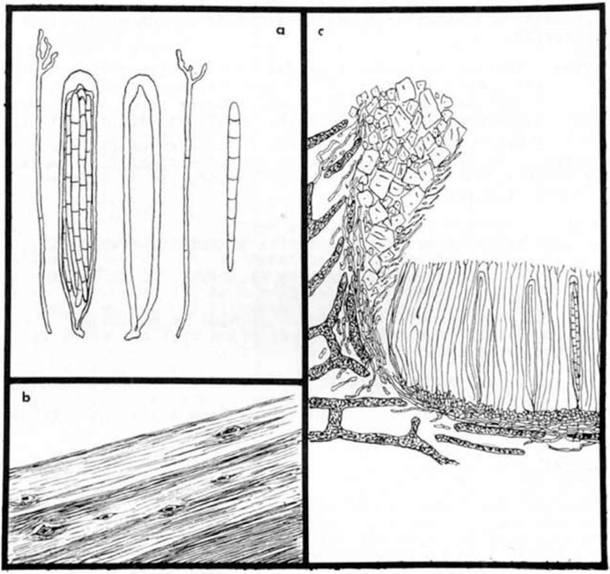

FIGURE 76. *Stictis javanica.* a. Asci, paraphyses, and spores, x750. b. Habit sketch, x7.5. c. Cross section of margin, x375. Drawn from the holotype.

HOLOTYPUS: CUP-Sa 415, on decaying stem of cultivated sedge, Tijbodas, Java, M. Rifai & R.P. Korf, 25.XII.1961.

Apothecia at first immersed, opening by a pore, not erumpent, 0.2-0.4 mm diam., elliptical in outline, the margin thin, entire, white-pruinose, the disc deeply-urceolate, pale ochraceous. Margin in cross section 50 µm thick, the wall colorless, nearly obsolete, the crystalline layer prominent, of moderately large, non-uniform crystals, the periphysoids unbranched, colorless, 10 x 1.5 µm. Hymenium J- throughout. Paraphyses numerous, filiform, 1.0 µm diam., branched and propoloid at the apex. Asci 60-65 x 10 µm, very thick-walled when young, the cap 5 µm thick, pierced by a broad pore. Spores 42-50 x 2.5-3 µm, tapering below, 7-septate.

On a sedge, Java. *S. dumontii* is similar, but has 4-spored asci and larger, more closely-septate spores.

SPECIMEN EXAMINED: See holotype, above.

(121). *STICTIS JUNCI* (Karst.) Velenovský
= *Stictis elevata* (Karst.) Karst., q.v.

(122). *STICTIS KAMATII* Tilak & Kale, Maharashtra Vidnyan Patrika 5(1-2): 4-8 (1970)

Cited in a key by Tilak & Nanir (1975). The journal is apparently unavailable and I have received no answer to requests for reprints and specimens from the above authors. Not cited in Index of Fungi.

(123). STICTIS KORFII Sherwood, spec. nov.

Figure 77

Ascocarpi primum immersi, profunde cupulati, 0.7-1.0 mm diam., margine integro, griseo, disco brunneo. Margo in sectione transversali 130 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., brunneo. Stratum crystallinum 80 µm crassum. Periphysoidea 100 x 1.5 µm, ramosa. Paraphyses filiformes, simplices, 200 x 1.0 µm, brunneae, in iodo non caerulescentes. Asci 190-205 x 7-8 (-9) µm, apice 5.0 m crassi, 8-spori. Sporae 180 x 1.0-1.5 µm, cellulis 5-7 µm longis.

HOLOTYPUS: MPU-Maire 5104, in ramis emortuis *Anagyridis foetidae*, Algeria, 25.XI.1917.

Apothecia at first immersed, opening by a pore, not erumpent, 0.7-1.0 mm broad, the margin pale grey, entire, prominent, the disc deeply urceolate, brown, splitting away from the margin when dry. Margin in cross section 130 µm thick, without a prominent accessory thalline margin, the wall 40 µm thick at its broadest point, of brown, non-carbonized, non-gelatinizing hyphae 1.5 µm diam., not continuing beneath the subhymenium. Crystalline layer 60-80 µm thick, of large non-rosettiform crystals interspersed with brown hyphae and amorphous material. Periphysoids 100 x 1.5 µm, numerous, richly-branched, imbedded in gel and forming a very conspicuous layer. Subhymenium 40 µm thick, of small, colorless, angular cells, resting on disintegrating host tissue, J-. Paraphyses numerous, filiform, simple, 1.0 µm diam. below, enlarged to 1.5-2.0 µm at the apex, brown above, J- or weakly J+ blue, exceeding the asci by 15 µm and forming a distinct epithecium. Asci 190-205 x 7-8 (-9) µm, thick-walled when young, the cap 5 µm thick, pierced by a conical pore. Ascospores 8, 180 x 1-1.5 µm, filiform, septate, the cells 5-7 µm long.

On twigs, Algeria and Azerbaijan. Brown paraphyses and very long periphysoids distinguish this species from *S. mollis* and *S. fusca*. *S. viticola* has spores twice as long. The species is named after R. P. Korf, the author's thesis advisor.

SPECIMENS EXAMINED (see also holotype, above): AFRICA: Algeria (MPU, Maire 2306, Ouer-El-Allerg. 22.VII.1914, Duvernoy). ASIA: (K, ex TAA, on wood, Azerbaijan S.S.R. dist. Lezinki, Kaitis 43133)

(124). *(STICTIS KUMMERAE)* P. Henn., Bot. Jahrb. Syst. 28: 328 (1900)

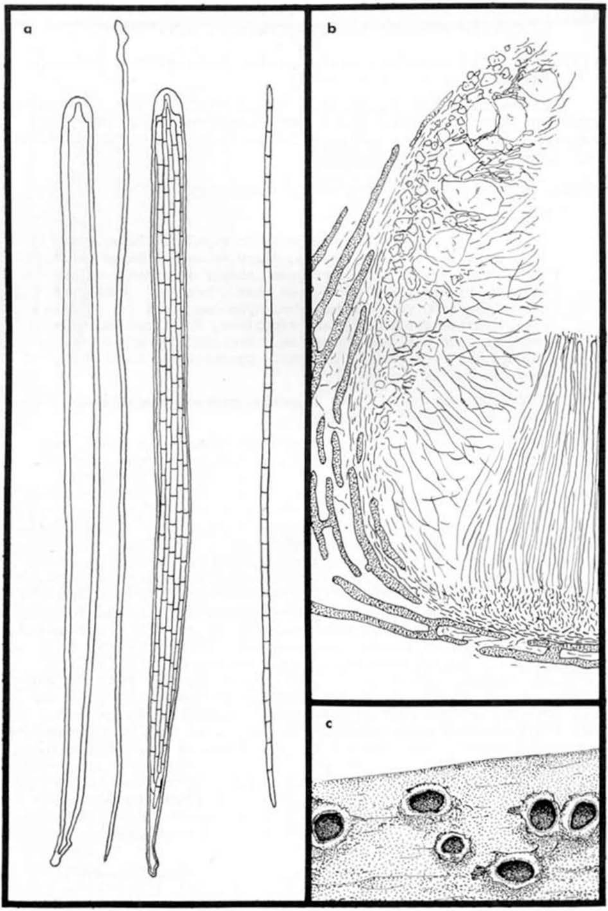

FIGURE 77. *Stictis korfii*. a. Asci, paraphysis, and spores, x750. b. b. Cross section of margin, x225. c. Habit sketch, x7.5. Drawn from the holotype.

No material of this species remains at Berlin, and I have been unable to locate a specimen identified as *Stictis kummerae*. The species was described as occurring in discolored spots on leaves in tropical Africa, and was said to open by teeth. Judging by Henning's statement that the species was allied to *S. quadrifida* and *S. panizzei*, this is probably a *Propolis*. The original description should provide enough information to neotypify the species.

(125). (STICTIS LACERA) Mont., Ann. Sci. Nat. Bot. sér. 4, 14: 180 (1860)
≡ *Cryptodiscus lacer* (Mont.) Sacc., Sylloge Fung. 8: 672 (1889)

I received no specimens in response to a request to PC for the type of this species, and could find no specimen at FH. According to the original description, the species grew on stems of Labiatae and had apothecia 0.5 mm in diameter which opened by teeth. The asci were 80 μm long, paraphysate, and contained 3-septate fusiform spores 10 x 5 μm. The description does not correspond to any species treated by Défago (1967) or by Hein (1976) in their monographs of immersed Dermateaceae. In the absence of any specimen or description of a fungus on a similar host which would correspond to *S. lacera,* I am unable to place the species, other than to suggest that it is probably an immersed member of the Dermateaceae, rather than Ostropalean.

(126). (STICTIS LAMYI) Mont. in Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 145 (1888), pro synon.
≡ *Cryptodiscus lamyi* (Mont.) Rabenh., Bot. Zeitung (Berlin) 9: 454 (1851), sine descr.
≡ *Naevia lamyi* (Mont.) Rehm, l.c.

Apparently based on a manuscript or herbarium name of Montagne's. Neither Rehm (l.c.) nor Rabenhorst (l.c.) cite a Montagne reference, and I have been unable to locate one. A specimen labelled *S. lamyi* in Montagne's herbarium is a *Diplonaevia (=Merostictis)*. The name, however, would appear to be tied to the only specimen mentioned when it was first validly published, by Rehm in 1888. This is a specimen in Winter's herbarium, on *Juncus*. I have not seen it, but according to Rehm (1887-96) it differed from *Stictis* (now *Merostictis*) *circinata* only in having more deeply sunken, lighter colored apothecia.

(127) (STICTIS LANTANAE) Tilak & Nanir
≡ *Schizoxylon lantanae* (Tilak & Nanir) Sherwood, q.v.

(128). STICTIS LANUGICINCTA Fairman in Millspaugh & Nuttall, Publ. Field Columbian Mus. Bot. ser. 5: 341 (1923)

Figure 78

Apothecia at first immersed, opening by a pore, raising the substrate into small pustules but not becoming erumpent, 0.3-0.5 mm broad, the margin brown, grey-pruinose, entire to lacerate, the disc deeply urceolate, brown. Margin in cross

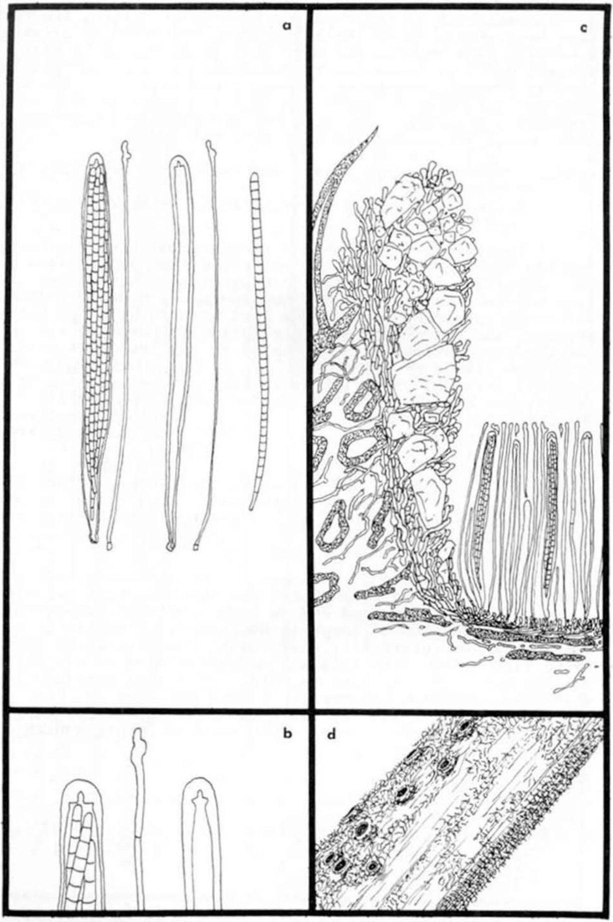

FIGURE 78. *Stictis lanugicincta*. a. Asci, paraphyses, and spores, x750. b. Detail of apices of asci, paraphysis, and spores, x1500. c. Cross section of margin, x375. d. Habit sketch, x7.5. Drawn from the holotype.

section 50-75 µm thick, without a prominent accessory thalline margin, the wall 10-15 µm thick, of interwoven, non-gelatinizing hyphae 2.0 µm diam., brown, the crystalline layer prominent, interspersed with brown hyphae; periphysoids brown, 2.0 µm diam., short, not abundant. Hymenium splitting away from the margin when dry. Subhymenium colorless, c. 10 µm thick, of small angular cells, J-. Paraphyses numerous, filiform, 1.0 µm broad below, enlarged to 1.5 µm at the tip, rarely branched, J+ greenish. Asci thick-walled when young, 85-100 x 5-6 (-8) µm, the cap 3.0 µm thick, pierced by a broad pore. Ascospores 8, 80-85 x 2.0 µm, tapered below, not sheathed, septate, the cells 2.0 µm long.

On *Marrubium*, California, USA. Distinguished from *S. caballeroi*, a closely allied species, by the brown paraphysis apices and poorly differentiated periphysoids.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-Fairman 5070, on *Marrubium*, Santa Catalina Island, California, holotype of *Stictis lanugicincta*)

(129). (STICTIS LECANORA) (Kunze & Schmidt) Fr.
= *Stictis ocellata* (Pers.) Fr., q.v.

(130). (STICTIS LEONIS) Tulasne & Tulasne, Sel. Fung. Carp. 3: 127 (1865)
≡ *Propolis leonis* (Tul. & Tul.) Rehm, Ascomyceten #360 (1876)

This distinctive conifer-inhabiting species, with equilateral, thick-walled, unicellular spores, is a *Propolomyces*. I have not seen original material, but the specimen cited agrees well with the original detailed description.

SPECIMEN EXAMINED: NORTH AMERICA: USA (Herb. Sherwood 2030, on cones of *Pinus*, Oregon, 20.VIII.1975)

(131). (STICTIS LEPRIEURII) Mont., Ann. Sci. Nat. Bot. sér. 4, 3: 97 (1855)
≡ *Cryptodiscus leprieurii* (Mont.) Sacc., Sylloge Fung. 8: 672 (1889)
≡ Phaeotrema leprieurii (Mont.) Sherwood, comb. nov.

Four specimens labelled by Montagne as *S. leprieurii* are deposited in Patouillard's herbarium at FH. Three (Leprieur 806, 807, 808) are mentioned in the original description. These appear to represent two different species of *Phaeotrema*. I chose to leave the problem of selection of a lectotype to someone better versed in the systematics of the Thelotremataceae.

(132). (STICTIS LICHENICOLA) Mont., Ann. Sci. Nat. Bot. sér. 2, 5: 281 (1836)
≡ *Melittosporium lichenicolum* (Mont.) Massee, Brit. Fungus-Fl. 4: 88 (1895)
= *Diploschistes scruposus* (Schreb.) Norm. var. *parasiticus* (Sommerf.) Zahlbr., Cat. Lich. Univ. 2: 672 (1924)

I have seen none of the original material, but Montagne's figures and description show a fungus with brown

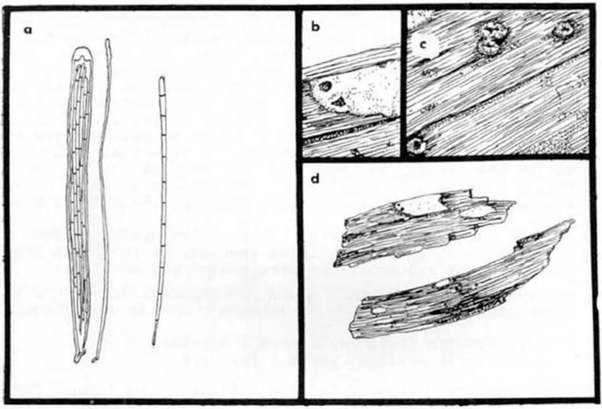

FIGURE 79. *Stictis lichenoides*. a. Ascus, paraphysis, and spores, x750. b. Habit sketch of apothecia imbedded in "thallus", x7.5. c. Habit sketch of solitary apothecia, x7.5. d. Sketch of type specimen, x0.75. Drawn from the holotype.

muriform spores with lenticular cell lumen, a spore type unknown in the Stictidaceae but characteristic of *Diploschistes* (Thelotremataceae).

(133). STICTIS LICHENOIDES Speg., Bol. Acad. Nac. Ci. 11: 276 (1887)

Figure 79

Apothecia at first immersed, soon becoming erumpent and at length nearly superficial, 0.3-0.5 mm diam., solitary or immersed in patches of crystalline material and colorless hyphae of uncertain origin, the margin thick, white-pruinose, involute, the disc deeply urceolate, pale ochraceous. Paraphyses numerous, simple, filiform, not apically enlarged, J-. Asci 75-80 x 5 µm, the cap 3.5 µm thick, pierced by a broad pore. Ascospores 8, 70 x 0.8 µm, septate, the cells 6-7 µm long.

On *"Fagus" (Nothofagus)*, Tierra del Fuego. Known only from an extremely fragmentary type collection. The margin in the apothecium I sectioned was predominantly crystalline and disintegrating. Additional collections of this species, which should be recognizable on ascospore and paraphysis characters, are needed to determine whether the so-called thallus of crystalline material is constantly associated with it.

SPECIMEN EXAMINED: SOUTH AMERICA: Argentina (LPS 28228, on *Fagus*, Isla de los Estados, III-1882, holotype of *Stictis lichenoides*)

(134). (STICTIS LIGUSTRI) Schw.
≡ *Schizoxylon ligustri* (Schw.) Sherwood, q.v.

(135). (STICTIS LINEARIS) Cke. & Ell., Grevillea 7: 7 (1878)
≡ *Xylogramma lineare* (Cke. & Ell.) Sacc., Sylloge Fung. 8: 678 (1889)

This species, with immersed, elongate black ascocarps, rather thick-walled asci which are J- and lack an obvious apical apparatus, and 3-septate colorless spores, is a typical *Xylogramma*.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D-9373, Ellis & Everhart, North American Fungi 569, on *Vaccinium* and *Acer*, Feb. 1878. [authentic])

(136). (STICTIS LONGA) (Pers.) Fr., Syst. Mycol. 2(2): 594 (1823)
≡ *Hysterium longum* Pers., Syn. Meth. Fung. 1: 99 (1801)
≡ *Xylogramma longa* (Pers.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 171 (1888)

I have seen no original material, but it is clear from the published descriptions that this is not a *Stictis*. Phillips (1887) considered the species to be a *Xylographa*, but did not make the combination.

(137). (STICTIS LOPHODERMOIDES) Seaver & Waterston
= *Stictis macularis* Berk. & Curt., q.v.

(138). STICTIS LUMBRICUS Sherwood, spec. nov.

Figure 80

Ascocarpi primum immersi, profunde cupulati, 0.3-0.5 mm diam., margine integro, nigro, disco brunneo. Margo in sectione transversali 100 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 4 µm diam., brunneo. Stratum crystallinum abest. Periphysoidea 25 x 2.0-2.5 µm, non ramosa. Paraphyses filiformes, ramosae, 200 x 1.0 µm, apice ad 3.0 µm incrassatae, brunneae, in iodo non caerulescentes. Asci 200 x 12-16(-20) µm, apice 3-4 µm crassi, 8-spori. Sporae 150-180 x 4.5-6 µm, cellulis 2-4 µm longis.

HOLOTYPUS: BPI, Fungi of West Pakistan 14924, on *Pinus*, Kaghan Valley, Shagran, 16.VII.1951, S. Ahmad.

Etymology: From *Lumbricus*, an earthworm, from the appearance of the broad, closely-septate spores.

Apothecia deeply immersed, opening by a pore, not becoming erumpent, 0.3-0.5 mm diam., the margin entire, narrow, dark grey-pruinose, the disc dark brown, deeply urceolate, splitting away from the margin when dry. Margin in cross section c. 100 µm thick, without a prominent accessory thalline margin, the wall 70 µm thick, of dark, interwoven, non-carbonized hyphae 4.0 µm diam. A distinct crystalline layer is absent, although there are scattered crystals imbedded in the wall, particularly along its upper face. Periphysoids numerous, unbranched, 25 x 2.0-2.5 µm, colorless, J-. Paraphyses numerous, filiform, 1.5 µm diam. below, inflated to 3.0 µm at the tip, branched, apically brown and

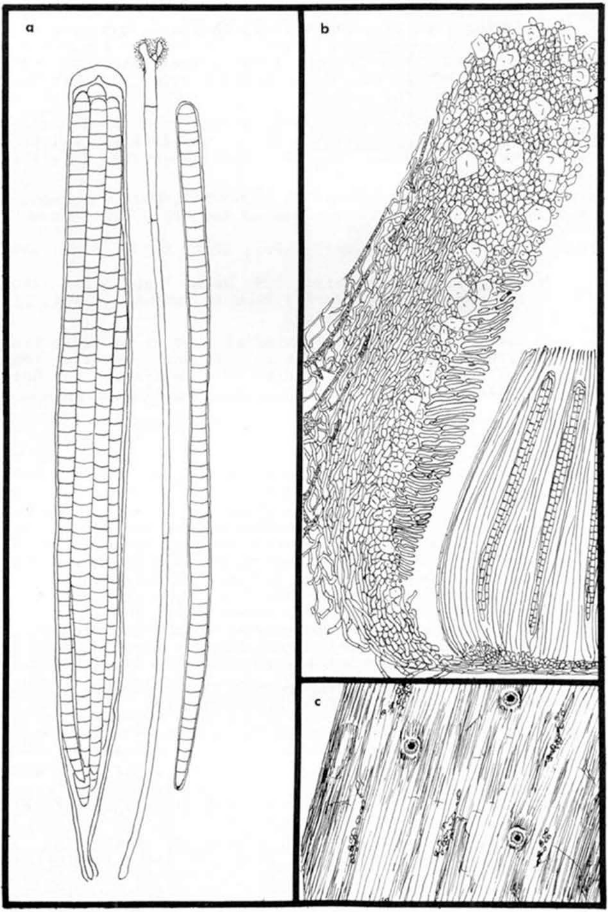

FIGURE 80. *Stictis lumbricus*. a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x300. c. Habit sketch, x7.5. Drawn from the holotype.

crystalliferous, J-, imbedded in brown amorphous material, forming an epithecium. Marginal paraphyses consisting of a single layer of agglutinated paraphyses which are brown along their entire length. Asci 200 x 12-16 (-20) µm, thick-walled when young, the cap 3.0-4.0 µm thick, pierced by a broad pore, not prominent. Ascospores 8, not obviously sheathed, not coiling when freed from the ascus, 150-180 x 4.5-6 µm, septate, the cells 2-4 µm long.

On decorticated wood of *Pinus*, Pakistan. The species is quite distinct from *S. pachyspora*, the only other species which remotely resembles it. *S. pachyspora* has sheathed, coiling spores, and lacks marginal paraphyses.

SPECIMEN EXAMINED: See holotype, above.

(139). *STICTIS LUPINI* Phil. & Harkn., Bull. Calif. Acad. Sci. 1: 5 (1885)
= *Stictis valdiviensis* Speg., Contrib. Estud. Hongos Chilensis 130 (1910)

Figure 81

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.3-0.6 mm diam., the margin thin, white-pruinose, usually entire, the disc deeply urceolate, pale ochraceous. Margin in cross section 50-75 µm thick, without a distinct accessory thalline margin, the wall 10-15 µm thick, of interwoven colorless hyphae 1.5 µm diam., the crystalline layer prominent, of heterogeneous, non-rosettiform crystals. Periphysoidal layer compact, of unbranched hyphae 20-25 x 2.0 µm. Asci 90-100 x 5-6(-8) µm, thick-walled when young, the cap 3.5 µm thick. Paraphyses simple, filiform, 1.0 µm diam, barely enlarged apically, J-. Ascospores 8, irregularly 4-seriate, 45-60 x 3-3.5 µm, tapered below, obscurely sheathed, not coiling when freed from the ascus, septate, the cells 2-5 µm long.

On *Lupinus*, California, and *Lobelia*, Chile. Short, sheathed, closely-septate spores distinguish the species from *S. stellata*, which it otherwise resembles.

SPECIMENS EXAMINED: NORTH AMERICA: USA (K, on *Lupinus*, Harkness 3164, holotype of *S. lupini*)(K, CUP-D-3385, Rabenh.-Wint. F. Eur. 3462, on *Lupinus*, California; CUP-D-9364, Ellis & Everhart, North American Fungi 2?53, on *Lupinus*, California). SOUTH AMERICA: Chile (LPS 28223, on *Lobelia*, Valdivia 1-1909, Spegazzini, holotype of *S. valdiviensis*)

(140). *STICTIS LUZULAE* Lib.
= *Stictis arundinacea* Pers., q.v.

(141). *STICTIS MACROLOMA* Dur. & Lév., Expl. Sc. Alg. Atlas pl. 29, f. 6 (1850)

I was unable to locate any original material of *Stictis macroloma*. Judging from this illustration, which is not accompanied by text, this is a species similar to *S. mollis*, with a dark brown margin, brown disc, and asci between 100 and 200 µm long, if the figure is drawn to the same scale as *S. oculiformis (=S. thelotrema* Dur. & Lév.*)*, which appears on the same page. The spores appear filiform and septate, and the paraphyses entirely colorless. It would be desirable to

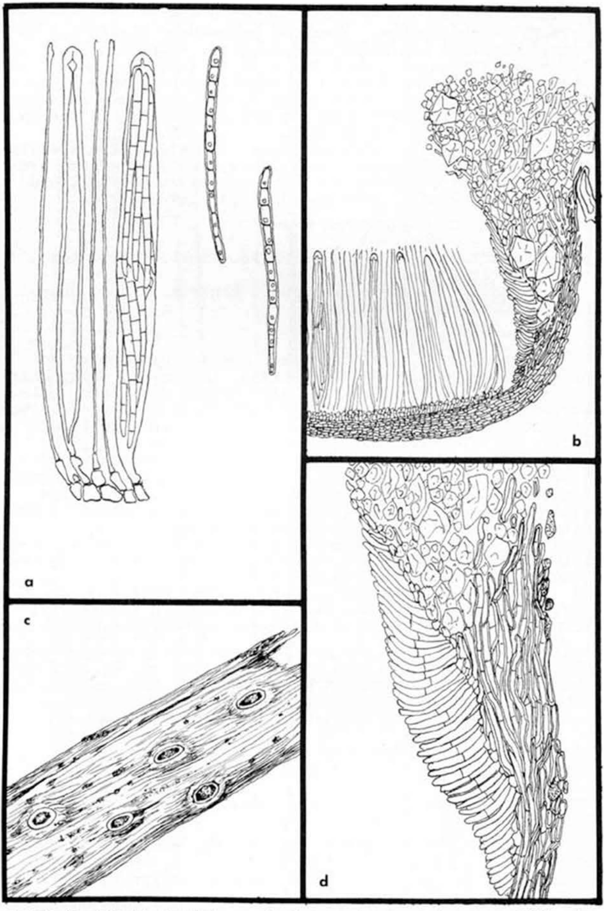

FIGURE 81. *Stictis lupini.* a. Asci, paraphyses, and spores, x750. b. Cross section of margin, x300. b. Cross section of margin, x300. c. Habit sketch, x7.5. d. Detail of wall and periphysoids, x750. Drawn from Rabenh.-Wint. F. Eur. 3462 (CUP-D)

know more about the *Stictis* spp. of Algeria before attempting to neotypify the species.

(142). (STICTIS MACULARIS) Berk. & Curt., J. Linn. Soc., Bot. 10: 371 (1868)
≡ *Naemacyclus macularis* (Berk. & Curt.) Sacc., Sylloge Fung. 8: 702 (1889)
= *Stictis lophodermoides* Seaver & Waterston, Mycologia 32: 400 (1940)

This is a true *Naemacyclus*, opening by splitting the surface of the substrate by a longitudinal slit. The linear fruitbodies occur on whitened patches of grasses and sedges, and have a very reduced margin consisting of 1 layer of globose brown cells. The asci are 50-65 x 8 µm, pointed, J-, thin-walled, and contain 8 acicular, apparently unicellular spores, 55 x 2.0 µm.

SPECIMENS EXAMINED: NORTH AMERICA: Cuba (FH, Curtis Herb. 711, on *Cyperus*, isotype of *Stictis macularis*). Bermuda (NY, on grass, Seaver et al. 1469, holotype of *S. lophodermoides*).

(143). STICTIS MARATHWADENSIS Tilak & Kale, Mycopathol. Mycol. Appl. 38: 381 (1969)

I received no answer to my inquiries to the authors for type or authentic material of this species. According to the original description the species was sometimes white and sometimes black, and had ascospores 220-285 x 0.8-1.6 µm. The illustration suggests that this is indeed a *Stictis* and not *Stictis radiata;* I am unable to characterize it further.

(144). (STICTIS MARITIMA) Rolland, Bull. Soc. Mycol. France 14: 84 (1898)
= *Lasiostictis fimbriata* (Schw.) Bäuml.

For a discussion of this species, see Sherwood (1974).

(145). STICTIS MAYDIS P. Henn., Hedwigia 41: 305 (1902)

No original material remains at Berlin, and I have been unable to locate any specimens identified as *S. maydis*. According to the original description, the species occurred on bleached spots on leaves of *Zea mays*, opened by splitting the substrate irregularly, and had asci 35-55 x 5-7 µm containing spores 30-50 x 1.5 µm, surrounded by filiform, branched paraphyses. It is not clear from the description whether this is a *Propolis*, *Karstenia*, or *Stictis* similar to *Stictis javanica* (q.v.).

(146). STICTIS MEGARRHIZAE Phil. & Harkn.
= *Stictis monilifera* Phil. & Harkn., q.v.

(147). (STICTIS MICROSTICTA) Mont., Ann. Sci. Nat. Bot. sér. 4, 3: 97 (1855)

I was unable to obtain any specimen labelled *S. microsticta* from either PC or FH. According to the original description the species had fruitbodies c. 0.25 mm diam., a stellate, white margin, pruinose hymenium, and linear, 4-

septate, colorless spores. Montagne (l.c.) distinguished *S. microsticta* from *S. leprieurii* on the basis that the former had a pruinose, blue-grey hymenium. *S. microsticta* may well be a lichen in the Thelotremataceae, but it cannot be characterized from the description alone.

(148). *(STICTIS MICROSTOMA)* Carm. apud. Berk. in Hooker
≡ *Cryptodiscus microstomus* (Carm. apud. Berk. in Hooker) Sacc., q.v.

(149). *(STICTIS MINIATA)* Niessl in Gola, Atti Acad. Sci. Veneto Trent. Istriana 21: suppl. 1, 139 (nom. nud.)

A specimen is listed in the catalogue of Saccardo's herbarium (Gola, l.c.) as a type, but the name seems to be otherwise unpublished. The specimen is apparently an immature, immersed Dermateaceous fungus.

SPECIMEN EXAMINED: (PAD, on *Eryngium*, sine loc., Niessl)

(150). *STICTIS MINIMA* Sacc. & Speg.
= *Stictis stellata* Wallr., q.v.

(151). STICTIS MINOR Sherwood, spec, nov.

Figure 82

Ascocarpi primum immersi, profunde cupulati, 0.4-0.7 mm diam., margine integro vel lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 100 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum 80 µm crassum. Periphysoidea 15 x 1.5 µm, non ramosa. Paraphyses filiformes, simplices, 80 x 1.0 µm, in iodo non caerulescentes. Asci 75-85 x 3.0-3.5(-4) µm, apice 1.5 m crassi, 8-spori. Sporae 18-22 x 2.0 µm, cellulis 5-6 µm longis.

HOLOTYPUS: MAC, on poplar [*Populus*] log, Dearness and Bisby. [locality presumably in the vicinity of MAC in Winnipeg, Manitoba].

Etymology: The epithet *minor* (lesser) refers to the small asci and spores rather than to the overall dimensions of the ascocarp.

Apothecia at first immersed, opening by a pore, not becoming erumpent, 0.4-0.7 mm diam., orbicular, the margin white-pruinose, entire to lacerate, moderately prominent, the disc deeply urceolate, pale ochraceous, splitting away from the margin when dry. Margin in cross section up to 100 µm thick, without a prominent accessory thalline margin, the wall 10 m thick, poorly differentiated, of interwoven colorless hyphae 1.5 µm diam. Crystalline layer 80 µm thick, prominent, of small, uniform, colorless crystals. Periphysoids 15 x 1.5 µm, unbranched, not markedly gelatinous, J-. Subhymenium c. 10 µm thick, of small colorless angular cells, resting directly on disintegrating host tissue. Paraphyses numerous, simple, filiform, 1.0 µm broad, not enlarged apically, J-. Asci 75-85 x 3.0-3.5(-4) µm, the cap 1.5 µm thick, with a narrow pore. Ascospores 8, irregularly bi-

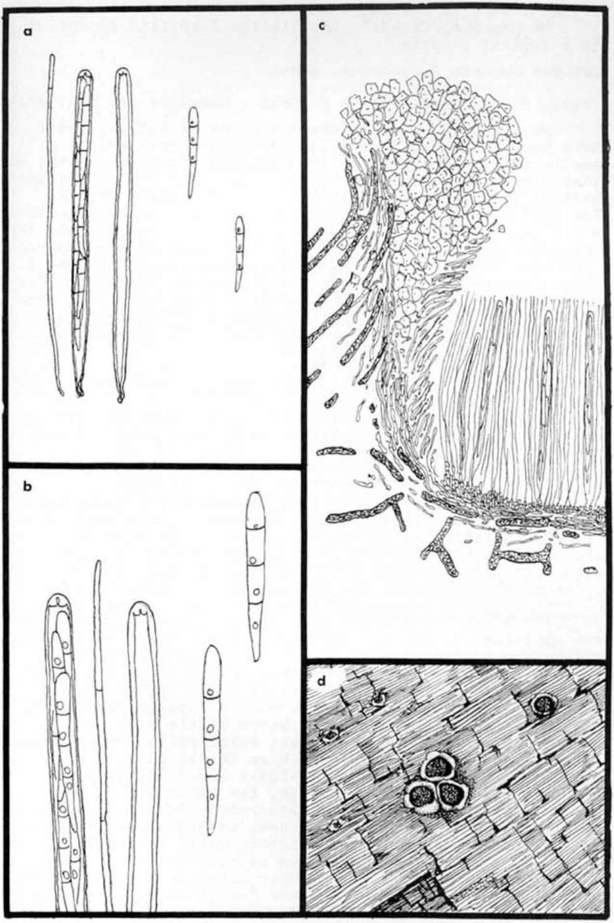

FIGURE 82. *Stictis minor*. a. Asci, paraphysis, and spores, x750. b. Detail of apices of asci, paraphysis, and spores, x1500. c. Cross section of margin, x375. d. Habit sketch, x7.5. Drawn from the holotype.

seriate, 18-22 x 2.0 μm, 3-septate.

On *Populus*, Canada? Despite the 3-septate spores, this is a typical *Stictis*.

SPECIMEN EXAMINED: See holotype, above.

(152). STICTIS MOELLERIANA P. Henn., Hedwigia 41: 17 (1902)

No specimen of this fungus remains at Berlin, and I have been unable to locate any specimen identified as *S. moelleriana*. According to the original description, the apothecia were approximately 1.0 mm diam., had a white-pruinose margin, and occurred on twigs at St. Catharine, Brazil. The asci were 600 x 16-20 μm and contained spores 380-430 x 7-9 μm, the cells 8-12 μm long. *Stictis xenospora* is the only species of *Stictis* or *Schizoxylon* with spores approaching these dimensions; it has spores which do not exceed 6.5 μm in breadth and are so obviously sheathed that it is difficult to believe that this character would have been overlooked by Hennings, whose description is otherwise fairly detailed. There should be no difficulty in recognizing *S. moelleriana* if it is recollected.

(153a). STICTIS MOLLIS Pers., Myc. Eur. 1: 337 (1822), subsp. *MOLLIS*
= *Stictis ollaris* Wallr., Fl. Crypt. Germ. 2: 444 (1833)
= *Stictis opuntiae* Rolland, Bull. Soc. Mycol. France 7: 212 (1891)

Figure 83

Apothecia at first immersed, opening by a pore, becoming partially erumpent, 0.5-1.2 mm diam., the margin massive, black, moderately grey-pruinose, entire, the disc deeply urceolate, brown. Margin in cross section 100-150 μm thick, without a prominent accessory thalline margin, the wall 50-75 μm thick, of interwoven non-carbonized brown hyphae 2.0 μm diam., rather gelatinous when wet. Crystalline layer poorly defined. There are some large crystals imbedded in the wall layer, and the outer face of the wall is crystalliferous. Subhymenium 10 μm thick, of small, colorless, angular cells, resting on a narrow extension of the brown wall layer, J-. Periphysoids 20-25 x 1.5 μm, mostly unbranched, sparse and inconspicuous. Paraphyses numerous, filiform, colorless to faintly brown at the apex, J-, not enlarged or branched above. Asci thick-walled when young, 150-200 x 7(-11) μm, the cap 3.0 μm thick, pierced by a broad pore. Ascospores 8, 150-180 x 2.0-2.5 (-3) μm, tapering somewhat below, septate, the cells 3-4 μm long.

On corticate and decorticated wood, Europe, Africa, and western North America. I have been unable to confirm any of the numerous reports from eastern North America. Many of the earlier reports are based on *Stictis sphaeroboloidea*.

Stictis pupula (q.v.), widely cited as a synonym, cannot, on the basis of material now deposited in the Friesian herbarium, be identified with *S. mollis*. As noted in the discussion of *Schizoxylon albo-atrum*, the names *St. mollis* and *St. pupula* were used by Persoon and Fries for a number of different fungi. Persoon included specimens of *Schizo-*

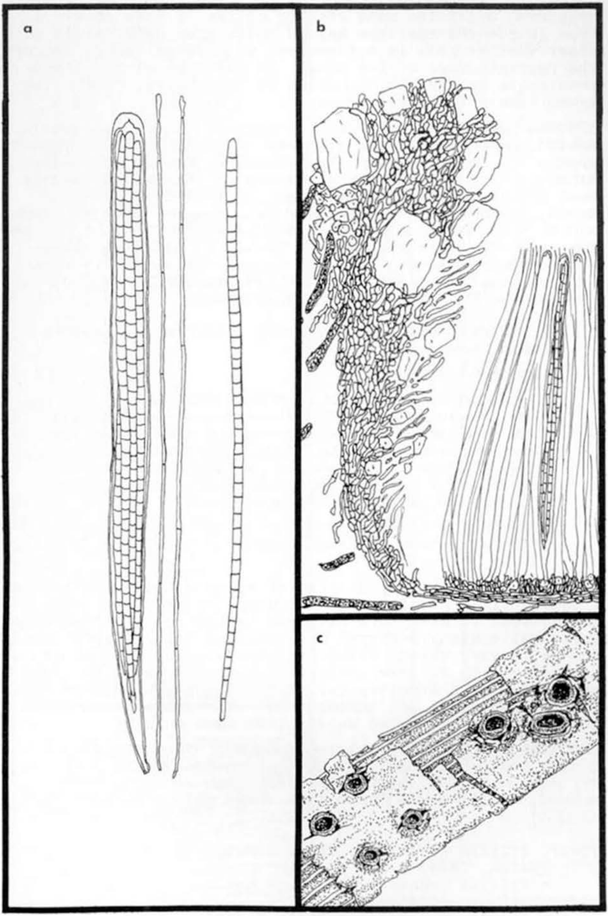

FIGURE 83. *Stictis mollis*. a. Ascus, paraphyses, and spores, x750. b. Cross section of margin, x375. c. Habit sketch, x7.5. Drawn from Rehm, Ascomyceten 22 (CUP-D).

xylon berkeleyanum and two different pyrenomycetes in his herbarium under the name *Stictis mollis*. I have chosen a type (since the specimen has no collection data, it is unclear whether this is a lectotype or neotype) which preserves the current usage of the name. No material of *S. ollaris* remains in Wallroth's herbarium at Strasbourg; I have followed Rehm's (1887-96) synonymy.

SPECIMENS EXAMINED: EUROPE: locality uncertain (L, herb. Persoon 910. 264-828, lectotype or neotype of *Stictis mollis*)(CUP-D 6691, Rehm Ascomyceten 22). France (FH, herb. Patouillard, on *Opuntia*, Golfe Juan, Rolland, holotype of *S. opuntiae*). Germany (B, Münster, det. by Rehm as *S. ollaris*, neotype, designated here, of *S. ollaris*). Norway (O, Malmoe, November 1840; on *Ulmus*, sine loc.; Ringeboe, on *Salix*, Sommerfelt II.1838). Sweden (UPS, Rommell 8.VII.1884)(CUP-D 120, on *Ligustrum*, Rommell 17.VII.1889). Greece? (G, on *Myrtus*, Ile de Levant, Müller 1859). AFRICA: South Africa (K, Boschberg, MacOwan 9/1883). Algeria (MPU, on *Reraia*, Atlas Mts., Bertault & Malençon, 9.III.1961). NORTH AMERICA: USA (NY, Ellis 259, on *Picea*, Colorado)

(153b). STICTIS MOLLIS Pers. subsp. POPULORUM Sherwood, subsp. nov.

Figure 84

Ascocarpi primum immersi, profunde cupulati, 0.5-1.0 mm diam., margine integro, albo, disco brunneo. Margo in sectione transversali 150-200 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., brunneo. Paraphyses filiformes, simplices, in iodo non caerulescentes. Asci 150-200 x 6-8 µm, apice 3.0 µm crassi, 8-spori. Sporae 150-180 x 2.0 µm, cellulis 4-6 µm longis.

HOLOTYPUS: H, on *Populus tremula* L., Inari Lappland, mesic alluvial woodlands by river Kaamasjoki, 23.VIII.1974. T. Ahti 29717.

Among collections of *Stictis radiata* from Scandinavia I encountered several specimens which proved, on closer inspection, to have dark marginal hyphae and a J- hymenium. These collections occurred on weathered decorticated wood and had a very thick, white-pruinose margin, and are referred here to *Stictis mollis* subsp. *populorum*. The subspecies differs from typical *S. mollis* in having more abundant periphysoids and somewhat narrower spores, and in occurring on decorticated wood rather than on bark.

SPECIMENS EXAMINED (See also holotype, above): Finland (H, HPP 7667, on *Sorbus*, Laurila 2.III.1937; HPP 7663, on *Populus*, Laurila 11.VIII.1936; HPP 7665, on *Populus*, Laurila 23.VI.1936). Sweden (UPS, herb. Fries, Småland, Femsjö). Norway (O, on *Ulmus*, Sommerfelt; on *Populus*, Linderun, XI.1840)

(154). STICTIS MONILIFERA Phil. & Harkn., Grevillea 12: 83 (March, 1884)
= *Stictis araucariae* Phil. & Harkn., Grevillea 13: 22 (Sept. 1884)
= *Stictis megarrhizae* Phil. & Harkn., *ibid.*

Figure 85

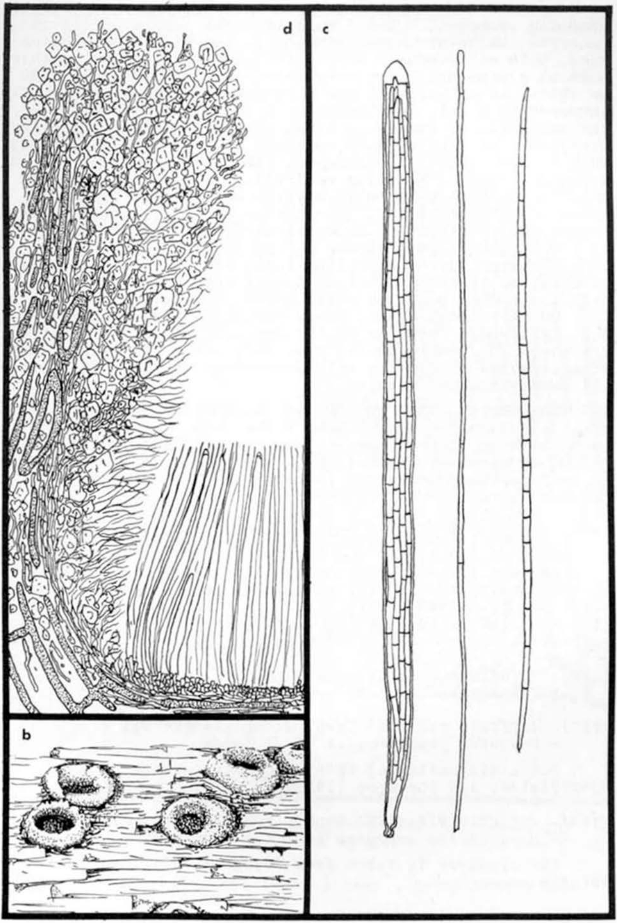

FIGURE 84. *Stictis mollis* subsp. *populorum*. a. Cross section of margin, x225. b. Habit sketch, x7.5. c. Ascus, paraphysis, and spores, x750. Drawn from the holotype.

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.2-0.5 mm diam., the margin entire to lacerate, white-pruinose, prominent, the disc deeply urceolate, pale ochraceous. Margin in cross section 100 µm thick, without a prominent accessory thalline margin, the wall 50 µm thick, of colorless loosely-interwoven hyphae 1.5 µm diam. immersed in a gel, sometimes appearing dilute brown due to the inclusion of amorphous brown material. Crystalline layer prominent, of rather small, uniform crystals. Periphysoids 10 x 1.5 µm, sometimes branched, immersed in a gel, forming a compact layer. Hymenium entirely J-. Subhymenium 15 µm thick, of small, colorless, angular cells, resting on disintegrating host tissue. Paraphyses 1.0 µm thick, not enlarged above, simple or once-branched, not propoloid. Asci 95-110 x 5(-6.5) µm, the cap 2.0 µm thick, pierced by a conical pore. Spores 8, cylindrical, 90 x 2.0 µm, septate, constricted at the septa and showing some tendency to disarticulate when old, the cells 2-2.5 µm long.

On herbaceous stems, woody capsules, and conifer needles, California. Needles of the *Araucaria* species concerned are woody and remain on the tree long after senescence. The other species of *Stictis* with ascospores of these dimensions all have pigmented margins.

SPECIMENS EXAMINED: NORTH AMERICA: USA (all from California):(CUP-D 7640, on *Pittosporium,* Rabenh.-Wint. F. Eur. 3364, Harkness; D-9365, on *Pittosporium,* Ellis,& Everhart, North American Fungi 2054, Harkness; D-7639, on *Megarrhiza*)(FH, Parks 5617, on *Marah (=Megarrhiza)*, ex UC) (K, on *Megarrhiza,* Harkness 2057, holotype of *Stictis megarrhizae*; on *Araucaria,* Harkness 2524, holotype of *S. araucariae*).

(155). STICTIS MONTAGNEI Dur. ex Mont., Ann. Sci. Nat. Bot. sér. 3, 12: 316 (1849)

The species was based on an illustration (misidentified as *Tympanis lonicerae* Fr.) which appeared in Ann. Sci. Nat. Bot. sér. 2, 5: 283 (1836). This species came to my attention too late to inquire about specimens. The illustration suggests it is near *S. arundinacea.*

(156). STICTIS MUSAE Seaver & Waterston
= *Stictis radiata* Pers., q.v.

(157). (STICTIS MYRICAE) Cash, Mycologia 50: 655 (1959)
= *Propolis phacidioides* (Fr.) Corda

For a discussion of this species, a member of the Phacidiales, see Sherwood (1977).

(158). (STICTIS NIESSLII) Roum., F. Gall. Exs. 3936 (1887)
= *Merostictis emergens* (Karst.) Clements

The synonymy is taken from Défago (1967). See also *Stictis emergens.*

(159). (STICTIS NIGRELLA) Sommerf.
= *Schizoxylon nigrellum* (Sommerf.) Sherwood, q.v.

(160). (STICTIS NIVEA) Pers., Myc. Eur. 1: 339 (1822)

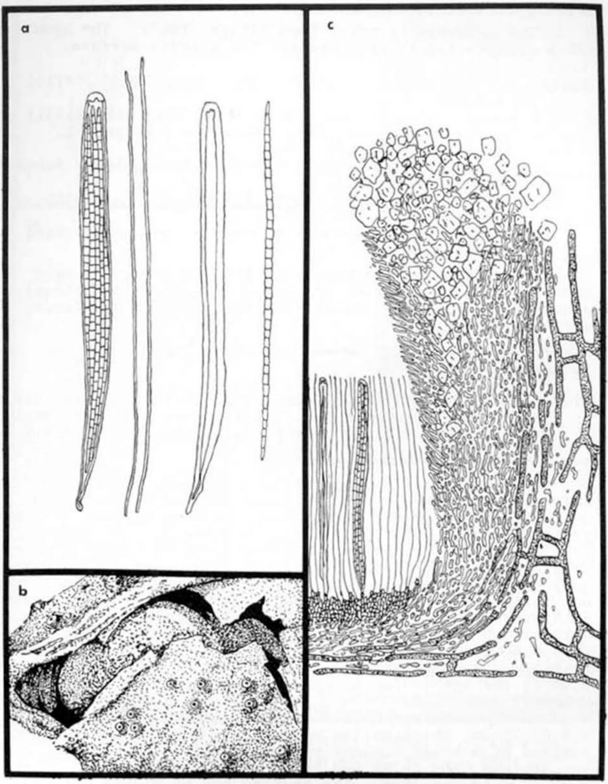

FIGURE 85. *Stictis monilifera.* a. Asci, paraphyses, and spores, x750. b. Habit sketch, x7.5. c. Cross section of margin, x375. Drawn from CUP-D 7641.

≡ *Naemacyclus niveus* (Pers.) Sacc., Botan. Centralbl.
18: 251 (1884)

See *Naemacyclus*, above.

(161). *(STICTIS OBVELATA)* (de Lacroix in Rabenh.) de Not.
= *Merostictis seriata* (Lib.) Défago

The synonymy is taken from Défago (1967). The species is a member of the Dermateaceae. See *Stictis seriata*.

(162). (STICTIS OCELLATA) (Pers.) Fr., Syst. Mycol. 2(1): 195 (1822)
≡ *Peziza ocellata* Pers., Syn. Meth. Fung. 667 (1801)
≡ *Ocellaria ocellata* (Pers.) Schroet., Krypt.-Fl. Schlesien 3(2): 150 (1893)
= *Peziza lecanora* Kunze & Schmidt, Deutschlands Schwämme Exs. 174 (1817)
  ≡ *Stictis lecanora* (Kunze & Schmidt) Fr., Syst. Mycol. 2(1): 193 (1822)
= *Ocellaria aurea* Tulasne & Tulasne, Sel. Fung. Carp. 3: 129 (1865)

I base the above synonymy on the literature; I have seen no original material of *Peziza ocellata*. Additional synonyms are given by Seaver (1951). See also *Ocellaria*, above.

SPECIMEN EXAMINED: EUROPE: Germany (FH, Kunze & Schmidt, Exs. 174, isotype of *Peziza lecanora*)

(163). STICTIS OCULIFORMIS Sacc., Sylloge Fung. 8: 686 (1889)
≡ *Stictis thelotrema* Dur. & Lév., Expl. Fl. Alg. Atlas pl. 29 f. 3 (1850) non *S. thelotrema* Mont. (1841)

Figure 86

Apothecia at first immersed, opening by a pore and raising the substrate into pustules but not becoming erumpent, 0.4-0.7 mm broad, orbicular, the margin dark, scarcely pruinose, entire, the disc deeply urceolate, dark brown. Thalline margin prominent, dark brown, of crystalline material, brown interwoven hyphae 1.5 µm diam., and disintegrating host tissue. There is no differentiated periphysoidal layer, but the hymenium does split away from the margin when dry. Subhymenium of small, angular, colorless cells, resting directly on host tissue, 10 µm thick, J+ faintly blue. Paraphyses numerous, filiform, exceeding the asci by 5 µm and forming an epithecium, 1.0 µm broad below, enlarged to 1.5 - 2 µm at the apex which is richly branched, brown, and J-. Marginal paraphyses forming an agglutinated layer 2 cells thick, brown throughout their entire length. Asci 100-110 x 6.0(-7) µm, thick-walled when young, the cap 5.0 µm thick, pierced by a broad conical pore. Ascospores 8, 85-95 x 1.5 µm, septate, the cells 5-8 µm long.

On wood, Algeria. The species may be viewed as transitional between *Stictis* and *Schizoxylon*. The lectotype specimen seems to be the one illustrated in the original description.

SPECIMENS EXAMINED: AFRICA: Algeria (PC, on *Callitris*, lectotype, designated here, of *Stictis oculiformis*; on *Phylleria*, Oran, Fevrier 1842, lectoparatype)

(164). (STICTIS OLEAE) de Not., Mem. Accad. Torrino 3: 55 (1841)

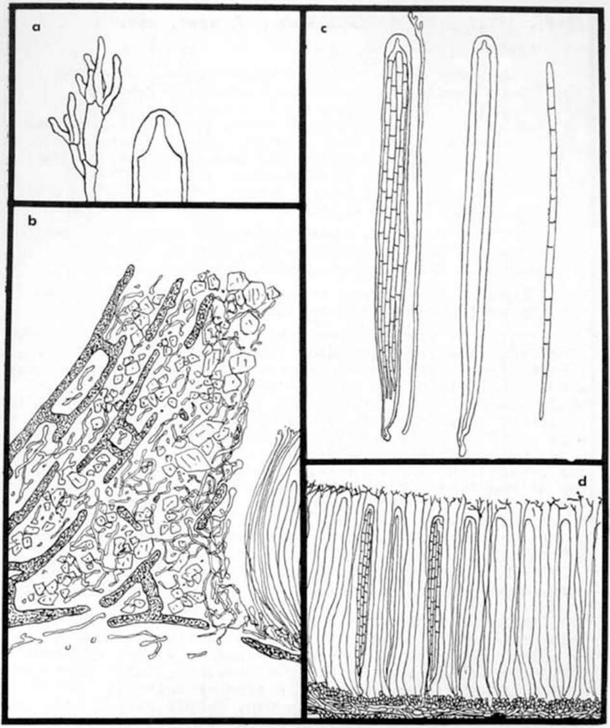

FIGURE 86. *Stictis oculiformis*. a. Detail of apices of an ascus and a paraphysis, x1500. b. Cross section of margin, x300. c. Asci, paraphysis, and spores, x750. d. Hymenium, x750. Drawn from the lectotype.

= *Trochila oleae* (de Not.) Fr., Summa Veg. Scand. sect. post. 367 (1849)

On leaves. The description suggests that the species is correctly assigned to *Trochila*. I received no answer to inquiries for the specimen.

(165). *STICTIS OLLARIS* Wallr.
= *Stictis mollis* Pers., q.v.

(166). STICTIS OSTROPOIDES Sherwood, spec. nov.

Figure 87

Ascocarpi primum immersi, profunde cupulati, 0.8-1.5 mm diam., margine integro, griseo, disco pallide ochraceo. Margo in sectione transversali 80 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum abest. Periphysoidea 80 x 1.5-2.0 µm, ramosa, brunnea. Paraphyses filiformes, simplices, 200-220 x 1.0 µm, in iodo non caerulescentes. Asci 200-220 x 6.0 (-8) µm, apice 5-6 m crassi, 8-spori. Sporae 190-200 x 2.0 µm, cellulis 2.5-3.5 µm longis.

HOLOTYPUS: CUP 54907, on dead branches of *Lonicera* cfr. *involucrata*, Devil's Elbow State Park, Lane Co. Oregon USA. August 13, 1975. Isotypi: K, OSC, Herb. Sherwood 2184.

Etymology: from *Ostropa*, because the fruitbodies, which open by a slit, somewhat resemble those of that genus.

Apothecia at first immersed, opening by splitting the overlying bark into irregular lobes, elongate, c. 0.8-1 x 1-1.5 mm diam., pale grey-pruinose, the margin remaining for a long time closed and finally opening by a longitudinal slit, the disc deeply urceolate, pale ochraceous. Hymenium splitting away from the margin when dry. Margin in cross section c. 80 µm thick, consisting of tightly-packed, gelatinous, branched periphysoids 80 x 1.5-2.0 µm, brown, the wall and crystalline layers nearly obsolete. The margin remains for a long time closed, and splits away from the surrounding wood, so that it appears annulate. Subhymenium c. 10 µm thick, of small, colorless, angular cells resting directly on host tissue. Paraphyses numerous, filiform, 1.0 µm broad below, simple, colorless, not enlarged above, J-. Asci 200-220 x 6(-8) µm, the cap 5-6 µm thick, pierced by a complex pore. Ascospores 8, 190-200 x 2.0 µm, the cells 2.5-3.5 µm long.

On *Lonicera* and *Scrophularia*, western North America. Apparently quite common. This is a distinctly coastal species. One might suppose this species with a annulate margin on *Lonicera* to be *Stictis annulata*, but I have not found a single example of it in type or authentic collections of that species. A thick ascus cap, simple paraphyses, and shorter, more closely-septate spores distinguish *S. ostropoides* from *S. chrysopsis*, the other member of sect. *Lichenopsis* which occurs on the west coast of North America.

SPECIMENS EXAMINED (see also holotype, above): NORTH AMERICA: USA (UC-Parks 7002, on *Scrophularia*, California; Parks 5506, on *Lonicera*, California)(CUP-54904, on *Lonicera*, Oregon)(Herb. Sherwood 2146, on *Lonicera*, Oregon)

(167). *STICTIS PACHYSPORA* (Rehm) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 175 (1888)

≡ *Schmitzomia pachyspora* Rehm, Ber. Naturhist. Vereins Augsberg 26: 102 (1881)

Figure 88

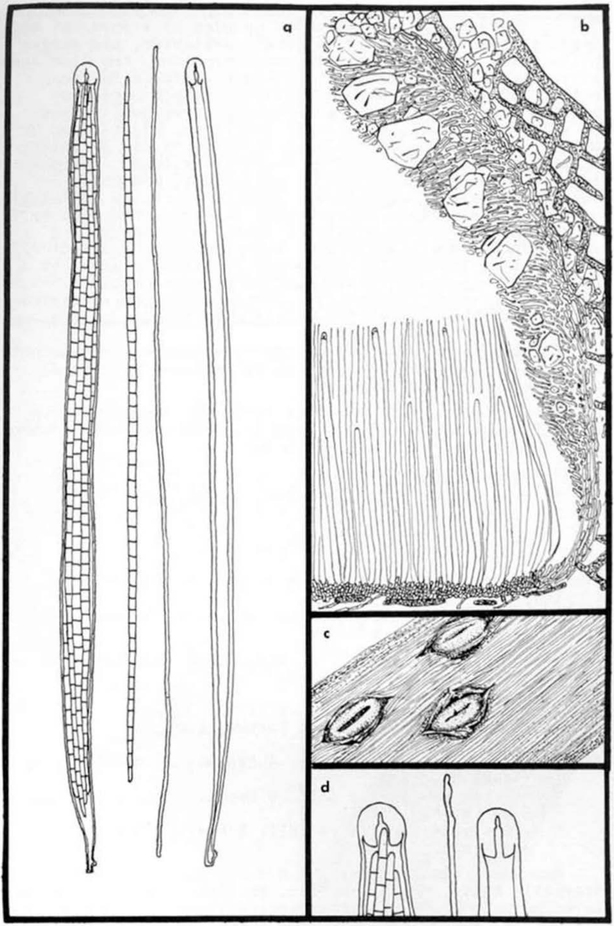

FIGURE 87. *Stictis ostropoides*. a. Asci, paraphysis, and spores, x750. b. Cross section of margin, x225, c. Habit sketch, x7.5. d. Detail of apices of asci, paraphysis, and spores, x1500. Drawn from CUP-54541 (= Parks 7002)

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.5-0.8 mm broad, orbicular, the margin entire, dark brown, moderately white-pruinose, the disc deeply urceolate, dark ochraceous to brown. Margin in cross section 160 µm thick, with a poorly developed accessory thalline margin of hyphae and disintegrating host tissue, the wall 20 µm thick, of closely interwoven light brown hyphae 1.5-2 µm diam. Crystalline layer up to 150 µm thick, of pedominantly large, non-rosettiform crystals. Periphysoids 30 x 1.5 µm, not markedly gelatinous, branched, J-. Subhymenium colorless, of small angular cells, 15 µm thick, J-. Paraphyses filiform, numerous, exceeding the asci by 5 µm, 1.0 m broad below, inflated to 1.5-2 µm above, 1-2 times branched apically, brown, not propoloid, J-. Asci 275-330 x 10-12 (-15) µm, the cap 5-5.5 µm thick, pierced by a broad pore. Spores a little shorter than the asci, 4.5-5.0 µm broad, tapering at both ends, septate, slightly constricted at the septa, sheathed, coiling when freed from the ascus, the cells 2-4 µm long.

On bark, Europe. This distinctive species is apparently rare. Goree (1972) discusses the differences between *S. pachyspora* and *S. serpentaria*.

SPECIMENS EXAMINED: EUROPE: Germany (B, CUP-D-7645, Rehm Ascomyceten 420, on *Pinus*, Augsberg 3/1877, isotypes of *Stictis pachyspora*). Norway? (O, on *Populus*, Sommerfelt 4/1823, sine loc.)

(168). (STICTIS PALLIDA) Pers.
≡ *Cryptodiscus pallidus* (Pers.) Corda, q.v.

(169). STICTIS PALLIDULA Sacc.
= *Stictis stellata* Wallr., q.v.

(170). (STICTIS PANIZZEI) de Not., Comment. Soc. Crittog. Ital. 1: 362 (1861)
≡ *Propolis panizzei* (de Not.) Sherwood, Mycotaxon 5: (1977)

For a redescription of the species, a member of the Phacidiales, see Sherwood (1977).

(171). (STICTIS PARALLELA) (Ach.) Fr.
= *Stictis abietina* (Pers.) Farlow, q.v.

(172). (STICTIS PARASITICA) Ell. & Everh., J. Mycol. 4: 54 (1888)
≡ *Propolis parasitica* (Ell. & Everh.) Sacc., Sylloge Fung. 8: 653 (1889)
≡ Hyaloscypha parasitica (Ell. & Everh.) Sherwood, comb. nov.

Apothecia minute, sessile, 0.2-0.3 mm broad, white, externally hairy, the disc white, shallowly cupulate. Ectal excipulum pale brown, pseudoparenchymatous, with short, angular cells. Hairs numerous, 30-35 µm long, 3 µm broad at the base, tapering abrubtly to a long, acuminate, straight tip, colorless. Asci thin-walled, J-, 25-30 x 5-6 µm. Ascospores 8, unicellular, colorless, 6-8 x 2.5 µm. Paraphyses

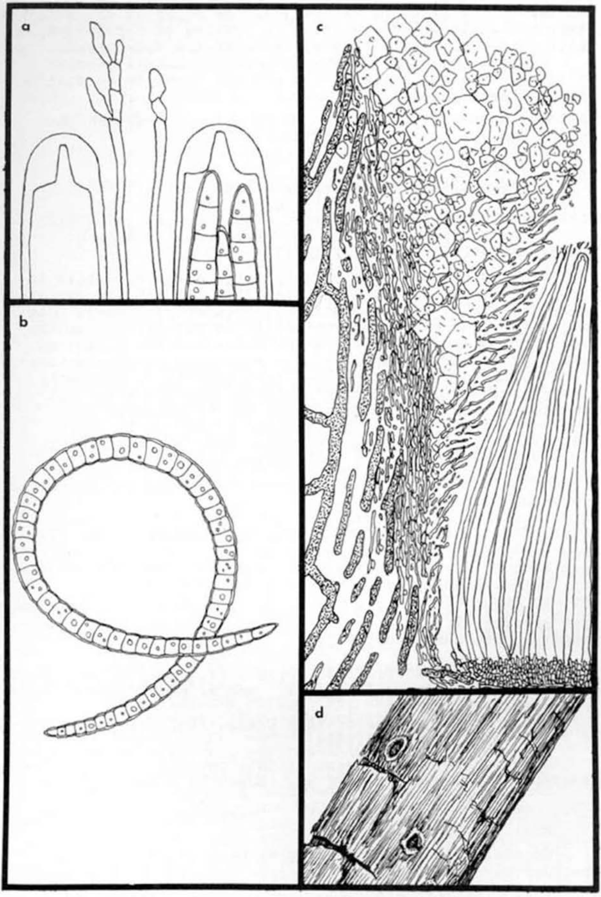

FIGURE 88. *Stictis pachyspora.* a. Detail of apices of asci, paraphyses, and spores, x1500. b. Ascospore, x750. c. Cross section of margin, x300. d. Habit sketch, x7.5. Drawn from B-Rehm Ascomyceten 420.

not seen. The black hairs mentioned by Ellis in the original description are conidiophores of a species of *Haplographium* which may or may not be associated with the *Hyaloscypha*.

On *Diatrype*, New Jersey. Known only from a poorly-preserved type collection. The species seems to be distinct from *H. dematiicola*.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, Ellis, on *Diatrype*, New Jersey, holotype of *S. parasitica*)(CUP-D 7646, isotype)

(173). (STICTIS PATELLEA) Cke.
= *Cryptodiscus pallidus* (Pers.) Corda, q.v.

(174). (STICTIS PELVICULA) Pers., Myc. Eur. 1: 337 (1822)
≡ *Cryptodiscus pelviculus* (Pers.) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 160 (1888)

Four specimens labelled *S. pelvicula* are deposited in Persoon's herbarium. One of these (910.263-936) is *Propolomyces farinosus*; it is annotated in handwriting other than Persoon's. The elongate frutibodies do not agree with the protologue of *S. pelvicula*, which described the fungus as having orbicular fruitbodies. The remaining three specimens are sterile and unidentifiable. #910.264-855 is annotated *Stictis pelvicula* in Persoon's handwriting and bears the additional label "*Stictis salicina* Ell ne resemble pas beaucoup a votre figure, un ais jene l cais ou la placer ailleurs Chaillet"; it may represent type material, since the species was described as ocurring on *Salix*.

SPECIMENS EXAMINED (see also text, above): EUROPE: sine loc. (L, Persoon 910.264-866; 910.264-856)

(175). (STICTIS PHACIDIOIDES) Fr., Syst. Mycol. 2(1): 198 (1822)
≡ *Propolis phacidioides* (Fr.) Corda, Icones Fungorum 2: 38 (1838)

S. phacidioides is a member of the Phacidiales and the type species of *Propolis*. For a discussion and additional synonyms, see Sherwood (1977).

(176). (STICTIS PHACIDIOIDES) (Desm.) Fr., Acta R. Soc. Sci. Upsal. ser. 3, 1: 123 (1851), non *S. phacidioides* Fr. (1822)
≡ *Cryptodiscus phacidioides* Desm., Ann. Sci. Nat. Bot. sér. 3, 3: 369 (1845)

I have seen no specimens of this species. The original description suggests that it may indeed be a *Cryptodiscus*.

(177). STICTIS PHILADELPHI Schw., Trans. Amer. Philos. Soc. n.s. 4: 180 (1832)

On *Philadelphus*, Bethlehem, Pennsylvania. The type specimen may be a species of *Stictis*, but there is no trace of hymenium left in it.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, Schweinitz, Bethlehem, holotype of *Stictis philadelphi*)

(178). *STICTIS PHRAGMITIDIS* Lobik, Mater. Provid. Florist. Faunist. Investig. Terek reg. Pyatigorsk, 27 (1928)

I was unable to obtain a copy of this reference or to locate any specimens of *S. phragmitidis*.

(179). *(STICTIS PIMENTAE)* Seaver & Waterston, Mycologia 33: 313 (1941)
= *Propolis quadrifida* (Lév.) Mont.

For a discussion of this species, see Sherwood (1977).

(180). *STICTIS POLYCOCCA* (Karst.) Karst., Acta Soc. Fauna Flora Fennica 2(6): 166 (1885)
≡ *Schmitzomia polycocca* Karst., Fungi Fennici Exs. 768 (1868)
= *Schizoxylon aduncum* Feltg., Vorstud. Pilz-Fl. Luxembourg 1(3): 94 (1906)
  ≡ *Stictis adunca* (Feltg.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 115: 1260 (1906)

Figure 89

Apothecia gregarious, at first immersed, opening by a pore and becoming partially erumpent, 0.25-0.5 mm diam., the margin thick, stellately divided, occasionally somewhat annulate, dark grey pruinose, the disc deeply urceolate, brown. Margin 110 µm broad at the broadest point, lacking a prominent accessory thalline margin, the wall of loosely-interwoven non-carbonized brown hyphae 2.5-5 µm diam., these intergrading with an internal wall layer of colorless hyphae 2.0-3.0 µm diam., immersed in a gel. Periphysoids numerous, filiform, 20-25 x 1.5-2 µm, somewhat gelatinous, usually unbranched. A distinct crystalline layer is absent, but there are numerous small crystals imbedded in the wall. Subhymenium J-, of small colorless angular cells resting on a continuation of the brown wall layer. Paraphyses numerous, filiform, 0.8-1.0 µm thick, sometimes branched, not obviously circinate, J-. Asci 160-180 x 4.0 µm, the cap 3.0 µm thick, pierced by a narrow pore. Ascospores 8, 150-170 x 1.0-1.2 µm, septate, the cells 4-5 µm long.

On herbaceous debris, rarely on wood, Europe, Asia, and western North America. *Stictis pustulata*, a very similar species, has circinate paraphyses, smaller marginal cells, and narrower spores. The immature apothecium of *S. polycocca* is distinctive. The margin splits radially before its lobes become reflexed, and resembles a closed bud.

SPECIMENS EXAMINED: ASIA: West Pakistan (BPI 16561, on *Berberis*). EUROPE: Norway (O, on *Rubus*, Oct. 1840). Finland (FH, Fungi Fennici 768, on *Epilobium*, Wasa, isotype of *Schmitzomia polycocca*). Luxembourg (FH, on *Silene*, Feltgen IV.1901, holotype of *Schizoxylon aduncum*). Austria (FH-Höhnel, on *Urtica*, 24.6.1905; on *Atropa*, VI.1909; on *Salvia*, VII. 1909; on *Digitalis*, 11.1909). NORTH AMERICA: Canada (TRTC 47473, on legume?, British Columbia)

(181). STICTIS PROMINENS Sherwood, spec. nov.

Figure 90

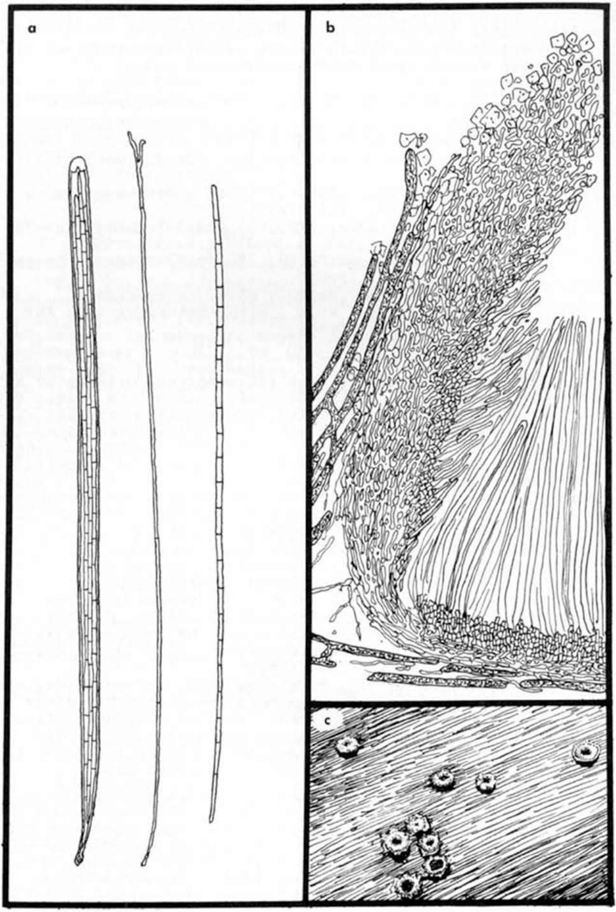

FIGURE 89. *Stictis polycocca*. a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x400. c. Habit sketch, x7.5. Drawn from FH-Höhnel, spec. on *Digitalis*.

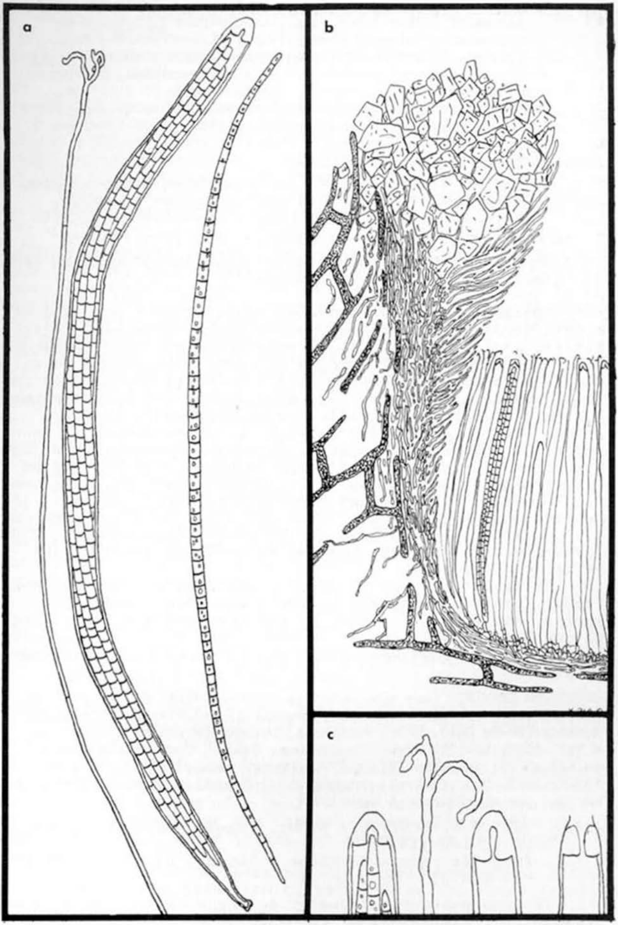

FIGURE 90. *Stictis prominens*. a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x225. c. Detail of apices of asci, paraphysis, and spores, x1500. Drawn from NY-Co 2006

Ascocarpi primum immersi, profunde cupulati, 0.8-1.0 mm diam., margine integro, albo, disco pallide ochraceo. Margo in sectione transversali 150 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 2.0 µm diam., achromo. Stratum crystallinum 50-75 µm crassum. Periphysoidea 50 x 1.5 µm, ramosa. Paraphyses filiformes, ramosae, circinatae, 250-300 x 1.0 µm, achromae, in iodo caerulescentes. Asci 220-300 x 6 (-8) µm, apice 5.0 m crassi, 8-spori. Sporae 220-300 x 2.0-2.25 µm, cellulis 3-4 µm longis.

HOLOTYPUS: COL [Dumont] 2006, on unidentified herbaceous stem, vicinity km 60 from Bogotá on the road between Guasca and Gacheta, Dpto. Cundinamarca. Dumont, Haines, Idrobo, 27.VII. 1974. ISOTYPUS: NY

Etymology: *Prominens* (prominent), because the apothecia are large and have a conspicuous thick margin.

Apothecia at first immersed, opening by a pore and at length becoming somewhat erumpent, with a prominent, white, entire, pruinose margin and deeply urceolate pale ochraceous disc, 0.8-1.0 mm diam. Margin in cross section 150 µm thick, the thalline margin more or less prominent, the wall 40 µm thick, of closely-packed, non-gelatinous, colorless hyphae 1.5 µm diam., the crystalline layer prominent, 50-75 µm thick. Periphysoids 50 x 1.0-1.5 µm, often branched, immersed in a gelatinous matrix, forming a compact layer. Subhymenium colorless, J-, of small angular cells resting on disintegrating host tissue. Paraphyses numerous, filiform, 1.0 µm broad, branched and circinate apically, J+ or J- (depending somewhat on age). Asci 220-300 x 6(-8) µm, the cap 5.0 µm thick, pierced by a narrow pore. Ascospores 8, 220-300 x 2.0-2.25 µm, not sheathed or coiling, septate, the cells 3-4 µm long.

On dead twigs, South America and Ceylon. Distinguished from *S. ramuligera* by the broader, more closely-septate spores, and from *S. radiata* by branched and circinate paraphyses and somewhat longer spores. This is one of the more easily disinguished members of the tropical *S. radiata* complex.

SPECIMENS EXAMINED (see also holotype, above): ASIA: Ceylon (CUP-SA-3280, Dumont, 15.I.1967; SA-3218, Dumont, 13.I.1967). SOUTH AMERICA: Ecuador (NY-Ec 2310, Prov. Pichincha, Dumont, Carpenter & Buriticá, 6.VIII.1975; Ec-1298, Prov. Tungurahua, Dumont, Carpenter & Buriticá, 24.VII.1975). Colombia (NY-Co 7707, Dumont et al., 1976). Venezuela (NY-Ve 6675, Dto. Federal, Dumont, Cain, Samuels & Manara; Ve-2413, Edo. Merida, Dumont, Haines, & Samuels)

(182). (STICTIS PROMINULA) Schw., Trans. Amer. Philos. Soc. n.s. 4: 180 (1832)
≡ *Propolis prominula* (Schw.) Thuem., Pilze Weinstockes 78 (1878)

Thuemen based his transfer to *Propolis* solely on Schweinitz's assignment of the species to *Stictis* subgen. *Propolis*. The type specimen consists of erumpent stromatic masses, pale brown in color, containing one or more convoluted locules lined with filamentous projections (conidia?

phialides?). This appears to be a coelomycete, but I am unable to place it.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, on *Vitis*, Bethlehem, Pa., holotype of *Stictis prominula*)

(183). (STICTIS PSYCHOTRIAE) Mont.
≡ *Biostictis psychotriae* (Mont.) Sherwood, q.v.

(184). (STICTIS PTERIDINA) Phill. & Bucknall, Proc. Bristol Naturalist's Soc., new [3rd] ser. 3: (1887)
≡ *Melittosporium pteridinum* (Phill. & Buckn.) Sacc., Sylloge Fung. 8: 705 (1889)

The type specimen contains two minute apothecia. According to Dennis (1968), the species is probably a *Cryptodiscus* rather than a *Melittosporium*, where it was placed by Saccardo on the grounds that it had muriform spores. In the absence of additional specimens I am unable to decide whether the species is a *Cryptodiscus*, *Propolidium*, or *Delpontia*. The external appearance of the fruitbody and the illustrations accompanying the type specimen would definitely exclude the species from *Melittosporium* and *Stictis*.

SPECIMEN EXAMINED: EUROPE: Great Britain (K, on *Pteris*, Bristol, Bucknall, holotype of *Stictis pteridina)*

(185). (STICTIS PUIGGARI) Speg., Bol. Acad. Nac. Ci. 23: 151 (1919)

The type is a lichen in poor condition. The spores are non-graphidean, and the hymenium, in the apothecia I examined, is J- (J+ according to Spegazzini). The thick margin consists of radiating hyphae immersed in a gelatinous matrix; there are no periphysoids. This seems to be a member of the Gyalectaceae.

SPECIMEN EXAMINED: SOUTH AMERICA: Brazil (LPS 28225, on Myrtaceae?, Apiahy, 34, holotype of *Stictis puiggari*)

(186). (STICTIS PUNCTIFORMIS) (Pers.) Phillips
≡ *Stictis pallida* Pers., q.v.

(187). (STICTIS PUPULA) Fr., Syst. Mycol. 2(1): 193 (1822)
≡ *Schmitzomia pupula* (Fr.) Fr., Summa Veg. Scand. sect. post. 364 (1849)

The application of the name *Stictis pupula* is ambiguous. In current publications (cfr. Nannfeldt, 1932) the name is treated as a synonym of *S. mollis*, an earlier name which must be rejected under the current International Code of Botanical Nomenclature if the two species are considered synonymous.

Fries's original description is ambiguous and he cites no specimen. His herbarium contains three specimens labelled *Schmitzomia pupula*. One, collected in 1861 and hence clearly not type material, is *Schizoxylon berkeleyanum*. The second contains flattened, greenish fruitbodies with a margin of crystalline material and an interior matrix of brown hyphae and globose green cells. It does not agree with the protologue, but may be what Fries (1828) referred to when he stated that *Agyrium atrovirens* was an abortive form of *Stictis pupula*. The third specimen contains two chips of wood. One bears apothecia of a *Stictis* with a colorless margin, and cannot be *S. pupula* in the current sense. The other bears *Schizoxylon berkeleyanum*. Fries (1828) synonymized *Stictis mollis*, a species with a dark margin unrepresented in the Fries herbarium, and *Sphaeria venusta* Sommerf. (an unpublished name represented in Sommerfelt's herbarium by a specimen of *Schizoxylon albo-atrum*) with *Stictis pupula*. I am unable to extract a suitable type specimen from this mixed protologue, and propose that the name be abandoned.

(188). *(STICTIS PUSILLA)* Lib. ex Speg. & Roum., Rev. Mycol. (Toulouse) 2: 20 (1880), pro synon.
≡ *Trochila pusilla* (Lib. ex Speg. & Roum.) Speg. & Roum., l.c.
≡ *Peziza perpusilla* Cooke, Grevillea 8: 85 (1880)
≡ *Naevia pusilla* (Lib. ex Speg. & Roum.) Rehm in Rabenh. Krypt.-Fl. ed. 2, 1(3): 143 (1888)
≡ *Hysteropezizella pusilla* (Lib. ex Speg. & Roum.) Nannf., Nova Acta Regiae Soc. Sci. Univ. Upsal. IV, 8(2): 120 (1932)

The combination *Stictis pusilla* Lib. is not validly published. The species, an immersed member of the Dermateaceae, is discussed (as *Hysteropezizella*) by Défago (1967).

(189). *STICTIS PUSILLA* Speg., Bol. Acad. Nac. Ci. 11: 277 (1887)

Figure 91

Apothecia minute, immersed, not becoming erumpent, 0.25 - 0.35 (-0.5, fide Spegazzini, l.c.) mm diam., the margin white-pruinose, entire, not prominent, the disc deeply urceolate, pale ochraceous. Margin 10-20 µm thick, of slender colorless hyphae 1.5 µm diam., not sharply differentiated into layers, the periphysoids scant. Subhymenium J-, of small, colorless angular cells resting directly of host tissue. Paraphyses numerous, filiform, J-, 1.0 µm broad below, abrubtly enlarged to 2.0 µm at the knoblike tip. Asci 80-95 x 5-6 µm, the cap 1.5 µm thick. Spores 80-100 x 1.0-1.5 µm, obscurely sheathed, somewhat coiled within the ascus, not septate in the type specimen.

On grasses, Tierra del Fuego, and possibly in England. Small size and knoblike paraphyses distinguish this species, which is quite different from *S graminicola* or *S. stellata*. The British specimen is indistinguishable from the type.

SPECIMENS EXAMINED: SOUTH AMERICA: Argentina (LPS. on *Rostkovia*, Isla de los Estados, Spegazzini, holotype of *S. pusilla*). EUROPE: Great Britain (K, on *Carex*, Sussex, Dennis 16.I.1971)

(190). *STICTIS PUSTULATA* Ellis, Bull. Torrey Bot. Club 8: 65 (1881)
= *Stictis helicotricha* Ell. & Everh., Proc. Acad. Philadelphia 1893: 151 (1894)

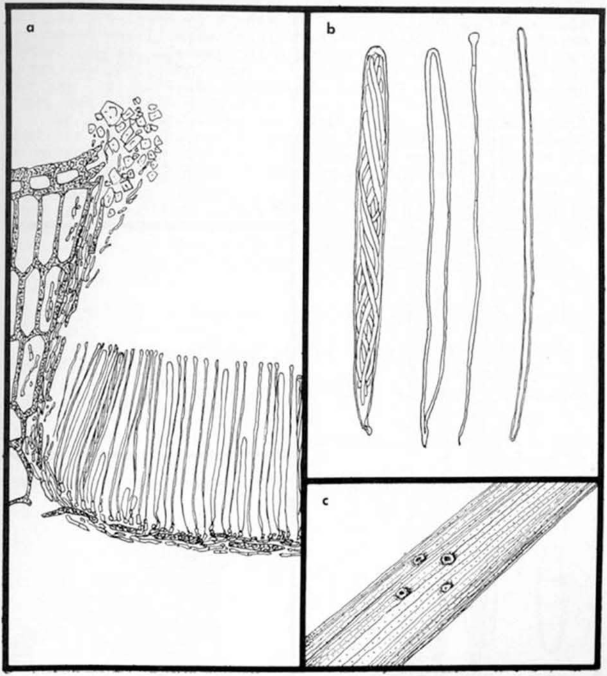

FIGURE 91. *Stictis pusilla*. a. Cross section of margin, x300. b. Asci, paraphysis, and spores, x750. c. Habit sketch, x7.5. Drawn from the holotype.

= *Stictis vincae* Ellis in Seymour, Host Index 571 (1929) (nom. nud.)

Figure 92

Apothecia at first immersed, becoming somewhat erumpent, 0.25-0.5 mm broad, the margin thick, entire, brown, scarcely pruinose, the disc deeply urceolate, brown. Margin in cross section 150 µm thick, the outermost layer stromatic, consisting of 6-8 rows of interwoven dark brown carbonized hyphae 2.0-2.5 µm diam, surrounding a wall of small, colorless, pseudoparenchymatous cells. Periphysoids 35-50 x 0.5-0.8 µm, unbranched, not gelatinous, forming a compact layer. A few small crystals are produced near the summit of the

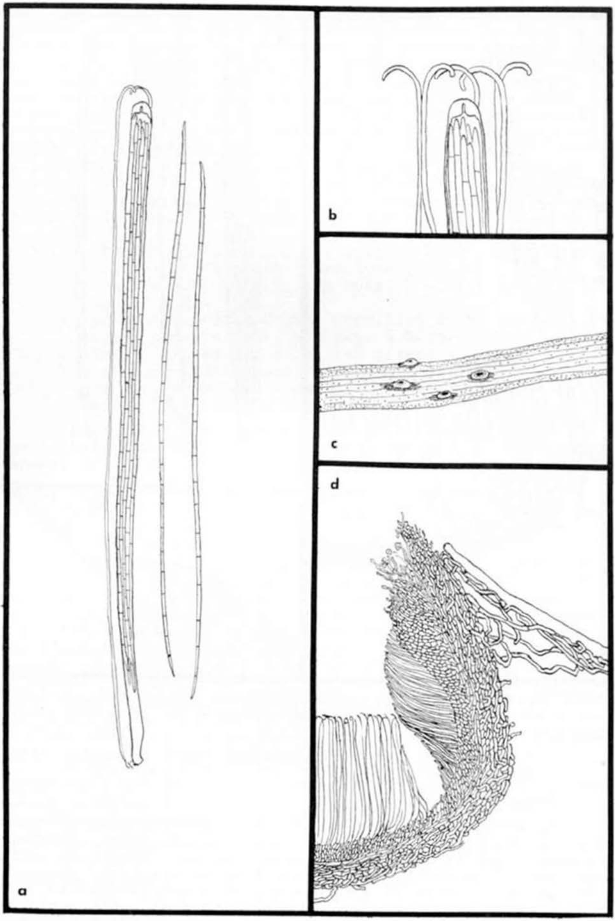

FIGURE 92. *Stictis pustulata*. a. Ascus, paraphyses, and spores, x750. b. Detail of apices of an ascus, paraphyses, and spores, x1500. c. Habit sketch, x7.5. d. Cross section of margin, x225. Drawn from CUP-D-7653.

margin, but there is no definite crystalline layer. Subhymenium of small, colorless, angular cells resting on brown fungus stroma. Paraphyses numerous, filiform, 0.5-0.8 µm broad, simple, circinate, J-. Asci 160-180 x 3.0-3.5 µm, the cap 2.5 µm thick. Spores 8, 0.8-1.0 x 160-175 µm, septate, the cells 4-5 µm long.

On herbaceous stems and small twigs, Europe and North America. *S. pustulata* is rare in Europe but fairly common in eastern North America. *S. polycocca* is very similar, and sections are necessary to distinguish the two species.

SPECIMENS EXAMINED: EUROPE: Hungary (BP, on *Ruta*, Tóth 14.IV.1956). NORTH AMERICA: USA (CUP-D-7707, on *Vinca*, Ohio, Kellerman 207, *Stictis vincae* ex herb. Ellis; D-2000, on *Arundinaria*, Mississippi, Tracy 15.IV. 1990, isotype of *S. helicotricha;* D-7653, on *Trifolium*, New Jersey, Ellis, 1881, isotype of *S. pustulata*). Canada (TRTC 9850, 3305, 8493, all on *Ribes*, Ontario*)*

(191). *(STICTIS QUADRIFIDA)* Lév., Ann. Sci. Nat. Bot. sér. 3, 5: 255 (1846)
≡ *Propolis quadrifida* (Lév.) Mont. in Gay, Fl. Chile 7: 425 (1852)

For a discussion of this species, a member of the Phacidiales, see Sherwood (1977).

(192). STICTIS QUADRINUCLEATA Sherwood, spec. nov.
Figure 93

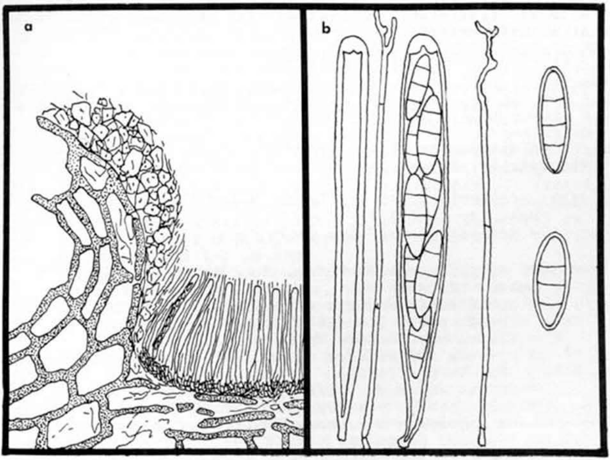

FIGURE 93. *Stictis quadrinucleata*. a. Cross section of margin, x375. b. Asci, paraphyses, and spores, x1500. Drawn from the holotype.

Ascocarpi primum immersi, profunde cupulati, 0.2-0.5 mm diam., margine lacerato, albo, disco pallide ochraceo. Margo in sectione transversali 50 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., achromo. Stratum crystallinum 50 µm crassum. Periphysoidea 8-10 x 1.0 µm, non ramosa. Paraphyses filiformes, ramosae, 55 x 1.0 µm, in iodo non caerulescentes. Asci 50-55 x 4(-6) µm, apice 2 µm crassi, 8-spori. Sporae 10-13 x 2.5-3.5 µm, vagina gelatinosa involutae, cellulis 2.5-3 µm longis.

HOLOTYPUS: NY-Ve 1916, On unidentified fern, ca. 6 km above Maracay on the Maracay-Choroni road, Parc. Nac. Henry Pittier, Edo. Aragua. K. P. Dumont, J. Haines & G. Samuels, 12 July 1971, Venezuela.

Etymology: The epithet refers to the 4-celled spores.

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.2-0.5 mm diam., the margin white-pruinose, lacerate, the disc moderately deeply immersed, pale ochraceous. Margin in cross section 50 µm thick, predominantly crystalline, the wall hyphae colorless, 1.5 µm diam; Periphysoids few, unbranched, 8-10 x 1.0 µm. Subhymenium 5 µm thick, of colorless angular cells resting directly on disintegrating host tissue. Paraphyses numerous, filiform, 1.0 µm broad, branched and propoloid at the apex, J-. Asci 50-55 x 4(-6) µm, the cap 2 µm thick. Ascospores 8, irregularly biseriate, sheathed, 10-13 x 2.5-3.5 µm, 3-septate.

On fern stalks, Venezuela. The species is intermediate between *Stictis* and *Propolidium*. Its external aspect is that of a small *Stictis*.

SPECIMENS EXAMINED: See holotype, above.

(193). (STICTIS QUERCIFOLIA) Cooke, Grevillea 5: 50 (1876)
≡ *Propolis quercifolia* (Cooke) Sherwood, Mycotaxon 5: 327 (1977)

A discussion of this species, which is a member of the Phacidiales, appears in Sherwood (1977).

(194). (STICTIS QUERCINA) Peck., Annual Rep. New York State Mus. 28: 69 (1879)
= *Stictis quercifolia* Cooke, q.v.

(195a). STICTIS RADIATA Pers., Obs. Mycol. 2: 73 (1799) subsp. *RADIATA*
≡ *Schmitzomia radiata* (Pers.) Fr., Summa Veg. Scand. sect. post. 364 (1849)
≡ *Peziza aecidioides* Nees, Syst. 2: 66 (1817)
≡ *Stictis aecidioides* (Nees) S.F. Gray, Nat. Arr. Brit. Pl. 1: 663 (1821)
= *Lichen excavatus* Hoffm., Enum. Lich. 47 (1784), n.v.
= *Sphaerobolus rosaceus* Tode, F. Meckl. 1: 44 (1790)
  ≡ *Schmitzomia rosacea* (Tode) Fr., Summa Veg. Scand. sect. post. 364 (1849)
= *Sphaerobolus corii* Schw., Trans. Amer. Philos. Soc. n.s. 4: 254 (1832)

≡ *Stictis corii* (Schw.) Sacc., Sylloge Fung. 8: 695 (1889)
= *Stictis hyssopi* Schw., l.c. p. 180
= *Stictis umbellatarum* Schw., l.c. p. 179
= *Schmitzomia carestiae* de Not., Comment. Soc. Crittog. Ital. 1: 362 (1864)
  ≡ *Schmitzomia radiata* (Pers.) Fr. var. *carestiae* (de Not.) Rehm, Ascomyceten 23 (1870)
  ≡ *Stictis carestiae* (de Not.) Winter in Kunze, Fungi Sel. Exs.Fungi Helvetici 67 (1880)
= *Stictis annulata* Cooke & Phillips, Grevillea 9: 8 (1880)
= *Stictis thelotremoides* Phill. in Kalchbr., Grevillea 11: 25 (1883)
= *Stictis bromeliae* Starbäck, Bih. Kongl. Svenska Vetensk. Akad. Handl. 25(14): 15 (1889)
= *Stictis bambusella* Höhn., Denschr. Kaiserl. Akad. Wiss., Math.-Naturwiss Kl. 83, extra: 30 (1907)
= *Stictis musae* Seaver & Waterston, Mycologia 33: 313 (1941)
= *Stictis filicicola* Seaver & Waterston, *ibid.:* 315
= *Stictis bengalensis* Singh & Pavgi, Sydowia 19: 244 (1965)

Figure 94

Apothecia at first immersed, opening broadly by a pore but not becoming erumpent, 0.4-1.0(-1.2) mm broad, the margin thick, white-pruinose, entire to more commonly lacerate, the disc deeply immersed, pale ochraceous. Margin in cross section 80-120 µm thick, 3-layered, with a poorly-differentiated accessory thalline margin, the wall of colorless interwoven hyphae 1.5 µm diam., not notably gelatinous, rarely turning reddish in iodine solutions, the crystalline layer prominent, of large, non-rosettiform crystals; periphysoids 15-30 x 1.0-1.5 µm, not markedly gelatinous, branched. Subhymenium c. 15 µm thick, of small, angular, colorless cells resting on disintegrating host tissue, J+ blue, at least when old. Paraphyses numerous, filiform, 1.0 µm thick below, enlarged to 1.5-2.0 µm above, somewhat irregularly branched, J+ (rarely J-), colorless. Asci 120-250 x 5.5-6(-8) µm, the cap 3.5 µm thick, pierced by a narrow pore. Ascospores 8, nearly as long as the asci, 2.0-2.5 µm broad, not sheathed or coiling, septate, the cells 4-6 µm long.

On bark, decorticated wood, herbaceous stems, and even conifer needles and old leather, throughout the humid parts of the world. This species accounts for more than half of the collections from temperate areas; it is somewhat less common in the tropics. The host range includes Pteridophytes, Gymnosperms, Monocots, and Dicots. *S. radiata* intergrades with *S. stellata* and *S. carnea*. *S. stellata* generally has a hymenium which does not blue in iodine, narrower spores, broader periphysoids, and an herbicolous habit. Ultimately, only broader, unbranched periphysoids are reliable for separating these two species, since *S. radiata* may be entirely J-. The spores of *S. carnea* are broader and more closely septate, so that many cells are as broad as long, a character not found in *S. radiata*.

With the exceptions noted below, all of the synonyms cited above are based on type specimens which I examined and found to be typical *S. radiata*.

I have not seen the type specimen of *Lycoperdon radiatum* L. For reasons explained under discussion of typification of *Stictis*, above, I am excluding the species from the synonymy. *Lichen excavatus* is taken from Persoon's synonymy. No original material remains of *Sphaerobolus rosaceus*. Tode's illustration shows the hymenium being ejected as a unit; the picture otherwise looks like a *Stictis*. The single specimen of *Schmitzomia rosacea* in Fries's herbarium is too fragmentary to determine with certainty, but may well be *Stictis radiata*. The specimen of *Stictis hyssopii* which I examined was likewise overmature and undeterminable.

Nees's name *Peziza aecidioides* was an avowed substitute for *S. radiata*, the epithet *radiata* being preoccupied in *Peziza*. The name *Stictis carestiae* is commonly applied to specimens on conifers with small (0.5 mm) apothecia, rather short (130-180 µm) asci, and an intensely J+ hymenium. *Stictis radiata* was originally described from *Pinus*, and the lectotype in Persoon's herbarium corresponds exactly to *S. carestiae*. If a varietal name is needed, it is for larger specimens on angiosperms.

Although at least two species *(S. ostropoides* and *S. chrysopsis)* having an annulate margin occur on *Lonicera* in the western US, all of the original material of *S. annulata* in Cooke's herbarium, as well as additional non-type collections in the Durand herbarium (CUP) are *S. radiata*. The type specimen of *S. thelotremoides*, growing underneath a disintegrating lichen thallus, lacks spores but otherwise seems to be *S. radiata*. *S. bambusella* is represented in the type collection by a single apothecium. A slide in von Höhnel's collection suggests that this is *S. radiata*, although I have seen no example of that species in which the hymenium turns wine-red in iodine, as was alleged by von Höhnel for *S. bambusella*.

SPECIMENS EXAMINED: EUROPE: Sweden (UPS, Småland, Femsjö, herb. Fries; Femsjö, Fries, labelled *Schmitzomia rosacea*; Uppsala, on *Salix*, Fries 18.X.1856)(S, on *Quercus*, Graversfors, Haglund 19.IX.1899; Vestergren, 18.I.1911, Gotland; on *Berberis*, Upsala 20.VIII.1895, Eliasson; on *Corylus*, 12.IV.1954, Nannfeldt & Woldmar; on *Fagus*, Nannfeldt 16.IV. 1946). France (ZT, on *Quercus*, Müller 18.IV.1959)(Herb. Korf, on *Lonicera*, Corsica, 14.X.1972, Korf & Demoulin). Germany (L, Persoon 910.263-968, in cortice *Pini abietis*, lectotype, designated here, of *Stictis radiata*; Persoon 910.263-965). Italy (FH-Rabenhorst, F. Eur. 775, Riva, 1863, in ramis *Abietis excelsa* leg. Carestia, isotype of *Schmitzomia carestiae*). Great Britain (NY, on *Lonicera*, Lyndhurst, Massee) (K, on *Lonicera*, ex herb. Phillips, labelled *S. annulata*). AFRICA AND ATLANTIC ISLANDS: Tristan da Cunha (K, on *Phylica*, Meyland 1693, 7.II. 1938). Canary Islands (CUP-MM 10, 44, 48, 60, 71, 102, 131, 204, 205, 206, all Tenerife, Korf, Denison, Kohn & Sherwood, Jan. 1976). Union of South Africa (K, nr. 76 ex herb. Phillips, holotype of *Stictis thelotremoides*). ASIA: Japan (CUP-JA 2942, Honshu, 25.II.1966, Korf, Dumont, Tubaki & Aoshima). Java (FH-Höhnel, Tijbodas, 1907-1908; Höhnel 4653, Buitenzorg, 1907-1908). India (K, on *Eupatorium*, Darjeeling, 23.XI.1964,

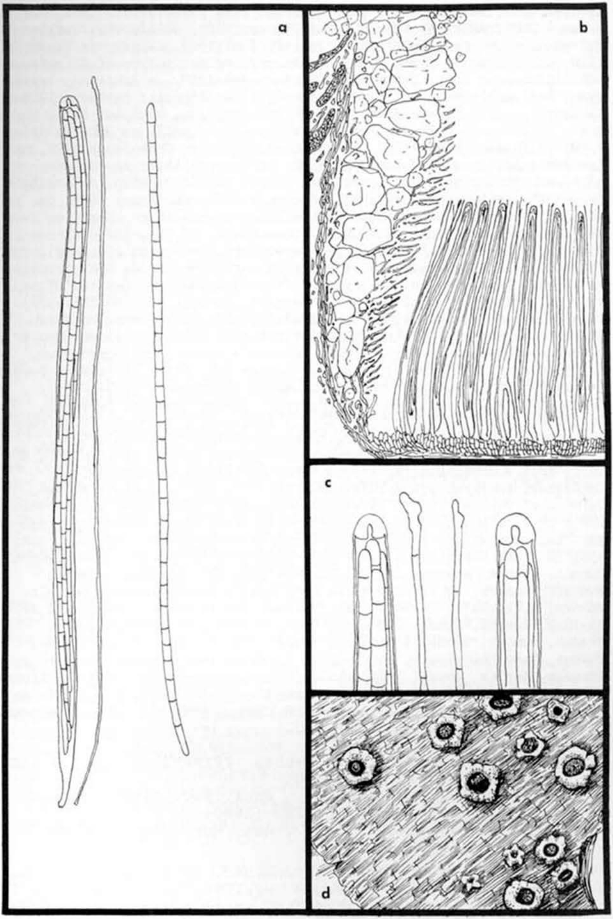

FIGURE 94. *Stictis radiata*. a. Ascus, paraphysis, and spores, x750. b. Cross section of margin, x225. c. Detail of apices of asci, paraphyses, and spores, x1500. d. Habit sketch, x7.5. Drawn from CUP-California Fungi 1110.

isotype of *S, bengalensis*). West Pakistan (BPI 4771, 20.VII,1972, S. Ahmad). NORTH AMERICA: USA (CUP-D-7675, on *Salix*, California, Harkness; Fairman, on *Spiraea*, California, Nuttall 8.II.1920; California Fungi 1110, on *Arbutus*; D-3906, Bethlehem Pennsylvania, isotype of *Stictis umbellatarum* ex herb. Schweinitz)(K, Harkness 1310, on *Lonicera*, lectotype, designated here, of *Stictis annulata*, California; Harkness 1213, California, lectoparatype)(UC [all Parks herbarium, Humboldt & Del Norte cos., California] 6498, on *Rubus*; 6148, on *Acer*; 6812, on *Umbellularia*; 6319, on *Physocarpus*; 4136, on *Pteridium*; 5306, on *Ceanothus*; 6795, on *Lonicera*; 6203, on *Rhododendron*; 5352, on *Garrya*; 5434, on *Sequoia*; 3575, on *Salix*; 5436, on *Gaultheria*; 6880, on *Ribes*; 5496, on *Erechtites*; 3540, on *Baccharis*; 4156, on *Rhamnus*; 6397, on *Alnus*; 6252, on *Corylus*; 4207, on *Pyrus*)(OSC 6363, on *Rhus*, Oregon)(Herb. Korf, on needles of *Pseudotsuga*, 13.VIII.1975; on *Picea*, 17.VIII.1975)(NY, on *Maclura*, Ohio, Fink 18.V.1915)(PH, Schweinitz, on corium (leather), Bethelehem, Pennsylvania, holotype of *Sphaerobolus corii*; Schweinitz, Bethlehem, Pennsylvania, holotype of *Stictis hyssopii*). Mexico (NY, Murrill, Orizaba, Jan 10-14, 1910; Tepeite, Murrill 525, 28.XII.1909). Canada (NY, Newfoundland, Waghorn 129). Bermuda (CUP 34639, on *Musa*, Seaver & Whetzel 76, isotype of *Stictis musae*; 32626, on *Agave*, Seaver & Whetzel)(NY-Bermuda 1322, Brown, Britton & Seaver, on *Acrostichum*, holotype of *S. filicicola*). Jamaica (K-Farr 243, Flora of Jamaica F-885) Panama (NY-Pa 1635, Prov. Chiriqui, Dumont &Carpenter, 2.VII.1975). SOUTH AMERICA: Ecuador (NY-Ec 1808, Prov. Zamora, Dumont, Capenter, Buriticá, 31.VII.1975; Ec-1970, *ibid.*, I.VIII.1975; Ec-237, Prov. Pichincha, *ibid.*, 17.VII.1975; Ec-538, *ibid.*, 19.VII.1975; Ec-181, *ibid.*, 17.VII.1975; Ec-1409, Prov. Tungurahua-Pastaza, *ibid.*, 24.VII.1975; Ec-1372, *ibid.*).)Colombia (Ny-Co 770, Dto. Antioquia, Dumont, Haines, Velasquez, Fonegra, 6.VII.1974; Co-1074, Dto. Valle, Dumont, Haines, Velasquez, Idrobo, 16.VII.1974; Co-4942; 6153; 6372; 6384; 6427; 6481; 6486; 6790; 6792; 6848; 6954; 6962; 7042; 7210; 8172; 6068; 5373; 5364; 5331 [all Dumont et. al., 1976]). Peru (NY-Pe 436; 472; 102; 305; 352; 438; 385 [all Dumont et al., 1976]). Venezuela (NY-Ve 103, Dto. Federal, Dumont, Haines, Manara, 18.VI.1971; Ve-3713, Edo. Miranda, Dumont, Samuels, Manara, 29.VII.1972; Ve-3775, Edo. Miranda, Dumont, Samuels, Manara, 1.VII.1972; Ve-3449, Edo. Merida, Dumont & Samuels, 30.VII.1971; Ve-1812, Dumont, Samuels, Haines, Leal, 10.VII.1971; Ve-1501, Edo. Aragua, Dumont, Haines & Samuels, 6.VII.1971; Ve-3848, Edo. Miranda, Dumont, Samuels, Manara, 30.VI.1972; Ve-3252, Edo. Tachira, Dumont, Samuels, Borjas, 28.VII.1971).Chile (NY, Juan Fernandez Isl., Masatierra, Skotsberg 30.X.1916). Brazil (S, Malme 264, 18.III.1893, Rio Grande do Sul, holotype of *Stictis bromeliae*)(FH, Höhnel 4653, in culmis Bambusae, São Paulo, holotype of *S. bambusella*).

(195b). *STICTIS RADIATA* Pers. subsp. *INTERMEDIA* (Speg.) Sacc., Sylloge Fung. 8: 682 (1889)
≡ *Stictis intermedia* Speg., Anal. Soc. Cientif. Argentina Buenos Aires 10: 226 (1880)
= *Stictis tropicalis* Speg., Ann. Mus. Buenos Aires 29: 455 (1909)

Stictis radiata subsp. *intermedia*, originally described as being intermediate between *S. stellata* and *S. radiata*, is characterized by short, unbranched periphysoids 2.0 μm broad, an intensely J+ hymenium, and ascospores 2.5-3 μm broad, with cells 2.5-5 μm long, not tapering basally.

SPECIMENS EXAMINED: NORTH AMERICA: Panama (NY-Pa 769, Prov. Veraguas, Dumont, SE&SM Carpenter, Mori, 19.VI.1975). SOUTH AMERICA: Ecuador (NY-Ec 1814, Prov. Zamora, Dumont, Carpenter, Buriticá, 31.VII.1975; Ec-1339, Prov. Tungurahua, *ibid.*, 24.VII.1975). Venezuela (NY-Ve 2898, Edo. Merida, Dumont, Samuels, Borjas, 24.VII.1971; 2390, on *Piper*, Edo. Merida, Dumont, Haines, Samuels, 19.VII.1971; Ve-5879, on *Inga*, Dto. Federal, Dumont, Cain, Samuels, Manara, 24.VII.1972; Ve-1691, Edo. Lara, Dumont, Haines, Samuels, Leal, 9.VII.1971; Ve-4122, Edo. Sucre, Dumont, Cain, Samuels, Morillo). Peru (NY-Pe 86; 42; 242 [all Prov. Junin, Dumont et al. 1976]). Colombia (NY-Co 6224; 6326; 6448; 6451 [all Dto. Antioquia, Dumont et.al., 1976]; Co-5414; 5423 [both Dto. Cundinamarca, Dumont et al., 1976]; 4554, Boyacá, Dumont et al., 1976;Co-515, Dumont et al., Dto. Cundinamarca). Argentina (LPS, on *Conium*, Bañado de San José de Flores, holotype of *Stictis intermedia;* 28230, on *Musa*, Orán, II-1905, holotype of *S. tropicalis*). AFRICA: Uganda (K, 4170, June 19). ASIA. Borneo (CUP-SA 2577, North Borneo, Dumont 15.XII.1966). Philippines (S, on *Daemonorops?*, Dr. Copeland, Los Baños 7/1913, as *S. stellata* f. *philippinensis* Rehm)

(196). STICTIS RAMULIGERA Starbäck, Bih. Kongl. Svenska Vetensk. Handl. 25(14): 15 (1899)

Figure 95

Apothecia at first immersed, opening by a broad pore but not becoming erumpent, 0.5-0.8 mm diam., the margin thick, white-pruinose, entire, the disc moderately deeply urceolate, pale ochraceous. Margin in cross section 75-85 µm thick, the wall 40 µm thick, of colorless, angular, more or less pseudoparenchymatous cells 1.5-2 µm diam., the periphysoids 30 x 2.0 µm, unbranched, non-gelatinous, the crystalline layer prominent. Subhymenium c. 10 µm thick, resting on disintegrating host tissue, J-. Paraphyses numerous, filiform, not enlarged above, colorless, 1.0-1.5 µm diam., branched and circinate apically, J+. Asci 180-220 x 1.5-1.75 µm, the cells 5-8 µm long.

On herbaceous stems, South America. *Stictis hydrangeae*, the only other species with circinate paraphyses, a colorless margin, and narrow, distantly-septate spores, has branched periphysoids and a gelatinous margin.

SPECIMENS EXAMINED: SOUTH AMERICA: Brazil (FH, Vestergren, Microm. Sel. Exs. 843, Rio Grande Do Sul, 24.I & 10.II 1893, isotype of *Stictis ramuligera*). Venezuela (NY-Ve 3108, Edo. Barinas, Dumont, Samuels, Borjas, 26.VII.1971). Colombia (NY-Co 1693, Dto. Antioquia, Dumont, Haines, Velasquez, 20.VII.1974; Co-6844, Norte de Santander, Dumont, Sherwood, Velasquez, 20.VIII.1976; Co-6844, Cundinamarca, Dumont et al.)

(197). (STICTIS RHODOLEUCA) Sommerfelt, Fl. Lapp. 198 (1826)
≡ *Propolis rhodoleuca* (Sommerf.) Fr., Summa Veg. Scand. sect. post. 372 (1849)
= *Stictis fulva* Peck, Bot. Gax. (Crawfordsville) 6: 36 (1880)

The species is a typical *Propolomyces*, distinguished from *P. farinosa* by having equilateral, slightly thick-walled spores 7-8 x 18-19 µm. The spores of *Propolis leonis*, which also occurs on pine cones, are much larger.

SPECIMENS EXAMINED: EUROPE: Norway (O, Saltd., in squamis strobili pini 3/1823, labelled lectotype of *Stictis rhodoleuca* by M. Jørgensen).

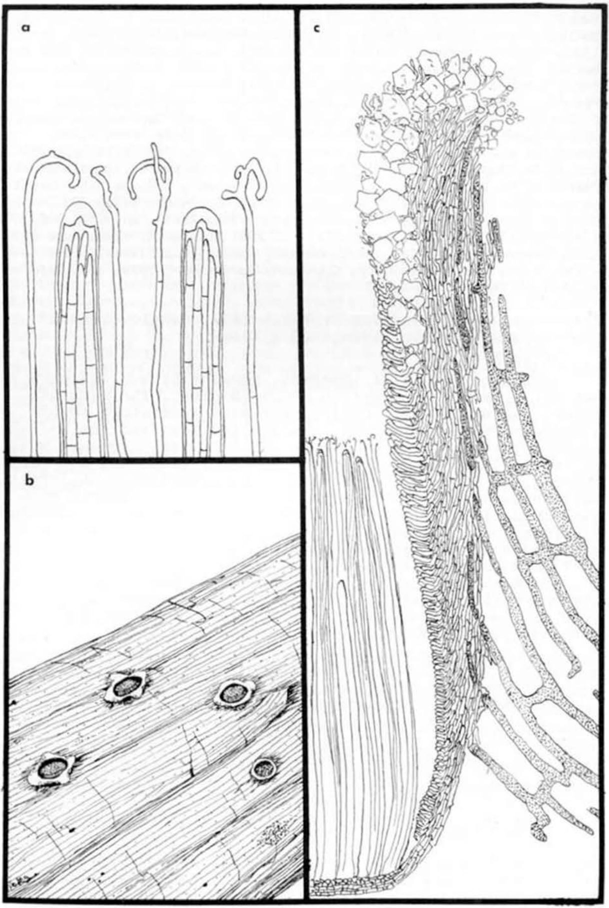

FIGURE 95. *Stictis ramuligera*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x300. Drawn from FH-Vestergren 843.

NORTH AMERICA: USA (CUP-D 9035, Vermont, Pringle 420, isotype of *Stictis fulva*)

(198). *STICTIS RUBI* Schw., Trans. Amer. Philos. Soc. n.s. 4: 179 (1832)

The holotype seems to have been a species of *Stictis*, but is too immature to characterize.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D 3903, isotype of *Stictis rubi* ex herb. Schweinitz)(PH, Bethlehem, holotype of *S. rubi*)

(199). *(STICTIS RUBI)* Crouan & Crouan, Fl. Finist. 42 (1867), non *S. rubi* Schw. (1832)

The type specimen could not be borrowed for examination. The species is probably not a *Stictis* and may be a *Cryptodiscus*, but the original description will not serve to characterize it.

(200). *(STICTIS RUBIACEARUM)* Pat.
= *Biostictis psychotriae* (Mont.) Sherwood, q.v.

(201). *(STICTIS RUBICUNDA)* Dur. & Lév., Expl. Sci. Alg. Atlas pl. 29, f. 6 (1850)

I received no answer to inquiries for this species addressed to PC, and it is unrepresented at FH. The original illustration shows a species with elongate black hysterothecia with an accessory red margin. It is unlikely that this is a *Stictis* in the present sense. It may be Hysterialean.

(202). *(STICTIS RUFA)* Pers., Obs. Mycol. 2: 74 (1799)
≡ *Agyrium rufum* (Pers.) Fr., Syst. Mycol. 2(1): 252 (1822)

For a discussion of the affinities of *Agyrium*, see the list of genera, above. I have designated 910.264-857 as the neotype (it cannot be the holotype, which occurred on *Taxus*) since this specimen confirms to current usage of the name and contains asci. The other specimen in Persoon's herbarium may well be correctly identified, but contains no asci.

SPECIMENS EXAMINED: EUROPE: France? (L, 910.264-857, on sapin (*Abies*), neotype, designated here, of *Stictis rufa*) Germany (L, Persoon 910.264-846, sine loc.)

(203). *STICTIS SACCARDOI* Rehm
= *Stictis stellata* Wallr., q.v.

(204). *(STICTIS SALIGNA)* (Albertini & Schw.) Pers., Myc. Eur. 1: 336 (1822)
≡ *Tremella saligna* Alb. & Schw., Consp. Fung. 303 (1805)

According to Streinz (1862), this is a synonym of *Propolomyces farinosus*. I have seen no original material, but the original description would support this synonymy.

(205). STICTIS SAGARETIAE Cash, Mycologia 35: 600 (1943)

Figure 96

Apothecia at first immersed, opening by a pore but not becoming erumpent, splitting the substrate irregularly, 0.4-0.8 mm diam., somewhat angular in outline, the margin white-pruinose, entire, not conspicuous, the disc moderately deeply immersed, pale ochraceous. Margin in cross section 20-30 µm thick, almost entirely crystalline, periphysoids few, inconspicuous. Subhymenium colorless, J+, of small, isodiametric, angular cells resting directly on host tissue. Paraphyses numerous, filiform, 1.0-1.5 µm broad, often branched and slightly inflated apically, J+ blue. Asci 65-80 x 7(-11) µm, very thick-walled when young, the cap 3.5 µm thick, pierced by a broad conical pore. Ascospores 8, 38-45 (-65, fide Cash) x 3.5 µm, with a thick gelatinous sheath, coiling when freed from the ascus.

On corticate twigs, tropical America. Iodine reactions and ascus structure will distinguish this species from any species of *Propolis*. Not likely to be confused with other *Stictis* spp.

SPECIMENS EXAMINED: NORTH AMERICA: USA (NY, on *Sagaretia*, Florida, Shear 433, isotype of *Stictis sagaretiae*). SOUTH AMERICA: Colombia (NY-Co 732, on *Cecropia*, Dto. Antioquia, Dumont, Haines, Velasquez, Fonnegra, 6.VII.1974; Co-721, Dto. Antioquia, *ibid.*, 5.VII.1974)

(206). STICTIS SAROTHAMNI Fckl., Jahrb. Nassauischen Vereins Naturk. 27-28: 48 (1873)

Figure 97

Apothecia at first immersed, gregarious, opening partially by a pore and partially by splitting the overlying substrate irregularly, 0.5-0.8 mm broad, the margin white or somewhat yellowish-pruinose, entire, the disc pale ochraceous, deeply immersed. Margin in cross section 175 µm thick, distinctly 3-layered, the wall colorless, c. 90 µm thick, of rather distantly-spaced, gelatinous, colorless hyphae 1.5 m diam., the crystalline layer prominent, of large, non-rosettiform crystals, the periphysoids 50 x 1.5 µm, numerous, sometimes branched, forming a compact layer. Subhymenium colorless, of small, angular cells, resting on an inconspicuous continuation of the wall. Paraphyses 1.0 µm diam., not enlarged apically, branched but not circinate, J-. Asci 180-200 x 4(-5) µm, the cap 4 µm thick, pierced by an angular pore. Ascospores nearly as long as the asci, c. 1.5 µm broad. The material I examined was slightly immature and contained no septate spores.

On *Sarothamnus* and rope, Europe. This does not resemble *Stictis mollis*, with which Rehm (1887-96) and Saccardo (1889) compared it. It seems to be distinct from immature *S. radiata*, and to differ from *S. hydrangeae* principally in having non-circinate paraphyses and a thinner ascus cap.

SPECIMENS EXAMINED: EUROPE: Austria (FH, Herbier Barbey-Boissier 1093, on *Sarothamnus*, Steinberg, Oestrich (Nassau), leg. Fuckel, isotype of *Stictis sarothamni*)(PAD, Fungi Rhenani 2670, isotype)(S, on rope, N. Oesterreich, Strasser 1913, as *S. sulphurea* var. *luxurians*)

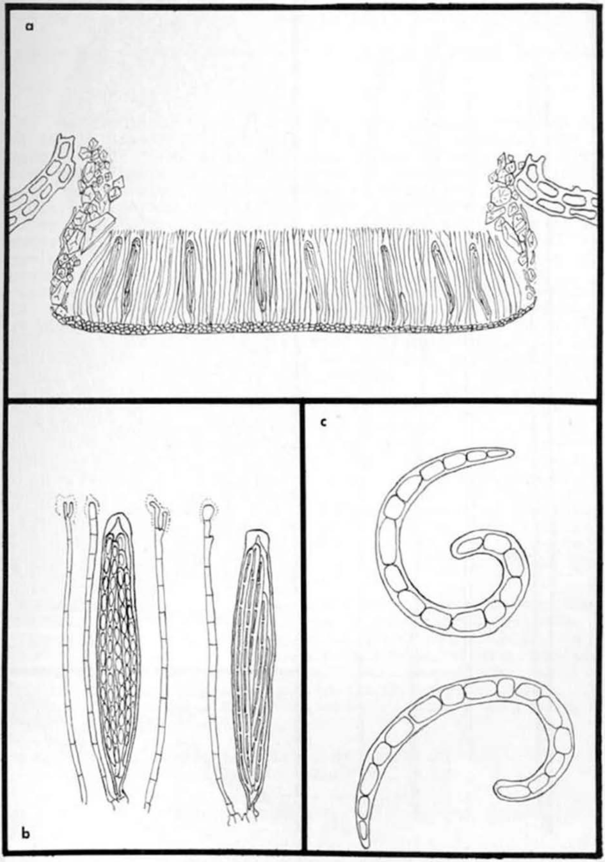

FIGURE 96. *Stictis sagaretiae*. a. Cross section of apothecium, x225. b. Asci, paraphyses, and spores, x750. c. Two ascospores, x1500. Drawn from NY-Co 732.

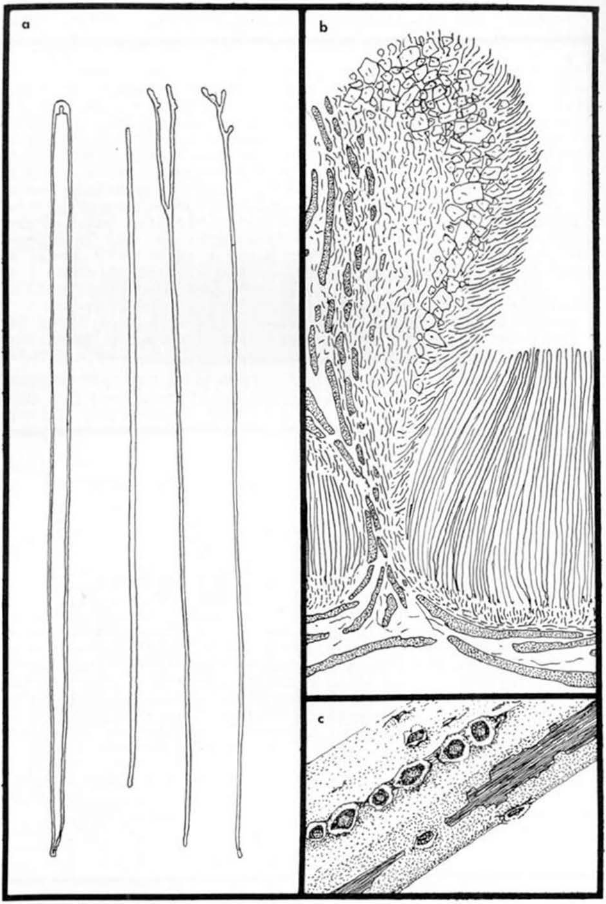

FIGURE 97. *Stictis sarothamni*. a. Ascus, paraphyses, and spore, x750. b. Cross section of margin, x225. c. Habit sketch, x7.5. Drawn from FH-Herbier Barbey-Boissier 1095.

(207). STICTIS SCHIZOXYLOIDES Ellis & Everhart, Proc. Philadelphia Acad. Sci. 46: 150 (1894)
= *Stictis edwiniae* Clements, Bull. Torrey Bot. Club 30: 86 (1903)
= *Stictis curtispora* Dearness & Bisby, Fungi Manitoba 64 (1929)

Figure 98

Apothecia at first immersed, soon becoming erumpent and at length nearly superficial, 0.7-1.5(-2.0) mm diam., the margin black, dark grey-pruinose, entire to somewhat lacerate, splitting away from the hymenium when dry, the disc grey, not deeply urceolate, somewhat pruinose. Margin in cross section 100 μm thick, without a distinct crystalline layer, continuing beneath the subhymenium, consisting of an outer layer of compacted dark brown hyphae 2.0 μm diam. giving rise to a tissue of loosely-interwoven colorless hyphae and thence to branched periphysoids 50 x 1.5 μm, colorless, numerous, forming a compact layer. Subhymenium c. 15 m thick, of small, colorless, angular cells, intensely J+ blue, resting on a continuation of the wall 80 μm thick, Paraphyses colorless, 1.0 μm broad, enlarged to 2.0-3.0 μm at the fusiform tip (which may be septate), crystalliferous, strongly J+ blue, forming an epithecium. Asci cylindrical, short-stipitate, 65-70 x 10 μm, very thick-walled when young, the cap 3.0 μm thick. Ascospores 8, 55-60 x 2.0-2.5 μm, usually 7-septate, not sheathed or coiling.

On wood and bark, western North America. Also reported by Gilenstam (1974) from Sweden. The known collections are from arid and cold habitats unlikely to be frequented by mycologists; the species may well be common. It seems quite isolated from other species of *Stictis* because of the thick, non-crystalliferous margin and asci which appear bitunicate, but cannot be accomodated elsewhere in the classification. I have not been able to locate the type of *S. edwiniae*, but the description fits this species.

SPECIMENS EXAMINED: NORTH AMERICA: Canada (DAOM, on *Populus*, Winnipeg, Manitoba, 9.I.1926, Bisby 2160, isotype of *Stictis curtispora*). USA (TRTC 47648, on *Ephedra*, Arizona, Malloch 18.IV.1972)(CUP-D-5821, Crypt. F. Colorado 72, on *Salix*, Clements 3.X.1904; D-142, on *Salix*, Montana; D-7648, Sheridan, Montana, isotype of *Stictis schizoxyloides*; D-7711, on *Fraxinus*, Colorado, Crandall 331. 24.III.1898; D-9367, Ellis & Everhart, North American Fungi 3540, on *Salix*, Montana, 1896; D-1749, on *Salix*, Montana, Kelsey)

(208). (STICTIS SERENOAE) Cash, Mycologia 35: 599 (1943)
= *Propolis quadrifida* (Lév.) Mont.?

Although microanatomically very similar to *P. quadrifida*, this may be a distinct species of *Propolis* (Phacidiales). For a discussion, see Sherwood (1977).

(209). (STICTIS SERIATA) Lib., Pl. Crypt. Ard. 3, 233 (1834)
≡ *Merostictis seriata* (Lib.) Défago, Sydowia 21: 49 (1967)
= *Peziza obvelata* de Lacroix in Rabenh., F. Eur. 422 (1862)

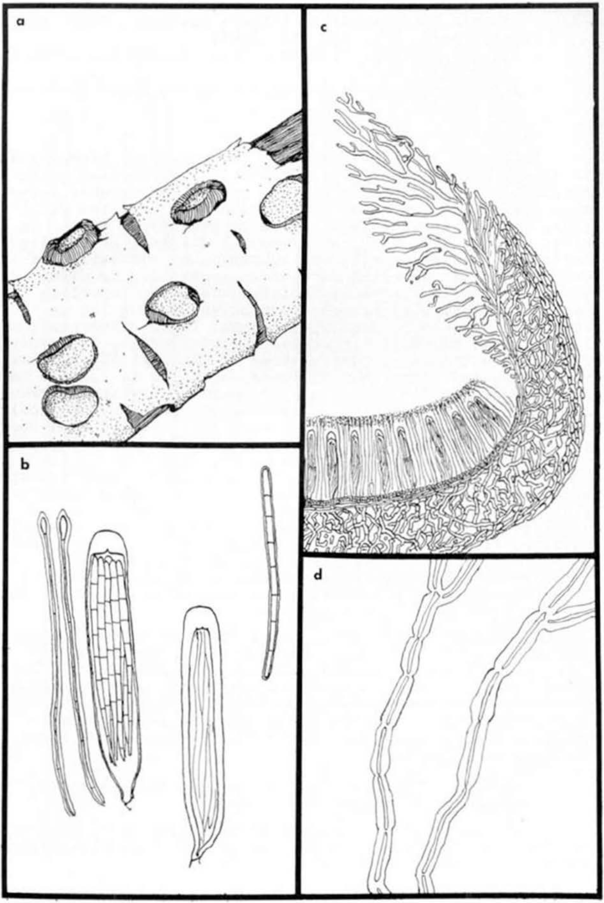

FIGURE 98. *Stictis schizoxyloides*. a. Habit sketch, x7.5. b. Asci, paraphyses, and spores, x750. c. Cross section of margin, x225 [hyphae not to scale]. d. Hyphae of the inner wall, x750. Drawn from Ellis & Everhart, N. Am. Fungi 3540 (CUP-D).

≡ *Stictis obvelata* (de Lacr.) de Not., Comment. Soc. Crittog. Ital. 1: 367 (1864)

Additional synonyms, and a redescription of the species, are provided by Défago (1967). *S. seriata* is Dermateaceous.

(210). STICTIS SERPENTARIA Ell. & Everh., Bull. Torrey Bot. Club 24: 469 (1897)

Figure 99

Apothecia at first immersed, opening by a pore and becoming somewhat erumpent, orbicular, 1.5-3.0 mm diam., the margin thick, grey-pruinose, entire to lacerate, the disc moderately deeply urceolate, also grey-pruinose. Margin in cross section 200 µm thick, 2-layered, the wall consisting of tightly-packed non-gelatinous dark brown hyphae 1.5-2.5 µm diam., the crystalline layer indistinct, consisting of small crystals irregularly scattered throughout the upper portion of the wall. Periphysoids 40-50 x 1.0-1.5 µm, branched, imbedded in a gelatinous matrix, J-. Subhymenium c. 10 µm thick, of small colorless angular cells, J- or J+, resting on brown wall tissue. Paraphyses numerous, filiform, 1.0 µm broad below, 1.5-2.0 µm broad at the tip, once or twice branched apically, J+, imbedded in brown amorphous material and forming an epithecium. Asci 350-400 (-500, fide Goree, 1972) x 12-14(-20) µm, the cap 6-7 µm thick, pierced by a broad conical pore. Ascospores 8, nearly as long as the asci, 4-5(-6) µm broad, sheathed, coiling when freed from the ascus, the cells 3-5 µm long.

On wood, western North America. The distribution of this species and the characters which distinguish it from *S. pachyspora* are reviewed by Goree (1972). This distinctive species is apparently quite rare.

SPECIMEN EXAMINED: NORTH AMERICA: USA (CUP-D 7644, on *Salix*, Washington State, Suksdorf 481, 18.IX.1894, isotype of *Stictis serpentaria*)

(211). STICTIS SESLERIAE Lib.
= *Stictis arundinacea* Pers., q.v.

(212). (STICTIS SICROSTOMA) Carmichael & Berkeley
≡ *Stictis microstoma* Carmichael & Berkeley, q.v.

(213). (STICTIS SPARSA) (Schw.) Sacc., Sylloge Fung. 8: 695 (1889)
≡ *Sphaerobolus sparsus* Schw., Trans. Amer. Philos. Soc. n.s. 4: 254 (1832)

As was noted by Berkeley (1873), the type specimen is extremely immature. The fruitbodies consist of a brown, non-periphysogenous, crystalliferous margin of interwoven hyphae surrounding filiform paraphyses with branched brown apices, and thick-walled cylindrical asci. This seems to be a *Schizoxylon*, but it is too immature to characterize.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, herb. Schweinitz, sine loc., holotype of *Sphaerobolus sparsus*)(CUP-D 6655, isotype)

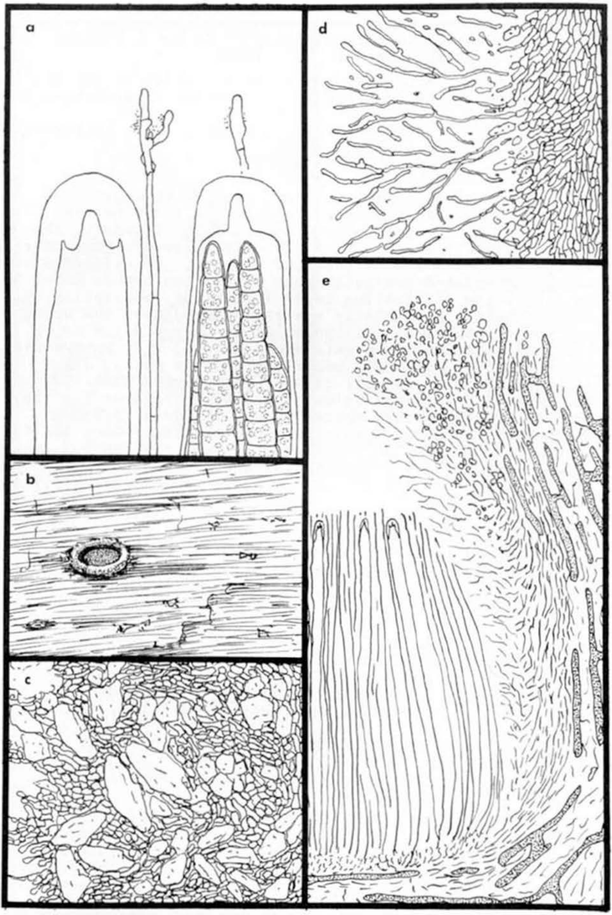

FIGURE 99. *Stictis serpentaria*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Detail of hyphae and crystalline inclusions in upper margin, x750. d. Periphysoids, x750. e. Cross section of margin, x150. Drawn from CUP-D-7644.

(214). (STICTIS SPHAERALIS) Fr., Syst. Mycol. 2(1): 194 (1822)
≡ *Laquearia sphaeralis* (Fr.) Fr., Summa Veg. Scand. sect. post. 366 (1849)

For a discussion of this species, see under *Laquearia,* above.

(215). STICTIS SPHAEROBOLOIDEA (Schw.) Berk. in Ell. & Everh., North Amercan Fungi 453 (1881)
≡ *Lichenopsis sphaeroboloidea* Schw., Trans. Amer. Philos. Soc. n.s. 4: 308 (1832)
= *Sphaerobolus crustaceus* Schw., l.c. 254 (1832)
≡ *Stictis crustacea* (Schw.) Sacc., Sylloge Fung. 8: 695 (1889)

Figure 100

Apothecia at first immersed, becoming erumpent, remaining for a long time closed, finally opening by a small and irregular pore, 1.0-2.0 mm diam., orbicular, white-pruinose or rarely faintly lilac-colored, the disc deeply urceolate, brown. Margin in cross section 2-layered, the wall consisting of small (c. 2.0 µm) pseudoparenchymatous cells, the periphysoids 6-8 x 1.5 µm, forming a compact layer in the upper part of the margin, disintegrating and imbedded in a gel in the lower part, J+ blue. An internal crystalline layer is absent, but the wall is crystalliferous on its outer face and splits away from the surrounding host substrate. Subhymenium c. 10 µm thick, of small, colorless, isodiametric cells, resting directly on host tissue. Paraphyses numerous, filiform, 450-650 x 1.0 µm, enlarged abrubtly at the tip which is 3.5-5 µm thick and brown, usually unbranched, J+. Asci strictly cylindrical, 450-650 x 7(-9) µm, the cap 5 µm thick, pierced by a broad pore. Ascospores 8, nearly equalling the asci, 2.0-2.5 µm broad, transversely multiseptate, the cells 4-5 µm long, or rarely (and abnormally) muriform.

On bark and wood, typically of *Quercus,* eastern North America. Fairly common. The taxonomic history of this species is reviewed under *Lichenopsis,* above. Schweinitz supposed that the fungus discharged its hymenium as a unit, since it eventually falls out of old specimens, leaving an empty hole. This is incorrect; many frutibodies can be found in which all of the asci have discharged, leaving a mass of agglutinated paraphyses within the fruitbody. This is the only Stictidaceous fungus with J+ blue periphysoids. The abnormal, muriform-spored form is discussed by Sherwood (1976).

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-D 9353, Ell. & Ev., N. Am. Fungi 453, on *Cornus,* Pennsylvania; Atkinson herb., *ibid.;* D-6234, on *Populus,* New York, Peck; D-307, Burnett 1904, sine loc; D-7696, on *Rosa,* Illinois, Cobden 8.IV.1887)(PH, Bethlehem, Pennsylvania, herb. Schweinitz, holotype of *Lichenopsis sphaeroboloidea*)(NY, Alabama Biol. Survey 2202, Earle 12.X.1899)(B, Maryland, Petrak v.1950)

(216). (STICTIS SPHAEROIDES) Niessl., Hedwigia 15: 116 (1876)

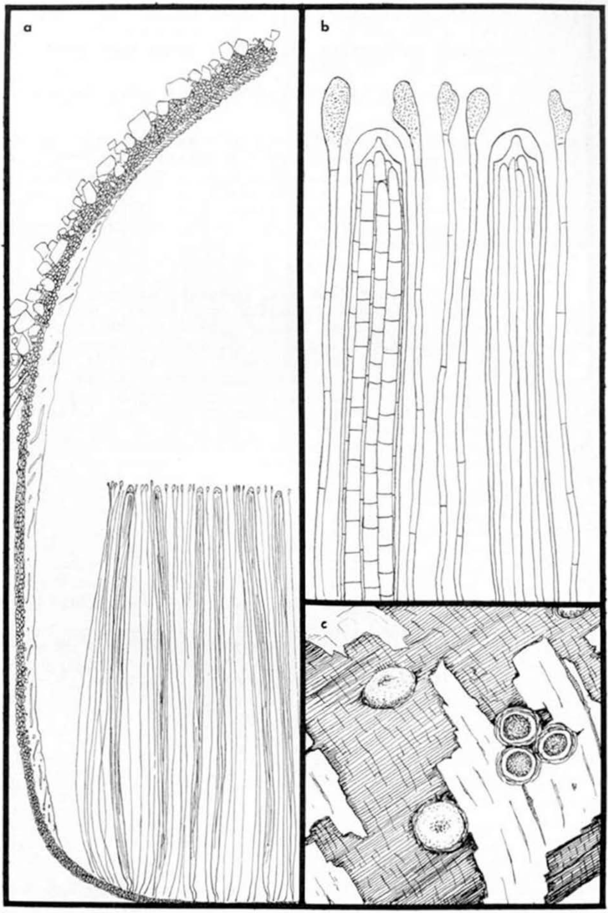

FIGURE 100. *Stictis sphaeroboloidea*. a. Cross section of ascocarp, x150. b. Detail of apices of asci, paraphyses, and spores, x1500. c. Habit sketch, x7.5. a-b drawn from the holotype. c drawn from Ell. & Ev., N. Am. Fungi 453 (CUP-D).

= *Pragmopara amphiloba* Massal., Framm. Lich. 13 (1855)

According to Groves (1967), from whom the above synonymy was taken, the species is allied to *Scleroderris* (Leotiaceae).

(217). *STICTIS STELLA* Schw., Trans. Amer. Philos. Soc. n.s. 4: 180 (1832)

The type specimen is extremely immature and contains no asci. It appears to be a *Stictis*, possibly *S. stellata*. or *S. radiata*.

SPECIMEN EXAMINED: NORTH AMERICA: USA (PH, herb. Schweinitz, Bethlehem, Pennsylvania, holotype of *Stictis stella*)

(218). *STICTIS STELLATA* Wallr., Fl. Crypt. Germ. 2: 144 (1833)
≡ *Schizoxylon stellatum* (Wallr.) Fckl., Jahrb. Nassauischen Vereins Naturk. 23-24: 251 (1870)
= *Stictis saccardoi* Rehm in Sacc., Michelia 2: 614 (1882)
= *Stictis pallidula* Sacc., Michelia 2: 614 (1882)

Figure 101

Apothecia at first immersed, opening broadly by a pore but not becoming erumpent, 0.4-0.8 mm broad, the margin narrow, white-pruinose, entire to lacerate, the disc deeply urceolate, pale ochraceous. Margin in cross section 40-70 µm thick, 3-layered, often with a poorly differentiated accessory thalline margin, the wall 20 µm thick, pseudoparenchymatous, of closely-packed cells 1.5-2.5 µm diam., colorless, the crystalline layer moderately well-developed, of heterogeneous non-rosettiform crystals. Periphysoids 10-20 x 1.5-2.0 µm, septate, unbranched, not gelatinous. Subhymenium c. 10 µm thick, of small, colorless, angular cells, J-. Paraphyses numerous, filiform, 1.0 µm broad below, barely enlarged above, simple to sparingly branched, J- or faintly J+. Asci 130-200 x 6(-8) µm, the cap 2.5-3.0 µm thick, pierced by a narrow, conical pore. Ascospores 8, 130-200 x 1.5-2.5 µm, septate, the cells 3-5 µm long.

On herbaceous stems, occasionally on wood, widespread a and common. *Stictis stellata* is distinguished from *S. radiata* by its predominantly herbicolous habit, broader, unbranched periphysoids, J- hymenium, and smaller size. Intergrades occur between the two species. *S. stellata* is characteristic of warmer climates than *S. radiata*.

No material examined by Wallroth could be located. I have designated Rabenhorst's Fungi Europaei 3161, which was widely distributed, as a tentative neotype which will preserve current usage of the name *Stictis stellata*.

SPECIMENS EXAMINED: EUROPE: Gread Britain (CUP 46392, on *Eupatorium*, Liverpool U. Myc. 1269)(IMI 71070, on *Hedera*, Sussex; 111458, on *Hedera*; 111491, on *Urtica*; 111329, on *Filipendula*; 111423, on *Filipendula*; 111383, on *Epilobium*). France (H, Rabenhorst-Wint., F. Eur. 3161, as *Schmitzomia elevata*, on *Rosa*, 28.X.1882, neotype [designated here] of *Stictis stellata*). ASIA: Ceylon (K, Berkeley 317, on *Thysanolana*). NORTH AMERICA: USA (CUP-D 7663, on *Arundinaria*, Louisiana, Langlois 1240, 27.III.1888; D-6555, ex herb. Schweinitz, labelled *S. pupula*)

(FH, on *Arundinaria*, Louisiana, Langlois 20.X.1890)(NY, on *Zea*, Louisiana, 21.XII.1896; on *Phytolacca*, New Jersey, Ellis IV.1894; on *Zea*, Ohio, Morgan 702). Mexico (OSC 32660, on *Abies*, Est. Mexico, Trappe 3286). Panama (NY-Pa 656, on palm, Prov. Veragua, Dumont, SE&SM Carpenter, 19.VI.1975; Pa-1300, Prov. Panamá, Dumont, Mori, SE&SM Carpenter, 28.VI.1975; Pa-2164, Prov. Chiriqui, Dumont & Carpenter, 4.VII. 1975; Pa-1817, *ibid.*, 3.VII.1975). SOUTH AMERICA: Ecuador (FH-Patouillard, Quito, 1892, Lagerheim)(NY-Ec 2148, Prov. Morona Santiago, Dumont, Carpenter, Buriticá, 3.VIII.1975; Ec-2278, Prov. Pichincha, *ibid.*, 6. VIII.1975; Ec-1950, Prov. Zamora, *ibid.*, 1.VIII.1975; Ec-1820, *ibid.*, 31.VII.1975; Ec-1494, Prov. Napo, *ibid.*, 26.VII.1975). Venezuela (NY-Ve 801, Dto. Federal, Dumont, Haines, Manara, 26.VI.1971; Ve-2582, Edo. Merida, Dumont, Haines, Samuels, Silverborg, Borjas, 20.VII.1971; Ve-6126, Dto. Federal, Dumont, Cain, Samuels, 27.VII.1972; Ve-2815, Edo. Merida, Dumont, Samuels, Borjas, 23.VII.1971; Ve-2582, *ibid.*, 20.VII. 1971)(CUP-Vz 1324, Est. Yaracuy, 27.IX.1932, Chardon). Peru (NY-Pe 150, Prov. Junin, Dumont et al., 1976; Pe-435; 590; 769; 591; 775; 706; 737; 373; 385, Dumont et. al., 1976). Colombia (NY-Co 1769, Dto, Antioquia, Dumont & Haines, 21.VII.1974; Co-4296, Dto. Boyacá, Dumont et al., 1976; 6325, Dto. Antioquia, Dumont et al., 1976; 6922; 7123; 7543; 8185a; 5544; 5817 [all Dumont et. al., 1976]).

(219). (STICTIS STEREICOLA) Berk. & Curt.
≡ *Cryptodiscus stereicola* (Berk. & Curt.) Sherwood, q.v.

(220). (STICTIS STICTICA) (Fr.) Fr., Syst. Mycol 2(1): 197 (1822)
≡ *Hysterium sticticum* Fr., Vet. Akad. Handl. 1819: 91 (1819), n.v.
≡ *Xylogramma sticticum* (Fr.) Wallr., Fl Crypt. Germ. 2: 509 (1833)
≡ *Xylographa stictica* (Fr.) Fr., Summa Veg. Scand. sect. post. 362 (1849)
≡ *Durella stictica* (Fr.) Nannf., Nova Acta Regiae Soc. Sci. Upsal. ser. 4, 8(2): 293 (1932)

Accepted by Rehm '(1887-96) and Nannfeldt (1932) as a *Xylogramma* (or *Durella*). I can find no record of critical examination of Friesian material.

(221). STICTIS STIGMA Cke. & Ell., Grevillea 7: 9 (1887)

Figure 102

Apothecia at first immersed,,opening by a pore and finally becoming somewhat erumpent, 1-2 mm broad (-3 mm, according to Cooke & Ellis, l.c.), the margin thick, inrolled, appearing brown because of included host tissue, rather fleshy when wet, splitting away from the hymenium when dry, the disc deeply immersed, ochraceous pruinose. Margin consisting of a thalline covering layer 20 µm thick of mixed host tissue and hyphae surrounding a thick wall 50-60 µm thick of interwoven colorless hyphae 1.0 µm diam., somewhat gelatinous. Periphysoids 15 x 1.0 µm, colorless, simple. Crystalline layer absent. Subhymenium barely noticeable, resting on 20 µm of colorless, J- wall. Hymenium intensely J+ throughout. Paraphyses simple, barely enlarged above, colorless. Asci 125-150 x 8(-12) µm, the cap 1.5 µm thick. Spores 8, c. 100 µm long, soon breaking up

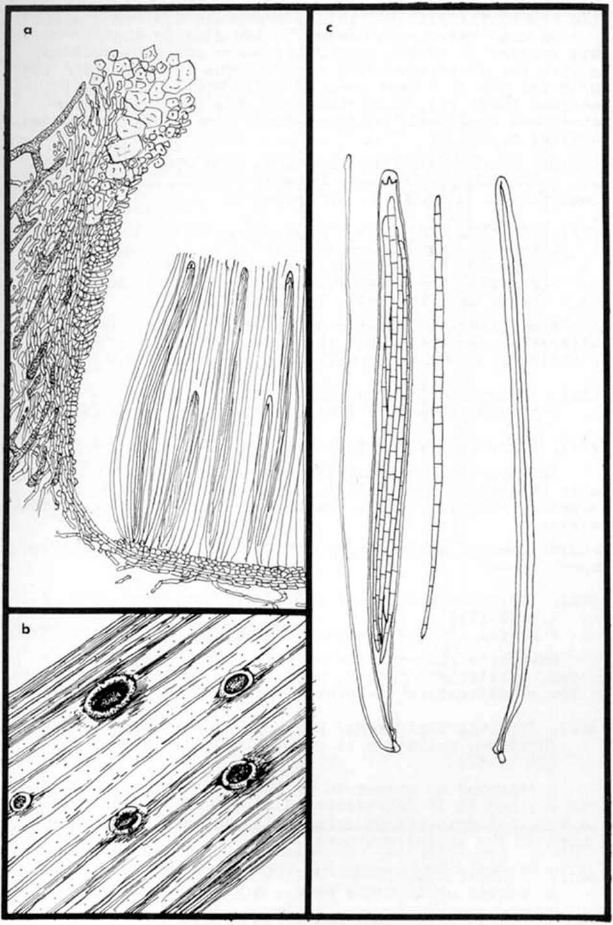

FIGURE 101. *Stictis stellata.* a. Cross section of margin, x300. b. Habit sketch, x7.5. c. Asci, paraphysis, and spores, x750. Drawn from CUP 46392.

into short cylindrical 1-celled fragments 2.5-3 x 3-5 µm.

On dead twigs, New Jersey. Like *Stictis monilifera*, this species is remote from *Schizoxylon* and *Acarosporina*, despite the disarticulating spores. The two specimens (in CUP-D and CUP-A) I have seen of Ellis & Everhart, North American Fungi 855, distributed as this species, are immature and apparently misidentified, since they have brown marginal hyphae.

SPECIMENS EXAMINED: NORTH AMERICA: USA (K, Ellis 2526, on *Cornus*, ex herb. Cooke, holotype of *Stictis stigma*)(CUP-D 7702, on dead twigs of *Cornus florida*, Ellis, 8 Nov. 1877 [authentic])

(222). (STICTIS STROBILINA) Cooke, Grevillea 11: 107 (1883)
≡ *Propolis rhodoleuca* (Sommerf.) Fr. var. *strobilina* (Cooke) Phil., Brit. Discom. 375 (1887)
≡ *Stictis versicolor* Fr. var. *strobilina* Desm., Ann. Sci. Nat. Bot. sér. 2, 19: 366 (1843)?

Rehm (1887-96) equated *S. strobilina* Cooke with Desmazières's subspecies, but there is no reference, direct or indirect, in Cooke's publication to Desmazières.

(223). STICTIS SULPHUREA Rehm
= *Stictis friabilis* (Phil. & Plowr.) Sacc. & Trav., q.v.

(224). (STICTIS TENUIS) Fr., Syst. Mycol. 2(1): 195 (1822)

The type specimen consists of regular ecorticate circular depressions on a stick. The pattern may have been caused by erumpent fungal fruitbodies, but no trace of these remains.

SPECIMEN EXAMINED: EUROPE: Sweden (UPS, Femsjö, herb. Fries, holotype of *Stictis tenuis*)

(225). (STICTIS TERRESTRIS) S.F. Gray, Nat. Arr. Brit. Pl. 1: 663 (1821)
≡ *Peziza immersa* Sowerby, Engl. Fungi pl. 389 (1802)

Sowerby's illustration suggests that this small, immersed, terricolous fungus, with an obvious hymenium visible at low magnification, is probably a member of the Pezizales.

(226). (STICTIS THELOTREMA) Mont. in de la Sagra, Hist. Physique, politique et naturelle d l'isle de Cuba 9: 356 (1841)

I received no answer to my inquiries for this species from PC, and it is unrepresented in the collections at FH. The original description suggests that this is probably a lichen in the Thelotremataceae.

(227). (STICTIS THELOTREMA) Dur. & Lév.
≡ *Stictis oculiformis* Sacc., q.v.

(228). STICTIS THELOTREMOIDES Phil. & Kalchbr.
= *Stictis radiata* Pers., q.v.

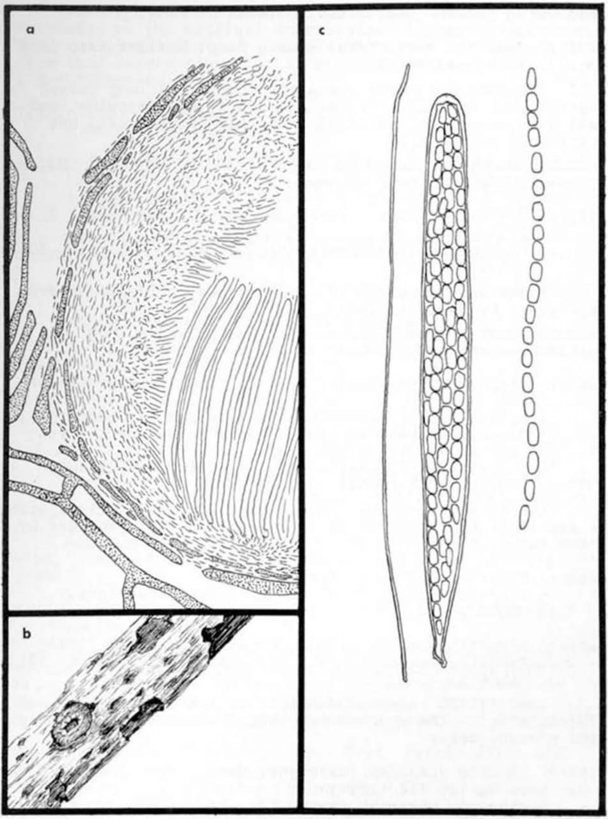

FIGURE 102. *Stictis stigma*. a. Cross section of margin, x375. b. Habit sketch, x7.5. c. Ascus, paraphysis, and spores, x750. Drawn from CUP-D 7702.

(229). *STICTIS TILAKII* Kale & Kale, Maharashtra Vidnyan Patrika 5: (1970)

I have been unable to locate a copy of the reference or specimens of this species, which is cited in a key by Tilak and Nanir (1975). Not cited in Index of Fungi.

(230). (STICTIS THIERRYANA) Roum., Fungi Gallici Exs. 1854 (1882)(nom. nud.)

The specimen which I examined contained long curved spores, but no asci. It was invaded by hyphomycetes, and may have been a coelomycete, or perhaps *Coccomyces*, but certainly not *Stictis*.

SPECIMEN EXAMINED: EUROPE: France (CUP-D 11364, F. Gall. Exs. 1854, on *Fraxinus*, labelled *Stictis thierryana*)

(231). (STICTIS TILIAE) Lasch in Rabenh., Bot. Zeit. 3: 66 (1845)
= *Platygloea disciformis* (Fr.) Neuhoff, Ark. Bot. 28(1): 56 (1936)

Additional synonyms of this species, a Basidiomycete, are given by Bandoni (1956).

SPECIMEN EXAMINED: EUROPE: Germany (FH-Höhnel, Klotzsch, Herb. Myc. 638, isotype of *Stictis tiliae*)

(232). (STICTIS TITHYMALINA) (Kunze) Rehm, Ascomyceten 312 (1878)
≡ *Calloria tithymalina* Kunze, Hedwigia 15: 105 (1876)
≡ *Naevia tithymalina* (Kunze) Rehm in Rabenh., Krypt.-Fl. ed. 2, 1(3): 139 (1888)
≡ *Naeviopsis tithymalina* (Kunze) Hein, Willdenowia Beih. 9: 64 (1976)

Additional synonyms, and a redescription of the species, a member of the Naevioideae (Dermateaceae) are provided by Hein (1976)

(233). *STICTIS TROPICALIS* Speg.
= *Stictis radiata* Pers. subsp. *intermedia* (Speg.) Sacc., q.v.

(234). (STICTIS TSUGAE) Farlow, Appalachia 3: 245 (1883)
≡ *Fabrella tsugae* (Farl.) Kirschst., Hedwigia 90: 131 (1941)

Korf (1962) referred *Fabrella* to the Hemiphacidiaceae (Helotiales). The species is clearly not Stictidaceous in the present sense.

(235). *STICTIS UBERRIMA* (Castagne) Mont., Ann. Sci. Nat. Bot. sér. 3, 12: 315 (1849)
≡ *Sphaeria uberrima* Cast., Cat. Pl. Marseilles 172 (1845)

I received no answer to my inquiries for this species from Castagne's herbarium (CN). The description suggests that it is a dark *Stictis* allied to *S. mollis*.

(236). (STICTIS ULMI) Crouan & Crouan, Fl. Finist. 42 (1867)
≡ *Propolis ulmi* (Crouan & Crouan) Sacc., Sylloge Fung. 8: 652 (1889)

The type of this species, if extant, cannot be borrowed. According to the original description the spores were fusiform and 13-guttulate. The species cannot be characterized from this description, but is probably neither a *Stictis* nor a *Propolomyces*.

(237). STICTIS UMBELLATARUM Schw.
= *Stictis radiata* Pers., q.v.

(238). (STICTIS URTICAE) Crouan & Crouan, Fl. Finist. 42 (1867)
≡ *Propolis urticae* (Crouan & Crouan) Sacc., Sylloge Fung. 8: 654 (1889)

The type of this species cannot be borrowed. From the original description, it may possibly be a *Propolomyces*.

(239). (STICTIS VACCINII) Ell. & Everh., Proc. Acad. Nat. Sci. Philadelphia 46: 352 (1894)
= *Propolis phacidioides* (Fr.) Corda

For a description of this species, a member of the Phacidiales, see Sherwood (1977).

(240). STICTIS VALDIVIENSIS Speg.
= *Stictis lupini* Phil. & Harkn., q.v.

(241). (STICTIS VALVATA) Mont., Ann. Sci. Nat. Bot. sér. 2, 6: 337 (1836)
≡ *Hysterostegiella valvata* (Mont.) Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl. Abt. 1, 126: 313 (1917)

Additional synonyms, and a redescription of this species, a member of the Dermateaceae, are given by Défago (1967).

(242). (STICTIS VARIOLOSA) Pers. in Gaudichaud, Voyage d l' Uranie 178 (1826)

No material of this species could be located. According to the original description it was common on the bark of trees on the island of Rawak and resembled *Propolomyces farinosus*, but with a more regular form. The species may be a lichen, but cannot be characterized from this description.

(243). (STICTIS VERSICOLOR) Fr., Syst. Mycol. 2(1): 198 (1822)
≡ *Melittosporium versicolor* (Fr.) Corda, Icones Fung. 2: 38 (1838)
≡ *Propolis versicolor* (Fr.) Fr., Summa Veg. Scand. sect. post. 372 (1849)

Although the name has been widely used for *Propolomyces farinosus*, it would seem to be tied to the only specimen mentioned when Fries first applied the name. This is Scleromycetes Sueciae 276, a hysterothecial Loculoascomycete and the type of *Melittosporium*. A brief discussion of the species appears under *Melittosporium*, above.

SPECIMEN EXAMINED: EUROPE: Sweden (FH, Fries, Scleromycetes Sueciae 276, isotype of *Stictis versicolor*)

(244). STICTIS VINCAE Ellis
= *Stictis pustulata* Ell. & Everh., q.v.

(245). STICTIS VIRGINEA Cke. & Phil., Grevillea 8: 64 (1879)
Figure 103

Apothecia at first immersed, opening by splitting the substrate longitudinally and at length becoming somewhat erumpent, 0.5-1.0 mm diam., somewhat elongate, white-pruinose, remaining for a long time closed and finally opening by a longitudinal slit or by splitting irregularly, the disc deeply urceolate, pale ochraceous, the margin appearing annulate. Margin in cross section c. 200 µm thick, 2-layered, the wall 100 µm thick, of interwoven colorless hyphae 1.5 µm diam. interspersed with large, colorless, non-rosettiform crystals, abundantly crystalliferous on the outer face and splitting away from the substrate. Periphysoids 100 x 1.0-1.5 µm, richly branched, somewhat gelatinous, J-. Subhymenium c. 30 µm thick, resting on 30 µm of wall tissue, J-. Paraphyses numerous, filiform, unbranched, vaguely circinate, not enlarged above, 1.0 µm thick, J-. Asci 300 x 5(-6) µm, the apical cap 6 µm thick, complex, apparently formed of two superimposed rings. Ascospores 8, nearly as long as the asci, 1.0 µm broad, septate, the cells 8-10 µm long.

On twigs, New Zealand. Very similar in external appearance to *S. ostropoides*, but easily distinguished from that species by the longer, narrower ascospores.

SPECIMEN EXAMINED: AUSTRALASIA: New Zealand (K, Waitaki, Bergren 289, holotype of *Stictis virginea*)

(246). (STICTIS VIRIDIS) Pers., Myc. Eur. 1: 338 (1822)

Cited by Fries (1822) as a synonym of *S. versicolor "c"*, this may be an older name for that species. Fries synonymizes *Hysterium viride* Fr. (1819), but there is no evidence in Persoon's description to connect *Stictis viridis* with *Hysterium viride*. I have seen no original Persoonian material.

(247). STICTIS VITICOLA Sherwood, spec. nov.
Figure 104

Ascocarpi primum immersi, profunde cupulati, 0.5-0.7 mm diam., margine integro vel lacerato, griseo, disco pallide ochraceo. Margo in sectione transversali 175 µm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5 µm diam., brunneo. Stratum crystallinum 150 µm crassum. Periphysoidea 20 x 1.0 µm, ramosa. Paraphyses filiformes, simplices, 400 x 1.0 µm, apice ad 2.0 µm incrassatae, achromae, in iodo caerulescentes. Asci 400 x 5.5-6(-7) µm, apice 5.0 µm crassi, 8-spori. Sporae 375-400 x 2.0 µm, cellulis 4-6 µm longis.

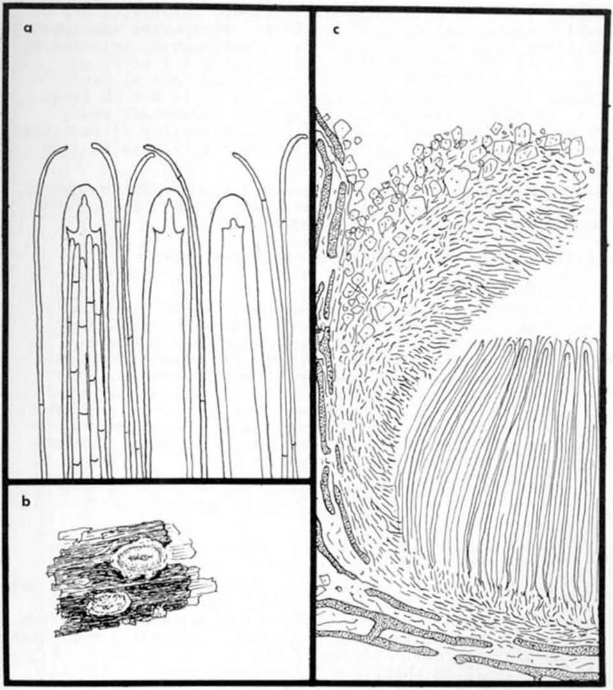

FIGURE 103. *Stictis virginea*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x150. Drawn from the holotype.

HOLOTYPUS: NY, on *Vitis rotundifolia,* Auburn, Lee Co., Alabama, USA, 11/7/1897, F.S. Earle. Isotype: CUP-D-7723.

Apothecia at first immersed, opening by a broad pore, the margin raised but not truly erumpent, 0.5-0.7 mm diam., orbicular in outline, the margin very thick, grey-pruinose, entire to lacerate, the disc deeply immersed, pale ochraceous. Margin in cross section 175 µm thick, with a prominent, colorless, accessory thalline margin, the wall dark brown, c. 20 µm thick, of interwoven hyphae 1.5 µm diam., the crystalline layer very prominent, of heterogeneous non-rosettiform crystals, the periphysoids 20 x 1.0 µm, with gelatinizing walls, branched, J-. Subhymenium resting directly on disintegrating host tissue, colorless, J-, of small angular cells, c.20 μm thick. Paraphyses numerous, filiform, 1.0 μm thick, colorless, unbranched, enlarged to 2.0 μm at the apex, J+ blue. Asci 400 x 5.5-6(-7) μm, the cap 5.0 μm thick, pierced by a broad conical pore. Spores 375-400 x 2.0 μm, septate, the cells 4-6 μm long.

On *Vitis*, Alabama. This species is unusual among *Stictis* species with a dark wall in possessing J+ paraphyses. Narrower spores and longer asci will distinguish it from *Stictis bicolor*.

SPECIMENS EXAMINED (see also holotype, above): NORTH AMERICA: USA (NY, on *Vitis*, Earle & Baker, 3/24/1897, Alabama [=CUP-D 7722]; on *Vitis*, Earle & Baker, 3/24/1897, Alabama [=CUP-D 7721]).

(248). STICTIS XENOSPORA Sherwood, spec. nov.

Figure 105

Ascocarpi primum immersi, profunde cupulati, 0.5-0.8 mm diam., margine integro, albo vel ochraceo, disco pallide ochraceo. Margo in sectione transversali 120 μm crassus, siccus ab hymenio se abrumpens, hypharum pariete 1.5-2.5 μm diam., achromo. Stratum crystallinum 50 μm crassum. Periphysoidea 8-10 x 2.5 μm, non ramosa. Paraphyses filiformes, ramosae, 400 x 1.0 μm, apice ad 1.5 μm incrassatae, achromae, in iodo caerulescentes. Asci 400 x 10-11(-20) μm, apice 9 μm crassi, 8-spori. Sporae 350-375 x 5-6.5 μm, vagina gelatinosa involutae, cellulis 5-6 μm longis.

HOLOTYPUS: CUP-Me 192, on a branch, km. 945 on Hwy. 190 between Tehuantepec and San Cristobal de las Cruces, K. P. Dumont, 13.VIII.1967, Mexico.

Etymology: Strange-spored. The immature spores, with a massive sheath and nearly invisible cell lumen, resemble ghosts.

Apothecia at first immersed, opening by a pore but not becoming erumpent, 0.5-0.8 mm diam., the margin entire, moderately thick, white or faintly yellowish-pruinose, the disc deeply urceolate, pale ochraceous, splitting away from the margin when dry. Margin in cross section 120 μm thick, the wall 15-20 μm thick, of interwoven colorless hyphae 1.5-2.5 μm diam., not notably gelatinous. Crystalline layer prominent, of large, colorless, non-rosettiform crystals. Periphysoids 8-10 x 2.5 μm at the base, tapering to a point, forming a compact layer, unbranched. Subhymenium colorless, of small angular cells resting directly on disintegrating host tissue. Paraphyses numerous, filiform, 1.0 μm diam. below, a little enlarged and usually branched above, faintly J+ blue. Asci 400 x 10-11(-20) μm, the cap 9 μm thick, complex, appearing to consist of two superimposed rings. Ascospores 8, 350-375 x 5-6.5 μm, with a very prominent gelatinous sheath when young, obviously sheathed when mature, septate, slightly constricted at the septa, the cells 5-6 μm long.

On twigs, Mexico and Venezuela. The type of *Stictis moelleriana*, the only other species with spores of these dimensions, has been lost; for reasons discussed under *S. moelleriana*, *S. xenospora* is thought to be distinct.

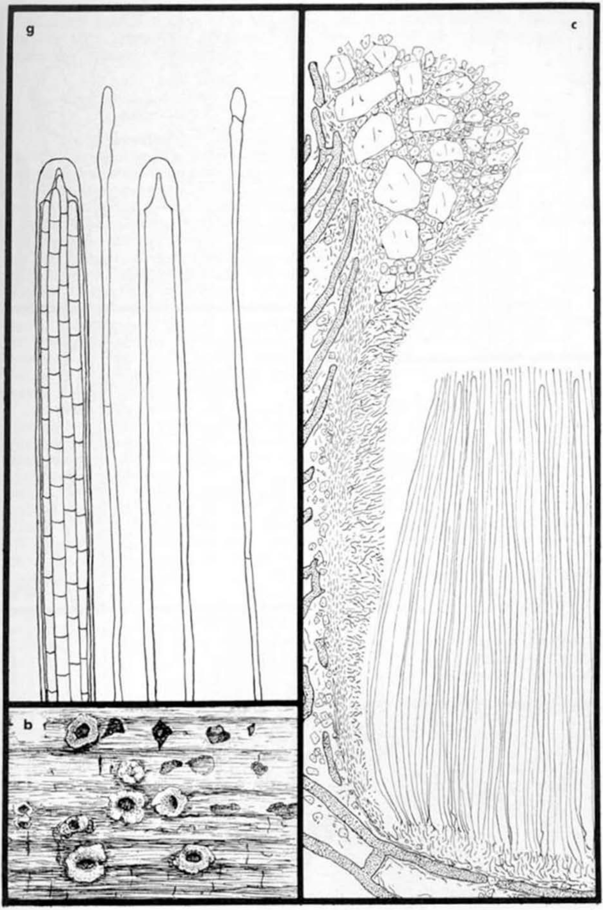

FIGURE 104. *Stictis viticola*. a. Detail of apices of asci, paraphyses, and spores, x1500. b. Habit sketch, x7.5. c. Cross section of margin, x225. Drawn from the holotype.

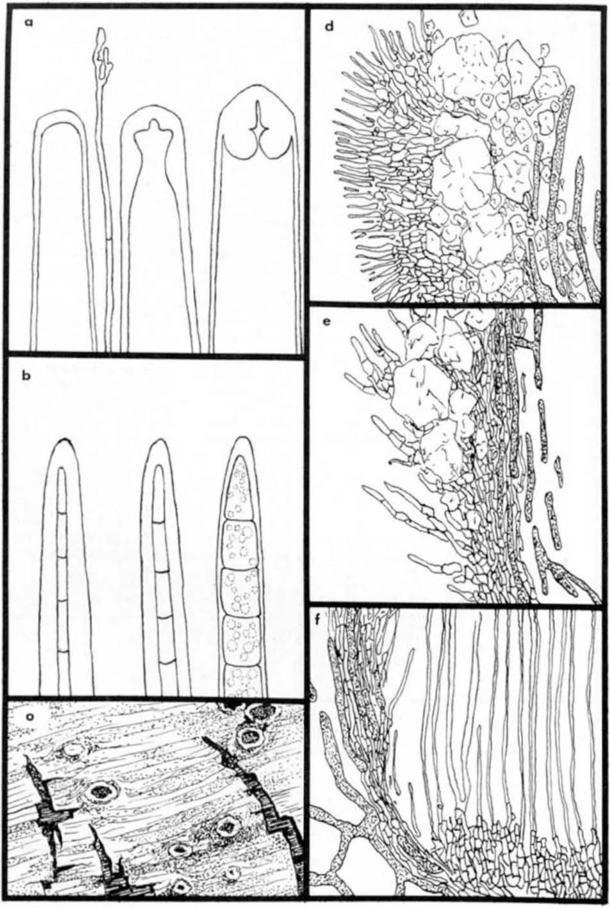

FIGURE 105. *Stictis xenospora*. a. Detail of apices of asci and paraphyses, x1500. b. Stages in the maturation of ascospores, x1500. c. Habit sketch, x7.5. d. Summit of margin, x375. d. Lower margin, x750. d. Base of ascocarp, x750. Drawn from the holotype.

SPECIMENS EXAMINED (see also holotype, above): SOUTH AMERICA: Venezuela (NY-Ve 1031, Parc. Nac. Guatapo, boundary between Edo. Miranda and Guarico, Dumont, Haines & Blanco, 30 June 1971)

SUMMARY

The Ostropales are redefined as a group of predominantly saprophytic, predominantly immersed Ascomycetes characterized by small, discocarpous fructifications interpreted as reduced apothecia consisting only of asci, true paraphyses, and subhymenium surrounded by a margin of vegetative origin. Most members of the group have cylindrical asci with a massive, non-refractive apical thickening pierced by a pore which does not blue in iodine, and cylindrical to filiform, transversely multiseptate ascospores. Muriform spores, and asci which appear bitunicate but lack a functional jack-in-the-box mechanism, occur sporadically throughout the order. The Ostropales are compared with the Phacidiales, Clavicipitales, Helotiales, Graphidales, Patellariaceae, and Gyalectaceae. A close relationship to the Clavicipitales is questioned; the affinities of the group appear to lie with either the Graphidales or the Patellariaceae. The Thelotremataceae are excluded from the Ostropales on the basis of ascospores with lenticular cell lumina and an inner wall which turns red in iodine solutions.

The nomenclature and taxonomy of 88 genera formerly included in the Ostropales or Stictidaceae are reviewed. A key to excluded and included genera is provided. Accepted Ostropalean genera include two new genera, *Acarosporina* and *Lillicoa*; seven genera included by other authors in the Ostropales, *Stictis, Schizoxylon, Ostropa, Robergea, Biostictis, Nanostictis,* and *Conotrema*; and 11 genera not previously accepted as Ostropalean by mycologists, *Propoliopsis, Absconditella, Ramonia, Thelopsis, Gloeolecta, Melittosporiella, Stictophacidium, Propolidium, Delpontia, Odontotrema,* and *Cryptodiscus*. *Vibrissea* and *Acrospermum* are excluded from the order. Revision of the excluded genus *Karstenia,* and redescriptions of accepted genera and their type species, accompany nomenclatoral notes. The final section of the paper consists of an expanded treatment of *Cryptodiscus* (6 spp., 2 new), a revision of *Robergea* (8 accepted species, 3 new), a revision of the North American species of *Schizoxylon,* with notes on extralimital species (19 accepted species, including 8 new combinations and 5 new species), and a comprehensive treatment of *Stictis*. Two hundred and forty-eight species are reviewed. Of these, 49 are accepted; 16 of these are new. Others are reduced to synonymy with accepted species, transferred to other genera, or accepted in genera where they had been placed by other authors.

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INDEX TO HOST GENERA AND FAMILIES OF VASCULAR PLANTS

INDEX TO FUNGOUS AND LICHEN TAXA
(EXCLUDING HOSTS)

This index includes families, infrafamilial taxa, genera, infrageneric taxa, and species. Infraspecific taxa are indexed only if new. New taxa and combinations are in CAPITALS, and the pages where they are published are indicated with a star*. A host index follows the index to fungous taxa.

MYCOTAXON

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RHYTIDOSPORA, A NEW CLEISTOCARPOUS GENUS OF THE MELANOSPORACEAE[1]

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SUMMARY

Rhytidospora is erected as a new genus in the Melanosporaceae. It is characterized by light coloured cleistothecia with a cephalothecoid peridium and one-celled, dark brown, wrinkled ascospores possessing two germ pores. R. tetraspora sp. nov. is described and photographed from burro dung collected in Venezuela.

INTRODUCTION

During the course of a continuing study of coprophilous fungi, one apparently undescribed cleistocarpous genus was isolated on Leonian's medium (Cain and Farrow, 1956) mixed with powdered burro dung. The taxon is characterized by light orange cleistothecia with a cephalothecoid peridium; globose to subglobose asci; and one-celled, dark brown, wrinkled ascospores possessing two germ pores. Since no other cleistocarpous genus is known with this combination of characteristics, the taxon is described here as a new genus.

TAXONOMY

Rhytidospora Jeng & Cain, gen. nov.

Ascocarpia dispersa, sine stromate nec ostiolo, globosa vel subglobosa, pallide armeniaca, glabra, e peridio membranaceo, pallide armeniaco, cephalothecoideo composita. Asci unitunicati, iodo non caerulescentes, globosi vel subglobosi, irregulariter dispersi, evanescentes. Paraphyses nullae. Ascosporae unicellulares, primum hyalinae, ma-

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[1] Supported by grants from the National Research Council of Canada.

turitate confirmata brunneae vel atro-brunneae, parietibus crassis, rugulosae, foramen germinale in utroque apice exhibentes. Conidia incognita.

TYPUS GENERIS: Rhytidospora tetraspora Jeng et Cain

ETYMOLOGY: Greek, rhytido = wrinkle and spora = seed, referring to the wrinkled wall of the ascospores.

Ascocarps scattered, non-stromatic, non-ostiolate, globose to subglobose, light orange, glabrous; peridium membranaceous, light orange, cephalothecoid in surface view. Asci unitunicate, non-amyloid, globose to subglobose, irregularly disposed, evanescent. Paraphyses lacking. Ascospores one-celled, at first hyaline, brown to dark brown at maturity, thick-walled, wrinkled with two germ pores. Conidia unknown.

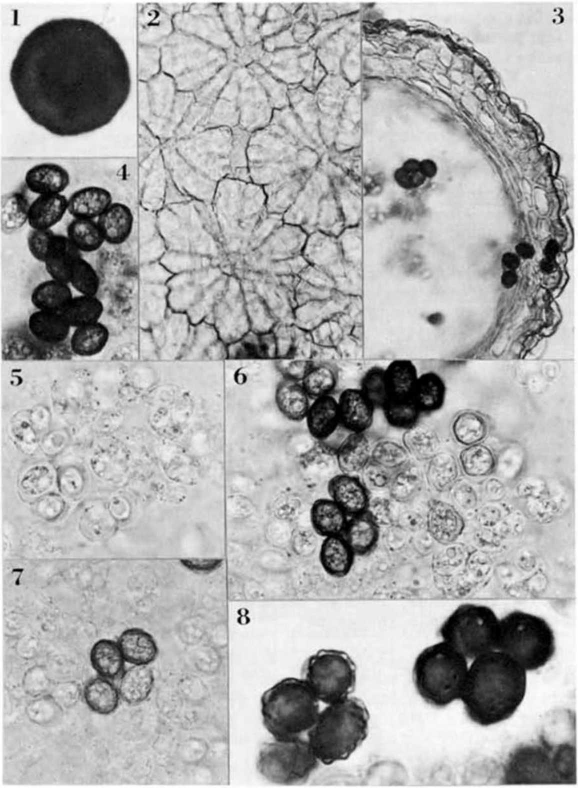
Rhytidospora tetraspora Jeng & Cain, sp. nov. Figs. 1-8.

Ascocarpia dispersa, superficialia, globosa vel subglobosa, 90-150 x 90-135 µm magna, pallide armeniaca, glabra, e peridio membranaceo, translucenti, pallide armeniaco, cephalothecoideo, 30-54 µm crasso, in tribus stratis composita. Asci unitunicati, iodo non caerulescentes, irregulariter dispersi, quadrispori, globosi vel subglobosi, 21-25 x 14-20 µm magni, parietibus tenuibus, evanescentes. Ascosporae unicellulares, ellipsoideae, 10-13 x 7-9 µm magnae, primum hyalinae, deinde pallide brunneae vel olivaceo-brunneae, maturitate confirmata atro-brunneae, parietibus crassis, rugulosae, foramen germinale in utroque apice exhibentes. Conidia incognita.

HOLOTYPUS: in equorum fimo lectus est, in calle a Manacal ad Los Pocitos vocato, in loco ab Irapa septentrionali-occidentali remoto, in Sucre pago reipublicae Venezuelensis, 13 Quint. 1972, Dumont, Cain, Samuels, Morillo et Farfan VE-4890y. In Torontoensis universitatis Cryptogamarum herbario.

ETYMOLOGY: Greek, tetra = four and spora = seed, referring to the number of ascospores in the ascus.

Ascocarps scattered, superficial, globose to subglobose, 90-150 x 90-135 µm, light orange, glabrous; peridium 30-54 µm thick, membranaceous, translucent, cephalothecoid in surface view, 3-layered in section, consisting of an outer layer composed of several regular plates of radiating as well as polygonal cells, light orange, one cell wide,



Figs. 1-8. Rhytidospora tetraspora. 1. Ascocarp. x150. 2. Peridium in surface view. x275. 3. Longitudinal section of the peridium. x275. 4. Mature ascospores. x615. 5. Young asci and ascospores. x615. 6. Young and mature ascospores. x615. 7. Portion of an ascocarp showing one ascus containing four mature ascospores. x615. 8. Mature ascospores showing the wrinkled spore wall and one of the two germ pores. x 1090.

4.5-7.5 μm thick, with flattened and elongated cells filled with light orange homogenous matrix, a middle layer 21-36 μm thick, with angular, thick-walled, hyaline cells measuring 6-36 x 6-12 μm and an inner layer 9-12 μm thick, with flattened and elongated, hyaline cells measuring 5-18 x 2-3 μm. Asci unitunicate, non-amyloid, irregularly disposed, 4-spored, globose to subglobose, 21-25 x 14-20 μm, thin-walled, evanescent. Paraphyses lacking. Ascospores one-celled, ellipsoidal, 10-13 x 7-9 μm, at first hyaline, ranging in color from light brown to olivaceous brown, dark brown at maturity, thick-walled, wrinkled with a germ pore measuring 1.4-1.7 μm in diameter at each end of the spore. Conidia unknown.

HABITAT: on burro dung.

SPECIMEN EXAMINED: VENEZUELA: Edo. Scure: NW of Irapa, trail between Manacal and Los Pocitos, burro dung, 13 July 1972, Dumont, Cain, Samuels, Morillo and Farfan VE-4890y (TRTC).

In a collection from Mexico (TRTC 36559) the ascospores are of the same magnitude as in R. tetraspora but the original notes indicate that the ascus contained only two spores. In the absence of other diagnostic characters and since the material is very scanty, we feel that a final disposition must await further information based on fresh material.

DISCUSSION

Superficially, R. tetraspora resembles the ostiolate Neocosmospora vasinfecta E.F. Smith (Udagawa, 1963), of the Hypocreaceae, in possessing a light coloured peridium and the ornamentation of the ascospores. It differs primarily in having dark ascospores with very distinct germ pores, features not known in Hypocreaceae.

The cephalothecoid peridium in Rhytidospora is quite interesting in that unlike most forms with this peridium type, it consists of several regularly arranged plates. Each plate is composed of a few small polygonal cells in the center which in turn are surrounded by several large radiating cells, each with thickened end walls. The continuation of these walls results in a permanent dehiscence line in each plate. This is the special mechanism in order to split the ascocarps for discharge of the mature ascospores.

Rhytidospora is more similar to some members of Melanosporaceae rather than Hypocreaceae, for example, *Melanospora* Corda (Doguet, 1955) and *Microthecium* Corda (Udagawa and Cain, 1969; Hawksworth and Udagawa, 1977), in possessing light coloured ascocarps and brown to dark brown ascospores with conspicuous terminal germ pores. It is apparent from such criteria that *Rhytidospora* belongs in the Melanosporaceae but differs from the other genera in its unique peridial structure and the characteristic ascospore ornamentation.

As pointed by Cain (1956), the production of globose to subglobose, evanescent asci and their irregular disposed arrangement within the ascocarp peridium, the absence of paraphyses; and the presence of peridial plates provides a typical example of progressive evolution from an ostiolate form. *R. tetraspora* may represent another example of this principle.

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ANOTHER GENUS OF THE GYMNOASCACEAE WITH SWOLLEN SEPTA ON PERIDIAL ELEMENTS

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Summary

A new genus of the Gymnoascaceae *(Macronodus)* is described and compared with related genera. A key to *Macronodus* and the species of *Auxarthron* is provided.

The genus *Auxarthron* Orr and Kuehn was established in 1963 (15) to accommodate gymnoascaceous species previously assigned to the genera *Myxotrichum* Kunze and *Gymnoascus* Baran. Ascocarps of *Auxarthron* are netlike as are numerous other Gymnoascaceae, but have characteristic swellings at most septa of the peridial elements. Ascospores are pale yellow or brown, spherical to oval and asperulate-reticulate. Species are separated on coloration of the ascocarp and the nature of the appendages on them.

Since 1963, one new species *(A. pseudauxarthron)* lacking the characteristic swollen septa has been described (14).

Reference has been made in several recent studies of keratinophilic fungi to species of *Auxarthron,* which were not specifically identified (3, 4, 6, 7, 19). Cultures of these fungi were obtained, and examination of them indicated that several strains represent a new genus of the Gymnoascaceae. This genus, like some others of this family, possesses swollen peridial septa. A key to these related genera follows.

KEY TO GENERA OF GYNMOASCACEAE WITH SEPTAL SWELLINGS ON PERIDIAL ELEMENTS

A. Gymnothecia dark colored.................. *Tripedotrichum*

AA. Gymnothecia light colored.............................B

B. Gymnothecial appendages ctenoid or pectinate...........C

BB. Gymnothecial appendages otherwise.....................D

C. Gymnothecial type elements surrounding a cellular cleistothecium enclosing the asci and ascospores, appendages ctenoid.................................... *Ctenomyces*

CC. Gymnothecia netlike, elements surrounding free asci and ascospores, appendages pectinate..........*Pectinotrichum*

D. Swellings at septa regularly present resembling swollen joints..E

DD. Swellings at septa infrequent, not resembling swollen joints......................................*Gymnoascus*

E. Ascospores ovoid to globose, asperulate-reticulate...*Auxarthron*

EE. Ascospores ovoid to ellipsoid, smooth.........*Macronodus*

The term gymnothecium, as suggested by Novak and Galcoczy (9), is used here since ascocarps produced by most Gymnoascaceae are not cellular cleistothecia, but open netlike structures. Asexual spores are called arthroaleuriospores as defined by Orr et al. (16) and confirmed by Kwon-Chung (10) and Sun and Huppert (23).

MACRONODUS ORR, GEN. NOV.

Gymnothecia discreta, plus minus globosa, appendiculata, saepe confluentia, flavidula vel brunneola, elementis septatis fere tumidis ad septa, anastomosantibus et reticulum efformantibus, asperulatis; appendices bigeneris: elongatae uncinatae vel bifurcatae, breves glabrae; asci globosae vel ovoidei, hyalini evanescentes, octospori; ascosporae globosae, ovoideae vel ellipsoideae flavae usque aurantiacae; status asexulis in forma arthroaleuriosporarum; hyphae ampulliformes praesentes.

Species typicus: *Macronodus bifurcatus* Orr

Gymnothecia discrete, more or less globose, appendaged, often confluent, yellowish to brownish. Elements of the gymnothecia septate, usually enlarged prominently at the septa, anastomosed to form a reticulum, asperulate. Appendages of two kinds; elongate, uncinate or bifurcate, and short, smooth. Asci globose or ovoid, hyaline, evanescent, 8-spored. Ascospores globose, ovoid or ellipsoid, walls smooth, yellow to orange. Asexual state represented by arthroaleuriospores. Ampulliform (racquet) hyphae present.

Macronodus bifurcatus Orr, sp. nov.

Fungus homothallicus; gymnothecia globosa, appendicibus exclusis, 185-670 (890) μm diam, flava usque aurantio-flava vel brunneola, elementis septatis fere ad septa, anastomosantibus et reticulum efformantes, asperulatis; appendices bigeneres: 1) elongatae, gymnothecio concolores, glabrae, plerumque bifurcatae, 300-785 μm longae; et 2) breves simplices glabrae, 5-45 μm longae; asci globosi 4.7-8.2 μm diam vel ovoidei 4.7-7.7 x 5.6-6.9 μm, hyalini evanecsentes octospori; ascosporae flavidulae vel aurantio-flavae glabrotunicatae, globosae 1.9-3.1 μm; status asexualis in forma arthroaleuriosporarum 2.3-6.1 x 1.9-2.9 μm; hyphae ampulliformes praesentes sed non cum gymnothecia consociatae.

Typus: in solo, Mission, Kansas, U. S. A.

Fungus homothallic. Gymnothecia more or less spherical 185-670 (890) µm diam, excluding the appendages, yellow, orange-yellow or brownish. Elements of the gymnothecium usually prominently enlarged at the septa, anastomosing to form a reticulum, asperulate. Appendages of two kinds: 1) elongate, of the same color as the gymnothecial elements, smooth, usually bifurcate, 300-785 µm long, and 2) short, simple, smooth, 5-45 µm long. Asci globose, 4.7-8.2 µm diam or ovoid 4.7-7.7 x 5.6-6.9 µm, hyaline evanescent, 8-spored. Ascospores pale yellow or orange-yellow, smooth, walls thick, globose, 2.3-3.1 µm diam or ovoid to ellipsoid, 2.3-3.4 x 1.9-2.6 µm. Asexual state represented by hyaline, usually cylindrical arthroaleuriospores, 2.3-6.1 x 1.9-2.9 µm. Racquet hyphae present, not associated with the gymnothecia.

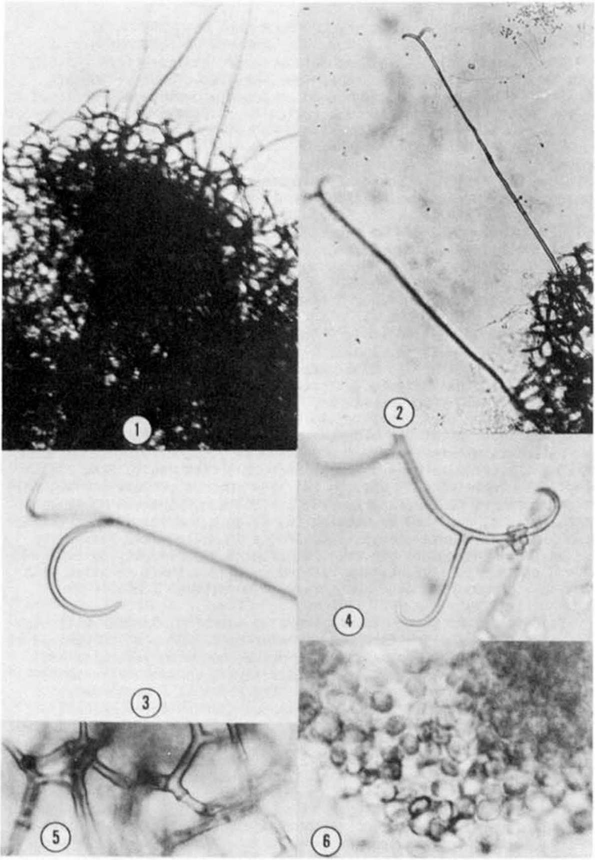
Type strain (desiccated): O-3750, deposited in the New York Botanical Garden, Bronx, New York 10458, U. S. A.

Material examined: O-1236 (GR-62, ATCC 32462), soil associated with a horn of an animal, Jankia, India; O-1259 (NRRL 6081, ATCC 32463), soil, Inyokern area, California, U. S. A.; O-3153 (Rees F 91, ATCC 32464), feathers of a domestic fowl, Queensland, Australia; O-3750 (NRRl 6155, ATCC 32465), soil, Mission, Kansas, U. S. A. Representative cultures (desiccated) have been deposited in the New York Botanical Garden, Bronx, New York; Plant Pathology Herbarium, Cornell University, Ithaca, New York; Farlow Herbarium, Harvard University, Cambridge, Massachuetts. Additional material examined: E 21, E 25, E 91 from soil, Etna, Italy, reported by Caretta and Piontelli (3) as a species of *Auxarthron*. 539A from the nest of *Carduelis cannabina* L., Voltice, Southern Moravia, Czechoslovakia, reported by Hubalek (6, 7) as a species of *Auxarthron*. These isolates, however, represent strains of *Malbranchea* possessing free uncinate appendages and have been reported previously by Emmons (5). A study of this genus and related fungi and their relation with sexual states has been made by Sigler and Carmichael (22).

Colonies of *M. bifurcatus* on Freezing agar (8), Oatmeal-Salts agar (18), and corn meal agar attain a diameter of 75-80 mm in 18-25 days at 22-25°C. They are at first pasty and white, becoming yellowish and finally orange to orange-brown. At maturity, such colonies resemble those of *Auxarthron zuffianum* (Morini) Orr & Kuehn, *A. umbrinum* (Boudier) Orr & Plunkett, and *A. conjugatum* (Kuehn) Orr & Kuehn (15). The reverse of some colonies is orange, but neither exudate or odor was observed.

Like many other Gymnoascaceae, *M. bifurcatus* produces asci through the intervention of croziers. Croziers arise from initials produced from the same or different parent hyphae. One initial coils about the other, and from this situation arise the croziers that produce the gymnothecia, asci, and ascospores.

Gymnothecia of *M. bifurcatus* are quite similar to those of *Auxarthron* in being netlike (Fig. 1) with enlargements or swellings at the septa on the peridial elements (Fig. 2). Short appendages of this species are also similar to those of *Auxarthron*, except those of the



FIGS. 1-6. *Macronodus bifurcatus*. 1. Gymnothecium showing netlike appearance x 450. 2. Gymnothecium with elongate bifurcate appendages. x 100. 3. Tip of appendage with bifurcate hooks. x 450. 4. Tip of elongate appendage with hooked branch below tip. x 950. 6. Ascospores. x 1000.

acutely pointed ones of *A. zuffianum* or the abortive ones of *A. umbrinum* (15). The elongate appendages of *M. bifurcatus*, however, differ from those of species of *Auxarthron* in being bifurcate (Figs. 2 & 3). Occasionally, some appendages on gymnothecia of *M. bifurcatus* are branched in a hook-like fashion below the bifurcate apex (Fig. 4). This branch gives a trifurcate appearance to some gymnothecia. DeVroey (4) reported the isolation of a species of *Auxarthron* from soil from Rwanda and provided an illustration. There is little doubt that his isolate also represents a strain of *M. bifurcatus*.

Bifurcation of appendages of *Auxarthron* has been reported for a strain (O-261) of *A. brunneum* (Rostrup) Orr & Kuehn (15). This strain was later determined to be *A. thaxteri* (Kuehn) Orr & Kuehn (13). In subsequent examinations of this strain over a period of years, I have not observed any bifurcate appendages. It is apparent that this condition is not common in species of Gymnoascaceae.

Although swollen peridial elements may sometimes be present in some species of *Gymnoascus* as pointed out by Apinis (1) and Samson (21), they are not the same type as those found in *Ctenomyces*, *Auxarthron* or *Macronodus*, nor are they as consistently present in *Gymnoascus* as they are in the genera noted above. Other genera with similar swellings are noted in the key to such genera earlier. Such swellings have been reported as somewhat resembling swollen "knuckle-joints" (15).

Ascospores of *M. bifurcatus* also differ from ascospores of species of *Auxarthron* in being circular in face view and ovoid to ellipsoid in longitudinal view. Furthermore, ascospores of *M. bifurcatus* are smooth (Fig. 6). Species of *Auxarthron* produce spherical to oval, ascospores which appear echinulate-reticulate and resemble the ascospores of some species of *Amauroascus* Schroeter (2). Ascospores of *M. bifurcatus* closely resemble those of species of *Gymnoascus*, *Gymnascella* Peck (18), *Arthroderma* Berkeley and *Nannizzia* Stockdale. Ascospores of the latter two genera were determined to be oblate spheroids by Padhye and Carmichael (19).

Perhaps, *M. bifurcatus* represents an intermediate species between *Auxarthron* (15) and *Gymnoascus* (17) on the one hand or between *Auxarthron* and *Pectinotrichum* Varsavsky & Orr (24) and *Ctenomyces* Eidam (11) on the other.

Apinis (1), Emmons (5), and Samson (21) have observed that species of *Auxarthron* are closely related, but they have not indicated precisely how close this relationship might be or just how species should be separated. Undoubtedly, *Macronodus* is closely related to *Auxarthron*. A key to *Macronodus* and species of *Auxarthron* follows.

KEY TO MACRONODUS AND SPECIES OF AUXARTHRON

A. Ascospores discoid-oblate, gymnothecial appendages bifurcate..........................*Macronodus bifurcatus*

AA. Ascospores spherical to ovoid, asperulate-reticulate, gymnothecial appendages other than bifurcate.*Auxarthron*..B

B. Gymnothecial elements lacking swollen septa...*A. pseudauxarthron*

BB. Gymnothecial elements with swollen septa................C

C. Gymnothecia with short appendages only..................D

CC. Gymnothecia with short and long appendages..............E

D. Appendages acutely pointed...................*A. zuffianum*

DD. Appendages blunt or rounded................*A. reticulatum*

E. Gymnothecia brown; swollen septa prominent.....*A. thaxteri*

EE. Gymnothecia orange or orange-brown......................F

F. Appendages uncinate, frequently branched below the uncination...............................*A. californiense*

FF. Appendages uncinate, coiled or bent, rarely branched.....G

G. Gymnothecia with short compact elemental units; appendages equal in length to the diameter of the gymnothecium...*A. compactum*

GG. Gymnothecia of varying length...........................H

H. Gymnothecia with elongate and/or abortive appendages...*A. umbrinum*

HH. Gymnothecia lacking abortive appendages......*A. conjugatum*

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MYCOTAXON

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AQUATIC FUNGI OF SCANDINAVIA: PETERSENIA IRREGULARE

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SUMMARY

A tubular, irregular, branched, or lobed thallus segments to form sporangia which may then disarticulate. Resting spores develop endogenously, but the enclosing thallus wall disintegrates after these cells mature. *Petersenia irregulare* has morphological affinities with the Sirolpidiaceae and Lagenidiaceae, but is retained in the Olpidiopsidaceae pending discovery of resting spore types in the other members of the genus.

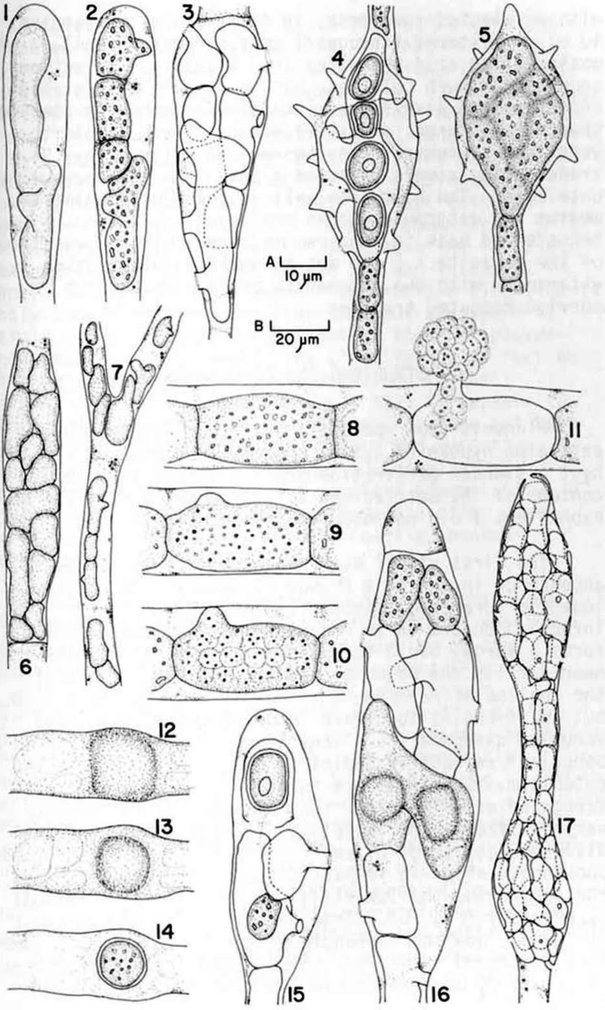
Constantineanu (1901) reported two zoösporic fungi parasitic in an unidentified *Saprolegnia: Olpidiopsis saprolegniae* (Braun) Fischer, and a new species, doubtfully assigned to *Olpidiopsis, O. irregularis.* He also reported *Pseudolpidium saprolegniae* (Braun) Fischer in another unidentified species of *Saprolegnia*, thus retaining two names for what is now (Sparrow, 1960) accepted as a single taxon, *O. saprolegniae* var. *saprolegniae* Cornu (1872).

In 1943, Sparrow removed *Olpidiopsis irregularis* Constantineanu from Cornu's (1872) genus, and placed it in *Petersenia* (as *P. irregulare*). The irregular nature of the sporangia in Constantineanu's fungus, a characteristic inconsistent with the usual configuration of the asexual stage in species of *Olpidiopsis*, was cited to justify this change. Sparrow noted, however, that *P. irregulare* might have to be removed from *Petersenia* when the resting spores were discovered and characterized.

Petersenia irregulare evidently has been reported few times since its discovery in Rumania. Sparrow collected the fungus as an endoparasite of unidentified species of *Achlya* in Denmark (1934) and in Michigan (1960); Höhnk (1960) found the species in Iceland, but gave no descriptive details. Milanez and Val (1969) noted the occurrence of the organism in Brazil. I have recovered *P. irregulare* in *Achlya treleaseana* (Humphrey) Kauffman from two sites in Sweden. The host and its parasite were collected on halves of hempseed baited in water (and bits of debris) expressed from mats of *Sphagnum* spp.: Vadbacka (59°50'10"N, 17°31'05"E), west of Uppsala, 3-VIII-76, Herb. No. 13464; Rodvatten (58°04'N, 12°02'30"E), north of Göteborg, 9-VIII-76, Herb. No. 13648. This paper is an account of the development and structure of these specimens, together with comments on the taxonomy of the species. Voucher specimens are deposited in the collections of the Institute for Systematic Botany, University of Uppsala.

Stages in the development of *Petersenia irregulare* were observed in the gross cultures, and subsequently (by inoculation) in a single-hypha isolate of *Achlya treleaseana* collected at Vadbacka. Infected colonies of *A. treleaseana* from gross culture were placed, together

FIGS. 1-17. *Petersenia irregulare*. 1. Small, immature thallus in hyphal tip. 2. Segmentation of thallus into sporangial rudiments. 3. Discharged sporangia. 4. Endogenous resting spores, and discharged sporangia in an intercalary oögonial initial. 5. Segmentation of a thallus in a terminal oögonial initial. 6, 7. Immature sporangia showing variations in shape and density. 8-11. Stages in sporangium maturation and planont discharge. 12-14. Stages in endogenous cleavage of a resting spore. 15. Resting spore with partially disintegrated thallus wall. 16. Segmented thallus walled off below invaded hyphal tip; two incipient resting spores. 17. Discharged sporangia in a hyphal tip. Figures 6, 7, 17, scale A; others, scale B.


1
2
3
4
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A 10 µm
B 20 µm
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17

with uninfected specimens, in Petri plates containing 40 ml of filtered (through 1 cm absorbent cotton), unsterilized acid bog water from Vadbacka. Infection occurred in such cultures, but never when the invaded and uninvaded plants were incubated together in sterile, charcoal-filtered, distilled water. I was unable to establish bacterial-free, two-member cultures by transferring single infected hyphae of *A. treleaseana* onto agar. The host grew well on the usual isolation medium for watermolds (corn meal agar), but when transferred back to hempseed in water culture, was free of the parasite. I did not attempt to infect other watermolds with the *Petersenia* because it did not survive repeated transfer.

STRUCTURE AND DEVELOPMENT

Planonts from sporangia of *Petersenia irregulare* settle on hyphae of *Achlya treleaseana*, and put into the host a slender penetration peg. I assume that the content of the settled spore is discharged into the host hypha, but I did not observe this event.

The first visual evidence of infection is the appearance in the host hyphae of tubular, irregular, lobed, or branched, stout filaments (Fig. 1). If infection occurs in an oögonial initial, the parasite forms a large, ovoid to broadly ellipsoidal thallus that nearly fills the oögonial cavity (Fig. 5). At first, the thallus of *Petersenia irregulare* is vacuolate (Fig. 1), but as it begins to cleave into sporangia, the large vacuoles disappear, and many conspicuous, irregular or spherical refractive bodies (Figs. 2, 5) appear in the cytoplasm. Sporangia are formed (Figs. 2, 5) as irregular or cylindrical thallus segments (of greatly varying size). The incipient sporangia tend to disarticulate (Fig. 2) shortly after they are delimited. Sporangium shape is in part dictated by whether or not the segmenting thallus fills the host hypha or induces hypertrophy (Fig. 6). Some parasitized hyphae are not distended, and the sporangia of the *Petersenia* are somewhat scattered (Fig. 7). Invaded hyphae of the host may (Figs. 3, 6) develop crosswalls at points along their length.

Sporangium maturation (Figs. 8-11) begins with the evagination of a broad papilla (Fig. 9) that is the incipient discharge tube. In some exceptionally elongate sporangia, two exit tubes are formed (Fig. 3). The large, refractive bodies in the cytoplasm seem to fragment(?) into smaller, spherical globules (Fig. 9) concurrently with exit tube formation, such that 1-3 shiny globules appear in each planont. The spores are cleaved endogenously (Fig. 10), and at release, flow out quickly through the exit tube orifice to cluster momentarily in a spherical mass (Fig. 11). Within minutes after release, the extruded group of spores breaks up, and laterally biflagellate planonts swim away. The anterior flagellum is slightly longer than the trailing one, but the spore is certainly not as strongly heterokont as those of plasmodiophoraceous fungi. Indeed, the flagella may in fact be equally long with one so closely appressed to the spore body along a part of its length that it appears to be shortened. Nomarski interference optics have not been helpful in determining flagellar length and insertion. In very foul cultures, the sporangial protoplast may begin cleavage endogenously, but complete segmentation into spores exogenously. Emptied sporangia often give an irregular net-like appearance to heavily invaded hyphae (Fig. 17).

Resting spores are formed endogenously within some thallus segments (Figs. 4, 16). At the site of resting spore development the cytoplasm of a portion of the invading thallus becomes densely congregated (Fig. 12). That portion of the cytoplasm of the parasite not involved in resting spore formation remains diffuse and vacuolate. The incipient resting cell contracts, becomes successively more dense (Fig. 13), and subsequently develops a thick wall (Fig. 14). A single, large, refractive body (Figs. 4, 15) ultimately appears, and the resting spore is assumed at this point to be mature. The resting spore may be spherical, ellipsoidal, or short cylindrical (Figs. 4, 15); after it has matured, the confining wall of the thallus disintegrates (Fig. 15). In thallus segments where a number of resting spores are produced in a scattered linear fashion, the cells appear as a loose chain of thick-walled structures free in the host hypha. Their germination has not been observed.

TAXONOMY

Petersenia irregulare exhibits structural parallelisms with two families of biflagellate fungi other than the Olpidiopsidaceae where it has been assigned by Sparrow (1960). Constantineanu's fungus is in any case not a species of Olpidiopsis, as surmised correctly by Sparrow (1943), and as is borne out by the structure of its resting spores. Chiefly to be decided is whether or not *P. irregulare* should be removed from *Petersenia* and deposited elsewhere as Sparrow predicted might be necessary.

The tubular nature of the thallus, and its segmentation into sporangia which may or may not disarticulate, are characteristics not far removed from those of members of the Sirolpidiaceae. For example, the thallus of *Petersenia irregulare* fragments into sporangia in a fashion seemingly identical to the developmental pattern of *Pontisma lagenidioides* Petersen in species of *Ceramium* (Sparrow, 1934). Karling (1942), in fact, excluded *Petersenia* from the Olpidiopsidaceae precisely because of the striking resemblance of its species to *Sirolpidium* and *Pontisma* (he retained the name applied by Constantineanu: *Olpidiopsis irregularis*). Resting spores have not been demonstrated in members of either of the two genera (Sparrow, 1960) of the Sirolpidiaceae, hence a meaningful comparison of *Petersenia irregulare* with representatives of this family is not possible currently.

While the thallus of *Petersenia irregulare* resembles superficially some of the more intricate forms of *Myzocytium* Schenk (in the Lagenidiaceae), the pattern of sexuality in members of Schenk's genus would seem to exclude *P. irregulare* from a position there. The irregular, refractive bodies in the cytoplasm of *P. irregulare* are very much like those in species of *Lagenidium* Schenk. Moreover, the multiplicity of sporangia produced by *P. irregulare* is a parallel to the structure of some taxa of *Lagenidium*. A few representatives of this large genus form resting spores parthenogenetically — *L. parthenosporum* Karling, and *L. entophytum* (Pringsheim) Zopf, to name two — and the similarity of resting spores in *P. irregulare* to those in *L. destruens* Sparrow (1950) is unmistakable. The thallus fragments into sporangia in the *Petersenia*; it does not do so in Sparrow's species. Certainly the fact that the planonts of *P. irregulare* are formed endogenously would not exclude it from *Lagenidium*.

Were one inclined to do so, *Petersenia irregulare* could be incorporated readily into *Lagenidium* or *Pontisma*. The resting spores of other species of *Petersenia* have not been discovered, and to remove *P. irregulare* because it has such structures would assume without evidence that the other taxa in the genus have quite different resting spores. Constantineanu's fungus is accommodated easily within the established limits of *Petersenia* even though all members of that genus are incompletely known. I believe the species should be retained in *Petersenia*, and that taxon kept in the family to which Sparrow assigned it. To do otherwise, based on the scanty information at hand, could likely result only in ineffectual shuffling.

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STUDIES IN THE LICHEN FAMILY PHYSCIACEAE. I
A NEW NORTH AMERICAN SPECIES

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Physcia adiastola Essl., sp. nov. Figure 1

Physcia rubropulchra subsimulans sed sporis minoribus et medulla nonpigmentosa (sine skyrin) differt.

Thallus greenish gray to dark gray or brownish, up to 6 cm or occasionally 10 cm in diameter, orbicular to irregular or at times pulvinate. Lobes irregularly to dichotomously branched, more or less linear, (0.3-) 0.5-1.5 (-3) mm broad, flat or often concave, especially at the frequently upturned tips. Sorediate, the soralia irregular to occasionally weakly capitate, largely terminal and marginal (occasionally also laminal); soredia coarsely granular to isidioid and often becoming loosely agglutinated into piles, (40-) 60-90 (-120) µm in diameter, concolorous with the thallus to slightly paler or distinctly darker. Lower surface black, often paler on the lobe-ends, with numerous long black (sometimes white-tipped) rhizines, these frequently visible from above along the lobe margins and/or the often upturned lobe ends. Apothecia occasional, to 3 mm in diameter, often with rhizines around the base; spores (15.5-) 17-22.5 (-25) x 6-9.5 µm, of the typical Physcia type (i.e., with angular lumina that are generally as broad or broader than long). Both the upper and lower cortices are paraplectenchymatous and leptodermatous.

Type: U.S.A. Virginia. Page Co.: ca. 0.5 mi. S of Hazeltop Ridge Overlook at mile 54.9 of Skyline Drive, ca. 3300-3400 ft. elev., *Esslinger 4723* (US, holotype; DUKE, herb. Esslinger, isotypes). No further specimens will be

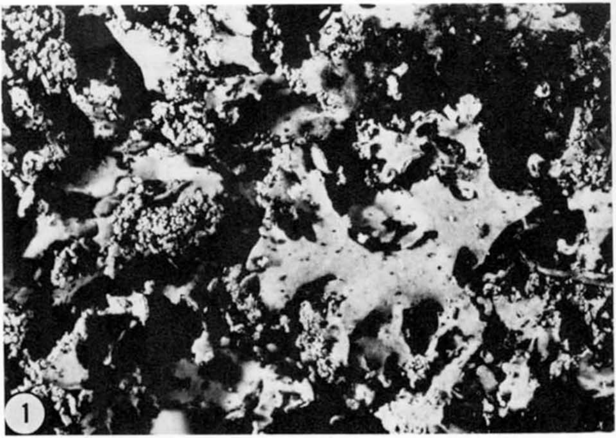
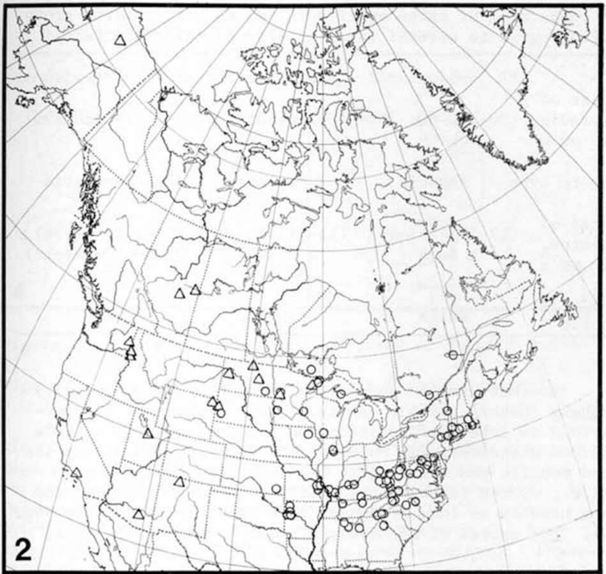


Figure 1. A small portion of the holotype of *Physcia adiastola*, X10.

cited. The data in Table II and the distribution maps (Figs. 2 & 3) are based on the examination of more than 500 specimens, 87 of which are *Ph. adiastola*. All the specimens examined are located in US, DUKE, FH, and my personal herbarium.

TAXONOMY

For many years this new species has been confused with *Ph. orbicularis* (Neck.) Poetsch, a species described from Europe and which appears to be primarily a western species in North America (Fig. 2). *Physcia adiastola* is distinguished from that species by its usually more linear lobes and its coarsely granular to isidioid soredia which are located largely in irregularly delimited marginal or terminal soralia. *Physcia orbicularis* has more finely granular soredia (Table I) located in round to irregular, laminal and submarginal soralia and, although variable, it generally has shorter and more rounded lobes. Also, although there is a broad overlap, the spores of *Ph. orbicularis* average somewhat larger than those of *Ph. adiastola* (Table I).



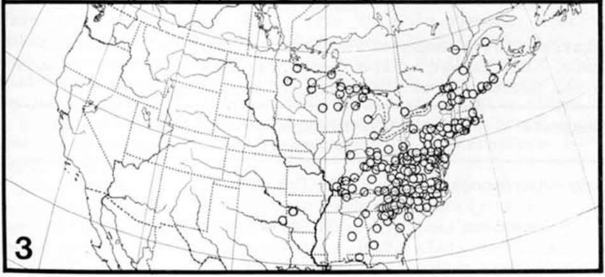


Figure 2. Distribution of *Ph. adiastola* (○) and North American distribution of *Ph. orbicularis* (△).

Figure 3. North American distribution of *Ph. rubropulchra*.

TABLE I

A comparison of three species in the *Ph. orbicularis* group with regard to several taxonomically useful characters.

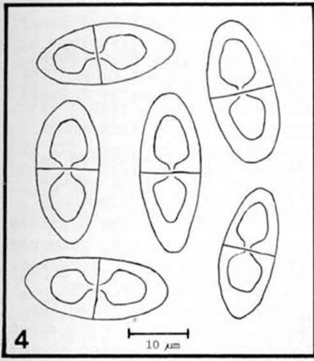
	Ph. orbicularis	*Ph. adiastola*	*Ph. rubropulchra*
Size of soredia, in µm's	(30-)40-60(-75)	(40-)60-90(-120)	(30-)40-80(-90)
Spore type	Physcia	Physcia	Pachysporaria
Size of spores, in µm's	(17-)20-25(-28) x 8-11	(15-)17-23(-25) x 6-9.5	(21-)24-31(-34) x (9-)10-14(-16)
Medulla color	white	white	red

Another similar species is *Ph. rubropulchra* (Degel.) Moberg (Moberg, 1975). Although very similar to *Ph. adiastola* in lobe configuration and soredial size (see Table I) and placement, *Ph. rubropulchra* differs markedly by its red medulla and its larger, Pachysporaria type spores (i.e., spores in which the lumina soon become rounded and are usually as long or longer than they are broad, see Fig. 4). The spores of *Ph. adiastola* are of the Physcia type,

TABLE II

Substrate preferences of *Ph. rubropulchra* and *Ph. orbicularis*. The number of specimens from each substrate as well as the percentage of the total it represents is given.

Substrate	*Ph. rubropulchra* 334 total	*Ph. adiastola* 87 total
Bark - hardwoods	299 (89.5%)	13 (14.9%)
- conifers	8 (2.4%)	0
Mosses - over rock	10 (3%)	58 (66.7%)
-over bark	11 (3.3%)	6 (6.9%)
Rock	5 (1.5%)	10 (11.5%)



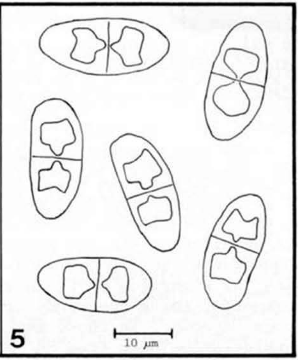


Figure 4. Pachysporaria type ascospores of *Physcia rubropulchra*.
Figure 5. Physcia type ascospores of *Physcia adiastola*.

with angular lumina which tend to be broader than they are long (Fig. 5). These differences are underscored by the very different substrate ecologies of the two species. As indicated by the data presented in Table II, *Ph. rubropulchra* has been collected most frequently from the bark of hardwoods (89.5% of the 334 specimens examined). *Physcia adiastola*, on the other hand, although also collected from hardwood bark (14.9%), occurs far more commonly over mosses on rock (66.7%) or on bare rock (11.5%). The two species are largely sympatric in eastern North America although *Ph. adiastola*, unlike *Ph. rubropulchra*, seems to be absent from the Atlantic and Gulf coastal plains (Figs. 2 & 3). *Physcia adiastola* is unknown outside of North America but *Ph. rubropulchra* was recently reported for Japan (Kashiwadani, 1975).

Specimens of *Ph. adiastola* growing directly on rock tend to be more orbicular with narrower, less imbricate lobes and with the rhizines more visible along the sides of the lobes. Such specimens are also often darker colored with darker soredia and have occasionally been mistaken for *Ph. sciastra* (Ach.) DuRietz, a dark, saxicolous species differing by its smaller thalli, narrower lobes, and its possession of isidia instead of soredia.

CHEMISTRY

Specimens for analysis by thin-layer chromatography (TLC) were selected from throughout the species range. The techniques used were essentially those outlined by Culberson (1972).

The taxonomic or systematic utility of chemistry in the genus *Physcia* is far below that of many other groups of macrolichens, particularly, for instance, the members of the lichen family Parmeliaceae. Relatively few depsides and depsidones, the two classes of substances most commonly found useful in other groups, are found in the Physciaceae. With the exception of the nearly ubiquitous substance atranorin, these compounds are apparently absent from the genus *Physcia*. In those members of the genus *Physcia* under consideration here (the *Ph. orbicularis* group), even atranorin is absent (or present only in very low, trace amounts; see Kashiwadani, 1975). In fact the only substances that have proven taxonomically useful in this group are the anthraquinones. Several species pairs exist in which one major difference between the members of a pair is the production by one member of the anthraquinone skyrin (in the medulla) and its absence from the other member. *Physcia rubropulchra* (with skyrin) and *Ph. adiastola* (without skyrin) are such a pair although morphological differences (discussed above) separate them as well. In addition to skyrin, *Ph. rubropulchra* sometimes contains trace amounts of unidentified compounds including several quinonoid pigments.

As pointed out by Kashiwadani (1975), orange-red pigments previously reported from this group as erythrin or parietin can probably be considered to be skyrin. The same is also true for all or most literature reports of rhodophyscin, a substance of unknown structure reported from *Physcia* and *Parmelia* (see Culberson, 1969). Whether or not the original material named by Zopf as Rhodophyscin is truly equivalent to skyrin is uncertain. This seems likely since *Physcia endoccina* (Körb.) Th. Fr., the species Zopf used as his source, is now known to contain skyrin (Kashiwadani, 1975).

European specimens of *Ph. orbicularis* rather commonly have an anthraquinone pigment associated with the soredia or the upper cortex, sometimes in relatively high and easily extractable concentrations. Chromatographic comparisons (see Table III below) have shown that this compound is definitely not skyrin. Attempts to identify it with one of the other common anthraquinone pigments listed by Culberson (1972) were unsuccessful, however. In North America very rarely a specimen of *Ph. orbicularis* or of *Ph. adiastola* has slightly orange pigmented soredia or upper cortex. In all cases the pigment has been present in such small amounts that attempts to extract it for chromatography have been unsuccessful. Its identity with the pigment in the European *Ph. orbicularis* has therefore not been proven.

In addition to anthraquinones, the members of this group often contain small and variable amounts of the triterpene zeorin and/or traces of similar unidentified compounds. Their occurrence seems to be sporadic in each of the three species dealt with here and no significance could be attached to there presence or absence.

TABLE III

TLC data for the major substances occurring in the *Physcia orbicularis* group. Numbers preceding the virgule (/) are the R_f values of the compounds listed, numbers following the virgule are the R_f values of norstictic acid and atranorin. The solvent systems are: (A) benzene-dioxane-acetic acid (180:45:5, 230 ml); (B) hexane-diethyl ether-formic acid (130:90:20, 240 ml); (C) toluene-acetic acid (200:30, 230 ml). The data are presented in a manner like those of Culberson (1972). See that publication for a discussion of R_f classes and other details regarding methods.

	R_f classes	R_f X 100 A	R_f X 100 B	R_f X 100 C
skyrin	5,4 or 5,3	36/34.5,71	17/15,56	16/22,58
Ph. orbicularis unknown pigm.	5,3,5	50/35,71	13.5/15.5,57	39/22,58
zeorin	5,5,5 or 6	49/34.5,71	21.5/15,56	42/23,57.5

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E. Hale, Jr., for the help and encouragement I received while at that institution. I also wish to express my gratitude to the curators and/or directors of those herbaria from which loans were obtained.

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MYCOTAXON

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THE IDENTIFICATION OF CERTAIN WIDELY STUDIED STRAINS OF ENTOMOPHTHORA PATHOGENIC FOR APHIDS

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The use of certain *Entomophthora* species for the control of aphids is being investigated in several laboratories throughout the world. The identity of some of these species has been uncertain, and, since their pathogenicities probably differ greatly, we report here some of our observations on their taxonomy as a guide to others studying this group.

Strains RS-2 and RS-40 used for research at the University of Maine and distributed elsewhere have been labelled provisionally as *Entomophthora* "near *thaxteriana*" (Soper and Bryan, 1974; Soper *et al.*, 1974; Soper *et al.*, 1975). These strains were derived respectively from the green peach aphid, *Myzus persicae* (Sulzer), and from the potato aphid, *Macrosiphum euphorbiae* (Thomas), at Presque Isle, Maine. The morphology of the strains in question closely resembled that of *E. virulenta* Hall & Dunn (1957). However, aphids infected by the Maine strains of *E.* "near *thaxteriana*" were not attached to the substrate by rhizoids whereas *E. virulenta* was described as producing rhizoids (Hall and Dunn, 1957). Because the unidentified strains also resembled fungi referable to *E. thaxteriana* (Petch) Hall & Bell (1963a), a species which was believed to produce no rhizoids, these strains were designated as *E.* "near *thaxteriana*". This identification, which was subject to later modification, has caused some confusion which could be clarified only by determining the actual identities of these strains.

More recently, the dimensions of primary spores (conidia) and of resting spores from these strains were compared with those of material from the Thaxter collections upon which the name *Entomophthora thaxteriana* was based--and from which a lectotype will be designated in a subsequent publication. These comparisons indicated that the University of Maine strains could not be identified correctly as *E. thaxteriana*.

None of the numerous later reports of fungi identified as *E. virulenta* have unambiguously confirmed that this species produces rhizoids. For example, when Gustafsson (1965) mentioned that rhizoids could anchor insects infected by *E. virulenta*, he was citing the original description of Hall and Dunn (1957); in fact, he had found no rhizoids on any specimens he examined (Gustafsson, personal communication). Remaudière *et al.* (1976) suggested that the rhizoids noted by Hall and Dunn might have been observed from aphids which were infected simultaneously by another fungus which did produce rhizoids; individual diseased aphids often show mixed infections by 2 or 3 different species of *Entomophthora* (Soper and MacLeod, 1963).

Unfortunately, the significance of rhizoids for *E. virulenta* cannot be evaluated completely because Hall and Dunn neither discussed nor illustrated the nature of these structures, nor did they deposit any type specimens in an herbarium. However, one of the authors of *E. virulenta* has applied this name to a strain which was never observed to produce rhizoids (Hall and Bell, 1963b). Furthermore, we have found that rhizoids did not form on three species of aphids--*Myzus persicae*, *Aphis fabae* Scopoli, and *Acyrthosiphon pisum* Harris--infected experimentally with Hall's strain of *E. virulenta* deposited at the American

Type Culture Collection (ATCC #14270).

We therefore conclude that fungi lacking rhizoids but which otherwise fit the description of *E. virulenta* should be identified as *E. virulenta*. Because of this, all strains identified as *E. thaxteriana* must be re-examined to correct any possible misidentifications. Accordingly, the University of Maine strains previously labelled as *E.* "near *thaxteriana*" are now identified as *E. virulenta*.

A more complete comparative study of the morphological variation of these University of Maine strains, of the Hall strains of *E. virulenta* (ATCC #14270) and *E. thaxteriana* (ATCC #24421), of other strains of these fungi from established culture collections, and of the Thaxter collections mentioned above is now being completed by R. Humber. This later study will include a list of papers in which the identity of the strain discussed has been affected by our taxonomic decision.

ACKNOWLEDGEMENT

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MYCOTAXON

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NEW SPECIES OF CORTICIOID FUNGI ON QUAKING ASPEN[1]

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SUMMARY

Four new species of lignicolous basidiomycetes in the Corticiaceae are described. These are *Hyphoderma arizonicum*, *Hyphoderma budingtonii*, *Hyphodontia magnacystidiata*, and *Laeticorticium simplicibasidium*. All are associated with a white rot of quaking aspen.

Quaking aspen (*Populus tremuloides* Michx.) is the most widely distributed tree in North America (Little, 1971). We have found approximately 235 species of wood-rotting basidiomycetes to occur on quaking aspen in a study now being completed. Four of these are described as new in this paper.

Microscopic characters were determined from freehand sections or crushed tissue in 4% KOH and phloxine and also in Melzer's reagent. Capitalized color names are from Ridgway (1912). Drawings were made with a camera lucida on a Leitz Dialux microscope.

HYPHODERMA ARIZONICUM Linds. et Gilbn., sp. nov. Fig. 1

Fructificatio late-effusa, adnata, membranacea, subrosea-bubalina vel pallida-brunnea; hyphae fibulatae; cystidia fusoidea, 40-60 x 5-7 µm; basidia anguste clavata, 4-sterigmatibus, 40-80 x 5-8 µm; basidiosporae ellipsoideae,

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[1] University of Arizona Agricultural Experiment Station Journal article No. 2675.

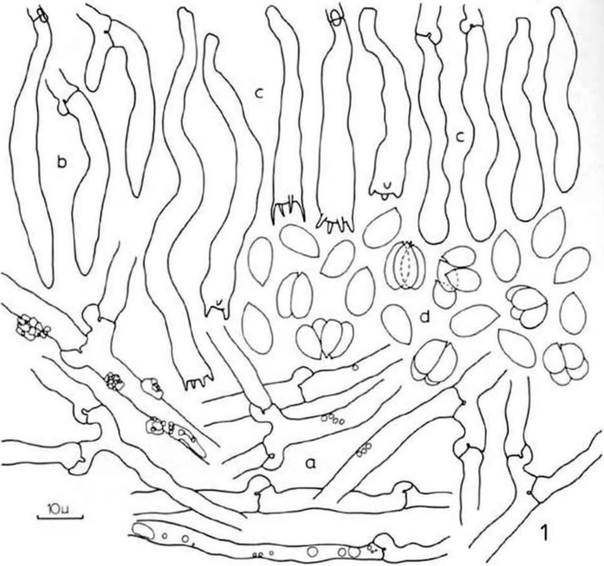


Fig. 1. *Hyphoderma arizonicum* (RLG 11284). a, subicular hyphae; b, cystidia; c, basidia; d, basidiospores, some adhering in groups of 2-4.

hyalinae, nonamyloideae, laeves, 8-10 x 4-5 µm, saepe in tetratibus.

HOLOTYPUS: in ligno *Populus tremuloides* Michx., Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona, U.S.A.; leg. R.L. Gilbertson, No. 11284; in herb. Nat. Fungus Collections, Beltsville, Maryland, U.S.A. (BPI).

ETYMOLOGY: Named for the state of Arizona.

Basidiocarps becoming broadly effused, adnate, membranous; hymenial surface Pinkish Buff to Wood Brown, smooth, cracking on drying to expose white mycelial strands in subiculum; margin abrupt and fertile or with white, arachnoid mycelium; subiculum white, soft; hyphal system monomitic; subicular hyphae abundantly nodose-septate, thin- to slightly thick-walled, with frequent branching, 2.5-5 (-7.5) µm diam, with scattered coarse crystalline material; cystidia fusoid, thin-walled, not incrusted, 40-60 x 5-7 µm, with a basal clamp; basidia narrowly clavate, 4-sterigmate, often sinuous, 40-80 x 5-8 µm, with a basal clamp; basidiospores ellipsoid, hyaline, smooth, negative in Melzer's reagent, 8-10 x 4-5 µm, often adhering in groups of 4.

Hyphoderma arizonicum is associated with a white rot of dead, fallen aspen. The diagnostic characters are the fusoid cystidia and the ellipsoid spores, often adhering in groups of 4. *H. medioburiensis* (Burt) Donk also has cylindric, thin-walled cystidia but has much larger cylindric basidiospores, not adhering in groups of 4.

Specimens examined: Holotype previously mentioned; JPL 493, on quaking aspen, Columbine Ranger Station, Pinaleno Mts., Coronado Nat. Forest, Graham County, Arizona; JPL 552, RLG 11642, on quaking aspen, Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona.

HYPHODERMA BUDINGTONII Linds. et Gilbn., sp. nov. Fig. 2

Fructificatio effusa, adnata, subrosea-bubalina vel pallida-bubalina, hydnacea; aculei breves, fimbriati; hyphae fibulatae; cystidia hyphoidea, 2.5-3 µm diam; gloeocystidia fusiforma vel mucronata, 7-35 x 4-6 µm; basidia clavata, 4-sterigmatibus, 30-35 x 4-6 µm; basidiosporae ellipsoidae, hyalinae, nonamyloideae, laeves, 5-6.5 x 3-3.5 µm. HOLOTYPUS: in ligno *Populus tremuloides* Michx., Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona; leg. A.B. Budington, No. 1442; in herb. Nat. Fungus Collections, Beltsville, Maryland, U.S.A. (BPI).

ETYMOLOGY: Named for Arthur B. Budington, collector of the type specimen and student of the wood-rotting fungi.

Basidiocarps effused up to 5 cm, adnate; hymenial surface Pinkish-Buff to Light Buff, hydnaceous, the teeth

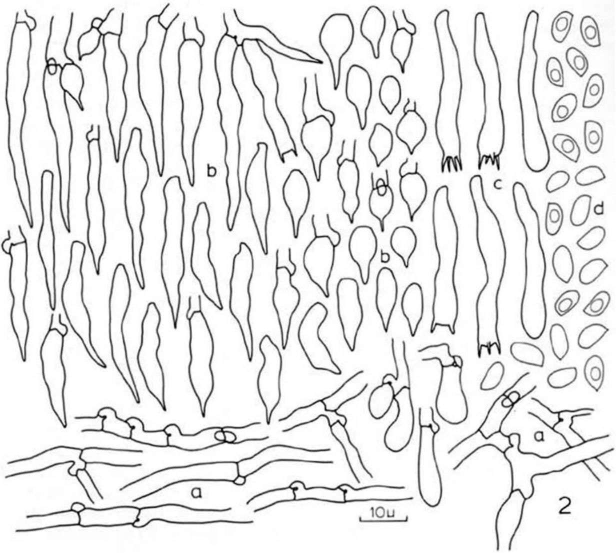


Fig. 2. *Hyphoderma budingtonii* (ABB 1442). a, subicular hyphae; b, gloeocystidia; c, basidia; d, basidiospores.

short, with fimbriate apices; margin thinning out, white, arachnoid; subiculum thin, pale buff; coarse pale buff rhizomorphs present on surface of wood under basidiocarp; hyphal system monomitic; subicular hyphae thin-walled, closely nodose-septate, with frequent branching, 2.5-4 µm diam; cystidia in hymenium hyphoid, thin-walled, not incrusted, numerous at apices of teeth, 2.5-3 µm diam, projecting up to 22 µm; gloeocystidia abundant in hymenial region and in subiculum, fusoid to sharply mucronate, 7-35 x 4-6 µm, highly refractive in Melzer's reagent, negative in sulfuric benzaldehyde, staining dark red in phloxine, with a basal clamp, some short and broad, others elongated, some of the latter with constrictions and appearing almost moniliform; basidia narrowly clavate, 4-sterigmate, 30-35 x 4-6 µm, with a basal clamp; basidiospores ellipsoid, hyaline, smooth, negative in Melzer's reagent, 5-6.5 x 3-3.5 µm.

Hyphoderma budingtonii is associated with a white rot of dead, fallen aspen. The diagnostic characters are the distinctive gloeocystidia and closely nodose-septate hyphae. Other species of *Hyphoderma* with gloeocystidia on quaking aspen are *H. mutatum* (Pk.) Donk, *H. pubera* (Fr.) Wallr., and *H. tenue* (Pat.) Donk. These all have much larger basidiospores and differ markedly in cystidial morphology.

Specimen examined: Holotype previously mentioned.

HYPHODONTIA MAGNACYSTIDIATA Linds. et Gilbn., sp. nov.
Fig. 3

Fructificatio late-effusa, mollis, cremea, hydnacea; aculei brevi, fimbriati; margo alba, floccosa vel arachnoidea; hyphae fibulatae; cystidia cylindrica vel capitata, 60-130 x 7-12 µm; basidia clavata, 4-sterigmatibus, 10-12 x 4-5 µm; basidiosporae ovoidae vel ellipsoidae, hyalinae, laeves, crassae-tunicatae, nonamyloideae, 5-6.5 x 3-4 µm. HOLOTYPUS: in ligno *Populus tremuloides* Michx., Paul Smith's, Franklin County, New York; leg. R.L. Gilbertson, No. 5481; in herb. Nat. Fungus Collections, Beltsville, Maryland, U.S.A. (BPI).

ETYMOLOGY: Named for the large cystidia.

Basidiocarps becoming widely effused, soft, easily separated from the substratum; hymenial surface cream-colored, hydnaceous, with short, scattered to crowded, fimbriate teeth; margin white, floccose to arachnoid; subiculum white, soft, thin; hyphal system monomitic; subicular hyphae moderately thick-walled, nodose-septate, with occasional branching, 2.5-3.5 µm diam, lightly to heavily incrusted with coarse crystalline material; cystidia frequent, thin-walled, cylindric to capitate or with median swollen portions, not incrusted or lightly incrusted with coarse crystalline material, 60-130 x 7-12 µm, projecting to 80 µm; basidia clavate, 4-sterigmate, 10-12 x 4-5 µm, with a basal clamp; basidiospores ovoid to ellipsoid, hyaline, smooth, with thickened walls, negative in Melzer's

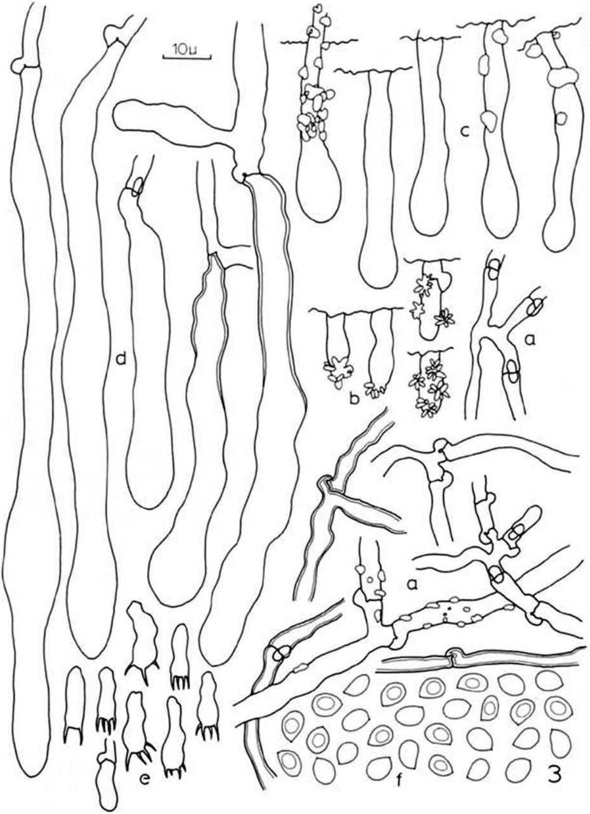


Fig. 3. *Hyphodontia magnacystidiata* (RLG 5481). a, subicular hyphae; b, small cystidia with rosettes of crystals; c, apices of larger cystidia; d, large cystidia, some with thickened basal portion; e, basidia; f, basidiospores.

reagent, 5-6.5 x 3-4 µm.

Hyphodontia magnacystidiata is associated with a white rot of dead, fallen aspen. The diagnostic characters are the large hymenial cystidia and the small basidia. Other species of *Hyphodontia* differ distinctly in cystidial morphology.

Specimen examined: Holotype previously mentioned.

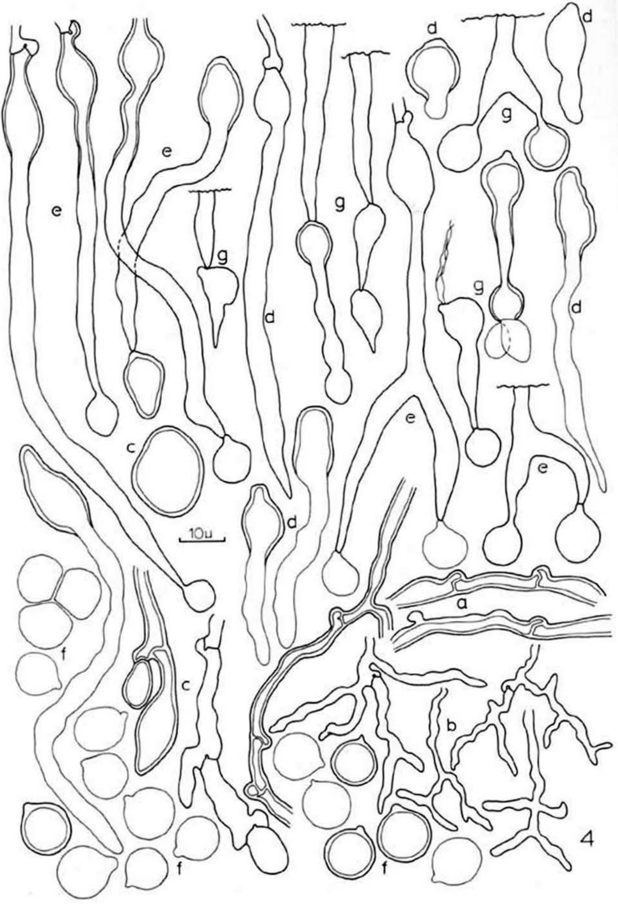
LAETICORTICIUM SIMPLICIBASIDIUM Linds. et Gilbn., sp. nov.
Fig. 4

Fructificatio effusa usque ad 15 cm, adnata, purpurea, laeves vel tuberculata; hyphae fibulatae, 2.5-5.5 µm, crassae-tunicatae; dendrohyphidia adsunt; probasidia globosa vel ellipsoidea, crassa-tunicata; basidia angusta, tenuitunicata, simplicia vel bifurcata, 75-125 x 3-5 µm, 1-sterigmatibus; basidiosporae globosae, hyalinae, laeves, tenui vel crassae-tunicatae, nonamyloideae, 9-11 µm. HOLOTYPUS: in ligno *Populus tremuloides* Michx., Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona; leg. J.P. Lindsey, No. 526; in herb. Nat. Fungus Collections, Beltsville, Maryland, U.S.A. (BPI).

ETYMOLOGY: Named for the simple, usually unbranched basidia.

Basidiocarps effused up to 15 cm, adnate; hymenial surface pinkish-buff at first, becoming reddish-purple at maturity, smooth to tuberculate; margin thinning out, pinkish-buff, entire to minutely fimbriate; subiculum dark purplish with a pale pinkish-buff layer next to the subtratum, less than 1 mm thick.

Hyphal system monomitic; subicular hyphae thin- to moderately thick-walled, abundantly nodose-septate, with occasional branching, 2.5-5.5 µm diam; cystidia none; dendrohyphidia abundant in catahymenium, thin-walled, much branched, with occasional clamps, 1.5-2.5 µm diam; probasidia developing at various levels in the catahymenium and subiculum, globose to ellipsoid, thick-walled, 8-15 x 15-30 µm; basidia elongated, narrow, unbranched or occasionally bifurcate, thin-walled, 75-125 x 3-5 µm, tapering at the apex to a single sterigma approximately 1 um wide; basidiospores globose, thin- to thick-walled, smooth, negative in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Melzer's reagent, 9-11 µm diam, with a large blunt apiculus, asymmetrically attached at the narrowed apex of the slender basidium, often germinating by repetition to give rise directly to secondary basidiospores.

Other species of *Laeticorticium* found on quaking aspen have typical 4-sterigmate basidia and ovoid to ellipsoid basidiospores (Larsen and Gilbertson, 1976). In spite of the unusual basidial structure, this fungus is placed in *Laeticorticium* because the thick-walled, nodose-septate hyphae, catahymenial development, dendrohyphidia, thick-walled probasidia, and general macroscopic appearance are all typical of that genus. To our knowledge, no other species of *Laeticorticium* exhibits repetitive spore production from the basidiospores.

Specimens examined: Holotype previously mentioned; RLG 11551, JPL 553, on quaking aspen, Mt. Lemmon, Santa Catalina Mts., Coronado Nat. Forest, Pima County, Arizona.

ACKNOWLEDGMENTS

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Fig. 4. *Laeticorticium simplicibasidium* (JPL 526). a, subicular hyphae; b, dendrohyphidia; c, probasidia; d, probasidia in various stages of germination; e, mature basidia with basidiospores, some bifurcate; f, basidiospores; g, basidiospores germinating by repetition.

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TAXONOMIC STUDIES IN THE PHACIDIALES: PROPOLIS AND PROPOLOMYCES

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SUMMARY

Propolis (Fr.) Corda, typified by *P. phacidioides*, a foliicolous Ascomycete with septate, acicular spores, antedates *Propolis* (Fr.) Fr., typified by *P. farinosa*, a lignicolous species with unicellular spores. *Propolomyces* is proposed as a new name for the latter genus. Redescriptions of five species of *Propolis* originally described in *Stictis* are provided; *S. panizzei*, *S. emarginata*, and *S. quercifolia* are transferred to *Propolis*.

Stictis, with over 200 described species, contains diverse heterogeneous elements. One of these is a group of fungi with immersed apothecia which are exposed by the splitting of the overlying substrate into teeth and occur predominantly on coriaceous leaves. Thin-walled asci exclude these species from *Stictis* and the Ostropales, and at least two species have been transferred to *Naemacyclus* in the Phacidiales (Dennis, 1960; Eriksson, 1970). A systematic investigation of *Stictis* revealed three other species, and numerous taxonomic synonyms, referrable to this group. At the same time it became clear, for reasons discussed below, that the correct name for the group was *Propolis* rather than *Naemacyclus*.

The name *Propolis* was first proposed by Fries (1822) as a subgenus of *Stictis*. Its place of publication at generic rank is usually given as Summa veg. Scand. (Fries, 1849; cfr. Dennis, 1968). Fries (1849) specifically attributes the name to himself and cites Flora Scanica (Fries, 1836) as the place of publication. The sole reference to *Stictis* and its segregates in Flora Scanica, "Huc genus Stictidis in plura genera suo tempore dividendum, praecipue Xylographae seorsim proponendae", does not constitute acceptance of either *Xylographa* (Fr.) Fr. or *Propolis* (Fr.) Fr., both of which properly date from 1849.

Corda (1838), examining available material in the old genus *Stictis*, independently arrived at the conclusion that the genus needed to be split. He raised *Propolis* to generic rank, citing *Stictis (Propolis)* Fries p.p, as a synonym, provided a careful description of the genus, and included a single species, *P. phacidioides*. *Stictis alba* Pers. (= *Propolomyces farinosus)* was retained in *Stictis*. *Propolis*, as a genus, must therefore date from 1838 and be typified by *P.*

phacidioides.

Fries (1849) did not mention Corda's treatment, although he must have been aware of it, but used *Propolis* in its older sense for Stictidaceous fungi with a pruinose hymenium. Three infrageneric taxa of uncertain rank were recognized: *Propolis* in the strict sense, *Melittosporium*, and b. *epiphylla*, the last containing *P. phacidioides* and *P. niveus* (Pers.) Fr., now considered a synonym of the holotype species of *Naemacyclus* Fckl.

The subsequent adoption of *Propolis* for species with unicellular spores was accidental and based on a series of misconceptions. Although Fries did not include spore characters in his description of *Propolis*, all of the species which formed the core of the genus had unicellular spores. By the time Fuckel (1873) proposed *Naemacyclus* for acicular spored foliicolous Stictidaceae, the second incorrect interpretation of *Propolis* was well established.

As Eriksson (1970) has indicated, Fries included at least two fungi in Scleromycetes Sueciae 297 under the name *Stictis phacidioides*. From the protologue, it is clear that a light-colored fungus with a pruinose hymenium was intended. Karsten (1870) equated a second, dark-colored fungus, which he renamed *Phacidium arctostaphyli*, with *Propolis phacidioides*, and this concept was widely accepted in the literature. As a result, *P. phacidioides* was left without a name, and, as the synonymy below indicates, has been redescribed many times.

The generic name *Propolis* cannot be used for lignicolous species with unicellular spores. *P. farinosa* and its allies are without a valid, taxonomically acceptable name in the Stictidaceae. A new name, *Propolomyces*, is therefore proposed for them.

PROPOLOMYCES Sherwood, nom. nov.

≡ *Propolis* (Fr.) Fr., Summa Veg. Scand. sect. post. 372 (1849) non *Propolis* (Fr.) Corda, Icon. fung. *2*: 38 (1838).
Lectotype species: *Stictis farinosa* Pers., Myc. Eur. *1:* 331 (1822).
≡ *Propolis farinosa* (Pers.) Fr., Summa Veg. Scand. sect. post. 372 (1849).
≡ **Propolomyces farinosus** (Pers.) Sherwood, comb. nov.

Fries (1822) included five species in *Stictis* subgen. *Propolis*. Of these, only *S. farinosa* appears in 1849 under *Propolis* in the strict sense; the other four species are accommodated in *Stictis*, *Propolis (Melittosporium)*, and *Propolis (b. epiphylla)*. I consider explicit exclusion of all but one of the original species from a type infrageneric taxon to constitute implicit typification sensu Korf and Rogers (1967).

A specimen (L: 910264-819) in Persoon's herbarium of *Stictis farinosa*, which I have designated as the type (since there is no collection data accompanying the specimen it is unclear whether this is a lectotype or neotype),is in poor condition, but appears to be the common lignicolous Ascomycete usually known as *Propolis faginea* (Schrad.) Karst. or *P. versicolor* (Fr.) Fr. Since the only specimen mentioned in the protologue of *Stictis versicolor* Fr. is the muriform-spored fungus now known as *Melittosporium versicolor* (Fr.)

Corda, the epithet *versicolor* is incorrect. It would appear that the correct basionymn under the current International Code of Botanical Nomenclature is the one sanctioned by Fries: *Stictis farinosa*. The more familiar epithet *faginea* is older, but is a devalidated pre-starting-point name. Pending study of species delimitations in this genus I defer transferring other species of *Propolis* to *Propolomyces*.

PROPOLIS (Fr.) Corda, Icon. fung. *2:* 38 (1838)

≡ *Stictis* subgen. *Propolis* Fr., Syst. mycol. *2*(1): 198 (1822)
Lectotype species: *Stictis phacidioides* Fries, Syst. mycol. *2*(1): 199 (1822).

Apothecia intraepidermal or subepidermal, lenticular in cross section, orbicular to somewhat elongate, opening by splitting the covering epidermis into 3 or more teeth. Covering layer colorless or brown, not carbonized, reduced, crystalliferous. Hymenium level with, or somewhat depressed from, the surface of the substrate, usually light-colored and pruinose. Asci uniformly thin-walled, pointed at the apex, without a distinct apical pore, J-. Ascospores long-cylindrical to acicular, colorless, simple or transversely septate, at most obscurely sheathed. Usually on dead coriaceous leaves.

Propolis differs from *Naemacyclus* in opening by teeth rather than by a slit, a character considered of taxonomic value at the generic level elsewhere in the Phacidiales. It differs from *Coccomyces* in lacking a well-developed, radiating, carbonized covering stroma, and from *Lasiostictis* in having J- asci and a thin, indistinct covering layer. *Propolis*, as treated here, may well encompass reduced forms of both of these genera. *Naemacyclus* was placed in the Hemiphacidiaceae by Korf (1962), but the asci and ascospores more closely resemble those of *Coccomyces*, *Lasiostictis*, and *Lophodermium*.

KEY TO SPECIES

- A. Covering layer brown (B)
  - B. Ascospores septate. On *Olea*. *P. panizzei*
  - B'. Ascospores unicellular. On *Eucalyptus*. *P. emarginata*
- A'. Covering layer colorless (C)
  - C. Apothecia orbicular, with reflexed, strongly pruinose marginal lobes (D)
    - D. Apothecia 0.5 - 1.0 mm broad. On a variety of hosts, tropical America. *P. quadrifida*
    - D'. Apothecia less than 0.5 mm broad. On *Quercus*, temperate North America. *P. quercifolia*
  - C'. Apothecia elongate, the lobes not reflexed. *P. phacidioides*

(1). PROPOLIS PANIZZEI (de Notaris) Sherwood, comb. nov.

≡ *Stictis panizzei* de Not., Comment. Soc. Crittog. Ital. *1*: 362 (1861)

Figure 1.

Apothecia intraepidermal, epiphyllous, 0.6 - 1.0 mm broad, orbicular, opening by splitting the epidermis into 4 -

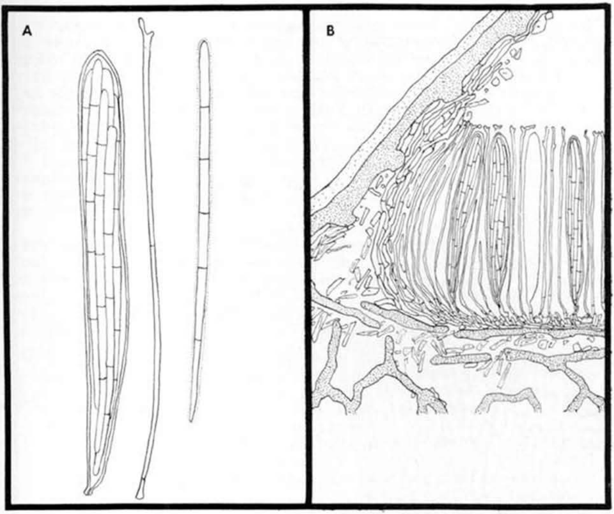

Figure 1. *Propolis panizzei*. A. Ascus, paraphysis, and spores, x750. B. Cross section of apothecium, x375. Drawn from NY-Rabenhorst 313.

6 lobes which are soon deciduous. Disc ochraceous, with a pale brown border. Margin consisting of 2 - 4 layers of brown, non-carbonized hyphae lying parallel to the reflexed epidermis, crystalliferous. Subhymenium c. 20µm thick, colorless in the center, brown toward the periphery of the apothecium. Paraphyses numerous, filiform, 1.5µm broad, branched near the apex, colorless, J-. Asci 100 - 115 x 10.5µm, uniformly thin-walled, pointed at the apex, J-. Ascospores 8, 75 - 105 x 2.5 - 3.0µm, colorless, 5-septate, with an obscure sheath.

On living leaves of *Olea*, causing the disease known as "Brusca", throughout the Mediterranean area. The gregarious intraepidermal apothecia ultimately cause the leaf cuticle and upper half of the epidermis to separate from the cells of the leaf, giving infected leaves their characteristic appearance.

SPECIMENS EXAMINED: EUROPE: Italy (PAD, Erbar. Crittog. Ital. 2241, San Remo, 1869)(NY, Rabenhorst Herb. Mycol. Ed. 2, 313, San Remo, De Notaris [authentic]).

(2). PROPOLIS EMARGINATA (Cooke & Massee) Sherwood, comb. nov.

≡ *Stictis emarginata* Cooke & Massee, Grevillea *18:* 7 (1889)
Figure 2.

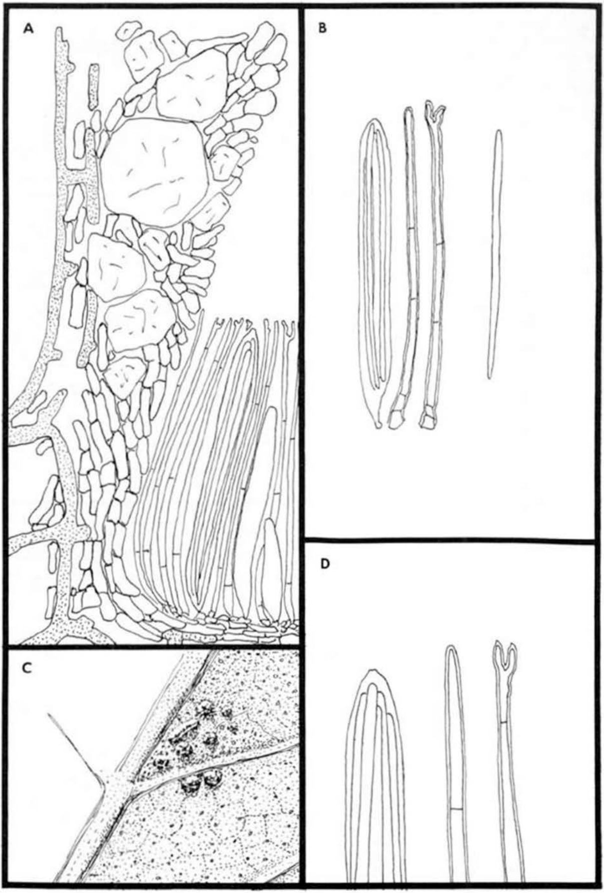

Figure 2. *Propolis emarginata*. A. Cross section of ascocarp, x750. B. Ascus, paraphyses, and ascospores, x750. C. Habit sketch, x7.5. D. Detail of ascus and paraphysis apices, x1500. Drawn from the holotype.

Apothecia immersed, subepidermal, amphigenous, 0.3 - 0.8 mm diam., orbicular, angular, or somewhat elongate, opening by 3-5 teeth, the disc pale grey-pruinose, the lobes dark, white-pruinose when rehydrated and reflexed, covering the disc when dry. Subhymenium and margin brown, the marginal hyphae 2.5 - 5µm in diameter, not carbonized, lying parallel to the reflexed substrate in the lower half, perpendicular to it in the upper half, crystalliferous. Asci 75 - 80 x 6 - 8µm, uniformly thin-walled, pointed at the apex, J-. Paraphyses numerous, filiform, 1.5 - 2µm broad, branched near the apex, J-. Ascospores 8, 55 - 70 x 1.5µm, not sheathed, not septate.

On dead leaves of *Eucalyptus*, Australia, Africa, and North America. This species illustrates some of the difficulties in defining generic limits in the Phacidiales. It has the perpendicular covering layer and unsheathed acicular spores characteristic of *Lasiostictis* (Phacidiaceae), the J- asci and foliicolous habit of a *Coccomyces* (Rhytismataceae) and the hymenium of *Propolis* (family uncertain).

SPECIMENS EXAMINED: AUSTRALASIA: Australia (K, on *Eucalyptus*, Martin 439, Holotype of *Stictis emarginata*). AFRICA: Canary Islands (CUP-MM 178; MM-305, on *Eucalyptus*, Tenerife; MM-993, on *Eucalyptus*, Gran Canaria). NORTH AMERICA: USA (TRTC 47464, on *Eucalyptus*, California).

(3) PROPOLIS QUADRIFIDA (Léveillé) Montagne in Gay, Fl. Chile 7: 425 (1852)

≡ *Stictis quadrifida* Lév., Ann. Sci. Nat. Bot. sér. 3, *5*: 255 (1846)
= *Stictis foliicola* Berk. & Curt., Journ. Linn. Soc. Bot. *10*: 371 (1868)
    ≡ *Naemacyclus foliicola* (Berk. & Curt.) Dennis, Kew Bull. *14*: 445 (1960)
= *Stictis chilensis* Speg., Fungi Chilensis 129 (1910)
= *Stictis coccolobi* Seaver & Waterston, Mycologia *32*: 399 (1940)
= *Stictis conocarpi* Seaver & Waterston, Mycologia *33*: 311 (1941)
?= *Stictis pimentae* Seaver & Waterston, *ibid.*: 313 (1941)
?= *Stictis serenoae* Cash, Mycologia *35*: 599 (1943)

Figure 3.

Apothecia subepidermal, amphigenous, 0.5 - 1.0 mm diam., orbicular, opening by 3 - 6 prominent, reflexed, white-pruinose teeth, the disc plane, somewhat depressed below the level of the substrate, pruinose, pale grey when fresh, drying grey, white, or yellowish (the color often variable within a single collection), becoming brownish when effete. Covering layer adnate to the ruptured epidermis, colorless or sometimes pale brown below, of 1-2 layers of hyphae 1.5µm diam., abundantly crystalliferous. Subhymenium colorless, c. 10µm thick, of small angular cells resting directly on host tissue. Asci 70 - 100 x 7 - 9µm, cylindric-clavate, uniformly thin-walled, pointed at the apex, J-. Ascospores 8, 65 - 80 x 2.0µm, tapering below, 3-septate. Paraphyses numerous, filiform, J-, 1.0µm broad below, enlarged and branched near the apex.

On dead coriaceous leaves throughout tropical and sub-

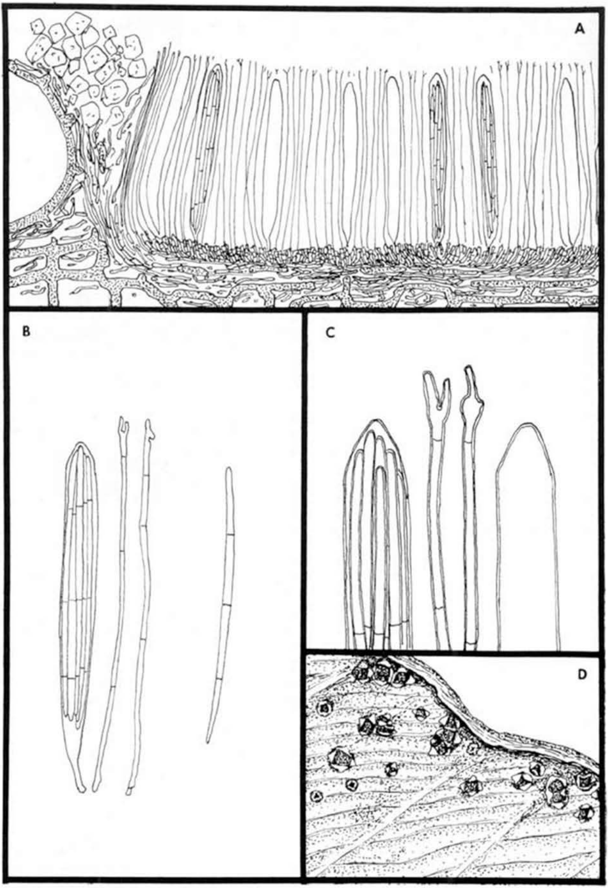

Figure 3. *Propolis quadrifida*. A. Cross section of ascocarp, x375. B. Ascus, paraphyses, and spores, x750. C. Detail of ascus and paraphysis apices, x1500. D. Habit sketch, x7.5. Drawn from CUP-GU-24.

tropical America. *Stictis serenoae*, which occurs on palm leaves and has a yellowish hymenium may possibly be distinct. The asci of *S. pimentae* measure 65 - 75 x 9µm; the asci of all the other specimens cited fall within the range given for the species. Dennis (1960; 1970) gives the measurements of the asci as 80 - 155 x 8 - 9µm. I have seen no asci longer than 100µm long in *P. quadrifida*. A similar, but apparently distinct species with a thick black basal stroma and asci 120 x 8µm also occurs in tropical America, and may have been included in Dennis's concept of *Stictis foliicola*. I was unable to locate Léveillé's type of *Stictis quadrifida*, but have little doubt that it is identical with *S. foliicola*. Physiological studies or cross inocculations on different hosts may ultimately prove that there is more than one taxon involved; the morphological picture is one of remarkable uniformity in all collections.

SPECIMENS EXAMINED: NORTH AMERICA: USA (BPI, on *Serenoa*, Florida, Shear 1396, holotype of *Stictis serenoae*)(CUP-D-7655, on *Persea*, Florida). Bermuda (NY, on *Eriobotrya*, Paget, 1942)(CUP 34624; 32627; 32640, on *Coccolobis*,authentic material of *S. coccolobi*; 34617, on *Conocarpus*, isotype of *S. conocarpi*; 34625, on *Pimenta*, isotype of *S. pimentae*; 34623, on *Pimenta*, paratype of *S. pimentae*). Cuba (FH, Cuba fungi 712, Wright, isotype of *S. foliicola*). Guadeloupe, F.W.I (CUP-GU-24; FH-GU-788, on *Clusia*). Puerto Rico (CUP-PR-1361, on *Clusia*). Mexico (CUP-ME-317, on a leaf, Oaxaca). Panama (NY-Pa-9, Prov. Panama, 11.VI.1975, K.P. Dumont, S.E. & S.M. Carpenter, S.A. Mori; Pa-57, on *Clusia*, *ibid.*; Pa-89, *ibid.*; Pa-315, Prov. Chocle, *ibid.*, 14.VI.1975; Pa-328, *ibid.*; Pa-279, on *Clusia*, *ibid.*; Pa-177, 13.VI.1975, *ibid.*; Pa-1548, Prov. Panama, K. P. Dumont, S.E. Carpenter, S.A. Mori, 30.VI.1975). SOUTH AMERICA: Ecuador. (FH-Patouillard, on *Myrtus*)(NY-Ec 1443, prov. Pastaza, K.P. Dumont, S.E. Carpenter, P. Buriticá, 24.VII.1975; Ec-1907, Prov. Zamora, *ibid.*, 1.VIII.1975). Colombia (NY-Co-1405, Dto. Cauca, K.P. Dumont, J.H. Haines, J.M. Idrobo, L.F. Velasquez, 15.VII.1974; Co-1290, on *Rapanea*, *ibid.*, 14.VII.1974; Co-74, Dto. Cundinamarca, *ibid.*, 28.VI.1974; Co-3828, Dto. Putumayo, K.P. Dumont, P. Buriticá, L.A. Molina, J. Luteyn, 28.I.1976) Venezuela (NY-Ve-89, on *Clusia*, Edo. Miranda, K.P. Dumont, J.H. Haines, B. Manara, 18.VI.1971; Ve-127, on *Clusia*, *ibid.*; Ve-6091, on *Clusia*, Dto. Federal, K.P. Dumont, R.F. Cain, G. Samuels, 27.VII.1972; Ve-6183, *ibid.*) Chile (LPS 28232, three specimens collectively labelled *Stictis chilensis*: on *Boldoa*, Concepción, lectotype, designated here; on *Boldoa*, Concepción, lectoparatype; on *Aetoxicum*, Concepción, lectoparatype).

(4). PROPOLIS QUERCIFOLIA (Cooke & Ellis) Sherwood, comb. nov.

≡ *Stictis quercifolia* Cke. & Ell., Grevillea *5*: 50 (1876)
= *Stictis quercina* Peck, Report N.Y. State botanist *28*: 69 "1875" (1879).

Figure 4, A, B.

Apothecia amphigenous, 0.2 - 0.5 mm diam., orbicular, opening by 3-5 reflexed, white-pruinose teeth, the disc yellow-pruinose, slightly depressed below the level of the substrate. Covering layer scant, colorless, crystalliferous, of hyphae 1.5 - 2.0µm diam., running parallel to the surface of the substrate. Paraphyses numerous, filiform, 1.0µm

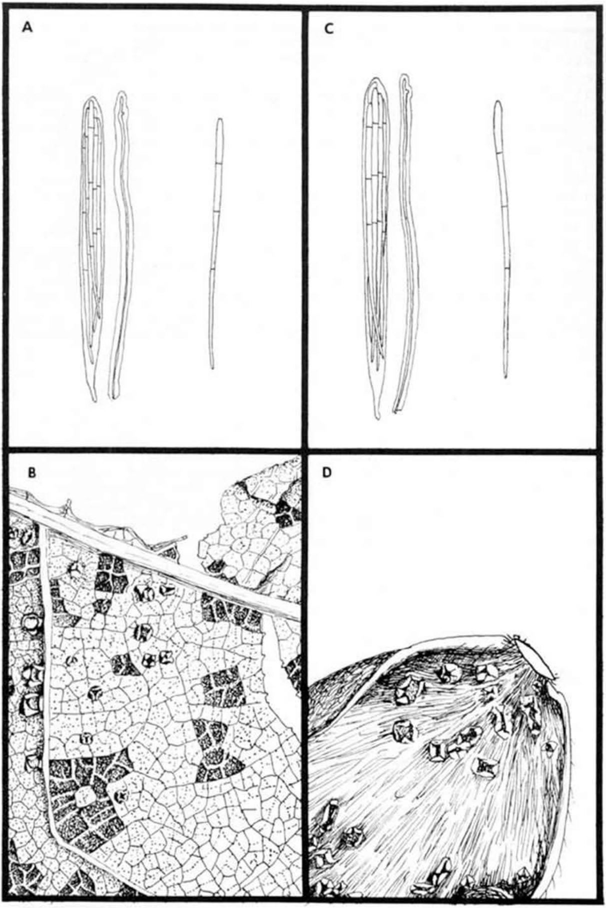

Figure 4. *Propolis quercifolia*. A. Ascus, paraphysis, and spores, x750. B. Habit sketch, x7.5. Drawn from CUP 25490. *Propolis phacidioides*. C. Ascus, paraphysis, and spores, x750. D. Habit sketch, x 7.5. Drawn from CUP-D-7708.

broad, sheathed, J-, branched and crystalliferous at the tip. Asci 65 - 81 x 5 - 6μm, thin-walled, pointed at the apex, J-. Ascospores 8, 50 - 65 x 1.5μm, 3-septate, not sheathed.

On dead leaves of *Quercus* (red oak group), eastern North America. Apparently distinct from *P. phacidioides*, which is not known to occur in the Atlantic coast of North America, although its Ericaceous hosts are common enough there.

SPECIMENS EXAMINED: NORTH AMERICA: USA (CUP-D-6235, Port Jarvis, N.Y., isotype of *Stictis quercina*, D-6236, Peck, Phoenicia, N.Y.; CUP - 29167, Massachussetts, Linder & White; CUP-D-7656, Ellis, New Jersey, 22.VIII. 1896; D-7657, Ellis, N.J., 7.VIII.1885; D-8112, Ellis, Newfield, 1876 [perhaps an isotype of *Stictis quercifolia*]; D-9366, Ellis, North American Fungi 149) (Herb. Sherwood 2284, N.J., 28.X.1976).

(5). PROPOLIS PHACIDIOIDES (Fr.) Corda, Icones fung. *2*: 38 (1838)

≡ *Stictis phacidioides* Fr., Syst. Mycol. *2*(1): 199 (1822)
  ≡ *Naemacyclus phacidioides* (Fr.) B. Eriks., Symb. Bot. Upsal. *29*(4): 49 (1970)
= *Stictis anaexa* Speg., Michelia *2*: 261 (1881)
= *Stictis vaccinii* Ell. & Ev., Proc. Acad. Philadelphia *46*: 352 (1894)
= *Stictis myricae* Cash, Mycologia *50*: 655 "1958" (1959)

Additional synonyms are given by Eriksson (1970)

Figure 4, C,D.

Apothecia hypophyllous, 0.3 - 0.8 mm broad, orbicular to somewhat elongate, opening by 3-5 teeth which cover the disc in dried material, the disc yellow, pruinose, the covering layer 15 - 20μm thick, of colorless hyphae 3.0 - 3.5μm diam., short-celled, vertically-oriented, its inner face with sparse, colorless periphysoidal hyphae, particularly near the margin. Paraphyses filiform, 1.0μm broad, sometimes branched, crystalliferous, J-. Asci 75 - 105 x 5 - 6μm, uniformly thin-walled, pointed at the apex, J-. Ascospores 8, 60 - 75 x 1.5 - 2.0μm, 3-septate, not sheathed.

On evergreen coriaceous leaves in cool regions. A predominance of Ericaceous hosts in the temperate evergreen flora, rather than true host preference, may be responsible for the known host range. Cash (l.c.) cited somewhat longer asci, J+ ascus apices, and spores lying straight in the asci as points of difference between *Stictis myricae* and *S. vaccinii*. I find the asci in her type material to be J- even after rehydration in 2% KOH. The spores of *S. vaccinii* lie straight in the ascus if sectioned rather than crush-mounted.

SPECIMENS EXAMINED: EUROPE: Sweden (FH, Fries, Sclerom. Sueciae 297, on *Arctostaphylos uva-ursi*, isotype of *S. phacidioides*). Italy (LPS 28243, on *Vaccinium*, holotype of *S. anaexa*). Great Britain (IMI 115071, on *Metrosideros*, Scilly Isles). NORTH AMERICA: USA (CUP, NY California Fungi 1209, on *Myrica*, isotypes of *S. myricae*)(CUP-D-7708, on *Vaccinium*, isotype of *S. vaccinii*; CUP-California fungi 1112, on *Vaccinium*).

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MYCOTAXON

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TYPE STUDIES IN THE POLYPORACEAE 9.
SPECIES DESCRIBED BY E.M. WAKEFIELD.

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SUMMARY

18 species described by E.M. Wakefield in the Polyporaceae have been reviewed and the types examined. 11 species are accepted, 6 are treated as synonyms whilst one species belongs in another family. The combination Aurificaria shoreae (Wakf.) Ryv. is proposed.

Miss Elsie M. Wakefield was appointed in 1910 as assistant to George Massee at the Herbarium, Royal Botanic Gardens, Kew. She became head of the mycology department in 1915 where she remained until her retirement in 1951. She was made Deputy of the Herbarium in 1945.

She received large collections of fungi for identification from different parts of the world, including a number of species which she described as new. She had access to the excellent collections at Kew and as a modern mycologist always used the microscope. Thus, she avoided the pitfall of many earlier mycologists who described numerous species based only on external morphology reflecting different stages of development and age. The following list shows that Wakefield had a sound taxonomic judgement, and most of her species have been accepted by later mycologists. Nevertheless, it seemed desirable to compile a survey of her species which were published over many years and in many different journals. For mycologists and plant pathologists working in the tropics without a good library at hand it may be advantageous to have the relevant data of her species in a single paper.

The species are placed alphabetically according to the genus in which they originally were described and within each genus alphabetically according to the specific epithet. The type locality is given, and the original label is cited in inverted commas. Unless otherwise stated, all holotypes are in the Herbarium of the Royal Botanic Garden, Kew, London (K).

Amauroderma fuscoporia Wakef., Bothalia 4:948, 1948. "Salisbury, Rhodesia, 20-03-1939. J.C.F. Hopkins, no. 4441". This is a characteristic species in the genus, apparently restricted to the so-called *Brachystegia*-zone across southern tropical Africa. I have myself seen specimens from South Africa, Rhodesia, Angola, Zambia, Malawi and Mozambique.

Characteristic is the smooth surface which is quite a rare feature in *Amauroderma* Murr. and the elongate spores (10-14 um long). For a more detailed description, the reader is referred to Furtado (1968).

Amauroderma infundibuliforme Wakef., Bull. Misc. Inf. Kew. 1917:309, 1917. "Uganda, Bumpenge forest, Coll. T. Maitland 24a".

This too is a characteristic species of the genus with conspicuous infundibuliform fruitbodies covered with a black distinct crust. The species must be rare, as it is still known only from the type collection. The species was transferred by Steyaert (1972) to his genus Magoderna. I would like to see SEM photographs of the spores of *A. infundibuliforme* and related species before I unconditionally accept its transfer to another genus.

Favolus sarasinii Wakef., Vierteljahrschr. Naturf.-Gesellsch. Zürich 61:629, 1961. "New Caledonia, Hienghese, Sarasin 65, June 1911".

This is not a polypore, but a species of *Favolaschia* (Pat.) Pat.

Fomes elegans Wakef., Bull. Misc. Inf. Kew, 1918:207, 1918. "India, Singgbhum, R.S. Hole 1916, on living *Shorea robusta*".

The type represents a fine specimen of *Pyrofomes tricolor* (Murr.) Ryv., originally described from the Philippine Islands. The genus *Pyrofomes* Kotl. & Pouz. is characterized by a brick red to orange brown colour of the context, a trimitic hyphal system with clamped generative hyphae and skeletal hyphae which are often weakly dextrinoid. The spores are truncate, thick-walled and light yellowish brown.

Pyrofomes tricolor is known only from Asia, i.e. from India to the Philippine Islands.

Fomes pseudoferreus Wakef., Bull. Misc. Inf. Kew, 1918: 208, 1918. "Kuala Lumpur (Malaya), Comm. W.N.C. Belgrave 1917".

This is *Ganoderma philippii* Bres. & Henn. according to Steyaert (1972:72).

Fomes mundulus Wakef., Kong. Norske Vidensk. Selsk. Forhand. Vol. 9, nr. 12:44, 1936".
"Africa, S. Rhodesia, Victoria Falls, 11-12/1930, leg. O.A. Höeg, no. F 76". Holotype in TRH, lectotype in K, both examined.

This is a characteristic species of Perenniporia Murr. to which it was transferred by Ryvarden (1972). It is perennial with a black crust and a distinctly stratified tube-layer. The spores are truncate, thick-walled and dextrinoid. The latter is also the case in part with the skeletal hyphae. The species seems to be restricted to the "Brachystegia-"zone across southern Africa.

A closely related species seems to be Vanderbylia ungulata Reid described from Tanzania (Reid 1973). Vanderbylia Reid is typified by Vanderbylia vicina (Van der Byl) Reid, an illegitimate combination as no basionym was cited. Further, some mistake must have crept in as the original author of the specific epithet is given as Van der Byl, while Lloyd is given as the author on the preceeding page (Reid 1973, p. 163-164).

Fomes zuluensis Wakef., Bothalia 4:948, 1948.
"Zululand (South Africa) Nkandhla Forest., Mar. 1938., leg. W.G. Rump 374. Herb. Myc. Pretoria 30186".

This is a good species which was transferred to Fomitopsis Karst. by Ryvarden (1972) owing to the perennial growth and a distinct crust on the pileus. The hyphal system is trimitic with clamped generative hyphae and hyaline binding and skeletal hyphae.

Ganoderma simulans Wakef., Bull. Misc. Inf. Kew, 1922: 161, 1918. "B.E. Africa, Mazeras, T.D. Maitland no.556".

This is Ganoderma subresinosum (Murr.) Humphrey according to Steyaert (1972), as noted by myself when I first examined the type of Wakefield's species in 1971. Steyaert has transferred the species to his genus Magoderna.

Hexagonia sericata Wakef., Bull. Misc. Inf. Kew, 1922:161, 1918. "Nairobi, Coll. Sumerun, Comm. T.D. Maitland no. 534".

Both this and the following species represent, according to my concept, Hexagonia speciosa Fr.. This species was described from South Africa and is known to extend along the eastern part of the continent, but is nowhere common. The pileus is shiny with brown colours and velutinate to finely tomentose in narrow to broad concentrical zones. There seems to be a secondary growth on the pileus on aging, and from the base it can be covered with a slightly thicker and more cottony tomentum of adpressed hyphae. The growth starts at the base as isolated spots and irregular protuberances, but later it becomes coherent, usually lighter in colour than the original tomentum and mostly azonate. This type of growth is known for other Hexagonia species, for example H. velutina Pat. & Har. and it may be an xeromorphic adaptation.

The striking and seemingly fairly constant character is the pore size. The pores are hexagonal ranging from 2-5 mm wide. The hyphal system and the spores are in general typical for the genus.

Hexagonia subvelutina Wakef., Bull. Misc. Inf. Kew, 1917: 310, 1917. "Brit. East Africa. Comm. W.J. Dawson no. 530, 1916".

This is Hexagonia speciosa Fr., for comments see the preceding species.

Polyporus australiensis Wakef., Bull. Misc. Inf. Kew, 1914:157, 1914. "Australia, Queensland, Coomera River, on logs. C.T. White Feb. 1912".

This is a beautiful species belonging to Piptoporus and was transferred by Cunningham (1965:107) and to which the reader is referred for a detailed description.

Polyporus coffeae Wakef., Bull. Misc. Inf. Kew, 1917:308, 1918. "Uganda, Magigye Eastate, May 1951, W. Small no. 327, on roots of dead coffee tree".

The type represent Diacanthodes novo-guineenses (Henn.) Fidalgo as indicated by Fidalgo (1962), who provided a detailed description of the species and its associated conidiiferous form and disease.

Polyporus doidgeae Wakef., Bothalia 4:948, 1948. "South Africa, Natal, Polela distr. Donnybrook, Hopevale, Feb. 1939, leg. K.E. Morgan", on Acacia mollissima.

This is a good species in Polyporus s. str. characterized by a dimitic hyphal system with clamped generative hyphae and arboriform binding hyphae.

Polyporus pyrophilus Wakef., Bull. Misc. Inf. Kew, 1916: 71, 1917. "Nigeria, Nsulu, May 1941, Farguharson no. 50".

The species has previously been transferred to Coltricia S.F. Gray by Ryvarden (1972) owing to the brown stipitate fruitbodies and monomitic hyphal system with coloured, simple septate generative hyphae. The species has as yet been noted only from burnt ground amongst ash.

Polyporus raphanipes Wakef., Bull. Misc. Inf. Kew, 1914:157, 1914. "Nigeria, North Prov., Leg. J.S. Macfies, 1912".

The species belongs in Polyporus s. str. It is close to Polyporus tricholoma Mont. and its taxonomic status and validity can only be decided when the complex of tropical species around *P. tricholoma* has been treated in detail.

Polyporus shoreae Wakef., Bull. Misc. Inf. Kew, 1916:72, 1916. "India, Bengal, Buxa Div., Comm. F.J.F. Shaw, Jan. 1915".

The species was adequately described by Bakshi (1971:124) to whom the reader is referred. Typical of the species is the distinct crust on the pileus, making it somewhat similar to *Aurificaria indica* (Mass.) Reid. As in this species, *P. shoreae* has a monomitic hyphal system with simple septate hyphae. *Aurificaria indica* is the type species of *Aurificaria* Reid, a genus close to *Inonotus* Karst., separated mainly by the distinct crust on the pileus. *Aurificaria indica* has coloured spores whilst those of *P. shoreae* are hyaline. The same type of variation is known within *Inonotus* where some species have hyaline spores whilst those of other species are more or less coloured, ranging from light yellowish to rusty brown. Thus, the different colouration of the spores between *P. shoreae* and *A. indica* is no obstacle to a congeneric placement. The crust on the pileus of *P. shoreae* indicates clearly, at least to me, that it is best placed in *Aurificaria*. Thus, the following combination is proposed: *Aurificaria shoreae* (Wakef.) Ryv. comb. Basionym: *Polyporus shoreae* Wakef., Bull. Misc. Inf. Kew, 1916:72, 1916.

Polystictus mimetes Wakef., Kongl. Norske Vidensk. selsk. Forhand. Vol. 9, no 13:47, 1935. Holotype in TRH, lectotype in K, both examined. "Rhodesia, Victoria Falls, 11-12/2-1930, leg. O.A. Høgh, no. F 84".

I have previously transferred the species to *Trametes* Fr. (Ryvarden, 1972) because of the trimitic hyphal system, hyaline spores, and clamped generative hyphae. I have myself collected the species in Tanzania, Zambia and Malawi and it may be restricted to the *Brachystegia* zone similar to *Amauroderma fuscoporia* and *Perenniporia mundula*. The pileus is smooth, concentrically zoned with slightly sulcate, light brownish zones. The fruitbody is relatively thin and coriaceous.

Polystictus violaceus Wakef., Bull. Misc. Inf. Kew, 1916: 72, 1916. "Uganda, Namutambula Forest, Jan. 1915, Maitland no. 103".

The species is a characteristic member of the genus *Nigroporus* Murr. owing to the dimitic hyphal system, with pale coloured skeletal hyphae, giving a dark, slightly violaceous tint in all the members of the genus. The spores are thick-walled and tinted pale. It was transferred to *Nigroporus* by Ryvarden (1972) and the species is probably rare as it is only known from the type collection.

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MYCOTAXON

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EXOPHIALA SPINIFERA, A NEW COMBINATION FOR *PHIALOPHORA SPINIFERA*

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ABSTRACT

Phialophora spinifera Nielsen et Conant is redescribed and transferred to the genus *Exophiala* Carmichael.

INTRODUCTION

Nielsen and Conant (6) isolated a dematiaceous hyphomycete from a nasal granuloma and described the fungus as *Phialophora spinifera* Nielsen et Conant, 1968. The hyphomycete was characterized by deeply pigmented spine-like conidiophores, phialides with collarettes and non-septate conidia which developed semi-endogenously.

Study of the type strain of *P. spinifera* (ATCC 18218) has revealed that the conidiogenous cells of this fungus are annellides. Therefore, *P. spinifera* is transferred to the genus *Exophiala* Carmichael.

TAXONOMIC PART

Exophiala spinifera (Nielsen et Conant) McGinnis, comb. nov. (Fig. 1).

≡ *Phialophora spinifera* Nielsen et Conant, Sabouraudia 6:228-229, 1968.

Colonies are yeast-like, black, gradually becoming effuse, raised, 3.5 cm in diameter after 14 days at 30°C on potato dextrose agar. Coloration is greenish black with an olivaceous black reverse color. Growth is present at 37°C. Mycelium is superficial, partly immersed, cylindrical to rarely toruloid, septate, branched, smooth and pale brown. Conidiophores are semi-macronematous to macronematous, branched or unbranched, smooth, dark brown and spine-like. Conidiogenous cells are: integrated, 1.6 - 2.7 x 5.9 - 11.2 (average 2.1 x 8.0) µm, with the annellations arising close to a septum; terminal, 1.5 - 2.8 x 5.4 - 14.4 (average 2.2 x 7.8) µm; or as thick-walled chlamydoconidia-like cells which are variable in size and shape. Conidiogenous cells are monoblastic, rarely polyblastic, percurrent, closely annellated, cylindrical, obclavate or lageniform, smooth, pale brown to almost black. Annelloconidia are exogenous, non-septate, subglobose, ellipsoidial to cylindrical, smooth, hyaline and 1.0 - 2.9 x 1.8 - 3.9 (average 1.7 x 2.5) µm. Annelloconidia aggregate in masses which tend to slide down the conidiophore or along the hypha. Yeast-like cells with blastoconidia are present.

Habitat: soil, occasional pathogen of man.

Type: ATCC 18218

Material examined: ATCC 18218 (Duke 3342),nasal granuloma.

DISCUSSION

Exophiala bears a similarity to *Phialophora* Medlar and *Wangiella* McGinnis, but differs in its method of conidium ontogeny. *Exophiala* is characterized by the development of annellides (1), whereas *Phialophora* (2) and *Wangiella* (4) produce phialides. Nielsen and Conant (6) have described phialides with collarettes in *E. spinifera*. Phialides with collarettes were not observed in this investigation.

E. spinifera is similar to *E. jeanselmei* (5) and *E. pisciphilus* (3). It is distinguished from *E. jeanselmei* by its spine-like conidiophores, narrower and more elongate annellides and more cylindrical annelloconidia. *E.*

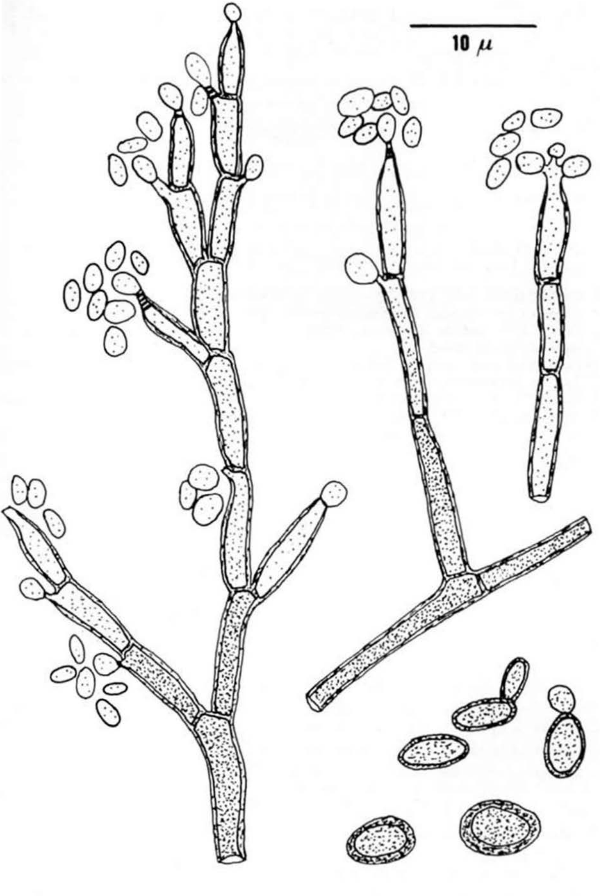

Figure 1. *Exophiala spinifera*. Conidiophores, conidia and yeast-like cells. ATCC 18218.

spinifera is readily separated from *E. pisciphilus* by its ability to grow at 37°C, yeast-like colonies, presence of yeast-like cells, toruloid hyphae and smaller annellides and annelloconidia.

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EXOPHIALA JEANSELMEI, A NEW COMBINATION FOR *PHIALOPHORA JEANSELMEI*

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ABSTRACT

The new combination *Exophiala jeanselmei* (Langeron) McGinnis et Padhye is proposed for a perennially confused taxon which was originally described as *Torula jeanselmei* Langeron and subsequently placed in the genera *Pullularia*, *Phialophora* and *Rhinocladiella* by various authors.

INTRODUCTION

De Beurmann and Gougerot in 1907 (3) isolated a dematiaceous hyphomycete from a subcutaneous cyst. Matruchot (19) obtained the isolate and concluded that it was a stable morphological variant of *Sporothrix schenckii* Hektoen et Perkins, 1900 (syn. *Sporotrichum beurmanni* Matruchot et Ramond). The isolate was more yeast-like and produced numerous budding cells and conidia laterally from the hyphae. Matruchot suggested the name *Sporotrichum gougerotii* (as *gouteroti*) for this variant, but did not formally propose a new species.

In 1928, Langeron (17) recovered a dematiaceous hyphomycete from a mycetoma of the foot. He characterized the fungus as producing toruloid hyphae that fragmented into arthrospores with blastospores developing solitarily or in clusters from the hyphae and the tips of short lateral branches. He named the fungus *Torula jeanselmei* Langeron.

Later, Dodge (12) transferred *T. jeanselmei* to *Pullularia* Berkhout as *P. jeanselmei* (Langeron) Dodge, 1935. Dodge stated, "I have hesitated to place this species in *Pullularia* but it apparently has blastospores as well as chlamydospores." Emmons (14), while studying an isolate of *T. jeanselmei* recovered from a mycetoma of the hand, observed occasional phialides with collarettes in addition to the structures noted by Langeron. Emmons felt that this species should be transferred to the genus *Phialophora* Medlar and proposed the new combination *P. jeanselmei* (Langeron) Emmons, 1945.

Borelli (5) obtained a subculture of a fungus isolated by Young and Ulrich (28) that was identified by them as *S. gougerotii* (confirmed by Dodge and Gougerot). Borelli observed unspecialized phialides without collarettes and then sent the culture to Gougerot, who confirmed that it was typical of what he had isolated in 1907 and given to Matruchot. Borelli designated this culture as the neotype to replace Matruchot's lost culture and compared it with isolates of *P. jeanselmei* and *Hormiscium dermatitidis* Kano. Borelli (4,5) concluded that the three were conspecific and proposed the new combination *Phialophora gougerotii* (Matruchot) Borelli, 1955.

Later, Carrión and Silva (7) reviewed the *"gougerotii"* problem and described the following four types of sporulation: (a) *Cladosporium*-like, i.e. with ovoid or barrel-shaped spores in chains that may branch, (b) phialides, i.e. elongate, swollen and sometimes bottle-shaped conidiogenous cells without collarettes, (c) *Pullularia*-like, i.e. clusters of conidia along the sides and tips of fertile hyphae and (d) budding yeast-like cells and pseudohyphae. These investigators felt the "black yeasts" were related to *Cladosporium* and proposed the new combination *Cladosporium gougerotii* (Matruchot) Carrión and Silva, 1955.

Setliff (24) has agreed in part with Borelli's conclusion that *P. jeanselmei* and *P. gougerotii* are conspecific and that *P. gougerotii* has priority. In contrast, Emmons (15) and Nielsen et al. (22) believe *P. jeanselmei*, *P. gougerotii* and *H. dermatitidis* are distinct and valid species of *Phialophora*. Cooke (10) reviewed the problem and concluded that *P. jeanselmei* and *P. gougerotii* were conspecific, but *P. jeanselmei* was the proper binomial for

for this fungus. No reasons were given for his conclusions.

Wang (27) and Setliff (24) have demonstrated that the conidiogenous cells of *P. jeanselmei* are annellides, thereby showing that this fungus is not a species of *Phialophora*. Emmons (15) disagreed and suggested that Wang's isolates were not *P. jeanselmei* but rather *P. gougerotii*. Shortly after Wang's study, Nielsen et al. (22) described rare phialides with collarettes in an isolate of *P. jeanselmei* recovered from a mycetoma. As a result, Nielsen et al. concluded that Emmons was correct and that *P. jeanselmei* belongs in the genus *Phialophora*.

In 1934, Nannfeldt (21) described a new hyphomycete from wood pulp as *Trichosporium heteromorphum* Nannfeldt. This fungus is initially yeast-like, becoming mycelial with age and then producing conidia from phialides and the hyphae. After studying *T. heteromorphum*, Mangenot (18) proposed the new combination *Margarinomyces heteromorpha* (Nannfeldt) Mangenot, 1952. Upon additional study, Cooke (11) reported that Mangenot's isolate was probably a mixed culture and concluded that *P. jeanselmei* was present in addition to *T. heteromorphum*.

Wang (26) investigated the *Trichosporium-Margarinomyces* problem and observed additional sporulation types in *T. heteromorphum* that had not been observed by Nannfeldt. She observed phialides with collarettes and collarettes on the hyphae and sclerotial bodies. Wang proposed the new combination *Phialophora heteromorpha* (Nannfeldt) Wang, 1964 and concluded that *Margarinomyces heteromorpha* (Nannfeldt) Mangenot sensu Mangenot was conspecific with *P. jeanselmei*, thus supporting Cooke in part. Setliff (24) reviewed Wang's isolates and concluded that *Phialophora heteromorpha* was conspecific with *P. jeanselmei*. In addition, Setliff considered CBS strain 101.67 (Schol-Schwarz sub *Rhinocladiella mansonii* (Castellani) Schol-Schwarz, 1968) to be *P. jeanselmei*. In her revision of *Rhinocladiella* Nannfeldt, Schol-Schwarz (23) listed *P. jeanselmei* as a synonym of *R. mansonii*.

In 1949, Langeron (1) established the new taxon *Torula bergeri* Langeron for a yeast-like fungus isolated from a case of phaeohyphomycosis. Trejos (25) studied *T. bergeri* and found the fungus to be identical with *P. jeanselmei*.

This conclusion has been supported by Cooke (10,11), Schol-Schwarz (23) and Setliff (24). In contrast, Emmons (15) feels that *T. bergeri* and *P. dermatitidis* are conspecific, not *T. bergeri* and *P. jeanselmei*.

Thus, the proper disposition of *T. jeanselmei* has remained unsettled (Table I). This investigation was undertaken to critically evaluate conidium ontogeny of *T. jeanselmei* and to determine its proper taxonomic disposition.

TABLE I. HISTORY OF THE TAXONOMY
OF *EXOPHIALA JEANSELMEI*.

A. *Sporotrichum gougerotii* (as *gougeroti*) Matruchot, 1910.
  1910: *Sporotrichum gougerotii* suggested for a variant of *Sporothrix schenckii* (19). Original culture lost.
  Current: *S. gougerotii* considered later syn. of *Sporothrix schenckii*.

B. *Torula jeanselmei* Langeron, 1928.
  1928: *Torula jeanselmei* described (17).
  1935: New comb. *Pullularia jeanselmei*. Type studied (12).
  1945: New comb. *Phialophora jeanselmei*. Type studied (14).
  1955: *P. jeanselmei* considered later syn. of *S. gougerotii*. New comb. *P. gougerotii*. Types not studied (5).
  1955: *P. jeanselmei* considered later syn. of *S. gougerotii*. *Hormiscium dermatitidis* considered later syn. of *P. gougerotii*. Neotype of *P. gougerotii* and type of *H. dermatitidis* studied (4).
  1955: New comb. *Cladosporium gougerotii*. Neotype studied (7).
  1962: *P. gougerotii* considered later syn. of *P. jeanselmei*. Types studied (10).
  1966: *P. jeanselmei*, *P. gougerotii* and *H. dermatitidis* considered distinct species. Types studied (15).
  1968: *P. jeanselmei* considered later syn. of *Rhinocladiella mansonii*. Types studied (23).
  Current: New comb. *Exophiala jeanselmei*. *P. gougerotii* sensu Borelli misidentified strain of *E. jeanselmei*. *H. dermatitidis* and *R. mansonii* are distinct species.

C. *Trichosporium heteromorphum* Nannfeldt, 1934.
1934: *Trichosporium heteromorphum* described (21).
1952: New comb. *Margarinomyces heteromorpha.* Type studied (18).
1962: *M. heteromorpha* considered later syn. of *P. jeanselmei.* Type of *P. jeanselmei* studied (10).
1962: *M. heteromorpha,* excluding *T. heteromorphum,* considered later syn. of *P. jeanselmei.* Types studied (11).
1964: *M. heteromorpha* sensu Mangenot considered later syn. of *P. jeanselmei.* New comb. *P. heteromorpha* for *T. heteromorphum* sensu Nannfeldt. Paratype of *T. heteromorphum* studied (26).
1971: *P. heteromorpha* considered later syn. of *P. jeanselmei.* Types studied (24).
Current: *M. heteromorpha* considered later syn. of *E. jeanselmei. P. heteromorpha* considered distinct species.

D. *Torula bergeri* Langeron, 1949.
1949: *Torula bergeri* described (1).
1953: *T. bergeri* considered later syn. of *P. jeanselmei.* Type probably studied (25).
1966: *T. bergeri* considered later syn. of *H. dermatitidis.* Types studied (15).
Current: *T. bergeri* considered later syn. of *E. jeanselmei. H. dermatitidis* considered distinct species.

TAXONOMIC PART

Utilizing bright field, phase-contrast, and scanning electron (unpublished data from Cole) microscopy, we have confirmed Wang's observations (27) that the conidia of *T. jeanselmei* arise from annellides. Phialides with collarettes were not observed by us in any isolate studied. *Exophiala* Carmichael (6) is the only dematiaceous hyphomycete characterized by the production of conidia that accumulate in balls at the tips of annellides. Therefore, we propose the new combination *Exophiala jeanselmei.*

Exophiala jeanselmei (Langeron) McGinnis et Padhye, comb. nov. (Figs. 1-5).

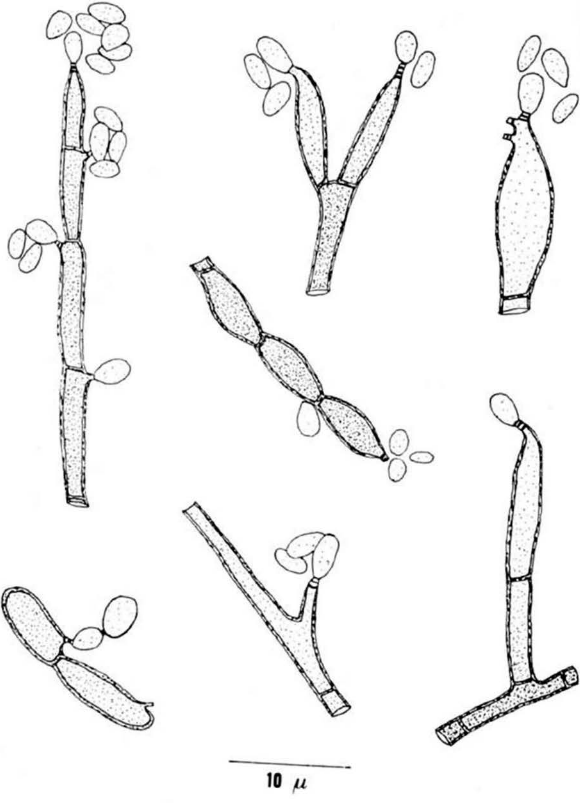


Figure 1. *Exophiala jeanselmei*. Conidiophores and conidia.

≡ *Torula jeanselmei* Langeron, Ann. Parasitol. Hum. Comp. 6:385-403, 1928.

≡ *Pullularia jeanselmei* (Langeron) Dodge, Medical Mycology, p. 675, 1935.

≡ *Phialophora jeanselmei* (Langeron) Emmons, Arch. Pathol. 39:364-368, 1945.

= *Torula bergeri* Langeron, Ann. Parasitol. Hum. Comp. 24:574-598, 1949.

Margarinomyces heteromorpha (Nannfeldt) Mangenot sensu Mangenot, Lib. Gén. l'Enseignement, Paris, p. 115, 1952, an *Phialophora heteromorpha* (Nannfeldt) Wang, Can. J. Bot. 42:1015, 1964.

Phialophora gougerotii (Matruchot) Borelli sensu Borelli, Mem. del VI. Con. Venez. Cient. Med. 5:2945-2971, 1955, pro parte, non *Sporotrichum gougerotii* (as *gougeroti*) Matruchot, Compt. Rend. Acad. Sci. (Paris) 150:543-545, 1910.

Rhinocladiella mansonii (Castellani) Schol-Schwarz sensu Schol-Schwarz, Antonie van Leeuwenhoek 34:122, 1968, pro parte, non *Microsporum mansonii* (as *Microsporon mansoni*) Castellani, Brit. Med. J. 2:1271, 1905, nom. dub.

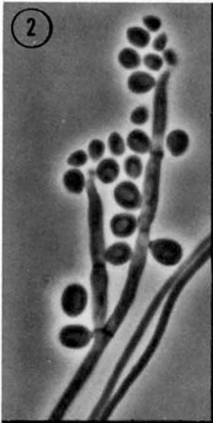
Initially, colonies may be yeast-like and black, gradually becoming effuse, raised or dome-shaped, 2-2.5 cm in diam. After 14 days at 30°C on Sabouraud dextrose agar (2% dextrose), colonies are covered with short aerial velvety hyphae. Coloration is mouse grey, olive grey to iron grey, with an olivaceous black reverse color. Growth is present at 37°C on potato dextrose agar and V-8 juice agar. Mycelium is superficial, partly immersed, cylindrical to toruloid, septate, branched, smooth-walled and pale brown. Conidiophores are semi-macronematous, mononematous, branched or unbranched, smooth-walled and pale brown. Conidiogenous cells are either: integrated, 1.0-3.1 x 5.0-19.1 (average 1.7 x 12.5) µm, with the annellations arising next to a septum, terminal, 0.9-3.0 x 5.0-19.8 (average 1.9 x 9.8) µm, or as thick-walled chlamydoconidia-like cells which are variable in size and shape. Conidiogenous cells are monoblastic, rarely polyblastic, percurrent, closely annellated, cylindrical, obclavate or lageniform, smooth-walled and pale brown to almost black in color. Conidia aggregate in masses which tend to slide down the conidiophore or along the hypha. Conidia are exogenous, non-septate, subglobose, ellipsoidal to cylindrical, smooth-walled, hyaline and 0.9-2.9 x 1.0-5.0 (average 1.5 x 2.8) µm. Yeast-like cells with blastoconidia typically present.

Habitat: cosmopolitan, occasional pathogen of man.

Type: ATCC 34123.

Material examined: As "*jeanselmei*": ATCC 34123, mycetoma (type); ATCC 10224, mycetoma; CDC B-53, finger abscess; CDC B-1003, mycetoma; Duke 3349, leg; Duke 766, lung abscess; Duke 3348, buttock; Duke 2939, neck; Duke 2533, lung secretion; Duke 3419, mycetoma; Duke 2539, bronchial aspirate; Gordon G302C, unknown clinical material; UAMH 2034, laboratory contaminant; UAMH 1207, cedar cooling tower; Wang 318, pulp suspension; Wang 102, pulp suspension. As "*gougerotii*": Wang 1040 (Young's isolate), subcutaneous cyst (neotype); NIH 8738, bone; Duke 3454, wound abscess. As "*dermatitidis*": CDC B-1259, lung; Duke 3377, oral mucosa. As "*bergeri*": CBS 351.52, skin (type). As *Margarinomyces heteromorpha*: Emmons E7850, polluted water; Mangenot M12, wood. As *Trichosporium heteromorphum*: DAOM 36487 (slide), from white water, Hellefors, Västmanland, Sweden (paratype); DAOM 40841 (slide), from white water, Sofiehems, Västerbotten, Sweden (paratype); DAOM 49117 (slide), from white water, Sofiehems, Västerbotten, Sweden; DAOM 49118, (slide), from white water, Vaplans, Jämtland, Sweden; DAOM 49119 (slide), from white water, Hellefors, Västmanland, Sweden; DAOM 49120 (slide), from Lulea, Norrbotten, Sweden; DAOM 75731, railway tie.

Figures 2-5. *Exophiala jeanselmei* (ATCC 34123). Fig. 2. Integrated annellides with annelloconidia. Fig. 3. Monoblastic annellated conidiogenous cell with annelloconidia in a ball. Fig. 4. Polyblastic annellated conidiogenous cell with annelloconidia. Fig. 5. Mono- and polyblastic annellated conidiogenous cells with annelloconidia in balls. Fig. 4. In Nomarski differential interference contrast; the others in phase-contrast. 2720x.



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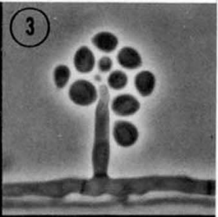

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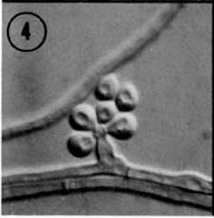

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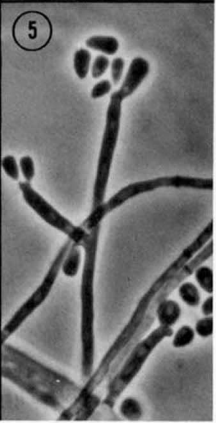

5

DISCUSSION

Much of the confusion surrounding *E. jeanselmei* has resulted from its misidentification as *Sporotrichum gougerotii*. Matruchot (19) clearly stated that he considered *S. gougerotii* to be a stable variant of *Sporothrix schenckii*, a well recognized pathogen of the early 1900's. Additional confusion has resulted from the use of fungal morphology in tissue (15) as the primary characteristic to distinguish *E. jeanselmei* and *Sporotrichum gougerotii* sensu Borelli. The production of granules in tissue by *E. jeanselmei* has been used as the primary basis for separating these two species. In our opinion, the ontogeny and morphology of conidia must be the principle basis of distinguishing taxa, not the morphology in tissue or host response to the presence of organisms. We consider *Exophiala* to be the most suitable generic disposition for *Torula jeanselmei* and that *Sporotrichum gougerotii* is a later synonym of *Sporothrix schenckii*. *Torula jeanselmei* cannot be accommodated in *Torula* whose type species, *T. herbarum* is based upon an entirely different kind of hyphomycete with a different kind of conidium ontogeny (2,13).

Exophiala bears a similarity to several genera of dematiaceous hyphomycetes, i.e. *Phialophora*, *Margarinomyces* Laxa and *Wangiella* McGinnis (9,16,20), but differs significantly in its method of conidium ontogeny. Cole (8) has recently reported that the conidiogenous cells of *Exophiala* are phialides. After reviewing figures 15-19 and a subculture of B-1228 which he investigated, it must be concluded that Cole apparently did not have *E. salmonis* Carmichael. Our observations support the conclusion of Carmichael (personal communication) and Wang (27) that *Exophiala* produces annellides.

ACKNOWLEDGEMENTS

The authors wish to thank Drs. J.W. Carmichael and M.B. Ellis for their comments concerning taxonomy; Dr. Donald Rogers for nomenclatural advice; Drs. Libero Ajello, Lindsay Olive and C.J.K. Wang for reviewing the manuscript; Dr. Garry Cole for unpublished scanning electron microscopy data; Jane Pfister and Teresa Riggsbee for secretarial assistance; and Barry Katz for photographic assistance.

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WANGIELLA, A NEW GENUS TO ACCOMMODATE *HORMISCIUM DERMATITIDIS*

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ABSTRACT

The new genus *Wangiella* McGinnis is proposed for the dematiaceous hyphomycete originally invalidly published as *Hormiscium dermatitidis* Kano and subsequently placed in the genera *Fonsecaea*, *Hormodendrum* and *Phialophora*. *Wangiella dermatitidis* McGinnis sp. nov. is described.

INTRODUCTION

In 1937, Kano (20) described a dematiaceous hyphomycete isolated from a patient with chromomycosis as *Hormiscium dermatitidis* Kano. The fungus was characterized by the production of chains of arthrospores from which budding occurred. *H. dermatitidis* was published without a Latin diagnosis and must therefore be rejected as it contravenes Article 36 of the International Code of Botanical Nomenclature. This violation of the Code has apparently gone unnoticed by many of the subsequent workers.

Carrión (6) studied Kano's isolate and proposed the new combination *Fonsecaea dermatitidis* (Kano) Carrión, 1950. The new combination was based upon the fungus being an agent of chromomycosis and possessing *Acrotheca*-like, *Cladosporium*-like, *Phialophora*-like and *Pullularia*-like sporulation. Later, Conant (11) transferred *F. dermatitidis* to the genus *Hormodendrum* as *H. dermatitidis* (Kano) Conant, 1953. The publication date for this new combination is in error and was actually 1954 (12). Since the new combination was not proposed in compliance with the Code, it must be rejected as it contravenes Article 33.

Borelli (2) placed *Hormiscium dermatitidis* in synonymy with *Phialophora gougerotii* (Matruchot) Borelli, 1955. The neotype strain of *P. gougerotii* is apparently a misidentified isolate of *Exophiala jeanselmei* (Langeron) McGinnis et Padhye (21). Cooke (13) disagreed with Borelli and considered *H. dermatitidis* and *Aureobasidium mansonii* (Castellani) Cooke, 1962 to be conspecific.

Emmons (16) restudied Kano's isolate and proposed the new combination *Phialophora dermatitidis* (Kano) Emmons, 1963. Emmons made the new combination because of the similarity between the phialides of *H. dermatitidis* and *P. verrucosa* Thaxter.

While studying *Rhinocladiella* Nannfeldt, Schol-Schwarz (27) considered *H. dermatitidis* and *R. mansonii*(Castellani) Schol-Schwarz to be conspecific. This treatment has not been widely accepted (3,8). Recently, Butterfield and Jong (3) reexamined Kano's isolate and concluded that *Fonsecaea dermatitidis* is the proper binomial for this organism.

Reevaluation of Kano's isolate in light of current generic concepts in the hyphomycetes, indicates that a new genus is needed to accommodate this organism.

TAXONOMIC PART

Wangiella gen. nov.

Deuteromycotina, Hyphomycetes.

(Etym. after Dr. C.J.K. Wang, Mycologist)

Mycelium cylindricum usque toruloideum, glabrum pallide brunneum; conidiophora semi-macronemata usque micronemata, ramosa vel eramosa, glabra pallide brunnea; cellulae conidiogenae monophialidicae vel rare polyphialidicae, ecollariatae terminales vel integratae, lageniformes vel ampulliformes, cylindricae obclavatae glabrae; conidia eseptata, subglobosa usque obovoidea, in caespites aggregata; cellulae fermentoideae typice praesentes.

Species typica: *Wangiella dermatitidis* McGinnis.

Mycelium cylindrical to toruloid, smooth, pale brown. Conidiophores semi-macronematous to micronematous, branched or unbranched, smooth, pale brown. Conidiogenous cells monophialidic, rarely polyphialidic, without collarette, terminal or integrated, lageniform or ampulliform, cylindrical, obclavate, smooth. Conidia non-septate, subglobose to obovoid, aggregate in clusters. Yeast-like cells typically present.

Wangiella dermatitidis McGinnis, sp. nov. (Figs. 1,2).

Auctus in mediis culturae omnibus tardus, ad temperaturam 37°C praesens; coloniae post 14 dies ad temperaturam 30°C in agaro solani 12-15 mm diam, ex hyphis brevibus aereis tectae, olivaceo-griseae, reverso ferreo-griseo; mycelium superficiale ex parte immersum, cylindricum usque toruloideum, septatum ramosum glabrum pallide brunneum; conidiophora semi-macronemata usque micronemata, ramosa vel eramosa, glabra pallide brunnea; cellulae conidiogenae monophialidicae vel rare polyphialidicae ecollariatae terminales discretae vel integrata, 2.1 - 5.0 x 4.5 - 11.0 (mediae 2.9 x 7.8)μm, lageniformes vel ampulliformes, cylindricae obclavatae glabrae pallide brunneae; conidia eseptata subglobosa usque obovoidea, 2.0 - 3.9 x 2.5 - 6.1 (mediae 2.7 x 3.8)μm, glabra hyalina, ad apices phialidium in caespites aggregata vel secundum conidiophora dis posita; cellulae fermentoideae subglobosae usque late ellipsoideae, in magnitudine variabiles, typice blastoconidia gignentes, cellulis parvis tenuitunicatis hyalinisque, magnis crassitunicatis et pallide brunneis.

Holotypus: Isolated from a case of chromomycosis, Japan, CBS 207.35. Dried material has been sent to the University of Alberta Mold Herbarium and Culture Collection, Edmonton, Alberta, Canada and the New York Botanical Garden, Bronx, New York, USA.

Growth on all media is slow. After 14 days at 30°C on potato dextrose agar, colonies are covered with short aerial hyphae and are 12-15 mm in diameter. Coloration is olivaceous grey with an iron grey reverse. Growth is present at

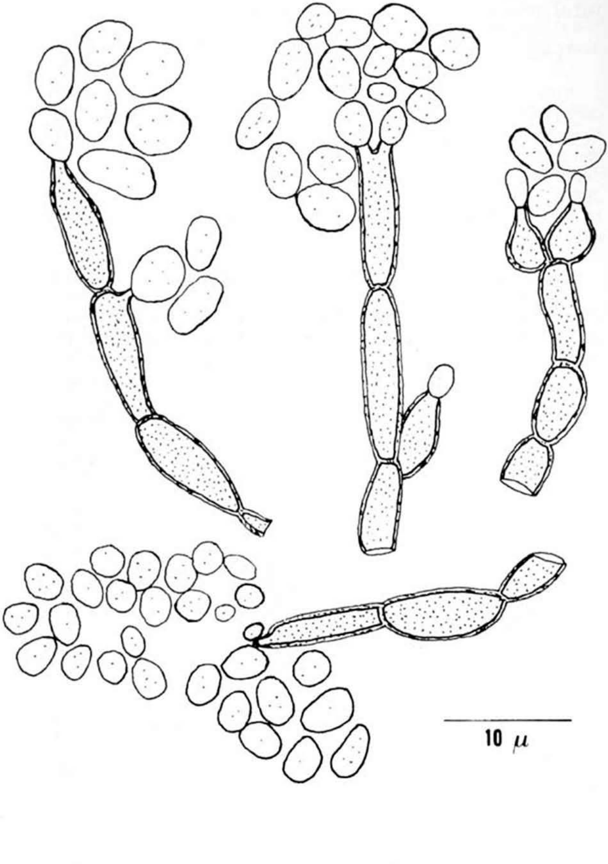

Figure 1. *Wangiella dermatitidis*. Conidiophores and conidia. CBS 207.35.

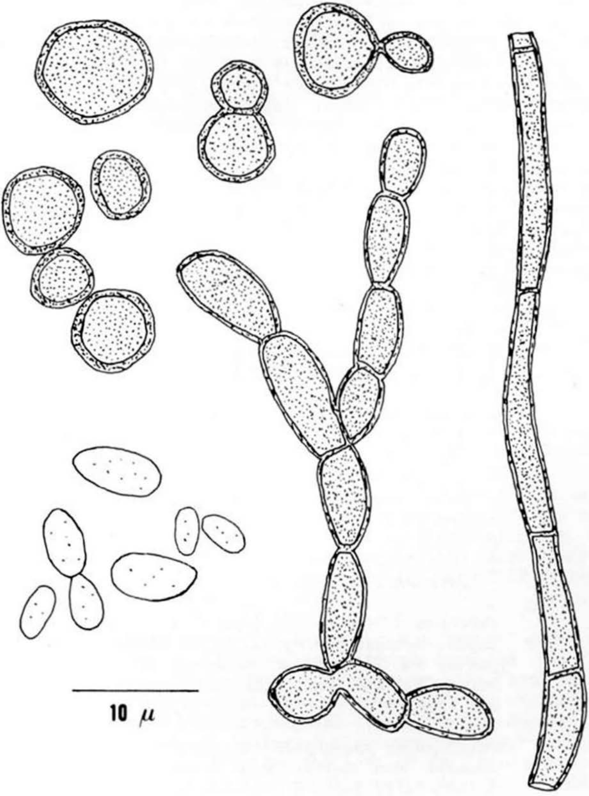

Figure 2. *Wangiella dermatitidis*. Yeast-like cells and hyphae. CBS 207.35.

37°C. Mycelium is superficial, partly immersed, cylindrical to toruloid, septate, branched, smooth, pale brown. Conidiophores are semi-macronematous to micronematous, branched or unbranched, smooth, pale brown. Conidiogenous cells are monophialidic, rarely polyphialidic, without collarette, terminal, discrete or integrated, 2.1 - 5.0 x 4.5-11.0 (average 2.9 x 7.8)µm, lageniform or ampulliform, cylindrical, obclavate, smooth, pale brown. Conidia are non-septate, subglobose to obovoid, 2.0 - 3.9 x 2.5 - 6.1 (average 2.7 x 3.8)µm, smooth, hyaline, aggregating in clusters at the apex of phialides and/or along the conidiophores. Yeast-like cells subglobose to broadly ellipsoidal, variable in size, typically producing blastoconidia. Small yeast-like cells thin-walled and hyaline. Large yeast-like cells thick-walled and light brown.

Wangiella dermatitidis McGinnis

≡ *Hormiscium dermatitidis* Kano, Arch. Dermatol. Syph. (Berlin) 176:288-294, 1937, nom. nud.

≡ *Fonsecaea dermatitidis* (Kano) Carrión, Arch. Dermatol. Syph. (Chicago) 61:996-1008, 1950.

≡ *Hormodendrum dermatitidis* (Kano) Conant, Manual of Clinical Mycology, p. 276, 1954 (as 1953).

≡ *Phialophora dermatitidis* (Kano) Emmons, Medical Mycology, p. 291, 1963.

Aureobasidium mansonii (Castellani) Cooke sensu Cooke, Mycopathol. Mycol. Appl. 17:34, 1962, pro parte, non *Microsporum mansonii* (as *Microsporon mansoni*) Castellani, Brit. Med. J. 2:1271, 1905, nom. dub.

Phialophora gougerotii (Matruchot) Borelli sensu Borelli, Mem. del VI. Con. Venez. Cient. Med. 5:2945-2972, 1955, pro parte, non *Sporotrichum gougerotii* (as *gougeroti)* Matruchot, Compt. Rend. Acad. Sci. (Paris) 150:543-545, 1910.

Rhinocladiella mansonii (Castellani) Schol-Schwarz sensu Schol-Schwarz, Antonie van Leeuwenhoek 34: 122, 1968, pro parte, non *Microsporum mansonii* (as *Microsporon mansoni*) Castellani, Brit. Med. J. 2:1271, 1905, nom. dub.

Material examined: Type, CBS 207.35 (Duke 2400), skin lesion; Duke 3381, lymph node; Duke 3358, sputum; G 243A, pathologic material; Duke 3379, brain; Duke 3355, blood; Duke 3378, oral mucosa, IHM 1762, soil; Duke 3326, finger; Emmons 8656, labelled as Toshi strain.

DISCUSSION

Cooke (13) and Schol-Schwarz (27) considered Kano's isolate and the fungus originally described as *Microsporum mansonii* (as *Microsporon mansoni*) Castellani (9) to be conspecific. Figure 4 in Schol-Schwarz's study of *Rhinocladiella* (27), which illustrates the type strain of *M. mansonii* (CBS 158.58), clearly indicates that these two fungi are not conspecific. The original description of *M. mansonii* (9) appears to be based upon *Pityrosporum orbiculare* Gordon. *M. mansonii* is therefore a nomen dubium.

Wangiella dermatitidis was originally believed (20) to be a species of *Hormiscium* Kunze, which is now considered (19) congeneric with *Torula* (Pers.) Link. *T. herbarum* (Pers.) Link ex S.F. Gray, the type species for the genus, is characterized by the development of acropetal chains of multicelled blastoconidia which disarticulate following cytolysis within the conidiogenous cell (15). *Torula* cannot accommodate *W. dermatitidis* since its method of conidium ontogeny is entirely different.

It has been suggested (11) that *W. dermatitidis* could be accommodated in the genus *Hormodendrum* Bonorden. De Vries (14) placed *Hormodendrum* in synonymy with *Cladosporium* Link ex Fries, a hyphomycete Hughes (18) has classified in Section IA of his experimental classification system. *Cladosporium* produces chains of blastoconidia which develop in acropetal succession from the apex of the conidiogenous cell. *W. dermatitidis* produces blastoconidia, but not in acropetal chains.

Cooke (13) placed *W. dermatitidis* in the genus *Aureobasidium* Viala et Boyer. *Aureobasidium* has been characterized by Barron (1) as developing blastoconidia on denticles directly from pigmented vegetative hyphae. The phialoconidia and integrated phialides of *W. dermatitidis* are superficially similar to the blastoconidia and conidiogenous cells of *Aureobasidium*.

Rhinocladiella was established by Nannfeldt (22) to accommodate a dematiaceous hyphomycete isolated from wood pulp and described as *R. atrovirens* Nannfeldt. Nannfeldt described non-septate conidia which originated from a sympodial conidiogenous cell. Schol-Schwarz (27) examined material deposited at the Uppsala Herbarium labelled "paratypus" and the living original strain of *R. atrovirens* (CBS 317.33) and observed in addition to sympodial conidiogenous cells, phialides with collarettes and chlamydospores and yeast-like cells with annellations. In other strains, she noted short acropetal chains of blastoconidia similar to those of *Cladosporium*. Schol-Schwarz emended the genus *Rhinocladiella* to include sympodial conidiogenous cells, phialides with collarettes, closely percurrent annellated conidiogenous cells and blastoconidia developing in acropetal chains. In addition to emending *Rhinocladiella*, she considered *Fonsecaea* to be a later synonym. *Rhinocladiella* cannot accommodate *W. dermatitidis*, a hyphomycete characterized by phialides without collarettes.

Negroni (23) established the genus *Fonsecaea* to accommodate the polymorphic hyphomycete *Hormodendrum pedrosoi* Brumpt. *Fonsecaea* was characterized as an agent of chromomycosis with simple or septate dematiaceous yeast-like cells in host tissue, hyphae which may develop nodular organs in culture, acropetal chains of blastoconidia and conidia which develop on a verrucose sympodial conidiogenous cell. Several months later, Negroni (24) emended the Latin diagnosis of the genus, but did not significantly change his generic concept. Independent of Negroni, Carrión and Emmons (7) observed phialides with collarettes in a strain of *H. pedrosoi* in addition to the typical acropetal chains of blastoconidia and conidia developing from a verrucose sympodial conidiogenous cell. These authors (17) redescribed *H. pedrosoi*, and later, Carrión (5) substituted the revised species concept of *H. pedrosoi* (17) for the generic concept of *Fonsecaea* without emending the generic description. Carrión (6) then transferred *Hormiscium dermatitidis* to *Fonsecaea* as *F. dermatitidis* (Kano) Carrión. He stated that "...Kano's organism may be admitted into the group by further emending the concept of the genus to include species showing supplementary characteristics of the

Pullularia type." No formal emendation of *Fonsecaea* was done. Neither *Fonsecaea* nor *Fonsecaea* sensu Carrión can accommodate *W. dermatitidis* since these organisms produce entirely different types of conidiogenous cells.

Wangiella bears a similarity to *Phialophora* Medlar and *Exophiala* Carmichael, but differs significantly in its method of conidium ontogeny. Oujezdsky and Szaniszlo (26) have demonstrated, and this investigation confirms, that the conidia of *W. dermatitidis* arise from phialides without collarettes. *Phialophora* is characterized by phialides which are typically constricted at their necks and terminate in a collarette (10). In contrast to *Phialophora* and *Wangiella, Exophiala* produces annellides (4,21,29).

Much of the confusion surrounding *W. dermatitidis* is a result of its polymorphic nature. Acid conditions tend to inhibit blastoconidium emergence from the yeast-like cells without inhibiting growth, nuclear division or cytokinesis. Such growth results in simple or septate, dematiaceous, thick-walled cells (28). Oujezdsky et al. (25) have demonstrated that only thick-walled yeast-like cells give rise to moniliform hyphae, which in turn develop into true hyphae. Butterfield and Jong (3) found that different carbon sources affect cell size, pigmentation and morphological form. Glucose or maltose enhances phialide development; erythritol enhances growth of yeast-like cells; L-arabinose enhances development of blastoconidia; and galactose, melibiose or L-sorbose enhances development of moniliform hyphae.

W. dermatitidis is intermediate between *Phialophora* and *Exophiala*. The principal conidiogenous cells of *Wangiella*, *Phialophora* and *Exophiala* are phialides without collarettes, phialides with collarettes and annellides, respectively. The justification for establishing a new genus for this organism is therefore evident.

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REVUE DES LIVRES

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THE CORTICIACEAE OF NORTH EUROPE, par John ERIKSSON et Leif RYVARDEN. VOL. 4. HYPHODERMELLA - MYCOACIA, p. 547-886, figs. 257-446, broché, 1976. Editions Fungiflora, Blindernveien 46c Oslo-3, Norvège. Prix: vol. 4: Nkr 100.oo, US $20.oo.

Ce quatrième volume nous offre un nouveau lot de descriptions et de notes taxonomiques sur 30 genres et 79 espèces de Corticiacées du Nord de l'Europe. Voir MYCOTAXON, 4(1): 324, 1976. Le lecteur ne sera pas déçu: les descriptions sont d'une telle qualité qu'elles forcent l'intérêt et éveille le désir de la redécouverte de ces champignons. Les auteurs, qui éditent eux-mêmes leurs ouvrages, ont choisi une présentation des textes descriptifs, format, caractères, style, qui les rendent clairs et d'un usage facile. L'illustration est très abondante puisqu'elle couvre une page sur deux. 115 planches de pleine page dessinées au trait par John Eriksson et 131 photographies dont la moitié au SEM par Leif Ryvarden "montrent" ces champignons dans tous leurs détails. Trois genres nouveaux, *Hyphodermella*, *Intextomyces* et *Merulicium*, 3 espèces et 1 variété nouvelles et 17 recombinaisons d'espèces sont ici publiées. Ce volume sera suivi d'autres encore, ainsi que du premier volume à paraître en dernier lieu.

A FIELD GUIDE TO WESTERN MUSHROOMS, par Alexander H. SMITH, 280 p., 3 figs., 201 photogrs. col., 13.5x27 cm, cartonné, juin 1975. The University of Michigan Press, Ann Arbor, USA. Prix US $16.5o.

Ce guide écrit et illustré par un mycologue de réputation mondiale concerne particulièrement la mycoflore des régions à l'ouest et au nord des Grandes Prairies des Etats-Unis d'Amérique, y compris les Montagnes Rocheuses. L'auteur, qui a récolté en ces régions plus de 50.000 spécimens de champignons, a choisi de n'illustrer ici que 201 espèces typiques, dont 70 sont propres ou originellement connues de ces régions. Nombreux seront ceux qui se réjouiront à la consultation de ce guide, à cause du choix des espèces, dont beaucoup ne sont pas décrites dans d'autres guides, et de la méthode didactique de ses descriptions qui, quoique brèves, mettent en valeur les "field identification marks" que l'auteur, en homme d'expérience, a retenus.

ADVANCES IN MYCOLOGY AND LICHENOLOGY IN SOVIET PRIBALTICS, par A. RAITVIIR, Scripta Mycologica, no. 6, 159 p., 1974. Academy of Sciences of the Estonian SSR, Institute of Zoology and Botany, Tartu. Prix R 1.02.

Compte-rendu du 7e Symposium des Mycologues et Lichénologues de la Baltique, Parc National Laheema, Estonie, Sept. 1974. En russe.

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